As shown, the hollow housing 268 may be integral with the bracket 260 and provide both a hollow passageway and an attachment point. However, in other examples, the hollow housing 268 may be external the bracket 260 and may be formed from a separate conduit. Similarly, the air flow conduit 110 connecting the attachment member 120 to the second flexible hose 335 may be the flexible hose 124 or any other suitable conduit, including flexible conduits, rigid conduits, conduits integral with the handle and conduits external the handle.

Optionally, the ribs 256 (or another portion of the second portion 216) may be surrounded by a housing or shell. The housing may provide structural strength to the second portion 216 or it may merely provide an improved aesthetic appearance of the vacuum 100, or both. If a housing is formed around a section of the second portion 216 (or any other section of the handle 210 or backbone 200) the mount for supporting the hand vacuum (for example the mount 220 or the saddle flanges 260) may be within a recess in the housing. Providing a recess in the housing for receiving the hand vacuum may create a more integrated or seamless visual appearance when the hand vacuum is mounted to the backbone 200; it may also improve the rigidity of the backbone 200.

As exemplified, wishbone portion 250 preferably extends forwardly and provides a mount for upper portion 214 (i.e. the handle) at a forward point of the backbone. Further, passageway 268 extends rearwardly. Accordingly, when hand vacuum 400 is mounted to the backbone, the centre of gravity of the backbone and hand vacuum 400 combined is below a plane P extending from the axle of rear wheel 320 to the upper end of upper portion 214 (as exemplified in Figure 17), thereby improving maneuverability of surface cleaning head 300. It will be appreciated that other constructions, such as that exemplified in Figures 1-5, may be used to position the centre of gravity behind the plane. In the example shown (best exemplified in Figure 5), the lower portion 216 includes an upper end, that is connected to the hinge 218 such that the upper portion 214 is

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drivingly connected to the surface cleaning head 300. In this construction the lower end includes a step-back or kinked-back portion 215. The step-back portion 215 enables the mount 220 to be positioned sufficiently behind the rear wheels 320 such that the centre of gravity of the combination of the backbone 200 and the hand vacuum 400 is below the plane P. As a result of this configuration, the vacuum 100 may be more stable when rotated and maneuvered by the user, especially when upper portion 214 is rotated about hinge 218. Specifically, locating the centre of gravity of the combination of the hand vacuum 400 and the backbone 200 below the plane P may tend to reduce the over rotation of the backbone 200 or over-steer of the vacuum 100 in use, and may reduce the strain on a user's arm and wrist.

It will be appreciated that the dual hose construction (i.e. the flexible hose 124 and the second flexible hose 335 of Figure 15-19) may be used in combination with any example disclosed herein or by itself in a surface cleaning apparatus. Similarly, the positioning of a removably mounted portable surface cleaning apparatus with a low centre of gravity may be used in combination with any example disclosed herein or by itself in a surface cleaning apparatus.

Referring now to Figures 6-14, examples of the portable cleaning apparatus 400 and the attachment member 120 of the vacuum 100 are shown in more detail. It will be appreciated that any portable surface cleaning apparatus may be used. Preferably, the portable surface cleaning apparatus uses cyclonic separation. More preferably, the portable surface cleaning apparatus is a hand vacuum cleaner.

The hand vacuum 400 can be operated as the vacuum suction supply for the vacuum 100 and it can be operated as a stand alone hand vacuum cleaner, that is movable along a surface to be cleaned by gripping and maneuvering handle 402, when it is removed from, or detached from the backbone 200. The hand vacuum 400 includes an upper portion 404, a lower

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portion 406, a front 408, and a rear 410. In the example shown, maneuvering handle 402 is provided at the upper portion 404. In alternate examples, maneuvering handle 402 may be provided elsewhere on the vacuum cleaner 400, for example at the rear 410.

In the example shown, the hand vacuum 400 comprises a nozzle 412 and a cyclone unit 414, which together preferably form a cleaning head portion 416 of the hand vacuum 400. In the example shown, the cleaning head portion 416 is provided at the front 408 of the hand vacuum 400.

Nozzle 412 comprises a dirty air inlet 418, through which dirty air is drawn into the portable cleaning apparatus 400, and when used as a hand vacuum cleaner the nozzle 412 directly engages a surface to be cleaned. An airflow passage extends from the dirty air inlet 418 to a clean air outlet 420 of the hand vacuum 400. In the example shown, clean air outlet 420 is at the rear 410 of the hand vacuum 400. It will be appreciated that clean air outlet may optionally be connected to a fluid conduit provided in the floor cleaning unit.

Cyclone unit 414 is provided in the airflow passage, downstream of the dirty air inlet 418. In the example shown, the cyclone unit 414 comprises one cyclone 422, and one dirt chamber 424. In alternate examples, the cyclone unit 410 may include more than one cyclone, and more than one dirt chamber. Further, the cyclones chambers may be arranged in stages, and may be provided in parallel or in sequence. Alternately, or in addition, one or more filters or other dirt separation members may be used.

In a preferred embodiment, cyclone unit 414 is the first cyclonic cleaning stage of an upright vacuum cleaner and one or more additional cyclonic stages may optionally be provided. Cyclone unit 414 preferably comprises an inverted cyclone and/or a dirt collection chamber that partially or completely surrounds a cyclone chamber.

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Referring to Figures 20 and 21, an example of a cyclone unit 414 is shown in more detail. Within the cyclone unit 414, the cyclone 422 may be of any configuration and orientation. Preferably, cyclone 422 comprises a chamber wall 442, which in the example shown, is cylindrical. The cyclone chamber is located inside chamber wall 442. The cyclone 422 has an air inlet and an air outlet, which, preferably are at the same end of cyclone 422. Preferably the air inlet and the air outlet are distal to front end of the hand vacuum 400. The cyclone air inlet and cyclone air outlet may be of any configuration known in the art and the cyclone air outlet may be covered by a screen or shroud or filter as is known in the art.

The air travels in a cyclonic path in the cyclone, and dirt in the air is separated from the air. The air exits the cyclone via an outlet passage 444. As exemplified in Figure 21, a plate 474 may be provided adjacent outlet passage 444, spaced from and facing the outlet passage 444. As exemplified in Figure 22, the cyclone outlet passage 444 may comprise a vortex finder 482, upstream from and in communication with the dirt outlet 446. As exemplified, the vortex finder is a cylindrical conduit, having an inlet facing the dirt outlet 446.

In the example shown, plate 474, legs 478 and a wire mesh surrounding legs 478 form a shroud 484 that is optionally removably mounted in cyclone 422.

Preferably, the shroud 484 is positioned such that air must pass through the openings in the shroud prior to traveling to a downstream component (e.g., a further cyclonic stage or a suction motor). As exemplified, the shroud surrounds the cyclone air outlet, or outlet passage 444. The shroud 484 may serve to prevent elongate material and larger, lighter dirt from passing through dirt outlet 446. As exemplified, the shroud 484 surrounds the vortex finder 482. Legs 478 extend from plate 474, along vortex finder 482. As exemplified, the shroud 484 also comprises a ring 485 that is integral with legs 478 and surrounds vortex finder 482. The ring and legs provide a mount for plate 474. Optionally, a

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screen extends from plate 474, around legs 478, to ring 485. Accordingly, the screen is positioned in the air flow path of air exiting the cyclone chamber and entering the vortex finder 482. It will be appreciated that in alternate embodiments, the shroud may be any other suitable configuration. For example, a plate need not be provided. In another example, the plate may be provided as part of the vortex finder. The shroud screen may be made of a wire mesh. Alternately, shroud 484 may be a molded plastic covering vortex finder 482 and may have a plurality of apertures therein.

Optionally, the dirt chamber may be internal or external to the cyclone chamber. Preferably, as exemplified in Figures 20-22, the dirt chamber 424 is external the outer cyclone housing 442, and the dirt that is separated from the air exits the outer cyclone housing 442 via dirt outlet 446, and enters dirt chamber 424. In the example shown, the dirt chamber 424 has an outer wall 415 that comprises a first portion 425 and a second portion 427. The second portion 427 may also be referred to as a door or outlet end wall. Together, the first and second portions 425, 427 cooperate to define a sealed dirt chamber 424. As exemplified, the first and second portions 425, 427 of the dirt chamber outer wall 415 may also form the outer housing, casing or unit wall of the cyclone unit 414, and more generally of the cleaning head portion 416 of the hand vacuum 400. In other examples, the first and second portions 425, 427 of the dirt chamber outer wall, or portions thereof, may be surrounded by a separate housing, casing or wall structure that defines the outer surface of the cyclone unit 414 and the cleaning head portion 416 of the hand vacuum 400. Also, the dirt chamber 424 may be in communication with the cyclone chamber by any means known in the art. Accordingly, one or more dirt outlets may be provided. Preferably, the dirt outlet is at the end opposed to the air inlet and, preferably, the dirt outlet is at the front end of the hand vacuum 400.

In the example shown, the dirt chamber 424 comprises two volumes. A first volume 448 is provided immediately adjacent the dirt outlet 446,

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and above the top of the outer cyclone housing 442, when the hand vacuum 400 is mounted on the backbone 200. A second volume 450 is the generally annular space formed between the outer cyclone housing 442 and the first portion 425 of the dirt chamber outer wall 415.

A separation plate 454 may be provided in the dirt chamber 424, adjacent the dirt outlet 446. The separation plate 454 aids in preventing dirt in dirt chamber 424 from re-entering cyclone 422. Preferably, plate 454 is spaced from dirt outlet 446 and faces dirt outlet 446. Plate 454 may be mounted by any means to any component in cyclone unit 414. As exemplified, the separation plate is mounted on an arm, which extends from an inner surface of the front wall 458 of the hand vacuum 400.

When the vacuum 100 is used to clean a surface the dirt separated from the dirty air is collected in and retained in the dirt chamber 424. When the hand vacuum 400 is mounted on the backbone 200, gravity will urge the dirt toward the bottom the dirt chamber 424 as exemplified in Figure 20 (that is, toward the air outlet 420 and away from the second portion 427 of the dirt chamber outer wall 415). As a result of ongoing or extended use of the vacuum 100, the amount of dirt collected within dirt chamber 424 will increase. As the amount of dirt contained within the dirt chamber 424 increases, the level of dirt within the dirt chamber 424 will rise, relative to the bottom of the dirt chamber 424 as exemplified in Figure 20. Over time, the level of dirt within the dirt chamber 424 will approach an optional designated fill line F indicated on at least one side of the first portion 425 of the dirt chamber outer wall 415.

The position of the fill line F may be based on the performance characteristics of the cyclone 422 including the height of the cyclone outer surface 442 or other suitable factors. As exemplified in Figure 20, the location of the fill line F may be below the top of the cyclone outer housing 442 and the dirt outlet 446 (when the hand vacuum 400 is vertically mounted on the backbone 200). Locating the fill line F below the dirt outlet 446 may reduce the likelihood of

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dirt re-entering the outer cyclone housing 442 and fouling the cyclone 422 or otherwise interfering with the operation of the hand vacuum 400. Optionally, the fill line F may be defined by the edge of the second portion 427 of the dirt chamber wall 415, instead of a line on the first portion 425.

In the example shown in Figures 20 and 21, the first portion 425 of the dirt chamber outer wall 415 is transparent (or at least substantially transparent) to allow a user to see the amount of dirt contained within the dirt chamber 424 without having to open or otherwise access the dirt chamber 424. When the hand vacuum is mounted on the backbone 200, a user looking into the dirt chamber 424 may be able to compare the height of the dirt in the dirt chamber 424 to the position of the fill line F to determine if the dirt chamber 424 is "full". Being able to see the amount of dirt in the dirt chamber 424 may enable a user to determine how much capacity remains within the dirt chamber 424, and accordingly anticipate how much additional cleaning can be completed before the dirt chamber 424 needs to be emptied. While the first portion 425 of the dirt chamber outer wall 415 is preferably transparent to allow a user to see inside the dirt chamber 424, the outer cyclone housing 442 is preferably opaque to conceal the cyclone 422 and to provide a contrasting background to allow the user to accurately determine the height of the dirt within the dirt chamber 424.

Due to the operation of the cyclone 422 and configuration of the dirt outlet 446, it may impede the operation of the vacuum 100 (and the hand vacuum 400) if the dirt outlet 446 is substantially blocked or occluded by the accumulated dirt in the dirt chamber 424. To reduce the chances of the dirt outlet 446 being blocked by dirt the fill line F may be located below the dirt outlet 446 as exemplified. The position of the fill line F may also be based on a maximum volume of the dirt chamber below the fill line F so that when the hand vacuum 400 is operated on its side, as a hand vacuum, the dirt in the dirt chamber 424 will not completely submerge the cyclone outer housing 442 and the dirt outlet 446. Optionally, the first portion 425 of the dirt chamber outer wall

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415 may include a second fill line that is oriented to be read when the hand vacuum 400 is in a sideways orientation. The dirt chamber 424 may also include a plurality of additional indicator lines, such as a half-full line and a quarter-full line.

Despite the presence of the fill line F indicating the maximum intended capacity of the dirt chamber 424, a user may be tempted to continue to operate the vacuum 100 to collect additional dirt, particularly if it appears that there is additional dirt storage capacity within the dirt chamber 424 above the fill line F, for example dirt chamber volume 448. As described above, filling the dirt chamber 424 above the fill line F can impede the operation of the vacuum 100. Therefore, to deter users from over-filling the dirt chamber 424 (i.e. filling above the fill line F), the second portion 427 of the cyclone unit wall 415 is preferably opaque (or at least substantially opaque) to visually obscure portions of the dirt chamber 424 from the user, as exemplified in Figure 20. Optionally, the first portion 425 may be partially translucent and partially opaque to further conceal the interior of the dirt chamber 424.

The second portion 427 of the dirt chamber outer wall 415 abuts the first portion 425 at a joint or juncture. The position of the juncture may be such that the lowest portion of the juncture (when the hand vacuum 400 is vertically mounted on the backbone 200) is proximate the fill line F. Configuring the dirt chamber 424 in this manner may further deter the user from over-filling the dirt chamber 424 because the opaque second portion 427 may create the illusion that the dirt chamber 424 does not extend much above the fill line F.

This embodiment is particularly preferred. When a user approaches the vacuum cleaner, they may approach it from the front, as seen in Figure 1. In this orientation, the shortest portion of first portion 425 is visible. Accordingly, if second portion is an openable lip, and is made from a plastic that is less translucent then first portion 415, a user may determine to empty the dirt collection chamber prior to using the vacuum cleaner if the dirt collection appears

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to be full due to dirt extending all the way up to the lowest portion of lid 427. It will be appreciated that a fill line need not be marked on the dirt collection chamber itself.

Cyclone unit 414 may be emptied by any means known in the art. For example, one of the ends of the cyclone unit 414 may be openable. The second portion 427 may be a pivotally mounted door to the first portion 425 of the cyclone unit wall 415, such that cyclone unit 414 may be opened, and dirt chamber 424 may be emptied. When second portion 427 is pivoted away from the remainder of the cyclone unit 414, separation plate 454 also preferably pivots away from the remainder of the cyclone unit 414. A securing member such as a latch 459, a screw mount or the like may be provided, which secures second portion 427 to the first portion 425 of the wall 415. In alternate examples, second portion 427 may be removable from cyclone unit wall 415 (As exemplified in Figure 21) or the opposed end of the cyclone unit 414 may be openable.

In the example shown, the nozzle 412 is positioned at the lower portion 406 of the portable cleaning apparatus 400. More preferably, as in the example shown, nozzle 412 is positioned at the bottom of the portable cleaning apparatus 400, and is preferably beneath the cyclone unit 414 when used as a hand vacuum cleaner and is between the cyclone unit 414 and the mount 220 when attached to the backbone 200. Further, as in the example shown, the nozzle 412 is preferably fixedly positioned at the lower portion 406 of the portable cleaning apparatus 400. That is, the nozzle 412 is not movable with respect to the remainder of the portable cleaning apparatus 400, and is fixed at the lower portion 106 of the portable cleaning apparatus 400. As shown in Figures 7 and 8, nozzle 412 has a width WN and, as shown in Figure 11, coupling plate 123 has a width Wp that is generally the same as width WN.

Nozzle 112 exemplifies a particular design for an open sided nozzle. Open sided nozzle 112 has an open side that faces the surface to be cleaned when the nozzle is placed against a surface to be cleaned. Accordingly,

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nozzle 112 defines an air flow chamber that has an open lower side. In operation, air will flow longitudinally through the air flow chamber to an air exit. It will be appreciated that only part of the nozzle may have an open lower side. Alternately, all of the nozzle, from an air inlet end to the air outlet, may have an open lower side. It will be appreciated that various other design may be used.

Referring now to Figures 8-14, nozzle 412 comprises an upper nozzle wall 426. In the example shown, the upper nozzle wall 426 comprises a portion 419 of a wall 415 of the cyclone unit. Nozzle 412 further preferably comprises a depending wall 428 extending downwardly from the upper nozzle wall 426. The depending wall 428 is generally U-shaped. The height of the depending wall may vary. The open end of the U-shape defines an open side wall 430 of the nozzle 414, and forms the dirty air inlet 418 of the portable cleaning apparatus 400. In the example shown, the open side wall 430 is provided at the front of the nozzle 414 and forms a portion of a flow passage that is in communication with the opening 438. When in use as a hand vacuum, optional wheels 435 are in contact with a surface and the open side wall 430 sits above and is adjacent a hard surface to be cleaned. It will be appreciated that depending wall 428 may be positioned only rearward of opening 438. Alternately, or in addition, depending wall 428 may be provided adjacent the lateral sides of opening 438. The depending walls may be discrete walls or they may be joined together as exemplified. The walls may be continuous or discontinuous.

In the example shown, the lower end 432 of the depending wall 428 defines an open lower end 434 of the nozzle 414. The open lower end 434 extends to the front 408 of the hand vacuum 400, and merges with the open side 430. In use, the open lower end 434 faces a surface to be cleaned. In the example shown, a plurality of wheels 435 are mounted to the depending wall 428, and extend below the lower end 432 of the depending wall 428. Accordingly, when in use as a hand vacuum, when wheels 435 are in contact with a surface, the lower end 432 of the depending wall 428 is spaced from a

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surface to be cleaned, and the space between the lower end of the depending wall 428 and the surface to be cleaned form a secondary dirty air inlet to the portable cleaning apparatus 400 when used as a hand vacuum.

The upper nozzle wall 426, depending wall 428, and open lower end 434 of the nozzle 412 define an airflow chamber 436 of the nozzle. An opening 438 is preferably provided in the upper nozzle wall 426, and is in communication with the airflow chamber 436. When in use as a hand vacuum, the wheels 435 are in contact with a surface, the opening 438 faces a surface to be cleaned, air enters the dirty air inlet 418, passes horizontally through the airflow chamber 436, and passes into the opening 438. Opening 438 is in communication with a cyclone inlet passage 439, which is in communication with a cyclone air inlet 440 of cyclone 422. In some embodiments, opening 438 need not be in upper wall 426.

Nozzle 412 and attachment member 120 are configured such that attachment member 120 may form part of the air flow conduit to opening 438 when attachment member 120 is mounted to hand vacuum 400. For example, when the portable cleaning apparatus 400 is used in combination with the backbone 200 and the surface cleaning head 300, the opening 438 in the nozzle 412 is in sealed, fluid communication with the air outlet 127 of the attachment member 120. By way of this connection, a continuous fluid pathway is established between the dirty air input 310 of the surface cleaning head 300 and the opening 438.

It will be appreciated that attachment member 120 may be removably mounted to nozzle 412 by any engagement means known in the connecting arts. Further, attachment member may be of any configuration. Attachment member may be part of, or may be connected to, an accessory cleaning tool by any means, such as a flexible hose. The flexible hose may be hose 110 if hose 110 is removably mounted to the floor cleaning unit.

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As exemplified, attachment member 120 is removably engaged with nozzle 412 by the engagement of pivoting arms in slots provided on nozzle 412. Accordingly, for example, nozzle 412 may also include a slot 490 defining a recess in the depending wall 428 that is adjacent the upper nozzle wall 426. The slot 490 preferably extends continuously along the U-shaped portion of the nozzle depending wall 428 and may be bounded at each end by corners 492. The attachment member 120 includes two arms 150 each having a shoulder 154 and being pivotally connected to the coupling plate 123 using pins 156 (alternatively, the arms 150 could be resilient). Figure 14 is a partially exploded view of the attachment member 120, illustrating one example of the rotational connection between the coupling 142 and the collar 140. In the example shown, the coupling 142 comprises a cylindrical body wall that passes through an opening in the collar 140. Once the coupling 142 had been inserted into the collar 140 it is retained using fastening clip 143. The combination of the coupling plate 123 and the arms 150 may also be described as connecting portion, mounting portion or nozzle mounting portion of the attachment member 120.

In order to assemble the mount on nozzle 412, coupling plate 123 may be slid into the open end of airflow chamber 436. Accordingly, when the coupling plate 123 of the attachment portion 120 is slid into the airflow chamber 436, the arms 150 are pressed together by the nozzle 412 walls until the point when arms 150 are aligned with slot 190 (i.e. when the shoulders 154 are advanced past the corners 192). When the arms 150 are aligned with the slot 190, the attachment member 120 is "clicked-in" or locked in place when the arms 150 spread apart and the shoulders 154 of the arms 150 become lodged behind the corners 192 of slot 190. The arms 150 may be manually separated or the attachment member may include a biasing means (not shown) that biases the arms 150 apart. With the arms 150 in the spread configuration the attachment member 120 cannot be slidingly removed from the nozzle 412. When a user wishes to detach the attachment means 120 from the nozzle 412 the user may

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squeeze upstanding tabs 152 together thereby allowing the shoulders 154 to slide past the corners 192. The mount may alternately be inserted by squeezing upstanding tabs 152 together so that plate 123 may be inserted in chamber 436.

When the hand vacuum 400 is coupled to the attachment member 120 the airflow chamber 436 may receive, and be partially filled with the coupling plate 123 of the attachment portion 120. The coupling plate 123 is preferably shaped to be slidingly received within the airflow chamber 436.

Insertion of the coupling plate 123 into the airflow chamber 436 serves to register the air outlet 127 with the nozzle opening 438. As shown, the air outlet 127 has a width Wo and a length Lo that are preferably the same as the width Wo and a length Lo of the opening 438. A sealing gasket 123 may provided at the juncture of the openings.

The attachment member 120 and the nozzle 412 may also include a plurality of magnets 158 that magnetically couple the attachment member 120 to the nozzle 412 to improve the connection between them and ensure that air outlet 127 is properly registered with opening 438. It will be appreciated that, in an alternate embodiment, only magnets maybe used. Other mounting means may be used. For example, a plurality of latches may be used or air outlet 127 may extend into opening 438.

Optionally, when the attachment member 120 is coupled to the portable cleaning apparatus 400, the upstream end of the air conduit 110 (for example hose 124) can be detached from the surface cleaning head 300 and the combination of the attachment member 120 and the flexible hose 124 (decoupled from the surface cleaning head 300) can serve as an auxiliary or accessory cleaning tool. The free end of the hose 124 may be maneuvered by the user to clean objects and surfaces that cannot be cleaned using the surface cleaning head 300. In some examples, the upstream end of the flexible hose 124 may be connected to the auxiliary cleaning tool 112. Alternatively, the flexible hose 124

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may be removed from the attachment member 120 and the auxiliary cleaning tool 112 may be mounted directly to the air inlet 126 of the attachment member 120. It will be appreciated that tool 112 may have a plate 123 and arms 150 provided at the coupling end thereof.

Optionally, the attachment member 120 may be removed from the nozzle 412 and the auxiliary cleaning tool 112 may be fitted directly to the nozzle 412, without the use of a flexible hose 124 or other type intermediate air conduit. In addition to the auxiliary or accessory cleaning tool 112, the nozzle 412 may be directly connected to any one of a number of cleaning tools that have been provided with the an appropriate attachment member, including wands, brushes, crevasse tools and other hoses.

Clean air outlet 420 is provided downstream of the cyclone unit 414, suction motor and optional post-motor filter contained optionally within the cleaner body 460. Clean air outlet 420 may comprise a plurality of apertures formed in housing 461. The cleaner body 460 may also contain one or more of a separation plate, a dirt chamber a pre-motor filter and a plurality of connecting fluid conduits or passageways.

In the example shown, cleaner body 460 is removably mounted to head portion 416. For example, cleaner body 460 may be entirely removable from head portion 416, or pivotably mounted to head portion 416. Accordingly, cleaner body 460 and head portion 416 may be separated in order to provide access to the interior of cleaner body 460 or head portion 416. This may allow a pre-motor filter to be cleaned, changed, or serviced, or the motor to be cleaned, changed or serviced. Alternately, head portion 416 may be cleaned or serviced. For example, any dirt stuck in the enclosed passages portable cleaning apparatus 400 may be removed. Alternately, a replacement cleaner body 460 or head portion 416 may be provided, and may be mounted to an existing head portion 416 or cleaner body 460, respectively.

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One or more additional rear wheels 480 may be mounted to housing 461 at lower portion 406, and may be used in conjunction with wheels 435 when the portable cleaning apparatus 400 is used as a hand vacuum. When the portable cleaning apparatus 400 is attached to the backbone 200 the additional wheel 480 preferably engages with the mount bracket 224 and partially supports the portable cleaning apparatus 400 on the handle 210 as described above.

Preferably, as exemplified, the portion of the attachment member 120 that is used to mount the attachment member to the backbone may also comprise part of the air flow path from surface cleaning head 300 to hand vacuum cleaner 400. For example, the attachment member 120 may include a mounting portion or collar 140 that includes a coupling 142 and defines a channel 144. The collar 140 is connected to the airflow passageway 128, or alternatively may be connected directly to the air conduit 110. Optionally, the coupling 142 is a rotatable coupling that allows the airflow passageway 128 to rotate relative to the collar 140. The upstream end of the airflow passageway 128 defines the air inlet 126. In operation, the air inlet 126 is preferably coupled to the airflow conduit 110 that extends to the surface cleaning head 300 (the flexible air hose 124 in the example shown). The air inlet 126 is releasably coupled to the flexible air hose by clips 160. Downstream of the coupling 142 an enclosed airflow passage connects the airflow passage 128 to the air outlet 127. It will be appreciated that the attachment member 120 need not comprise part of the air flow passage. For example, coupling 142 may be located out of the flow path defined by passageway 128. Alternately, plate 123 need not have opening 127. Accordingly, attachment member may have a first part that is secured to hand vacuum 400 and a second distinct part that completes that air flow passage from surface cleaning head 300 to opening 438.

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The airflow passageway 128 may be flexible or rigid and may be generally straight or may have a curved shape, as shown. Preferably, the curved airflow passageway 128 subtends fewer than 45 degrees.

It will be appreciated that a construction that uses a dirt collection chamber that partially or completely surrounds a cyclone in an upright surface cleaning apparatus may be used by itself or with any other feature disclosed herein. It will be appreciated that an inverted first stage cyclone in an upright surface cleaning apparatus may be used by itself or with any other feature disclosed herein. In addition, any of the features disclosed herein may be used by themselves, or with any other feature, and may include the construction of the dirt collection chamber to denote a fill line.

What has been described above has been intended to be illustrative of the invention and non-limiting and it will be understood by persons skilled in the art that other variants and modifications may be made without departing from the scope of the invention as defined in the claims appended hereto.

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CLAIMS:

1. A hand vacuum cleaner comprising:

a) a front end having a front wall and a rear end;

b) an air flow passage extending from a dirty air inlet to a clean air outlet;

c) a first cyclone unit positioned in the air flow passage, the first cyclone unit comprising at least one cyclone and at least one dirt collection chamber external to the cyclone chamber;

d) the cyclone and the dirt collection chamber having an openable door, the front wall comprising the openable door, whereby, when the door is in an open position, both the cyclone and the dirt collection chamber are opened; and,

e) a suction motor positioned in the air flow passage.

2. The hand vacuum cleaner of claim 1 wherein the at least one cyclone has a cyclone front end, a cyclone rear end, a cyclone air inlet and a cyclone air outlet and the cyclone front end is at the front end of the hand vacuum cleaner.

3. The hand vacuum cleaner of claim 2 wherein the cyclone air inlet and the cyclone air outlet are at the same end.

4. The hand vacuum cleaner of claim 3 wherein the cyclone air inlet and the cyclone air outlet are at the cyclone rear end.

5. The hand vacuum cleaner of claim 1 wherein the cyclone front end has a dirt outlet and a separation plate is mounted in facing relation to the dirt outlet.

6. The hand vacuum cleaner of claim 5 wherein the separation plate is mounted to the door.

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7. The hand vacuum cleaner of claim 1 wherein the at least one cyclone has a cyclone axis extending longitudinally through the at least one cyclone, the hand vacuum cleaner has an axis extending from the front end to the rear end and the cyclone axis is generally parallel to the axis of the hand vacuum cleaner.

8. The hand vacuum cleaner of claim 1 wherein the first cyclone unit is positioned forward of the suction motor.

9. The hand vacuum cleaner of claim 1 wherein the door is removable.

10. The hand vacuum cleaner of claim 1 wherein the door is pivotally mounted to the hand vacuum cleaner.

11. The hand vacuum cleaner of claim 1 wherein the dirt collection chamber is removable from the hand vacuum cleaner.

12. The hand vacuum cleaner of claim 1 wherein the dirt collection chamber is removable from the surface cleaning apparatus as a sealed unit for emptying.

13. The hand vacuum cleaner of claim 12 wherein the first cyclone unit is sealed when removed from the hand vacuum cleaner other than fluid flow passages leading to and from the first cyclone unit.

14. The hand vacuum cleaner of claim 1 wherein the dirt collection chamber is removable from the hand vacuum cleaner with the first cyclone unit.

15. The hand vacuum cleaner of claim 1 wherein the first cyclone unit has a single cyclone and a single dirt collection chamber.

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16. The hand vacuum cleaner of claim 15 wherein the single dirt collection chamber is positioned exterior to the single cyclone.

17. The hand vacuum cleaner of claim 16 wherein the single cyclone and the single dirt collection chamber comprise a one-piece assembly.

18. The hand vacuum cleaner of claim 17 wherein the single cyclone and the single dirt collection chamber are integrally formed.

19. The hand vacuum cleaner of claim 1 wherein the hand vacuum cleaner further comprises a suction motor housing, the suction motor is positioned in the suction motor housing and the first cyclone unit is removably mounted to the suction motor housing.

20. The hand vacuum cleaner of claim 1 further comprising a second cyclone unit downstream from the first cyclone unit.

21. The hand vacuum cleaner of claim 1 wherein the at least one cyclone has a cyclone axis extending longitudinally through the at least one cyclone and the dirt collection chamber has a perimeter at the front end and the openable door has a perimeter that is generally the same as the perimeter of the dirt collection chamber.

22. The hand vacuum cleaner of claim 1 wherein the front wall is the openable door.

23. A hand vacuum cleaner comprising:

a) a front end having a front wall and a rear end;

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b) an air flow passage extending from a dirty air inlet to a clean air outlet;

c) a first cyclone unit positioned in the air flow passage, the first cyclone unit comprising at least one cyclone and at least one dirt collection chamber;

d) the dirt collection chamber having an openable door, the front wall comprising the openable door; and,

e) a suction motor positioned in the air flow passage wherein the door is openable when the dirt collection chamber is mounted to the hand vacuum cleaner.

24. A hand vacuum cleaner comprising:

a) a front end having a front wall and a rear end;

b) an air flow passage extending from a dirty air inlet to a clean air outlet;

c) a first cyclone unit positioned in the air flow passage, the first cyclone unit comprising at least one cyclone and at least one dirt collection chamber;

d) the dirt collection chamber having an openable door, the front wall comprising the openable door; and,

e) a suction motor positioned in the air flow passage wherein the openable door covers an end of the dirt collection chamber.

25. A hand vacuum cleaner comprising:

a) a front end having a front wall and a rear end;

b) an air flow passage extending from a dirty air inlet to a clean air outlet;

c) a first cyclone unit positioned in the air flow passage, the first cyclone unit comprising at least one cyclone and at least one dirt collection chamber;

d) the dirt collection chamber having an openable door, the front wall comprising the openable door; and,

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e) a suction motor positioned in the air flow passage wherein the dirt collection chamber has a rear end and the rear end is non-removably mounted to the first cyclone unit.

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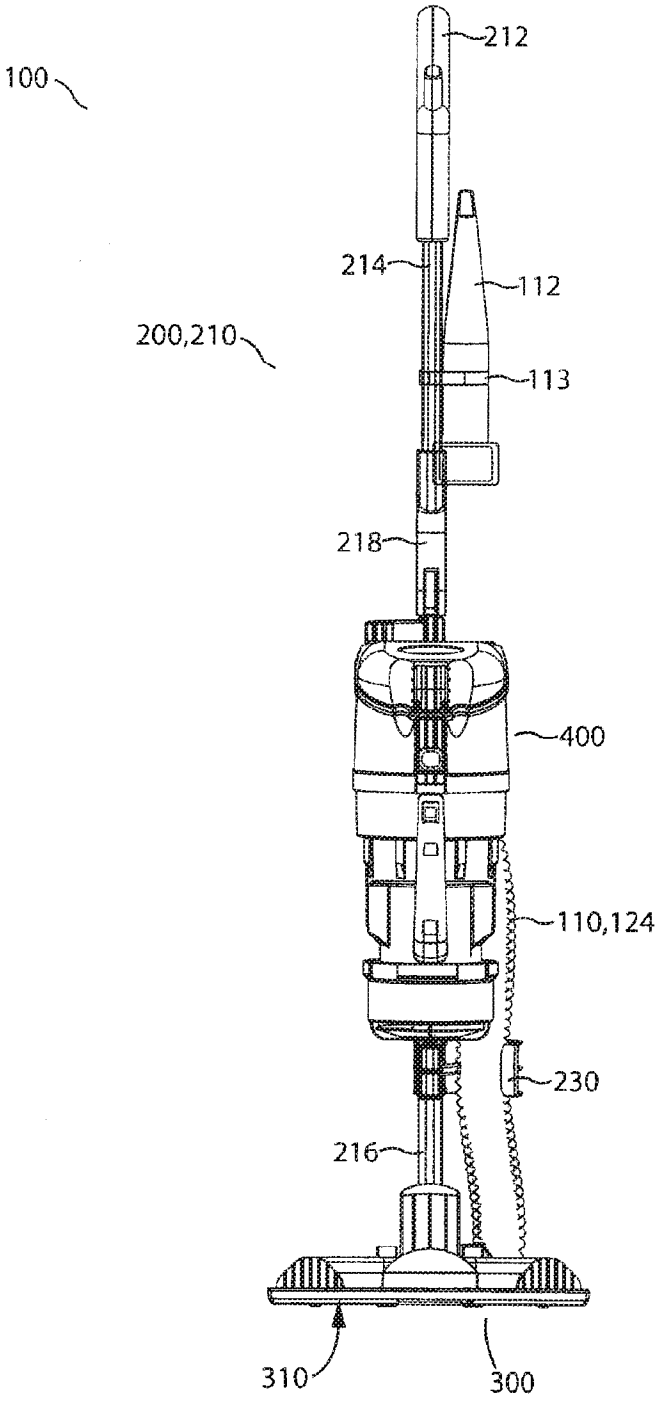


Fig. 1

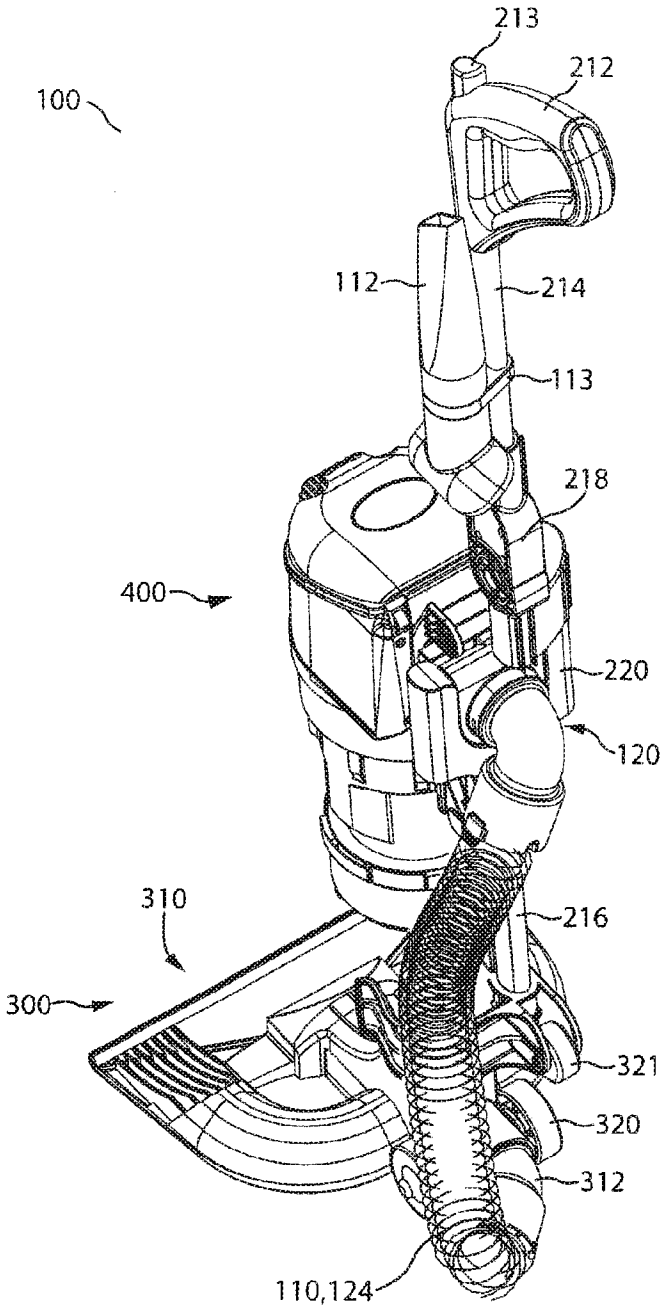

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Fig. 2

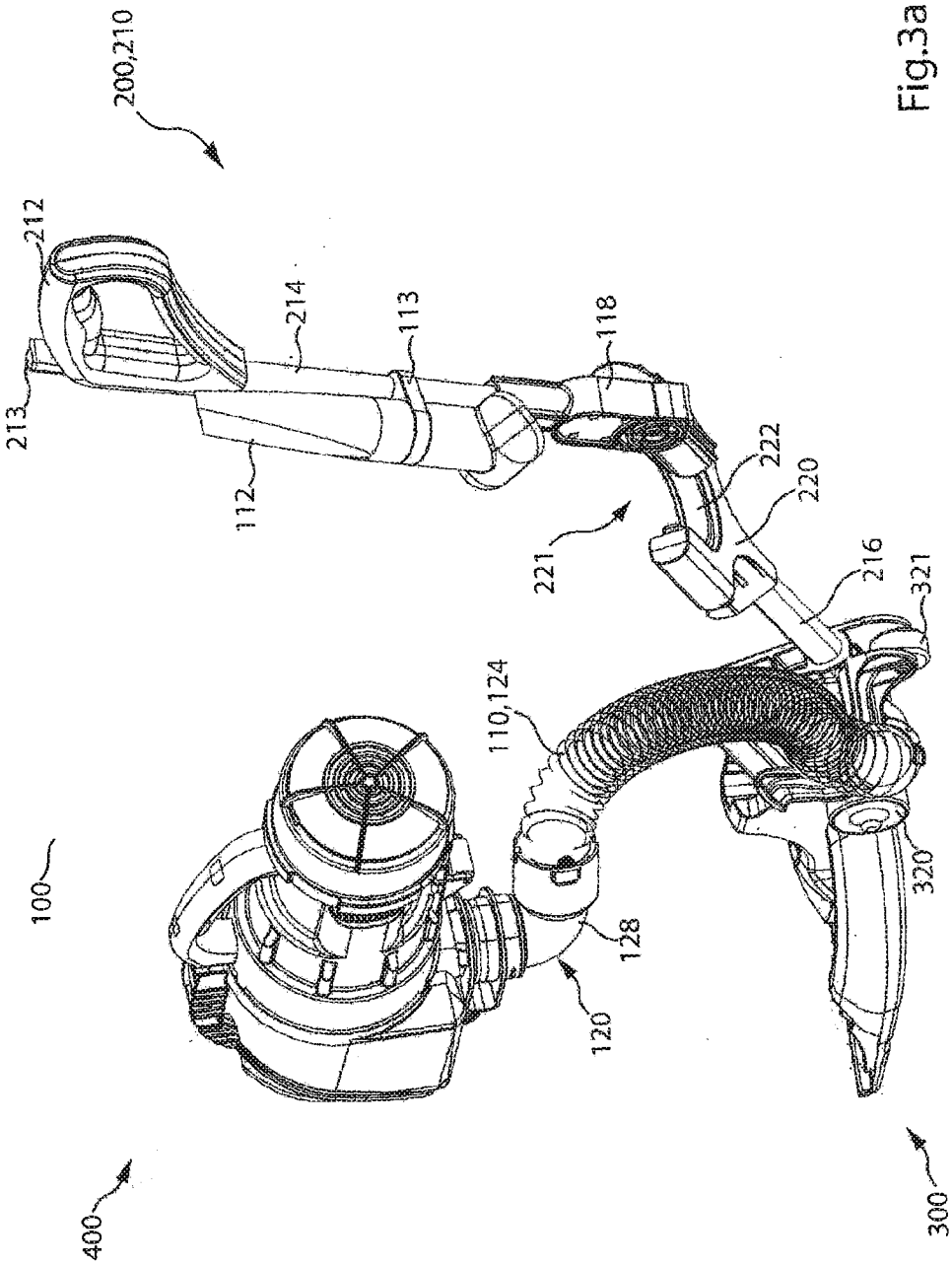
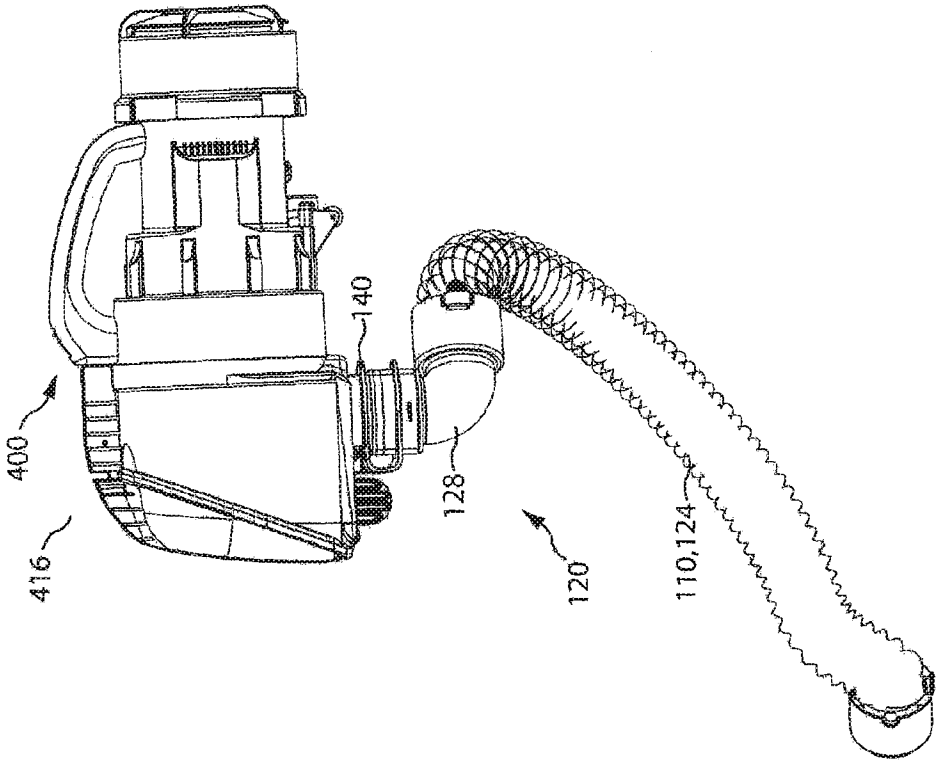

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Fig.3a

Fig.3b



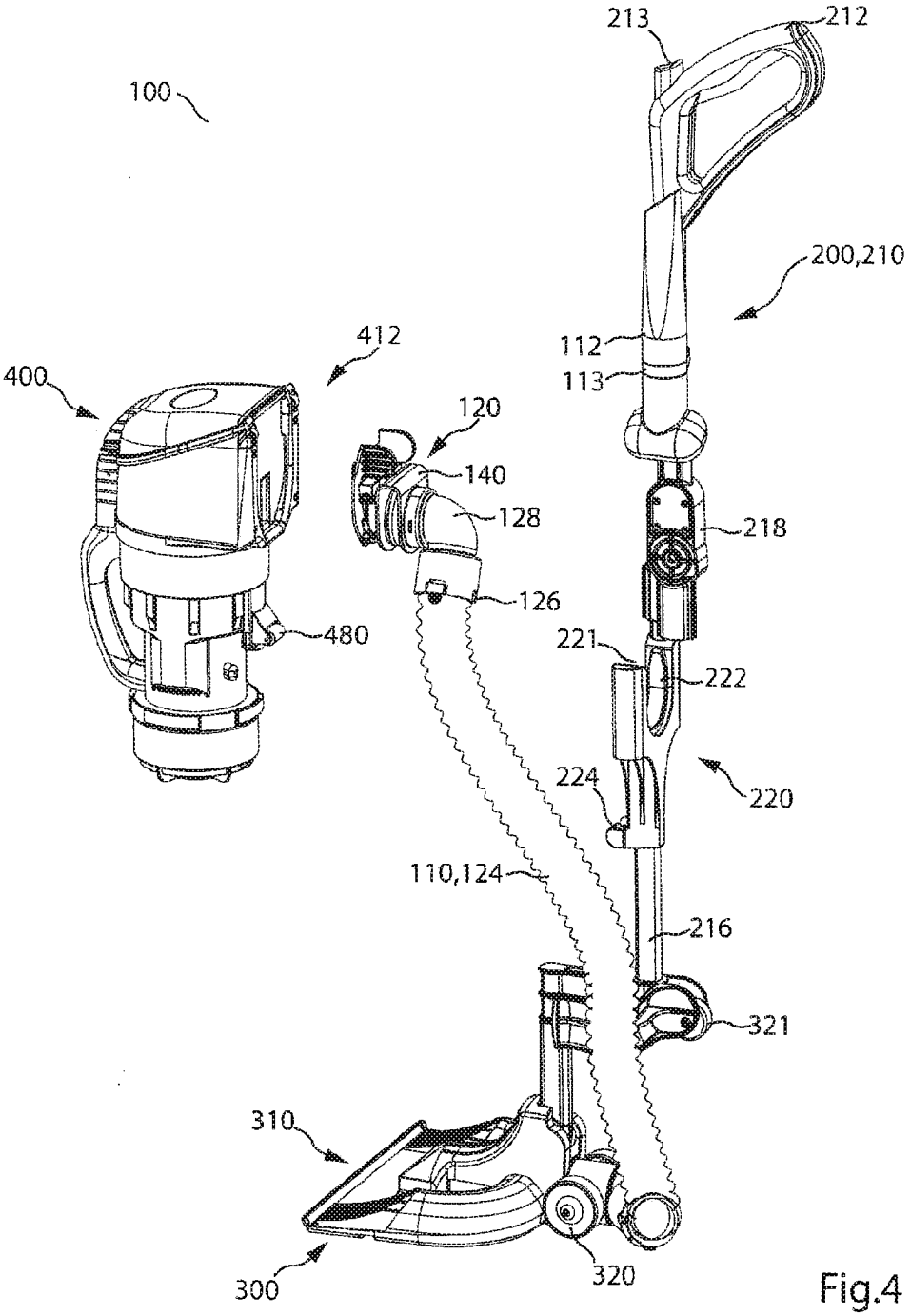

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Fig.4

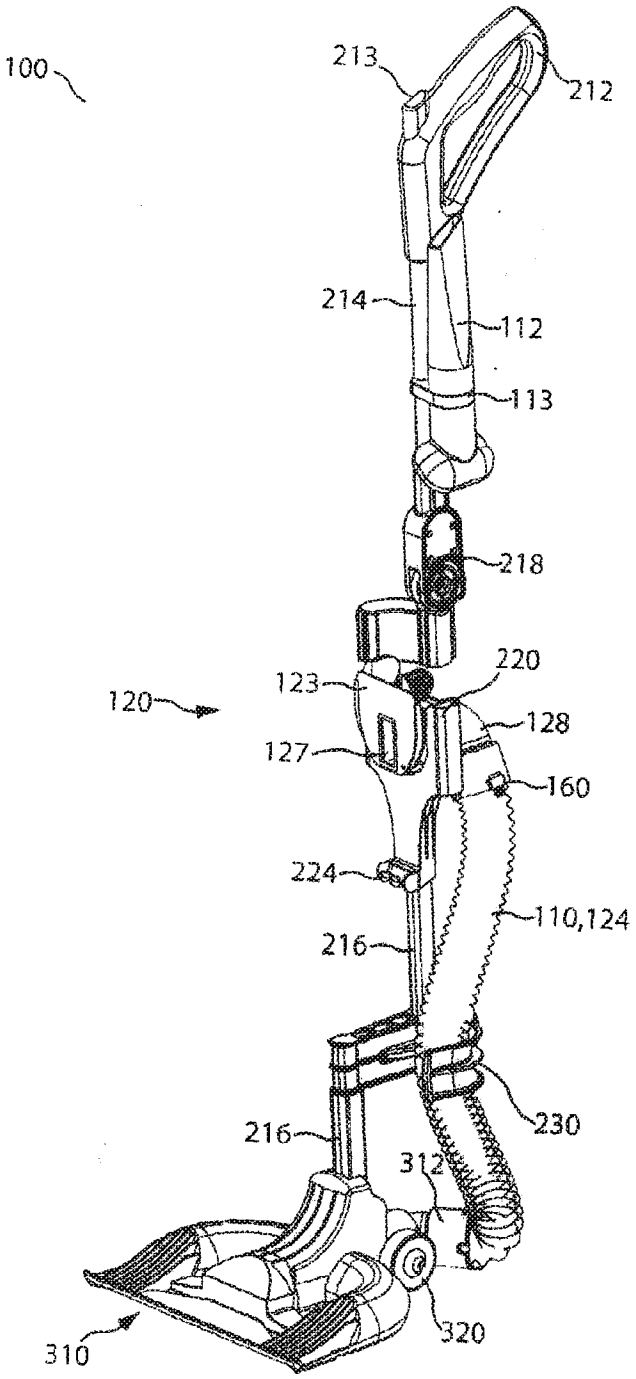

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Fig.5

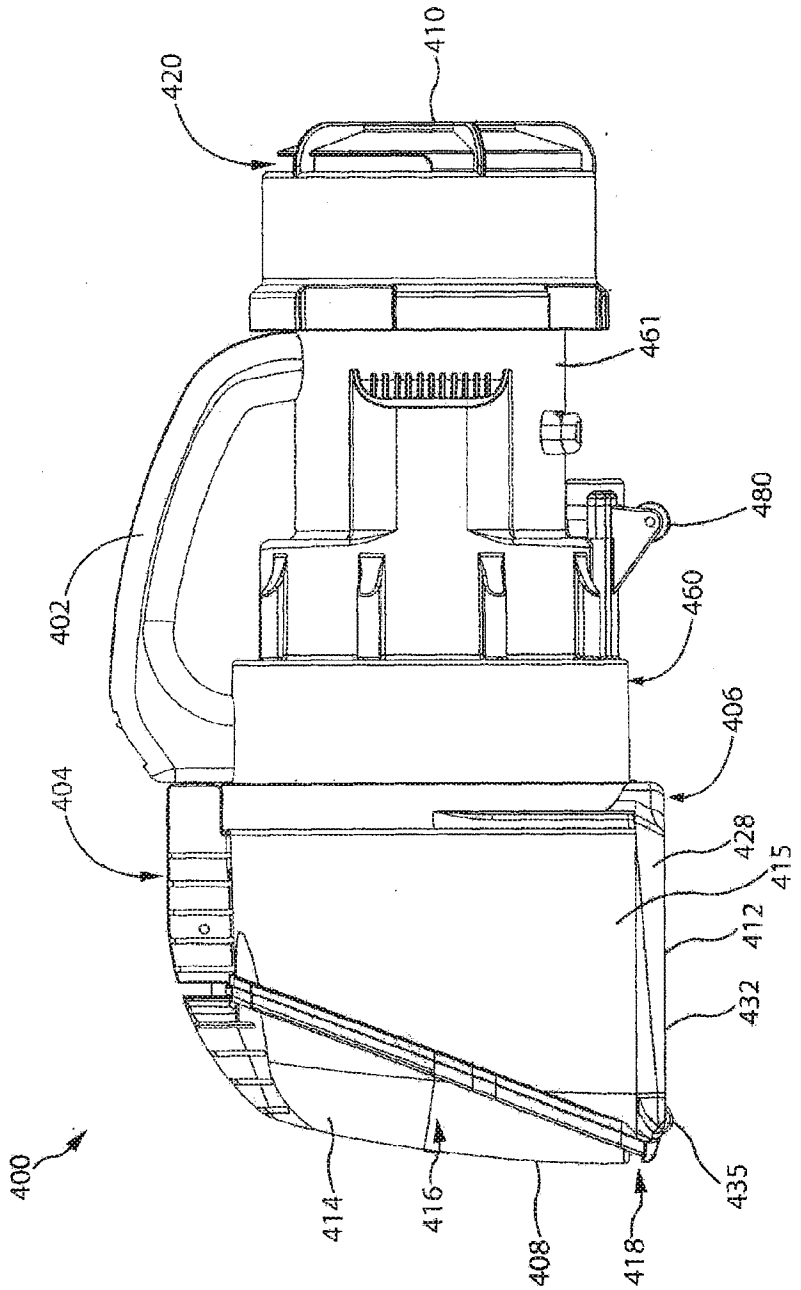

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Fig.6

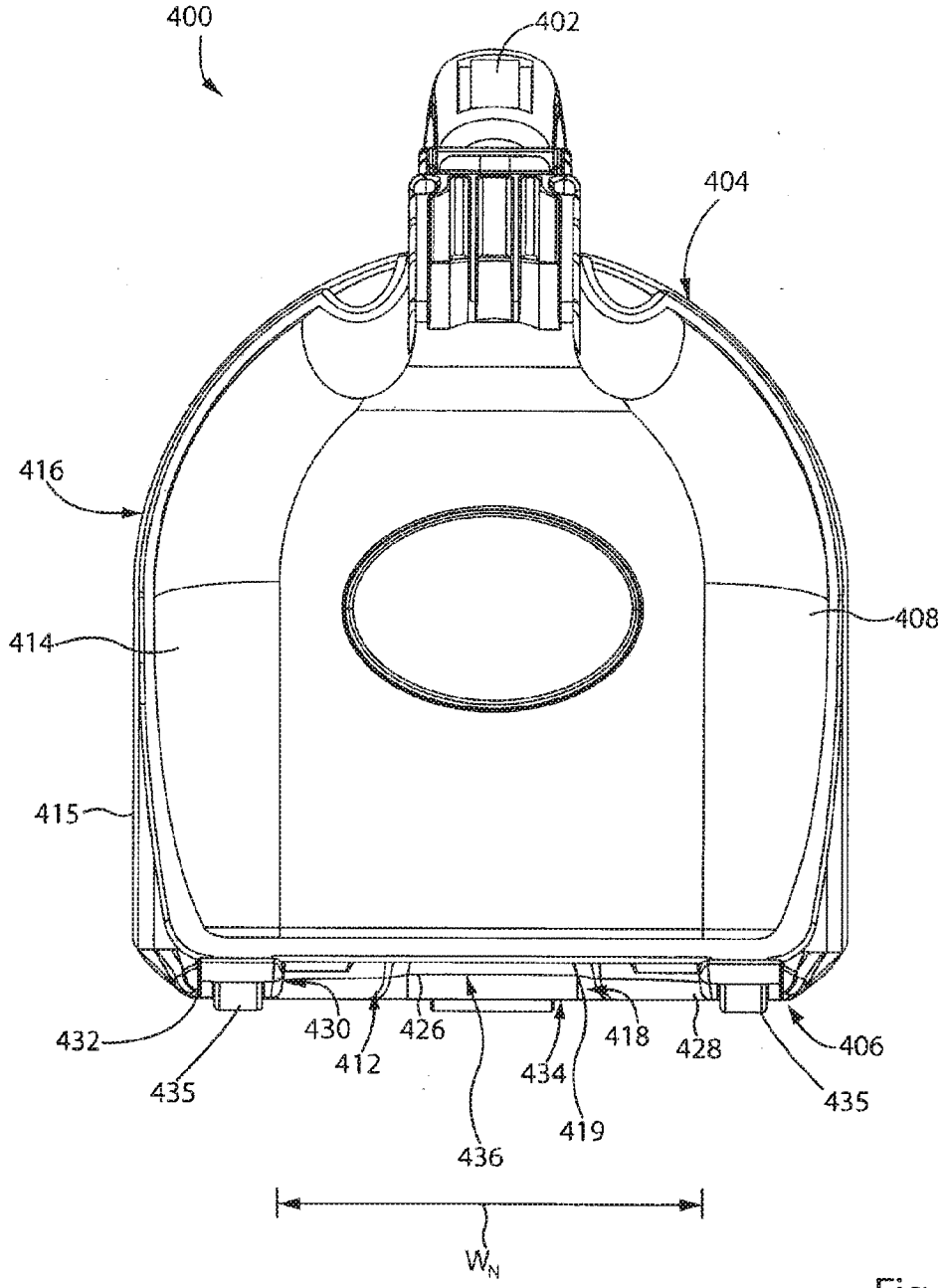
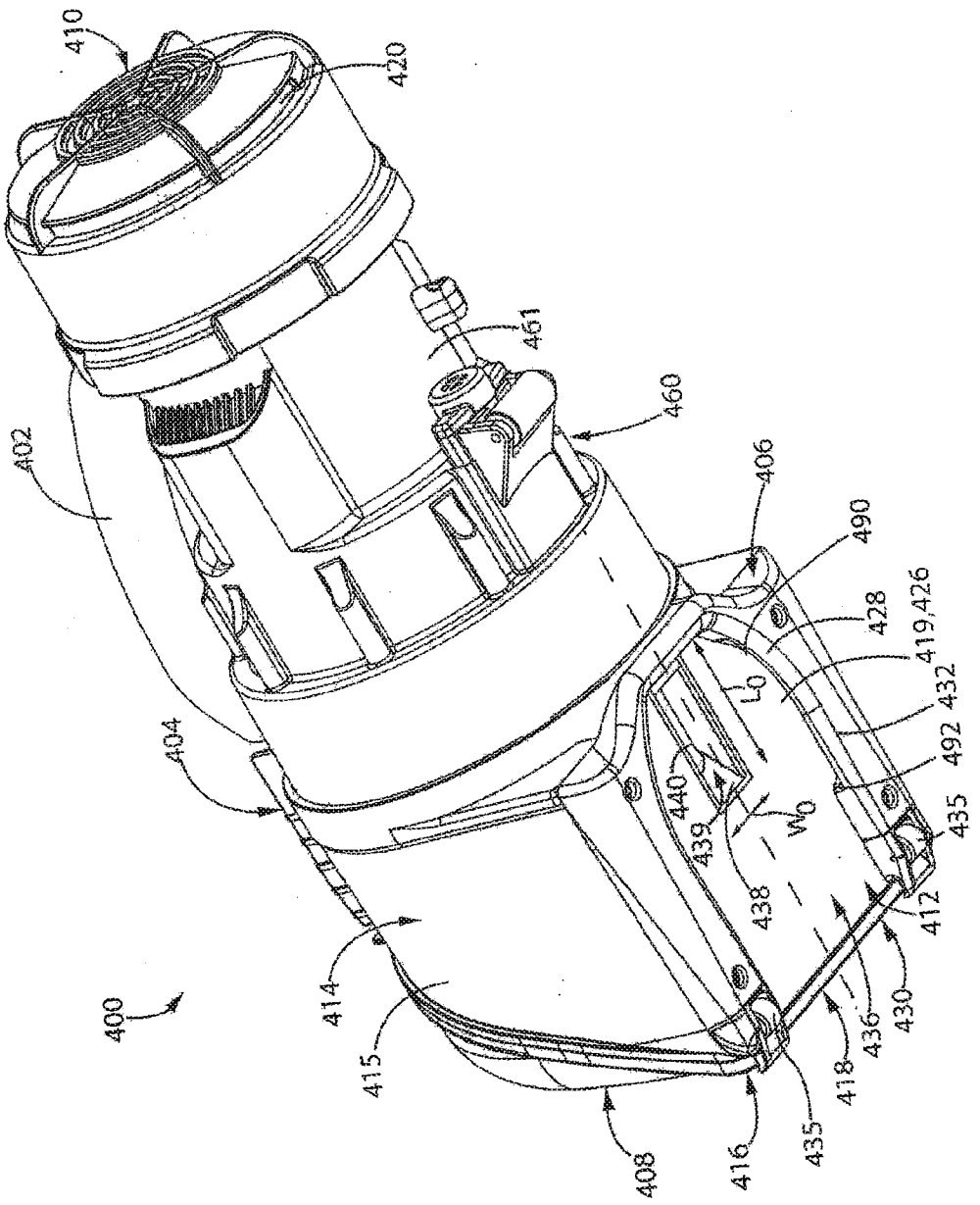

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W_N

Fig. 7

Fig.8


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W_0
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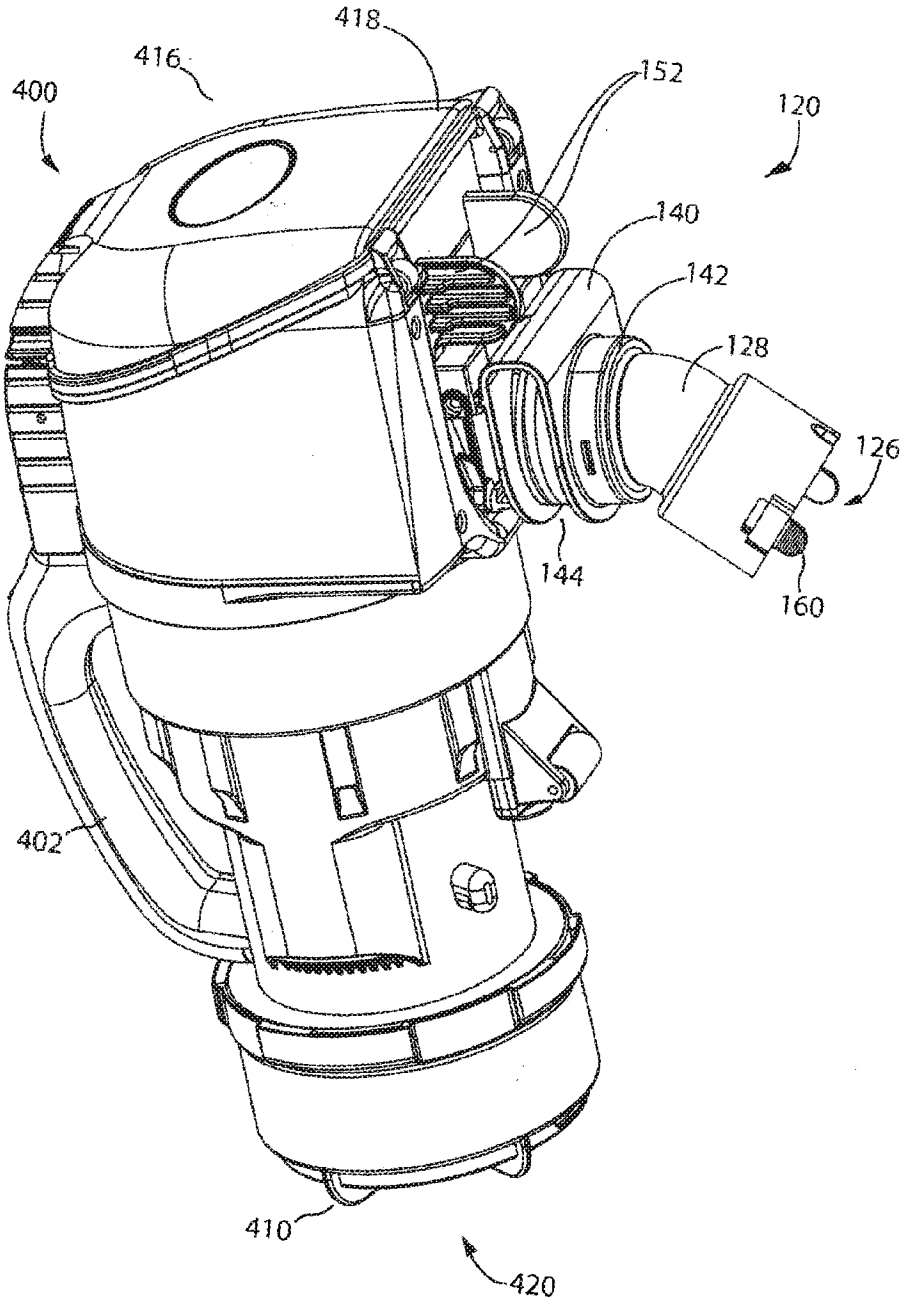


Fig. 9

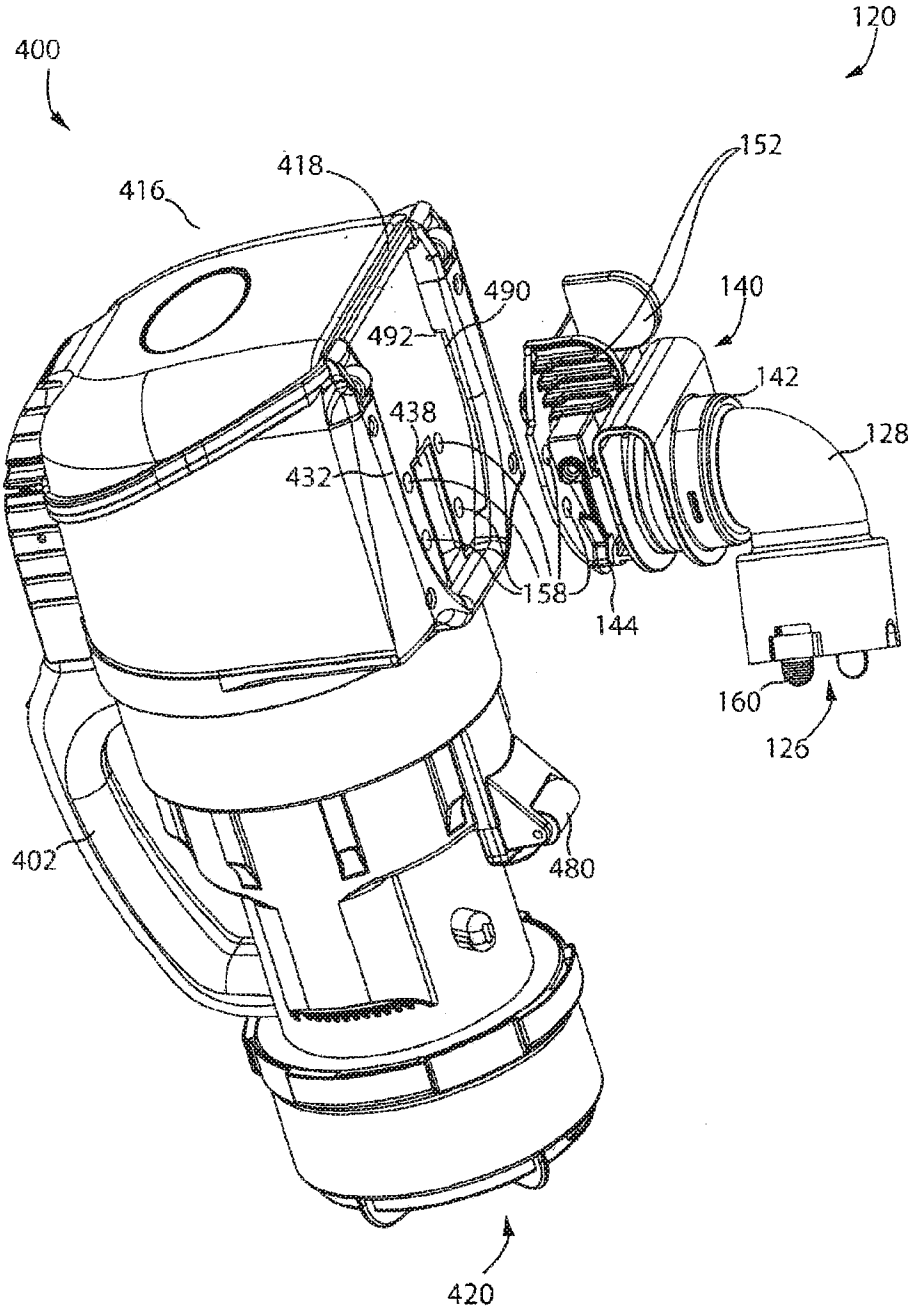

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Fig. 10

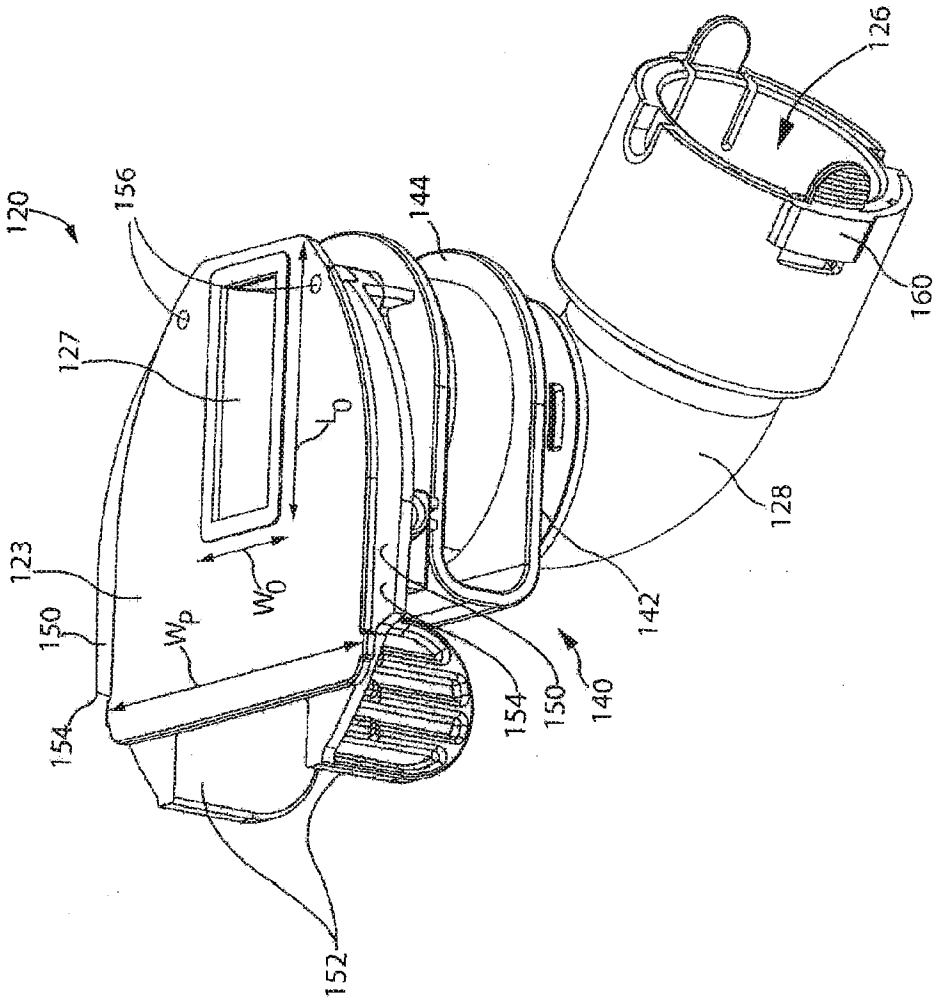

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Fig. 11

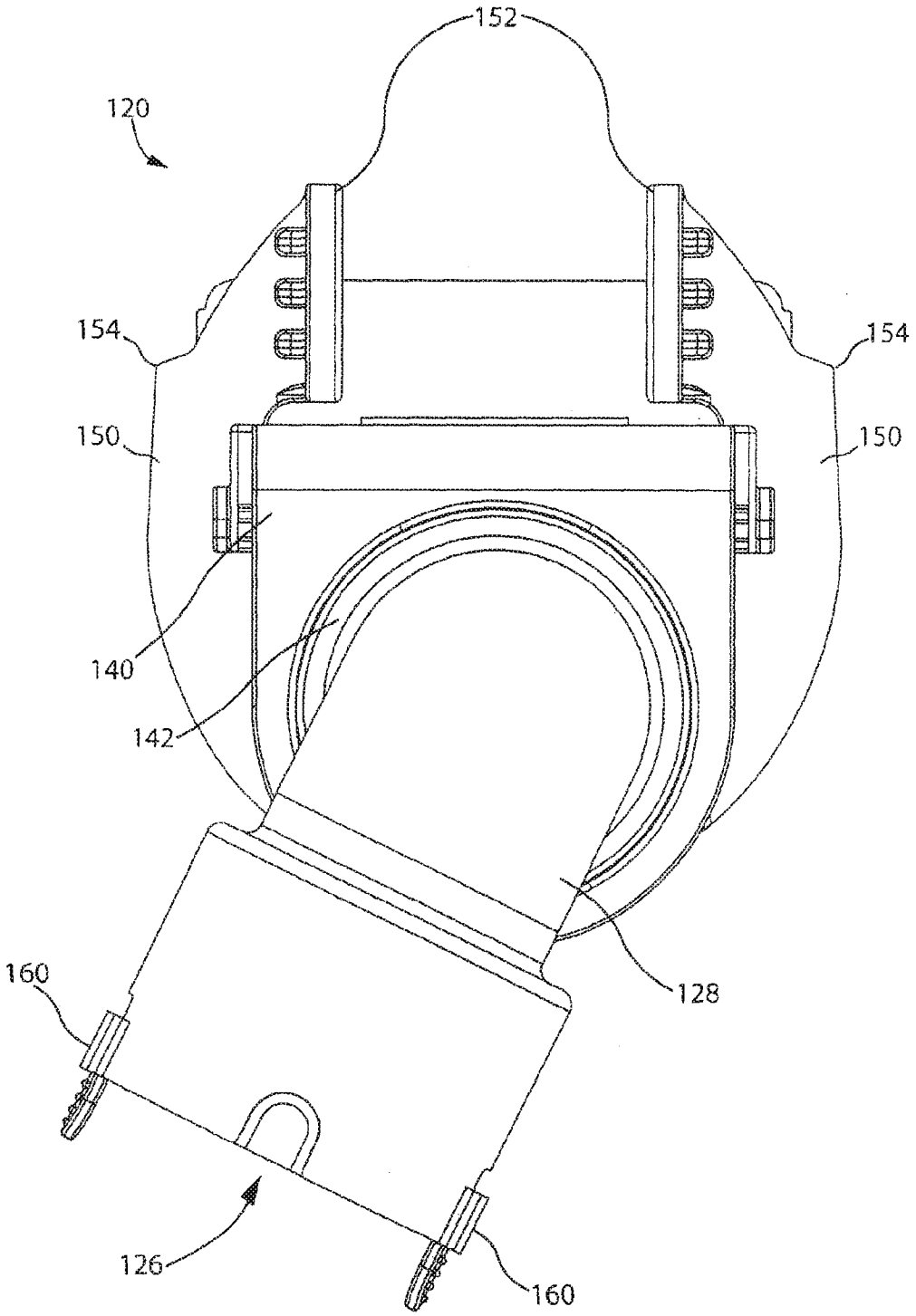
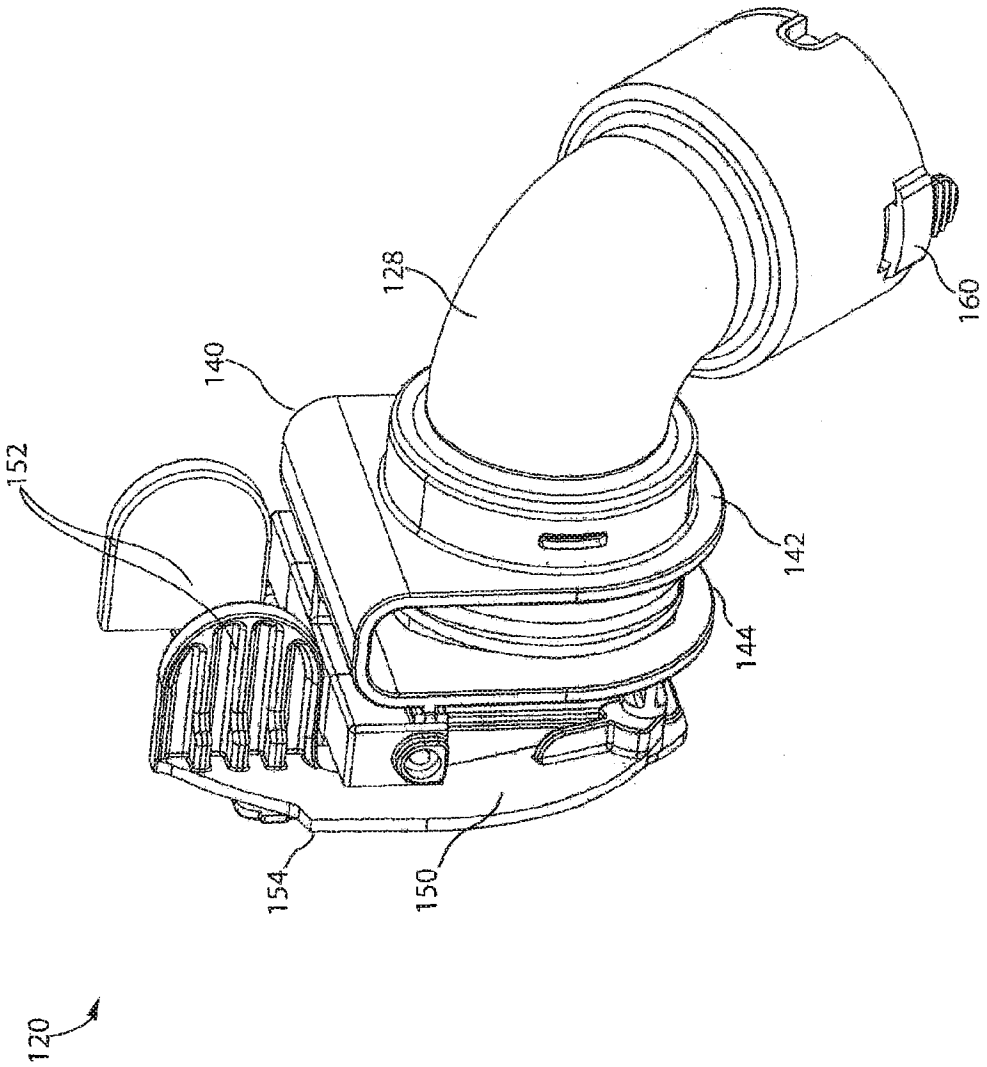


Fig. 12

Fig.13



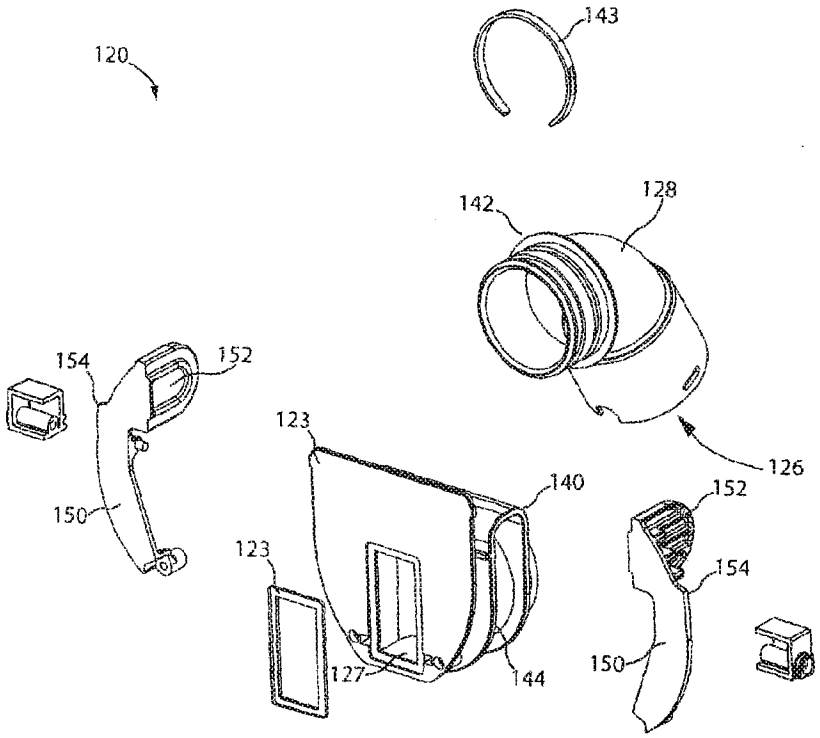


Fig. 14

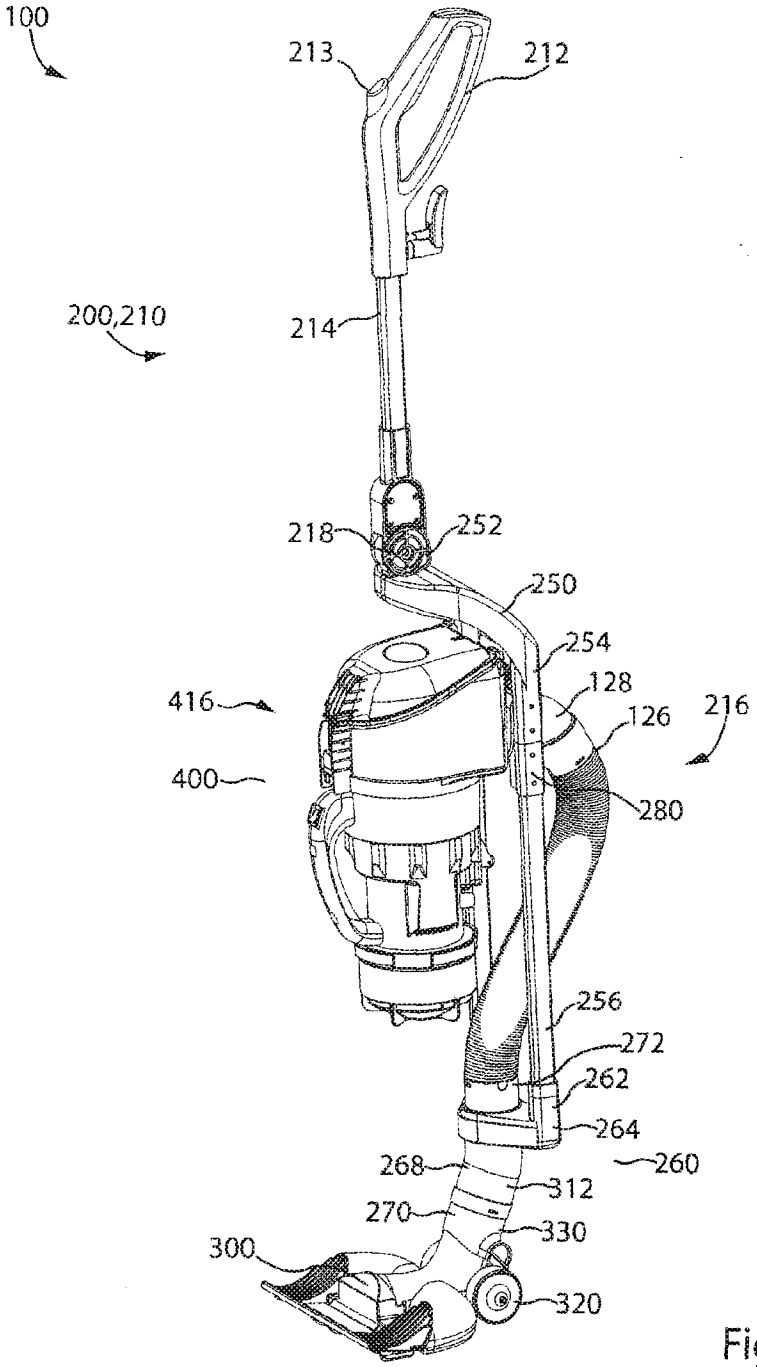

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Fig. 15

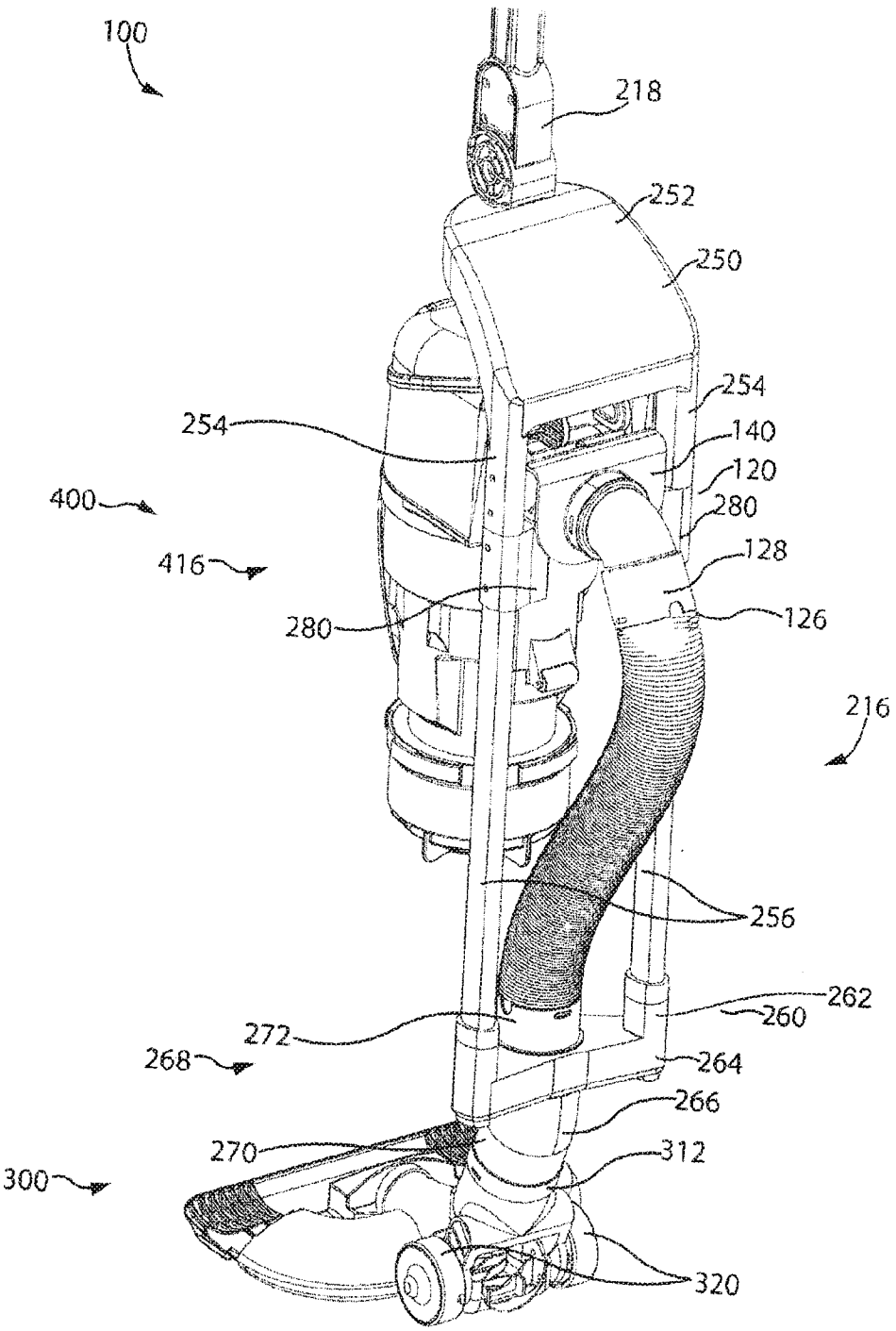

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Fig. 16

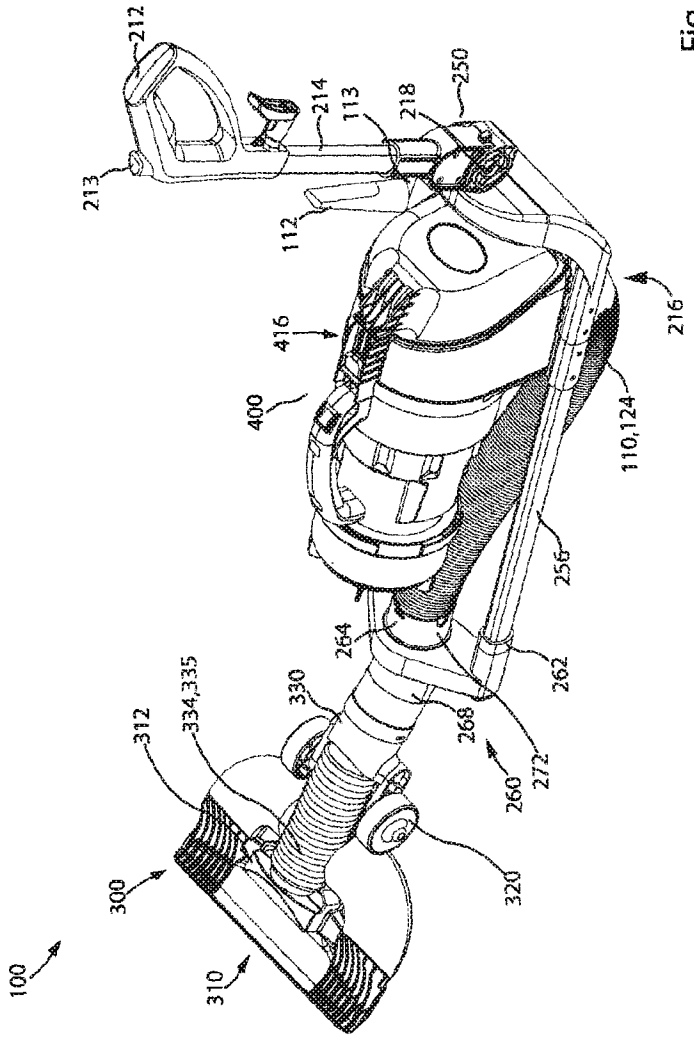

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Fig. 17

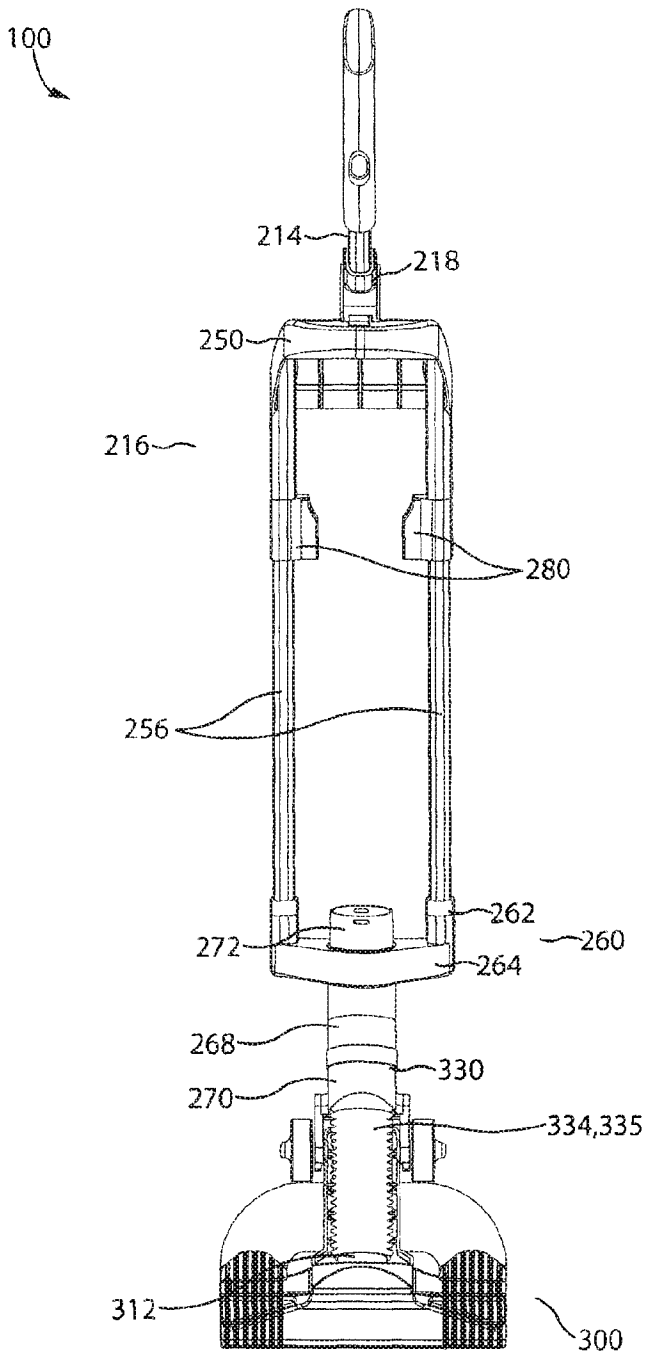

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Fig. 18

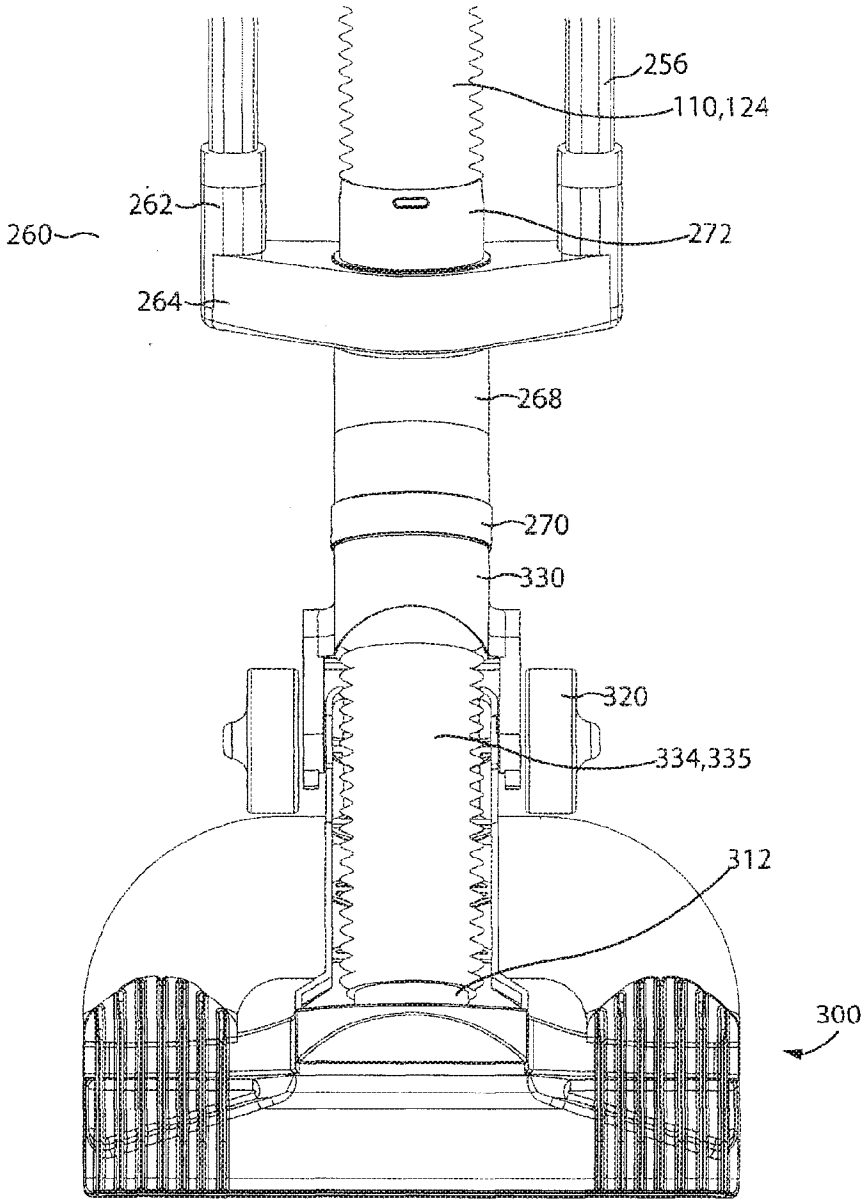


Fig. 19

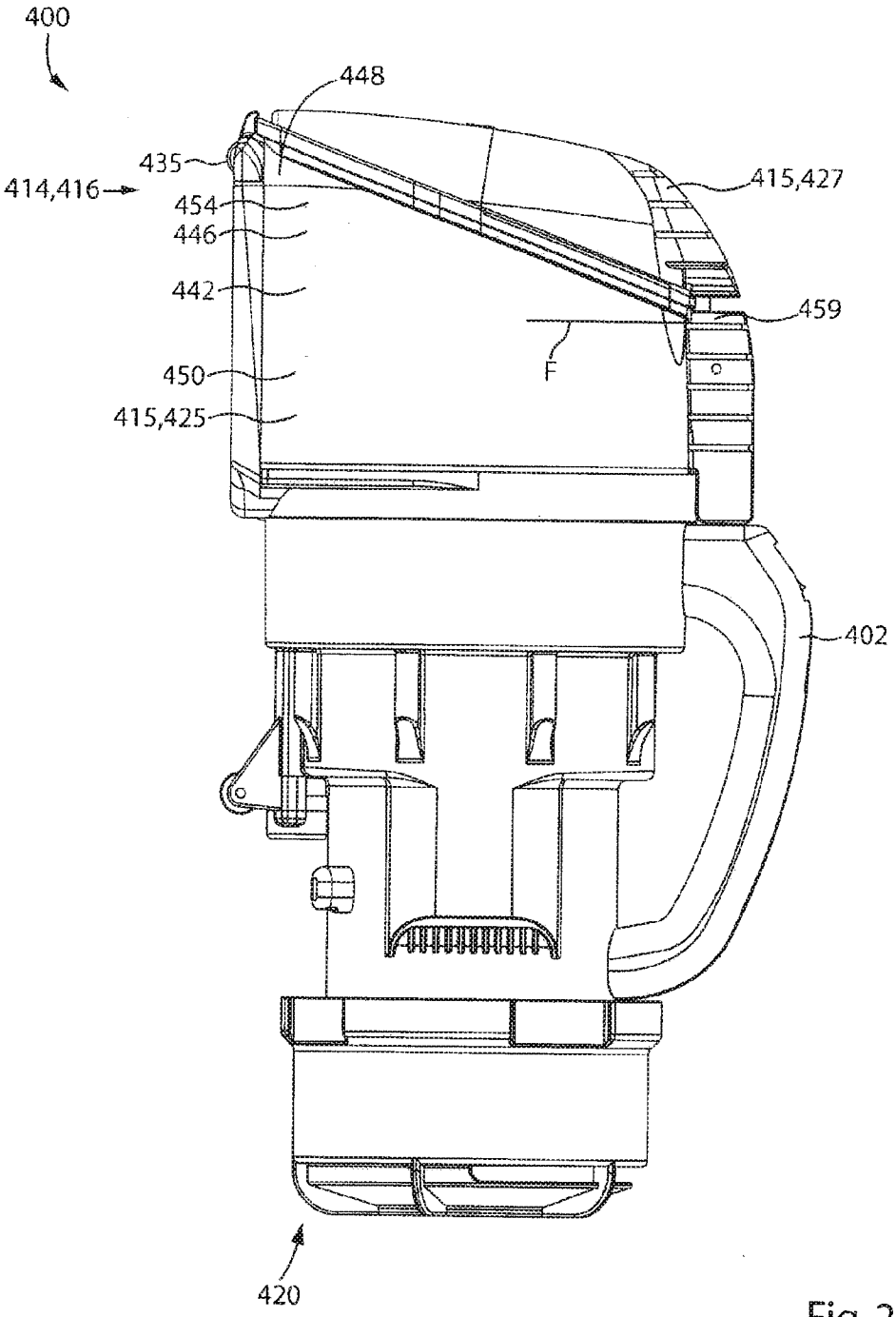


Fig. 20

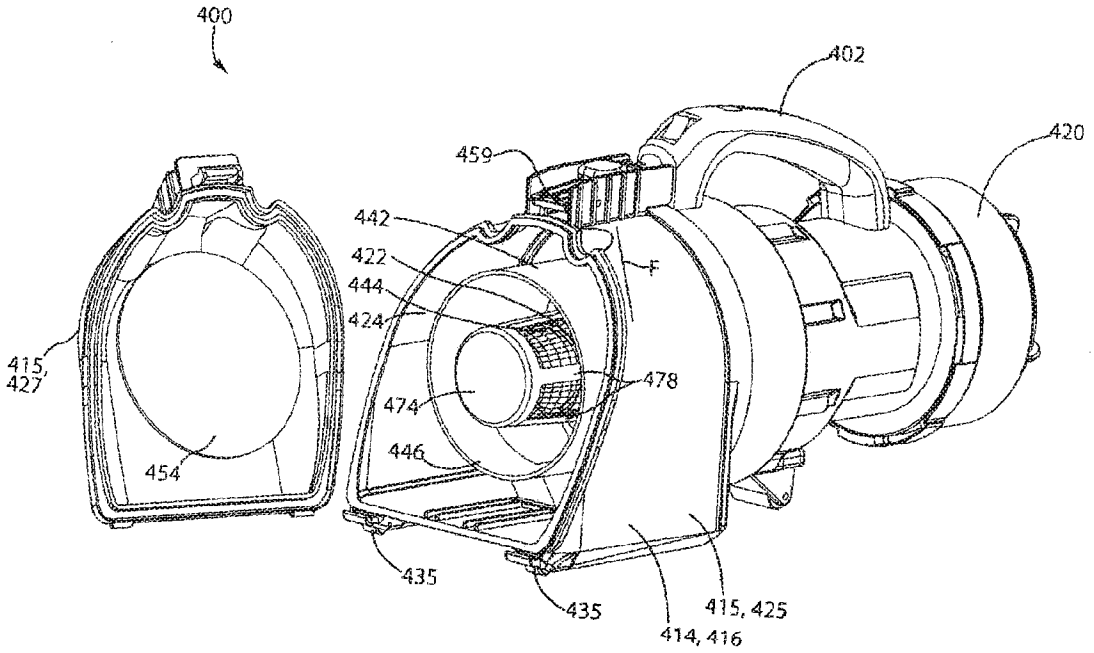

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Fig. 21

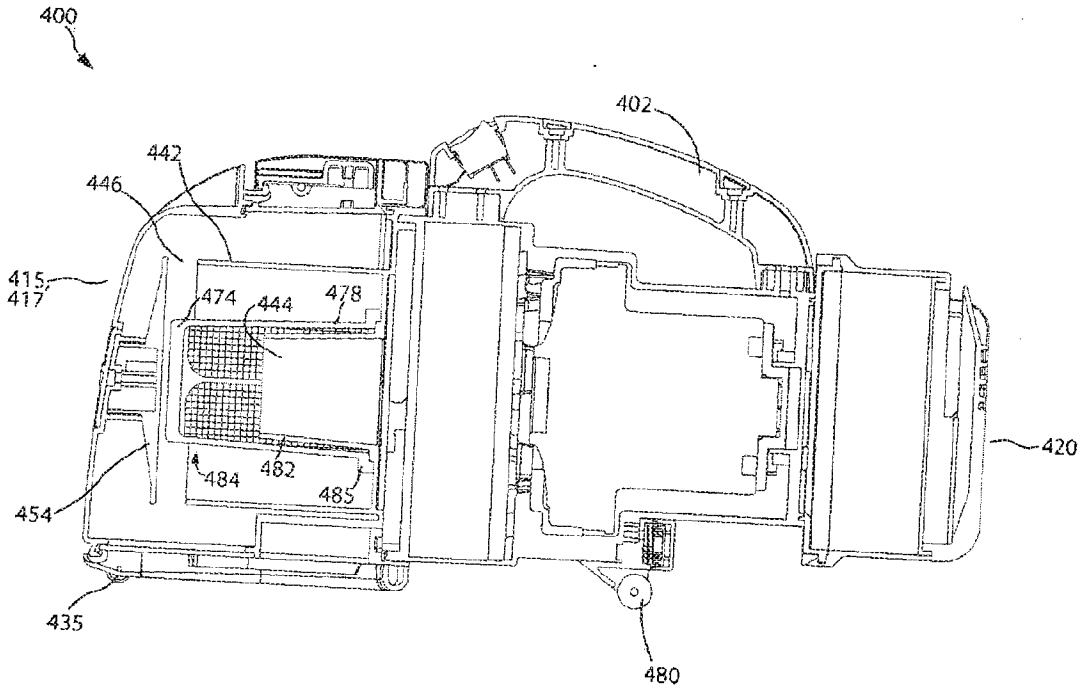
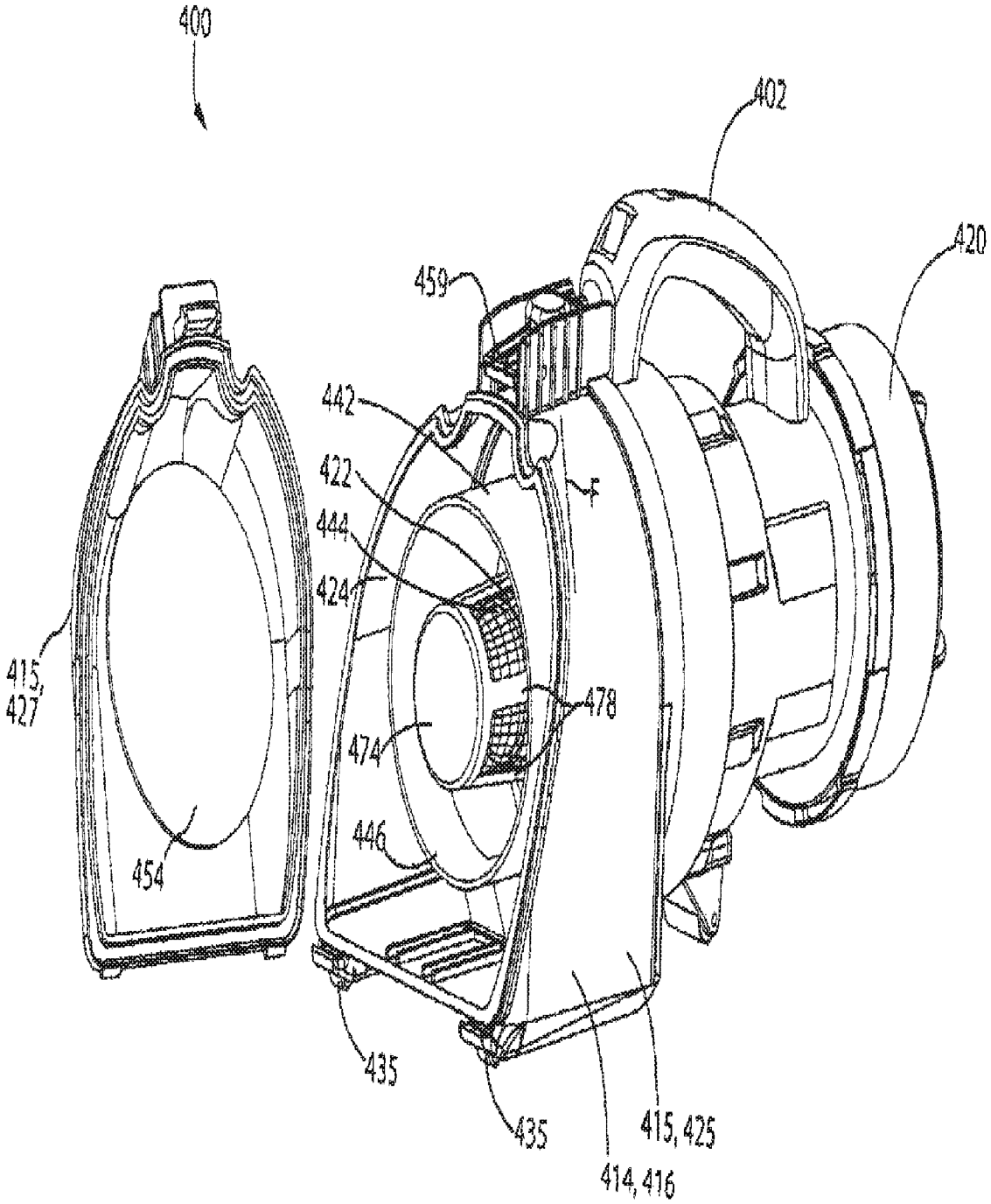


Fig.22


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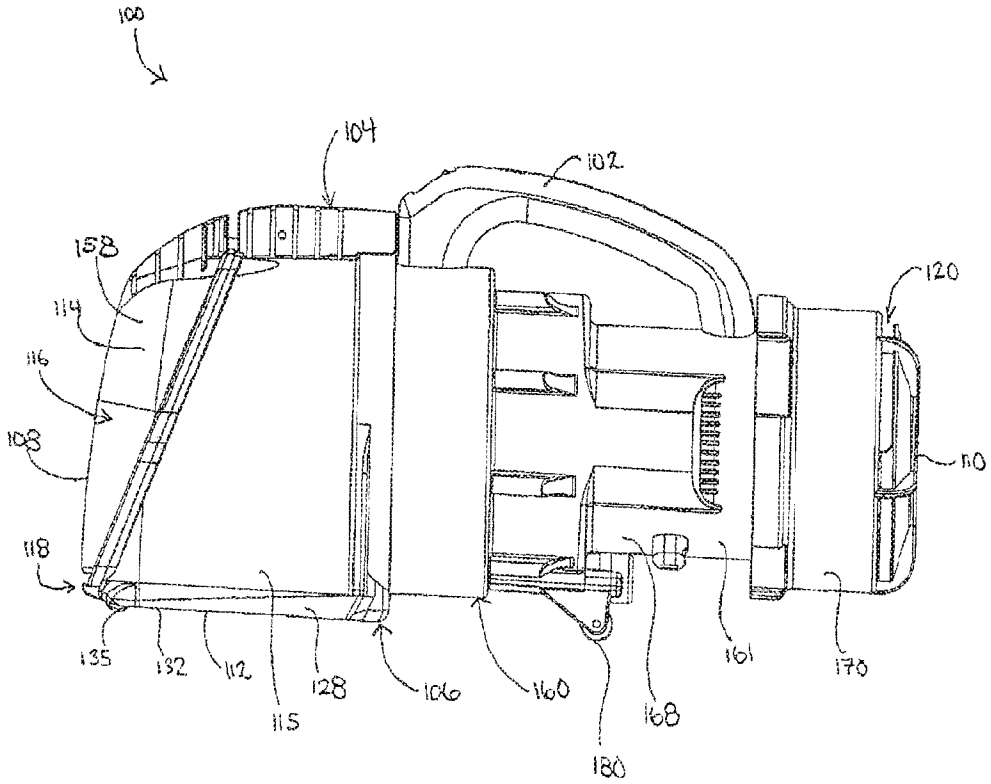
(51) Cl.Int./Int.Cl. *A47L 9/16* (2006.01), *A47L 5/22* (2006.01), *A47L 5/24* (2006.01), *A47L 5/28* (2006.01)

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(54) Titre : APPAREIL DE NETTOYAGE DE SURFACE PORTABLE
(54) Title: PORTABLE SURFACE CLEANING APPARATUS



(57) Abrégé/Abstract:
A portable surface cleaning apparatus, such as a hand vacuum cleaner, having a cyclone and a cleaner body, wherein a pre-motor filter is positioned in the air flow passage upstream from the suction motor and, the cyclone and the cleaner body are separable.

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ABSTRACT

A portable surface cleaning apparatus, such as a hand vacuum cleaner, having a cyclone and a cleaner body, wherein a pre-motor filter is positioned in the air flow passage upstream from the suction motor and, the cyclone and the cleaner body are separable.

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TITLE: PORTABLE SURFACE CLEANING APPARATUS

The specification relates to surface cleaning apparatuses. More specifically, the specification relates to cyclonic surface cleaning apparatuses.

INTRODUCTION

The following is not an admission that anything discussed below is prior art or part of the common general knowledge of persons skilled in the art.

Cyclonic vacuum cleaners utilize one or more cyclones that have an associated dirt collection chamber. The dirt collection chamber may be formed in the bottom of a cyclone chamber. A disc or divider may be positioned in the cyclone casing to divide the cyclone casing into an upper cyclone chamber and a lower dirt collection chamber. In it also known to position a dirt collection chamber exterior to a cyclone casing, such as surrounding the cyclone chamber.

SUMMARY

The following introduction is provided to introduce the reader to the more detailed discussion to follow. The introduction is not intended to limit or define the claims.

According to one broad aspect, a surface cleaning apparatus is provided that utilizes a cyclone having an open end, wherein the open end comprises the dirt outlet of the cyclone. A plate, that preferably has a planar surface facing the open end, is positioned facing the open end. For example, the plate may line in a plane that is perpendicular to the longitudinal axis extending through a cyclone chamber and may be spaced from the open end. Accordingly, a gap is provided between the plate and the open and defines a dirt outlet of the cyclone. In accordance with this aspect, the gap has a non uniform length.

For example, the cyclone casing may have a variable length. The portion that have a shorter length define a gap having a increased height.

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Alternately, or in addition, the plate may be provided with a sidewall on the side of the plate facing the open end of the cyclone. The sidewall may extend part way around the plate. The height of the wall maybe constant or may be variable.

The sidewall is preferably provided on the periphery of the plate. The diameter of the plate is preferably about the same as the diameter of the open end of the cyclone.

In some embodiments, the sidewall of the plate has a constant length. In other embodiments, the sidewall of the plate has a variable length.

In some embodiments, the sidewall of the cyclone has a first end at the open end, the first end has a perimeter, and the gap has a first portion having a first length and a second portion having a second length greater than the first length. The first length and the second length may be constant. Alternately, the first length and the second length may be variable.

In some embodiments, one of the portions extends up to 210° of the perimeter. For example, the second portion may extend up to 210° of the perimeter. In other embodiments, the second portion extends up to 240° of the perimeter.

According to another broad aspect, a surface cleaning apparatus is provided. The surface cleaning apparatus comprises an air flow passage extending from a dirty air inlet to a clean air outlet. A suction motor is positioned in the air flow passage. A cyclone is positioned in the air flow passage. The cyclone comprises an air inlet, an air outlet, an open end, a longitudinal axis and a longitudinally extending sidewall. The side wall has a variable length. A dirt collection chamber is in flow communication with the open end.

In some embodiments, a first portion of the sidewall is longer than a second portion of the sidewall.

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In some embodiments, the sidewall has a first end at the open end, the first end has a perimeter, and the first portion comprises up to 240°of the perimeter and the second portion comprises from up to 120° of the perimeter.

In some embodiments, the surface cleaning apparatus further comprises a plate facing the open end. The plate may be spaced from a front end wall of the surface cleaning apparatus. A first portion of the dirt collection chamber may be provided between the plate and the front end wall. Preferably, a second portion of the dirt collection chamber surrounds at least a portion of the cyclone.

According to another broad aspect, another surface cleaning apparatus is provided. The surface cleaning apparatus comprises an air flow passage extending from a dirty air inlet to a clean air outlet. A suction motor is positioned in the air flow passage. A cyclone is positioned in the air flow passage. The cyclone comprises an air inlet, an air outlet, an open end, a longitudinal axis and a longitudinally extending sidewall. A plate is provided having a cyclone side facing the open end. The plate is positioned to define a gap between the plate and the open end of the cyclone. The plate has a plate sidewall extending towards the open end. A dirt collection chamber is in flow communication with the open end.

In some embodiments, the plate sidewall extends part way around the plate. In some embodiments, the sidewall of the plate has a constant length. In other embodiments, the sidewall of the plate has a variable height.

Any of the surface cleaning apparatuses described herein may comprise a portable vacuum cleaner, and preferably, a hand vacuum cleaner. The portable vacuum cleaner may be removably mountable to an upright vacuum cleaner.

It will be appreciated that an embodiment may contain one or more of features set out in the examples.

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DRAWINGS

In the detailed description, reference will be made to the following drawings, in which:

Figure 1 is a side plan view of an example of a hand vacuum cleaner;

Figure 2 is a top plan view of the hand vacuum cleaner of Figure 1;

Figure 3 is a front plan view of the hand vacuum cleaner of Figure 1;

Figure 4 is a partially exploded rear perspective view of the hand vacuum cleaner of Figure 1;

Figure 5 is a partially exploded front perspective view of the hand vacuum cleaner of Figure 1;

Figure 6 is a cross section taken along line 6-6 in Figure 2;

Figure 7 is a bottom perspective view of the hand vacuum cleaner of Figure 1;

Figure 8 is a perspective illustration of the surface cleaning apparatus of Figure 1 mounted to an upright vacuum cleaner;

Figure 9 is a partially exploded front perspective view of an alternate embodiment of a hand vacuum cleaner; and,

Figure 10 is a cross section taken along line 10-10 in Figure 9.

DESCRIPTION OF VARIOUS EXAMPLES

Various apparatuses or methods will be described below to provide an example of each claimed invention. No example described below limits any claimed invention and any claimed invention may cover processes or apparatuses that are not described below. The claimed inventions are not limited to apparatuses or processes having all of the features of any one apparatus or

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process described below or to features common to multiple or all of the apparatuses described below. It is possible that an apparatus or process described below is not an embodiment of any claimed invention.

Referring to Figures 1 to 7, a first example of a surface cleaning apparatus 100 is shown. Preferably, the surface cleaning apparatus 100 (also referred to herein as cleaner 100 or vacuum cleaner 100) is a portable vacuum cleaner 100, such as a hand vacuum cleaner 100 as shown. The hand vacuum cleaner 100 is movable along a surface to be cleaned by gripping and maneuvering handle 102. In alternate embodiments, the surface cleaning apparatus 100 may be another type of surface cleaning apparatus, such as a stick-vac, an upright vacuum cleaner, or a canister vacuum cleaner.

The exemplified embodiments are hand vacuum cleaners. The design for a cyclone and facing plate having a gap therebetween of non-uniform height may be used in any cyclonic cleaning apparatus. If the feature is used with a portable surface cleaning apparatus such as a hand vacuum cleaner, then the portable surface cleaning apparatus may be of any design. For example, as exemplified, the vacuum cleaner includes an upper portion 104, a lower portion 106, a front 108, and a rear 110. In the example shown, handle 102 is provided at the upper portion 104. In alternate examples, handle 102 may be provided elsewhere on the vacuum cleaner 100, for example at the rear 110 and may be of any design. The vacuum cleaner 100 may be of various configurations (e.g., different positioning and orientation of the cyclone unit and the suction motor and differing cyclone units that may comprise one or more cyclones and one or more filters) and may use any type of nozzle or position of the nozzle.

In the example shown, the vacuum cleaner 100 comprises a nozzle 112, which may be of any design, and a cyclone unit 114, which together form a surface cleaning head 116 of the vacuum cleaner 100. As exemplified, the surface cleaning head 116 is preferably provided at the front 108 of the vacuum cleaner 100.

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Nozzle 112 engages a surface to be cleaned, and comprises a dirty air inlet 118, through which dirty air is drawn into the vacuum cleaner 100. An airflow passage extends from the dirty air inlet 118 to a clean air outlet 120 of the cleaner 100. In the example shown, clean air outlet 120 is at the rear 110 of the cleaner 100.

Cyclone unit 114 is provided in the airflow passage, downstream of the dirty air inlet 118. In the example shown, the cyclone unit 114 comprises one cyclone 122 positioned in the airflow passage, and one dirt chamber 124. In alternate examples, the cyclone unit 110 may include more than one cyclonic stage, wherein each cyclonic stage comprising one or more cyclones and one or more dirt chambers. Accordingly, the cyclones may be arranged in parallel and/or in sequence.

In the example shown, the nozzle 112 is positioned at the lower portion 106 of the vacuum cleaner 100. Preferably, as exemplified, nozzle 112 is positioned at the bottom of the vacuum cleaner 100, and, preferably, beneath the cyclone unit 114. Accordingly, as exemplified, nozzle 112 may be on lower surface 117 of cyclone unit 114. In a particularly preferred design, the upper wall of the nozzle may be a lower wall of the cyclone unit 114. As shown in figure 6, dirt chamber 124 surrounds the lower portion of cyclone 122. Accordingly, the upper wall of nozzle 112 may be part of the lower wall of the dirt chamber. It will be appreciated that if dirt chamber 124 does not extend around the lower portion of cyclone 122, then the upper wall of nozzle 112 may be part of a lower wall of cyclone 122.

Preferably, in the example shown, the nozzle 112 is fixedly positioned at the lower portion 106 of the vacuum cleaner 100. That is, the nozzle 112 is not movable (e.g., rotatable) with respect to the remainder of the vacuum cleaner 100, and is fixed at the lower portion 106 of the vacuum cleaner 100.

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As shown in Figures 3 and 5, nozzle 112 has a width WN, and cyclone unit 114 has a width WC. In the example shown, WN, and WC are about the same. An advantage of this design is that the nozzle may have a cleaning path that is essentially as wide as the hand vacuum itself.

Preferably, nozzle 112 comprises an airflow chamber wherein at least a portion, and preferably a majority, of the lower surface of the chamber is open. In an alternate design , the nozzle may comprise a lower wall, which closes the lower end. Accordingly, nozzle 112 may be of various design and may be an open sided passage or a closed passage.

Nozzle 112 may also share a common wall with another component of cyclone unit 114. As exemplified in Figure 7, nozzle 112 comprises an upper nozzle wall 126, which defines a closed upper end of the airflow chamber 136. In the example shown, the upper nozzle wall 126 comprises a lower portion 119 of a wall 115 of the cyclone unit.

Preferably, one or more depending walls 128 extend downwardly from the upper nozzle wall 126. The depending wall is preferably generally U-shaped. In one embodiment, depending wall is provided rearward of opening 138. In other embodiments, depending walls may alternately or in addition be provided on the lateral sides of opening 138. It is preferred that depending walls are provided on each lateral side of opening 138 and rearward thereof. Further, depending walls 128 may extend a substantial distance to the front end 108 and, preferably, essentially all the way to front end 108. The depending walls may be continuous to define a single wall as shown, or may be discontinuous. The depending walls are preferably rigid (e.g., integrally molded with cyclone unit 114). However, they may be flexible (e.g., bristles or rubber) or moveably mounted to cyclone unit 114 (e.g., hingedly mounted).

Preferably, the lower end 132 of depending wall 128 is spaced above the surface being cleaned when the hand vacuum cleaner is placed on a

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surface to be cleaned. As exemplified in Figure 6, when vacuum cleaner 100 is placed on floor F, lower end 132 of depending wall 128 is spaced a distance H above the floor. Preferably distance H is from 0.01 to 0.175 inches, more preferably from 0.04 to 0.08 inches.

The height of the depending wall (between upper nozzle wall 126 and lower end 132) may vary. In some examples, the depending wall may have a height of between about 0.05 and about 0.875 inches, preferably between about 0.125 and about 0.6 inches and more preferably between about 0.2 and about 0.4 inches. The height of depending wall may vary but is preferably constant.

As exemplified, the open end of the U-shape defines an open side 130 of the nozzle 112, and forms the dirty air inlet 118 of the cleaner 100. In the example shown, the open side 130 is provided at the front of the nozzle 112. In use, when optional wheels 135 are in contact with a surface, the open side 130 sits above and is adjacent a surface to be cleaned (e.g. floor F). Preferably, lower end 132 of depending walls 128 is spaced above floor F. Accordingly, some air may enter nozzle 112 by passing underneath depending wall 132. In such a case, the primary air entry to nozzle 112 is via open side 130 so that dirty air inlet 118 is the primary air inlet, with a secondary air inlet being under depending wall 128. In the example shown, the lower end 132 of the depending wall 128 defines an open lower end 134 of the nozzle 112. The open lower end 134 preferably extends to the front 108 of the cleaner 108, and merges with the open side 130.

In use, the exemplified nozzle has an open lower end 134 that faces a surface to be cleaned. In the example shown, a plurality of wheels 135 are mounted to the depending wall 128, and extend lower than the lower end 132 of the depending wall 128. Accordingly, in use, when wheels 135 are in contact with a surface, the lower end 132 of the depending wall 128 is spaced from a surface to be cleaned, and the space between the lower end of the depending wall 128 and the surface to be cleaned form a secondary dirty air inlet to the

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vacuum cleaner 100. It will be appreciated that wheels 135 are optional. Preferably, wheels 135 are positioned exterior to the airflow path through nozzle 112, e.g., laterally outwardly from depending wall 128. Preferably a pair of front wheels 135 is provided. Preferably, the wheels are located adjacent front 108. Optionally, one or more rear wheels 108 may be provided. In an alternate embodiment, no wheels may be provided.

The upper nozzle wall 126, depending wall 128, and open lower end 134 of the nozzle 112 define an open sided airflow chamber 136 of the nozzle. In use, when wheels 135 are in contact with a horizontal surface, the nozzle 112 and the airflow chamber 136 extend generally horizontally, and preferably linearly along a nozzle axis 113 (see Figure 7).

An opening 138 is provided in the upper nozzle wall 126, and is in communication with the airflow chamber 136. Opening 138 may be of any size and configuration and at various locations in upper nozzle wall 126. In use, when wheels 135 are in contact with a surface, the opening 138 faces a surface to be cleaned, air enters the dirty air inlet 118, passes horizontally through the airflow chamber 136, and passes into the opening 138. Opening 138 is in communication with a cyclone inlet passage 139, which is in communication with an air inlet 140 of cyclone 122.

Referring to Figures 5 and 6, cyclone 122 comprises a longitudinally extending sidewall 142. In the example shown, the longitudinally extending sidewall 142 is substantially cylindrical. The cyclone chamber is located inside chamber wall 142. The cyclone 122 extends along a longitudinal axis 123. Preferably, as shown, axis 123 is parallel to the nozzle axis, and extends generally horizontally when cleaner 100 is in use and wheels 135 are seated on a surface.

Cyclone 122 further comprises an air inlet 140, and an air outlet 145. The cyclone air inlet and cyclone air outlet may be of any configuration

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known in the art. The cyclone 122 further comprises an open end 147. The open end 147 comprises a dirt outlet 146 of the cyclone 122.

As exemplified, the cyclone air inlet 140 is defined by an aperture in the chamber wall 142. As can be seen in Figure 5, the inlet passage 139 is at configured such that air enters the cyclone 122 in a tangential flow path, e.g., passage 139 may be arcuate. The air travels in a cyclonic path in the cyclone, and dirt in the air is separated from the air. The air exits the cyclone via an outlet passage 144, which is in communication with outlet 145. The dirt that is separated from the air exits the cyclone via dirt outlet 146 defined by open end 147, and enters dirt chamber 124.

As exemplified in Figure 6, a shroud 174 may be provided adjacent outlet passage 144, spaced from and facing the inlet 176 to outlet passage 144. Shroud 174 may be mounted to cyclone 122 via legs 178. In the example shown, shroud 174, and legs 178 form an assembly 182 that is removably mounted in cyclone 122. In some examples, a screen may be mounted around legs 178. Shroud 174 may be of any design.

As noted hereinabove, the open end 147 of the cyclone 122 is in communication with a dirt chamber 124. In the example shown, dirt chamber 124 comprises two portions. A first portion 148 is provided forwardly of the dirt outlet 146. A second portion 150 is concentric with the cyclone 122, and surrounds at least a portion of the cyclone 122. A lower portion 152 of the second portion 150 is below the cyclone. As exemplified, nozzle 112 is positioned below first portion 148, and lower portion 152.

Preferably, the surface cleaning apparatus comprises a plate 154 facing the open end 147 of the cyclone. Preferably, the plate 154 has a cyclone side 155 facing the open end 147, and a dirt bin side 157 facing front wall 158. The cyclone side 155 is preferably planar. For example, as exemplified, cyclone side may be oriented to be perpendicular to the cyclone axis 123. Preferably,

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plate 123 is spaced for the open end of the cyclone. Preferably, the diameter of plate 154 and the diameter of the open end are about the same. The plate may be slightly smaller and/or slightly larger (e.g., +/- 10%).

As shown, plate 154 may be provided in the dirt chamber 124, and is spaced from a front wall 158 at the front 108 of the cleaner. Accordingly, the first portion 148 of dirt chamber 124 is provided between dirt bin side 157 of plate 154 and a front end wall 158 of the surface cleaning apparatus.

Preferably, the plate is positioned to define a gap 171 between the plate 154 and the open end 147 of the cyclone 122. More preferably, the gap has a variable length in the direction of the longitudinal axis 123 of the cyclone 122.

For example, as shown in Figures 5 and 6, the sidewall 142 of cyclone 122 has a variable length. That is, as shown, a first portion 184 of the sidewall 142 is longer than a second portion 186 of the sidewall. Accordingly, in this embodiment, the variable length of the sidewall of the cyclone provides the variable length of the gap.

In the embodiment shown, first portion 184 of the sidewall 142 has a first length L1A, and second portion 186 of the sidewall 142 has a second length L2A. Accordingly, the gap has a first length L1B adjacent the first portion 184 of the sidewall, and a second length L2B adjacent the second portion 186 of the sidewall. In the embodiment shown, the second length L2A is greater than the first length L1A. Accordingly, the first length L1B of the gap 171 is greater than the second length L2B of the gap 171.

Preferably, the first length L1A of the first portion 184 and the first length L2A of the second portion are constant. More preferably, the first length L1B of the gap 171 and the second length L2B of the gap 171 are constant. In alternate embodiments, however, one or both of the first length L1B of the gap 171 and the second length L2B of the gap 171 may be variable.

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In the exemplified embodiment, sidewall 142 has a first end 188 at open end 147, and a second end 190 opposed to the first end. The first end has a perimeter. Preferably, in embodiments wherein the first length L1A and the second length L2A are constant, one of first portion 184 and second portion 186 extends up to 210o of the perimeter. For example, the first portion 184 may extend up to 210o of the perimeter. For example, as shown, first portion 184 extends for about 180o of the perimeter (indicated by arrow P1) and the second portion 186 extends for about 180o of the perimeter (indicated by arrow P2).

In alternate embodiments, wherein the first length L1A and/or the second length L2B are variable, one of first portion 184 and second portion 186 preferably extends up to 240o of the perimeter. For example, the first portion may comprise 240o of the perimeter, and the second portion may comprise 120o of the perimeter. In such an embodiment, the face of the wall facing the open end of the cyclone may extend upwardly at an angle.

It will be appreciated that in alternate embodiments, a cyclone 122 having a variable length may be useful, even if a plate 154 is not provided.

Alternately or in addition, as exemplified in Figures 9 and 10, the plate 154 may have a plate sidewall 153 extending towards the open end 147. Preferably, the plate sidewall 153 is at the periphery of the plate. In the embodiment shown, the plate sidewall 153 extends part way around the plate 154. Accordingly, in this embodiment, the space between the plate sidewall and the open end of the cyclone defines the variable length of the gap, and gap 171 has a first length L1B between the plate 154 and the end 188 of cyclone 122, and a second length L2B between the sidewall 153 and the end 188 of cyclone 122 that is less than the first length L1B

In some embodiments, as shown, the sidewall 153 of the plate 154 has a constant length.

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In a alternate embodiments, the plate sidewall 154 may extend all the way around the plate 154, and may have a variable length.

Plate 154 may be mounted by any means to any component in cyclone unit 114. As exemplified, the separation plate is mounted on an arm 156, which extends from a front wall 158 at the front 108 of the cleaner 100.

Cyclone unit 114 may be emptied by any means known in the art. For example, one of the ends of the cyclone unit 114 may be openable. As exemplified in Figures 4 and 5, front wall 158 is pivotably mounted to the cyclone unit wall 115, such that cyclone unit 114 may be opened, and dirt chamber 124 may be emptied. When front wall 158 is pivoted away from the remainder of the cyclone unit 114, separation plate 154 and arm 156 also pivot away from the remainder of the cyclone unit. A latch 159 is provided, which secures front wall 158 to wall 115. In alternate examples, front wall 158 may be removable from cyclone unit wall 115 or the opposed end of the cyclone unit 114 may be openable.

The clean air exiting cyclone 122 passes through outlet passage 144, exits surface cleaning head 116, and passes into the cleaner body 160. The air exiting the cyclone may be subjected to one or more treatment stages (e.g., cyclonic and/or filtration). In the example shown, a cleaner body 160 is positioned rearward of the surface cleaning head 116. The cleaner body comprises a housing 161, which preferably houses an optional pre-motor filter assembly 162, a suction motor 164, and an optional post-motor filter 166.

In the exemplified embodiments, the vacuum cleaner has a linear configuration. Accordingly, pre-motor filter assembly 162 is preferably provided in the airflow path adjacent and downstream of the outlet passage 144. Pre-motor filter assembly 162 serves to remove remaining particulate matter from air exiting the cyclone 122, and may be any type of filter, such as a foam filter. One or more filters may be used, as shown. If the vacuum cleaner is of a non-linear

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configuration, then pre-motor filter assembly 162 need not be located adjacent outlet passage 144.

Suction motor 164 is provided in the airflow path preferably adjacent and downstream of the pre-motor filter 162. The suction motor draws air into the dirty air inlet 118 of the cleaner 100, through the airflow path past the suction motor 164, and out of the clean air outlet 120. The suction motor 164 has a motor axis 165. In the example shown, the motor axis 165 and the cyclone axis 122 extend in the same direction and are generally parallel. The suction motor 164 may be any type of suction motor. If the vacuum cleaner is of a non-linear configuration, then motor 164 need not be located adjacent pre-motor filter 162.

Post motor filter 166 is provided in the airflow path downstream of, and preferably adjacent, the suction motor 164. Post motor filter serves to remove remaining particulate mater from air exiting the cleaner 100. Post-motor filter 166 may be any type of filter, such as a HEPA filter.

Clean air outlet 120 is provided downstream of post-motor filter 166. Clean air outlet 120 comprises a plurality of apertures preferably formed in housing 161.

Preferably, as in the example shown, cleaner body 160 is removably mounted to surface cleaning head 116. For example, cleaner body 160 may be entirely removable from surface cleaning head 116, or pivotably mounted to surface cleaning head 116. Accordingly, cleaner body 160 and surface cleaning head 116 may be separated in order to provide access to the interior of cleaner body 160 or surface cleaning head 116. This may allow pre-motor filter assembly 162 to be cleaned, changed, or serviced, or motor 164 to be cleaned, changed or serviced. Alternately, or in addition, surface cleaning head 116 may be cleaned or serviced. For example, any dirt stuck in outlet passage 144 may be removed. Alternately, a replacement cleaner body 160 or

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surface cleaning head 116 may be provided, and may be mounted to an existing surface cleaning head 116 or cleaner body 160, respectively. If no filter element is fixedly mounted to cleaning head 116, then cleaning head 116 may be removed and washed with water.

As can be seen in Figure 6, housing 161 preferably comprises a first portion 168 housing pre-motor filter assembly 162, and suction motor 164, and a second portion 170 housing post-motor filter 166. Second portion 170 is openable, such as by being removably mounted to first portion 168, such that post-motor filter 166 may be cleaned, changed, or serviced.

One or more additional rear wheels 180 may be mounted to housing 161, preferably at lower portion 106, and may be used in conjunction with wheels 135. Preferably, a single rear wheel 180 is provided. Preferably, rear wheel 180 is located on a centre line of the vacuum cleaner and rearward of the depending wall 128.

As mentioned hereinabove, surface cleaning apparatus 100 is a preferably a portable vacuum cleaner 100, as shown in Figures 1 to 7.

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CLAIMS:

1) A hand vacuum cleaner comprising:

a) an air flow passage extending from a dirty air inlet to a clear air outlet;

b) a main body comprising a suction motor positioned in the air flow passage, a front end, a rear end and a handle, the suction motor having a suction motor inlet end that faces the front end of the main body; and,

c) a cyclone unit positioned in the air flow passage upstream from the suction motor and comprising a first cyclonic stage comprising a cyclone chamber and a dirt chamber, the cyclone unit removably mounted to the front end of the main body wherein the first cyclonic stage faces towards the suction motor inlet end.

2) The hand vacuum cleaner of claim 1, wherein the front end is spaced forwardly from the rear end in a forward direction and the cyclone unit is removable from the main body in the forward direction.

3) The hand vacuum cleaner of claim 1, further comprising a pre-motor filter positioned in the air flow passage and facing the suction motor inlet end, wherein when the cyclone unit is mounted to the front end of the main body the pre-motor filter is disposed between the cyclone chamber and the suction motor.

4) The hand vacuum cleaner of claim 3, wherein the pre-motor filter is exposed when the cyclone unit is removed from main body.

5) The hand vacuum cleaner of claim 1, further comprising a pre-motor filter positioned in the air flow passage, the suction motor has a motor rotation axis

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and air flowing thorough the pre-motor filter travels in a direction that is generally parallel to the motor rotation axis.

6) The hand vacuum cleaner of claim 1, wherein the front end is spaced forwardly from the rear end in a forward direction and the suction motor has a motor rotation axis that extends in the forward direction and a projection of the motor rotation axis intersects the cyclone unit.

7) The hand vacuum cleaner of claim 6, wherein the motor rotation axis intersects the cyclone chamber.

8) The hand vacuum cleaner of claim 6, wherein air exiting the cyclone unit travels in a direction that is generally parallel to the motor rotation axis.

9) The hand vacuum cleaner of claim 1, wherein the suction motor has a motor rotation axis, the cyclone chamber has a longitudinal axis and the longitudinal axis and the motor rotation axis are generally parallel.

10) The hand vacuum cleaner of claim 1, wherein the dirt chamber has a sidewall terminating at an open end, the open end is closed by an openable door, wherein all of the open end is opened when the door is in an open position.

11) The hand vacuum cleaner of claim 1, further comprising a second cyclonic stage downstream from the first cyclonic stage.

12) A hand vacuum cleaner comprising:

a) an air flow passage extending from a dirty air inlet to a clear air outlet;

b) a main body comprising a suction motor positioned in the air flow passage and a handle provided on the top of the main body with a grip portion

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provided between a lower surface of the handle and an upper surface of the main body, the suction motor having a suction motor axis extending in a forward/rearward direction and a suction motor inlet end, the handle extending in the forward/rearward direction and having a front end, a rear end and a handle length that is greater than a length of the suction motor in the forward/rearward direction; and,

c) an air treatment member positioned in the air flow passage upstream from the suction motor and, the air treatment member removably mounted at the suction motor inlet end of the main body.

13)The hand vacuum cleaner of claim 12, wherein the air treatment member has a unit length in the forward/rearward direction that is less than the handle length.

14)The hand vacuum cleaner of claim 12, wherein the air treatment member comprises a cyclone unit comprising a cyclone chamber.

15)The hand vacuum cleaner of claim 14, wherein the cyclone chamber has a cyclone axis about which air circulates within the cyclone chamber and a cyclone chamber length along the cyclone axis that is less than the handle length.

16)The hand vacuum cleaner of claim 12, further comprising a pre-motor filter facing the suction motor inlet end, wherein when the air treatment member is mounted to the main body, the pre-motor filter is disposed between the suction motor and the air treatment member.

17)The hand vacuum cleaner of claim 12, wherein the air treatment member is mounted directly to the main body.

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18)A hand vacuum cleaner comprising:

a) an air flow passage extending from a dirty air inlet to a clear air outlet;

b) a main body positioned in the air flow passage and comprising a front end, a rear end, a handle and a motor housing containing a suction motor having a suction motor axis extending in a forward/rearward direction, the motor housing having a first support member; and,

c) a cyclone unit positioned in the air flow passage upstream from suction motor and comprising a cyclone chamber and a dirt chamber, the cyclone unit removably mounted to a front end of the main body and comprising a second support member;

wherein when the vacuum cleaner is placed on a horizontal surface, the vacuum cleaner is supported on the first and second support members and the suction motor axis is substantially horizontal.

19)The hand vacuum cleaner of claim 18, wherein the second support member is removable from the main body with the cyclone unit.

20)The hand vacuum cleaner of claim 18, wherein the second support member is provided on an outer surface of a dirt chamber sidewall.

21)The hand vacuum cleaner of claim 20, wherein the second support member is integrally formed with the dirt chamber sidewall.

22)The hand vacuum cleaner of claim 18, wherein when the vacuum cleaner is resting on the horizontal surface the, first support member underlies the suction motor.

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23)The hand vacuum cleaner of claim 22, wherein when the vacuum cleaner is resting on the horizontal surface, the second support member underlies the dirt chamber.

24)The hand vacuum cleaner of claim 18, further comprising a pre-motor filter positioned axially between the cyclone chamber and the suction motor and positioned in the air flow passage upstream from the suction motor, and a post-motor filter positioned axially between the suction motor and the rear end of the main body and positioned in the air flow passage downstream from the suction motor, wherein the first support member is positioned axially between the pre-motor filter and the post-motor filter.

25)The hand vacuum of claim 24, wherein the second support member is positioned axially forward of the pre-motor filter.

26)The hand vacuum cleaner of claim 18, wherein a portion of the vacuum cleaner has a generally round cross-sectional shape taken in a plane that is orthogonal to the suction motor axis.

27)A hand vacuum cleaner comprising:

a) an air flow passage extending from a dirty air inlet to a clear air outlet;

b) a main body comprising a motor housing containing a suction motor positioned in the air flow passage and having a suction motor axis extending in a forward/rearward direction, a front end, a rear end and a handle; and,

c) an air treatment member positioned in the air flow passage upstream from the suction motor, the air treatment member is removably mounted to a suction motor inlet end of the main body, the air treatment member having

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a dirt chamber having a height in a direction orthogonal to the suction motor axis; and,

d) a pre-motor filter provided in the air flow passage upstream from the suction motor in the forward/rearward direction when the air treatment member is mounted to the motor housing, the pre-motor filter having a height in a direction orthogonal to the suction motor axis that is about the same as the height of the dirt chamber.

28) The hand vacuum cleaner of claim 27, wherein the air treatment member comprises a cyclone chamber and the dirt chamber and the cyclone chamber remains closed when separated from the pre-motor filter.

29) The hand vacuum cleaner of claim 27, wherein the pre-motor filter covers the entire suction motor inlet end of the main housing.

30) The hand vacuum cleaner of claim 27, wherein the air treatment member comprises a cyclone chamber and the dirt chamber, the cyclone chamber has a cyclone axis about which air circulates within the cyclone chamber and a cyclone cross-sectional area taken in a plane orthogonal to the cyclone axis, wherein the pre-motor filter has a cross-section area taken in a plane that is orthogonal to the motor axis that is larger than the cyclone cross-sectional area.

31) The hand vacuum cleaner of claim 27, wherein the dirt chamber has an openable end that has a height in a direction that is orthogonal to the suction motor axis and the height of the pre-motor filter pre that is about the same as the height of the openable end.

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32)The hand vacuum cleaner of claim 27, wherein the handle extends between a handle front end and a handle rear end, and the handle front end is positioned forward of the suction motor.

33)The hand vacuum cleaner of claim 27, further comprising a post-motor provided in the air flow passage downstream from the suction motor and covering a rear end of the suction motor.

34)The hand vacuum cleaner of claim 32, wherein air travelling through the pre-motor filter flows in the same flow direction as air travelling through the post-motor filter.

35)The hand vacuum cleaner of claim 34, wherein the flow direction is generally parallel to the motor axis.

36)A hand vacuum cleaner comprising:

a) an air flow passage extending from a dirty air inlet to a clear air outlet;

b) a main body comprising a front end, a rear end, a handle and a motor housing containing a suction positioned in the air flow passage and having a suction motor axis extending in a longitudinal direction; and,

c) an air treatment unit positioned in the air flow passage upstream form the suction motor and comprising an air treatment chamber and a dirt chamber, the dirt chamber comprises a longitudinally extending sidewall extending from a first chamber end to a free edge at a second chamber end, the free edge of the sidewall defining an opening that is closeable by an openable door and the free edge extends in a direction that is inclined relative to the longitudinal direction of the sidewall.

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37) The hand vacuum of claim 36, wherein the free edge of the sidewall defines a perimeter of the opening and substantially the entire perimeter lies in a plane that is inclined relative to the longitudinal direction.

38) The hand vacuum of claim 36, wherein when the hand vacuum cleaner is oriented such that the suction motor axis is horizontal, an upper portion of the free edge of the dirt chamber sidewall is offset from a lower portion of the free edge of the dirt chamber sidewall in the longitudinal direction.

39) The hand vacuum cleaner of claim 38, wherein the openable door has a first end which rotates relative to the dirt chamber sidewall and an opposed securable end that is securable to the dirt chamber sidewall by a lock and the securable end is located rearwardly of the first end.

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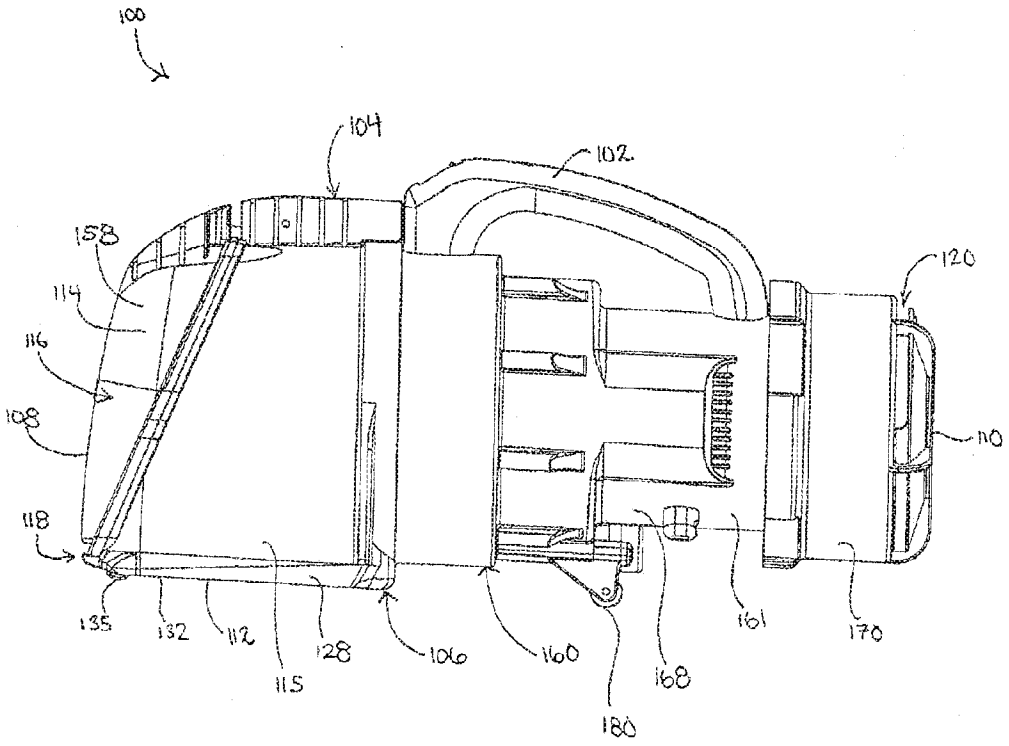

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FIG. 1

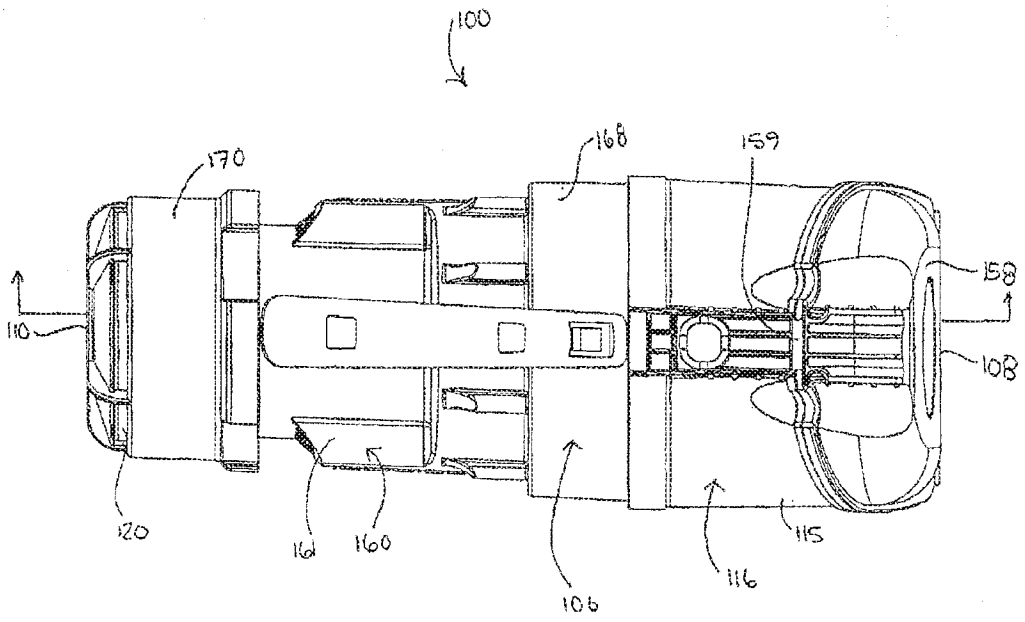


Fig. 2

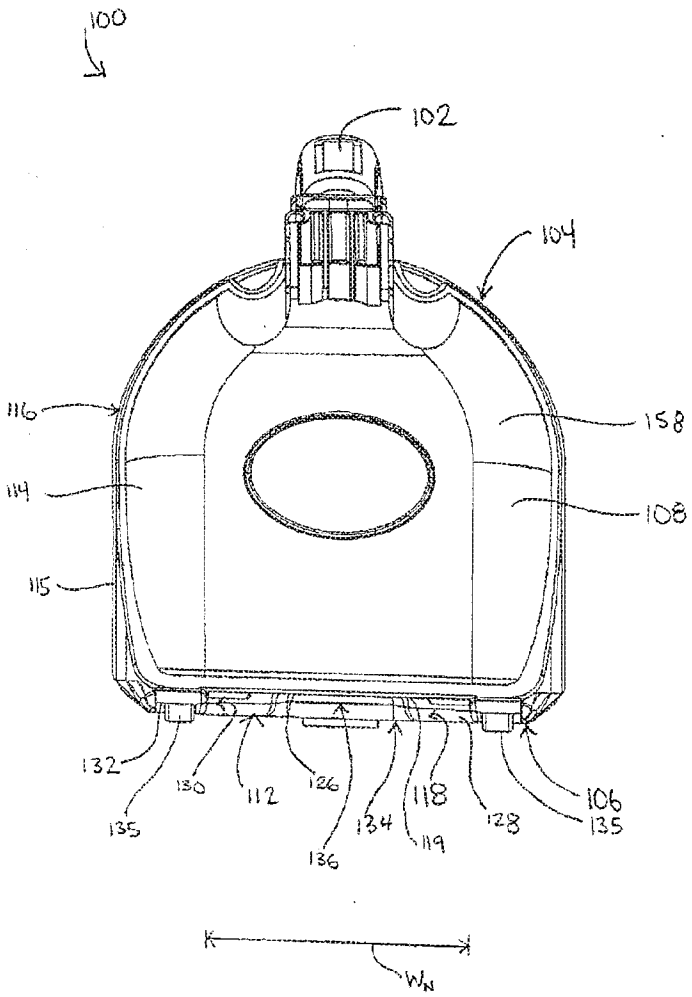

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Fig. 3

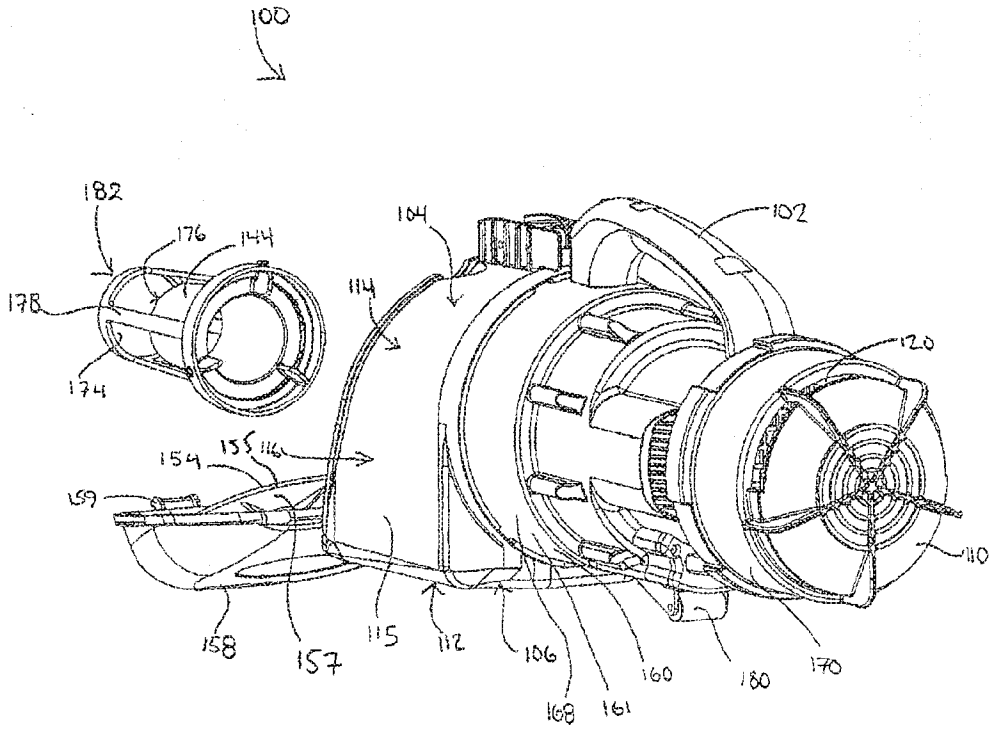

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Fig.4

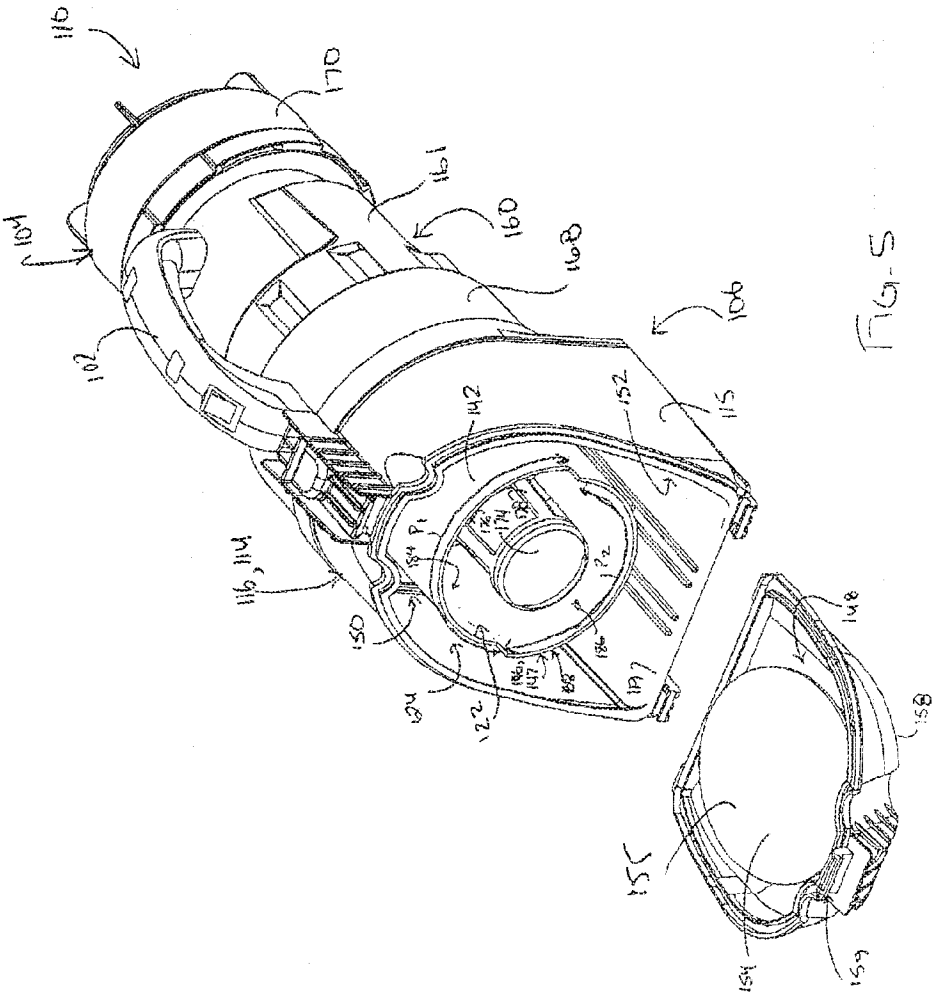

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FIG. 5

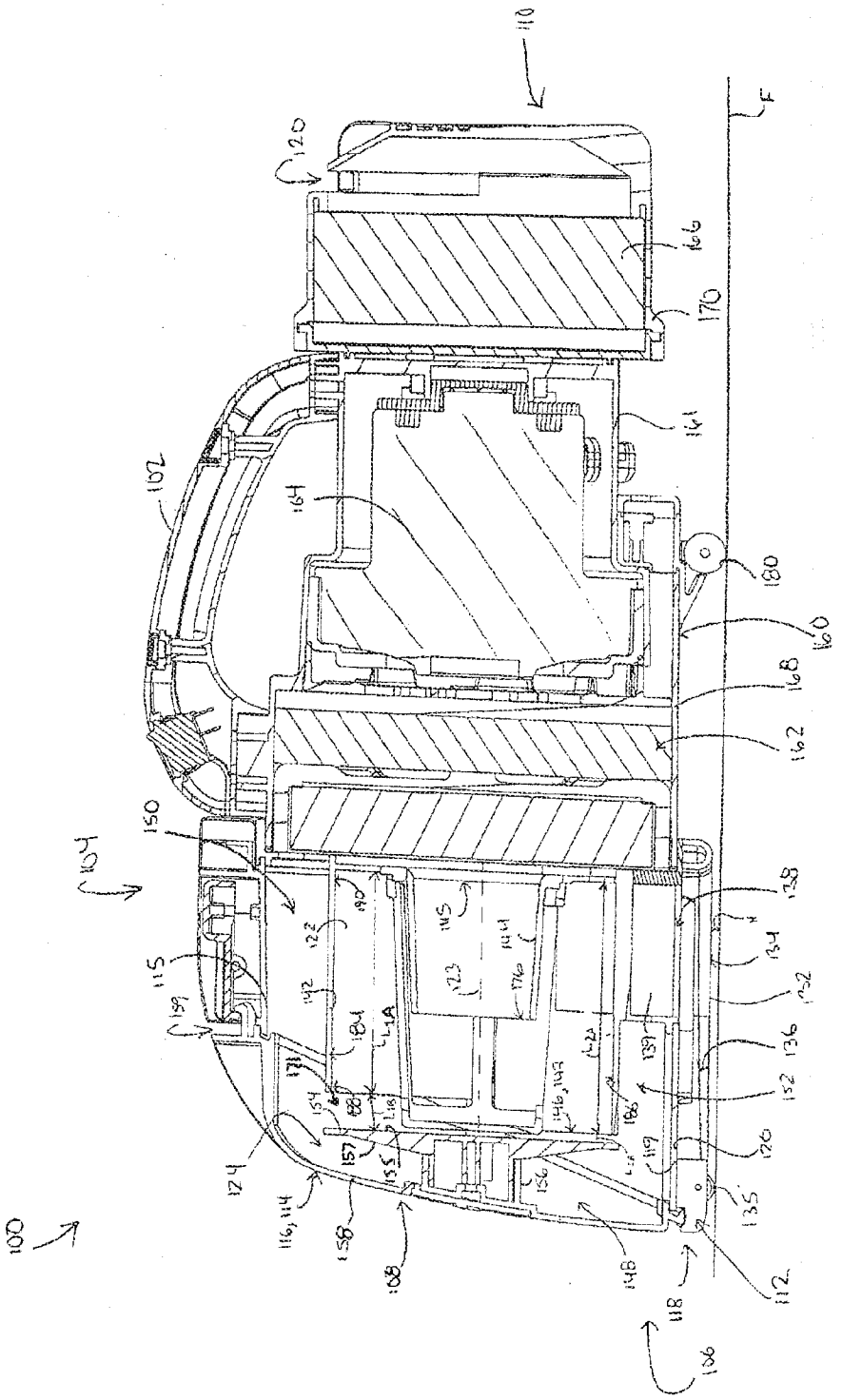

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Fig. 6

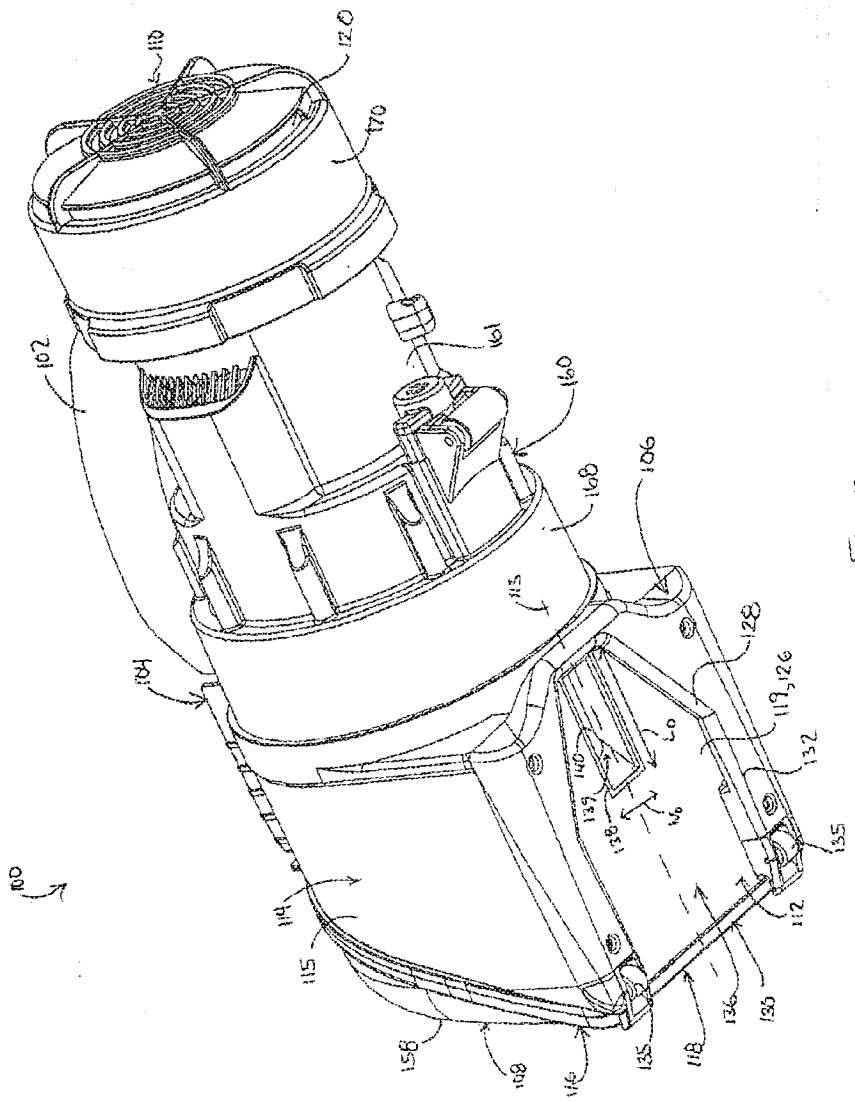

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FIG. 7

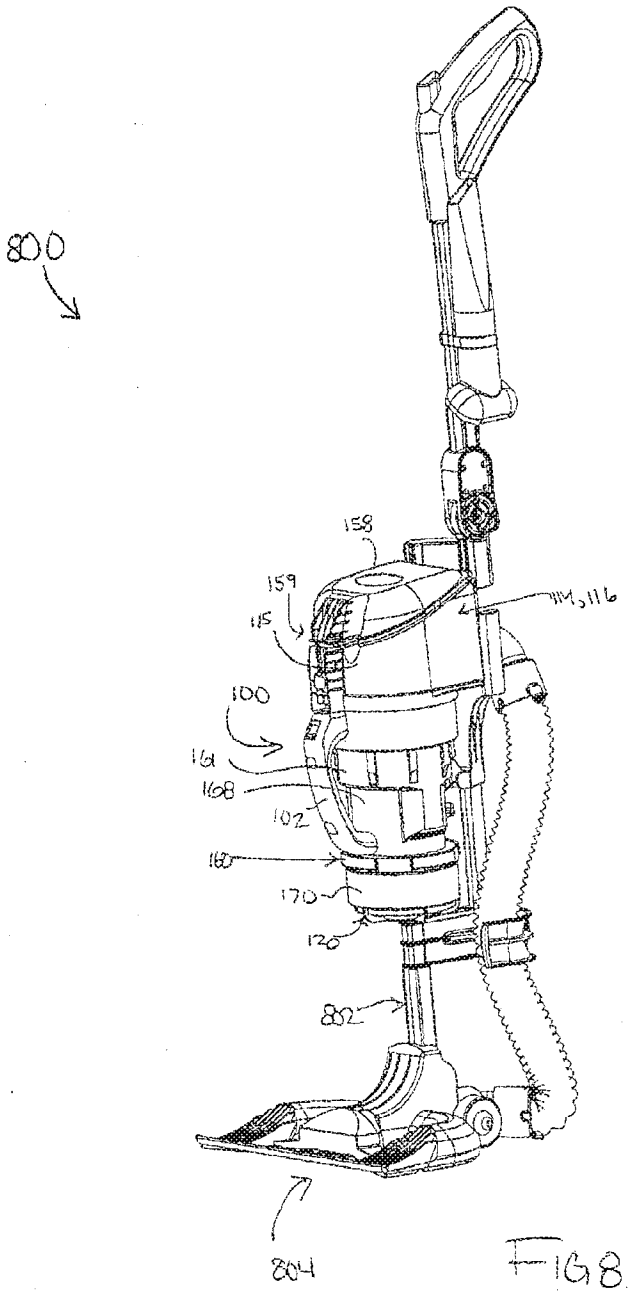


FIG 8

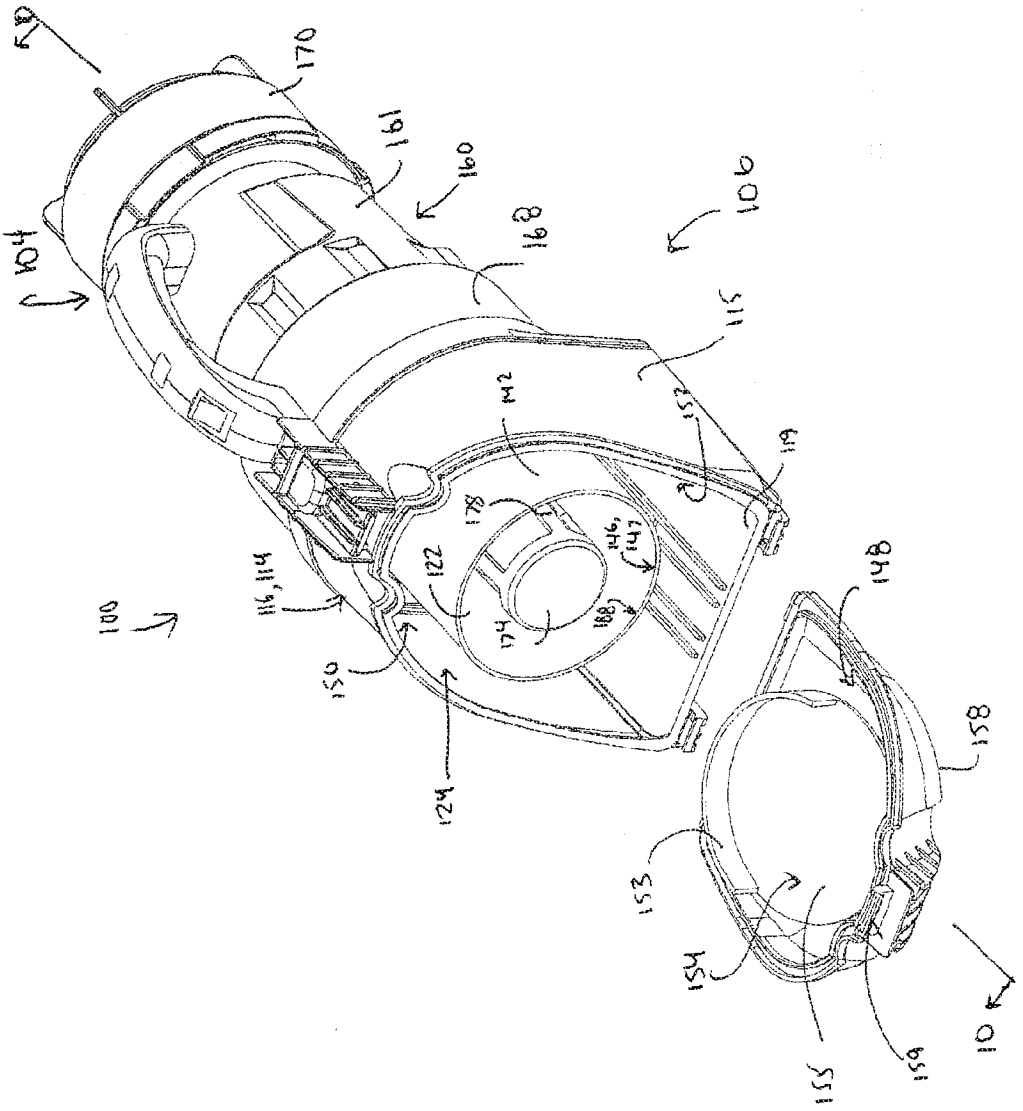

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Fig. 9

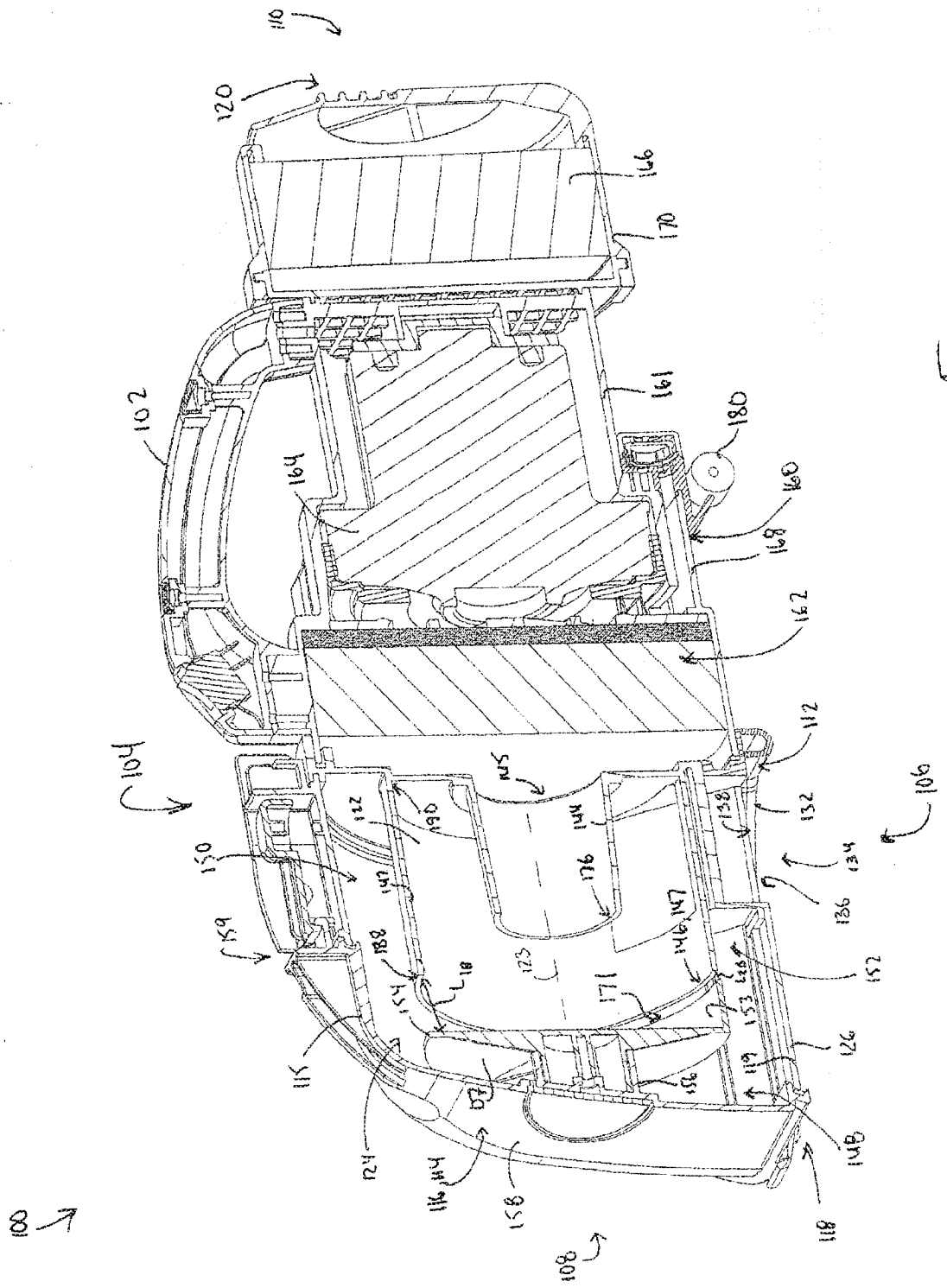
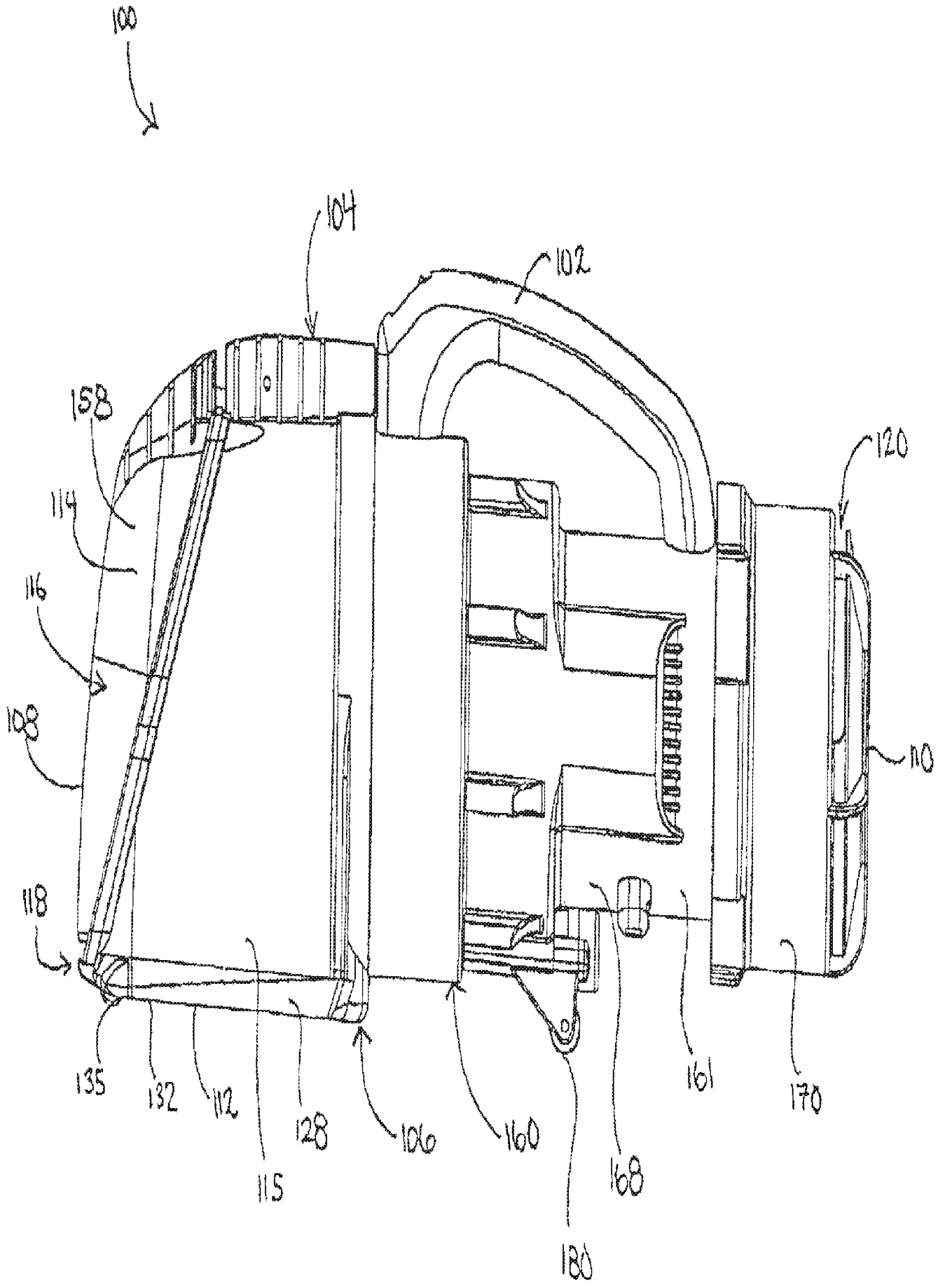

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FIG. 10



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Hand-guided electrical vacuum cleaner operating method, involves driving blower by electric motor, and blowing suction air emerging from rough dirt strainer for separation of fine dust still contained in suction air into filter bag

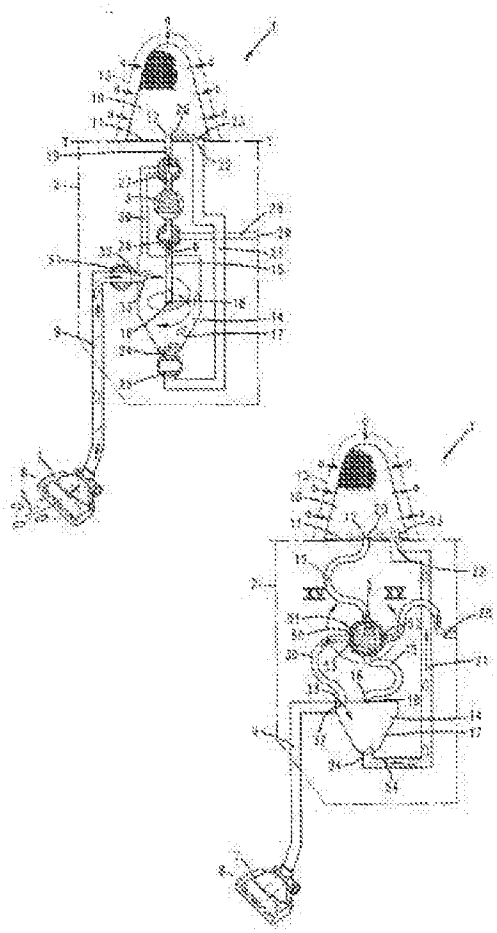
Page bookmark	DE102009041728 (A1) - Hand-guided electrical vacuum cleaner operating method, involves driving blower by electric motor, and blowing suction air emerging from rough dirt strainer for separation of fine dust still contained in suction air into filter bag
Inventor(s):	MEGGLE MARTIN [DE]; LIS RAPHAEL [DE]; ZACHOS ALEXANDROS [DE] ±
Applicant(s):	VORWERK CO INTERHOLDING [DE] ±
Classification:	- international: ***A47L9/10***
	- cooperative: A47L5/24; A47L9/106; A47L9/14; A47L9/16
Application number:	DE20091041728 20090916
Priority number(s):	DE20091041728 20090916 ; DE200810644O7 20081222

Abstract of DE102009041728 (A1)

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The method involves driving a blower (3) by an electric motor, and sucking air through a suction opening. A suction air flow is led by a rough dirt strainer (14) with a rough dirt container (17). Suction air emerging from the rough dirt strainer is blown for separation of fine dust still contained in the suction air into a filter bag (10). The suction air is blown for emptying the rough dirt container and delivered coarse dirt is incorporated into the filter bag. Rough dirt is transported by the suction air passed into the rough dirt container into a receiver container in a cleaning station. An independent claim is also included for a displaceable vacuum cleaner device including a blower operated by electric motors.

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DESCRIPTION DE102009041728

[0001]

The invention first relates to a method of operating a vacuum cleaner is a electric motor-driven fan and a suction port through which sucked, the suction air stream is passed through a coarse sediment bowl with associated coarse dirt container.

[0002]

The method of the type in question are known. About the APPLIED BY hoover side blower suction air is removed from the surface to be processed through the suction port of dust and dirt and supplied a arranged in the vacuum cleaner coarse sediment bowl. In this regard are known for separating coarse dirt cyclone separator. In these centrifugal forces acting achieves a separation of coarse dirt particles, according to which are collected in one, the trap associated with bulk waste container. The freed of the coarse dirt suction occurs thereafter made from the coarse sediment bowl. That the Saugluftstromströmung causing fan is mostly seen in the flow direction provided behind the coarse sediment bowl.

[0003]

In view of the prior art described above, a technical problem of the invention is seen to improve a vacuum cleaner of the type in question, in particular with regard to its filter properties.

[0004]

This problem is solved first and foremost by the subject matter of claim 1, wherein based on the fact that the coming out of the coarse sediment bowl suction air for the separation of fine dust still comprised therein is blown into a filter bag. In consequence of the proposed method is achieved an improved cleaning of the dirt-laden suction air. The filter bag is preferably terminally, d. H. in suction air located downstream of the fan, consequently on the surface of the air-permeable filter bag, the filtered suction air is blown out over a large area. The filter bag is here preferably a HEPA filter material further optionally also for odor reduction activated carbon or an activated charcoal filter layer comprising. In addition, achieved by the proposed method, a separate collecting coarse dirt and fine debris. Approximately sucked coarse parts such as decorative pieces or play building blocks are secreted in the abscheiderseitigen bulk waste container, which more preferably the same for review and is obviously to control the recorded coarse dirt.

The fine dust filter bag is receiving in conventional manner removable from the vacuum cleaner or removable therefrom, to feed this to disposal.

[0005]

Further features of the invention are given below, in the description of the figures, often described in their preferred allocation to the subject matter of claim 1 or features of other claims. but you can also be an assignment to only individual features of claim 1 or the respective further claim or each independently of meaning.

[0006]

The bulk waste container for emptying example openable optionally removable from the vacuum cleaner for disposal of coarse dirt in a waste container. In a preferred embodiment, it is provided that for emptying the coarse dirt container suction air is blown through the bulk waste container and thus be transmitted coarse dirt is entered into the filter bag. Accordingly, the emptying of the bulk waste container is provided internally within the vacuum cleaner, this example triggered by user interaction, switched via a device-side control unit that triggers the emptying process, for example, depending on

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the level of the bulk waste container, further alternatively time-dependent. The suction air, d. H. The drawn through a device port from the ambient air is directed to the emptying of the bulk waste container that data collected in the container coarse dirt particles entrained and is supplied to the serving the usual suction, d. H. In conventional floor cleaning operation of the dust collection filter bag.

The latter includes hereafter accordingly both fine and coarse dirt particles, which latter are fed through a conventional filter bag change a disposal. The not directly affected in the usual vacuum cleaner operation of the suction air coarse dirt container thereof is specifically applied for emptying by suction, this such that the coarse dirt particles are blown out. This is in one embodiment achieved through a targeted circuit of Saugluftwege, for example by means provided switching valves.

[0007]

In an alternative embodiment, the injection of the suction air in the coarse dirt container is made by means of a reverse rotation of the fan. Accordingly, the intake air flow is in the range of the fan according to a change of rotation thereof by 180 ° opposite to the conventional, prevailing in the vacuum cleaner operation flow directed so that further example through the usual Staubsaugbetrieb the air outlet from the coarse sediment bowl serving flow channel for emptying the coarse dirt container from the area sucked air is blown. The reverse rotation of the fan is achieved for example by a polarity reversal, according to a rotation direction reversal of the impeller is effected. The fan is in this case in accordance with a reverse fan. Alternatively, the fan may also, for example, received in a fluid-tight capsule, are rotated by a total of 180 ° by reversing the flow direction with constant direction of rotation of the impeller.

Also is possible to reverse the direction of rotation of the suction air a rearrangement of Saugleitungsabschnitte the blower.

[0008]

In addition, an embodiment is advantageous in which a cleaning station is provided, wherein the vacuum cleaner to empty the bulk waste container is connected to the cleaning station and the coarse dirt is transported by means of the introduced into the coarse dirt container suction air in a receptacle in the cleaning station proves this more preferably by blowing suction air into the coarse dirt container, further, for example by reversing the rotation direction hoover side blower. Alternatively, the cleaning station is provided with a suction fan for emptying the coarse dirt container. Accordingly, a cleaning of the coarse dirt container is in an external receptacle. The evacuation process can be triggered in this case automatically with docking of the vacuum cleaner to the cleaning station, alternatively user-triggered after the connection. Independently of this, is alternatively opened by insertion of the emptying process directly with the docking of the vacuum cleaner to the cleaning station, access to the bulk waste container.

The fine dust filter receiving bag is in this connection preferably further designed as a disposable filter which is disposed of separately, depending on the degree of filling and / or a function of a retention time in the vacuum cleaner.

[0009]

in a development of the subject invention is provided that is transferred by connecting the vacuum cleaner to the cleaning station of the filter bag or a total of particulate matter contained in the filter bag into the cleaning station. As is feasible with the terminal of the vacuum cleaner in the cleaning station, both a drain of the coarse dirt container and a disposal of the filter bag or its contents. In the event of disposing of the fine dust contained in the filter bag it is blown according to the emptying of the bulk waste container, this further. For example, by blowing suction air into the filter bag, which further lends itself for example in permanent filters, d. H. Not exchangeable filters

[0010]

The method described above finds particular application in vacuum cleaners, in particular a domestic vacuum cleaners, etc. for hand-held Staubsaugergeräten, moreover, but also, more particularly in connection with an assignable cleaning station, with automatically movable Staubsaugergeräten, called Saugrobotern.

[0011]

During the emptying of the bulk waste container by blowing suction air of the floor cleaning serving suction mouth of the vacuum cleaner is further preferably closed. The suction air required is drawn in through another, from the environment free device opening.

[0012]

The invention further relates to a movable Staubsaugeinrichtung with an electric motor driven fan and a penetrated by a suction air filter bag, wherein the suction air stream generated by the fan.

[0013]

Staubsaugeinrichtungen of the type in question are known, especially in hand-held Staubsaugergeräten, more especially for the household sector, in addition, also in the form of automatically movable tillage equipment, such as robotic vacuum cleaner or the like. For suction cleaning of the floor to be

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maintained a suction air flow is generated via a vacuum cleaner fan side which is sucked by one, facing the floor to be maintained suction mouth. The dissolved and entrained through the suction air dirt and dust particles are delivered via an air flow channel of the vacuum cleaner in the arranged at or in the vacuum cleaner filter bag. This filter bag is air-permeable design, wherein the air flowing through the air Filterbeutelwandung for retention of the particles is filtered. Such filter bags are made in particular from a nonwoven material, further example of a Hepa filter material which separates even fine dust.

[0014]

in view of the above-described prior art, a technical problem of the invention is seen in terms of suction filter characteristics to improve a movable Staubsaugeinrichtung of the type in question, in particular on.

[0015]

This problem is solved first and foremost by the subject matter of claim 6, wherein based on the fact that the suction air before it enters the filter bag passes through a coarse sediment bowl with an associated bulk waste container. This configuration is achieved a separate filtering of coarse and fine dust. The over the suction mouth absorbed, entrained with the airflow coarse material is separated within the Grobschmutzabscheiders and collected in the coarse dirt container. The separator filters this through a grid, a pressure separator or an impingement separator, where necessary, further by forming the separator as a cyclone separator, wherein coarse material, according to the be separated in this centrifugal forces acting The further feinstaub afflicted suction air passes through after leaving the coarse sediment bowl which the Feinstaubfiltrierung serving filter bag. According possible accidentally sucked rough parts are easily accessible by the separate filtration by a suction process, this example by opening the coarse dirt container.

A common destruction of the filter bag in the conventional single-filter systems for coarse and fine dirt is for viewing sucked rough parts accordingly not necessary. it offers itself according to the proposed solution, a control of the collected coarse dirt prior to its final disposal at. Additionally, the solution offers the possibility of a graded solely on fine dirt particles material selection of the filter bag. In consequence of the lack of entry of coarse dirt in this, the stability of the filter bag correspondingly lower selectable, such as omitting a bag inner support or Protective layer.

[0016]

Further features of the invention are given below, in the description of the figures, often described in their preferred allocation to the subject matter of claim 6 or features of other claims. but you can also be an assignment to only individual characteristics of claim 6 or the respective further claim or each independently of meaning.

[0017]

A preferred embodiment of the subject invention provides that the coarse sediment bowl for emptying the bulk waste container in the reverse direction is enforceable by the suction air stream. Accordingly, the suction air flows through in the course of clearing the coarse sediment bowl or the bulk waste container counter to the orientation in the conventional Staubsaugbetrieb in this opposite direction of flow. If the collected in the container coarse material unaffected by the performed by the coarse sediment bowl airflow during the usual Staubsaugbetriebs essentially, this will be specifically directed towards the collected coarse dirt to drain, so this is blown out of the coarse dirt container. For this purpose, as well as the usual Staubsaugbetrieb, air sucked from the vacuum cleaner around. This clearing operation is preferably triggered by user interaction, so especially after the end of a Staubsaugvorganges. Alternatively, a device side, automatic triggering is possible, this is preferably also after the end of a Staubsaugvorganges, the automatic triggering further example füllgrad- or time-dependent.

[0018]

Particularly advantageous is an embodiment in which the suction air stream passes through the driven by the electric motor fan after leaving the Grobschmutzabscheiders and before it enters the filter bag. Accordingly, according to the upstream fan in the flow direction of Grobschmutzabscheiders only, freed from coarse dirt suction air is penetrated, so that advantageously a high power blower, a so-called clean air blower, can be used. Such blowers operate at high rotational speeds, for example, with more than 15,000 U / min, preferably greater than 60,000 U / min. Due to the coarse dirt-sensitivity of such high-performance blowers, find in the so-called A-filter systems only use in an arrangement behind the dust filter bag - viewed in the flow direction -. Here, the dirt-prone suction air is drawn through the filter bag or by the wall. The filter bag is here in a pressure-tight chamber arranged such that the filter bag is in a low pressure area.

There are appropriate sealing measures required. Further, in such a system, usually the space provided after the suction fan exhaust vent is geographically relatively small, so be adjusted relatively high air velocity of the filtered air. In consequence of the proposed preliminary parting of coarse material within the Grobschmutzabscheiders is the arrangement of such a high-performance blower upstream of the filter bags possible, which provides an effective Saugreinigungsergebnis. Further, by the selected arrangement of the filter bag terminally be formed such that its forms a relatively large blow surface outwardly facing bag surface and so the flow rate of jet air is substantially reduced. Since, according to the proposed arrangement of the blower before the filter bag that does not have to have to

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be arranged in a sealed housing, an elaborate proof envelope of the filter bag or a sealing of the system is required after the filter bag, which further positively to the size and thus the weight of the vacuum cleaner effect.

[0019]

In an evacuation of the bulk waste container by suction air in the reverse direction in a preferred embodiment provides the suction air stream in a filter bag in which to dispose of the coarse dirt that is spent. This filter bag is preferably formed when used alone for receiving coarse debris from a relative to the, the particulate receiving filter bag simplified filter material. The only coarse dirt receiving filter bag has accordingly not necessarily to Feinststaubfiltereigenschaften. The coarse material which ultimately collecting filter bag may be externally connected to the vacuum cleaner to empty the bulk waste container. Preferred is an arrangement of the filter bag within the vacuum cleaner, more preferably in the form of a removable filter bag. In this connection, it proves to be particularly advantageous in terms of handling, when the suction air stream delivered to the emptying of the Grobschmutzabscheiders in the same filter bag that serves after the fan in the suction air flow Staubsaugbetrieb the fine filtration.

According to the vacuum cleaner filter bag only one is provided, the time offset to the suction and additionally collects the discharged from the coarse dirt container coarse dirt by inverting the Saugströmungsrichtung.

[0020]

For this, the filter bag in a preferred embodiment two inlet openings on this more preferably in the range of a conventional connecting the filter bag serving on the assigned device surface plate, wherein on the one hand an entry port for entry of dust and the other an entry port for entry of, first of the coarse sediment bowl deposited and thereafter discharged from this coarse dirt is. Preferably, the inlet openings are closed lids, so in particular by arranging opening by Saugluftanströmung swivel lids that can be spring-loaded into its closed position. Also an upstream to the inlet openings valve assembly is possible in this regard. Depending on the mode - Staubsaugbetrieb or coarse debris-clearing operation - is opened while the other is closed, only one of the two entry openings. It can further be filter bags each provided only one entry opening, which flow directionally upstream a flow channel section is assigned, which is divided into two independent, possibly valve closable channel branches, wherein a channel branch leads to the fan and used the directional transport of fine dust prone suction air in Staubsaugbetrieb and the other channel branch leads to the bulk waste container.

[0021]

To empty the coarse dirt container separate, the blower upstream intake is provided in a development of the subject matter. This air is sucked from the cleaner environment in the emptying operation. In a development may be equal to the Saugmundöffnung the intake, said the Saugmundöffnung downstream suction branches accordingly for the two modes. Further alternatively, the separate intake is downstream of the coarse sediment bowl is provided, this particular with respect to the direction of air flow in Staubsaugbetrieb.

[0022]

To empty the coarse dirt container, it is reversely penetrated by the suction air stream. This is achieved a change in the direction of rotation of the fan in an embodiment using. With respect to the flow direction in Staubsaugbetrieb is the direction of rotation of the fan of the coarse sediment bowl connecting to the blower suction to blow, the further blows the sucked from the ambient air suction in the coarse sediment bowl and into the coarse dirt container after a change. The reverse rotation of the fan can be reached in axial fans for example by appropriate reversal of the fan driving electric motor, more in the manner of a reverse fan. Preferred is an embodiment in which the fan within a, prolonging the suction channel, airtight chamber by 180 ° is rotated on constant rotation direction of the impeller. The necessary rotational displacement of the blower is preferably carried out electrically, alternatively mechanically by user intervention.

Also two in opposite directions acting, alternately switchable fan may be provided. Alternatively interchange the channel connection regions is to reverse the direction of air flow can be carried out relative to the stationary fan, after serving as the suction channel in the usual Staubsaugbetrieb portion of the blowing side of the blower is assigned and the blow of the suction side.

[0023]

Further alternatively, the flow direction reversal through appropriate switching of the flow paths can be achieved. Thus it is provided that the suction mouth from the Staubsaugeinrichtung for coarse sediment bowl leading suction line can be shut off so particularly by providing an appropriate switch valve within the suction line. This to the suction mouth leading suction line is closed in the evacuation operation.

[0024]

More preferably, the filter bag for leading from the blower pipe, a control valve on the return line of the suction air flow in the coarse sediment bowl. Accordingly, the guided in Staubsaugbetrieb by the blower in the direction of the filter bag the suction air flow before the filter bag is deflected for blowing into the coarse sediment bowl, this preferably by using a separate suction opening in emptying direction of flow before the blower, that further between the blower and coarse dirt separator, for which purpose

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continues to take place the return of the suction air flow in the coarse sediment bowl on a separate line.

[0025]

Further alternatively, the the filter bags leading from the blower pipe a shift valve, for connection to a separate from the suction port of suction, this more preferably in connection with an embodiment in which the emptying of the bulk waste container by means of a change in the direction of rotation of the fan takes place.

[0026]

With regard to the above-off valves may be for example, conventional through or multi-way valves, which are controlled manually or electrically, pneumatically or hydraulically. Alternatively, the valves are designed as a slide can be further example as multipath slide, on which further example also off multiple channels or up shoot bert.

[0027]

Also alternatively provided that the coarse dirt container is rotatable for emptying, so as to achieve in a further preferred embodiment, a reversal of the air flow through the coarse dirt container. For example, the coarse dirt container rotatable such that in the normal blow Staubsaugbetrieb the associated opening in the emptying operation is assigned to the suction channel and the suction channel in the usual Staubsaugbetrieb the associated opening in the emptying operation the blow port. Such an embodiment provides in a further preferred embodiment at a coarse sediment bowl in the form of a Filterabscheiders fc which filter separator is flowed through in Staubsaugbetrieb from the dust-laden air, whereby coarse dirt particles are deposited on a preferably transversely to the flow direction oriented, more preferably coarse-mesh filter. The here in Staubsaugbetrieb accumulating coarse particle cake is blown opposite direction from the coarse dirt container toward the Staubsaugbetrieb by rotating the coarse dirt container and subsequent air flow.

This further proves an embodiment advantageous in which the coarse dirt container two or more chambers which are flowed through by turning the coarse dirt container with a first and a second air flow, the air flows are directed opposite to each other. The chambers are further preferably conformed, this continues like in particular with regard to their cross-sectional design and as regards the inclusion of a filter element or. This is more a chamber constantly connected in the flow channel between the facing surface to be cleaned Saugmundöffnung and the fan, for the filtration of dust laden air and for the purpose of separation of coarse dirt. Another, preferably adjacent and axially parallel to the above-described chamber extending chamber is connected in operation in the air flow path between the blower and fine dust filters, which led through this chamber air flow in the opposite direction is directed to the first chamber by flowing air.

[0028]

Turning the coarse dirt container the chambers either the suction air or blast air are before or assigned behind the fan, which after a corresponding rotation of a previously used for coarse filtration of dust laden air chamber for emptying thereof the blast air is allocated behind the fan, while the front twisting the blast air assigned and correspondingly emptied chamber is assigned after twisting back the suction air before the fan. This configuration is achieved in a structurally simple solution that manages preferably further without valves or the like for switching any airway. Moreover, no distinction is made in this embodiment between Staubsaug- and emptying operations, since both modes are carried out simultaneously. During Staubsaugbetriebs and appropriate filtration of coarse dirt in one chamber to another chamber is emptied According Blasdurchströmung in the opposite direction, so that the previously separated in the further chamber coarse dirt particles are discharged into the dust filter.

[0029]

In terms of handling advantageous development it is provided that one of the chambers of the coarse dirt container can be removed, such as the review of the Staubsaugbetrieb in the chamber deposited coarse debris. Optionally accidentally sucked coarse particles, such as jewelry or play building blocks can then be removed prior to disposal of coarse dirt. The coarse dirt into the removable chamber is disposable by pouring in a separate waste container. Preference in this regard is a reinsertion of the removable chamber, where appropriate after reviewing the contents, in the coarse dirt container to be emptied by a corresponding rotation of the coarse dirt container of expected behind the suction fan blow the fine dust filter.

[0030]

in this connection, it proves advantageous, if a chamber in a removal position is not flowed through, while at least two other chambers are connected fc the air flow in mutually opposite directions. Thus, the vacuum cleaner is further operative even after a removal of a correspondingly positioned chamber such that during a normal Staubsaugbetriebs the content of the extracted chamber can be seen. The in the removal position is not air-flow chamber is according to the Staubsaugbetrieb in a standby position. In a more preferred arrangement of three chambers in the bulk waste containers are in operation two chambers in use and are flowed through in opposite directions. The third chamber at this time is not in use and does not flow through until the coarse dirt container to preferably 120 ° rotated. After rotation, the third chamber and the other two chambers in use and the other chamber in the removal or

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Standby position. If the coarse dirt container rotated three times to each preferably 120 °, the starting position is reached again.

[0031]

For removal of a chamber, it can be like a drawer pulled out of the coarse dirt container. A pivoting is possible in this regard.

[0032]

More preferably, the coarse dirt collector about an axis which corresponds to the through-flow direction, rotating, further about an axis which is parallel to the geometrical longitudinal axes of the channels. The suction or Blaskanalabschnitte are at least as merged in the field of bulk waste container that two chambers of the suction and blowing channels can be assigned by revolver-like turning the coarse dirt container.

[0033]

In a development of the subject invention is provided that the emptying of the bulk waste container takes place in a separate bag from the filter receptacle. This may be an external zuordbares receptacle which flow just above an openable port of the vacuum cleaner housing is connected to the bulk waste container. Emptying this example, depending on a Andockerfassung automatically by switching on the vacuum cleaner side blower, this further, as described, with a corresponding reversal of the flow direction. Alternatively, the release is ensured because switchable, second fan. This is preferably a separate blower for the vacuum cleaner, more preferably an electric motor-driven fan, associated with the separate receptacle.

[0034]

Be particularly advantageous, especially in the context Saugrobotern, moreover, but also with conventional, hand-held vacuum cleaners, proves a development in which the Staubsaugeinrichtung one of these is compared to stationary cleaning station assigned to which the vacuum cleaner is connected, for emptying the coarse dirt container and / or the filter bag. This cleaning station, in the case of a robotic vacuum cleaner preferably the base station at which is also a recharging of the device-side accumulators. The cleaning station includes the separate receptacle, in which the coarse dirt container is emptied. So has in this connection a mechanical or electrical contact at that detects a docking of Staubsaugeinrichtung and optionally automatically triggers the emptying process. Here, the device-side fan may be used. Does the cleaning station has its own power supply, so lends itself to a solution in which the cleaning station, a separate fan is provided for sucking the vacuum cleaner side bulk waste container.

According to this configuration are coarse dirt and separately sent for disposal in the filter bag collected fine dirt. Further alternatively also the fine dust contained in the filter bag or further alternatively, the filter bag can be transferred in a total of the cleaning station of the cleaning station, after which the docked Vacuuming device is completely emptied dirt.

[0035]

Hereinafter the invention with reference to the accompanying drawing which shows only several embodiments is explained in more detail. It shows:

[0036]

fig. 1 shows a Staubsaugeinrichtung in the form of a hand-held electric vacuum cleaner in a perspective view;

[0037]

2 is a schematic representation of the flow paths and filter sections of the vacuum cleaner in a first embodiment, the Staubsaugbetrieb concerning;

[0038]

3 shows the corresponding representation in the evacuation operation 2;

[0039]

4 shows a further representation corresponding to FIG 2, concerning the Staubsaugbetrieb in a second embodiment;

[0040]

5den evacuation operation according 3, but the embodiment of Figure 4 concerning;

[0041]

6 shows a further schematic representation of Figure 3, relating to a third embodiment of the

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evacuation operation;

[0042]

7 shows a further representation corresponding to FIG 2, concerning the vacuum cleaner operation in a fourth embodiment with a Schieberverstellbarkeit;

[0043]

8 shows a representation of the corresponding emptying the operation 7;

[0044]

9den slider according to the fourth embodiment in a position in accordance with 7;

[0045]

10wie 9, in a position shown in Figure 8;

[0046]

11 shows a further embodiment of the slide in a position shown in Figure 9;

[0047]

12den slides corresponding to 11 in a position according to 10;

[0048]

13eine more the corresponding representation 2, concerning the vacuum cleaner operation in a fifth embodiment with a rotatable hose connection;

[0049]

14einer the 13 corresponding representation in the evacuation operation;

[0050]

15The enlargement of the region XV in Figure 14; 16 shows a further representation corresponding to FIG 2, concerning the vacuum cleaner operation in a sixth embodiment of a coarse sediment bowl;

[0051]

17eine the representation 16 corresponding in evacuation operation;

[0052]

18den coarse sediment bowl in top view;

[0053]

19den section along the line XIX-XIX in 18;

[0054]

20eine the corresponding representation 18, however, another embodiment concerning;

[0055]

21den section along the line XXI-XXI in Figure 20;

[0056]

22einen longitudinal section through a coarse sediment bowl in a further embodiment;

[0057]

23eine plan view of a coarse sediment bowl in a further embodiment;

[0058]

24den section along the line XXIV-XXIV in 23;

[0059]

25eine the corresponding representation 23, however, another embodiment concerning;

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[0060]

26den section along the line XXVI-XXVI in 25;

[0061]

27in perspective view another embodiment of a Grobschmutzabscheiders with removable compartments.

[0062]

Shown and described in first instance with reference to a 1 Staubsaugeinrichtung in the form of a hand-held vacuum cleaner 1, in particular a domestic vacuum cleaner, is which designed as hand-held device handle. initially this has a base unit 2, with a recorded herein electric motor for a suction / blower unit 3rd

[0063]

The power supply unit built in the base unit 2 fan 3 via an electrical cable. 4

[0064]

Next, the base unit 2 has a gooseneck-shaped extension, which covers the areas of a docked to the base unit 2 filter bag assembly. In the area of the free end of this extension formed from a plug receptacle for a stem 5 of the vacuum cleaner. 1 In the area of the free end of the stem 5, a control handle 6 is provided. This has a daumenbetätigbare actuating unit in the form of a slide switch, via which the power of the accommodated in the base unit 2 or the electric motor of the fan 3 is in particular adjustable.

[0065]

For tillage the base unit 2 is fluidly connected to a header. 7 This can be a suction nozzle which has a rotating brush.

[0066]

The suction mouth 8 of the attachment 7 is fluidly connected with a base device side flow channel. 9

[0067]

At the base unit 2, a filter bag 10 is removably disposed, wherein the mechanical and flow connection to the basic device-side flow channel 9 is reached in the range of preferably transverse to the length of the base unit 2 aligned parting plane T.

[0068]

The filter bag 10 has a holding plate 11, which preferably consists of a hard plastic material. The filter in the bag attachment position preferably parallel to the plane of separation T aligned retaining plate 11 is provided with an inlet opening 12th At the, the base unit remote from bottom of the retaining plate 11 of the filter bag is fixed, so verscheißt example with the holding plate 11th

[0069]

The filter bag 10 and the filter bag material may be here several layers, further optionally at least partially made of synthetic fibers composed. Preferably the Filterbeutelwandung is made of a Hepa filter material.

[0070]

The Filterbeutelwandung is air-permeable, so that the run through the filter bags 10, dirt-laden air stream under complete filtration of all relevant pollutants, possibly also pollutants, training through the Filterbeutelwan free outwardly released into the environment can (show the arrows a, the preferred large-scale blow-out of filtered air into preferably a plurality of different directions).

[0071]

More preferably, the bag wall is formed self-supporting. Next 13 may be provided one, the filter bag 10 or its bag wall extensive, air-permeable protective covering.

[0072]

The blower 3 is connected in the flow direction in the Staubsaugbetrieb as shown in Figure 2 in the flow path between the suction mouth 8 and filter bags 10, in accordance with the sucked air through the suction port 8 and blows it into the dust filter bag 10th

[0073]

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upstream of the blower 3 in accordance Staubsaugbetrieb 2 a coarse sediment bowl 14, here a cyclone separator is provided in the base unit the second In this, the flow channel 9 is connected to the suction port 8 opens. The mouth is preferably designed so that a desired inside the cyclone spiral flow is supported thereby. In particular, it is preferable that an opening direction skewed to - is directed to cyclone given off direction of the dust-laden air - preferably centrally. For example, this handy flow tangentially into the cyclone separator preferably cylindrically formed in this area. Oriented perpendicular to the terminal portion of the flow channel in the cyclone separator is further into the cyclone separator a centrally arranged dip tube 15 is provided. Meanwhile, projects into the cyclone separator free end opens into a plane vertically below the entrance plane of the flow channel 9 in the cyclone.

Next, the free end 16 is spaced vertically to itself. At the cyclone separator in the bottom portion thereof subsequent coarse dirt-collecting space or bulk waste container 17 The latter tapers opposite funnel shape to the dip tube inlet side of the cyclone. Further preferred is a lower portion of the cyclone itself.

[0074]

The provided in the base unit 2 coarse sediment bowl 14 is used for preliminary separation of coarse dirt in the course of usual Saugbearbeitung as shown in Fig.2. In the embodiment of the dirt-prone suction air via the flow channel 9 is achieved air turbulence in the cyclone separator by the tangential inflow, according to the case acting on the coarse dirt particles centrifugal deposition of the same is achieved from the air stream. The coarse dirt particles settle in the bottom portion of the cyclone or in the trained here coarse dirt container 17th

[0075]

The freed of the coarse dirt suction air (arrow b) is hereinafter According sucked suction via the fan 3 through the projects into the cyclone dip tube 15, said opening having a condition any swirled coarse dirt particles retaining screen 18 is provided at the free immersion tube end 16th

[0076]

Since the suction air is b According to no longer offset the pre-separation of coarse particles, the b of the suction air to - or through which flow fan 3 to be a high-performance blower with effective efficiency and high speeds. It is preferred according to a so-called clean air blower is used.

[0077]

The after preliminary separation only still mixed with fine dust suction b is blown through a in the flow direction at Staubsaugbetrieb behind the blower 3 subsequent duct section 19 into the filter bag 10, which in the embodiment, the air flow but possibly also a separately-operated actuator one, when not in operation the inlet opening 12 of the filter bag 10 closing, possibly this spring support flap 20 holds in open position.

[0078]

In the embodiments illustrated in Figures 2 to 5 of the coarse dirt container 17 is internally, d. H. Emptied inside the vacuum cleaner 1. This emptying is carried out by blowing out the collected in the coarse dirt container 17 particles in the filter bag 10th

[0079]

For this, a discharge channel 21 is initially provided which at one end to a - is connected inlet opening 22 of the filter bag 10 in the mounting plate - preferably more. These filter bags side opening 22 is as active in Staubsaugbetrieb inlet opening 12 closed by a spring-loaded flap 23, for example first.

[0080]

The other end of the discharge channel 21 is connected to a bottom opening 24 of the coarse dirt container 17, which opening 24 is closed in the usual Staubsaugbetrieb according to Figures 2 and 4, for example by a check valve 25th

[0081]

With continued reference to Figures 2 and 3 in the illustrated first embodiment, with reference to the flow direction in front of and behind the fan 3 each shift valves 26, 27 preferably arranged in the form of 2- / 3-way valves. These are shown in Figure 2 as connected in the Staubsaugbetriebsstellung that the suction air stream of the b coarse sediment bowl 14 immediately above the blower 3 and the is coming up out adjoining channel section 19 into the filter bag 10th In the emptying operation according to Figure 3, both switching valves 26 and 27 are switched so that the direct flow connection of the blower 3 to the dip tube 15 and is further interrupted at the channel portion 19th Rather, the fan 3 is connected at its suction side now directly in fluid communication with the vacuum cleaner outside. The switching valve 26 has the fan 3 of the dip tube 15 are separated fluidly. For this purpose, a separate suction channel 28 is provided which at one end cooperates with the switching valve 27 and the other end opens into a suction port 29 which is formed in the housing of the base unit the second

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[0082]

The further switching valve 27 switches to the emptying operation a return channel 30 free, for direct connection of Blass side of the blower 3 with the coarse sediment bowl 14th The preferably provided as a separate line backflow 30 opens in the illustrated embodiment, the ceiling side in the cyclone separator, the orientation of the return duct 30 is further selected such that through this guided airflow when entering the cyclone extends at least tend parallel to Abscheiderlängsachse and / or further is specifically directed toward the bottom coarse dirt container 17th

[0083]

The clearing operation can be triggered automatically by means of a vacuum cleaner-side control unit, such as a function of a degree of filling of bulk waste container 17 further example, depending on an operating time of the vacuum cleaner 1 according to a recent evacuation of the bulk waste container 17th In addition, the evacuation operation can also be initiated by the user himself, so on, for example, by appropriate control over the operating handle. 6 More preferably, the emptying operation is only triggered, for example, automatically triggered when the vacuum cleaner 1 is in a rest position, for example after a Staubsaugvorganges.

[0084]

With triggering of the discharge mode, the switching valves are switched 26 and 27 described as above, wherein the valves to be switched can be coupled via a linkage. The bottom-side opening of the ccarse dirt container closing check valve 25 is brought into the open position. In addition, the entry of the flow channel 9 is locked in the coarse sediment bowl 14 via a further shut-off valve 31, wherein a further flow channel inlet opening 32 According to the lack of suction air is closed by, for example, a further spring-loaded flap 33rd

[0085]

About the fan 3 a suction air will b generated in the depletion, this under suction via the separate free outward suction 29th About the return flow channel 30, the intake of outside clean air in the coarse sediment bowl 14 and is further blown into the coarse dirt container, the information gathered here is coarse dirt particles via the drain channel 21 with a ccresponding opening of the inlet opening 22 associated flap 23 are transported into the filter bag 10th After preferably complete emptying of the bulk waste container 17 and accordingly completed the bulk waste transfer into the filter bag 10 The latter can be removed for disposal both from the fine and coarse dirt particles.

[0086]

In the second embodiment illustrated in Figures 4 and 5, the flow reversal for blowing suction air into the coarse sediment bowl 14 or to blow out and emptying of the coarse dirt container 17 is achieved by a reversal of rotation of the blower third Also in this embodiment, a switching valve 27 is disposed between the fan 3 and the filter bag 10, which the channel portion 19 corresponding to the injection of particulate matter afflicted suction air into the filter bag 10 switches in Staubsaugbetrieb according to the fourth For example, as seen in Figure 4, the given in the previously described embodiment through channel 30 can be eliminated without replacement.

[0087]

In the purge operation position according to 5 the connection between the fan 3 and channel section 19 is inhibited. Rather, in this position connects the switching valve 27, the blower 3 with an outwardly directed, for vacuum cleaner environment through the intake duct 28 with an opening formed in the housing of the basic unit 2 suction 29th

[0088]

Accordingly, the blow pipe connected in the vacuum cleaner operating in accordance 4 with the blowing side of the blower 3 is in the emptying operating position according to an intake pipe 5.

[0089]

To reverse rotation of the fan 3 is this under 5 (chain-dotted lines an intermediate position of the blower 3 is shown), for example, rotated, preferably, as in the embodiment because of the arrangement chosen there to rotate 180 °, after which the suction side of the blower 3 to the switching valve 27 or . the intake duct 28 and the blowing side of the blower 3 are associated with the dip tube 15.

[0090]

With the appropriate valve position of check valves 25 and 31 according to the embodiment described above, three suction air is in the emptying operation on the rotated fans is blown via the dip tube 15 into the cyclone separator and into the coarse dirt container 17, for emptying of the same by removal of the collected coarse dirt via the drain passage 21 in the filter bag 10th

[0091]

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6shows an embodiment with an external, d. H. Having provided for the vacuum cleaner 1 separate cleaning station 34. This cleaning station 34 has a separate receptacle 35, further, for example picking up a disposal serving collection bag or the like.

[0092]

To dispose of the collected in the coarse dirt container 17 coarse dirt vacuum cleaner 1 of the cleaning station 34 is associated, on to this so docked example flow-connected.

[0093]

The vacuum cleaner 1 and the base unit 2 has in accordance with the embodiments described above, a connected between the suction mouth 8 leading flow channel 9 and the blower 3 cyclone separator 14, comprising a bulk waste container 17th The blower 3 is connected via the channel portion 19 in fluid communication with the filter bag 10th

[0094]

The connected to the opening 24 of the coarse dirt container 17 emptying channel 21 is performed in this embodiment, to the outside, wherein the free end of the emptying channel 21 interfaces the same in the area of the device housing, a discharge opening ausformt 36th This is the usual Staubsaugbetrieb further closed by a flap 37 even when not operating the vacuum cleaner. A dip tube 15 by the fan 3 in the depletion separating switching valve 37 connects the draining operation, the dip tube 15 with an outward guided intake port 28, which interfaces the same having a suction port 29 also for example in the area of housing.

[0095]

In the docking position - shown schematically in Figure 6 - are preferred, the vacuum cleaner-side intake passage 28, but in any case the discharge channel 21 in the area for the external openings sealingly connected to corresponding channel portions of the cleaning station 34th To this end, this initially has a drain to channel 21 elongating in the cleaning station 34 inlet duct 38th This flows, although not shown in detail, facing the receptacle 35, further wherein the coarse particle separation preferably also with respect to the receptacle 35 is achieved in the manner of a cyclone separation.

[0096]

The vacuum cleaner side intake port 26 is another station transferred to a blow. 39

[0097]

In the illustrated embodiment, the suction air to blow out the coarse dirt particles required from the coarse dirt container 17 is constructed of a separate, recorded in the cleaning station 34 blower 40th Consequently, an cleaning station 34 via a separate power supply.

[0098]

The blow port 39 is blasseitig of the blower 40 is connected to this. On the suction side leading from the fan 40, an open environment for intake duct 41st

[0099]

The freed from coarse dirt air blows freely over an exhaust grille 42 into the environment.

[0100]

According to the above-described embodiment is not used the hoover side blower 3 for emptying the coarse dirt container 17th Rather, the evacuation is carried out in a non-operating position of the vacuum cleaner, for example, in a parking position, which further example provides for so-called Saugrobotern which 34 advanced base station for charging the device side accumulators binds to a prescribed to a cleaning station.

[0101]

Alternatively, the vacuum cleaner side blower 3 for clearing the coarse dirt container can be used 17 in the external receptacle 35, so for example, by reversing the direction of the suction flow, further, for example by rotating the fan 3 by 180 ° according to the embodiment in Figures 4 and 5. FIG. In this case, the suction air is sucked in through an intake port 28 open to the environment as shown in Figure 5 and blown the coarse dirt-prone air into the receptacle 35 of the cleaning station 34th A separate fan 40 in the cleaning station 34 may be allotted, according to further a separate power supply to the cleaning station 34, which increases the mobility of the cleaning station 34th

[0102]

Further, the cleaning station 34 may be also designed so that in the course or at different times to an emptying of the bulk waste container 17 is a transfer of the particulate matter contained in the filter bag

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10, or more, alternatively, a transfer of the filter bag 10 in total in the cleaning station 34 or into its receptacle 35 takes place.

[0103]

The above-described embodiment with a separate cleaning station may further preferably find application in connection with autonomously operating, selbstverfahrbaren Home Care devices, so-called suction or sweeping robots, which are provided with a coarse sediment bowl of the type described.

[0104]

A fourth embodiment is illustrated by 7 to 10th 7 shows a vacuum cleaner 1 based on the embodiment of Figure 2, but may be connected in reverse from Staubsaugbetrieb in the emptying operation, and here the vacuum cleaner 1 by means of a slide 43rd For this purpose, the suction or Blow lines so merged spatially in an area that a slider, preferably a single slide 43 also passes through all lines. Anyway seen in the direction of movement of the slide 43 are the lines in this area next to and / or above one another.

[0105]

The slider 43 is replaced in the illustrated embodiment, the switching valves 26 and 27 shown in FIGURES 2 and 3 the first embodiment. Here, the slide is formed as an elongated flat body, for example in the form of a plastic plate, which slide 43 thereof in the longitudinal extent considered two spaced holes 44 and 45 has. These openings 44 and 45 are further in a sliding direction of displacement r of the slide 43 one behind the other, wherein the distance between the openings 44 and 45 in the displacement direction corresponds to approximately 1.2 times of an opening diameter. Accordingly, a closure portion 46 is formed between the openings 44 and 45th Such a sealing section is also at each end of the slide 43 - viewed in the direction of displacement r - provided (reference numerals 46 and 46 ") so that each aperture 44 and 45 in the displacement direction R of the slider 43 as viewed from a closure portion 46 or 46 'or 46 " flanked.

[0106]

The diameter of the openings 44 and 45 is adapted to the diameter of the guided slide 43 to the suction or Blowing lines, here adapted to the cross-sections of flow channel 30, channel section 19, channel portion of the dip tube 15 and the intake passage 28 so that in a slide-open position to a favorable flow through the air flow setting. The the slider 43 facing end portions of the off or aufzuschiebenden channel portions are provided corresponding to the arrangement of apertures and plugging portions in the slide 43 in juxtaposition in such a way that depending on the slide position the free passage ends in overlap either one to an opening 44 or 45 or closing section 46-46 ".

[0107]

With respect to the blade 43 are opposed to the slide 43 to run channels 15, 19, 28 and 30 every two channels merged. So open in the illustrated embodiment, the channel of the dip tube 15 and the intake port 28 in one of the suction side of the fan 3 associated intake channel 47, while the channel section 19 and the flow channel 30 are merged assigned in one of the blowing side of the blower 3 Ausblaskanalabschnitt 48th The arrangement of the channels and the above-described embodiment of the slider 43 only one of the channels 15, 28 with the intake channel 47 and only one of the channels 19, 30 with the Ausblaskanalabschnitt 48 is fluidly connected depending on the slide-shift position respectively. The sliding displacement of the slide 43 is carried out, for example, manually controlled by the user, including, for example at the vacuum cleaner housing a freely accessible sliding handle may further be provided.

In a preferred embodiment, the sliding displacement of the slide 43 via mechanical or electrical actuating means is carried out.

[0108]

The bottom opening 24 of the coarse dirt container 17 is closed by a flap 54 in this embodiment, which is hinged and mounted such that it opens automatically in only one direction of flow, namely the clearing operation in accordance. 8 Next the flow channel inlet opening 32 closing flap 33 hinged so that it opens only in the Staubsaubetrieb according to Figure 7 and is urged by the entering through the through-flow channel 30 into the cyclone airflow in the closed position in the emptying operation according to 8 in the illustrated embodiment.

[0109]

The operation of the fourth embodiment is explained in more detail. Starting from the 7 is the vacuum cleaner 1 in Staubsaugbetrieb, wherein the slide 3 in an embodiment lower, preferably stop-limited end position is (see. Also 9). In this position, the slide 43 is with its openings 44 and 45 of the channel section 19 and the channel section with the dip tube 15 free, are being blocked by the closure section 46 and 46 " of the flow channel 30 and the suction channel 28, are further closed flow-tight. According to the channel portion of the dip tube 15 to the intake channel 47 of the blower 3 and the channel section 19 with the Ausblaskanalabschnitt 48 fluidly and environment sealed. After a coarse particle separation in the cyclone separator is the only with fine offset vacuum stream b via the dip tube 15 and

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the intake channel 47 is sucked by the blower 3 and further over the Ausblaskanalabschnitt 48 and the thereon fluidly connected channel section 19 into the filter bag 10th

The coarse dirt deposits, from As in the embodiments described above, the coarse dirt container 17th

[0110]

For the emptying operation of the slide 43 is in the stop-limited in the embodiment upper end position slide shifted (see FIG. 8 and 10). In this position, the slider 43 is with its openings 44 and 45 free the through-flow channel 30 and the intake passage 28, being blocked by the closure portions 46 and 46 'of the channel portion 19 and the channel portion of the dip tube 15th in order to convey the coarse debris from the coarse dirt container 17 into the filter bag 10, is via the intake 28 and through the corresponding slide switch position adjoining intake channel sucked 47 ambient air and blown into downstream of the fan 3 by the Ausblaskanalabschnitt 48 in the flow channel 30, of which emerges from the blast air into the cyclone separator and the coarse dirt container 17, this 54 According Luftstrombeaufschlagung so that the coarse dirt is transported from the bulk waste container 17 through the discharge channel 21 into the filter bag 10 further automatic opening of the bottom flap.

[0111]

The arrangement of the openings in the slider are dependent on the arrangement of the Kanalendabschnitte in the area of the slide. Thus, the channel sections may for exampie be combined into a bundle, further in the manner that two passage portions are arranged in juxtaposition, said further superposed the so combined channel section / pair, this further preferably such that in a cross-section which, the channel center axes lines connecting a rectangle, preferably a square rear. assigned such a channel arrangement slide 43 is shown in Figures 11 and 12. FIG.

[0112]

The slide 43 has in this embodiment transversely to the pushing direction of displacement r two rows of openings and closing sections, wherein initially has a number two in the shift displacement direction r of spaced openings 43 and 44, between which a closing portion 46 extends. This closing section 46 is in the adjacent row associated with a further opening 49, as viewed in the sliding direction of displacement r of the slide 43 on both sides is flanked (as shown above and below) by plugging portions 46 'and 46' ', which latter adjacent according to the above arrangement, are the openings 43 and 44 of the other row.

[0113]

Each row of openings and closing sections of the slide 43 is a superposed associated pair of channel sections, so on the row with the openings 43 and 44, the channel portion 19 and the suction passage 28, while the second row of the through-flow channel 30 and the channel portion of the opening 49 dip tube is associated with 15th

[0114]

in 11ist the slider 43 is thus shifted into a preferably stop-limited position that the holes 44 and 49 are 19 assigned to the channel portion of the dip tube 15 and the other channel section and correspondingly connect these fluid communication with the suction and Ausblaskanalabschnitten 47 and 48th Accordingly, the slide position in the 11 Staubsaugbetrieb ago, which means the closing sections 46 and 46 'of the suction channel 28 and the flow channel 30 are flow-tight.

[0115]

To empty the coarse dirt container 17 of the slider is also in this embodiment, 43 stop-limited shifted so that now the openings 45 and 49 the intake associated with 28 and the flow channel 30 and connect fluidly in accordance with the intake and Ausblaskanalabschnitten 47 and 48, while the shutter portions 46 and 46 '' the channel portion 19 and the channel portion of the dip tube 15 sealingly closed.

[0116]

As described with reference to the embodiment in Figures 4 and 5, is a change from Staubsaugbetrieb in the clearing operation by a change in the direction of flow, preferably as a result of rotation of the fan 3, allows. The 13 and 14 show in this connection a further embodiment in which the fan 3 is fixed, however, the discussions on this channel, in particular the terminal portions of the channels are reversed relative to the stationary fan. 3

[0117]

For this purpose, a blower 3, in particular a circular cross-section fan casing surrounding ring 51 is first provided, which receives the terminal portions of the guided on these lines (19, 28, 15, 30). The terminal portions extend through the ring 51 such that the lines open directed radially free on the blower housing 50th

[0118]

The terminal portions of the lines are arranged in a cross-section according to the illustrations in

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Figures 13 and 14 are uniformly distributed over the circumference of the ring 51 and attached to the ring, close to the corresponding circumferentially adjacent connecting areas form an angle of 90 °. Here, it is further provided that the terminal regions of the channel portion of the dip tube 15 and the channel section 19 are arranged diametrically opposite, while at 90 ° thereto enables the terminal portions of the intake passage 28 and the flow-through channel 30 open diametrically opposite.

[0119]

The fan housing 50 has in cross section on diametrically opposite openings 52 and 53 which extend in the same cross section plane as the connection regions.

[0120]

The ring 51 fed lines (channels and channel sections) are designed to be flexible, further, for example tubular.

[0121]

The ring 51 is rotatable around the fan casing 50, this further about an axis which is directed transversely to the flow direction in the blow third There are further in this regard preferably predefined rotational positions of the ring 51 is provided, for example, according to übertaufbarer latching means. Further, a rotation limitation of the ring 51 may be provided, so a rotation limit of 90 °, so that a rotation of the ring 51 only in the counterclockwise direction and within a 90 ° range can be achieved.

[0122]

In 13ist the ring position shown in Staubsaugbetrieb. The terminal portions of the channel section of the dip tube 15 and the channel section 19 are fluidly connected with the ports 52 and 53 of the blower housing 50 so that the dip tube 15 of the suction side of the blower 3 and the duct section 19 are associated with the blowing side of the blower 3 accordingly. The intake passage 28 and the flow channel 30 are closed by appropriate assignment of a wall portion of the fan housing 50 under closure of the corresponding port area of the channels.

[0123]

For the emptying operation, the ring 51 is rotated by 90 ° with respect to the illustrations in the clockwise direction, so that hereinafter, the connection regions of the channel section 19 and the dip tube are closed 15, while the connection portions of the suction passage 28 and the flow passage 30 fluidly related to the fan housing-side openings 52 and 53rd Accordingly aspirated 28 ambient air via the intake and blown through the flow channel 30 in the coarse dirt container 17 to blow out the collected therein coarse dirt.

[0124]

Also, the rotation of the ring 51 to change the operating states can be done manually by the user Alternatively, a mechanical, electro-mechanical, for example, rotation of the ring 51 is possible, the further optionally automatically in function of predetermined parameters.

[0125]

In the above embodiment, the ring acts 51 valvelike. The change from Staubsaugbetrieb in the evacuation operation is carried out by active switching only one element - here the ring 51 - so that - as in the embodiment according to 7 to 12 - a compact design can be achieved.

[0126]

On the basis of 16 to 19, a sixth embodiment is described below. According to the embodiment of Figure 6 also here, the filter bag 10 only only an inlet opening 12 with a flap 20 which is dimensioned so that the coarse dirt can be introduced through this inlet opening 12 in the filter bag 10th Furthermore, the vacuum cleaner 1, a fan 3 and a coarse sediment bowl 14.

[0127]

The coarse sediment bowl 14 has initially a circular cylindrical body. In this body are two mutually parallel, further extending to a base-center axis cylindrical, tubular chambers' taken parallel 54 and 54th The two chambers 54 and 54 'are - as can be seen in 18 - disposed on a symmetry axis of the circular contour of the base body, further both sides of the base body center axis.

[0128]

The two chambers 54 and 54 'pass through each end a disk-shaped ceiling 55 or 55 "of the base, so that adjust in the ceiling 55 and 55' corresponding to the inlet and outlet openings.

[0129]

These openings are fluidly sealed to the installed in the vacuum cleaner 1 suction and blow lines. Thus

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opens into the operating position of Figure 16 the inlet side of the chamber 54 of the light coming from the header 7 flow channel 9 and in the opposite direction of flow opening of the chamber 54 an intermediate duct 56, which is the other end connected to the suction side of the blower third Another intermediate channel 57 leads from the blowing side of the blower 3 to an opening of the other chamber 54 ', which opening at the same ceiling 55' is formed as the opening of the chamber 54 which is in communication with the intermediate channel 56th

[0130]

The opening of the chamber 54 'in the opposite direction of flow blanket 55 is connected to a leading to the dust filter bag 10 channel portion 19th

[0131]

Each chamber 54, 54 'is provided with a Grobgutsieb 58th This may be a metal or plastic mesh, with a form adapted to the size of the separating debris mesh. They may be be a flat sieve which 'passes through the free internal cross-section of the respective chambers 54, 54th

[0132]

Are shown in the embodiment of 16 to 19 Grobgutsiebe 58, each initially having a radially outer stiffened section that vertically or nearly vertically extending from the chamber inner wall to the chamber towards the center and thereafter steep falls below margin of an acute angle to the chamber axis and as a collection reservoir 59 forms. This collecting reservoir 59 of the chambers 54 and 54 'are directed in the flow direction, further in the longitudinal extent of the chambers 54 and 54' arranged centrally considered.

[0133]

The coarse sediment bowl 14 or the base body, the base body central axis receiving rotation axis 60 by an angle of 180 ° rotatable about a, so that the chamber is associated with 54 after a corresponding rotation of the intermediate channel 57 and the channel section 19, while the chamber 54 ', the forming fluid communication between the flow channel 9 and the leading to the fan 3 between channel 56th Thus, according to according to the rotational position of the body, each chamber 54 and 54 'either suction air or blasluftbeaufschlagt.

[0134]

According to the arrangement of the chambers 54 and 54 'in conjunction with the incoming and outgoing air ducts arise during operation of the vacuum cleaner 1 in the chambers 54 and 54' air currents which are directed opposite to each other, further, each chamber 55, 54 'of a airflow is penetrated, by the attachment 7 performs more than a first chamber of Grobschmutzabscheiders 14, the blower 3, the second chamber of Grobschmutzabscheiders 14 towards the dust filter bag 10th The coarse particle separation takes place here in the direction of flow upstream of the blower 3 while guided behind the blower 3 blow air blows the non-filter active chamber in the opposite direction of flow for-charging flow direction and so the bulk waste discharges in the dust filter bag 10th The emptying process of a chamber is correspondingly associated with the Staubsaugvorgang in conjunction with a coarse filtration in the other chamber, the blown coarse material is flushed directly into the dust filter bag 10 without passing through the blower 3 and the blower 3 driving motor.

[0135]

After a rotation of Grobschmutzabscheiders 14 and the main body about the rotational axis 60 by 180 °, the chambers 54 and 54 'swapped in their association with the supplied cables, so the emptied before twisting coarse dirt chamber 54' now the line section on the suction side of the blower 3 is allocated and used in suction of coarse filtration, during the serving before the rotation of the coarse filtration chamber 54 is now positioned in the blowing side duct section behind the fan 3 for blowing and respective spaces of accumulated coarse dirt.

[0136]

The chambers 54 and 54 'can be rotated during operation of the vacuum cleaner 1, or even after the operation of the vacuum cleaner 1 and to be replaced thereby. The rotation of Grobschmutzabscheiders 14 can be controlled to the rotation axis 60 by a pressure sensor, which causes the rotation, for example in case of rising pressure loss through excessive abgefiltertem coarse material in the sieve. This in turn is preferably mechanically, for example, further brought electromechanically, but can also be manually achieved by user intervention. More preferably, the rotational positions are defined, for example by überlaufbare locking devices. In addition, the proper allocation of chambers can be 54 and 54 'monitors to be connected line sections by a sensor system which allows a just in-commissioning of the vacuum cleaner 1 in one of the two 180 ° -Drehstellungen of Grobschmutzabscheiders 14th

[0137]

If the rotation of Grobschmutzabscheiders 14 during operation of the vacuum cleaner 1 is briefly interrupted the suction air in the course of rotation, as the body with its ceiling 55 and 55 'during

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rotation closes the facing terminal portions of the channels. Thus prevents uncontrolled dirt enters into the base unit. 2

[0138]

In the proposed design of the Grobgutsiebes 58 (see FIG. 19 also) collects the coarse dirt in the central collection reservoir 59, while the suction preferably predominantly through the radially outer annular region of the Grobgutsiebes 58 flows. The collection reservoir 59 takes in about half the axial length of the chamber 54 or 54 'a.

[0139]

The Grobgutsieb 58 is further configured preferably flexible, in particular the area of the collecting reservoirs 59th The Grobgutsieb 58, in particular the collection reservoir 59 flows in this case with the air stream. If the tube is rotated 180 °, the Grobgutsieb 58 folded with the now running in the opposite direction of air flow in the chamber. Particles which have settled in the stitches are removed by folding the Grobgutsiebes 58 and the resulting stitch expanding and transported into the filter bag 10th The screen is accordingly self-cleaning. By arranging the Grobgutsiebes 58 centrally with respect to the longitudinal extent of a chamber is a folding the Grobgutsiebes 58 allows for changing the direction of air flow within the chamber.

[0140]

Is the Grobgutsieb 58 rigid or less flexible design, so that when the airflow direction change no turning is achieved thereof, in particular the collecting reservoir 59, this, at least approximately occupy the entire length of the associated chamber, so that the air flowing through the entire length at the edge of can flow chamber, the dirt is collected over the entire length of the chamber in the collecting reservoir 59th

[0141]

20 and 21 show a further development of the above described embodiment of the Grobgutabscheiders 14, wherein the entire cross section of the cylindrical base body is used for the chambers 54 and 54 '. Thus, the two chambers 54 and 54 'each have a semicircular cross-section, wherein the circle segment-outer wall at the same time forms the wall of the basic body, of which the inside in the cross section along a diameter line of a partition wall 61 is arranged for separating the chambers 54 and 54'. The partition wall 61 also handles centrally absorbing the corresponding central axis of the basic body, the axis of rotation 60.

[0142]

Like the previously described embodiment are provided in the longitudinal extent of the chambers 54 and 54 'Grobgutsiebe 58 of the chambers are set wandungsinnenseitig and extend over the entire cross section of the respective chamber. According to the semi-circular in cross-section design of the chambers 54 and 54 'is achieved compared with the above-described solution enlarged filter cross-sectional area at the same compared to the embodiment described abcve, cuter diameter of the base body.

[0143]

Shown is in 21 each a flexible Grobgutsieb 58, which can change with change in the air flow direction.

[0144]

To the flow rate at Grobgutsieb 58 will decrease further proposed according to the embodiment in Figure 22, 'to give the the Grobgutsieb 58 accommodating chambers 54 and 54, especially in the area of influence of Grobgutsiebes 58 a bulbous shape. Thus, each chamber 54, 54 'are first starting from the in the ceiling 55 and 55' provided openings of tubular shaped having a circular cross-section, this in each case starting from the ceiling 55 or 55 'about a quarter of the total axial length of the chamber. The remaining, about half the axial length of the chamber extending middle portion 62 of each chamber extends from the facing ends of the end tube sections of the chambers in a longitudinal section in accordance with 22 convex, so that the area directly affected by the Grobgutsieb 58 a cross-sectional enlargement of the chambers results. Thereby, the impact speeds of the coarse material can be reduced at Grobgutsieb 58, this further enlargement of Siebquerschnittsfläche.

Pressure losses are minimized, with more coarse material in comparison to a cross-section over the axial length constant chamber can be deposited.

[0145]

Also, more than two chambers may be arranged in the base body, so for example according to the embodiment shown in Figures 23 and 24 includes three chambers 54, 54 'and 54' '. The arrangement is so selected that raise an equilateral triangle in a cross section and in plan view in accordance with 23 lines that connect the chambers-center axes. The chambers mid-axes run parallel to the rotational axis 60 of the base body 52, further wherein the central axes are positioned on a concentric axis of rotation 60 extending circle.

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[0146]

In combination with a conduit assembly according to the embodiment in Figures 14 and 16 are two of the chambers 54, 54 'and 54' 'during operation of the vacuum cleaner 1 is active, according flowed through in mutually opposite directions, wherein in a chamber as described, a Grobschmutzfiltrierung takes place, while the other active chamber is emptied blasluftbeaufschlagt. The third chamber is in this case does not flow through, is accordingly not in use to the base body or the coarse sediment bowl 14 60 is rotated about the rotational axis by 120 °. After this rotation, the third chamber and the other two chambers in use. If the coarse sediment bowl 14 is rotated three times by 120 °, the starting position is reached again.

[0147]

The non-active and corresponding non-air-flow chamber is always the chamber, which serves 14 of the coarse filtration before a 120 ° rotation of Grobschmutzabscheiders. This offers the advantage that before a further twist, after which the chamber is introduced into the blast air for clearing of coarse dirt particles, a sighting of ausfiltrierten content is provided in the chamber. Thus, unintentionally sucked objects be removed. These are trapped in the Grobgutsieb 58 of the non-active chamber and can be removed from the coarse material.

[0148]

For this purpose, preferably, the vacuum cleaner housing to a Reversionsöffnung lying in coverage to the cover-side opening of the non-active chamber.

[0149]

25 and 26 show a rating based on the embodiment shown in Figures 23 and 24 with alternative three chambers 54, 54 'and 54' 'in accordance with the advantage of the embodiment according to Figures 20 and 21 the entire cross section of the circularly cylindrical base body. This offers the advantage of a larger Grobgutsiebes 58, which can receive correspondingly more coarse material until it needs to be emptied. Correspondingly, the chambers 54-54 '' are each about one-third of the cross section of the base body a. The operation corresponds to the previously described embodiment

[0150]

Finally, Figure 27 shows an embodiment based on the embodiment according to Figures 25 and 26, in which the chambers 54, 54 'and 54' 'are separately formed each other, each having respective independent walls. These chambers 54, 54 'and 54' 'are accommodated in a base frame 63, which has the central axis of rotation 60, and each end of the rotational axis 60 annular ceiling 64th The latter have respective through openings 65 which are aligned with the cross-section of the chambers in the vertical absorbing overlap on the free internal cross-section of the chambers.

[0151]

The chambers 54, 54 'and 54' 'are removed from the thus configured Grobpartikelabscheider 14, this preferably by pulling radially outwardly, whereby a drawer-like removal of the non-active chamber is achievable. This configuration allows the user to comfortably explore the previously sucked coarse dirt example by accidentally sucked objects.

[0152]

To simplify the removal of the drawer-like chambers from the coarse sediment bowl 14 and out of the main body frame 63, the circular-section-shaped circumferential surface is provided a handle 66 each wandungsaußenseitig.

[0153]

In order to hold the drawer-like chambers in the base frame 63 releasable means are provided, such as überlaufbare locking devices.

[0154]

To make the non-active, drawer-like compartment accessible is preferred in the base unit 2 is a flap or the like. Provided. Alternatively, the base unit 2 is designed so that a direct access to the respective drawer-like chamber is made possible.

[0155]

All disclosed features are essential to the invention (for themselves). In the disclosure of the application of the disclosure content of the associated attached priority documents is hereby (copy of prior application) included in full, including for the purpose of incorporating features of these documents in claims of the present application.

LIST OF REFERENCE NUMBERS

[46]

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[52]

: Vacuum cleaner 2 : Base unit 3 : Suction / blower unit 4 : Power line 5 : stalk 6 : Operating handle 7 : Attachment 8 : Saugmund 9 A lazy river 10 : Filter bag 11 : Holding plate 12 : inlet opening 13 : Protective sheath 14 : coarse sediment bowl 15 : Dip tube 16 : Free end 17 : Coarse dirt container 18 : Screening 19 . Channel section 20 : flap 21 : Emptying channel 22 . Inlet opening 23 : flap 24 : opening 25 : Check valve 26 : Switching valve 27 : Switching valve 28 : intake duct 29 : suction 30 : flow channel 31 : Check valve 32 Lazy river inlet opening 33 : flap 34 Cleaning Station 35 : Receptacle 36 : Emptying opening 37 : flap 38 : Inlet channel 39 : blow 40 ' fan 41 : intake duct 42 : exhaust grille 43 : slide 44 : opening 45 : opening 46 : Closing section 46' : Closing section 46": Closure portion 47 : intake channel 48 : Ausblaskanalabschnitt 49 : opening 50 : Fan housing 51 : Ring 52 ' opening

[66]

53 : opening 54 : Chamber 54' : Chamber 54" : Chamber 55 : Blanket 55' : Blanket 56 : Intermediate channel 57 : Intermediate channel 58 : Grobgutsieb 59 : Collection reservoir 60 : Axis of rotation 61 : Partition wall 62 : Mid section 63 : Base frame 64 : Blanket 65 : Passage opening 66 : Handle A: Discharge b: suction air r: sliding displacement direction T: parting plane

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CLAIMS DE102009041728

1.

A method of operating a vacuum cleaner (1) having an electric motor driven fan (3) and a suction mouth (8) is sucked by means of which, with the suction air stream (b) through a coarse sediment bowl (14) with associated coarse dirt container (17) is directed, characterized that the emerging from the coarse sediment bowl (14) suction air for the separation of particulate matter contained therein even in a filter bag (10) is blown.

2.

The method of claim 1 or in particular according thereto, characterized in that is blown for emptying the coarse dirt container (17) of suction air through the coarse dirt container (17) and thus be transmitted coarse dirt is registered in the filter bag (10).

3.

Method according to one or more of the preceding claims or in particular according thereto, characterized in that the injection of suction air into the coarse dirt container (17) is carried out by means of a reversal of rotation of the fan (3).

4.

Method according to one or more of the preceding claims or in particular according thereto, characterized in that a cleaning station (34) is provided, that the vacuum cleaner (1) for emptying of the coarse dirt container (17) to the cleaning station (34) is connected and the coarse debris by means of the introduced into the coarse dirt container (17) of suction air is transported in a receptacle (35) in the cleaning station (34).

5.

Method according to one or more of the preceding claims or in particular according thereto, characterized in that, after connection of the vacuum cleaner (1) to the cleaning station (34) of the filter bag (10) Fine particulate matter contained in total or in the filter bag (10) in the cleaning station (34) is transferred.

6.

Movable Staubsaugeinrichtung with an electric motor driven fan (3) and one of a suction air stream (b) through clogged filter bag (10), wherein the suction air stream (b) is generated by the fan (3), characterized in that the suction air flow (B) before entrance into the filter bag (10) a coarse sediment bowl (14) with an associated bulk waste container (17) passes through.

7.

Staubsaugeinrichtung according to Claim 6 or in particular according thereto, characterized in that the coarse sediment bowl (14) for emptying in the reverse direction from the suction air stream (b) is enforceable.

8.

Staubsaugeinrichtung according to one or more of claims 6 to 7 or in particular according thereto, characterized in that the suction air stream (B) passes through the driven by the electric motor fan (3) after leaving the Grobschmutzabscheiders (14) and before entry into the filter bag (10).

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9.

Staubsaugeinrichtung according to one or more of claims 6 to 8 or in particular according thereto, characterized in that the suction air flow (S) delivered to the emptying of the Grobschmutzabscheiders (14) in a filter bag (10).

10.

Staubsaugeinrichtung according to one or more of claims 6 to 9 or in particular according thereto, characterized in that the suction air flow (S) delivered to the emptying of the Grobschmutzabscheiders (14) in the same filter bag (10), in this even when filling of the Grobschmutzabscheiders (14) supplies.

11.

Staubsaugeinrichtung to one or more of claims 6 to 10 or in particular according thereto, characterized in that the filter bag (10) has two inlet openings (12, 22), on the one hand the entry of dust and the other to the info where coarse sediment bowl (14) deposited coarse dirt.

12.

Staubsaugeinrichtung according to one or more of claims 6 to 11 or in particular according thereto, characterized in that for emptying of the coarse dirt container (17) separate, the fan (3) upstream intake opening (29) is provided.

13.

Staubsaugeinrichtung according to one or more of claims 6 to 12 or in particular according thereto, characterized in that the separate suction opening (29) downstream of the coarse sediment bowl (14) is provided.

14.

Staubsaugeinrichtung according to one or more of claims 6 to 13 or in particular according thereto, characterized in characterized in that the emptying of the coarse dirt container (17) by means of a change of the direction of rotation of the fan (3).

15.

Staubsaugeinrichtung according to one or more of claims 6 to 14 or in particular according thereto, characterized in that the emptying of the coarse dirt container (17) takes place by means of a permutation of the terminal portions relative to a stationary fan (3).

16.

Staubsaugeinrichtung according to one or more of claims 6 to 15 or in particular according thereto, characterized in that the suction mouth (8) of the Staubsaugeinrichtung for coarse sediment bowl (14) is leading the suction line can be shut off.

17.

Staubsaugeinrichtung according to one or more of claims 6 to 16 or in particular according thereto, characterized in that the blower (3) to the filter bag (10) carrying line having a switching valve (27) to the return line of the suction air stream (b) in the cyclone separator (14).

18.

Staubsaugeinrichtung according to one or more of claims 6 to 17 or in particular according thereto, characterized in that the blower (3) to the filter bag (10) carrying line having a switching valve (27) for connection to one of the suction mouth (8) separate suction opening (29).

19.

Staubsaugeinrichtung according to one or more of claims 6 to 18 or in particular according thereto, characterized in that the coarse dirt container (17) is rotatable for emptying.

20.

Staubsaugeinrichtung according to one or more of claims 6 to 19 or in particular according thereto, characterized in that the coarse dirt container (17) two or more chambers (54, 54 ', 54' '), which by rotation of the coarse dirt container (17) having a first are and second air flow can flow, the air currents are directed opposite to each other.

21.

Staubsaugeinrichtung according to one or more of claims 6 to 20 or in particular according thereto, characterized in that one of the chambers (55, 54 ', 54' ') from the coarse dirt container (17) is

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removable.

22.

Staubsaugeinrichtung according to one or more of claims 6 to 21 or in particular according thereto, characterized in that a chamber (54, 54 ', 54' ') in a removal position is not flowed through, while at least two other chambers (54, 54', 54 ' ') are designed for air flow in mutually opposite directions.

23.

Staubsaugeinrichtung according to one or more of claims 6 to 22 or in particular according thereto, characterized in that the coarse dirt container (17) about an axis (60) which corresponds to the throughflow direction, is rotatable.

24.

Staubsaugeinrichtung according to one or more of claims 6 to 23 or in particular according thereto, characterized in that the emptying of the coarse dirt container (17) in one of the filter bag (10) separate receptacle (35) is carried out.

25.

Staubsaugeinrichtung according to one or more of claims 6 to 24 or in particular according thereto, characterized in that the evacuation is carried out by a switchable, the second blower (40).

26.

Staubsaugeinrichtung according to one or more of claims 6 to 25 or in particular according thereto, characterized in that the Staubsaugeinrichtung one associated with this opposite stationary cleaning station (34) to which the Staubsaugeinrichtung be connected, for emptying of the coarse dirt container (17) and / or of the filter bag (10).

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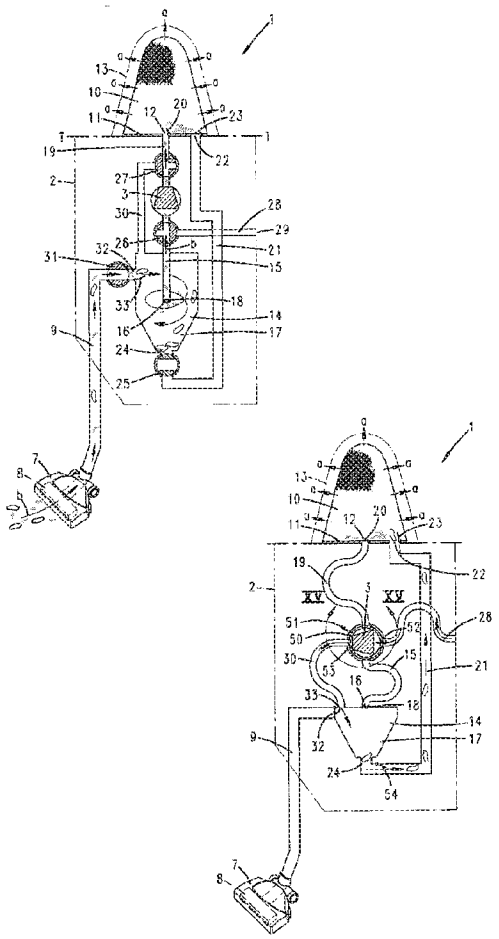
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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Verfahren zum Betreiben eines Staubsaugers sowie verfahrbare Staubsaugeinrichtung**

(57) Zusammenfassung: Die Erfindung betrifft zunächst ein Verfahren zum Betreiben eines Staubsaugers (1) mit einem elektromotorisch angetriebenen Gebläse (3) und einem Saugmund (8), durch welchen gesaugt wird, wobei der Saugluftstrom (b) durch einen Grobschmutzabscheider (14) mit zugeordnetem Grobschmutzbehälter (17) geleitet wird. Um einen Staubsauger der in Rede stehenden Art insbesondere hinsichtlich seiner Filtereigenschaften weiter zu verbessern, wird vorgeschlagen, dass die aus dem Grobschmutzabscheider (14) austretende Saugluft zur Abscheidung von darin noch enthaltenem Feinstaub in einen Filterbeutel (10) geblasen wird. Des Weiteren betrifft die Erfindung eine verfahrbare Staubsaugeinrichtung mit einem elektromotorisch betriebenen Gebläse (3) und einem von einem Saugluftstrom (b) durchsetzten Filterbeutel (10), wobei der Saugluftstrom (b) durch das Gebläse (3) erzeugt ist. Um eine verfahrbare Staubsaugereinrichtung der in Rede stehenden Art insbesondere hinsichtlich der Saugluft-Filtereigenschaften weiter zu verbessern, wird vorgeschlagen, dass der Saugluftstrom (b) vor Eintritt in den Filterbeutel (10) einen Grobschmutzabscheider (14) mit einem zugeordneten Grobschmutzbehälter (17) durchsetzt.



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Beschreibung

[0001] Die Erfindung betrifft zunächst ein Verfahren zum Betreiben eines Staubsaugers mit einem elektromotorisch angetriebenen Gebläse und einem Saugmund durch welchen gesaugt wird, wobei der Saugluftstrom durch einen Grobschmutzabscheider mit zugeordnetem Grobschmutzbehälter geleitet wird.

[0002] Verfahren der in Rede stehenden Art sind bekannt. Über den mittels des staubsaugerseitigen Gebläses aufgebrachten Saugluftstrom wird von der zu bearbeitenden Fläche über den Saugmund Staub und Schmutz abgetragen und einem in dem Staubsauger angeordneten Grobschmutzabscheider zugeführt. Diesbezüglich sind zum Abscheiden des Grobschmutzes Zyklonabscheider bekannt. In diesen wird zufolge einwirkender Zentrifugalkräfte eine Abscheidung von Grobschmutzpartikeln erreicht, die in einem, dem Abscheider zugeordneten Grobschmutzbehälter gesammelt werden. Die von dem Grobschmutz befreite Saugluft tritt hiernach aus dem Grobschmutzabscheider aus. Das die Saugluftströmung bewirkende Gebläse ist zumeist in Strömungsrichtung betrachtet hinter dem Grobschmutzabscheider vorgesehen.

[0003] Im Hinblick auf den vorbeschriebenen Stand der Technik wird eine technische Problematik der Erfindung darin gesehen, einen Staubsauger der in Rede stehenden Art insbesondere hinsichtlich seiner Filtereigenschaften weiter zu verbessern.

[0004] Diese Problematik ist zunächst und im Wesentlichen durch den Gegenstand des Anspruches 1 gelöst, wobei darauf abgestellt ist, dass die aus dem Grobschmutzabscheider austretende Saugluft zur Abscheidung von darin noch enthaltenem Feinstaub in einen Filterbeutel geblasen wird. Zufolge des vorgeschlagenen Verfahrens ist eine verbesserte Abreinigung der schmutzbeladenen Saugluft erreicht. Der Filterbeutel ist bevorzugt endständig, d. h. in Saugluftströmung nachgeschaltet dem Gebläse angeordnet, demzufolge über die Oberfläche des luftdurchlässigen Filterbeutels die gefilterte Saugluft auch großflächig ausgeblasen wird. Der Filterbeutel besteht hierbei bevorzugt aus einem Hepa-Filtermaterial, weiter gegebenenfalls auch zur Geruchsminderung Aktivkohle bzw. eine Aktivkohlefilterschicht aufweisend. Darüber hinaus ist durch das vorgeschlagene Verfahren ein getrenntes Sammeln von Grobschmutz und Feinschmutz erreicht. Etwa aufgesaugte Grobteile, wie beispielsweise Schmuckteile oder Spiel-Bausteine werden in dem abscheiderseitigen Grobschmutzbehälter abgesondert, welcher weiter bevorzugt zur Durchsicht desselben und zur Kontrolle des aufgenommenen Grobschmutzes offenbar ist. Der den Feinstaub aufnehmende Filterbeutel ist in üblicher Weise von dem Staubsauger abnehmbar bzw. aus diesem herausnehmbar, um diesen einer Entsorgung zuzuführen.

[0005] Weitere Merkmale der Erfindung sind nachstehend, auch in der Figurenbeschreibung, oftmals in ihrer bevorzugten Zuordnung zum Gegenstand des Anspruches 1 oder zu Merkmalen weiterer Ansprüche erläutert. Sie können aber auch in einer Zuordnung zu nur einzelnen Merkmalen des Anspruches 1 oder des jeweiligen weiteren Anspruches oder jeweils unabhängig von Bedeutung sein.

[0006] Der Grobschmutzbehälter ist zur Entleerung beispielsweise öffenbar, gegebenenfalls aus dem Staubsauger zur Entsorgung des Grobschmutzes in einem Abfallbehälter entnehmbar. In einer bevorzugten Ausgestaltung ist vorgesehen, dass zur Entleerung des Grobschmutzbehälters Saugluft durch den Grobschmutzbehälter geblasen wird und damit ausgetragener Grobschmutz in den Filterbeutel eingetragen wird. Entsprechend erfolgt die Entleerung des Grobschmutzbehälters intern innerhalb des Staubsaugers, dies beispielsweise ausgelöst durch Benutzereingriff, alternativ gesteuert über eine geräteseitige Steuereinheit, die beispielsweise in Abhängigkeit vom Füllstand des Grobschmutzbehälters, weiter alternativ zeitabhängig den Entleerungsvorgang auslöst. Die Saugluft, d. h. die durch eine Geräteöffnung aus der Umgebung gesaugte Luft, wird zur Entleerung des Grobschmutzbehälters so gerichtet, dass die in dem Behälter gesammelten Grobschmutzpartikel mitgerissen und dem im üblichen Saugbetrieb, d. h. im üblichen Bodenreinigungsbetrieb der Feinstaubsammlung dienenden Filterbeutel zugeführt wird. Letzterer beinhaltet hiernach entsprechend sowohl Fein- als auch Grobschmutzpartikel, womit Letztere durch einen üblichen Filterbeutelwechsel einer Entsorgung zugeführt werden. Der im üblichen Staubsaugerbetrieb nicht unmittelbar von der Saugluft beeinträchtigte Grobschmutzbehälter wird zur Entleerung desselben gezielt durch die Saugluft beaufschlagt, dies derart, dass die Grobschmutzpartikel ausgeblasen werden. Dies ist in einer Ausgestaltung erreicht durch eine gezielte Schaltung der Saugluftwege, beispielsweise mittels vorgesehener Schaltventile.

[0007] In alternativer Ausgestaltung ist die Einblasung von Saugluft in den Grobschmutzbehälter mit Hilfe einer Drehrichtungsumkehr des Gebläses vorgenommen. Entsprechend ist die Saugluftströmung im Bereich des Gebläses nach einer Drehrichtungsumkehr desselben um 180° entgegengesetzt zu der üblichen, im Staubsaugerbetrieb vorherrschenden Strömung gerichtet, so dass weiter beispielsweise durch den im üblichen Staubsaugbetrieb dem Luftaustritt aus dem Grobschmutzabscheider dienenden Strömungskanal zur Entleerung des Grobschmutzbehälters die aus der Umgebung angesaugte Luft eingeblasen wird. Die Drehrichtungsumkehr

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des Gebläses wird beispielsweise erreicht durch eine Umpolung, zufolge eine Drehrichtungsumkehrung des Gebläserades bewirkt wird. Das Gebläse ist hierbei entsprechend ein Umkehrgebläse. Alternativ kann das Gebläse auch, beispielsweise aufgenommen in einer strömungsdichten Kapsel, insgesamt um 180° gedreht werden, womit sich bei gleichbleibender Drehrichtung des Gebläserades die Strömungsrichtung umkehrt. Auch ist zur Drehrichtungsumkehr der Saugluftströmung eine Umordnung der Saugleitungsabschnitte am Gebläse möglich.

[0008] Zudem erweist sich eine Ausgestaltung von Vorteil, bei welcher eine Reinigungsstation bereitgestellt wird, wobei der Staubsauger zur Entleerung des Grobschmutzbehälters an die Reinigungsstation angeschlossen wird und der Grobschmutz mittels der in den Grobschmutzbehälter eingeleiteten Saugluft in ein Aufnahmebehältnis in der Reinigungsstation transportiert wird, dies weiter bevorzugt durch Einblasen der Saugluft in den Grobschmutzbehälter, weiter beispielsweise durch Drehrichtungsumkehr des staubsaugerseitigen Gebläses. Alternativ ist die Reinigungsstation mit einem Sauggebläse zur Entleerung des Grobschmutzbehälters versehen. Entsprechend erfolgt eine Abreinigung des Grobschmutzbehälters in ein externes Aufnahmebehältnis. Der Entleerungsvorgang kann hierbei selbsttätig ausgelöst werden mit Andocken des Staubsaugers an der Reinigungsstation, alternativ benutzerausgelöst nach dem Anschluss. Unabhängig hiervon wird mit Einsetzen des Entleerungsvorganges, alternativ unmittelbar mit dem Andocken des Staubsaugers an der Reinigungsstation ein Zugang zum Grobschmutzbehälter geöffnet. Der den Feinstaub aufnehmende Filterbeutel ist in diesem Zusammenhang bevorzugt weiter als Einwegfilter gestaltet, der in Abhängigkeit vom Füllgrad und/oder in Abhängigkeit von einer Verweildauer im Staubsauger gesondert entsorgt wird.

[0009] In einer Weiterbildung des Erfindungsgegenstandes ist vorgesehen, dass nach Anschluss des Staubsaugers an die Reinigungsstation der Filterbeutel insgesamt oder der in dem Filterbeutel enthaltene Feinstaub in die Reinigungsstation überführt wird. So ist mit dem Anschluss des Staubsaugers an der Reinigungsstation sowohl eine Entleerung des Grobschmutzbehälters als auch eine Entsorgung des Filterbeutels bzw. dessen Inhalts durchführbar. Im Falle einer Entsorgung des in dem Filterbeutel enthaltenen Feinstaubes wird dieser entsprechend der Entleerung des Grobschmutzbehälters ausgeblasen, dies weiter beispielsweise durch Einblasen von Saugluft in den Filterbeutel, was sich weiter beispielsweise bei Dauerfiltern, d. h. nicht wechselbaren Filtern anbietet.

[0010] Das vorbeschriebene Verfahren findet insbesondere Anwendung bei Staubsaugern, insbesondere Haushalts-Staubsaugern, so weiter bei handgeführten Staubsauggeräten, darüber hinaus aber auch, weiter insbesondere im Zusammenhang mit einer zuordbaren Reinigungsstation, bei selbsttätig verfahrbaren Staubsauggeräten, sogenannten Saugrobotern.

[0011] Im Zuge der Entleerung des Grobschmutzbehälters durch Einblasen von Saugluft ist weiter bevorzugt der der Bodenreinigung dienende Saugmund des Staubsaugers geschlossen. Die benötigte Saugluft wird über eine weitere, zur Umgebung hin freie Geräteöffnung angesaugt.

[0012] Die Erfindung betrifft des Weiteren eine verfahrbare Staubsaugeinrichtung mit einem elektromotorisch betriebenen Gebläse und einem von einem Saugluftstrom durchsetzten Filterbeutel, wobei der Saugluftstrom durch das Gebläse erzeugt wird.

[0013] Staubsaugeinrichtungen der in Rede stehenden Art sind bekannt, so insbesondere in handgeführten Staubsauggeräten, weiter insbesondere für den Haushaltsbereich, darüber hinaus auch in Form von selbsttätig verfahrbaren Bodenbearbeitungsgeräten, wie Saugroboter oder dgl. Zur Saugreinigung des zu pflegenden Bodens wird über ein staubsaugerseitiges Gebläse ein Saugluftstrom erzeugt, der durch einen, dem zu pflegenden Boden zugewandten Saugmund eingesogen wird. Die über die Saugluft gelösten und mitgerissenen Schmutz- und Staubpartikel werden über einen Luftströmungskanal des Staubsaugers in den an bzw. in dem Staubsauger angeordneten Filterbeutel geliefert. Dieser Filterbeutel ist luftdurchlässig gestaltet, wobei die durch die Filterbeutelwandung strömende Luft zur Rückhaltung der Partikel gefiltert wird. Derartige Filterbeutel bestehen insbesondere aus einem Vliesmaterial, weiter beispielsweise aus einem Hepa-Filtermaterial, welches auch Feinststäube abscheidet.

[0014] Im Hinblick auf den zuvor beschriebenen Stand der Technik wird eine technische Problematik der Erfindung darin gesehen, eine verfahrbare Staubsaugeinrichtung der in Rede stehenden Art insbesondere hinsichtlich der Saugluft-Filtereigenschaften weiter zu verbessern.

[0015] Diese Problematik ist zunächst und im Wesentlichen durch den Gegenstand des Anspruches 6 gelöst, wobei darauf abgestellt ist, dass der Saugluftstrom vor Eintritt in den Filterbeutel einen Grobschmutzabscheider mit einem zugeordneten Grobschmutzbehälter durchsetzt. Zufolge dieser Ausgestaltung ist eine separate Filterung von Grobgut und Feinstaub erreicht. Das über den Saugmund aufgesogene, mit der Luftströmung mitgerissene Grobgut wird innerhalb des Grobschmutzabscheiders separiert und in dem Grobschmutzbehälter gesammelt. Der Abscheider filtert hierbei durch ein Gitter, einen Druckabscheider oder einen Prallabscheider, weiter

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gegebenenfalls durch Ausbildung des Abscheiders als Zyklonabscheider, wobei Grobgut zufolge der auf diese einwirkenden Fliehkräfte separiert werden Die weiter feinstaubbehaftete Saugluft durchsetzt nach Austritt aus dem Grobschmutzabscheider den der Feinstaubfiltrierung dienenden Filterbeutel. Entsprechend sind nach einem Saugvorgang etwaig versehentlich aufgesaugte Grobteile durch die separate Filtrierung leicht zugänglich, dies beispielsweise durch Öffnen des Grobschmutzbehälters. Ein übliches Zerstören des Filterbeutels bei den üblichen Ein-Filtersystemen für Grob- und Feinschmutz ist zur Sichtung eingesaugter Grobteile entsprechend nicht nötig. Es bietet sich zufolge der vorgeschlagenen Lösung eine Kontrolle des gesammelten Grobschmutzes vor dessen endgültiger Entsorgung an. Darüber hinaus bietet die Lösung die Möglichkeit einer allein auf Feinschmutzpartikel ausgelegten Materialwahl des Filterbeutels. Zufolge des fehlenden Eintrages von Grobschmutz in diesen ist die Stabilität des Filterbeutels entsprechend geringer wählbar, so beispielsweise unter Fortlassung einer beutelinneren Stütz- bzw. Schutzschicht.

[0016] Weitere Merkmale der Erfindung sind nachstehend, auch in der Figurenbeschreibung, oftmals in ihrer bevorzugten Zuordnung zum Gegenstand des Anspruches 6 oder zu Merkmalen weiterer Ansprüche erläutert. Sie können aber auch in einer Zuordnung zu nur einzelnen Merkmalen des Anspruches 6 oder des jeweiligen weiteren Anspruches oder jeweils unabhängig von Bedeutung sein.

[0017] Eine bevorzugte Ausgestaltung des Erfindungsgegenstandes sieht vor, dass der Grobschmutzabscheider zur Entleerung des Grobschmutzbehälters in umgekehrter Richtung von dem Saugluftstrom durchsetzbar ist. Entsprechend durchströmt die Saugluft im Zuge der Entleerung den Grobschmutzabscheider bzw. den Grobschmutzbehälter entgegen der Ausrichtung beim üblichen Staubsaugbetrieb in hierzu entgegengesetzter Strömungsrichtung. Bleibt das in dem Behälter aufgefangene Grobgut im Zuge des üblichen Staubsaugbetriebs im Wesentlichen unbeeinflusst von der durch den Grobschmutzabscheider geführten Luftströmung, so wird zur Entleerung diese gezielt in Richtung auf den gesammelten Grobschmutz gerichtet, so dass dieser aus dem Grobschmutzbehälter ausgeblasen wird. Hierzu wird, wie auch im üblichen Staubsaugbetrieb, Luft aus der Staubsaugerumgebung angesogen. Dieser Entleerungsvorgang wird bevorzugt durch Benutzereingriff ausgelöst, so weiter insbesondere nach Beendigung eines Staubsaugvorganges. Alternativ ist auch eine geräteseitige, selbsttätige Auslösung möglich, dies bevorzugt gleichfalls nach Beendigung eines Staubsaugvorganges, wobei die selbsttätige Auslösung weiter beispielsweise füllgrad- oder zeitabhängig ist.

[0018] Als besonders vorteilhaft erweist sich eine Ausgestaltung, bei welcher der Saugluftstrom das von dem Elektromotor angetriebene Gebläse nach Verlassen des Grobschmutzabscheiders und vor Eintritt in den Filterbeutel durchsetzt. Entsprechend ist das Gebläse zufolge des in Strömungsrichtung vorgeschalteten Grobschmutzabscheiders lediglich von, vom Grobschmutz befreiter Saugluft durchsetzt, so dass in vorteilhafter Weise ein Hochleistungsgebläse, ein sogenanntes Reinluftgebläse, zur Anwendung kommen kann. Derartige Gebläse arbeiten mit hohen Umdrehungszahlen, beispielsweise mit mehr als 15.000 U/min, vorzugsweise mehr als 60.000 U/min. Bedingt durch die Grobschmutz-Empfindlichkeit derartiger Hochleistungsgebläse finden diese in sogenannten Ein-Filtersystemen lediglich Anwendung in einer Anordnung hinter den Staubfilterbeutel – in Strömungsrichtung betrachtet –. Hierbei wird die schmutzbehaftete Saugluft durch den Filterbeutel bzw. durch dessen Wandung gesogen. Der Filterbeutel ist hierbei in einer druckfesten Kammer angeordnet derart, dass sich der Filterbeutel in einem Unterdruckbereich befindet. Es sind entsprechende Abdichtmaßnahmen erforderlich. Weiter ist bei derartigen System in der Regel die hinter dem Sauggebläse vorgesehene Ausblasöffnung flächenmäßig relativ klein, so dass sich relativ hohe Ausblasgeschwindigkeiten der gefilterten Luft einstellen. Zufolge des vorgeschlagenen Vorabscheidens von Grobgut innerhalb des Grobschmutzabscheiders ist die Anordnung eines derartigen Hochleistungsgebläses in Strömungsrichtung vor dem Filterbeutel möglich, was ein effektives Saugreinigungsergebnis bietet. Weiter ist durch die gewählte Anordnung der Filterbeutel endständig ausbildbar, so dass dessen nach außen weisende Beuteloberfläche eine relativ große Ausblasoberfläche bildet und so die Strömungsgeschwindigkeit der Ausblasluft wesentlich verringert ist. Da sich zufolge der vorgeschlagenen Anordnung des Gebläses vor dem Filterbeutel dieser nicht zwingend in einem dichten Gehäuse angeordnet sein muss, kann eine aufwändige dichte Umhüllung des Filterbeutels bzw. eine Abdichtung des Systems hinter dem Filterbeutel entfallen, was sich weiter positiv auf die Größe und somit auf das Gewicht des Staubsaugers auswirkt.

[0019] Bei einer Entleerung des Grobschmutzbehälters durch Saugluftbeaufschlagung in umgekehrter Richtung liefert in einer bevorzugten Ausgestaltung der Saugluftstrom in einen Filterbeutel, in welchem zur Entsorgung des Grobschmutzes dieser verbracht wird. Dieser Filterbeutel ist bei alleiniger Anwendung zur Aufnahme von Grobschmutz bevorzugt aus einem gegenüber dem, den Feinstaub aufnehmenden Filterbeutel vereinfachten Filtermaterial gebildet. Der allein Grobschmutz aufnehmende Filterbeutel weist entsprechend nicht zwingend Feinststaubfiltereigenschaften auf. Der das Grobgut letztlich sammelnde Filterbeutel kann extern an dem

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Staubsauger zur Entleerung des Grobschmutzbehälters angeschlossen sein. Bevorzugt ist eine Anordnung des Filterbeutels innerhalb des Staubsaugers, weiter bevorzugt in Form eines Wechsel-Filterbeutels. In diesem Zusammenhang erweist es sich handhabungstechnisch als besonders vorteilhaft, wenn der Saugluftstrom bei der Entleerung des Grobschmutzabscheiders in denselben Filterbeutel liefert, der im Staubsaugbetrieb der Feinfiltrierung des Saugluftstromes nach dem Gebläse dient. Entsprechend ist in dem Staubsauger nur ein Filterbeutel vorgesehen, der zeitlich versetzt zum Saugbetrieb und nach Umkehrung der Saugströmungsrichtung zusätzlich den aus dem Grobschmutz-Behälter ausgetragenen Grobschmutz sammelt.

[0020] Hierzu weist der Filterbeutel in bevorzugter Ausgestaltung zwei Eintrittsöffnungen auf, dies weiter bevorzugt im Bereich einer üblichen, dem Anschluss des Filterbeutels an die zugeordnete Gerätefläche dienenden Halteplatte, wobei zum einen eine Eintragsöffnung zum Eintrag von Feinstaub und zum anderen eine Eintragsöffnung zum Eintrag von, zunächst von dem Grobschmutzabscheider abgeschiedenen und hiernach aus diesem ausgetragenen Grobschmutz dient. Bevorzugt sind die Eintrittsöffnungen deckelverschlossen, so insbesondere durch Anordnung von durch Saugluftanströmung öffnenden Schwenkdeckeln, die in ihre Schließstellung federbelastet sein können. Auch eine zu den Eintrittsöffnungen vorgeschaltete Ventilanordnung ist diesbezüglich möglich. Je nach Betriebsart – Staubsaugbetrieb oder Grobschmutz-Entleerungsbetrieb – ist lediglich eine der beiden Eintragsöffnungen geöffnet, während die andere verschlossen ist. Weiter kann auch nur eine Eintragsöffnung filterbeutelseitig vorgesehen sein, welcher strömungsrichtungsmäßig vorgeordnet ein Strömungskanalabschnitt zugeordnet ist, der in zwei voneinander unabhängige, gegebenenfalls ventilverschließbare Kanalzweige unterteilt ist, wobei ein Kanalzweig zum Gebläse führt und dem gerichteten Transport der feinstaubbehafteten Saugluftströmung im Staubsaugbetrieb dient und der weitere Kanalzweig zum Grobschmutzbehälter führt.

[0021] Zur Entleerung des Grobschmutzbehälters ist in einer Weiterbildung des Erfindungsgegenstandes eine gesonderte, dem Gebläse vorgeschaltete Ansaugöffnung vorgesehen. Über diese wird im Entleerungsbetrieb Luft aus der Staubsaugerumgebung angesogen. In einer Weiterbildung kann die Ansaugöffnung gleich der Saugmundöffnung sein, wobei der der Saugmundöffnung nachgeschaltete Saugkanal entsprechend für die beiden Betriebsarten verzweigt. Weiter alternativ ist die gesonderte Ansaugöffnung nachgeschaltet zu dem Grobschmutzabscheider vorgesehen ist, dies insbesondere mit Bezug auf die Luftströmungsrichtung im Staubsaugbetrieb.

[0022] Zur Entleerung des Grobschmutzbehälters wird dieser in umgekehrter Richtung von dem Saugluftstrom durchsetzt. Dies ist in einer Ausgestaltung mit Hilfe einer Änderung der Drehrichtung des Gebläses erreicht. Mit Bezug auf die Strömungsrichtung im Staubsaugbetrieb wird nach einer Änderung der Drehrichtung des Gebläses der den Grobschmutzabscheider mit dem Gebläse verbindende Saugkanal zu einem Blaskanal, der die aus der Umgebung angesaugte Saugluft in den Grobschmutzabscheider und weiter in den Grobschmutzbehälter bläst. Die Drehrichtungsumkehr des Gebläses ist bei Axialgebläsen erreichbar beispielsweise durch entsprechende Umpolung des das Gebläse antreibenden Elektromotors, weiter in Art eines Umkehrgebläses. Bevorzugt ist eine Ausgestaltung, bei welcher das Gebläse innerhalb einer, den Saugkanal verlängernden, luftdichten Kammer um 180° gedreht wird, dies bei gleichbleibender Drehrichtung des Gebläserades. Die nötige Drehverlagerung des Gebläses erfolgt bevorzugt elektrisch, alternativ mechanisch durch Benutzereingriff. Auch können zwei in entgegengesetzte Richtungen wirkende, wechselweise schaltbare Gebläse vorgesehen sein. Alternativ ist zur Umkehr der Luftströmungsrichtung ein Vertauschen der Kanalanschlussbereiche relativ zu dem feststehenden Gebläse durchführbar, wonach der im üblichen Staubsaugbetrieb als Saugkanal dienende Abschnitt der Blasseite des Gebläses zugeordnet ist und der Blaskanal der Saugseite.

[0023] Weiter alternativ ist die Strömungsrichtungs-Umkehr durch entsprechendes Schalten der Strömungswege erreichbar. So ist vorgesehen, dass die vom Saugmund der Staubsaugeinrichtung zum Grobschmutzabscheider führende Saugleitung absperrbar ist, so insbesondere durch Anordnung eines entsprechenden Schaltventils innerhalb der Saugleitung. Diese zum Saugmund führende Saugleitung ist im Entleerungsbetrieb verschlossen.

[0024] Weiter bevorzugt weist die vom Gebläse zum Filterbeutel führende Leitung ein Schaltventil auf, zur Rückleitung des Saugluftstroms in den Grobschmutzabscheider. Entsprechend wird die im Staubsaugbetrieb durch das Gebläse in Richtung auf den Filterbeutel geführte Saugluftströmung vor dem Filterbeutel umgelenkt zum Einblasen in den Grobschmutzabscheider, dies bevorzugt unter Nutzung einer gesonderten Ansaugöffnung in Entleerungs-Strömungsrichtung betrachtet vor dem Gebläse, d. h. weiter zwischen Gebläse und Grobschmutz abscheider, wozu weiter die Rückleitung des Saugluftstromes in den Grobschmutzabscheider über eine gesonderte Leitung erfolgt.

[0025] Weiter alternativ weist die vom Gebläse zum Filterbeutel führende Leitung ein Schaltventil auf, zur Verbindung mit einer von dem Saugmund gesonderten Ansaugöffnung, dies weiter bevorzugt im Zusammenhang mit einer Ausgestaltung, bei welcher die

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Entleerung des Grobschmutzbehälters mit Hilfe einer Änderung der Drehrichtung des Gebläses erfolgt.

[0026] Hinsichtlich der vorbeschriebenen Schaltventile kann es sich beispielsweise um übliche Durchgangs- oder Mehrwegeventile handeln, die per Hand oder auch elektrisch, pneumatisch oder hydraulisch gesteuert werden. Alternativ sind die Ventile als Schieber ausgebildet, weiter beispielsweise als Mehrwege-Schieber, über welche weiter beispielsweise zugleich mehrere Kanäle ab- oder aufgeschiebert werden können.

[0027] Auch ist alternativ vorgesehen, dass der Grobschmutzbehälter zur Entleerung drehbar ist, um so in weiter bevorzugter Ausgestaltung eine Umkehr der Luftströmung durch den Grobschmutzbehälter zu erzielen. So ist beispielsweise der Grobschmutzbehälter derart drehbar, dass eine im üblichen Staubsaugbetrieb dem Blaskanal zugeordnete Öffnung im Entleerungsbetrieb dem Saugkanal zugeordnet ist und die im üblichen Staubsaugbetrieb dem Saugkanal zugeordnete Öffnung im Entleerungsbetrieb dem Blaskanal. Eine derartige Ausgestaltung bietet sich in weiter bevorzugter Ausgestaltung bei einem Grobschmutzabscheider in Form eines Filterabscheiders an, welcher Filterabscheider im Staubsaugbetrieb von der staubbeladenen Luft durchströmt wird, wobei Grobschmutzpartikel an einem bevorzugt quer zur Durchströmungsrichtung ausgerichteten, weiter bevorzugt grobmaschigen Filter abgeschieden werden. Der sich hier im Staubsaugbetrieb ansammelnde Grobpartikel-Kuchen wird durch Drehung des Grobschmutzbehälters und anschließender Luftdurchströmung hin zum Staubsaugbetrieb entgegengesetzter Richtung aus dem Grobschmutzbehälter ausgeblasen. Hierbei erweist sich weiter eine Ausgestaltung von Vorteil, bei welcher der Grobschmutzbehälter zwei oder mehr Kammern aufweist, die durch Verdrehen des Grobschmutzbehälters mit einer ersten und einer zweiten Luftdurchströmung durchströmbar sind, wobei die Luftströmungen entgegengesetzt zueinander gerichtet sind. Die Kammern sind weiter bevorzugt gleichgestaltet, dies weiter insbesondere hinsichtlich ihrer Querschnittgestaltung und hinsichtlich der Aufnahme eines Filterelementes oder dergleichen. Hierbei ist weiter eine Kammer stets in dem Strömungskanal zwischen der der zu reinigenden Fläche zugewandten Saugmundöffnung und dem Gebläse geschaltet, zur Filtrierung der staubbeladenen Luft und zum Zwecke der Abscheidung von Grobschmutz. Eine weitere, bevorzugt benachbart und achsparallel zu der vorbeschriebenen Kammer verlaufende Kammer ist im Betrieb geschaltet in dem Luftströmungsweg zwischen Gebläse und Feinstaubfilter, wobei die durch diese Kammer geführte Luftströmung in entgegengesetzter Richtung zu der die erste Kammer durchströmenden Luft gerichtet ist.

[0028] Durch Drehen des Grobschmutzbehälters werden die Kammern entweder der Saugluft- oder der Blasluftleitung vor bzw. hinter dem Gebläse zugeordnet, womit nach einem entsprechenden Verdrehen eine zuvor zur Grobfiltrierung der staubbeladenen Luft genutzte Kammer zur Entleerung derselben dem Blasluftstrom hinter dem Gebläse zugeordnet wird, während die vor einem Verdrehen dem Blasluftstrom zugeordnete und entsprechend geleerte Kammer nach dem Verdrehen wieder der Saugluftleitung vor dem Gebläse zugeordnet wird. Zufolge dieser Ausgestaltung ist eine konstruktiv einfache Lösung erreicht, die weiter bevorzugt ohne Ventile oder dergleichen zur Umschaltung etwaiger Luftwege auskommt. Zudem wird in dieser Ausführungsform nicht zwischen Staubsaug- und Entleerungsbetrieb unterschieden, da beide Betriebsarten zeitgleich durchgeführt werden. Während des Staubsaugbetriebs und entsprechender Filtrierung von Grobschmutz in der einen Kammer wird eine weitere Kammer entleert zufolge Blasdurchströmung in entgegengesetzter Richtung, womit die in der weiteren Kammer zuvor separierten Grobschmutzpartikel in den Feinstaubfilter abgeführt werden.

[0029] In einer handhabungstechnisch günstigen Weiterbildung ist vorgesehen, dass eine der Kammern aus dem Grobschmutzbehälter entnehmbar ist, so beispielsweise zur Durchsicht von im Staubsaugbetrieb in der Kammer abgeschiedenen Grobschmutzteile. Gegebenenfalls versehentlich aufgesaugte Grobteile, wie beispielsweise Schmuckstücke oder Spiel-Bausteine können so vor einer Entsorgung der Grobschmutzteile noch herausgenommen werden. Der Grobschmutz in der entnehmbaren Kammer ist durch Ausschütten in ein gesondertes Müllgefäß entsorgbar. Bevorzugt wird diesbezüglich ein Wiedereinsetzen der entnehmbaren Kammer, gegebenenfalls nach Durchsicht des Inhaltes, in den Grobschmutzbehälter, um nach einer entsprechenden Drehung des Grobschmutzbehälters über den hinter dem Sauggebläse vorgesehenen Blaskanal in den Feinstaubfilter entleert zu werden.

[0030] In diesem Zusammenhang erweist es sich von Vorteil, wenn eine Kammer in einer Entnahmeposition nicht durchströmbar ist, während mindestens zwei weitere Kammern zur Luftdurchströmung in zueinander entgegengesetzten Richtungen geschaltet sind. So ist der Staubsauger auch nach einer Entnahme einer entsprechend positionierten Kammer weiter betriebsfähig, so dass während eines üblichen Staubsaugbetriebs der Inhalt der entnommenen Kammer gesichtet werden kann. Die in der Entnahmeposition nicht luftdurchströmte Kammer liegt entsprechend im Staubsaugbetrieb in einer Bereitschaftsstellung. Im Falle einer weiter bevorzugten Anordnung von drei Kammern in dem Grobschmutzbehälter sind im Betrieb zwei Kammern im Einsatz und werden entgegengesetzt durchströmt. Die dritte Kammer ist zu diesem Zeitpunkt nicht im Einsatz und

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wird nicht durchströmt bis der Grobschmutzbehälter um bevorzugt 120° gedreht wird. Nach der Drehung sind die dritte Kammer und eine der anderen beiden Kammern im Einsatz und die weitere Kammer in der Entnahme- bzw. Bereitschaftsposition. Wird der Grobschmutzbehälter dreimal um jeweils bevorzugt 120° gedreht, ist wieder die Ausgangsposition erreicht.

[0031] Zur Entnahme einer Kammer kann diese schubladenartig aus dem Grobschmutzbehälter gezogen werden. Auch ein Ausschwenken ist diesbezüglich möglich.

[0032] Weiter bevorzugt ist der Grobschmutzbehälter um eine Achse, die der Durchströmungsrichtung entspricht, drehbar, weiter um eine Achse, die parallel verläuft zu den geometrischen Längsachsen der Kanäle. Die Saug- bzw. Blaskanalabschnitte sind zumindest im Bereich des Grobschmutzbehälters so zusammengeführt, dass durch revolverartiges Verdrehen des Grobschmutzbehälters jeweils zwei Kammern den Saug- und Blaskanälen zuordbar sind.

[0033] In einer Weiterbildung des Erfindungsgegenstandes ist vorgesehen, dass die Entleerung des Grobschmutzbehälters in ein von dem Filterbeutel gesondertes Aufnahmebehältnis erfolgt. Dieses kann ein extern zuordbares Aufnahmebehältnis sein, welches über eine öffenbare Schnittstelle des Staubsaugergehäuses strömungsdicht an den Grobschmutzbehälter angeschlossen wird. Die Entleerung erfolgt hierbei beispielsweise in Abhängigkeit einer Andockerfassung selbsttätig durch Einschalten des staubsaugerseitigen Gebläses, dies weiter, wie beschrieben, mit entsprechender Umkehr der Strömungsrichtung. Alternativ erfolgt die Entleerung durch ein zuschaltbares, zweites Gebläse. Dieses ist bevorzugt ein zu dem Staubsauger gesondertes Gebläse, weiter bevorzugt ein elektromotorisch angetriebenes Gebläse, zugeordnet dem gesonderten Aufnahmebehältnis.

[0034] Als besonders vorteilhaft, insbesondere im Zusammenhang mit Saugrobotern, darüber hinaus aber auch mit üblichen, handgeführten Staubsaugern, erweist sich eine Weiterbildung, bei welcher der Staubsaugeinrichtung eine dieser gegenüber stationäre Reinigungsstation zugeordnet ist an welche der Staubsauger anschließbar ist, zur Entleerung des Grobschmutzbehälters und/oder des Filterbeutels. Diese Reinigungsstation ist im Falle eines Saugroboters bevorzugt die Basisstation, an welcher auch eine Wiederaufladung der geräteseitigen Akkumulatoren erfolgt. Die Reinigungsstation weist das gesonderte Aufnahmebehältnis auf, in welches der Grobschmutzbehälter entleert wird. So bietet sich in diesem Zusammenhang eine mechanische oder auch elektrische Kontaktierung an, die ein Andocken der Staubsaugeinrichtung erfasst und gegebenenfalls selbsttätig den Entleerungsvorgang auslöst. Hierbei kann das geräteseitige Gebläse genutzt werden. Verfügt die Reinigungsstation über eine eigene Stromversorgung, so bietet sich weiter eine Lösung an, bei welcher in der Reinigungsstation ein gesondertes Gebläse vorgesehen ist, zum Aussaugen des staubsaugerseitigen Grobschmutzbehälters. Entsprechend dieser Ausgestaltung werden Grobschmutz und in dem Filterbeutel gesammelter Feinschmutz gesondert einer Entsorgung zugeführt. Weiter alternativ kann über die Reinigungsstation auch der in dem Filterbeutel enthaltene Feinstaub oder weiter alternativ der Filterbeutel insgesamt in die Reinigungsstation überführt werden, wonach die angedockte Staubsaugereinrichtung vollständig schmutzentleert ist.

[0035] Nachstehend ist die Erfindung anhand der beigefügten Zeichnung, welche lediglich verschiedene Ausführungsbeispiele darstellt, näher erläutert. Es zeigt:

[0036] Fig. 1 eine Staubsaugeinrichtung in Form eines handgeführten Elektro-Staubsaugers in perspektivischer Darstellung;

[0037] Fig. 2 eine schematische Darstellung der Strömungswege und Filterabschnitte des Staubsaugers, in einer ersten Ausführungsform, den Staubsaugbetrieb betreffend;

[0038] Fig. 3 eine der Fig. 2 entsprechende Darstellung im Entleerungsbetrieb;

[0039] Fig. 4 eine weitere der Fig. 2 entsprechende Darstellung, betreffend den Staubsaugbetrieb in einer zweiten Ausführungsform;

[0040] Fig. 5 den Entleerungsbetrieb gemäß Fig. 3, jedoch die Ausführungsform gemäß Fig. 4 betreffend;

[0041] Fig. 6 eine weitere schematische Darstellung gemäß Fig. 3, betreffend eine dritte Ausführungsform im Entleerungsbetrieb;

[0042] Fig. 7 eine weitere der Fig. 2 entsprechende Darstellung, betreffend den Staubsaugerbetrieb in einer vierten Ausführungsform mit einer Schieberverstellbarkeit;

[0043] Fig. 8 eine der Fig. 7 entsprechende Darstellung im Entleerungsbetrieb;

[0044] Fig. 9 den Schieber entsprechend der vierten Ausführungsform in einer Stellung gemäß Fig. 7;

[0045] Fig. 10 wie Fig. 9, in einer Stellung gemäß Fig. 8;

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[0046] Fig. 11 eine weitere Ausführungsform des Schiebers in einer Stellung gemäß Fig. 9;

[0047] Fig. 12 den Schieber entsprechend Fig. 11 in einer Stellung gemäß Fig. 10;

[0048] Fig. 13 eine weitere der Fig. 2 entsprechende Darstellung, betreffend den Staubsaugerbetrieb in einer fünften Ausführungsform mit einem drehbaren Schlauchanschluss;

[0049] Fig. 14 einer der Fig. 13 entsprechenden Darstellung im Entleerungsbetrieb;

[0050] Fig. 15 die Herausvergrößerung des Bereiches XV in Fig. 14; Fig. 16 eine weitere der Fig. 2 entsprechende Darstellung, betreffend den Staubsaugerbetrieb in einer sechsten Ausführungsform mit einem Grobschmutzabscheider;

[0051] Fig. 17 eine der Fig. 16 entsprechende Darstellung im Entleerungsbetrieb;

[0052] Fig. 18 den Grobschmutzabscheider in Draufsicht;

[0053] Fig. 19 den Schnitt gemäß der Linie XIX-XIX in Fig. 18;

[0054] Fig. 20 eine der Fig. 18 entsprechende Darstellung, jedoch eine weitere Ausführungsform betreffend;

[0055] Fig. 21 den Schnitt gemäß der Linie XXI-XXI in Fig. 20;

[0056] Fig. 22 einen Längsschnitt durch einen Grobschmutzabscheider in einer weiteren Ausführungsform;

[0057] Fig. 23 eine Draufsicht auf einen Grobschmutzabscheider in einer weiteren Ausführungsform;

[0058] Fig. 24 den Schnitt gemäß der Linie XXIV-XXIV in Fig. 23;

[0059] Fig. 25 eine der Fig. 23 entsprechende Darstellung, jedoch eine weitere Ausführungsform betreffend;

[0060] Fig. 26 den Schnitt gemäß der Linie XXVI-XXVI in Fig. 25;

[0061] Fig. 27 in perspektivischer Darstellung eine weitere Ausführungsform eines Grobschmutzabscheiders mit entnehmbaren Kammern.

[0062] Dargestellt und beschrieben ist zunächst mit Bezug zu Fig. 1 eine Staubsaugeinrichtung in Form eines handgeführten Staubsaugers **1**, insbesondere Haushalts-Staubsaugers, welcher als handgeführtes Stielgerät ausgeführt ist. Dieses weist zunächst ein Basisgerät **2** auf, mit einem hierin aufgenommenen Elektromotor für eine Saug-/Gebläse-Einheit **3**.

[0063] Die Stromversorgung des in dem Basisgerät **2** integrierten Gebläses **3** erfolgt über ein Elektrokabel **4**.

[0064] Weiter besitzt das Basisgerät **2** einen schwanenhalsförmigen Fortsatz, welcher sich über den Bereichen einer an dem Basisgerät **2** angedockten Filterbeutel-Anordnung erstreckt. Im Bereich des freien Endes formt dieser Fortsatz eine Steckaufnahme für einen Stiel **5** des Staubsaugers **1** aus. Im Bereich des freien Endes des Stieles **5** ist ein Betätigungsgriff **6** vorgesehen. Dieser besitzt eine daumenbetätigbare Stelleinheit in Form eines Schiebeschalters, über welchen insbesondere die Leistung des in dem Basisgerät **2** aufgenommenen Elektromotors bzw. des Gebläses **3** einstellbar ist.

[0065] Zur Bodenbearbeitung ist das Basisgerät **2** strömungsmäßig mit einem Vorsatzgerät **7** verbunden. Dieses kann eine Saugdüse sein, die eine rotierende Bürste aufweist.

[0066] Der Saugmund **8** des Vorsatzgerätes **7** steht strömungsmäßig in Verbindung mit einem basisgeräteseitigen Strömungskanal **9**.

[0067] An dem Basisgerät **2** ist ein Filterbeutel **10** auswechselbar angeordnet, wobei die mechanische und strömungsmäßige Verbindung mit dem basisgerätseitigen Strömungskanal **9** im Bereich einer bevorzugt quer zur Längserstreckung des Basisgerätes **2** ausgerichteten Trennebene T erreicht ist.

[0068] Der Filterbeutel **10** weist eine Halteplatte **11** auf, welche bevorzugt aus einem Hart-Kunststoffmaterial besteht. Die in der Filterbeutel-Befestigungsstellung bevorzugt parallel zur Trennebene T ausgerichtete Halteplatte **11** ist mit einer Eintrittsöffnung **12** versehen. An der, dem Basisgerät abgewandten Unterseite der Halteplatte **11** ist der Filterbeutel befestigt, so beispielsweise mit der Halteplatte **11** verschweißt.

[0069] Der Filterbeutel **10** bzw. das Filterbeutelmaterial kann hierbei mehrlagig, weiter gegebenenfalls zumindest teilweise aus Kunststofffasern bestehend ausgebildet sein. Bevorzugt ist die Filterbeutelwandung aus einem Hepa-Filtermaterial gefertigt.

[0070] Die Filterbeutelwandung ist luftdurchlässig ausgebildet, so dass der durch den Filterbeutel **10** geführte, schmutzbeladene Luftstrom unter kompletter Filtration aller relevanten Schmutzstoffe, gegebenenfalls auch Schadstoffe, durch die Filterbeutelwan-

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dung frei nach außen in die Umgebung austreten kann (die Pfeile a verdeutlichen die bevorzugt großflächige Ausblasung der filtrierten Luft in bevorzugt einer Vielzahl von unterschiedlichen Richtungen).

[0071] Weiter bevorzugt ist die Beutelwandung selbsttragend ausgeformt. Weiter kann eine, den Filterbeutel **10** bzw. dessen Beutelwandung umfassende, luftdurchlässige Schutzumhüllung **13** vorgesehen sein.

[0072] Das Gebläse **3** ist in Strömungsrichtung im Staubsaugbetrieb gemäß der Darstellung in Fig. 2 in den Strömungsweg zwischen Saugmund **8** und Filterbeutel **10** geschaltet, saugt entsprechend die Luft über den Saugmund **8** an und bläst diese in den Staubfilterbeutel **10** ein.

[0073] Im Staubsaugbetrieb gemäß Fig. 2 dem Gebläse **3** vorgeschaltet ist in dem Basisgerät **2** ein Grobschmutzabscheider **14**, hier ein Zyklonabscheider vorgesehen. In diesen mündet der mit dem Saugmund **8** verbundene Strömungskanal **9**. Die Mündung ist bevorzugt so ausgebildet, dass eine im Inneren des Zyklonabscheiders gewünschte Spiralströmung hierdurch unterstützt ist. Insbesondere ist bevorzugt, dass eine Mündungsrichtung windschief zu einer – bevorzugt zentral – den Zyklonabscheider gegebenen Abzugsrichtung der staubbeladenen Luft gerichtet ist. Beispielsweise kann diese praktisch tangential in den in diesem Bereich bevorzugt zylinderartig gebildeten Zyklonabscheider einströmen. Senkrecht ausgerichtet zum Anschlussabschnitt des Strömungskanals an den Zyklonabscheider ist weiter in den Zyklonabscheider ein zentral angeordnetes Tauchrohr **15** vorgesehen. Dessen in den Zyklonabscheider einragende freie Ende mündet in einer Ebene vertikal unterhalb der Eintrittsebene des Strömungskanals **9** in den Zyklonabscheider. Weiter ist das freie Ende **16** vertikal beabstandet zu einem sich an dem Zyklonabscheider im Bodenbereich desselben anschließenden Grobschmutz-Sammelraums oder Grobschmutzbehälter **17**. Letzterer verjüngt sich gegenüberliegend zu der Tauchrohreintrittsseite des Zyklonabscheiders trichterförmig. Weiter bevorzugt handelt es sich um einen unteren Bereich des Zyklonabscheiders selbst.

[0074] Der in dem Basisgerät **2** vorgesehene Grobschmutzabscheider **14** dient zur Vorabscheidung von Grobschmutz im Zuge der üblichen Saugbearbeitung gemäß der Darstellung in Fig. 2. Beim Ausführungsbeispiel wird durch die tangentiale Einströmung der schmutzbehafteten Saugluft über den Strömungskanal **9** in den Zyklonabscheider eine Luftverwirbelung erreicht, zufolge der hierbei auf die Grobschmutzpartikel einwirkenden Fliehkräfte eine Abscheidung derselben aus dem Luftstrom erreicht wird. Die Grobschmutzpartikel setzen sich im Bodenbereich des Zyklonabscheiders bzw. in dem hier ausgebildeten Grobschmutzbehälter **17** ab.

[0075] Der von dem Grobschmutz befreite Saugluftstrom (Pfeil b) wird hiernach zufolge Ansaugung über das Gebläse **3** durch das in den Zyklonabscheider einragende Tauchrohr **15** angesaugt, wobei im Bereich des freien Tauchrohrendes **16** die Öffnung mit einem, etwaig aufgewirbelte Grobschmutzpartikel rückhaltenden Sieb **18** versehen ist.

[0076] Da der Saugluftstrom b zufolge der Vorabscheidung nicht mehr mit Grobpartikeln versetzt ist, kann das von dem Saugluftstrom b um – bzw. durchströmte Gebläse **3** ein Hochleistungsgebläse mit effektivem Wirkungsgrad und hohen Drehzahlen sein. Es kommt bevorzugt entsprechend ein sogenanntes Reinluftgebläse zum Einsatz.

[0077] Die nach der Vorabscheidung lediglich noch mit Feinstaub versetzte Saugluft b wird über einen sich in Strömungsrichtung bei Staubsaugbetrieb hinter dem Gebläse **3** anschließenden Kanalabschnitt **19** in den Filterbeutel **10** eingeblasen, wobei beim Ausführungsbeispiel die Luftströmung gegebenenfalls aber auch ein gesondert betätigter Aktuator eine, im Nichtbetrieb die Eintrittsöffnung **12** des Filterbeutels **10** verschließende, gegebenenfalls hierzu federunterstützte Klappe **20** in Offenstellung hält.

[0078] In den in den Fig. 2 bis Fig. 5 dargestellten Ausführungsformen wird der Grobschmutzbehälter **17** intern, d. h. innerhalb des Staubsaugers **1** entleert. Diese Entleerung erfolgt durch Ausblasen der in dem Grobschmutzbehälter **17** gesammelten Partikel in den Filterbeutel **10**.

[0079] Hierzu ist zunächst ein Entleerungskanal **21** vorgesehen, der einerends an einer – bevorzugt weiteren – Eintrittsöffnung **22** des Filterbeutels **10** im Bereich der Halteplatte angeschlossen ist. Auch diese filterbeutelseitige Öffnung **22** ist wie die im Staubsaugbetrieb aktive Eintrittsöffnung **12** durch eine beispielsweise federbelastete Klappe **23** zunächst verschlossen.

[0080] Das andere Ende des Entleerungskanals **21** ist angeschlossen an eine bodenseitige Öffnung **24** des Grobschmutzbehälters **17**, welche Öffnung **24** im üblichen Staubsaugbetrieb gemäß den Fig. 2 bzw. Fig. 4 geschlossen ist, beispielsweise durch ein Sperrventil **25**.

[0081] Weiter mit Bezug zu dem in den Fig. 2 und Fig. 3 dargestellten ersten Ausführungsbeispiel sind mit Bezug auf die Strömungsrichtung vor und hinter dem Gebläse **3** jeweils Schaltventile **26**, **27** bevorzugt in Form von 2-/3-Wegeventilen angeordnet. Diese sind in der Staubsaugbetriebsstellung gemäß Fig. 2 so geschaltet, dass der Saugluftstrom b von dem Grobschmutzabscheider **14** kommend unmittelbar

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über das Gebläse **3** und dem sich hieran anschließenden Kanalabschnitt **19** in den Filterbeutel **10** geführt ist. Im Entleerungsbetrieb gemäß Fig. 3 sind beide Schaltventile **26** und **27** so geschaltet, dass die unmittelbare strömungsmäßige Verbindung des Gebläses **3** zu dem Tauchrohr **15** sowie weiter zu dem Kanalabschnitt **19** unterbrochen ist. Vielmehr ist das Gebläse **3** an seiner Saugseite nunmehr unmittelbar strömungsmäßig mit der Staubsaugeraußenseite verbunden. Das Schaltventil **26** hat das Gebläse **3** von dem Tauchrohr **15** strömungsmäßig getrennt. Hierzu ist ein gesonderter Ansaugkanal **28** vorgesehen, der einerends mit dem Schaltventil **27** zusammenwirkt und anderenends in einer Ansaugöffnung **29** mündet, die in dem Gehäuse des Basisgerätes **2** ausgebildet ist.

[0082] Das weitere Schaltventil **27** schaltet in dem Entleerungsbetrieb einen Rückströmkanal **30** frei, zur unmittelbaren Verbindung der Blassseite des Gebläses **3** mit dem Grobschmutzabscheider **14**. Der bevorzugt als gesonderte Leitung vorgesehene Rückströmkanal **30** mündet in dem dargestellten Ausführungsbeispiel deckenseitig in den Zyklonabscheider, wobei die Ausrichtung des Rückstromkanals **30** weiter so gewählt ist, dass die durch diesen geführte Luftströmung bei Eintritt in den Zyklonabscheider zumindest tendenziell parallel zur Abscheiderlängsachse verläuft und/oder weiter gezielt in Richtung auf den bodenseitigen Grobschmutzbehälter **17** gerichtet ist.

[0083] Der Entleerungsbetrieb kann mittels einer staubsaugerseitigen Steuereinheit selbsttätig ausgelöst werden, so beispielsweise in Abhängigkeit von einem Füllgrad des Grobschmutzbehälters **17**, weiter beispielsweise abhängig von einer Betriebsdauer des Staubsaugers **1** nach einer letzten Entleerung des Grobschmutzbehälters **17**. Darüber hinaus kann der Entleerungsbetrieb auch durch den Benutzer selbst ausgelöst werden, so weiter beispielsweise durch eine entsprechende Steuerung über den Betätigungsgriff **6**. Weiter bevorzugt ist der Entleerungsbetrieb nur dann auslösbar, beispielsweise auch selbsttätig auslösbar, wenn sich der Staubsauger **1** in einer Ruhestellung befindet, beispielsweise nach Abschluss eines Staubsaugvorganges.

[0084] Mit Auslösung des Entleerungsmodus werden die Schaltventile **26** und **27** wie vor beschrieben geschaltet, wobei die zu schaltenden Ventile über ein Gestänge gekoppelt sein können. Das die bodenseitige Öffnung des Grobschmutzbehälters verschließende Sperrventil **25** wird in die Offenstellung verbracht. Zudem wird über ein weiteres Sperrventil **31** der Eintritt des Strömungskanals **9** in den Grobschmutzabscheider **14** gesperrt, wobei weiter eine Strömungskanal-Eintrittsöffnung **32** zufolge der fehlenden Saugluftbeaufschlagung durch beispielsweise eine weiter federbeaufschlagte Klappe **33** verschlossen ist.

[0085] Über das Gebläse **3** wird auch im Entleerungsbetrieb ein Saugluftstrom b erzeugt, dies unter Ansaugen über die gesonderte, nach außen freie Ansaugöffnung **29**. Über den Rückströmkanal **30** wird die von außen angesaugte Reinluft in den Grobschmutzabscheider **14** sowie weiter in den Grobschmutzbehälter eingeblasen, wobei die hier gesammelten Grobschmutzpartikel über den Entleerungskanal **21** unter entsprechender Öffnung der der Eintrittsöffnung **22** zugeordneten Klappe **23** in den Filterbeutel **10** transportiert werden. Nach bevorzugt vollständiger Entleerung des Grobschmutzbehälters **17** und entsprechend abgeschlossenem Grobschmutztransfer in den Filterbeutel **10** kann Letzterer zur gemeinsamen Entsorgung von Fein- und Grobschmutzpartikel entnommen werden.

[0086] In dem in den Fig. 4 und Fig. 5 dargestellten zweiten Ausführungsbeispiel ist die Strömungsumkehr zum Einblasen von Saugluft in den Grobschmutzabscheider **14** bzw. zum Ausblasen und Entleeren des Grobschmutzbehälters **17** gelöst durch eine Drehrichtungsumkehr des Gebläses **3**. Auch bei dieser Ausgestaltung ist zwischen dem Gebläse **3** und dem Filterbeutel **10** ein Schaltventil **27** angeordnet, welches im Staubsaugbetrieb gemäß Fig. 4 den Kanalabschnitt **19** entsprechend zum Einblasen von Feinstaub behafteter Saugluft in den Filterbeutel **10** schaltet. Wie beispielsweise aus Fig. 4 ersichtlich, kann der bei der vorbeschriebenen Ausführungsform gegebene Durchströmkanal **30** ersatzlos wegfallen.

[0087] In der Entleerungs-Betriebsstellung gemäß Fig. 5 ist die Verbindung zwischen Gebläse **3** und Kanalabschnitt **19** unterbunden. Vielmehr verbindet das Schaltventil **27** in dieser Stellung das Gebläse **3** mit einem nach außen, zur Staubsaugerumgebung hin führenden Ansaugkanal **28** mit einer in der Gehäusewandung des Basisgerätes **2** ausgebildeten Ansaugöffnung **29**.

[0088] Entsprechend ist die im Staubsaugerbetrieb gemäß Fig. 4 mit der Blasseite des Gebläses **3** verbundene Blasleitung in der Entleerungs-Betriebsstellung gemäß Fig. 5 eine Ansaugleitung.

[0089] Zur Drehrichtungsumkehr des Gebläses **3** wird dieses gemäß Fig. 5 (in strichpunktierter Linienart ist eine Zwischenstellung des Gebläses **3** dargestellt) beispielsweise gedreht, bevorzugt, wie beim Ausführungsbeispiel wegen der dort gewählten Anordnung, um 180° gedreht, wonach die Saugseite des Gebläses **3** dem Schaltventil **27** bzw. dem Ansaugkanal **28** und die Blasseite des Gebläses **3** dem Tauchrohr **15** zugeordnet sind.

[0090] Bei entsprechender Ventilstellung der Sperrventile **25** und **31** gemäß dem zuvor beschriebenen

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Ausführungsbeispiel wird im Entleerungsbetrieb über das gedrehte Gebläse **3** Saugluft über das Tauchrohr **15** in den Zyklonabscheider bzw. in den Grobschmutzbehälter **17** eingeblasen, zur Entleerung desselben durch Abtransport des gesammelten Grobschmutzes über den Entleerungskanal **21** in den Filterbeutel **10**.

[0091] Fig. 6 zeigt eine Ausgestaltung mit einer externen, d. h. mit einer für den Staubsauger **1** bereitgestellten gesonderten Reinigungsstation **34**. Diese Reinigungsstation **34** verfügt über ein gesondertes Aufnahmebehältnis **35**, weiter beispielsweise aufnehmend einen der Entsorgung dienenden Aufnahmebeutel oder dgl.

[0092] Zur Entsorgung des in dem Grobschmutzbehälter **17** gesammelten Grobschmutzes wird der Staubsauger **1** der Reinigungsstation **34** zugeordnet, weiter an dieser angedockt also beispielsweise leitungsmäßig verbunden.

[0093] Der Staubsauger **1** bzw. das Basisgerät **2** verfügt gemäß den vorbeschriebenen Ausführungsbeispielen über einen zwischen den zum Saugmund **8** führenden Strömungskanal **9** und dem Gebläse **3** geschalteten Zyklonabscheider **14**, aufweisend einen Grobschmutzbehälter **17**. Das Gebläse **3** ist über den Kanalabschnitt **19** strömungstechnisch mit dem Filterbeutel **10** verbunden.

[0094] Der mit der Öffnung **24** des Grobschmutzbehälters **17** verbundene Entleerungskanal **21** ist in dieser Ausführungsform nach außen geführt, wobei das freie Ende des Entleerungskanals **21** schnittstellengleich im Bereich des Gerätegehäuses eine Entleerungsöffnung **36** ausformt. Diese ist im üblichen Staubsaugbetrieb, weiter auch bei Nichtbetrieb des Staubsaugers durch eine Klappe **37** verschlossen. Ein das Tauchrohr **15** vom Gebläse **3** im Entleerungsbetrieb trennendes Schaltventil **37** verbindet im Entleerungsbetrieb das Tauchrohr **15** mit einem nach außen geführten Ansaugkanal **28**, welcher gleichfalls schnittstellengleich beispielsweise im Bereich der Gehäusewandung eine Ansaugöffnung **29** aufweist.

[0095] In der Andockstellung – in Fig. 6 schematisch dargestellt – werden bevorzugt der staubsaugerseitige Ansaugkanal **28**, jedenfalls aber der Entleerungskanal **21** im Bereich der nach außen geführten Öffnungen dichtend angeschlossen an entsprechende Kanalabschnitte der Reinigungsstation **34**. Hierzu weist diese zunächst einen den Entleerungskanal **21** in die Reinigungsstation **34** verlängernden Eintrittskanal **38** auf. Dieser mündet, wenngleich nicht näher dargestellt, zugewandt dem Aufnahmebehältnis **35**, wobei weiter die Grobschmutzabscheidung bevorzugt auch bezüglich des Aufnahmebehältnisses **35** in Art einer Zyklonabscheidung erreicht wird.

[0096] Der staubsaugerseitige Ansaugkanal **28** ist stationsseitig überführt in einen Blaskanal **39**.

[0097] In der dargestellten Ausführungsform wird die zum Ausblasen der Grobschmutzpartikel aus dem Grobschmutzbehälter **17** benötigte Saugluft von einem gesonderten, in der Reinigungsstation **34** aufgenommenen Gebläse **40** aufgebaut. Entsprechend verfügt die Reinigungsstation **34** über eine gesonderte Stromversorgung.

[0098] Der Blaskanal **39** ist blasseitig des Gebläses **40** an diesem angeschlossen. Saugseitig führt von dem Gebläse **40** ein zur Umgebung offener Ansaugkanal **41**.

[0099] Die von Grobschmutz befreite Luft bläst frei über ein Ausblasgitter **42** in die Umgebung aus.

[0100] Entsprechend vorbeschriebener Ausgestaltung wird zur Entleerung des Grobschmutzbehälters **17** nicht das staubsaugerseitige Gebläse **3** genutzt. Vielmehr erfolgt die Entleerung in einer Nicht-Betriebsstellung des Staubsaugers, beispielsweise in einer Parkposition, was sich weiter beispielsweise anbietet bei sogenannten Saugrobotern, die an einer um eine vorbeschriebene Reinigungsstation **34** erweiterte Basisstation zur Aufladung der geräteseitigen Akkumulatoren andockt.

[0101] Alternativ kann auch das staubsaugerseitige Gebläse **3** zum Ausräumen des Grobschmutzbehälters **17** in das externe Aufnahmebehältnis **35** genutzt werden, dies beispielsweise durch Richtungsumkehr der Saugströmung, weiter beispielsweise durch Drehen des Gebläses **3** um 180° gemäß dem Ausführungsbeispiel in den Fig. 4 und Fig. 5. In diesem Fall wird die Saugluft über einen zur Umgebung hin offenen Ansaugkanal **28** entsprechend der Darstellung in Fig. 5 angesaugt und die grobschmutzbehaftete Luft in das Aufnahmebehältnis **35** der Reinigungsstation **34** eingeblasen. Ein gesondertes Gebläse **40** in der Reinigungsstation **34** kann hierbei entfallen, entsprechend weiter eine gesonderte Stromversorgung der Reinigungsstation **34**, was die Mobilität der Reinigungsstation **34** erhöht.

[0102] Weiter kann die Reinigungsstation **34** auch so ausgelegt sein, dass im Zuge oder zeitlich versetzt zu einer Entleerung des Grobschmutzbehälters **17** eine Überführung des in dem Filterbeutel **10** enthaltenen Feinstaubs oder weiter alternativ eine Überführung des Filterbeutels **10** insgesamt in die Reinigungsstation **34** bzw. in dessen Aufnahmebehältnis **35** erfolgt.

[0103] Die vorbeschriebene Ausführungsform mit einer gesonderten Reinigungsstation kann weiter bevorzugt Anwendung finden im Zusammenhang mit autonomarbeitenden, selbstverfahrbaren Reini-

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gungsgeräten, sogenannten Saug- oder Kehrrobotern, die mit einem Grobschmutzabscheider der beschriebenen Art versehen sind.

[0104] Eine vierte Ausführungsform ist anhand der Fig. 7 bis Fig. 10 näher erläutert. Die Fig. 7 zeigt einen Staubsauger **1** basierend auf der Ausführungsform gemäß Fig. 2, jedoch kann hier der Staubsauger **1** mittels eines Schiebers **43** vom Staubsaugbetrieb in den Entleerungsbetrieb und umgekehrt geschaltet werden. Hierzu sind die Saug- bzw. Blasleitungen in einem Bereich räumlich so zusammengeführt, dass ein Schieber, bevorzugt ein einziger Schieber **43** zugleich alle Leitungen durchsetzt. Jedenfalls in Bewegungsrichtung des Schiebers **43** gesehen liegen die Leitungen in diesem Bereich neben- und/oder übereinander.

[0105] Der Schieber **43** ersetzt in der dargestellten Ausführungsform die Schaltventile **26** und **27** der in den Fig. 2 und Fig. 3 dargestellten ersten Ausführungsform. Hierbei ist der Schieber als langgestreckter Flachkörper, beispielsweise in Form einer Kunststoffplatte gebildet, welcher Schiebe **43** in Längserstreckung desselben betrachtet zwei zueinander beabstandete Öffnungen **44** und **45** aufweist. Diese Öffnungen **44** und **45** liegen weiter in einer Schieberverlagerungsrichtung r des Schiebers **43** hintereinander, wobei der Abstand zwischen den Öffnungen **44** und **45** in Verschieberichtung etwa dem 1,2-Fachen eines Öffnungsdurchmessers entspricht. Demzufolge ist zwischen den Öffnungen **44** und **45** ein Verschlussabschnitt **46** gebildet. Ein solcher Verschlussabschnitt ist zudem jeweils endseitig des Schiebers **43** – in Verschiebungsrichtung r betrachtet – vorgesehen (Bezugszeichen **46** und **46"**), so dass jede Öffnung **44** und **45** in Verschieberichtung r des Schieber **43** betrachtet von einem Verschlussabschnitt **46** bzw. **46'** oder **46"** flankiert wird.

[0106] Der Durchmesser der Öffnungen **44** und **45** ist angepasst an den Durchmesser der zu dem Schieber **43** geführten Saug- bzw. Blasleitungen, hier angepasst an die Querschnitte von Durchströmkanal **30**, Kanalabschnitt **19**, Kanalabschnitt des Tauchrohres **15** sowie des Ansaugkanals **28**, so dass in einer Schieber-Offenstellung sich ein günstiges Durchströmen des Luftstromes einstellt. Die dem Schieber **43** zugewandten Endabschnitte der ab- bzw. aufzuschiebernden Kanalabschnitte sind entsprechend der Anordnung von Öffnungen und Verschlussabschnitten in dem Schieber **43** in Nebeneinanderlage vorgesehen derart, dass je nach Schieberstellung die freien Kanalenden in Überdeckung sind entweder zu einer Öffnung **44** oder **45** oder zu einem Verschlussabschnitt **46** bis **46"**.

[0107] Mit Bezug auf den Schieber **43** sind gegenüberliegend zu den zum Schieber **43** geführten Kanälen **15**, **19**, **28** und **30** jeweils zwei Kanäle zusammengeführt. So münden in dem dargestellten Ausführungsbeispiel der Kanal des Tauchrohres **15** und der Ansaugkanal **28** in einem der Ansaugseite des Gebläses **3** zugeordneten Ansaugkanalabschnitt **47**, während der Kanalabschnitt **19** und der Durchströmkanal **30** zusammengeführt sind in einem der Blasseite des Gebläses **3** zugeordneten Ausblaskanalabschnitt **48**. Durch die Anordnung der Kanäle und die vorbeschriebene Ausgestaltung des Schiebers **43** ist in Abhängigkeit von der Schieber-Verlagerungsstellung jeweils nur einer der Kanäle **15**, **28** mit dem Ansaugkanalabschnitt **47** und jeweils nur einer der Kanäle **19**, **30** mit dem Ausblaskanalabschnitt **48** strömungsmäßig verbunden. Die Schiebeverlagerung des Schiebers **43** erfolgt beispielsweise manuell gesteuert durch den Benutzer, wozu weiter beispielsweise an dem Staubsaugergehäuse eine frei zugängliche Schiebehandhabe vorgesehen sein kann. In bevorzugter Ausgestaltung erfolgt die Schiebeverlagerung des Schiebers **43** über mechanische oder elektrische Stellmittel.

[0108] Die bodenseitige Öffnung **24** des Grobschmutzbehälters **17** ist in dieser Ausführungsform durch eine Klappe **54** verschließbar, welche so angelenkt und angeschlagen ist, dass diese nur in einer Strömungsrichtung selbsttätig öffnet, nämlich im Entleerungsbetrieb gemäß Fig. 8. Weiter ist in der dargestellten Ausführungsform die die Strömungskanal-Eintrittsöffnung **32** verschließende Klappe **33** so angelenkt, dass diese nur im Staubsaubetrieb gemäß Fig. 7 öffnet und im Entleerungsbetrieb gemäß Fig. 8 durch den über den Durchströmkanal **30** in den Zyklonabscheider eintretenden Luftstrom in die Verschlussstellung gedrängt wird.

[0109] Nachfolgend ist die Wirkungsweise der vierten Ausführungsform näher erläutert. Ausgehend von der Fig. 7 befindet sich der Staubsauger **1** im Staubsaugbetrieb, wobei sich der Schieber **3** in einer im Ausführungsbeispiel unteren, bevorzugt anschlagbegrenzten Endstellung befindet (vgl. auch Fig. 9). In dieser Stellung gibt der Schieber **43** mit seinen Öffnungen **44** und **45** den Kanalabschnitt **19** und den Kanalabschnitt mit dem Tauchrohr **15** frei, wobei durch die Verschlussabschnitt **46** und **46"** der Durchströmkanal **30** und der Ansaugkanal **28** blockiert sind, weiter strömungsdicht verschlossen sind. Entsprechend ist der Kanalabschnitt des Tauchrohrs **15** mit dem Ansaugkanalabschnitt **47** des Gebläses **3** und der Kanalabschnitt **19** mit dem Ausblaskanalabschnitt **48** strömungsmäßig und zur Umgebung dicht verbunden. Nach einer Grobschmutzabscheidung im Zyklonabscheider wird der lediglich mit Feinstaub versetzte Saugluftstrom b über das Tauchrohr **15** und dem Ansaugkanalabschnitt **47** durch das Gebläse **3** angesogen und weiter über den Ausblaskanalabschnitt **48** und den hieran strömungsmäßig angeschlossenen Kanalabschnitt **19** in den Filterbeutel **10** geleitet. Der Grobschmutz lagert sich, wie auch

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schon in den vorbeschriebenen Ausführungsbeispielen, im Grobschmutzbehälter **17** ab.

[0110] Für den Entleerungsbetrieb ist der Schieber **43** in die in dem Ausführungsbeispiel anschlagbegrenzte obere Endstellung schiebeverlagert (vgl. Fig. 8 und Fig. 10). In dieser Stellung gibt der Schieber **43** mit seinen Öffnungen **44** und **45** den Durchströmkanal **30** und den Ansaugkanal **28** frei, wobei durch die Verschlussabschnitte **46** und **46'** der Kanalabschnitt **19** und der Kanalabschnitt des Tauchrohres **15** blockiert sind. Um den Grobschmutz aus dem Grobschmutzbehälter **17** in den Filterbeutel **10** zu befördern, wird über den Ansaugkanal **28** und den sich durch die entsprechende Schieberschaltstellung hieran anschließenden Ansaugkanalabschnitt **47** Umgebungsluft angesaugt und in Strömungsrichtung hinter dem Gebläse **3** durch den Ausblaskanalabschnitt **48** in den Durchströmkanal **30** geblasen, von welchem aus der Blasluftstrom in den Zyklonabscheider bzw. den Grobschmutzbehälter **17** tritt, dies weiter unter selbsttätiger Öffnung der bodenseitigen Klappe **54** zufolge Luftstrombeaufschlagung, so dass der Grobschmutz aus dem Grobschmutzbehälter **17** durch den Entleerungskanal **21** in den Filterbeutel **10** transportiert wird.

[0111] Die Anordnung der Öffnungen im Schieber sind abhängig von der Anordnung der Kanalendabschnitte im Bereich des Schiebers. So können die Kanalabschnitte beispielsweise zu einem Bündel zusammengefasst sein, weiter in der Art, dass jeweils zwei Kanalabschnitte in Nebeneinanderlage angeordnet sind, wobei weiter die so zusammengefassten Kanalabschnitt/Paare übereinanderliegen, dies weiter bevorzugt derart, dass in einen Querschnitt die, die Kanal-Mittelachsen verbindenden Linien ein Rechteck, bevorzugt ein Quadrat aufziehen. Einen einer solchen Kanalanordnung zuzuordnenden Schieber **43** ist in den Fig. 11 und Fig. 12 dargestellt.

[0112] Der Schieber **43** weist in dieser Ausführungsform quer zur Schiebeverlagerungsrichtung r zwei Reihen von Öffnungen und Verschlussabschnitten auf, wobei zunächst eine Reihe zwei in Schiebeverlagerungsrichtung r zueinander beabstandete Öffnungen **43** und **44** aufweist, zwischen welchen sich ein Verschlussabschnitt **46** erstreckt. Diesem Verschlussabschnitt **46** ist in der benachbarten Reihe eine weitere Öffnung **49** zugeordnet, die in Schiebeverlagerungsrichtung r des Schiebers **43** betrachtet beidseitig (in der Darstellung ober- und unterseitig) flankiert ist von Verschlussabschnitten **46'** und **46"**, welch Letztere entsprechend der vorbeschriebenen Anordnung benachbart sind zu den Öffnungen **43** und **44** der anderen Reihe.

[0113] Jede Reihe von Öffnungen und Verschlussabschnitten des Schiebers **43** ist einem übereinanderliegenden Paar von Kanalabschnitten zugeordnet, so weiter die Reihe mit den Öffnungen **43** und **44** dem Kanalabschnitt **19** und dem Ansaugkanal **28**, während die zweite Reihe mit der Öffnung **49** dem Durchströmkanal **30** und dem Kanalabschnitt des Tauchrohres **15** zugeordnet ist.

[0114] In Fig. 11 ist der Schieber **43** so in eine bevorzugt anschlagbegrenzte Stellung verlagert, dass die Öffnungen **44** und **49** dem Kanalabschnitt des Tauchrohres **15** und dem weiteren Kanalabschnitt **19** zugeordnet sind und entsprechend diese strömungsmäßig mit den Ansaug- und Ausblaskanalabschnitten **47** und **48** verbinden. Entsprechend stellt die Schieberstellung in Fig. 11 den Staubsaugbetrieb her, wobei mittels der Verschlussabschnitte **46** und **46'** der Ansaugkanal **28** und der Durchströmkanal **30** strömungsdicht verschlossen sind.

[0115] Zum Entleeren des Grobschmutzbehälters **17** wird auch in dieser Ausführungsform der Schieber **43** anschlagbegrenzt verlagert derart, dass nunmehr die Öffnungen **45** und **49** dem Ansaugkanal **28** und dem Durchströmkanal **30** zugeordnet sind und diese strömungsmäßig entsprechend mit den Ansaug- und Ausblaskanalabschnitten **47** und **48** verbinden, während die Verschlussabschnitte **46** und **46"** den Kanalabschnitt **19** und den Kanalabschnitt des Tauchrohres **15** dichtend verschließen.

[0116] Wie anhand des Ausführungsbeispiels in den Fig. 4 und Fig. 5 beschrieben, ist eine Umstellung vom Staubsaugbetrieb in den Entleerungsbetrieb durch ein Wechsel der Strömungsrichtung, bevorzugt infolge einer Drehung des Gebläses **3**, ermöglicht. Die Fig. 13 und Fig. 14 zeigen in diesem Zusammenhang eine weitere Ausführungsform, bei welcher das Gebläse **3** feststehend ist, jedoch die zu diesem geführten Kanäle, insbesondere die Anschlussbereiche der Kanäle relativ zu dem feststehenden Gebläse **3** vertauscht werden.

[0117] Hierzu ist zunächst ein das Gebläse **3**, insbesondere ein im Querschnitt kreisrundes Gebläsegehäuse umgebender Ring **51** vorgesehen, der die Anschlussbereiche der zu diesen geführten Leitungen (**19**, **28**, **15**, **30**) aufnimmt. Die Anschlussbereiche durchsetzen den Ring **51** derart, dass die Leitungen frei radial gerichtet auf das Gebläsegehäuse **50** münden.

[0118] Die Anschlussbereiche der Leitungen sind in einem Querschnitt gemäß den Darstellungen in den Fig. 13 und Fig. 14 gleichmäßig über den Umfang des Ringes **51** verteilt angeordnet und am Ring befestigt, schließen entsprechend zu den in Umfangsrichtung benachbarten Anschlussbereichen einen Winkel von 90° ein. Hierbei ist weiter vorgesehen, dass die Anschlussbereiche des Kanalabschnitts des Tauchrohres **15** und des Kanalabschnitts **19** diametral gegenüberliegend angeordnet sind, während um

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90° hierzu versetzt die Anschlussbereiche des Ansaugkanals **28** und des Durchströmkanals **30** diametral gegenüberliegend münden.

[0119] Das Gebläsegehäuse **50** weist im Querschnitt diametral gegenüberliegende Öffnungen **52** und **53** auf, welche sich in derselben Querschnittsebene wie die Anschlussbereiche erstrecken.

[0120] Die dem Ring **51** zugeführten Leitungen (Kanäle und Kanalabschnitte) sind flexibel gestaltet, weiter beispielsweise schlauchförmig.

[0121] Der Ring **51** ist um das Gebläsegehäuse **50** drehbar, dies weiter um eine Achse, die quergerichtet ist zur Strömungsrichtung in dem Gebläse **3**. Es sind weiter diesbezüglich bevorzugt vordefinierte Drehstellungen des Ringes **51** vorgesehen, beispielsweise zufolge überlaufbarer Rastmittel. Weiter kann auch eine Drehbegrenzung des Ringes **51** vorgesehen sein, so weiter eine Drehbegrenzung um 90°, so dass eine Verdrehung des Ringes **51** nur in und entgegen Uhrzeigerrichtung innerhalb eines 90°-Bereiches erreicht werden kann.

[0122] In Fig. 13 ist die Ringstellung im Staubsaugbetrieb dargestellt. Die Anschlussbereiche des Kanalabschnittes des Tauchrohres **15** und des Kanalabschnittes **19** sind strömungsmäßig mit den Öffnungen **52** und **53** des Gebläsegehäuses **50** verbunden, so dass entsprechend das Tauchrohr **15** der Saugseite des Gebläses **3** und der Kanalabschnitt **19** der Blasseite des Gebläses **3** zugeordnet sind. Der Ansaugkanal **28** sowie der Durchströmkanal **30** sind durch entsprechende Zuordnung eines Wandungsabschnittes des Gebläsegehäuse **50** unter Verschluss der entsprechenden Anschlussbereich der Kanäle verschlossen.

[0123] Für den Entleerungsbetrieb wird der Ring **51** mit Bezug auf die Darstellungen in Uhrzeigerrichtung um 90° verdreht, so dass hiernach die Anschlussbereiche des Kanalabschnittes **19** und des Tauchrohres **15** verschlossen sind, während die Anschlussbereiche des Ansaugkanals **28** und des Durchströmkanals **30** strömungsmäßig in Verbindung stehend zu den gebläsegehäuseseitigen Öffnungen **52** und **53**. Entsprechend wird über den Ansaugkanal **28** Umgebungsluft angesogen und über den Durchströmkanal **30** in den Grobschmutzbehälter **17** zum Ausblasen des darin gesammelten Grobschmutzes eingeblasen.

[0124] Auch die Verdrehung des Rings **51** zum Wechseln der Betriebszustände kann manuell durch den Benutzer erfolgen. Alternativ ist auch eine mechanische, beispielsweise elektromechanische Drehung des Ringes **51** möglich, dies weiter gegebenenfalls in Abhängigkeit von vorgegebenen Parametern selbsttätig.

[0125] In der vorbeschriebenen Ausführungsform wirkt der Ring **51** ventilartig. Die Umstellung von Staubsaugbetrieb in den Entleerungsbetrieb erfolgt durch aktives Schalten nur eines Elements – hier des Ringes **51** – so dass – wie auch in der Ausführungsform gemäß den Fig. 7 bis Fig. 12 – eine kompakte Bauform erreichbar ist.

[0126] Anhand der Fig. 16 bis Fig. 19 ist nachfolgend eine sechste Ausführungsform beschrieben. Entsprechend der Ausführungsform gemäß Fig. 6 weist auch hier der Filterbeutel **10** lediglich nur eine Eintrittsöffnung **12** mit einer Klappe **20** auf, welche so dimensioniert ist, dass auch der Grobschmutz durch diese Eintrittsöffnung **12** in den Filterbeutel **10** verbracht werden kann. Des Weiteren weist der Staubsauger **1** ein Gebläse **3** und einen Grobschmutzabscheider **14** auf.

[0127] Der Grobschmutzabscheider **14** besitzt zunächst einen kreiszylindrischen Grundkörper. In diesem Grundkörper sind zwei parallel zueinander verlaufende, weiter parallel zu einer Grundkörper-Mittelachse verlaufende zylindrische, röhrenförmige Kammern **54** und **54'** aufgenommen. Die beiden Kammern **54** und **54'** sind – wie in Fig. 18 zu erkennen – auf einer Symmetrieachse der Kreiskontur des Grundkörpers angeordnet, weiter beidseitig der Grundkörper-Mittelachse.

[0128] Die beiden Kammern **54** und **54'** durchsetzen jeweils endseitig eine scheibenförmige Decke **55** bzw. **55'** des Grundkörpers, so dass sich in den Decken **55** und **55'** entsprechend Ein- und Austrittsöffnungen einstellen.

[0129] Diese Öffnungen sind strömungsmäßig dicht verbunden mit den in dem Staubsauger **1** verlegten Saug- und Blasleitungen. So mündet in der Betriebsstellung gemäß Fig. 16 eintrittsseitig der Kammer **54** der von dem Vorsatzgerät **7** kommende Strömungskanal **9** und im Bereich der in Strömungsrichtung gegenüberliegenden Öffnung der Kammer **54** ein Zwischenkanal **56**, der andernends an der Saugseite des Gebläses **3** angeschlossen ist. Ein weiterer Zwischenkanal **57** führt von der Blasseite des Gebläses **3** zu einer Öffnung der weiteren Kammer **54'**, welche Öffnung in derselben Decke **55'** ausgebildet ist wie die Öffnung der Kammer **54**, welche in Verbindung steht mit dem Zwischenkanal **56**.

[0130] Die Öffnung der Kammer **54'** in der in Strömungsrichtung gegenüberliegenden Decke **55** ist angeschlossen an einen zum Staubfilterbeutel **10** führenden Kanalabschnitt **19**.

[0131] Jede Kammer **54**, **54'** ist mit einem Grobgutsieb **58** versehen. Hierbei kann es sich um ein Metall- oder Kunststoffsieb handeln, mit einer an die Größe der zur separierenden Schmutzpartikel angepassten

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Maschenweite. Es kann sich hierbei um ein flächiges Siebteil handeln, welches den freien inneren Querschnitt der jeweiligen Kammern **54**, **54'** durchsetzt.

[0132] Dargestellt sind in der Ausführungsform gemäß den Fig. 16 bis Fig. 19 Grobgutsiebe **58**, welche jeweils zunächst einen radial äußeren ausgesteiften Teilabschnitt aufweisen, der sich senkrecht oder nahezu senkrecht von der Kammer-Innenwandung zur Kammermitte hin erstreckt und hiernach steil unter Einschuss eines spitzen Winkels zur Kammerachse abfällt und so ein Auffangreservoir **59** bildet. Diese Auffangreservoire **59** der Kammern **54** und **54'** sind in Strömungsrichtung gerichtet, weiter in Längserstreckung der Kammern **54** und **54'** betrachtet mittig angeordnet.

[0133] Der Grobschmutzabscheider **14** bzw. der Grundkörper sind um eine die Grundkörper-Mittelachse aufnehmende Drehachse **60** um einen Winkel von 180° drehbar, so dass die Kammer **54** nach einer entsprechenden Verdrehung dem Zwischenkanal **57** und dem Kanalabschnitt **19** zugeordnet ist, während die Kammer **54'** die strömungsmäßige Verbindung zwischen dem Strömungskanal **9** und den zum Gebläse **3** führenden Zwischenkanal **56** bildet. So sind entsprechend je nach Drehstellung des Grundkörpers jede Kammer **54** und **54'** entweder saugluft- oder blasluftbeaufschlagt.

[0134] Zufolge der Anordnung der Kammern **54** und **54'** in Verbindung mit den zu- und abführenden Luftleitungen ergeben sich im Betrieb des Staubsaugers **1** in den Kammern **54** und **54'** Luftströmungen, die entgegengesetzt zueinander gerichtet sind, wobei weiter jede Kammer **55**, **54'** von einer Luftströmung durchsetzt ist, die insgesamt vom Vorsatzgerät **7** über eine erste Kammer des Grobschmutzabscheiders **14**, das Gebläse **3**, die zweite Kammer des Grobschmutzabscheiders **14** hin zum Staubfilterbeutel **10** führt. Die Grobschmutzabscheidung erfolgt hierbei in Strömungsrichtung betrachtet vor dem Gebläse **3**, während die hinter dem Gebläse **3** geführte Blasluft die nicht filteraktive Kammer in entgegengesetzter Strömungsrichtung zur Befüllungs-Strömungsrichtung ausbläst und so den Grobschmutz in den Staubfilterbeutel **10** austrägt. Der Entleerungsvorgang einer Kammer geht entsprechend einher mit dem Staubsaugvorgang in Verbindung mit einer Grobfiltrierung im Bereich der anderen Kammer, wobei das ausgeblasene Grobgut direkt in den Staubfilterbeutel **10** gespült wird, ohne das Gebläse **3** bzw. den das Gebläse **3** antreibenden Motor zu passieren.

[0135] Nach einer Verdrehung des Grobschmutzabscheiders **14** bzw. des Grundkörpers um die Drehachse **60** um 180° werden die Kammern **54** und **54'** in ihrer Zuordnung zu den zugeführten Leitungen vertauscht, so dass die vor der Verdrehung von Grobschmutz entleerte Kammer **54'** nunmehr den Leitungsabschnitt auf der Saugseite des Gebläses **3** zugeordnet ist und im Saugbetrieb der Grobfiltrierung dient, während die vor der Verdrehung der Grobfiltrierung dienende Kammer **54** nunmehr im blasseitigen Leitungsabschnitt hinter dem Gebläse **3** positioniert ist, zum Ausblasen und entsprechenden Räumen von gesammelten Grobschmutz.

[0136] Die Kammern **54** und **54'** können während des Betriebs des Staubsaugers **1** oder auch nach dem Betrieb des Staubsaugers **1** gedreht und dadurch getauscht werden. Auch kann die Drehung des Grobschmutzabscheiders **14** um die Drehachse **60** durch einen Drucksensor gesteuert werden, der beispielsweise bei einsetzendem Druckverlust durch zuviel abgefiltertem Grobgut im Sieb die Drehung veranlasst. Diese wiederum wird bevorzugt mechanisch, weiter beispielsweise elektromechanisch herbeigeführt, kann jedoch auch manuell durch Benutzereingriff erreicht werden. Weiter bevorzugt sind die Drehstellungen definiert, so beispielsweise durch überlaufbare Rastvorrichtungen. Zudem kann die ordnungsgemäße Zuordnung der Kammern **54** und **54'** zu den zu verbindenden Leitungsabschnitten durch eine Sensorik überwacht werden, die eine in Betriebnahme des Staubsaugers **1** nur in einer der beiden 180°-Drehstellungen des Grobschmutzabscheiders **14** zulässt.

[0137] Erfolgt die Verdrehung des Grobschmutzabscheiders **14** während des Betriebs des Staubsaugers **1** wird im Zuge der Drehung kurzzeitig der Saugluftstrom unterbrochen, da der Grundkörper mit seinen Decken **55** und **55'** während der Drehung die zugewandten Anschlussabschnitte der Kanäle verschließt. So wird verhindert, dass unkontrolliert Schmutz in das Basisgerät **2** tritt.

[0138] Bei der vorgeschlagenen Ausgestaltung des Grobgutsiebes **58** (vgl. auch Fig. 19) sammelt sich der Grobschmutz in dem zentralen Auffangreservoir **59**, während die Saugluft bevorzugt überwiegend durch den radial äußeren, kreisringförmigen Bereich des Grobgutsiebes **58** strömt. Das Auffangreservoir **59** nimmt in etwa die halbe axiale Länge der Kammer **54** bzw. **54'** ein.

[0139] Das Grobgutsieb **58** ist weiter bevorzugt flexibel ausgestaltet, insbesondere der Bereich des Auffangreservoirs **59**. Das Grobgutsieb **58**, insbesondere das Auffangreservoir **59** strömt hierbei mit dem Luftstrom. Wird die Röhre um 180° gedreht, wird das Grobgutsieb **58** mit der nun in die entgegengesetzte Richtung verlaufenden Luftströmung in der Kammer umgeschlagen. Partikel, welche sich in den Maschen festgesetzt haben werden durch das Umschlagen des Grobgutsiebes **58** und die daraus resultierende Maschenaufweitung entfernt und in den Filterbeutel **10** transportiert. Das Sieb ist entsprechend selbstreinigend. Durch die Anordnung des Grobgutsiebes **58**

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mittig mit Bezug auf die Längserstreckung einer Kammer ist ein Umschlagen des Grobgutsiebes **58** bei Änderung der Luftströmungsrichtung innerhalb der Kammer ermöglicht.

[0140] Ist das Grobgutsieb **58** steif oder weniger flexibel ausgebildet, so dass bei Luftströmungs-Richtungswechsel kein Umschlagen desselben erreicht wird, kann dieses, insbesondere das Auffangreservoir **59** zumindest annähernd die gesamte Länge der zugeordneten Kammer einnehmen, womit die durchströmende Luft über die gesamte Länge am Rand der Kammer vorbeiströmen kann, wobei der Schmutz über die gesamte Länge der Kammer im Auffangreservoir **59** gesammelt wird.

[0141] Die Fig. 20 und Fig. 21 zeigen eine Weiterbildung der vorbeschriebenen Ausführungsform des Grobgutabscheiders **14**, wobei der gesamte Querschnitt des zylindrischen Grundkörpers für die Kammern **54** und **54'** ausgenutzt wird. Somit weisen die beiden Kammern **54** und **54'** jeweils einen halbkreisförmigen Querschnitt auf, wobei die Kreisabschnitt-Außenwandung zugleich die Wandung des Grundkörpers formt, von welcher innenseitig im Querschnitt entlang einer Durchmesserlinie eine Trennwand **61** angeordnet ist, zur Separierung der Kammern **54** und **54'**. Die Trennwand **61** nimmt zudem mittig entsprechend aufnehmend die Mittelachse des Grundkörpers, die Drehachse **60** auf.

[0142] Gleich der zuvor beschriebenen Ausführungsform sind in Längserstreckung der Kammern **54** und **54'** Grobgutsiebe **58** vorgesehen, die wandungsinnenseitig der Kammern festgelegt sind und sich über den gesamten Querschnitt der jeweiligen Kammer erstrecken. Zufolge der im Querschnitt halbkreisförmigen Gestaltung der Kammern **54** und **54'** ist bei im Vergleich zu der zuvor beschriebenen Ausführungsform gleichem Außendurchmesser des Grundkörpers eine gegenüber der vorbeschriebenen Lösung vergrößerte Filter-Querschnittsfläche erreicht.

[0143] Dargestellt ist in Fig. 21 jeweils ein flexibles Grobgutsieb **58**, welches mit Änderung der Luftstromrichtung umschlagen kann.

[0144] Um die Strömungsgeschwindigkeit am Grobgutsieb **58** zu verringern wird weiter gemäß der Ausführungsform in Fig. 22 vorgeschlagen, der das Grobgutsieb **58** aufnehmenden Kammern **54** bzw. **54'**, insbesondere im Wirkungsbereich des Grobgutsiebes **58** eine bauchige Form zu geben. So ist jede Kammer **54**, **54'** zunächst ausgehend von den in den Decken **55** und **55'** vorgesehenen Öffnungen rohrartig mit kreisrundem Querschnitt geformt, dies jeweils ausgehend von der Decke **55** bzw. **55'** über ein Viertel der gesamten axialen Länge der Kammer. Der verbleibende, sich über die halbe axiale Länge der Kammer erstreckende Mittenabschnitt **62** der jeweiligen Kammer erstreckt sich ausgehend von den zugewandten Enden der endseitigen Rohrabschnitte der Kammern in einem Längsschnitt gemäß Fig. 22 konvex, so dass sich im unmittelbaren Einwirkungsbereich auf das Grobgutsieb **58** eine Querschnittsvergrößerung der Kammern ergibt. Hierdurch werden die Aufprallgeschwindigkeiten des Grobgutes am Grobgutsieb **58** verringert, dies weiter unter Vergrößerung der Siebquerschnittsfläche. Druckverluste sind minimiert, wobei mehr Grobgut im Vergleich zu einer über die axiale Länge querschnittsgleichbleibenden Kammer abgeschieden werden kann.

[0145] Auch können mehr als zwei Kammern in dem Grundkörper angeordnet sein, so beispielsweise gemäß der in den Fig. 23 und Fig. 24 dargestellten Ausführungsform drei Kammern **54**, **54'** und **54"**. Die Anordnung ist hierbei so gewählt, dass in einem Querschnitt bzw. in einer Draufsicht gemäß Fig. 23 Linien, die die Kammern-Mittenachsen verbinden ein gleichseitiges Dreieck aufziehen. Die Kammern-Mittenachsen verlaufen parallel zur Drehachse **60** des Grundkörpers **52**, wobei weiter die Mittenachsen auf einer konzentrisch zur Drehachse **60** verlaufenden Kreislinie positioniert sind.

[0146] In Verbindung mit einer Leitungsanordnung gemäß der Ausführungsform in den Fig. 14 und Fig. 16 sind zwei der Kammern **54**, **54'** und **54"** im Betrieb des Staubsaugers **1** aktiv, werden entsprechend in zueinander entgegengesetzten Richtungen durchströmt, wobei in einer Kammer, wie beschrieben, eine Grobschmutzfiltrierung erfolgt, während die andere aktive Kammer blasluftbeaufschlagt entleert wird. Die dritte Kammer wird hierbei nicht durchströmt, ist entsprechend nicht im Einsatz bis der Grundkörper bzw. der Grobschmutzabscheider **14** um die Drehachse **60** um 120° gedreht wird. Nach dieser Drehung sind die dritte Kammer und eine der anderen beiden Kammern im Einsatz. Wird der Grobschmutzabscheider **14** dreimal um 120° gedreht, ist wieder die Ausgangsposition erreicht.

[0147] Die nicht aktive und entsprechend nicht luftdurchströmte Kammer ist stets die Kammer, welche vor einer 120°-Drehung des Grobschmutzabscheiders **14** der Grobfiltrierung dient. Dies bieten den Vorteil, dass vor einer weiteren Verdrehung, nach welcher die Kammer in dem Blasluftstrom zum Ausräumen von Grobschmutzpartikeln eingefahren wird, eine Sichtung des ausfiltrierten Inhaltes in der Kammer ermöglicht ist. So können ungewollt eingesaugte Gegenstände noch entnommen werden. Diese sind in dem Grobgutsieb **58** der nicht aktiven Kammer gefangen und können aus dem Grobgut entnommen werden.

[0148] Hierzu weist bevorzugt das Staubsaugergehäuse eine Reversionsöffnung auf, die in Überdeckung liegt zu der deckenseitigen Öffnung der nicht

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aktiven Kammer.

[0149] Die Fig. 25 und Fig. 26 zeigen eine auf der Ausführungsform gemäß in Fig. 23 und Fig. 24 basierende Alternative mit drei Kammern **54**, **54'** und **54"** die entsprechend der Ausführungsform gemäß den Fig. 20 und Fig. 21 den gesamten Querschnitt des kreiszylindrischen Grundkörpers ausnutzen. Dies bietet den Vorteil eines größeren Grobgutsiebes **58**, welches entsprechend mehr Grobgut aufnehmen kann bis es geleert werden muss. Entsprechend nehmen die Kammern **54** bis **54"** jeweils etwa ein Drittel des Querschnitts des Grundkörpers ein. Die Wirkungsweise entspricht der zuvor beschriebenen Ausführungsform.

[0150] Schließlich zeigt Fig. 27 eine Ausführungsform basieren auf der Ausführungsform gemäß den Fig. 25 und Fig. 26, bei welcher die Kammern **54**, **54'** und **54"** gesondert zueinander ausgebildet sind, entsprechend jeweils eigenständige Wandungen aufweisen. Diese Kammern **54**, **54'** und **54"** sind in einem Grundkörpergestell **63** aufgenommen, welches die zentrale Drehachse **60** sowie jeweils endseitig der Drehachse **60** kreisringförmige Decken **64** aufweist. Letztere besitzen jeweils Durchtrittsöffnungen **65**, die den Querschnitt der Kammern aufnehmend in vertikaler Überdeckung zum freien Innenquerschnitt der Kammern ausgerichtet sind.

[0151] Die Kammern **54**, **54'** und **54"** sind aus dem so gestalteten Grobpartikelabscheider **14** entnehmbar, dies bevorzugt durch Herausziehen nach radial außen, womit eine schubladenartige Entnahme der nicht aktiven Kammer erreichbar ist. Zufolge dieser Ausgestaltung kann der Benutzer komfortabel den zuvor eingesaugten Grobschmutz beispielsweise nach versehentlich eingesaugten Gegenständen untersuchen.

[0152] Um das Entnehmen der schubladenartigen Kammern aus dem Grobschmutzabscheider **14** bzw. aus dem Grundkörpergestell **63** zu vereinfachen, ist jeweils wandungsaußenseitig der kreisabschnittförmigen Mantelfläche eine Handhabe **66** vorgesehen.

[0153] Zur Halterung der schubladenartigen Kammern in dem Grundkörpergestell **63** sind auslösbare Mittel vorgesehen, so beispielsweise überlaufbare Rastvorrichtungen.

[0154] Um die nicht aktive, schubladenartige Kammer zugängig zu machen ist bevorzugt in dem Basisgerät **2** eine Klappe oder dgl. vorgesehen. Alternativ ist das Basisgerät **2** so gestaltet, dass ein direkter Zugriff auf die jeweilige schubladenartige Kammer ermöglicht ist.

[0155] Alle offenbarten Merkmale sind (für sich) erfindungswesentlich. In die Offenbarung der Anmeldung wird hiermit auch der Offenbarungsinhalt der zugehörigen beigefügten Prioritätsunterlagen (Abschrift der Voranmeldung) vollinhaltlich mit einbezogen, auch zu dem Zweck, Merkmale dieser Unterlagen in Ansprüche vorliegender Anmeldung mit aufzunehmen.

Bezugszeichenliste

1	Staubsauger
2	Basisgerät
3	Saug-/Gebläseeinheit
4	Elektrokabel
5	Stiel
6	Betätigungsgriff
7	Vorsatzgerät
8	Saugmund
9	Strömungskanal
10	Filterbeutel
11	Halteplatte
12	Eintrittsöffnung
13	Schutzumhüllung
14	Grobschmutzabscheider
15	Tauchrohr
16	freies Ende
17	Grobschmutzbehälter
18	Sieb
19	Kanalabschnitt
20	Klappe
21	Entleerungskanal
22	Eintrittsöffnung
23	Klappe
24	Öffnung
25	Sperrventil
26	Schaltventil
27	Schaltventil
28	Ansaugkanal
29	Ansaugöffnung
30	Durchströmkanal
31	Sperrventil
32	Strömungskanal-Eintrittsöffnung
33	Klappe
34	Reinigungsstation
35	Aufnahmebehältnis
36	Entleerungsöffnung
37	Klappe
38	Eintrittskanal
39	Blaskanal
40	Gebläse
41	Ansaugkanal
42	Ausblasgitter
43	Schieber
44	Öffnung
45	Öffnung
46	Verschlussabschnitt
46'	Verschlussabschnitt
46"	Verschlussabschnitt
47	Ansaugkanalabschnitt
48	Ausblaskanalabschnitt
49	Öffnung

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50	Gebläsegehäuse
51	Ring
52	Öffnung
53	Öffnung
54	Kammer
54'	Kammer
54"	Kammer
55	Decke
55'	Decke
56	Zwischenkanal
57	Zwischenkanal
58	Grobgutsieb
59	Auffangreservoir
60	Drehachse
61	Trennwand
62	Mittenabschnitt
63	Grundkörpergestell
64	Decke
65	Durchtrittsöffnung
66	Handhabe
a	Ausblasrichtung
b	Saugluftstrom
r	Schiebeverlagerungsrichtung
T	Trennebene

Patentansprüche

1. Verfahren zum Betreiben eines Staubsaugers (**1**) mit einem elektromotorisch angetriebenen Gebläse (**3**) und einem Saugmund (**8**) durch welchen gesaugt wird, wobei der Saugluftstrom (b) durch einen Grobschmutzabscheider (**14**) mit zugeordnetem Grobschmutzbehälter (**17**) geleitet wird, **dadurch gekennzeichnet**, dass die aus dem Grobschmutzabscheider (**14**) austretende Saugluft zur Abscheidung von darin noch enthaltenem Feinstaub in einen Filterbeutel (**10**) geblasen wird.

2. Verfahren nach Anspruch 1 oder insbesondere danach, dadurch gekennzeichnet, dass zur Entleerung des Grobschmutzbehälters (**17**) Saugluft durch den Grobschmutzbehälter (**17**) geblasen wird und damit ausgetragener Grobschmutz in den Filterbeutel (**10**) eingetragen wird.

3. Verfahren nach einem oder mehreren der vorhergehenden Ansprüche oder insbesondere danach, dadurch gekennzeichnet, dass die Einblasung von Saugluft in den Grobschmutzbehälter (**17**) mit Hilfe einer Drehrichtungsumkehr des Gebläses (**3**) vorgenommen wird.

4. Verfahren nach einem oder mehreren der vorhergehenden Ansprüche oder insbesondere danach, dadurch gekennzeichnet, dass eine Reinigungsstation (**34**) bereitgestellt wird, dass der Staubsauger (**1**) zur Entleerung des Grobschmutzbehälters (**17**) an die Reinigungsstation (**34**) angeschlossen wird und der Grobschmutz mittels der in den Grobschmutzbehälter (**17**) eingeleiteten Saugluft in ein Aufnahmebehältnis (**35**) in der Reinigungsstation (**34**) transportiert wird.

5. Verfahren nach einem oder mehreren der vorhergehenden Ansprüche oder insbesondere danach, dadurch gekennzeichnet, dass nach Anschluss des Staubsaugers (**1**) an die Reinigungsstation (**34**) der Filterbeutel (**10**) insgesamt oder der in dem Filterbeutel (**10**) enthaltene Feinstaub in die Reinigungsstation (**34**) überführt wird.

6. Verfahrbare Staubsaugeinrichtung mit einem elektromotorisch betriebenen Gebläse (**3**) und einem von einem Saugluftstrom (b) durchsetzten Filterbeutel (**10**), wobei der Saugluftstrom (b) durch das Gebläse (**3**) erzeugt ist, dadurch gekennzeichnet, dass der Saugluftstrom (b) vor Eintritt in den Filterbeutel (**10**) einen Grobschmutzabscheider (**14**) mit einem zugeordneten Grobschmutzbehälter (**17**) durchsetzt.

7. Staubsaugeinrichtung nach Anspruch 6 oder insbesondere danach, dadurch gekennzeichnet, dass der Grobschmutzabscheider (**14**) zur Entleerung in umgekehrter Richtung von dem Saugluftstrom (b) durchsetzbar ist.

8. Staubsaugeinrichtung nach einen oder mehreren der Ansprüche 6 bis 7 oder insbesondere danach, dadurch gekennzeichnet, dass der Saugluftstrom (b) das von dem Elektromotor angetriebene Gebläse (**3**) nach Verlassen des Grobschmutzabscheiders (**14**) und vor Eintritt in den Filterbeutel (**10**) durchsetzt.

9. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 8 oder insbesondere danach, dadurch gekennzeichnet, dass der Saugluftstrom (b) bei der Entleerung des Grobschmutzabscheiders (**14**) in einen Filterbeutel (**10**) liefert.

10. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 9 oder insbesondere danach, dadurch gekennzeichnet, dass der Saugluftstrom (b) bei der Entleerung des Grobschmutzabscheiders (**14**) in denselben Filterbeutel (**10**) liefert, in den dieser auch bei Füllung des Grobschmutzabscheiders (**14**) liefert.

11. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 10 oder insbesondere danach, dadurch gekennzeichnet, dass der Filterbeutel (**10**) zwei Eintrittsöffnungen (**12, 22**) aufweist, zum einen zum Eintrag von Feinstaub und zum anderen zum Eintrag von, in dem Grobschmutzabscheider (**14**) abgeschiedenem Grobschmutz.

12. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 11 oder insbesondere danach, dadurch gekennzeichnet, dass zur Entleerung des Grobschmutzbehälters (**17**) eine gesonderte,

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dem Gebläse (**3**) vorgeschaltete Ansaugöffnung (**29**) vorgesehen ist.

13. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 12 oder insbesondere danach, dadurch gekennzeichnet, dass die gesonderte Ansaugöffnung (**29**) nachgeschaltet zu dem Grobschmutzabscheider (**14**) vorgesehen ist.

14. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 13 oder insbesondere danach, dadurch gekennzeichnet, dadurch gekennzeichnet, dass die Entleerung des Grobschmutzbehälters (**17**) mit Hilfe einer Änderung der Drehrichtung des Gebläses (**3**) erfolgt.

15. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 14 oder insbesondere danach, dadurch gekennzeichnet, dass die Entleerung des Grobschmutzbehälters (**17**) mit Hilfe einer Vertauschung der Anschlussbereiche relativ zu einem feststehenden Gebläse (**3**) erfolgt.

16. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 15 oder insbesondere danach, dadurch gekennzeichnet, dass die vom Saugmund (**8**) der Staubsaugeinrichtung zum Grobschmutzabscheider (**14**) führende Saugleitung absperrbar ist.

17. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 16 oder insbesondere danach, dadurch gekennzeichnet, dass die vom Gebläse (**3**) zum Filterbeutel (**10**) führende Leitung ein Schaltventil (**27**) aufweist, zur Rückleitung des Saugluftstromes (b) in den Zyklonabscheider (**14**).

18. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 17 oder insbesondere danach, dadurch gekennzeichnet, dass die vom Gebläse (**3**) zum Filterbeutel (**10**) führende Leitung ein Schaltventil (**27**) aufweist, zur Verbindung mit einer von dem Saugmund (**8**) gesonderten Ansaugöffnung (**29**).

19. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 18 oder insbesondere danach, dadurch gekennzeichnet, dass der Grobschmutzbehälter (**17**) zur Entleerung drehbar ist.

20. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 19 oder insbesondere danach, dadurch gekennzeichnet, dass der Grobschmutzbehälter (**17**) zwei oder mehr Kammern (**54**, **54'**, **54"**) aufweist, die durch Verdrehen des Grobschmutzbehälters (**17**) mit einer ersten und zweiten Luftströmung durchströmbar sind, wobei die Luftströmungen entgegengesetzt zueinander gerichtet sind.

21. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 20 oder insbesondere danach, dadurch gekennzeichnet, dass eine der Kammern (**55**, **54'**, **54"**) aus dem Grobschmutzbehälter (**17**) entnehmbar ist.

22. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 21 oder insbesondere danach, dadurch gekennzeichnet, dass eine Kammer (**54**, **54'**, **54"**) in einer Entnahmeposition nicht durchströmbar ist, während mindestens zwei weitere Kammern (**54**, **54'**, **54"**) zur Luftdurchströmung in zueinander entgegengesetzten Richtungen gestaltet sind.

23. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 22 oder insbesondere danach, dadurch gekennzeichnet, dass der Grobschmutzbehälter (**17**) um eine Achse (**60**), die der Durchströmungsrichtung entspricht, drehbar ist.

24. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 23 oder insbesondere danach, dadurch gekennzeichnet, dass die Entleerung des Grobschmutzbehälters (**17**) in ein von dem Filterbeutel (**10**) gesondertes Aufnahmebehältnis (**35**) erfolgt.

25. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 24 oder insbesondere danach, dadurch gekennzeichnet, dass die Entleerung durch ein zuschaltbares, zweites Gebläse (**40**) erfolgt.

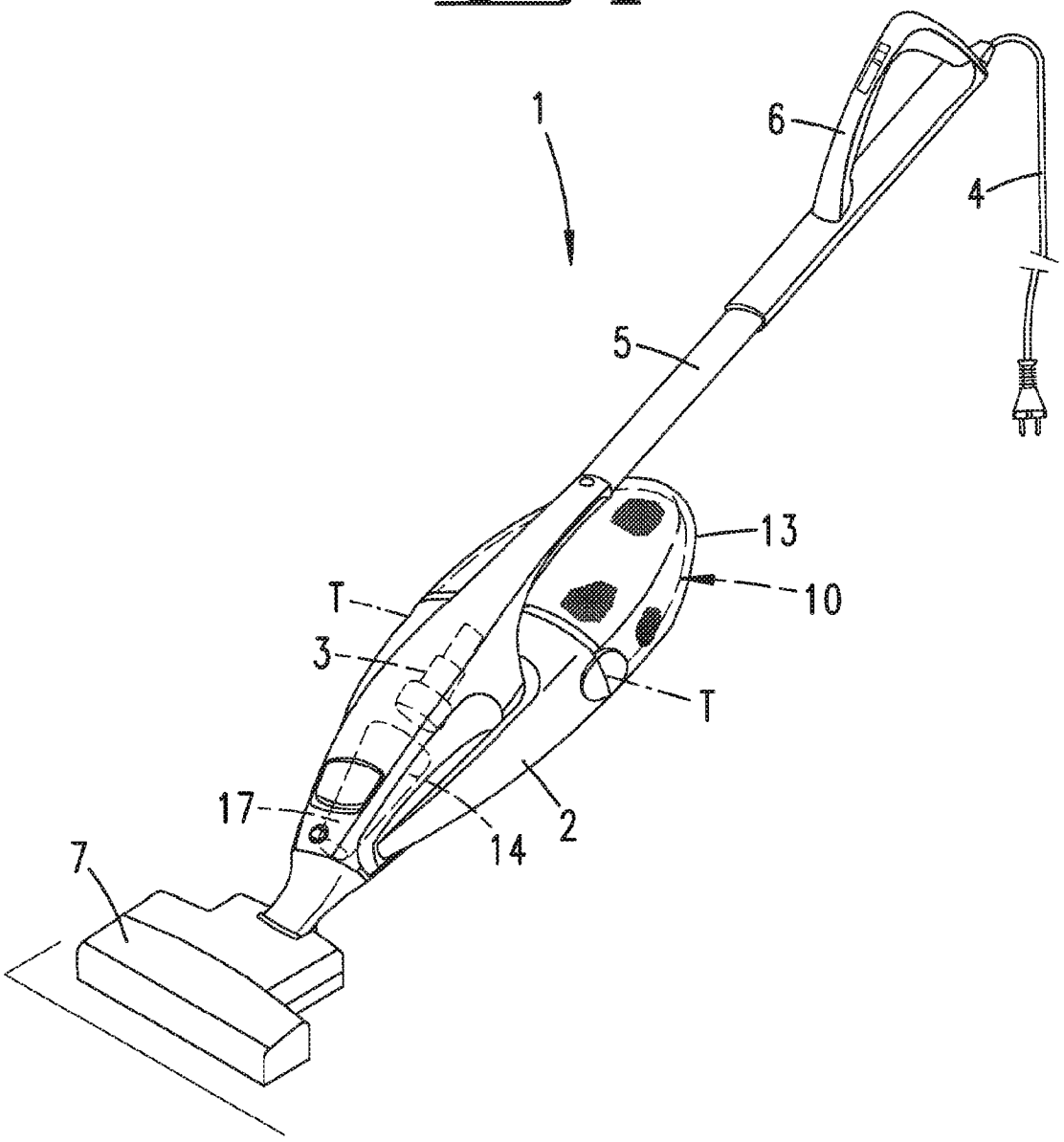
26. Staubsaugeinrichtung nach einem oder mehreren der Ansprüche 6 bis 25 oder insbesondere danach, dadurch gekennzeichnet, dass der Staubsaugeinrichtung eine dieser gegenüber stationäre Reinigungsstation (**34**) zugeordnet ist, an welche die Staubsaugeinrichtung anschließbar ist, zur Entleerung des Grobschmutzbehälters (**17**) und/oder des Filterbeutels (**10**).

Es folgen 21 Blatt Zeichnungen

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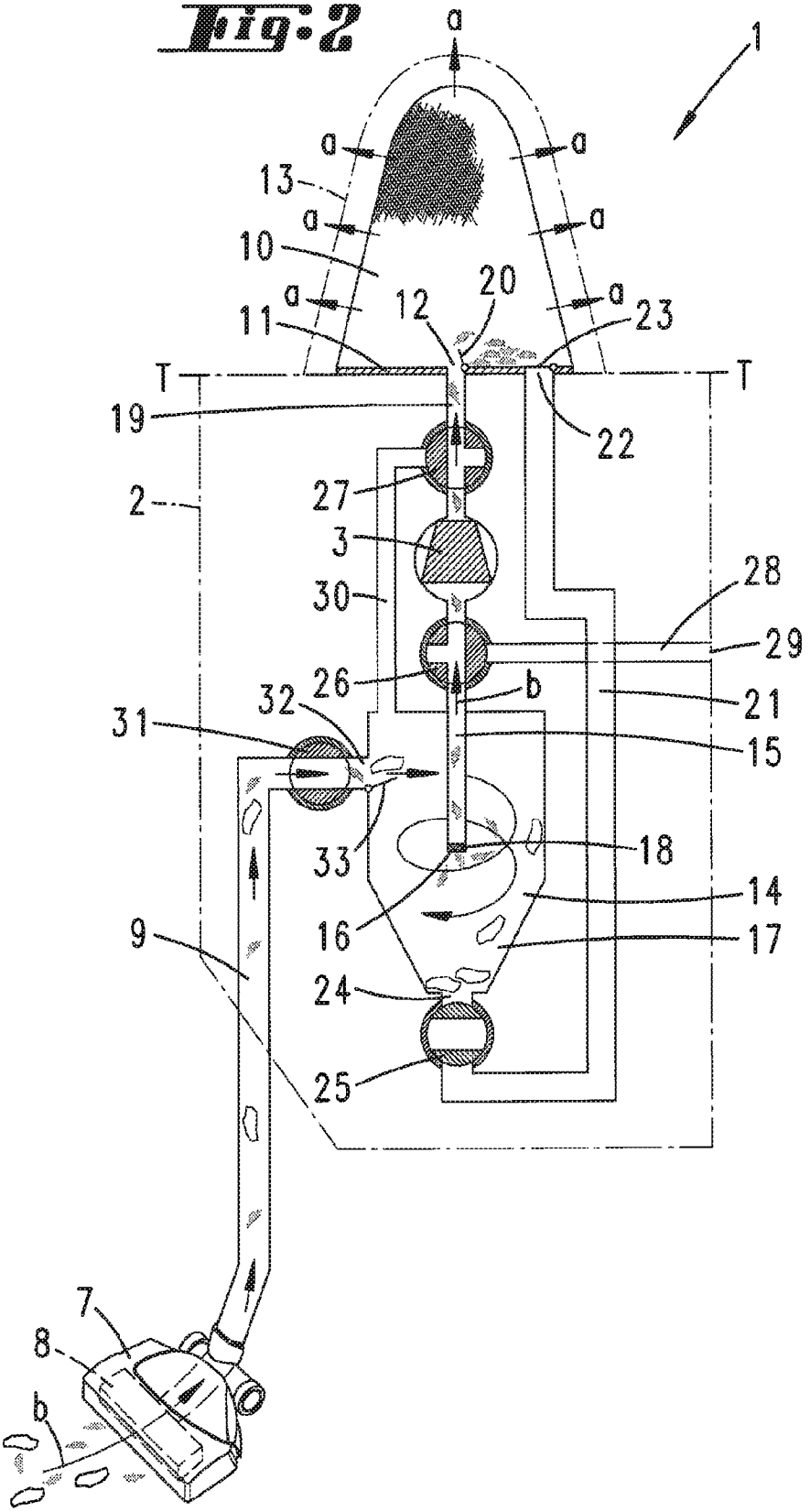
Anhängende Zeichnungen

Fig. 1



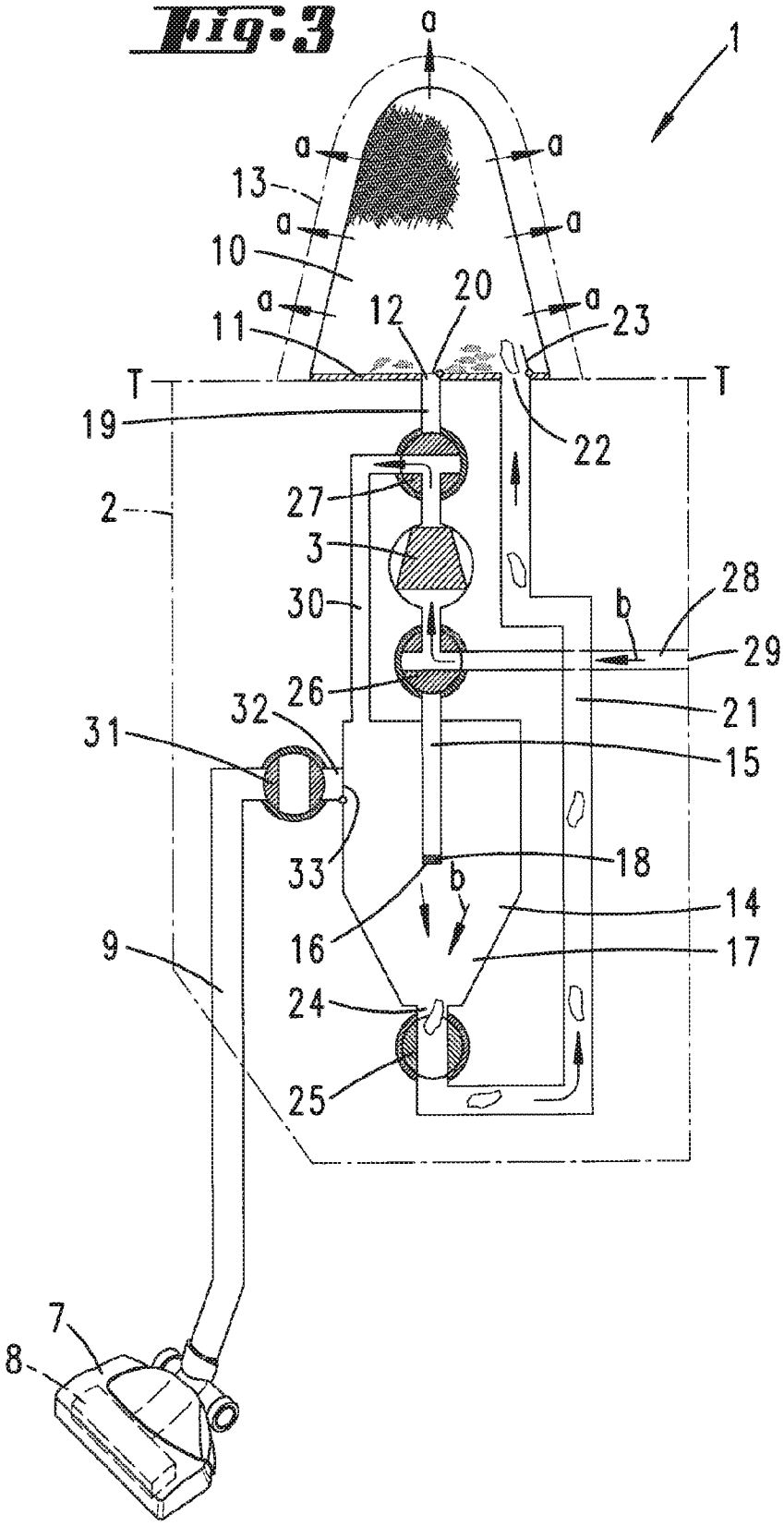
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Fig: 2



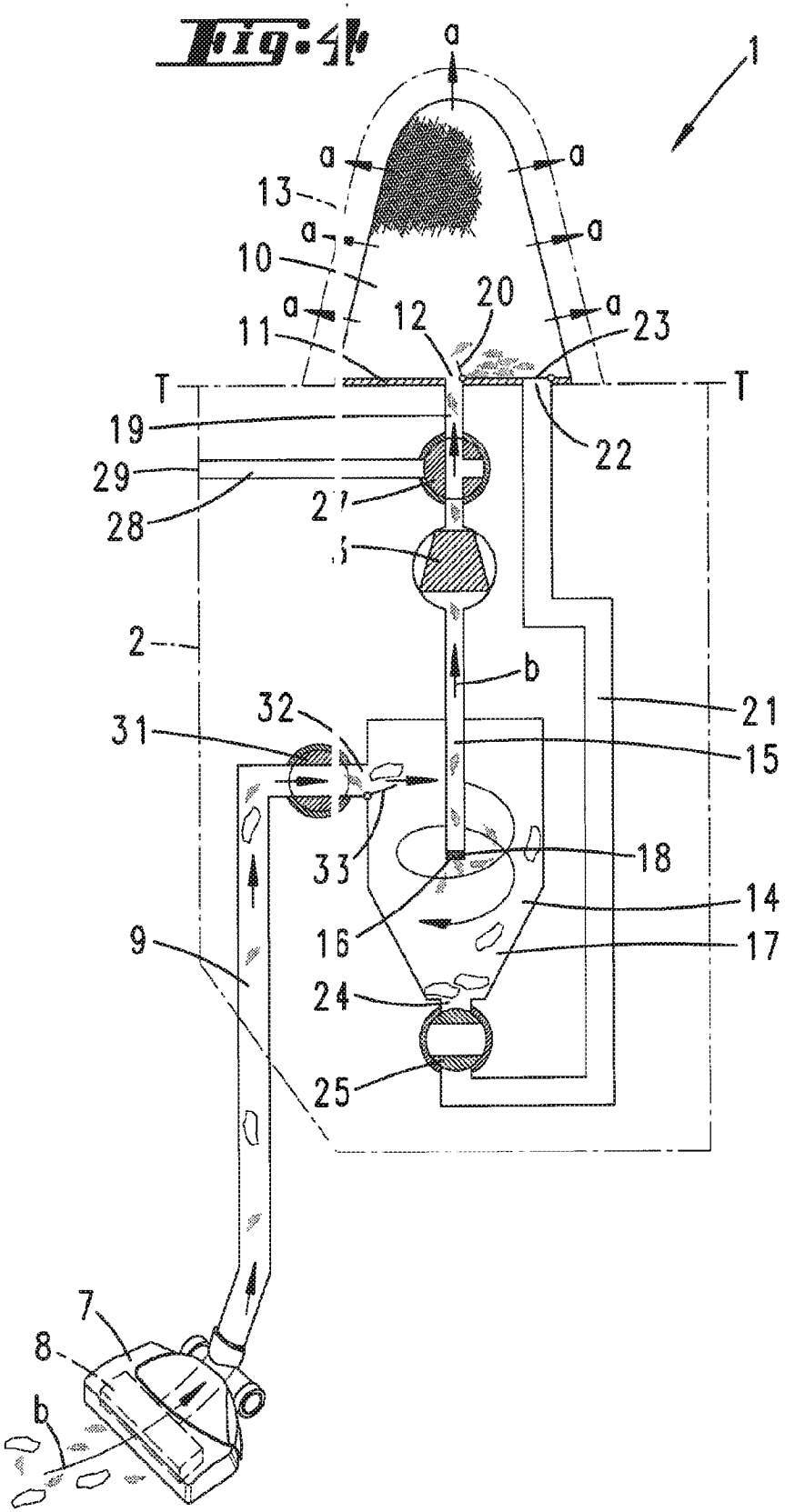
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Fig. 3



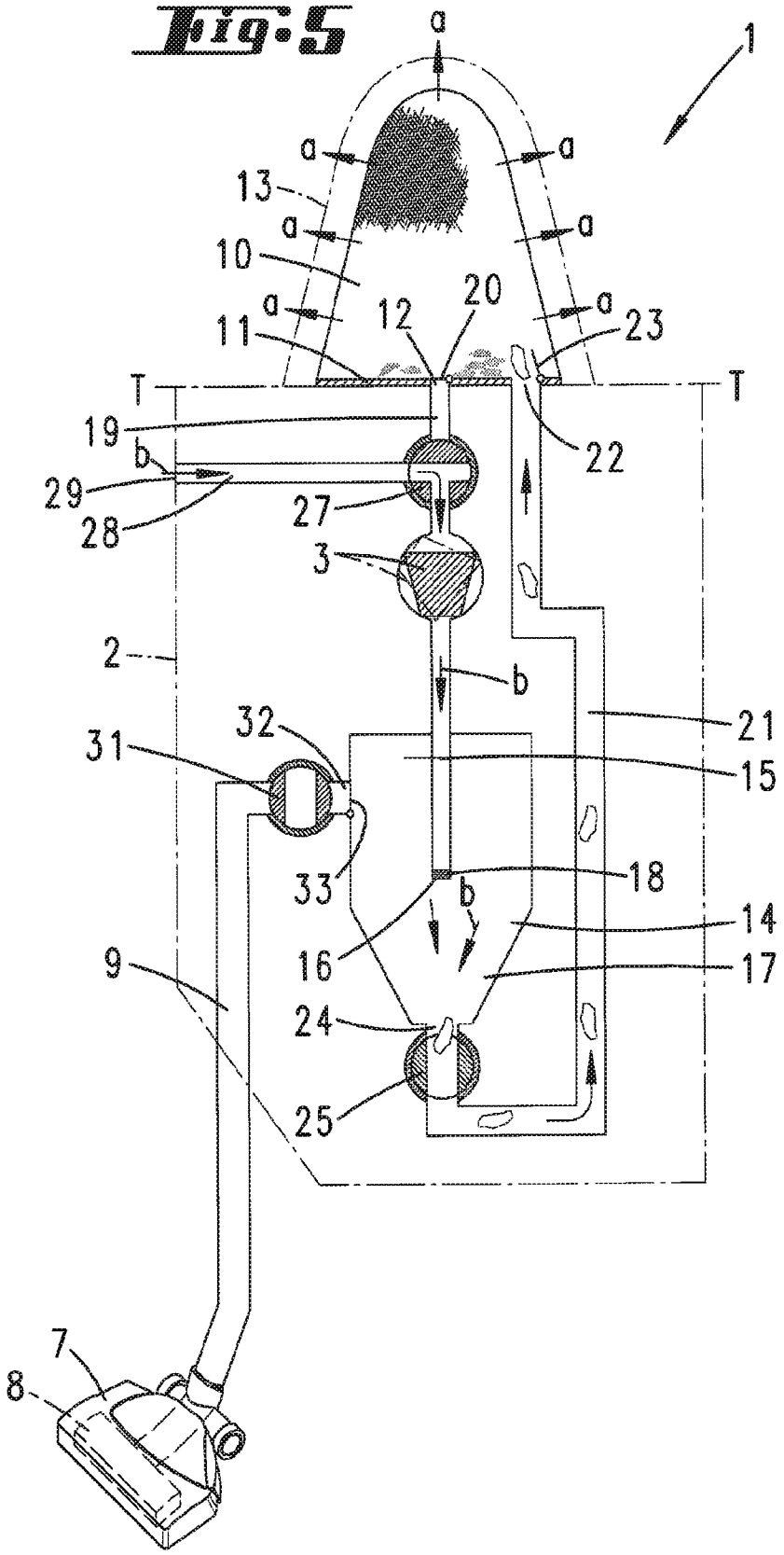
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Fig. 4



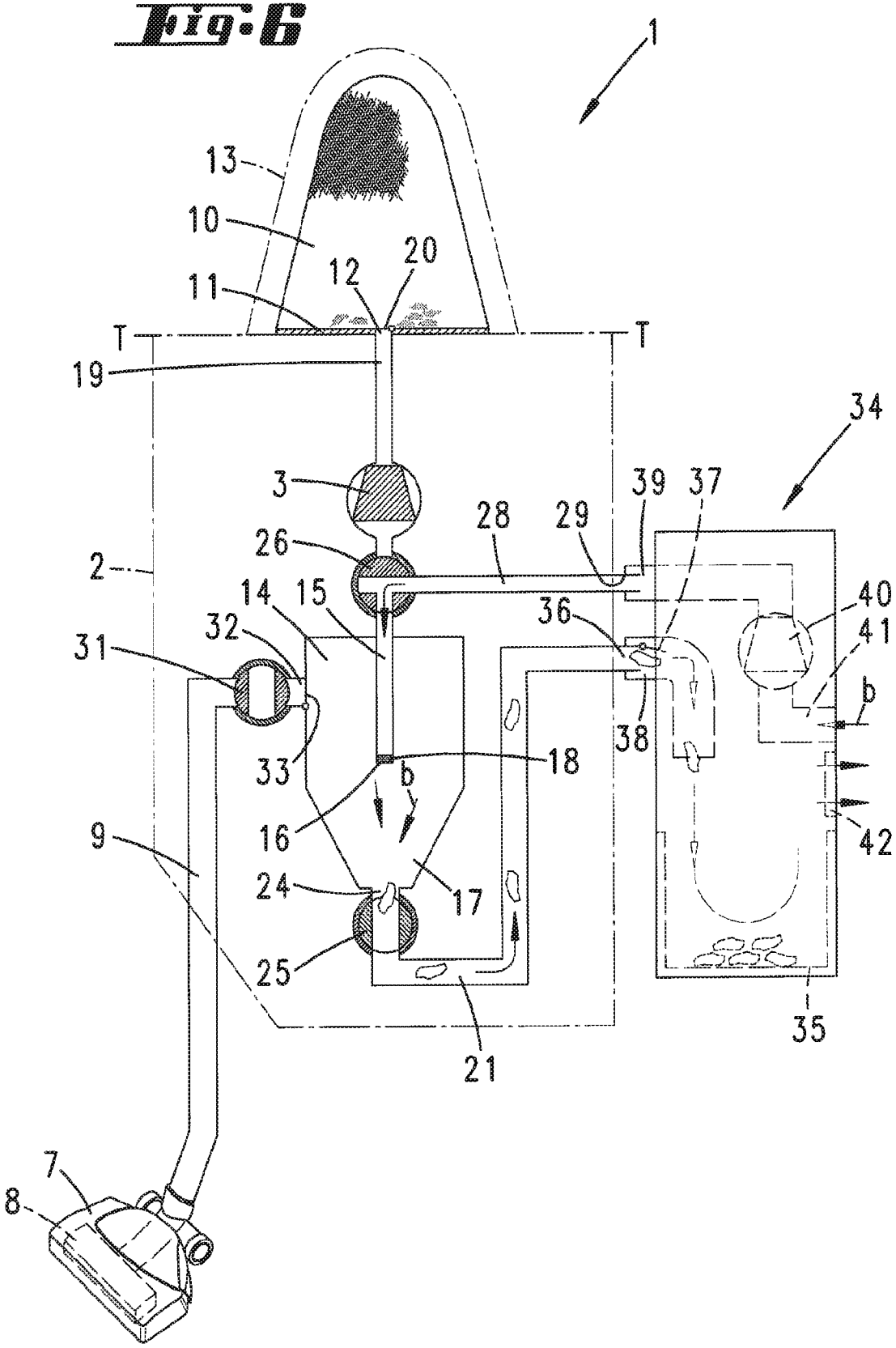
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Fig. 5



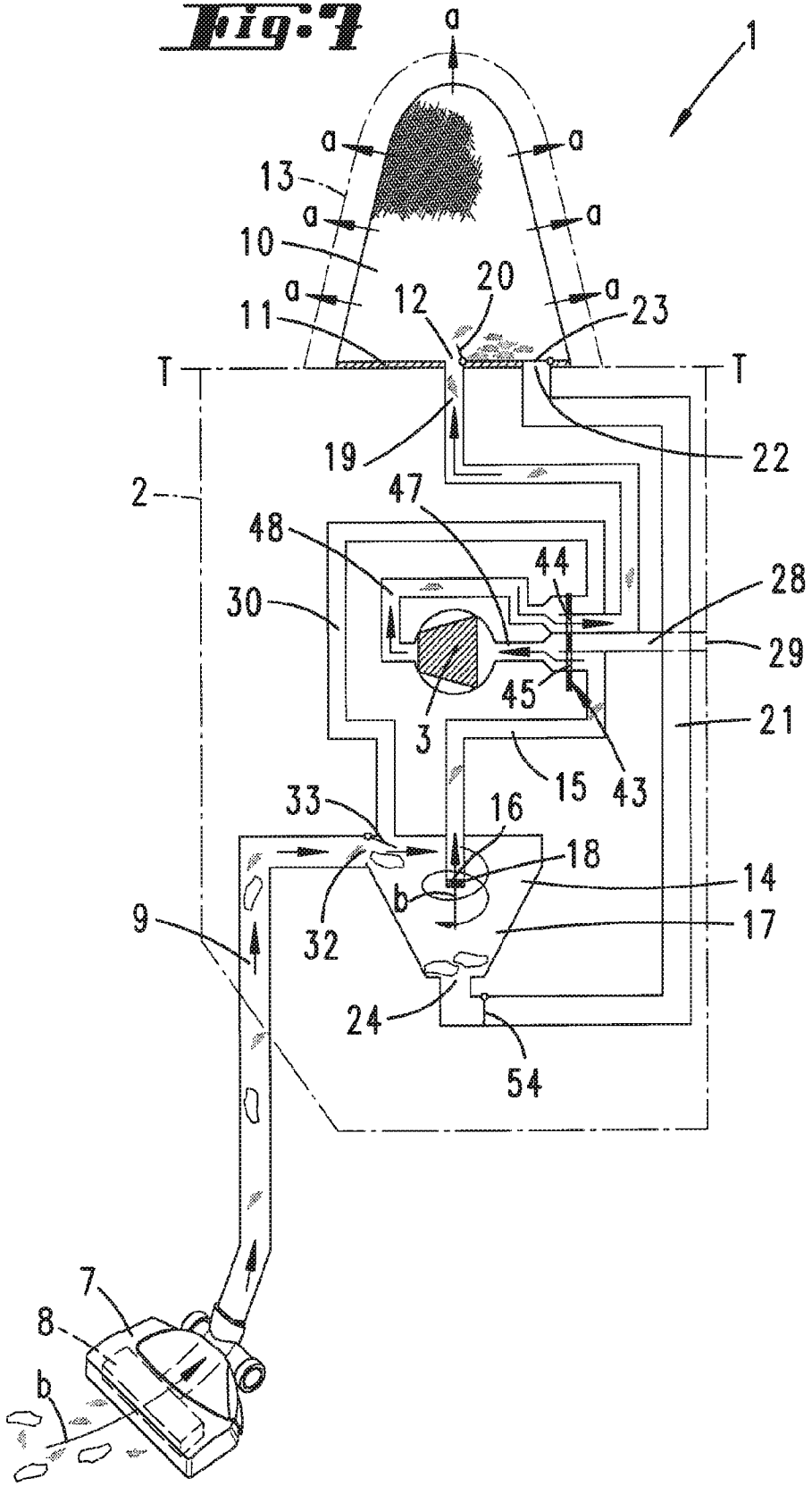
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Fig. 6



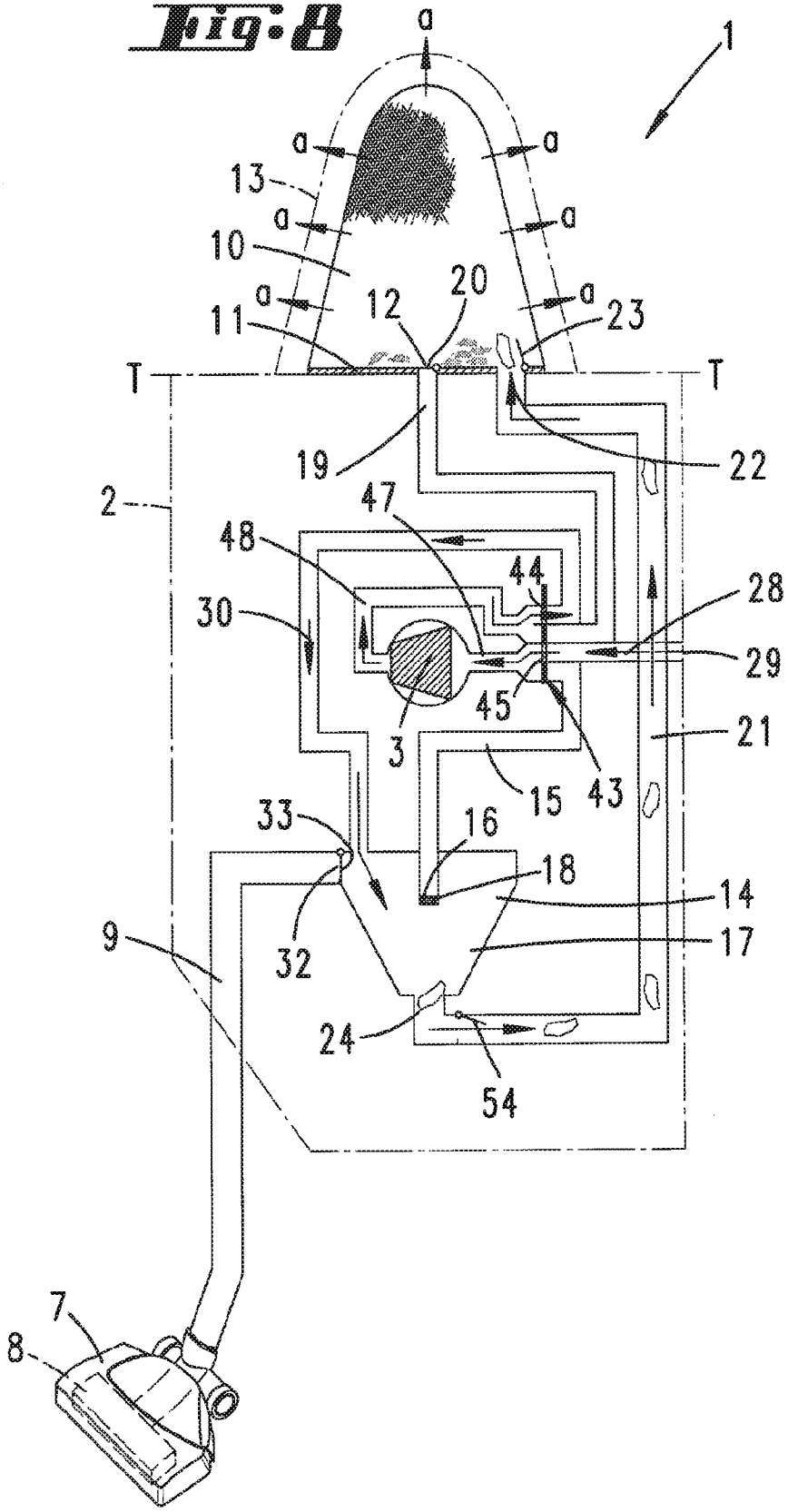
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Fig. 1



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Fig: 8



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Fig. 9

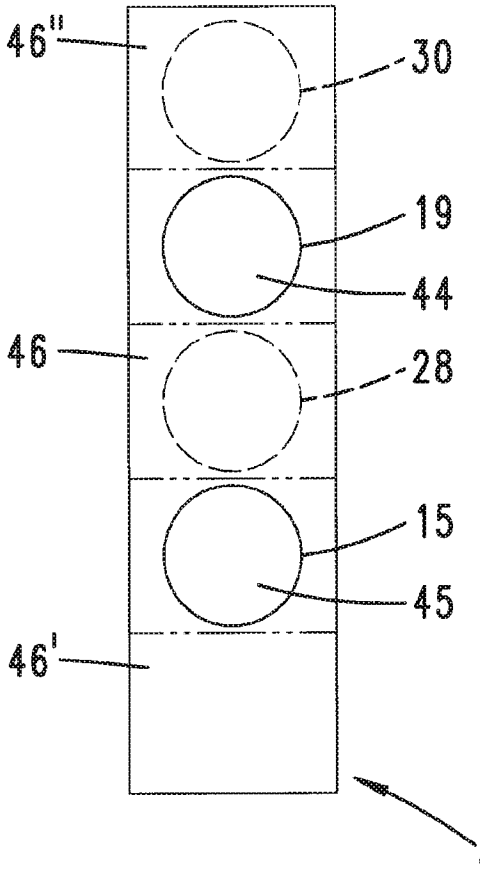
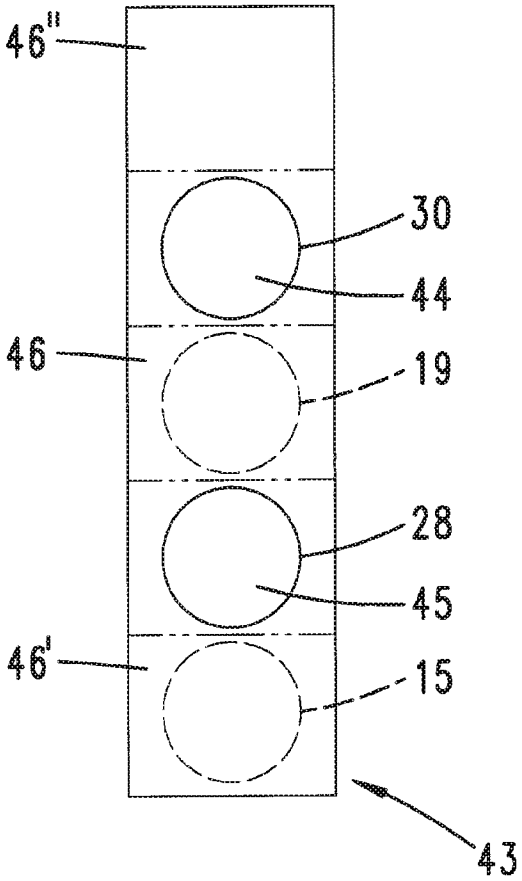


Fig. 10



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Fig. 12

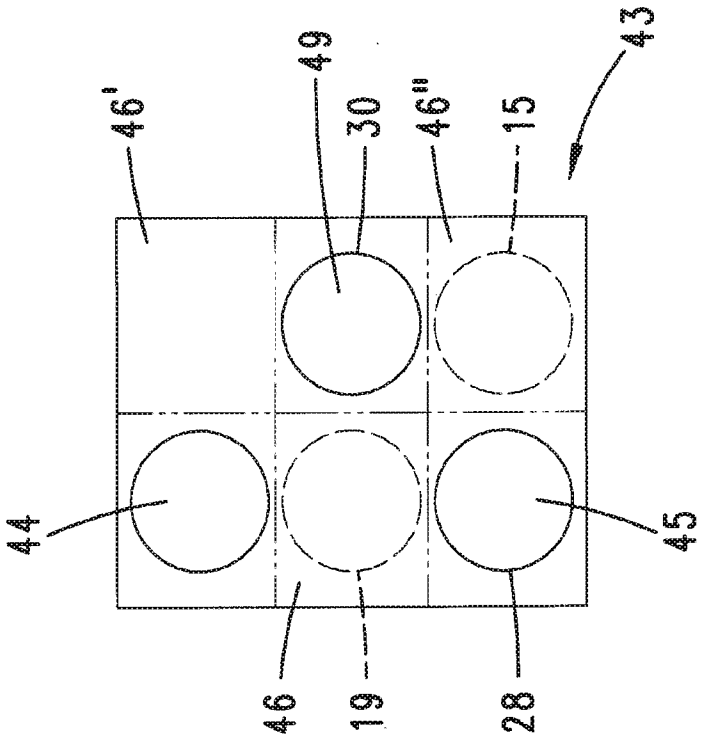
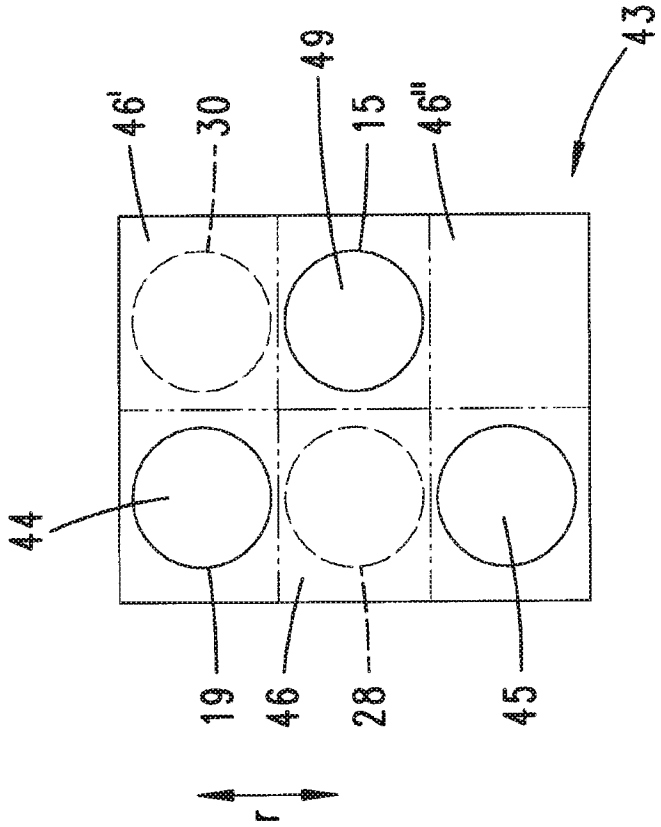
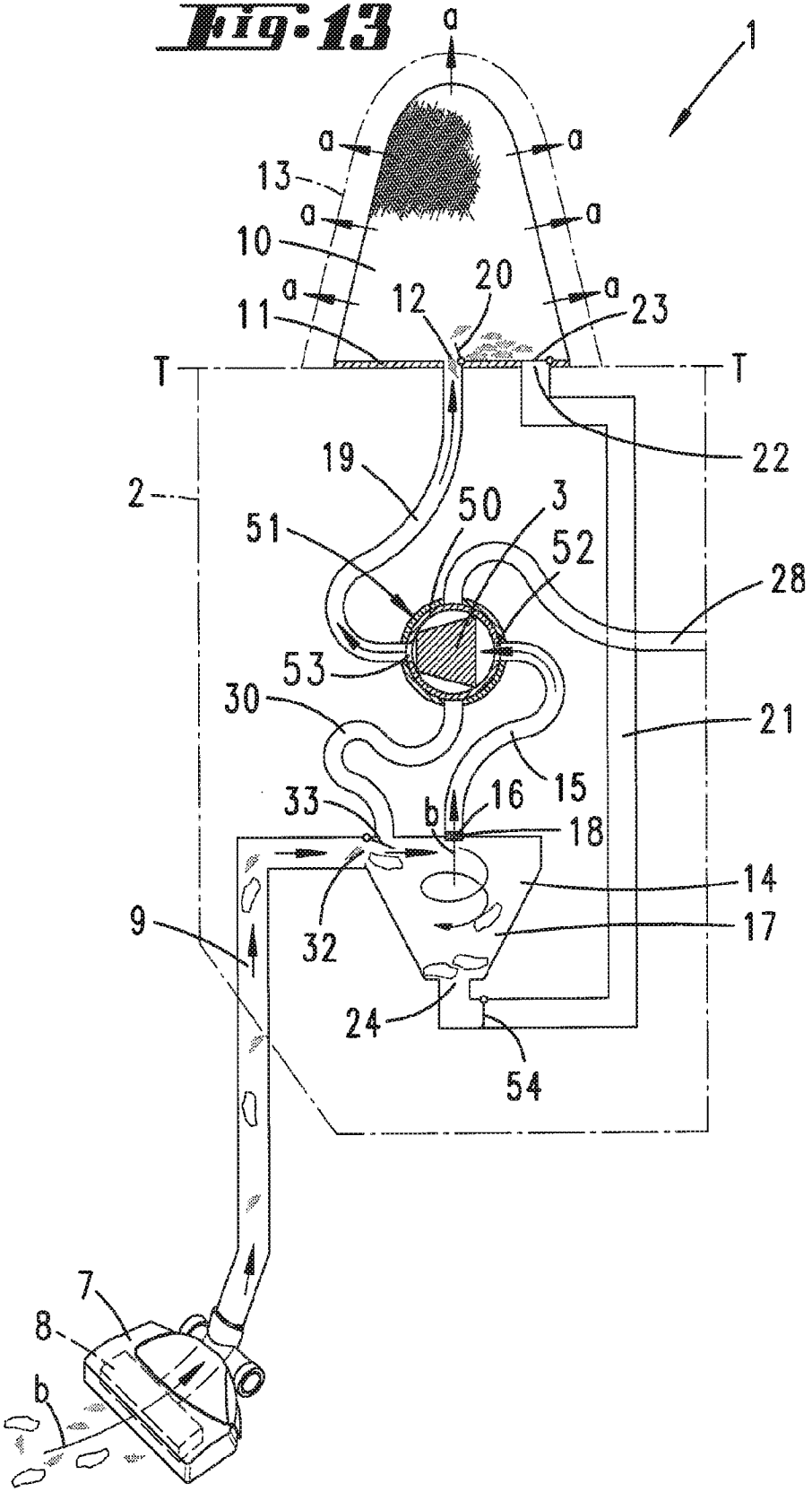


Fig. 11



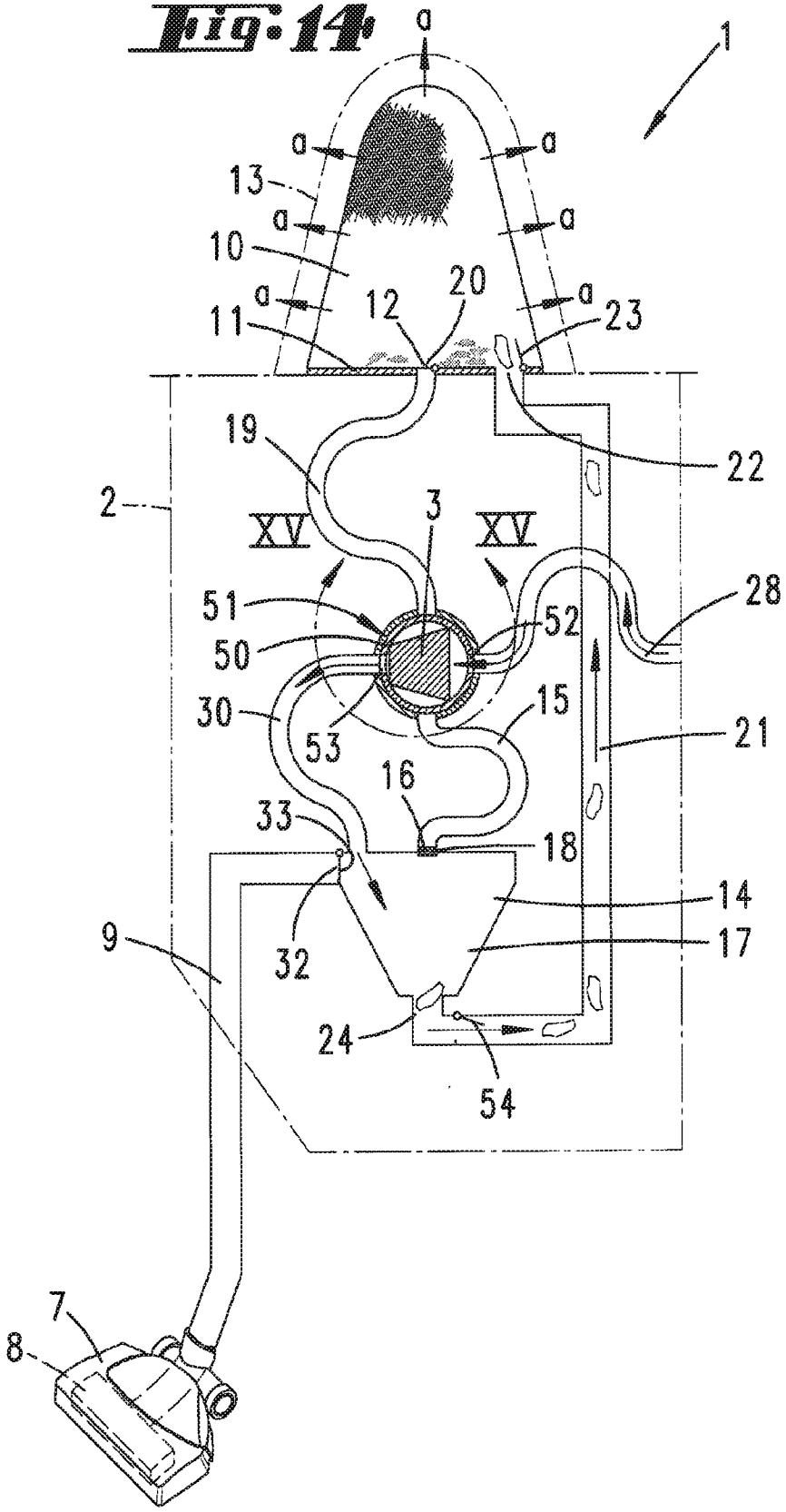
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Fig. 13



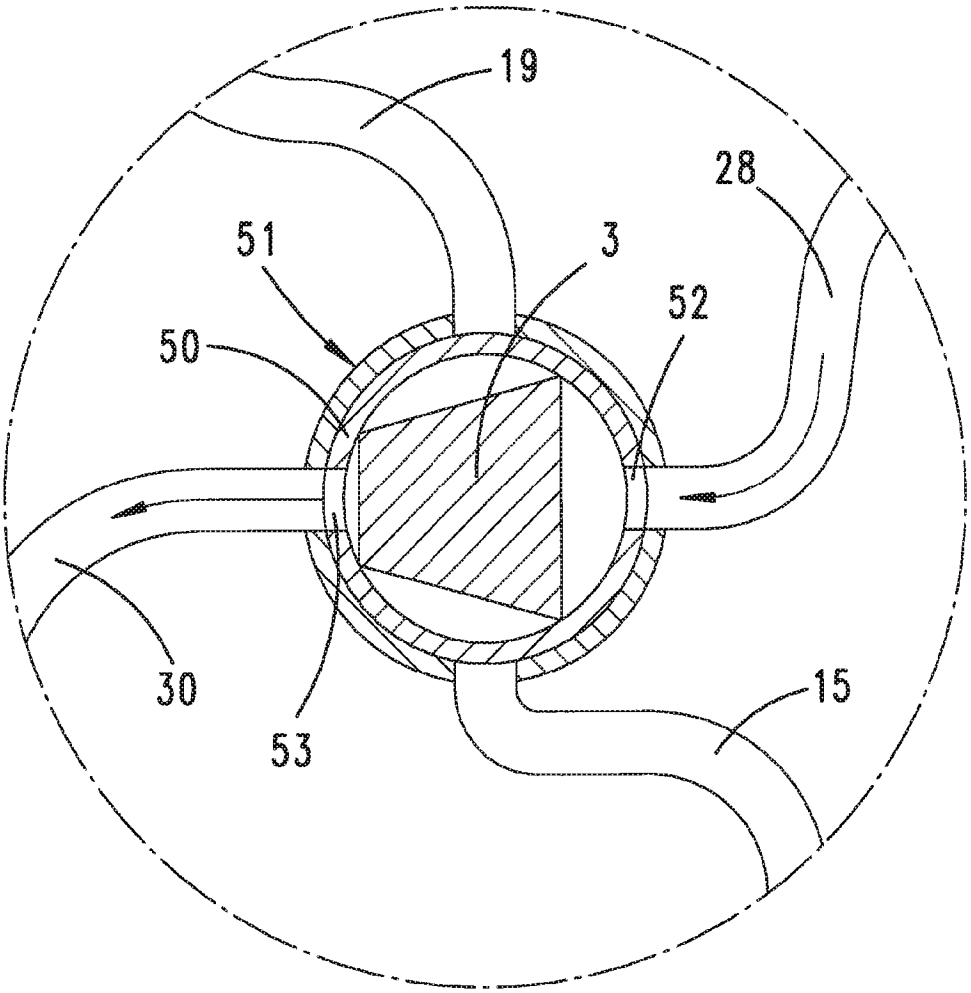
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Fig. 14



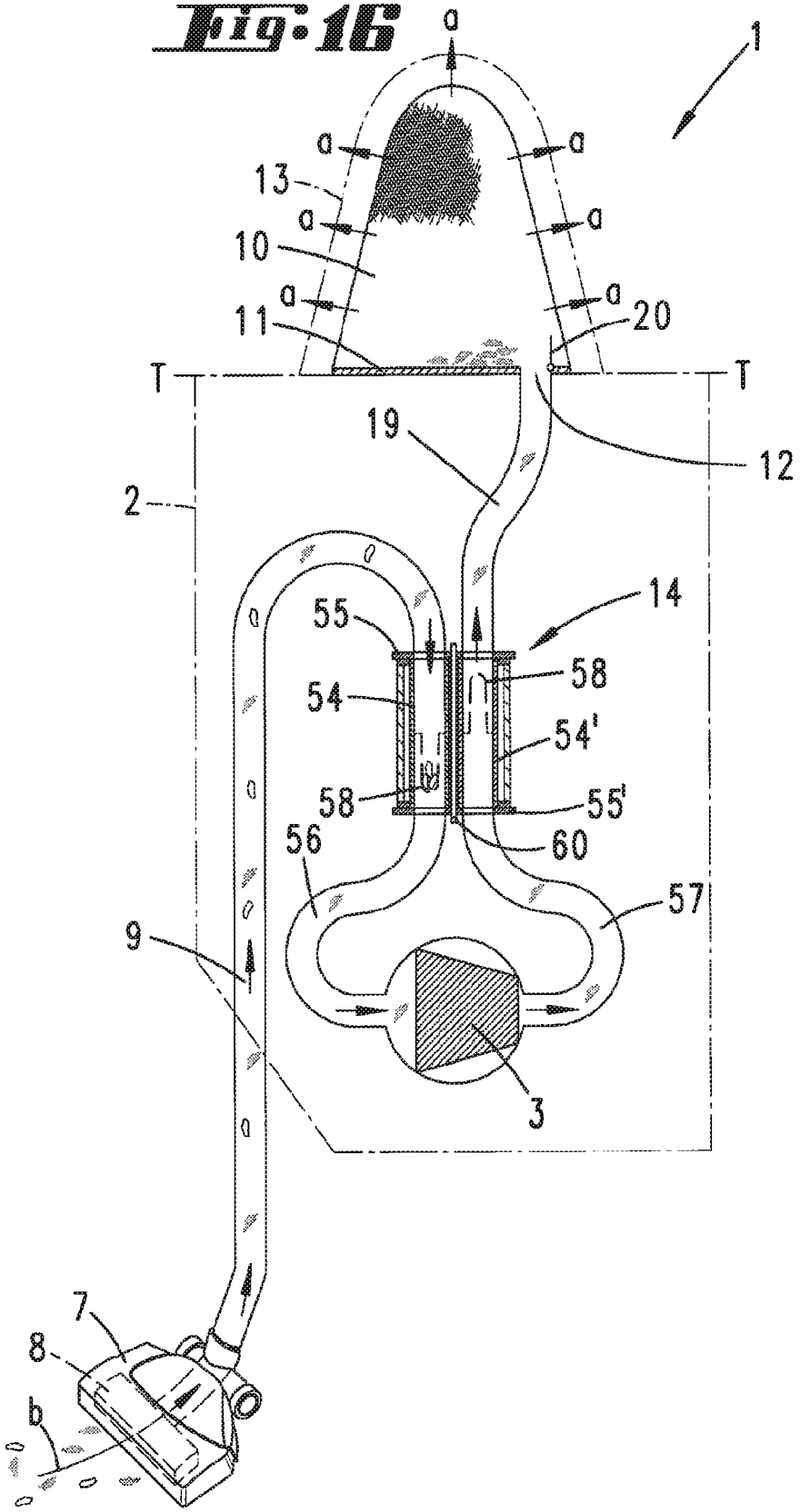
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Fig. 15



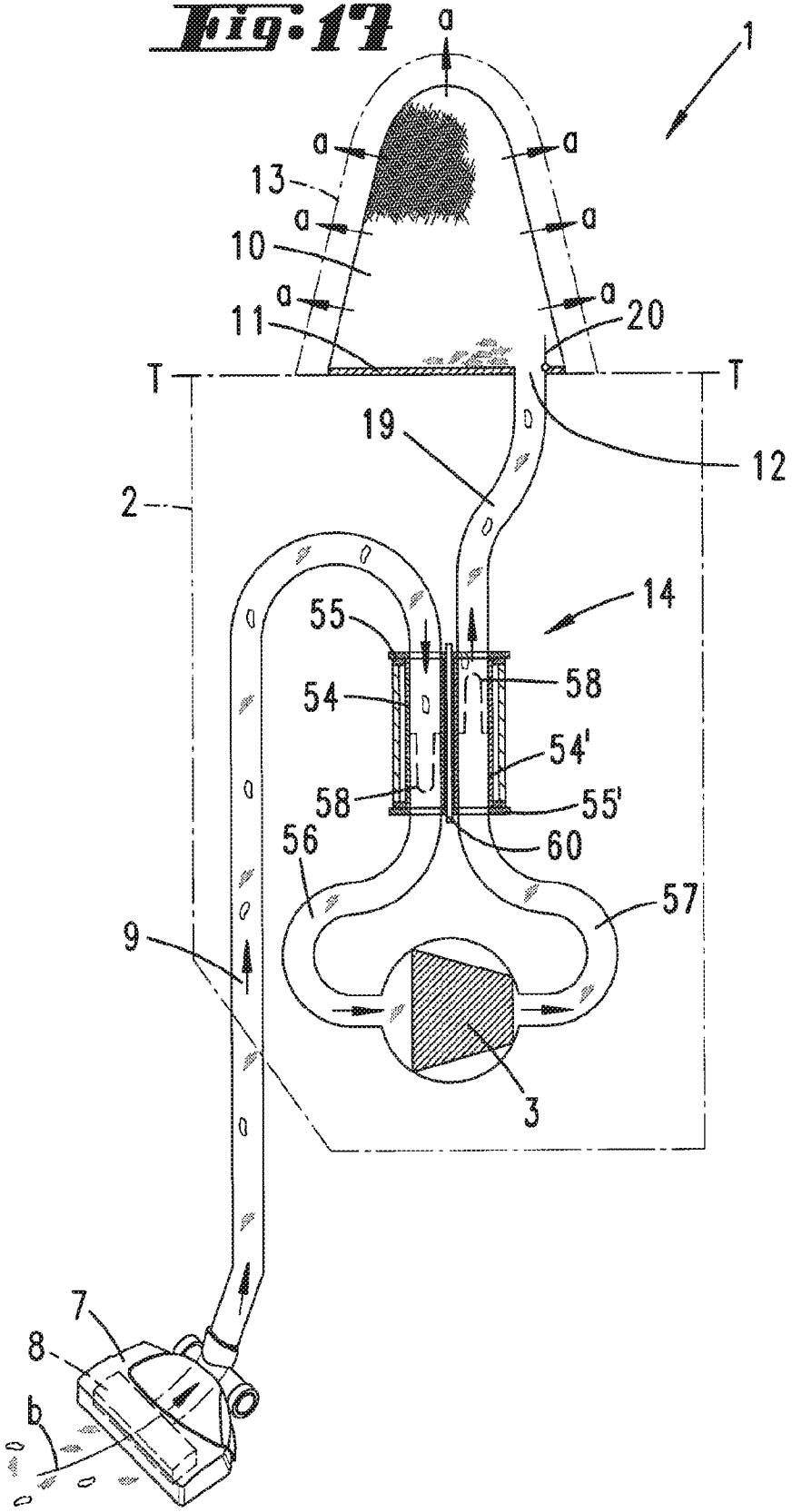
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Fig. 16



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Fig. 17



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Fig. 18

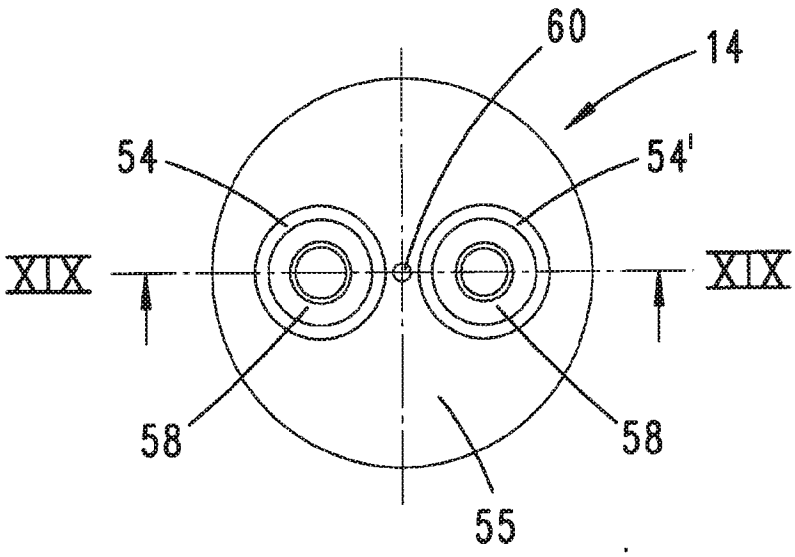
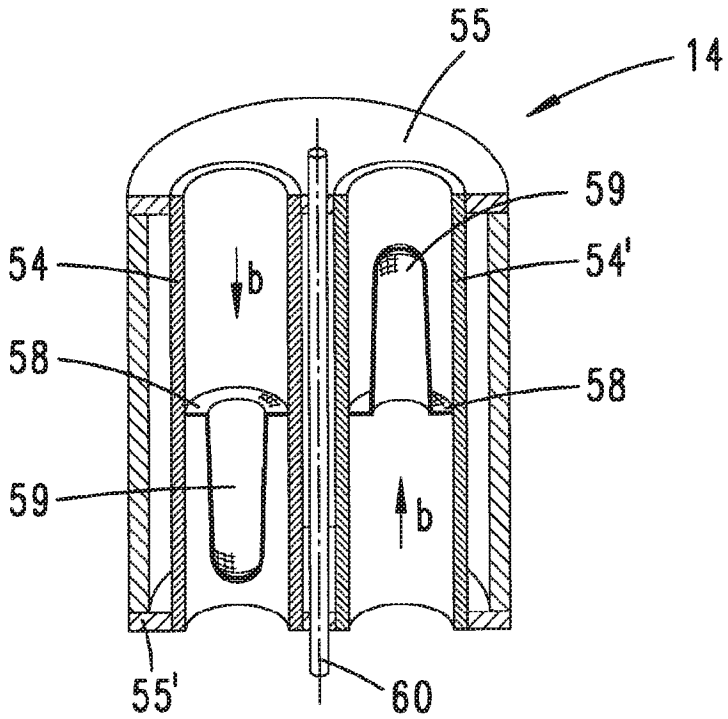


Fig. 19



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Fig. 20

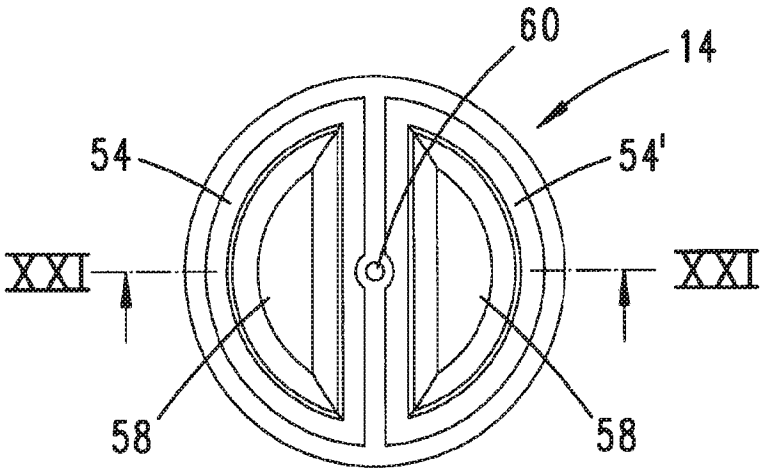
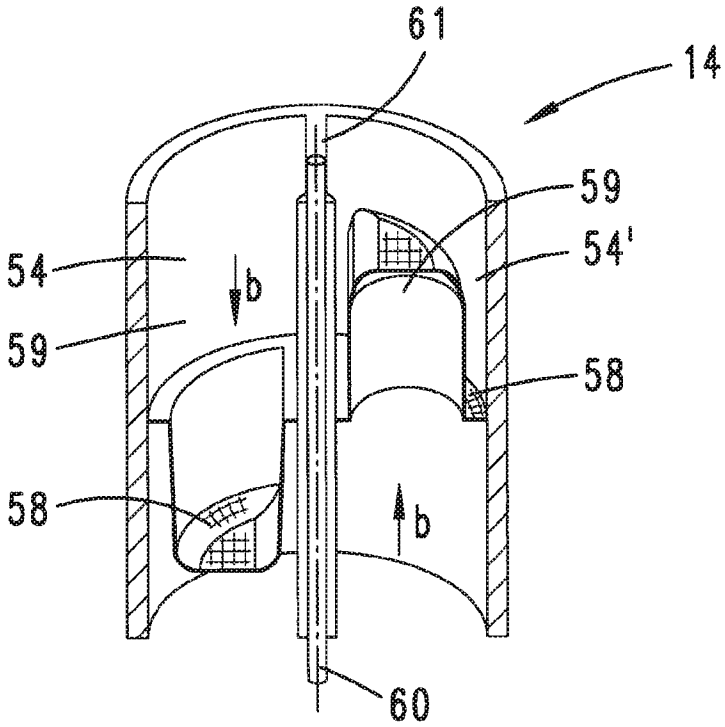
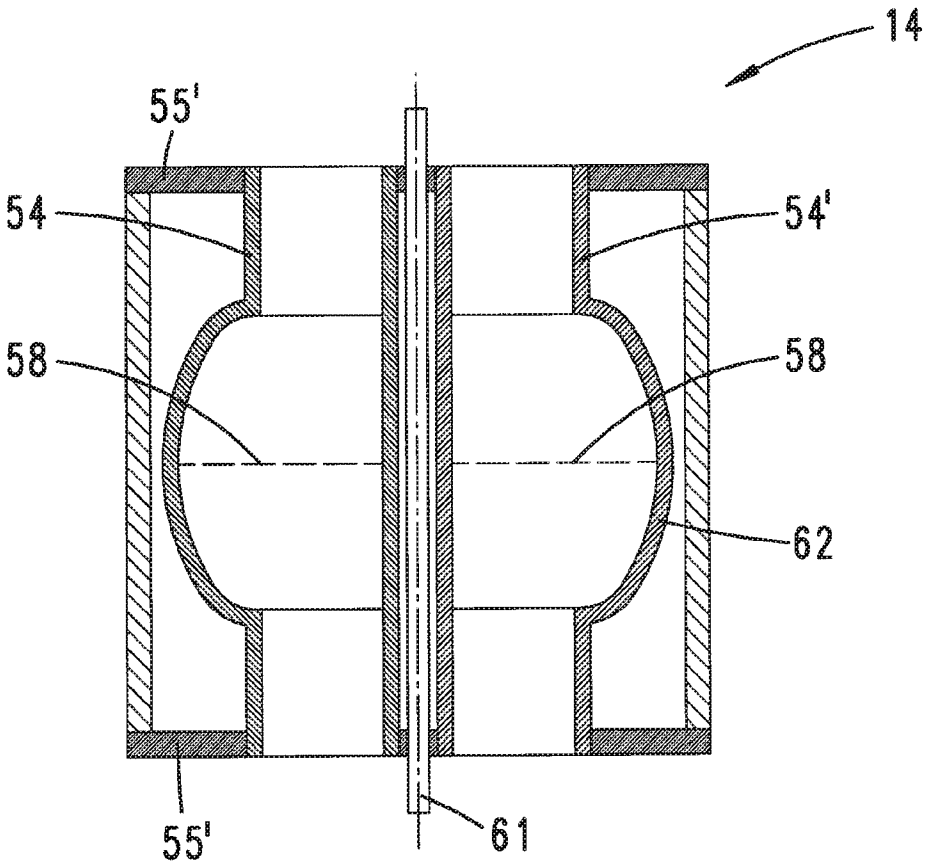


Fig. 21



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Fig. 22



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Fig: 23

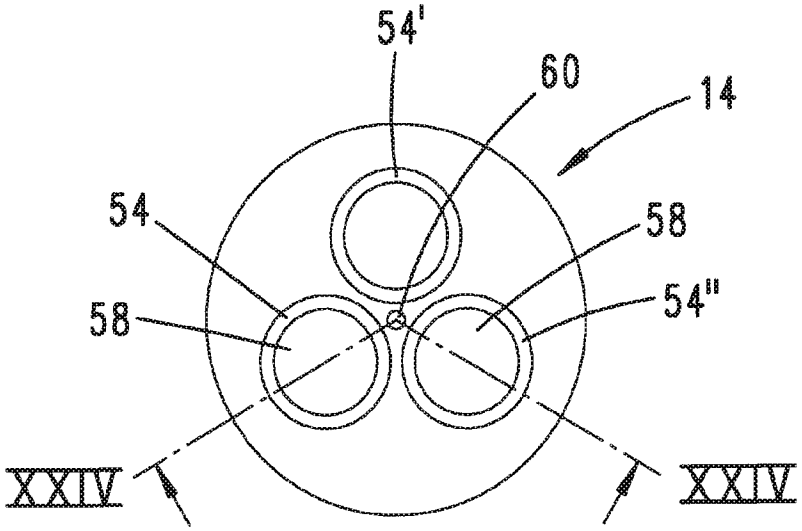
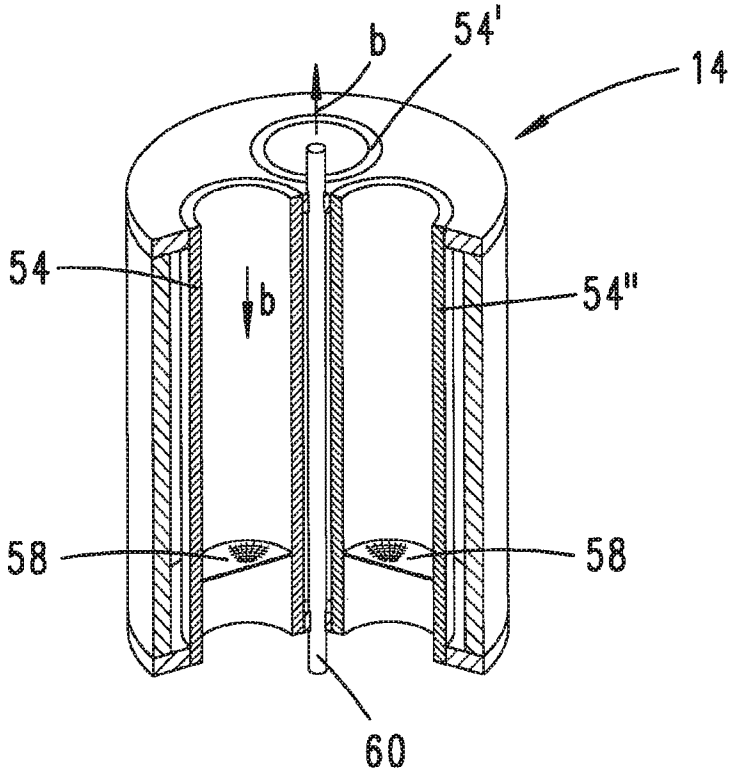


Fig: 24



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Fig. 25

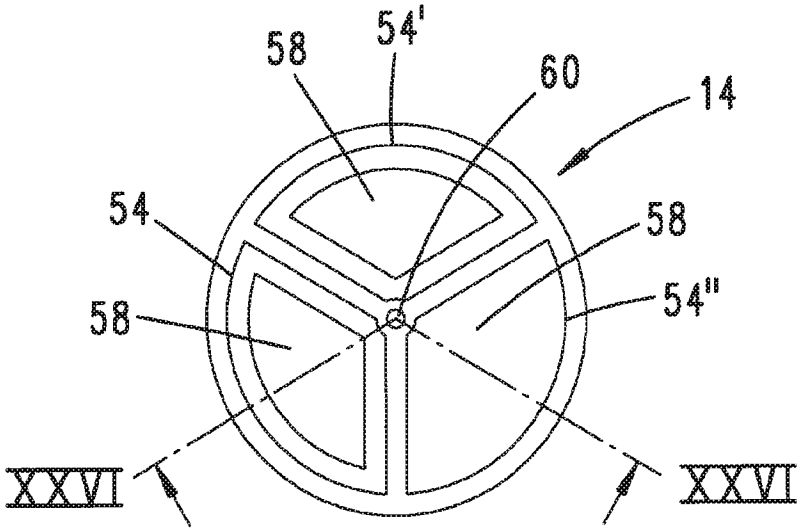
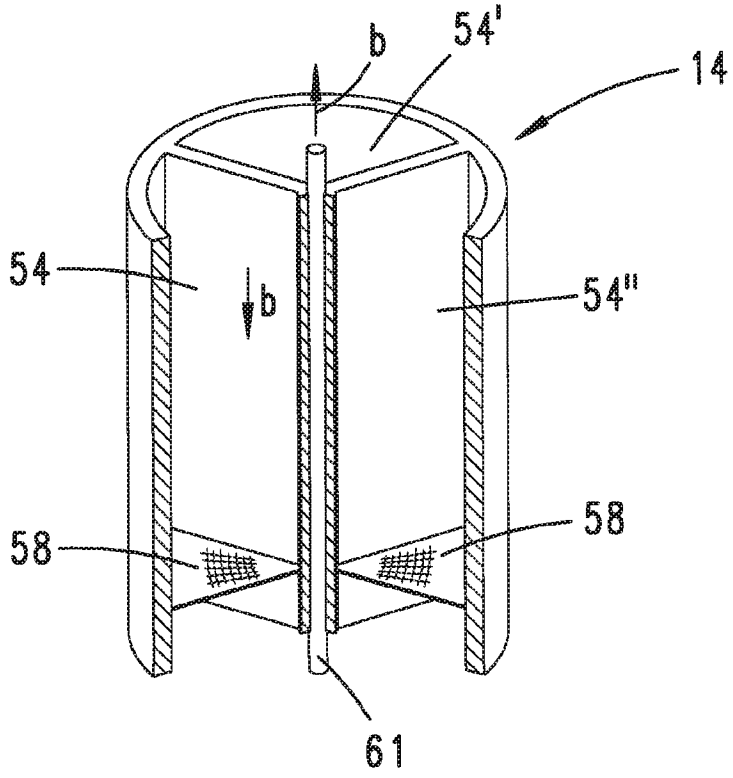
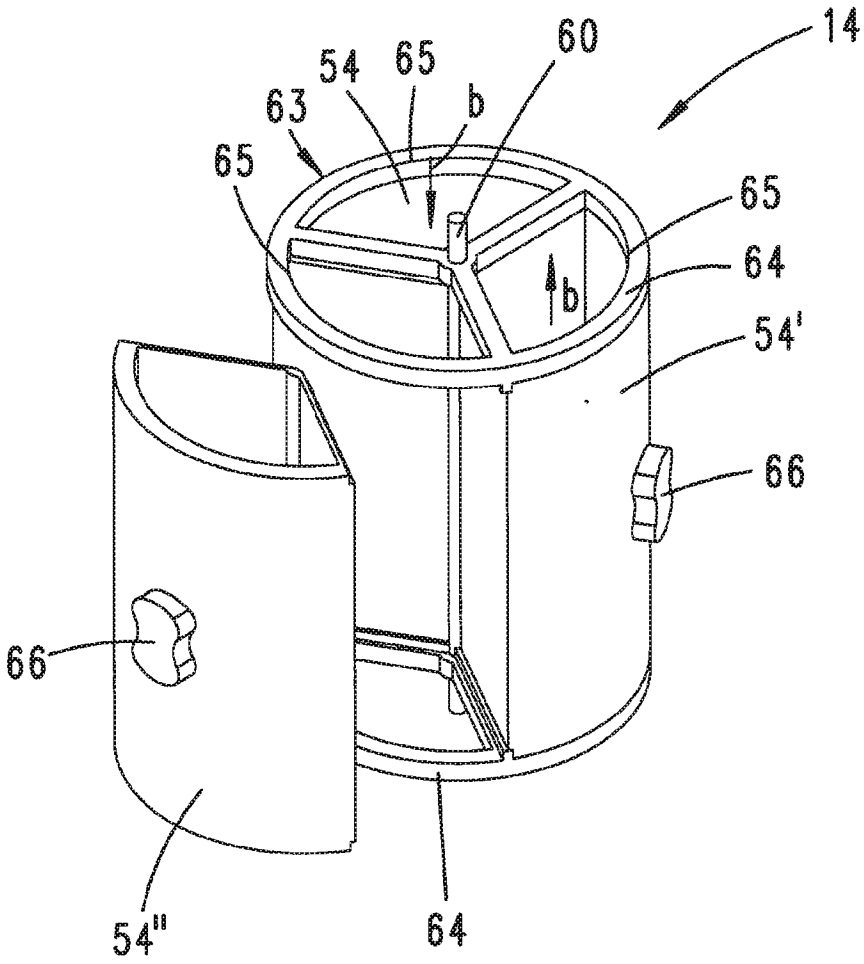


Fig. 26



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Fig. 27



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CYCLONE TYPE VACUUM CLEANER

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Inventor(s): MATSUO KAZUNORI; KANEYASU HIROSHI ±

Applicant(s): TSUIN BADO KOGYO KK ±

Classification: - international: ***A47L9/10; A47L9/16***

- cooperative:

Application number: JP20080136123 20080524

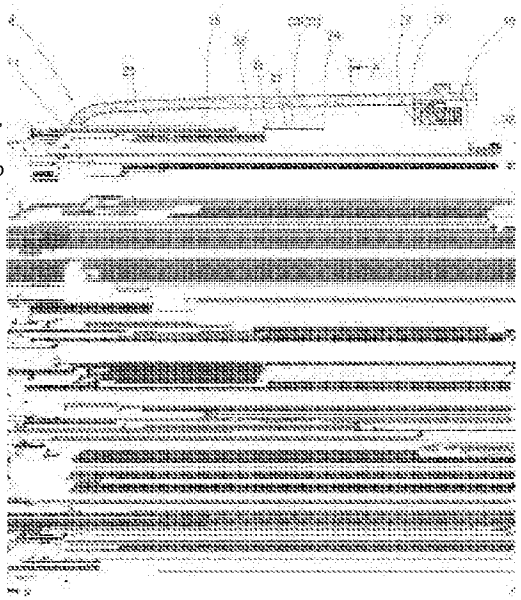
Priority number(s): JP20080136123 20080524

Also published as: JP5190299 (B2) CN101584566 (A) CN101584566 (B)

Abstract of JP2009279284 (A)

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PROBLEM TO BE SOLVED: To provide a cyclone type vacuum cleaner which can easily perform a dust discarding or the like by easily attaching/detaching a cylindrical body. ;SOLUTION: A dust collecting means 4 which is freely detachably attached to the vacuum cleaner main body 2 in which an electric blower 5 is built is constituted by having a dust collecting container 11, the cylindrical body 12, and a secondary filter body 13. In this case, the cylindrical body 12 is freely detachably attached to the dust collecting container 11, and at the same time, in which small holes 24 and 25 working as a primary filter are installed. The secondary filter body 13 is freely detachably attached on the downstream side of the cylindrical body 12, and at the same time, keeps a bag-like secondary filter 34 installed. At the central section of the cylindrical body 12, a protuberance 27 which projects and extends to the secondary filter 34 side is installed.; Therefore, when the cylindrical body 12 is attached to/detached from the dust collecting container 11, the cylindrical body 12 can easily be held by gripping the protuberance 27, and thus, a possibility for dropping the cylindrical body 12 can be reduced. ;COPYRIGHT: (C)2010,JPO&INPIT



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DESCRIPTION JP2009279284

The present invention relates a cylindrical body easily removable to provide a cyclonic vacuum cleaner or the like can be easily discarded dust. The A electric blower 5 rotatably attached are precipitator unit 4 attached to and detached from the vacuum cleaner body 2, which is built, the primary along with the dust container 11 is removably attached to this dust collection container 11 a cylindrical body 12 which small holes 24, 25 are provided to act as a filter, a bag-shaped secondary filter 34 together detachably attached to the downstream side of the cylindrical body 12 is provided a secondary filter member 13 while configured with bets, the center of the cylindrical body 12, said by providing the secondary filter 34 side projection 27 extending protruding, the tubular body 12 to the dust collection container 11 the mounting and demounting, by pinching the projection 27, the cylindrical body 12 can be easily grasped, which makes it possible to reduce the possibility that dropping the tubular body 12. .FIELD 2

Cyclone vacuum cleaner

[0001]

The present invention relates to cyclonic vacuum cleaner, more particularly, to a care performs likely cyclonic vacuum cleaner of the dust collecting means.

[0002]

Conventionally, as this type of cyclonic vacuum cleaner, a cleaner body in which the blower is incorporated, and the mounting is dust collecting container detachably attached to the vacuum cleaner main body, removably in the opening of the dust collection container attached by a short cylindrical or truncated short cone-shaped base and the vortex generating member having a (corresponding to the tubular body of the present invention), the downstream side to removably filter attached member of this vortex generation member (the present invention the secondary filter corresponding to body) and having a is known (for example, see Patent Document 1.). Then, the air blower by actuating the said collecting dust in the dust container is centrifuged from the air stream, the coarse together with dust is accumulated in the dust collection container, fine dust filter and the filter member of the base filter it is captured by. Then, dust adhering to the collector dust and the respective filter pooled in the dust container, after removal of the the dust container from the cleaner body, removing the filter body and the vortex generating member from the dust collection container that is, it can be discarded.

[0003]

Incidentally, in such a cyclonic vacuum cleaner, in order to enhance the dust collection efficiency, to enhance the efficiency of the centrifugal separation, it is necessary to increase the separation efficiency by the filter of the filter body. Then, in order to improve the separation efficiency by the filter of the filter body, it is necessary to increase the area of the filter. Then, as one of structures for increasing the area of the filter, there is a structure to fold to turn over a portion of the bag-like filter having flexibility. Such, folding the bag-shaped filter structure, by washing stretched folded portion of the filter has the advantage that it can be washed off the fine dust adhering to the filter. JP 2002-209814 JP

[0004]

However, in such a cyclonic vacuum cleaner, because it is difficult to grasp is the vortex generating member, accumulated dust when removing the vortex generating member to discard, the vortex generation member of fine dust on the surface is attached to be there is a risk that soiling is dropped onto the cleaning surface. Further, when employing a structure to fold the bag-like filter, when mounting the vortex generating member and the filter body to the dust collecting container, and forget folding the filter, that filter would overlap, airflow filters it becomes airflow resistance is increased by passing through many times result, dust collection efficiency was also lowered.

[0005]

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The present invention solves the above problems, the first object that a tubular body and easily attached and detached to provide a cyclonic vacuum cleaner can be easily dust discarded and the like. Further, to provide a cyclonic vacuum cleaner capable of suppressing reduction in dust collection efficiency even forget folded secondary filter and the second object.

[0006]

The cyclonic cleaner according to claim 1 of the present invention includes a cleaner body in which the electric blower is incorporated, a dust collecting container detachably attached with respect to the cleaner main body, to the dust collection container cyclone having a tubular body in which the primary filter is provided together with a detachably attached, and a bag-shaped secondary filter is provided secondary filter member together detachably attached to the downstream side of the cylindrical body on in formula cleaner, the central portion of the cylindrical body, is provided with a protrusion extending projecting to the secondary filter side.

[0007]

Further, cyclonic cleaner according to claim 2 of the present invention resides in that in Claim 1, to the secondary filter member, a support provided for supporting the secondary filter having flexibility, the secondary filter together with the closed end side of the can be folded to be flipped to the inside of the support, when fitted with the secondary filter member to said cylindrical body, configured such that the protrusions are inserted inside of the support one in which the.

[0008]

Furthermore, cyclonic cleaner according to claim 3 of the present invention resides in that in Claim 1, in which said projection is formed in a plate shape.

[0009]

The cyclonic cleaner according to claim 1 of the present invention, by configuring as described above, when detaching the cylindrical body with respect to the dust collecting container, extends and projects to the secondary filter side by picking projection provided in a central portion of the tubular body, the tubular body can be easily grasped, which makes it possible to reduce the possibility worsen the tubular body.

[0010]

Further, the secondary filter member, a support for supporting the secondary filter having flexibility is provided, along with the closed end side of the secondary filter is folded so that flipped inside of the support, wherein when fitted with the secondary filter member to the cylindrical body, by the projection is configured to be inserted inside of the support, I forgot folded bag-shaped secondary filter having flexibility while also the secondary filter member as attached to the tubular member, it means that the secondary filter is folded back by being pushed by the projection, it is possible to suppress the reduction in dust collecting efficiency due to increased ventilation resistance it can.

[0011]

Furthermore, by the projections were formed in a plate shape, the ability wider and thinner in the projection, to increase the margin between the inner surface of the tubular member and a finger when picked this projection with a finger can be, thereby, the finger picking the projection is hardly hits the inner surface of the tubular body, the protrusion can be easily thumb.

[0012]

Hereinafter, embodiments of the present invention will be described with reference to FIGS. 1 to 7. 1 is a hand-held cyclonic vacuum cleaner. The cyclonic vacuum cleaner 1 includes a cleaner body 2, a nozzle 3 that is detachably attached with respect to the vacuum cleaner main body 2, and a dust collection unit 4 which is detachably attached to the cleaner main body 2 it has been configured to have.

[0013]

The vacuum cleaner body 2 includes a body portion 6 which is the electric blower 5 is incorporated, the connecting portion 7 to the suction path (not shown) provided inside, and the grip portion 8, is constructed and a power cord 9 there. Further, the grasping portion 8, the switch operating portion is provided the operation unit 10 and not shown, for attaching and detaching the dust collection unit 4. Then, one end of the suction path of the connecting portion 7, the nozzle 3 is attached detachably.

[0014]

The dust collection unit 4 includes a dust container 11, a cylindrical body 12, and the secondary filter member 13, a valve 14 is constructed and a seal member 15. The dust container 11, a transparent synthetic resin of a relatively hard, one end open and the other end is formed into a bottomed cylindrical shape with closed. Then, on the inner surface of one opening 16 of the dust collection container 11, together with the stepped portion 17 is formed, slightly closer to the other end than the

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side wall 11A and at the stepped portion 17 of the dust collection container 11 is , the communication hole 18 is formed through. Further, one end of the side wall 11A of the dust collection container 11 is engagement receiving portion 19 is formed, by engaging claw (not shown) of the vacuum cleaner body 2 in the engagement receiving portion 19 is engaged , the dust collection unit 4 is configured to be secured to the vacuum cleaner body 2. Further, the side wall 11A of the dust collection container 11, adjacent to the communication hole 18, the mounting groove 20 is formed to extend from one end to the other end of the dust collection container 11.

[0015]

The tubular body 12 is relatively rigid together are integrally molded by a synthetic resin or the like, the bottomed cylindrical cylinder portion 21, a flange portion 22 formed outwardly from the open end of the cylindrical portion 21, is constructed and a return portion 23. Then, the side wall 21A of the cylindrical portion 21, with a number of small holes 24 which acts as the primary filter is formed also on the bottom wall 21B of the cylindrical portion 21, a plurality of small holes which act as a primary filter 25 There has been formed. Further, inside the bottom wall 21B of the cylindrical portion 21, the auxiliary filter 26 is attached detachably. Furthermore, the central portion of the bottom wall 21B of the cylindrical portion 21, so as to extend to the opening end of the cylindrical portion 21, plate-like projections 27 are formed integrally. Note that the protrusion 27, when the secondary filter member 13 attached to the tubular body 12 when fully extended maximally to the downstream side folded to flip the closed end 34B side of the later-described secondary filter 34 its tip is formed on the length that does not contact the closed end 34B of the secondary filter 34. Further, the flange portion 22, as well is formed in a substantially circular except for the positioning portion 22A, the cylindrical body 12 from the one end opening 16 when it is inserted into the dust collection container 11, its outer peripheral portion and it is configured to abut on the step portion 17. Furthermore, the return part 23, constituted by a radially enlarged portion 28 which diameter gradually increases continuously from the side wall 21A of the cylindrical portion 21, a short cylindrical portion 29 formed continuously from the enlarged diameter portion 28 it is. Then, within the dust collection container 11, the other end of the dust collection container 11 from where the distal end of the short cylindrical portion 29 of the return part 23 at the time of mounting the tubular body 12 to the dust collection container 11 is positioned space to the bottom wall 11B side becomes the dust reservoir 30

[0016]

The secondary filter member 13 includes a short cylindrical portion 31 whose both ends are open, a flange portion 32 formed outwardly from one end of the short cylindrical portion 31, which is formed to extend from the other end of the short cylindrical portion 31 the support 33 is configured and a bag-shaped secondary filter 34 having a fixed to the short cylindrical portion 31 flexible. Incidentally, the short cylindrical portion 31 and the flange portion 32 and the support 33 are integrally formed by a relatively soft synthetic resin. Then, the inside of the short cylindrical portion 31, finger grips 35 are formed. Further, the flange portion 32, as well is formed in a substantially circular except for the positioning portion 32A, the seal member 15 attached portion 36 for attaching a is formed. Further, the support 33, a plurality of columnar members 37 and tips of these columnar body 37 by an annular portion 38 which connects to the annular, together are formed as a whole frustoconical, the columnar body 37 and between the inside of the annular portion 38, the air flow is configured to be circulated. Further, the secondary filter 34, the together covering the short cylindrical portion 31 and the support 33 from the outside, the open end 34A is fixed to the short cylindrical portion 31. On the other hand, closed end 34B side of the secondary filter 34, so as to flip it, which is foldable constructed through the annular portion 38 to the inside of the support 33. Then, the secondary filter 34 in this way is folded are supported by the support 33. Incidentally, the closed end 34B of the secondary filter 34, until the folded portion of the secondary filter 34 is brought into contact with the annular portion 38, it is possible to push into the support 33. Further, the seal member 15 mounted to the mounting portion 36, a side wall 11A of the secondary filter member 13 when inserted from the one end opening 16 to the dust collection container 11, an outer peripheral portion of the dust collection container 11 it is configured so as to be in close contact with the inner surface.

[0017]

The valve 14 is formed in a substantially rectangular by a plate-like synthetic rubber. Then, one edge of the valve 14, the mounting ribs 39 are inserted into the fitting groove 20 is formed. Then, by inserting the mounting rib 39 to the mounting groove 20, the valve 14 is attached to the dust collection container 11. At this time, the valve 14 is in the normal state, its outer surface is brought into contact with the side wall 11A of the periphery of the communication hole 18. Further, in a state where the valve 14 is attached to the dust collection container 11, together with the side where the mounting ribs 39 are formed is a fixed end 40, opposite to become edge of the fixed end 40 is a free end 41 . Further, in a state where the valve 14 is attached to the dust collection container 11, the edge 42 serving as the dust reservoir 30 side, a rib 43 for imparting waist, and the central axis X of the dust collection container 11 it is formed so as orthogonal. Incidentally, the outer surface of the valve 14 abuts against the side wall 11A of the periphery of the communication hole 18, as well is formed in a flat plate shape so as to protrude on the inner surface of the valve 14, the rib 43 is formed .

[0018]

Next, the operation of this embodiment will be described. In a state where the vacuum cleaner body 2 above the nozzles 3 and the dust collecting unit 4 into is attached, after the power plug (not shown) provided at the distal end of the power cord 9, was connected to the same power source (not shown),

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also not shown switch by operating the operation unit, the electric blower 5 is operated. Then, by the electric blower 5 in this way operates, the suction path (not shown) from the nozzle 3, suction airflow leading to the electric blower 5 through the dust collection means 4 is formed. The suction air flow, as shown in FIG. 4, when it passes through the communication hole 18 fall within the dust collection container 11, to deflect the valve 14 closes the said communication hole 18. Then, as described above, the valve 14 is to have a fixed end 40 and free end 41, is inclined to the free end 41 side is moved inwardly. Accordingly, the airflow within the dust collection container 11 is diverted along the valve 14 which is inclined, as shown in FIG. 4, the counter-clockwise along the inner surface of the side wall 11A of the dust collection container 11 It is a vortex F. As described above, by the ribs 43 are formed on the edge 42 of the valve 14, the elastic force of the edge 42 side is stronger than the elastic force of the other portions, the edge 42 deflection of the side is smaller than the amount of deflection of the other portions. In other words, the elastic force of the edge 42 of the non-side portion of the valve 14, so is smaller than the elastic force of the edge 42 side of the portion where the rib 43 is formed, the valve 14 is the electric blower by the airflow formed by 5, it is possible to reliably large bend. That is, the valve 14, the portion other than the edge 42 side is slightly deformed to bulge inward than the portion of the edge 42 side. Thus, despite using the valve 14 of the plate, said air flow, said guided to move in the dust storage part 30 side while swirling along the inner surface of the side wall 11A, other directions it can be suppressed to reduce the amount of air flow flowing through.

[0019]

Thus, the vortex flow F is formed in the above dust-collecting container 11, coarser dust contained in the vortex F is centrifuged, moving from between the side wall 11A and the return portion 23 in the dust storage part 30 as well as, rough and heavy dust is separated from the air flow of the sand or the like, said from the small hole 25, or from the small holes 24 to overcome the return part 23, flows into the cylindrical body 12. Incidentally, when the said air current gets over the return part 23, many of the dust contained in the air stream it would be returned downward by the return part 23. Then, rough and light dust such as cotton dust contained in the air flow, when flowing into the cylindrical body 12, it is captured by the small holes 24 and 25 or the auxiliary filter 26, which acts as a primary filter . Furthermore, the small holes 24 and 25, or fine dust that has passed through the auxiliary filter 26 is captured by the secondary filter 34. Then, clean air flow fine dust separated by the secondary filter 34, between the columnar body 37 or passes through the short cylindrical portion 31 from the inside of the annular portion 38, leading to the electric blower 5 . As described above, by the protrusions 27 are formed in a plate shape, it is possible to widen the distance between the projection 27 and the annular portion 38, the cylindrical and annular portion 38 of the support 33 between the projections 27 of the shaped body 12 can be made to the air flow is unrestricted passing through the secondary filter 34 via a.

[0020]

When stopping the electric blower 5 by operating the switch operating unit (not shown), also disappears suction airflow. When the suction airflow disappears, the valve 14 is restored by its own elasticity, the outer surface closing the communication hole 18 abuts against the side wall 11A of the periphery of the communication hole 18. In this case, as described above, by the ribs 43 are formed on the edge 42 of the valve 14, the elastic force of the edge 42 side is stronger than the elastic force of the other portion, at least, edge 42 of the dust reservoir 30 side dust is accumulated is comes into contact with the side wall 11A and reliably restored. Thus, the pooled in the dust reservoir 30 dust, to leak to the outside through the suction channel and the nozzle 3 is not shown from the communication hole 18, it can be reliably prevented by the valve 14.

[0021]

When disposing of accumulated dust into the dust reservoir 30 of the dust collection container 11, after releasing the engagement between the engaging claw (not shown) with the engagement receiving portion 19 by pressing the operation portion 10, the dust collection Remove the dust collection unit 4 from the vacuum cleaner body 2 and the container 11 is moved to the nozzle 3 side, further, the secondary filter member 13 and the cylindrical body 12 from one opening 16 of the dust collection container 11 remove to open the one end opening 16. Thus, the converging an end opening 16 of the dust container 11 be to open, it is possible to discard the accumulated dust in the dust storage part 30 from the one end opening 16. In this case, as described above, since the edge 42 is closed the communication holes 18, the pooled in the dust reservoir 30 dust, prevented from being dropped unintentionally location from the communication hole 18 it is. Incidentally, the secondary filter member 13, by pulling out by applying a finger to the finger hook portion 35 is removed from the one end opening 16 of the dust collection container 11. Further, the cylindrical member 12, by pulling out picking flat of the projection 27 is easily detached from the one end opening 16 of the dust collection container 11. Furthermore, the protrusion 27 and is formed in the wider and thinner tabular As described above, when the picked the projection 27 with the thumb and index finger, the inner surface of the side wall 21A of the finger cylindrical portion 21 it is possible to increase the margin between, whereby the so finger picking projection 27 can hardly hits the inner surface of the side wall 21A of the cylindrical portion 21, it is possible to pick the protrusion 27 easily and reliably.

[0022]

Then, even after discarding the dust accumulated in the dust reservoir 30, the inner surface of the side wall 11A and bottom wall 11B of the dust collection container 11, fine dust is attached. Also, the focusing said detached from the dust container 11 secondary filter member 13 and the cylindrical body

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12 to drop accumulated dust in the dust reservoir 30, the dust is adhered. Therefore, it is necessary to remove the dust adhering to them. Dust adhering to the dust collection container 11 and the tubular member 12 can not only be dropped swept by the brush or the like, can also be washed away by washing. Incidentally, the auxiliary filter 26 attached to the tubular body 12 can also be cleaned removed from the tubular body 12. On the other hand, the secondary filter member 13, the dust adheres to the secondary filter 34. Then, the secondary filter 34, as shown in FIG. 2, since it is folded to the closed end 34B side is turned over, after extruding the folded portion from the inside of the support 33, the two it dropped or sweep the dust attached to the surface of the next filter 34 with a brush or the like, the dust impregnated in the secondary filter 34 itself by or washed off with water or the like, the secondary filter 34 can be cleaned. In this way, each element constituting the dust collecting unit 4 is cleaned

[0023]

Then, the auxiliary filter 26, which is to clean, also after attached to the cylindrical body 12, which is clean, inserted from one end opening 16 of the dust collection container 11 to the tubular member 12 has been cleaned , further, by inserting the secondary filter member 13 which is cleaned downstream of the cylindrical body 12, the dust collection unit 4 is assembled again. Note that by having picking flat of the projection 27 can be easily inserted the tubular body 12 to the dust collection container 11. Moreover, before inserting the secondary filter member 13 from one opening 16 of the dust collection container 11, such that said flip the closed end 34B side of the secondary filter 34, of the support 33 through the annulus 38 advance folded inward. Then, thus the dust collection unit 4 assembled again, by mounting again in the vacuum cleaner body 2, the cyclone vacuum cleaner 1 becomes available again.

[0024]

Incidentally, without wrap closed end 34B side of the secondary filter 34, which may the secondary filter member 13 thus mounted is inserted from the one end opening 16 of the dust collection container 11. In this case, as shown in FIGS. 5 to 7, wherein the closed end 34B of the secondary filter 34 abuts the distal end of the projection 27, this projection 27, the support the closed end 34B side from the annular portion 38 33 together is pushed inwardly of said projections 27 also enters from the annular portion 38 inside the support 33. As described above, the secondary filter member 13 when attached to the tubular body 12 when fully extended maximally folded to flip the closed end 34B side of the secondary filter 34 on the downstream side, the if the tip of the projection 27 does not abut against the closed end 34B of the secondary filter 34 (in other words, in the state where the tip end of the protrusion 27 is in contact with the closed end 34B of the secondary filter 34, the support there is room) because between the annular portion 38 provided at the tip of 33 and folded portion of the secondary filter 34, the secondary filter 34 is pushed into the inside of the support 33 by the projections 27 even, excessive tension is not applied, hard to tear.

[0025]

As described above, the cyclonic vacuum cleaner 1 of the present invention, freely mounting is dust collection means 4 attached to and detached from the vacuum cleaner body 2 in which the electric blower 5 is incorporated, the dust container 11, the dust collection container a cylindrical body 12 which small holes 24, 25 are provided to act as a primary filter together is detachably attached with respect to 11, bag-shaped secondary together detachably attached to the downstream side of the tubular body 12 together constitute and a filter 34 are provided secondary filter member 13, the central portion of the tubular body 12, by providing the projections 27 extending projecting said secondary filter 34 side, the condenser when detaching the cylindrical member 12 relative to the dust container 11, by pinching the projection 27, it is possible to easily grasp the cylindrical body 12, thereby resulting in drop the tubular body 12 risk are those that can be reduced.

[0026]

Further, the secondary filter member 13, a support 33 for supporting the secondary filter 34 having flexibility is provided so that the closed end 34B of the secondary filter 34 is flipped to the inside of the support 33 well as folded, when fitted with the secondary filter member 13 on the downstream side of the tubular body 12, since the projection 27 is adapted to be inserted inside of the support 33, the secondary filter also 34 the secondary filter member 13 remains forgot folded closed end 34B side of the mounted downstream of the tubular body 12, closed end 34B side is of the second order filter 34 by being pushed into the projection 27 since the folded by it, in which it is possible to suppress deterioration in dust collecting efficiency due to an increase in ventilation resistance.

[0027]

Furthermore, by the projections 27 formed in a plate shape, that the width of the projection 27 is wide and can be made thin, when picked the protrusion 27 with a finger, increase the margin between the finger and the side wall 21A inner surface it can be, thereby, the finger picking the protrusion 27 is less likely to hit the side wall 21A inner surface, since the projection 27 can be easily knob further reduce the possibility that dropping the tubular body 12 it is those capable of.

[0028]

The present invention is not limited to the above embodiments, and various modifications can be

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implemented within the scope of the invention. For example, in the above embodiment has formed the plurality of small holes as the primary filter to the tubular body, as shown in FIG. 8, a large opening 53 in the side wall 52A and the bottom wall 52B of the cylindrical portion 52 of the tubular body 51, 54 is formed, these openings 53 and 54, is attached a conventional filter 55, 56 as the primary filter, the center of the bottom wall 52B may be formed a protrusion 57. In the above embodiment, although the projection is formed in a plate shape, short, easy knob, and since may be a shape that does not interfere with the airflow through the inside of the annular portion, as shown in FIG. 9, it may be formed so that the cross section of the protrusion 61 is cross-shaped, and as shown in FIG. 10 may be formed a protrusion 71 in a cylindrical shape.

[0029]

It is a side view of a cyclonic vacuum cleaner showing an embodiment of the present invention. Same, it is an enlarged cross-sectional view of the dust collecting mechanism. Same, an A-A sectional view of the dust collecting mechanism during stopping of the electric blower. Same, an A-A sectional view of the dust collecting mechanism during operation of the electric blower. Same, there is an enlarged cross-sectional view showing a state before the installation of the secondary filter body to the cylindrical body. Same is an enlarged sectional view showing a state during mounting of the secondary filter member to the cylindrical member. Same is an enlarged sectional view showing a state after attachment of the secondary filter member to the cylindrical member. It is an enlarged cross-sectional view of the tubular body of the cyclonic vacuum cleaner of another embodiment of the present invention. A further enlarged sectional view of the tubular body of the cyclonic vacuum cleaner showing another embodiment of the present invention, (a) shows the longitudinal section, (b) is a B-B in cross section. A further enlarged sectional view of the tubular body of the cyclonic vacuum cleaner showing another embodiment of the present invention, (a) shows the longitudinal section, (b) is a C-C in cross section.

Description of the code

[0030]

1 cyclone vacuum cleaner 2 vacuum cleaner body 5 electric blower 11 dust-collecting container 12,51 tubular body 13 secondary filter body 24 small holes (primary filter) 25 small holes (primary filter) 27,57,61,71 projection 33 support 34 secondary filter 34B closed end 55 and 56 primary filter

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CLAIMS JP2009279284

1.

A cleaner body in which the electric blower is incorporated, a dust collecting container detachably attached with respect to the cleaner main body, a cylindrical primary filter is provided together with a removably attached to this dust collection container and body, in the cylindrical body cyclonic vacuum cleaner having a bag-shaped secondary filter is provided secondary filter member together detachably attached to the downstream side of, Cyclonic vacuum cleaner, characterized in that the central portion of the tubular body, provided with a protrusion extending projecting to the secondary filter side.

2.

To the secondary filter member, a support for supporting the secondary filter having flexibility is provided, along with the closed end side of the secondary filter is folded so that flipped inside of the support, the tubular when fitted with the secondary filter member to the body, the cyclone vacuum cleaner according to claim 1, characterized in that the projection is configured to be inserted inside of the support.

3.

The cyclonic vacuum cleaner according to claim 1, characterized in that the projection is formed in a plate shape.

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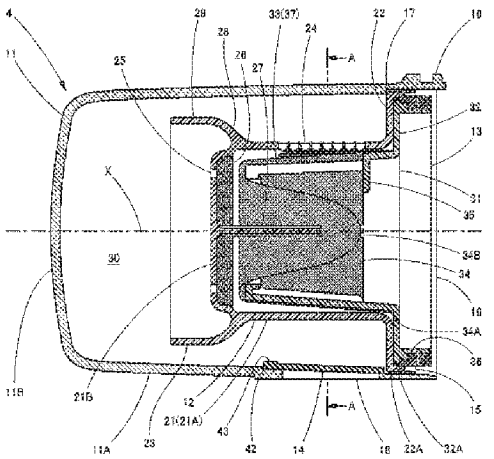
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(54)【発明の名称】サイクロン式掃除機

(57)【要約】
【課題】筒状体を容易に着脱して塵捨て等を容易に行うことができるサイクロン式掃除機を提供すること。
【解決手段】電動送風機５が内蔵された掃除機本体２に対して着脱自在に取り付けられる集塵手段４を、集塵容器１１と、この集塵容器１１に対して着脱自在に取り付けられると共に一次フィルタとして作用する小孔２４，２５が設けられた筒状体１２と、この筒状体１２の下流側に着脱自在に取り付けられると共に袋状の二次フィルタ３４が設けられた二次フィルタ体１３とを有して構成すると共に、前記筒状体１２の中央部に、前記二次フィルタ３４側に突出して延びる突起２７を設けたことで、前記集塵容器１１に対し前記筒状体１２を着脱する際に、前記突起２７を摘むことで、前記筒状体１２を容易に把持することができ、これによって、前記筒状体１２を落としてしまう虞を低減することができる。
【選択図】図２



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【特許請求の範囲】
【請求項1】
電動送風機が内蔵された掃除機本体と、この掃除機本体に対して着脱自在に取り付けられた集塵容器と、この集塵容器に対して着脱自在に取り付けられると共に一次フィルタが設けられた筒状体と、この筒状体の下流側に着脱自在に取り付けられると共に袋状の二次フィルタが設けられた二次フィルタ体とを有するサイクロン式掃除機において、
前記筒状体の中央部に、前記二次フィルタ側に突出して延びる突起を設けたことを特徴とするサイクロン式掃除機。
【請求項2】
前記二次フィルタ体に、可撓性を有する前記二次フィルタを支持する支持体を設け、前記二次フィルタの閉塞端側が前記支持体の内側に裏返されるように折り返されると共に、前記筒状体に前記二次フィルタ体を取り付けた際に、前記突起が前記支持体の内側に挿入されるように構成したことを特徴とする請求項１記載のサイクロン式掃除機。
【請求項3】
前記突起が平板状に形成されていることを特徴とする請求項１記載のサイクロン式掃除機。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は、サイクロン式掃除機に関するものであり、特に、集塵手段の手入れが行いやすいサイクロン式掃除機に関するものである。
【背景技術】
【0002】
従来、この種のサイクロン式掃除機としては、送風機が内蔵された掃除機本体と、この掃除機本体に対して着脱自在に取り付けられる集塵容器と、この集塵容器の開口部に着脱自在に取り付けられて短筒状又は裁頭短錐状の基部（本発明の筒状体に相当する）を有する渦流発生部材と、この渦流発生部材の下流側に着脱自在に取り付けられるフィルタ部材（本発明の二次フィルタ体に相当する）とを有するものが知られている（例えば、特許文献１参照。）。そして、前記送風機を作動させることで、前記集塵容器内で塵埃が気流から遠心分離され、粗い塵埃が前記集塵容器内に溜められると共に、細かい塵埃が前記基部のフィルタ及び前記フィルタ部材のフィルタによって捕捉される。そして、前記集塵容器内に溜められた塵埃及び前記各フィルタに付着した塵埃は、前記掃除機本体から前記集塵容器を取り外した後、この集塵容器から前記フィルタ体及び渦流発生部材を取り外すことで、廃棄することができる。
【0003】
なお、このようなサイクロン式掃除機において、集塵効率を高めるためには、遠心分離の効率を高めると共に、前記フィルタ体のフィルタによる分離効率を高める必要がある。そして、前記フィルタ体のフィルタによる分離効率を高めるためには、このフィルタの面積を大きくする必要がある。そして、フィルタの面積を大きくするための構造の一つとして、可撓性を有する袋状のフィルタの一部を裏返すように折り返す構造がある。このような、袋状のフィルタを折り返す構造は、フィルタの折り返された部分を伸ばして洗浄することで、フィルタに付着した細かい塵埃を洗い落とすことができるという長所を有する。
【特許文献1】特開２００２－２０９８１４号公報
【発明の開示】
【発明が解決しようとする課題】
【0004】
しかしながら、このようなサイクロン式掃除機においては、前記渦流発生部材が掴みにくいので、溜まった塵埃を捨てるために前記渦流発生部材を取り外す際に、表面に細かい塵埃が付着した前記渦流発生部材を被清掃面上に落下させて汚してしまう虞があった。また、袋状のフィルタを折り返す構造を採用した場合、前記渦流発生部材及びフィルタ体を

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前記集塵容器に取り付ける際に、前記フィルタを折り返し忘れると、フィルタが重なり合ってしまうことで、気流がフィルタを何度も通過することで通気抵抗が大きくなってしまい、結果、集塵効率が低下してしまうという問題もあった。

【0005】

本発明は以上の問題点を解決し、筒状体を容易に着脱して塵捨て等を容易に行うことができるサイクロン式掃除機を提供することを第一の目的とする。また、二次フィルタを折り返し忘れたとしても集塵効率の低下を抑えることができるサイクロン式掃除機を提供することを第二の目的とする。

【課題を解決するための手段】

【0006】

本発明の請求項１に記載のサイクロン式掃除機は、電動送風機が内蔵された掃除機本体と、この掃除機本体に対して着脱自在に取り付けられた集塵容器と、この集塵容器に対して着脱自在に取り付けられると共に一次フィルタが設けられた筒状体と、この筒状体の下流側に着脱自在に取り付けられると共に袋状の二次フィルタが設けられた二次フィルタ体とを有するサイクロン式掃除機において、前記筒状体の中央部に、前記二次フィルタ側に突出して延びる突起を設けたものである。

【0007】

また、本発明の請求項２に記載のサイクロン式掃除機は、請求項１において、前記二次フィルタ体に、可撓性を有する前記二次フィルタを支持する支持体を設け、前記二次フィルタの閉塞端側が前記支持体の内側に裏返されるように折り返されると共に、前記筒状体に前記二次フィルタ体を取り付けた際に、前記突起が前記支持体の内側に挿入されるように構成したものである。

【0008】

更に、本発明の請求項３に記載のサイクロン式掃除機は、請求項１において、前記突起が平板状に形成されているものである。

【発明の効果】

【0009】

本発明の請求項１に記載のサイクロン式掃除機は、以上のように構成することにより、前記集塵容器に対して前記筒状体を着脱する際に、前記二次フィルタ側に突出して延びる前記筒状体の中央部に設けられた突起を摘むことで、前記筒状体を容易に把持することができ、これによって、前記筒状体を落としてしまう虞を低減させることができる。

【0010】

また、前記二次フィルタ体に、可撓性を有する前記二次フィルタを支持する支持体を設け、前記二次フィルタの閉塞端側が前記支持体の内側に裏返されるように折り返されると共に、前記筒状体に前記二次フィルタ体を取り付けた際に、前記突起が前記支持体の内側に挿入されるように構成したことにより、可撓性を有する袋状の前記二次フィルタを折り返し忘れたまま前記二次フィルタ体を前記筒状体に取り付けたとしても、前記突起に押されることによって前記二次フィルタが折り返されることになるので、通気抵抗の増大による集塵効率の低下を抑えることができる。

【0011】

更に、前記突起を平板状に形成したことにより、この突起の幅が広く且つ薄くできることで、この突起を指で摘んだ際に指と前記筒状体の内面との間の余裕を大きくすることができ、これによって、前記突起を摘む指が前記筒状体の内面に当たりにくくして、前記突起を摘み易くすることができる。

【発明を実施するための最良の形態】

【0012】

以下、本発明の実施形態について、図１乃至図７に基づいて説明する。１は手持ち型のサイクロン式掃除機である。このサイクロン式掃除機１は、掃除機本体２と、この掃除機本体２に対して着脱自在に取り付けられるノズル３と、前記掃除機本体２に対して着脱自在に取り付けられる集塵手段４とを有して構成されている。

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【0013】
前記掃除機本体２は、電動送風機５が内蔵された胴部６と、図示しない吸引経路が内部に設けられた接続部７と、把持部８と、電源コード９とを有して構成されている。また、前記把持部８には、前記集塵手段４を着脱するための操作部１０及び図示しないスイッチ操作部が設けられている。そして、前記接続部７の吸引経路の一端には、前記ノズル３が着脱自在に取り付けられている。
【0014】
前記集塵手段４は、集塵容器１１と、筒状体１２と、二次フィルタ体１３と、弁１４と、シール部材１５とを有して構成されている。前記集塵容器１１は、比較的硬質で透明な合成樹脂によって、一端が開放、他端が閉塞した有底筒状に形成されている。そして、前記集塵容器１１の一端開口部１６の内側面には、段差部１７が形成されていると共に、前記集塵容器１１の側壁１１Ａで且つ前記段差部１７よりもやや他端寄りには、連通孔１８が貫通して形成されている。また、前記集塵容器１１の側壁１１Ａの一端側には係合受部１９が形成されており、この係合受部１９に前記掃除機本体２の図示しない係合爪が係合することで、前記集塵手段４が前記掃除機本体２に固定されるように構成されている。また、前記集塵容器１１の側壁１１Ａには、前記連通孔１８に隣接して、取付溝２０が前記集塵容器１１の一端側から他端側に延びるように形成されている。
【0015】
前記筒状体１２は、比較的硬質の合成樹脂等で一体成型されていると共に、有底筒状の円筒部２１と、この円筒部２１の開口端から外側に形成されたフランジ部２２と、返し部２３とを有して構成されている。そして、前記円筒部２１の側壁２１Ａには、一次フィルタとして作用する多数の小孔２４が形成されていると共に、前記円筒部２１の底壁２１Ｂにも、一次フィルタとして作用する複数の小孔２５が形成されている。また、前記円筒部２１の底壁２１Ｂの内側には、補助フィルタ２６が着脱自在に取り付けられている。更に、前記円筒部２１の底壁２１Ｂの中央部には、前記円筒部２１の開口端側へ延びるように、平板状の突起２７が一体に形成されている。なお、この突起２７は、後述する二次フィルタ３４の閉塞端３４Ｂ側を裏返すように折り返して下流側に最大限伸ばした状態で前記二次フィルタ体１３を前記筒状体１２に取り付けた際に、その先端が前記二次フィルタ３４の閉塞端３４Ｂに当接しない程度の長さに形成されている。また、前記フランジ部２２は、位置決め部２２Ａを除いてほぼ円形に形成されていると共に、前記筒状体１２を前記一端開口部１６から前記集塵容器１１に挿入した際に、その外周部が前記段差部１７に当接するように構成されている。更に、前記返し部２３は、前記円筒部２１の側壁２１Ａから連続して徐々に径が大きくなる拡径部２８と、この拡径部２８から連続して形成された短円筒部２９とで構成されている。そして、前記集塵容器１１内において、この集塵容器１１に前記筒状体１２を取り付けた際に前記返し部２３の短円筒部２９の先端が位置する場所から前記集塵容器１１の他端側の底壁１１Ｂまでの空間が、塵埃貯溜部３０となる。
【0016】
前記二次フィルタ体１３は、両端が開口した短円筒部３１と、この短円筒部３１の一端から外側に形成されたフランジ部３２と、前記短円筒部３１の他端から延びて形成された支持体３３と、前記短円筒部３１に固定された可撓性を有する袋状の二次フィルタ３４とを有して構成されている。なお、前記短円筒部３１とフランジ部３２と支持体３３は、比較的軟質な合成樹脂によって一体成型されている。そして、前記短円筒部３１の内側には、指掛け部３５が形成されている。また、前記フランジ部３２は、位置決め部３２Ａを除いてほぼ円形に形成されていると共に、前記シール部材１５を取り付けるための取付部３６が形成されている。また、前記支持体３３は、複数の柱状体３７及びこれらの柱状体３７の先端同士を環状に接続する環状部３８とにより、全体として裁頭円錐形に形成されていると共に、前記柱状体３７同士及び前記環状部３８の内側を、気流が流通可能に構成されている。また、前記二次フィルタ３４は、前記短円筒部３１と支持体３３を外側から覆っていると共に、その開口端３４Ａが前記短円筒部３１に固定されている。一方、前記二次フィルタ３４の閉塞端３４Ｂ側は、これを裏返すように、前記環状部３８を通して前記

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支持体３３の内側へ折り返し可能に構成されている。そして、このように折り返された前記二次フィルタ３４は、前記支持体３３によって支えられる。なお、前記二次フィルタ３４の閉塞端３４Ｂは、前記二次フィルタ３４の折り返された部分が前記環状部３８に当接するまで、前記支持体３３内に押し込むことが可能である。更に、前記取付部３６に取り付けられたシール部材１５は、前記二次フィルタ体１３を前記一端開口部１６から前記集塵容器１１に挿入した際に、外周部が前記集塵容器１１の側壁１１Ａの内面に密着するように構成されている。

【0017】

前記弁１４は、板状の合成ゴムによってほぼ方形に形成されている。そして、前記弁１４の一縁には、前記取付溝２０に挿入される取付リブ３９が形成されている。そして、この取付リブ３９を前記取付溝２０に挿入することで、前記弁１４は前記集塵容器１１に取り付けられる。この際、前記弁１４は、常態では、その外面が前記連通孔１８の周囲の前記側壁１１Ａに当接する。また、前記弁１４が前記集塵容器１１に取り付けられた状態において、前記取付リブ３９が形成された側が固定端４０となると共に、この固定端４０の反対側となる縁が自由端４１となる。また、前記弁１４が前記集塵容器１１に取り付けられた状態において、前記塵埃貯溜部３０側となる縁４２に、腰を持たせるためのリブ４３が、前記集塵容器１１の中心軸Ｘと直交するように形成されている。なお、前記連通孔１８の周囲の前記側壁１１Ａに当接する前記弁１４の外面は、平板状に形成されていると共に、前記弁１４の内面に突出するように、前記リブ４３が形成されている。

【0018】

次に、本実施形態の作用について説明する。前記掃除機本体２に前記ノズル３及び集塵手段４が取り付けられた状態で、前記電源コード９の先端に設けられた図示しない電源プラグを、同じく図示しない電源に接続した後、同じく図示しないスイッチ操作部を操作することで、前記電動送風機５が作動する。そして、このように前記電動送風機５が作動することで、前記ノズル３から図示しない吸引経路、前記集塵手段４を経て前記電動送風機５に至る吸引気流が形成される。この吸引気流は、図４に示すように、前記連通孔１８を通過して前記集塵容器１１内に入る際に、前記連通孔１８を閉塞している前記弁１４を撓ませる。そして、前述したように、前記弁１４は固定端４０と自由端４１とを有することで、自由端４１側が内側に移動するように傾斜する。このため、前記気流は、前記集塵容器１１内において、傾斜した前記弁１４に沿って方向転換され、図４に示すように、前記集塵容器１１の側壁１１Ａの内面に沿う反時計回りの渦流Ｆとされる。なお、前述したように、前記リブ４３が前記弁１４の縁４２に形成されていることで、この縁４２側の弾性力が他の部分の弾性力よりも強くなっているので、前記縁４２側の撓み量が他の部分の撓み量よりも小さくなっている。換言すれば、前記弁１４の前記縁４２側以外の部分の弾性力が、リブ４３が形成された前記縁４２側の部分の弾性力よりも小さくなっているので、前記弁１４は前記電動送風機５によって形成された気流によって、確実に大きく撓ませることができる。即ち、前記弁１４は、前記縁４２側以外の部分が、前記縁４２側の部分よりも僅かに内側に膨らむように変形する。従って、板状の前記弁１４を用いているにも拘わらず、前記気流は、前記側壁１１Ａの内面に沿って旋回しながら前記塵埃貯溜部３０側に移動するように案内され、それ以外の方向に流れる気流の量を少なく抑えることができる。

【0019】

このように、前記集塵容器１１内で渦流Ｆが形成されると、この渦流Ｆに含まれる粗い塵埃が遠心分離され、前記側壁１１Ａと返し部２３との間から前記塵埃貯溜部３０に移動すると共に、砂等の粗くて重い塵埃が分離された気流は、前記小孔２５から、或いは前記返し部２３を乗り越えて前記小孔２４から、前記筒状体１２内に流入する。なお、前記気流が前記返し部２３を乗り越える際に、この気流に含まれる塵埃の多くは、前記返し部２３によって下方に返されることになる。そして、前記気流に含まれる綿埃等の粗くて軽い塵埃は、前記筒状体１２内に流入する際に、一次フィルタとして作用する前記小孔２４及び２５、或いは前記補助フィルタ２６によって捕捉される。更に、前記小孔２４及び２５

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、或いは前記補助フィルタ２６を通過した細かい塵埃は、前記二次フィルタ３４によって捕捉される。そして、前記二次フィルタ３４によって細かい塵埃が分離された清浄な気流は、前記柱状体３７の間、或いは前記環状部３８の内側から前記短円筒部３１を通過して、前記電動送風機５に至る。なお、前述したように、前記突起２７が平板状に形成されていることで、前記突起２７と環状部３８との間隔を広くすることができるので、前記支持体３３の環状部３８と前記筒状体１２の突起２７との間を経由して前記二次フィルタ３４を通過する気流が妨げられないようにすることができる。

【0020】

そして、図示しないスイッチ操作部を操作して前記電動送風機５を停止させると、吸引気流も消滅する。そして、この吸引気流が消滅すると、前記弁１４は自身の弾性力によって復元し、その外面が前記連通孔１８の周囲の前記側壁１１Ａに当接して前記連通孔１８を閉塞する。この際、前述したように、前記弁１４の縁４２に前記リブ４３が形成されていることで、前記縁４２側の弾性力が他の部分の弾性力よりも強くなっているので、少なくとも、塵埃が溜まっている前記塵埃貯溜部３０側の縁４２は、確実に復元して前記側壁１１Ａに当接することになる。従って、前記塵埃貯溜部３０に溜められた塵埃が、前記連通孔１８から図示しない吸引経路及び前記ノズル３を経て外部に漏れ出ることを、前記弁１４によって確実に阻止することができる。

【0021】

前記集塵容器１１の塵埃貯溜部３０内に溜まった塵埃を廃棄する場合、前記操作部１０を押して前記係合受部１９と図示しない係合爪との係合を解除した後、前記集塵容器１１を前記ノズル３側に移動させて前記集塵手段４を前記掃除機本体２から取り外し、更に、前記二次フィルタ体１３及び筒状体１２を前記集塵容器１１の一端開口部１６から取り外してこの一端開口部１６を開放させる。このように、前記集塵容器１１の一端開口部１６を開放させることで、前記塵埃貯溜部３０に溜まった塵埃を前記一端開口部１６から廃棄することが可能となる。この際、前述したように、前記縁４２が前記連通孔１８を閉塞しているので、前記塵埃貯溜部３０に溜められた塵埃が、前記連通孔１８から意図しない場所に廃棄されることが防止される。なお、前記二次フィルタ体１３は、前記指掛け部３５に指を掛けて引き出すことで、前記集塵容器１１の一端開口部１６から取り外される。また、前記筒状体１２は、平板状の前記突起２７を摘んで引き出すことで、前記集塵容器１１の一端開口部１６から容易に取り外される。更に、前記突起２７は、前述したように幅が広く且つ薄い平板状に形成されているので、この突起２７を親指と人指し指で摘んだ際に、指と前記円筒部２１の側壁２１Ａの内面との間の余裕を大きくすることができ、これによって、前記突起２７を摘む指が前記円筒部２１の側壁２１Ａの内面に当たりにくくできるので、前記突起２７を容易に且つ確実に摘むことができる。

【0022】

そして、前記塵埃貯溜部３０に溜められた塵埃を廃棄した後も、前記集塵容器１１の側壁１１Ａや底壁１１Ｂの内面には、細かい塵埃が付着している。また、塵埃貯溜部３０内に溜まった塵埃を廃棄するために前記集塵容器１１から取り外された前記二次フィルタ体１３及び筒状体１２にも、塵埃が付着している。従って、これらに付着した塵埃を除去する必要がある。前記集塵容器１１及び筒状体１２に付着した塵埃は、ブラシ等によって掃き落とすことができるばかりでなく、水洗いによって洗い流すこともできる。なお、前記筒状体１２に取り付けられた前記補助フィルタ２６も、前記筒状体１２から取り外して洗浄することができる。一方、前記二次フィルタ体１３は、その二次フィルタ３４に塵埃が付着する。そして、前記二次フィルタ３４は、図２に示すように、閉塞端３４Ｂ側が裏返されるように折り返されているので、この折り返された部分を前記支持体３３の内側から押し出した後、前記二次フィルタ３４の表面に付着した塵埃をブラシ等で掃き落としたり、前記二次フィルタ３４自身に染み込んだ塵埃を水等で洗い落としたりすることで、前記二次フィルタ３４を清浄にすることができる。このようにして、前記集塵手段４を構成する各要素が清浄にされる。

【0023】

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そして、清浄にされた前記補助フィルタ２６を、同じく清浄にされた前記筒状体１２に装着した後、この筒状体１２を清浄にされた前記集塵容器１１の一端開口部１６から挿入し、更に、清浄にされた前記二次フィルタ体１３を前記筒状体１２の下流側に挿入することで、前記集塵手段４が再び組み立てられる。なお、平板状の前記突起２７を摘んで持つことで、容易に前記筒状体１２を前記集塵容器１１に挿入することができる。また、前記二次フィルタ体１３を前記集塵容器１１の一端開口部１６から挿入する前に、前記二次フィルタ３４の閉塞端３４Ｂ側を裏返すように、前記環状部３８を通して前記支持体３３の内側へ予め折り返しておく。そして、このように再び組み立てられた前記集塵手段４を、再び前記掃除機本体２に取り付けることで、前記サイクロン式掃除機１が再び使用可能となる。

【0024】

なお、前記二次フィルタ３４の閉塞端３４Ｂ側を折り返さないまま、前記二次フィルタ体１３を前記集塵容器１１の一端開口部１６から挿入して装着してしまうことがある。この際、図５乃至図７に示すように、前記二次フィルタ３４の閉塞端３４Ｂが前記突起２７の先端に当接し、この突起２７によって、前記閉塞端３４Ｂ側が前記環状部３８から前記支持体３３の内側に押し込まれると共に、前記突起２７も、前記環状部３８から前記支持体３３の内側に入り込む。なお、前述したように、前記二次フィルタ３４の閉塞端３４Ｂ側を裏返すように折り返して下流側に最大限伸ばした状態で前記二次フィルタ体１３を前記筒状体１２に取り付けた際に、前記突起２７の先端が前記二次フィルタ３４の閉塞端３４Ｂに当接しない（換言すれば、前記突起２７の先端が前記二次フィルタ３４の閉塞端３４Ｂに当接している状態では、前記支持体３３の先端に設けられた前記環状部３８と前記二次フィルタ３４の折り返し部との間に余裕がある）ので、前記二次フィルタ３４は、前記突起２７によって前記支持体３３の内側に押し込まれたとしても、過度の張力が加わらず、破れにくい。

【0025】

以上のように、本発明のサイクロン式掃除機１は、電動送風機５が内蔵された掃除機本体２に対して着脱自在に取り付けられる集塵手段４を、集塵容器１１と、この集塵容器１１に対して着脱自在に取り付けられると共に一次フィルタとして作用する小孔２４，２５が設けられた筒状体１２と、この筒状体１２の下流側に着脱自在に取り付けられると共に袋状の二次フィルタ３４が設けられた二次フィルタ体１３とを有して構成すると共に、前記筒状体１２の中央部に、前記二次フィルタ３４側に突出して延びる突起２７を設けたことで、前記集塵容器１１に対し前記筒状体１２を着脱する際に、前記突起２７を摘むことで、前記筒状体１２を容易に把持することができ、これによって、前記筒状体１２を落としてしまう虞を低減させることができるものである。

【0026】

また、前記二次フィルタ体１３に、可撓性を有する前記二次フィルタ３４を支持する支持体３３を設け、前記二次フィルタ３４の閉塞端３４Ｂが前記支持体３３の内側に裏返されるように折り返されると共に、前記筒状体１２の下流側に前記二次フィルタ体１３を取り付けた際に、前記突起２７が前記支持体３３の内側に挿入されるように構成したので、前記二次フィルタ３４の閉塞端３４Ｂ側を折り返し忘れたまま前記二次フィルタ体１３を前記筒状体１２の下流側に取り付けたとしても、前記突起２７に押し込まれることによって前記二次フィルタ３４の閉塞端３４Ｂ側が折り返されることになるので、通気抵抗の増大による集塵効率の低下を抑えることができるものである。

【0027】

更に、前記突起２７を平板状に形成したことにより、この突起２７の幅が広く且つ薄くできることで、この突起２７を指で摘んだ際に、指と前記側壁２１Ａ内面との間の余裕を大きくすることができ、これによって、前記突起２７を摘む指が前記側壁２１Ａ内面に当たりにくくして、前記突起２７を摘み易くすることができるので、前記筒状体１２を落としてしまう虞を更に低減させることができるものである。

【0028】

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なお、本発明は以上の実施形態に限定されるものではなく、発明の要旨の範囲内で種々の変形実施が可能である。例えば、上記実施形態では、筒状体に一次フィルタとして多数の小孔を形成したが、図８に示すように、筒状体５１の円筒部５２の側壁５２Ａ及び底壁５２Ｂに大きな開口５３，５４を形成し、これらの開口５３，５４に、一次フィルタとして通常のフィルタ５５，５６を取り付けると共に、前記底壁５２Ｂの中央に突起５７を形成しても良い。また、上記実施形態では、前記突起を平板状に形成したが、要は、摘みやすく、また、前記環状部の内側を通る気流を妨げない形状であればよいので、図９に示すように、突起６１の断面が十字状となるように形成してもよく、また、図１０に示すように、突起７１を円筒状に形成してもよい。

【図面の簡単な説明】

【0029】

【図1】本発明の一実施形態を示すサイクロン式掃除機の側面図である。

【図2】同、集塵機構部の拡大断面図である。

【図3】同、電動送風機の停止時における集塵機構部のＡ－Ａ断面図である。

【図4】同、電動送風機の作動時における集塵機構部のＡ－Ａ断面図である。

【図5】同、筒状体への二次フィルタ体の取付前の状態を示す拡大断面図であり。

【図6】同、筒状体への二次フィルタ体の取付中の状態を示す拡大断面図である。

【図7】同、筒状体への二次フィルタ体の取付後の状態を示す拡大断面図である。

【図8】本発明の他の実施形態を示すサイクロン式電気掃除機の筒状体の拡大断面図である。

【図9】本発明の更に他の実施形態を示すサイクロン式掃除機の筒状体の拡大断面図であり、（ａ）は縦断面図、（ｂ）はＢ－Ｂ断面図である。

【図10】本発明の更に他の実施形態を示すサイクロン式掃除機の筒状体の拡大断面図であり、（ａ）は縦断面図、（ｂ）はＣ－Ｃ断面図である。

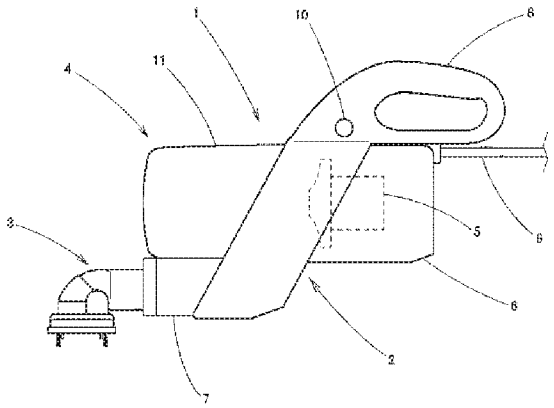
【符号の説明】

【0030】

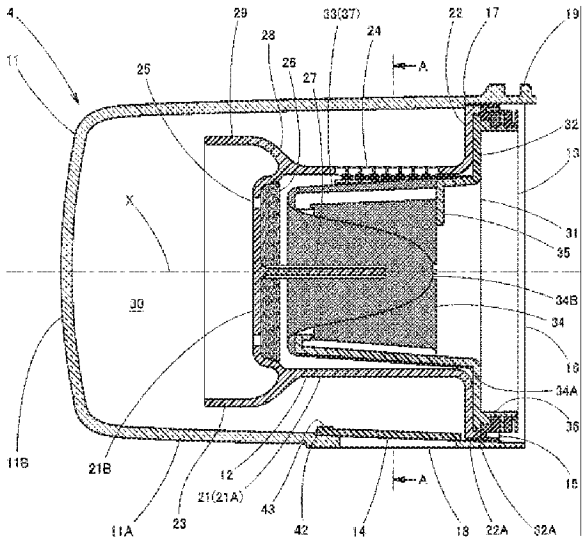
１　サイクロン式掃除機
２　掃除機本体
５　電動送風機
１１　集塵容器
１２，５１　筒状体
１３　二次フィルタ体
２４　小孔（一次フィルタ）
２５　小孔（一次フィルタ）
２７，５７，６１，７１　突起
３３　支持体
３４　二次フィルタ
３４Ｂ　閉塞端
５５，５６　一次フィルタ

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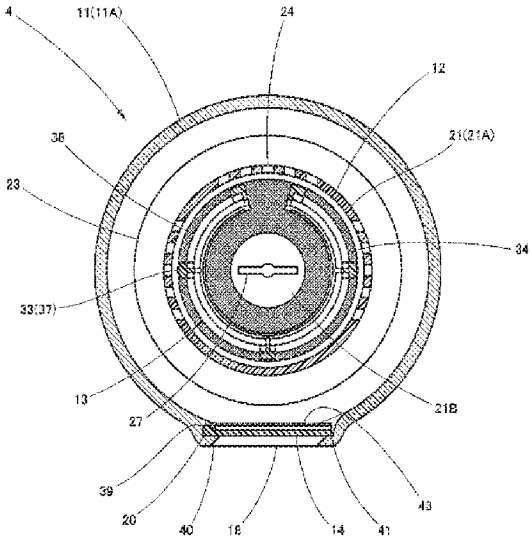
【図1】



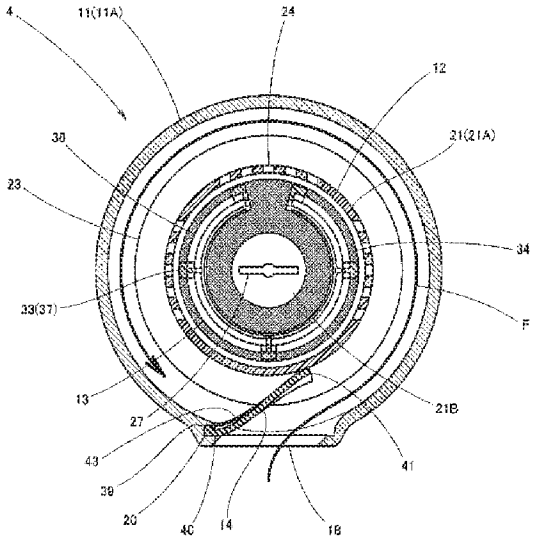
【図2】



【図3】

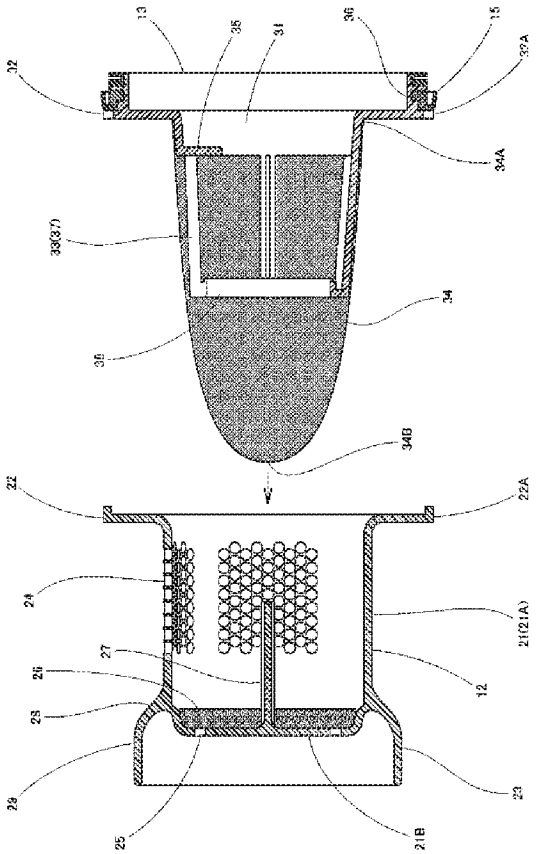


【図4】

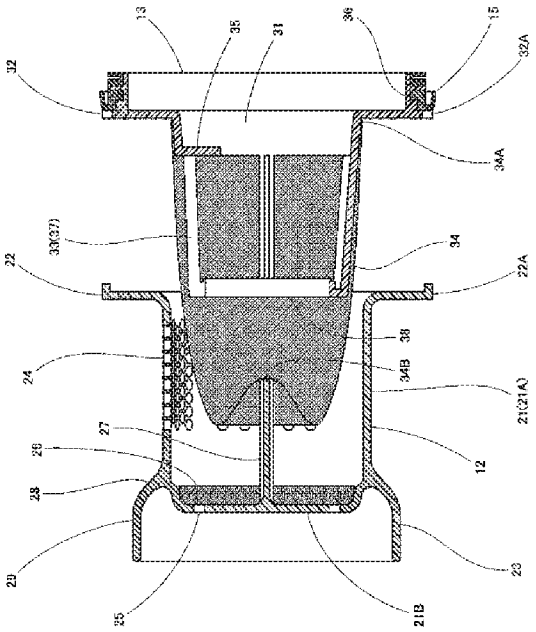


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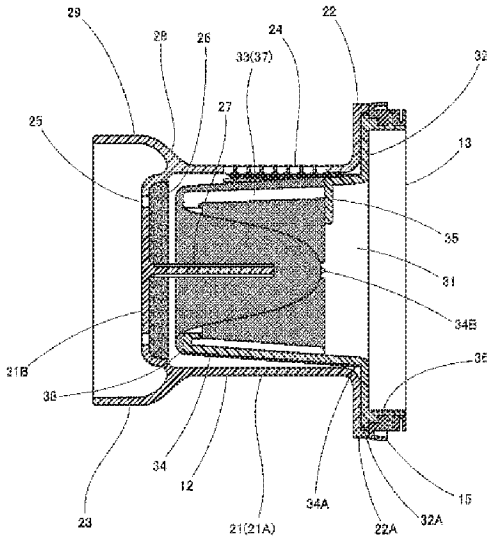
【図5】



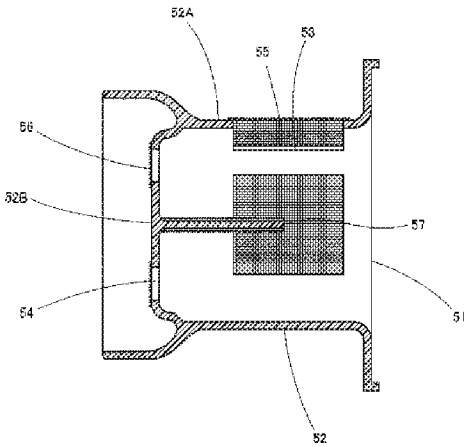
【図6】



【図7】



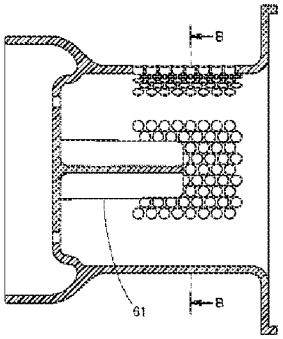
【図8】



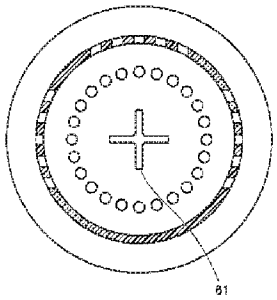
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【図9】

(a)

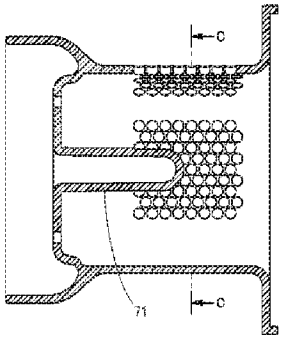


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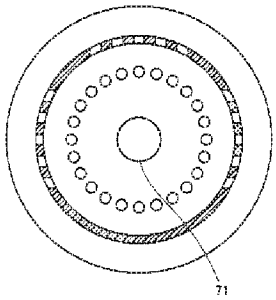


【図10】

(a)



(b)



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Cyclone suction machine

Page bookmark	CN201346180 (Y) - Cyclone suction machine
Inventor(s):	YUMING CHEN [CN]; TONGWEI QU [CN]; HANG LIU [CN]; BING HU [CN]; DEQIN CAO [CN]; ZHONGNING MENG [CN]; SHUISEN WU [CN] ±
Applicant(s):	DONGGUAN KWONNIE ELECTRICAL PR [CN] ±
Classification:	- international: ***A47L5/28***
	- cooperative:
Application number:	CN20082235063U 20081215
Priority number(s):	CN20082235063U 20081215

Abstract of CN201346180 (Y)

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A cyclone suction machine belongs to the field of sanitation machinery, as charged hand-held suction machines in prior art are troublesome in dust unloading and have complex structures, many assembly lines and high production costs, thus in the cyclone suction machine of the utility model, a dust rotating separator is arranged between a dust container and a motor, wherein the dust rotating separator comprises a cylinder seat, a separation cylinder, an air cylinder and a conical filter screen, the air cylinder and the conical filter screen which are positioned in the separation cylinder is connected into a whole, the cylinder seat, the separation cylinder and the air cylinder are also connected into a whole, a dust inlet which is vertical to the outer wall of the air cylinder and a cyclone outlet are arranged in the dust rotating separator, and the dust inlet and the cyclone outlet are communicated, a spiral inclined plane is arranged in a dust rotating channel between the air cylinder and the separation cylinder, a protruding conical surface is arranged on the outer end of an air cylinder which is connected with the conical filter screen, and a front port capable of being opened by hands is arranged on the outlet portion of the dust container. The cyclone suction machine for dust absorption is very convenient for dust discharging and has simple structure, few assembly processes and low production cost.

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DESCRIPTION CN201346180

Tornado vacuum cleaners, belonging to sanitation machinery. A prior art rechargeable portable vacuum cleaners remove dirt very cumbersome and compiex structure, assembly processes, high production costs. The utility model between the dust container and the motor is designed with a rotary dust separator, dust separator by a rotating cylinder blocks, cylinder separation, air cylinder and cone filter, is located on the separation barrel and a tapered cylindrical air filter even as a whole, cylinder blocks, cylinder and air cylinder isolated as a single entity, in the rotary dust separator designed cyclone dust inlet and outlet, inlet of the cyclone dust outlet, dust and air inlet tube outer wall tangent to the air cylinder and the separator tube in Turn the channel between the dust spiral bevel design, with tapered cylindrical air filter connected to the outer end protruding cone design, the outlet portion of the dust container can be designed with a hand before the mouth open. Such vacuum cleaners for vacuuming dust landed very convenient, simple structure, less assembly process, low production costs.

Tornado vacuum cleaners

TECHNICAL FIELD

The utility model relates to the technical field of electrical vacuum cleaner, and more particularly to a cyclonic vacuum cleaners.

Background technique

A prior art rechargeable portable vacuum cleaner comprising a housing, motor and head cleaning, the motor provided in the housing Body, cleaning the head of the housing into contact with air, vacuum housing comprising a bottom member and a top member, the bottom body is provided with a motor, battery and driven by the motor of the fan tray, the bottom of the body to the top of the card is provided at the bottom of the table with the top body Let the end of the card socket, the top body in turn has a fixed plate, top frame filters, seals, filters, Filter holder, Kokura, fan cover, fan drive, motor top frame, motor, motor and undercarriage battery pack into the wind Jack plug with a different function of vacuum head on the outside of the bottom of the body is provided with a handle, the handle has a motor switch. This rechargeable portable vacuum cleaners remove dirt very cumbersome and complex, multi-step assembly, production High costs; and when the dust container in the dusty, which attract the dust suction weakened. With the social issue Development and scientific and technological progress, vacuum cleaners products are constantly upgrading. It is urgent that want one unloading Dust is very convenient, simple structure, less assembly process, low production cost of vacuum cleaners available.

Utility Model Content

The utility model technical problem to be solved is to meet the aspirations of the people, there is provided a whirlwind suck Dust machines, vacuum cleaners that remove dirt easily, and simple structure, less assembly process, low production cost, when When the dust container dusty, which attract the dust suction is still large.

Technical scheme of the utility model for solving the technical problem is adopted: cyclone vacuum cleaners, including ash Dust container, the body, the nozzle and dust channels in the body is designed with a motor, and even as one nozzle Dust channel design in the lower part of the dust container, characterized in that, between the dust container and the motor is designed with an ash Rotary dust separator, the dust from the rotary separator tube holder, separator tube, air filter and a tapered cylinder group Cheng, located in separate cylinder air cylinder and cone filter as a single entity, cylinder blocks, cylinder and air cylinder connected to separate As one.

Rotary dust separator designed cyclone dust inlet and outlet, inlet of the cyclone dust outlet.

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The dust and the air inlet tube outer wall tangent.

Turn the channel in dust and air cylinder tube separation between the design of a spiral ramp.

In connection with the conical air filter cartridge outer end protruding cone design.

In the dust container outlet portion of a design by hand before the mouth open.

The utility model has the beneficial effect: As the dust between the container and the motor is designed with a rotating dust Separators, dust separator by a rotating cylinder blocks, cylinder separation, air cylinder and cone filter, is located minutes From the air cylinder and a tapered cylinder filter as a single entity, cylinder blocks, cylinder and air cylinder isolated as a single entity, in Dust rotary separator is designed with dust cyclone inlet and outlet, inlet of the cyclone dust outlet dust Tangential inlet air tube outer wall, air passages in the rotating cylinder and dust separator tube between a spiral design Slope, in connection with the conical filter air cylinder outer end cone design with a projection in the dust container outlet portion Design a bit by hand before the mouth open, so this vacuum cleaner dust unloading easy, simple structure, Assembly process, low production cost, when the dust container is dusty, it still suck dust suction Larger.

BRIEF DESCRIPTION

FIG. 1 is a new cross-sectional view of the utility;

Figure 2 is a right side view of the utility model in the dust rotary separator;

Figure 3 is a front view of the utility model in the dust rotary separator;

Figure 4 is a left side view of the utility model in the dust rotary separator;

Figure 5 is a cross-sectional view of the utility model in the dust rotary separator.

[6]

FIG, 1, the front of the mouth; 2, the dust container; 3, rotation of the dust separator; 4, body; 5, the suction nozzle; 6、Dust channel; 7, seat tube; 8, separator tube; 9, an air cylinder; 10, conical filter; 11, dust Entrance; 12, convex cone; 13, Tornado exports; 14, spiral bevel; 15, filter.

detailed description

Below in conjunction with the accompanying drawings and specific embodiments of the present utility model is further described in detail.

[3]

Referring to Figure 1, a cyclonic vacuum cleaners embodiment according to the present embodiment, the dust container 2 comprises, body 4, Dust nozzle channel 5 and 6, in the design of the body 4 within a motor, even as one of the nozzle channel 5 and the dust 6In the lower portion of the dust container design 2, in the dust container is designed with a 2 exit site by hand before the mouth open 1, Characterized in that: between the dust container and the motor 2 is designed with a rotary dust separator 3. Referring to FIG. 2, FIG. 3、Figures 4 and 5, the rotation of the dust separator 3 through 7 from the seat tube, the separator tube 8, the air cylinder 9 and a conical Filter 10, it is located within the separator tube air cylinder 8 and 9 of the conical filter 10 as a single entity, seat tube 7, Separator tube 8 and the air cylinder 9 as a single entity; rotary dust separator 3 is designed with an inlet 11 and rotating dust Air outlet 13, inlet 11 communicates cyclone dust outlet 13; the dust and the air inlet tube 11 relative to the outer wall 9 Cut; this design is conducive to dust or spoil between the air cylinder 9 and the dust separator tube 8 rotary channels Rotate; rotate channel 9 and the dust separator tube 8 between the air cylinder 14 is designed with a spiral ramp that Spoil design is conducive to dust or dirt in the rotating cylinder 8 channel 9 and the separation between the air cylinder to the cyclone Spin out port 13, so that the dust thrown into the container 2; 9 outside air cylinder 10 is connected with the tapered end of the filter Design protruding cone 12, this design is conducive to the air cylinder 9 near the outer wall of the rotary dust or spoil encounter Convex tapered surface 12 after being thrown to the inner wall of the separator tube 8, so that the dirt or spoil the centrifugal force from rotation Unscrew the air outlet 13, and thrown into the dust container 2; the purpose of design is to separate cylinder 8 from dust or spoil Accelerating the rotation of the; purpose of the design of the air cylinder 9 is conducive to air after the separation from the body after the motor 4 In the discharge. When this cyclone vacuum cleaners start work when vacuuming, air, dust or spoil into the nozzle 5, Channel 6 through the dust, dust inlet 11 by dust inlet 11 tangentially into the design of spiral bevel 14 Air and dust rotating cylinder

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9 8 channel separation between the cylinder under the action of centrifugal force, air and ash Spoil dust or separation, dust or spoil outlet 13 from the cyclone spin off and thrown into the dust container 2; by air Over the conical filter 10, through the air cylinder 9 and the design on the cylinder base 7 of the filter 15 into the motor after 4 are discharged from the body, the purpose of the filter 15 is designed to prevent larger particles of dust into the motor, damage Fan; when the dust container 2 in the amount of dust or spoil reaches a certain level need to be cleaned by hand Before the mouth open after a clean-up of dust, let go after the former mouth 1 automatic back.

The above is only the utility model is a preferred embodiment. Worthy of note is, for the present Ordinary skill in the art, in the utility model without departing from the principles of the premise, can also present real With the new to make some modifications and improvements, so any configuration utility model patent application under this range, wherein the special Sign and principle made equivalent variations or modifications also belong to the scope of the patent application for utility model protection.

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CLAIMS CN201346180

[6]

Tornado vacuum cleaners, including dust container (2), the body (4), the nozzle (5) and dust channels (6)In the body (4) is designed with a motor, even as one of the nozzle (5) and dust channel (6) is provided Meter in the dust container (2) a lower portion, characterized in that: the dust container (2) between the motor and is designed with an ash Rotary dust separator (3), the rotation of the dust separator (3) by the tube base (7), the separator tube (8), the air Cylinder (9) and a conical filter (10), is located on the separator tube (8) within the air cylinder (9) and a tapered over Filter (10) as a single entity, a cartridge holder (7), the separator tube (8) and the air cylinder (9) as a single entity.

[2]

2、Claim cyclone vacuum cleaner 1, characterized in that: the rotary dust separator (3) Designed dust inlet (11) and the cyclone outlet (13), dust inlet (11) communicating the cyclone outlet (13)

[3]

3、Claim cyclone vacuum cleaner 2, characterized in that: the dust inlet (11) And the air cylinder (9) is tangent to the outer wall.

[4]

4、Claim cyclone vacuum cleaner 1, characterized in that: the air cylinder (9) and points Dust from the rotary tubular passage (8) between the spiral bevel design (14).

[5]

5、Claim cyclone vacuum cleaner 1, characterized in that: in the conical filter (10) (9) connected to the outer end of the air cylinder designed with protruding cone (12).

[6]

6、According cyclone vacuum cleaner according to claim 1, characterized in that: in the dust container (2) of the Mouth parts can be designed with a hand before the mouth open (1).

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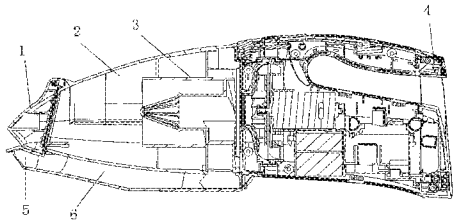
权利要求书 1 页 说明书 4 页 附图 2 页

[54] 实用新型名称

旋风式吸尘机

[57] 摘要

旋风式吸尘机，属于环卫机械领域。现有技术的一种充电式手提吸尘机卸灰尘很麻烦，且结构复杂，装配工序多，生产成本高。本实用新型在灰尘容器与马达之间设计有一灰尘旋转分离器，灰尘旋转分离器由筒座、分离筒、空气筒和锥形过滤网组成，位于分离筒内的空气筒和锥形过滤网连为一体，筒座、分离筒和空气筒连为一体，在灰尘旋转分离器中设计有灰尘入口和旋风出口，灰尘入口连通旋风出口，灰尘入口与空气筒外壁相切，在空气筒与分离筒之间的灰尘旋转通道中设计有螺旋斜面，在与锥形过滤网连接的空气筒外端设计有凸出锥面，在灰尘容器出口部位设计有一可用手打开的前嘴。这种吸尘机用于吸尘，其卸灰尘很方便、且结构简单、装配工序少、生产成本低。



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1、旋风式吸尘机，包括灰尘容器（2）、机体（4）、吸嘴（5）和灰尘通道（6），在机体（4）内设计有一马达，连为一体的吸嘴（5）和灰尘通道（6）设计在灰尘容器（2）下部，其特征是：在灰尘容器（2）与马达之间设计有一灰尘旋转分离器（3），所述灰尘旋转分离器（3）由筒座（7）、分离筒（8）、空气筒（9）和锥形过滤网（10）组成，位于分离筒（8）内的空气筒（9）和锥形过滤网（10）连为一体，筒座（7）、分离筒（8）和空气筒（9）连为一体。

2、根据权利要求 1 所述的旋风式吸尘机，其特征是：在灰尘旋转分离器（3）中设计有灰尘入口（11）和旋风出口（13），灰尘入口（11）连通旋风出口（13）。

3、根据权利要求 2 所述的旋风式吸尘机，其特征是：所述灰尘入口（11）与空气筒（9）外壁相切。

4、根据权利要求 1 所述的旋风式吸尘机，其特征是：在空气筒（9）与分离筒（8）之间的灰尘旋转通道中设计有螺旋斜面（14）。

5、根据权利要求 1 所述的旋风式吸尘机，其特征是：在与锥形过滤网（10）连接的空气筒（9）外端设计有凸出锥面（12）。

6、根据权利要求 1 所述的旋风式吸尘机，其特征是：在灰尘容器（2）出口部位设计有一可用手打开的前嘴（1）。

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旋风式吸尘机

技术领域

本实用新型涉及电器吸尘器技术领域，特别是涉及一种旋风式吸尘机。

背景技术

现有技术的一种充电式手提吸尘机包括壳体、电机及吸尘头，电机设于壳体中，吸尘头与壳体的入风口相接，吸尘机壳体包括底部体及顶部体，底部体中设有电机、电池及由电机带动的扇盘，底部体顶端所设卡台与顶部体底端所设的卡端相套接，顶部体中依次设有固定盘、过滤器顶架、密封圈、过滤器、过滤器托架、小仓、扇盖、扇盘、电机顶架、电机、电机底架及电池组，进风插口中插设有不同功能的吸尘头，在底部体的外侧设有把手，把手上设有电机开关。这种充电式手提吸尘机卸灰尘很麻烦，且结构复杂，装配工序多，生产成本高；且当灰尘容器中的灰尘较多时，其吸灰尘的吸力减弱。随着社会的发展和科学技术的进步，吸尘机产品也在不断地更新换代。人们迫切希望一种卸灰尘很方便、且结构简单、装配工序少、生产成本低的吸尘机问世。

实用新型内容

本实用新型所要解决的技术问题是，满足人们的愿望，提供一种旋风式吸尘机，这种吸尘机卸灰尘很方便、且结构简单、装配工序少、生产成本低，当灰尘容器中的灰尘较多时，其吸灰尘的吸力仍然较大。

本实用新型解决其技术问题所采用的技术方案是：旋风式吸尘机，包括灰

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尘容器、机体、吸嘴和灰尘通道，在机体内设计有一马达，连为一体的吸嘴和灰尘通道设计在灰尘容器下部，其特征是：在灰尘容器与马达之间设计有一灰尘旋转分离器，所述灰尘旋转分离器由筒座、分离筒、空气筒和锥形过滤网组成，位于分离筒内的空气筒和锥形过滤网连为一体，筒座、分离筒和空气筒连为一体。

在灰尘旋转分离器中设计有灰尘入口和旋风出口，灰尘入口连通旋风出口。

所述灰尘入口与空气筒外壁相切。

在空气筒与分离筒之间的灰尘旋转通道中设计有螺旋斜面。

在与锥形过滤网连接的空气筒外端设计有凸出锥面。

在灰尘容器出口部位设计有一可用手打开的前嘴。

本实用新型的有益效果是：由于在灰尘容器与马达之间设计有一灰尘旋转分离器，灰尘旋转分离器由筒座、分离筒、空气筒和锥形过滤网组成，位于分离筒内的空气筒和锥形过滤网连为一体，筒座、分离筒和空气筒连为一体，在灰尘旋转分离器中设计有灰尘入口和旋风出口，灰尘入口连通旋风出口，灰尘入口与空气筒外壁相切，在空气筒与分离筒之间的灰尘旋转通道中设计有螺旋斜面，在与锥形过滤网连接的空气筒外端设计有凸出锥面，在灰尘容器出口部位设计有一可用手打开的前嘴，因而这种吸尘机卸灰尘很方便、且结构简单、装配工序少、生产成本低，当灰尘容器中的灰尘较多时，其吸灰尘的吸力仍然较大。

附图说明

图 1 是本实用新型的剖视图；

图 2 是本实用新型中的灰尘旋转分离器的右视图；

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图 3 是本实用新型中的灰尘旋转分离器的主视图；

图 4 是本实用新型中的灰尘旋转分离器的左视图；

图 5 是本实用新型中的灰尘旋转分离器的剖视图。

图中，1、前嘴；2、灰尘容器；3、灰尘旋转分离器；4、机体；5、吸嘴；6、灰尘通道；7、筒座；8、分离筒；9、空气筒；10、锥形过滤网；11、灰尘入口；12、凸出锥面；13、旋风出口；14、螺旋斜面；15、过滤网。

具体实施方式

下面结合附图和具体实施例对本实用新型作进一步详细的说明。

参见图 1，本实施例所述的一种旋风式吸尘机，包括灰尘容器 2、机体 4、吸嘴 5 和灰尘通道 6，在机体 4 内设计有一马达，连为一体的吸嘴 5 和灰尘通道 6 设计在灰尘容器 2 下部，在灰尘容器 2 出口部位设计有一可用手打开的前嘴 1，其特征是：在灰尘容器 2 与马达之间设计有一灰尘旋转分离器 3。参见图 2、图 3、图 4 和图 5，所述灰尘旋转分离器 3 由筒座 7、分离筒 8、空气筒 9 和锥形过滤网 10 组成，位于分离筒 8 内的空气筒 9 和锥形过滤网 10 连为一体，筒座 7、分离筒 8 和空气筒 9 连为一体；在灰尘旋转分离器 3 中设计有灰尘入口 11 和旋风出口 13，灰尘入口 11 连通旋风出口 13；所述灰尘入口 11 与空气筒 9 外壁相切；这种设计有利于灰尘或弃渣在空气筒 9 与分离筒 8 之间的灰尘旋转通道中旋转；在空气筒 9 与分离筒 8 之间的灰尘旋转通道中设计有螺旋斜面 14，这种设计有利于灰尘或弃渣在空气筒 9 与分离筒 8 之间的灰尘旋转通道中向旋风出口 13 旋出，从而抛入灰尘容器 2 中；在与锥形过滤网 10 连接的空气筒 9 外端设计有凸出锥面 12，这种设计有利于靠近空气筒 9 外壁旋转的灰尘或弃渣遇到凸出锥面 12 后被抛向分离筒 8 的内壁，从而使灰尘或弃渣在离心力作用下从旋

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风出口 13 旋出，并抛入灰尘容器 2 中；设计分离筒 8 的目的是对灰尘或弃渣起加速旋转作用；设计空气筒 9 的目的是有利于分离后的空气经过马达后从机体 4 内排出。当这种旋风式吸尘机开始吸尘工作时，空气、灰尘或弃渣进入吸嘴 5，经过灰尘通道 6、灰尘入口 11，并由灰尘入口 11 切向进入设计有螺旋斜面 14 的空气筒 9 与分离筒 8 之间的灰尘旋转通道中，在离心力的作用下，空气与灰尘或弃渣分离，灰尘或弃渣从旋风出口 13 旋出，并抛入灰尘容器 2 中；空气经过锥形过滤网 10、穿过空气筒 9 和设计在筒座 7 上的过滤网 15，并进入马达后从机体 4 内排出，设计过滤网 15 的目的是防止较大颗粒的灰尘进入马达，损坏风叶；当灰尘容器 2 里的灰尘或弃渣数量达到一定的程度需要清理时，用手将前嘴 1 打开后清理灰尘，放手后前嘴 1 自动回位。

以上所述的仅是本实用新型的一个优选实施方式。值得说明的是，对于本领域的普通技术人员来说，在不脱离本实用新型原理的前提下，还可以对本实用新型作出若干变形和改进，故凡依本实用新型专利申请范围所述的构造、特征及原理所做的等效变化或修饰，同样属于本实用新型专利申请保护的范围。

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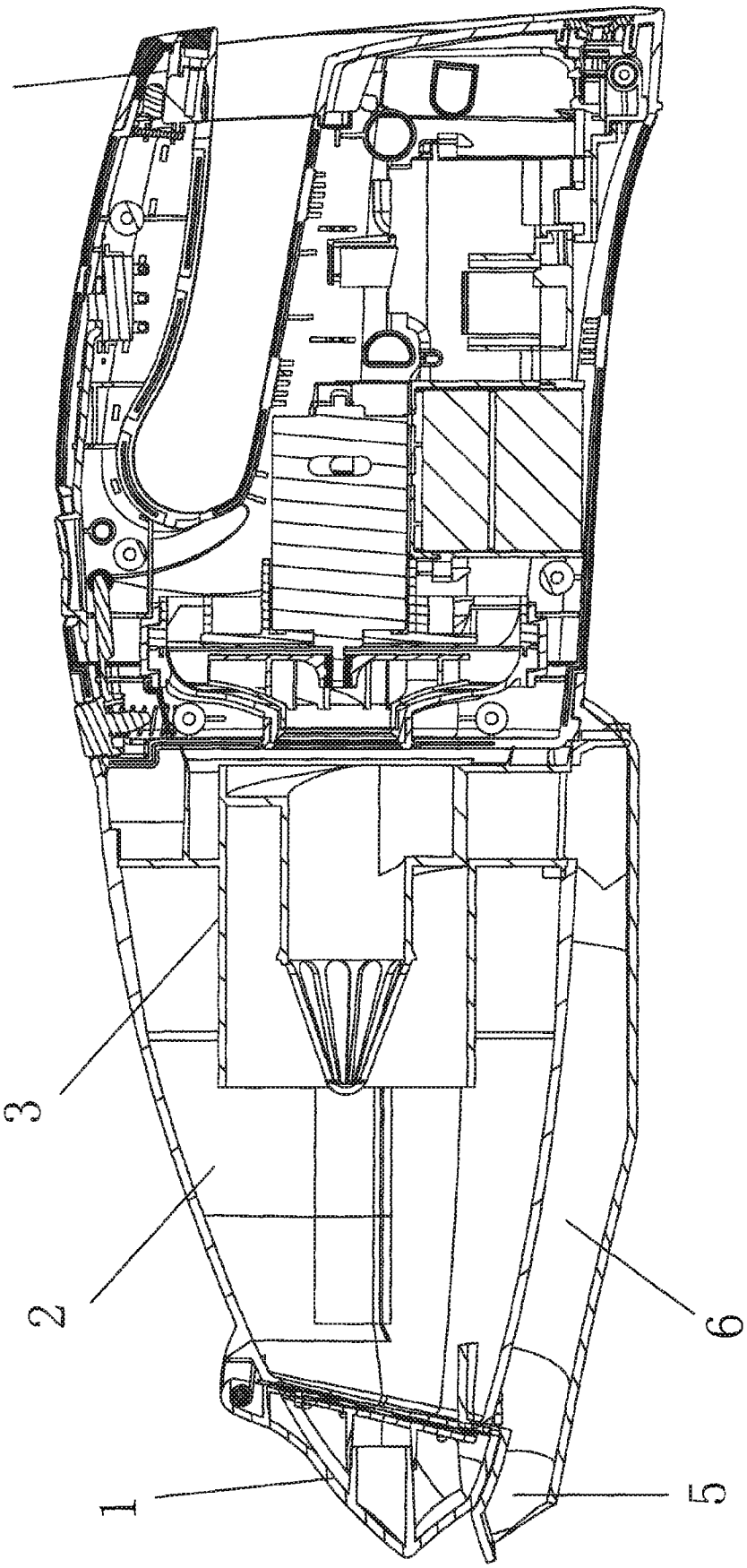


图 1

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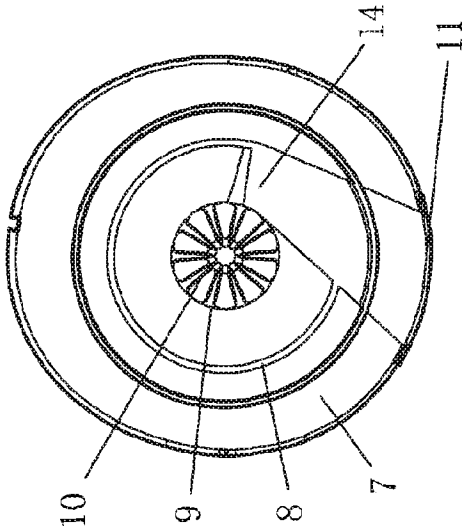


图 4

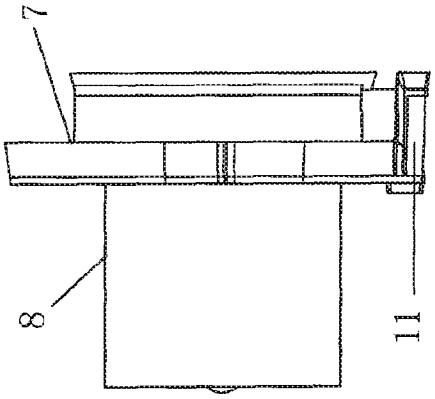


图 3

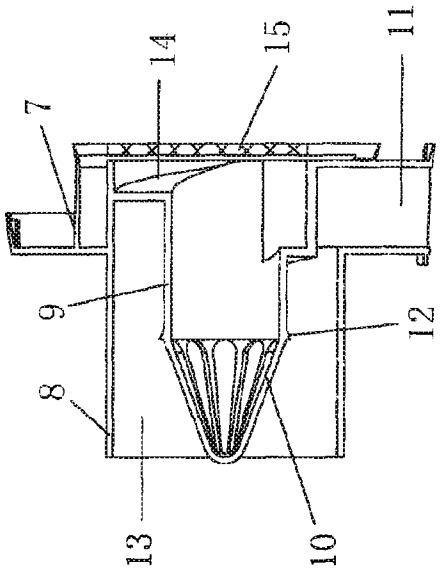


图 5

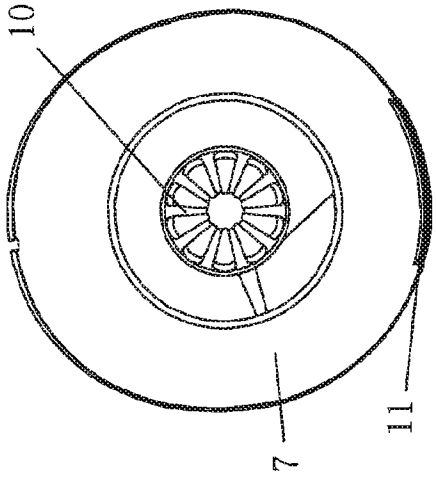


图 2

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JP2009261501 (A)
Bibliographic data
Description
Claims
Mosaics
Original document
Cited documents
Citing documents
INPADOC legal status
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Bibliographic data: JP2009261501 (A) — 2009-11-12

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STICK VACUUM CLEANER

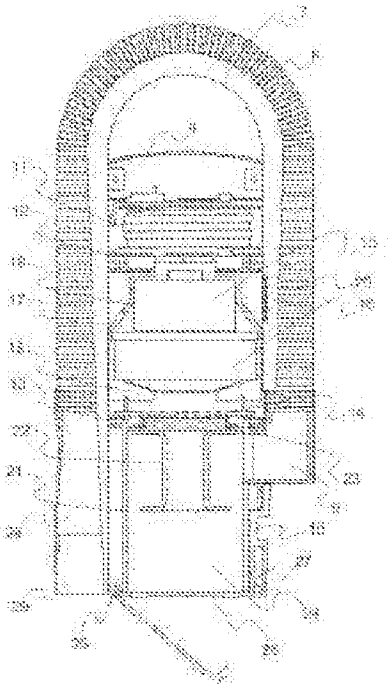
Page bookmark	JP2009261501 (A) - STICK VACUUM CLEANER
Inventor(s):	YOSHITOMI JUNICHI; SASAKI KAZUHIRO ±
Applicant(s):	YAMADA ELECTRIC IND ±
Classification:	- international: ***A47L5/28; A47L9/16; A47L9/28; A47L9/32***
	- cooperative:
Application number:	JP20080112404 20080423
Priority number(s):	JP20080112404 20080423

Abstract of JP2009261501 (A)

Translate this text into

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PROBLEM TO BE SOLVED: To satisfy the conflicting functions of efficient operability in cleaning and improvement in suction force for a stick vacuum cleaner to be used as a shoulder hanging cleaner, in configuring the cleaner to be stably erected upright by itself when stored to reduce the storage space. ;SOLUTION: When the stick vacuum cleaner is stored, an extension pipe is detached and the vacuum cleaner is stably erected by itself on the bottom of a cleaner body. The operability is improved by collectively disposing heavyweight parts such as a cord reel and an electric blower in the vicinity of a handle at the upper end of the cleaner body. The number and the weight of parts is reduced by reinforcing the compression strength of a casing with a circular reinforcing cylinder and by using the reinforcing cylinder also as an outer barrel of a cyclone dust collection part, and as a result, the suction force can be increased by the increase of output of a motor. ;COPYRIGHT: (C)2010,JPO&INPIT



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DESCRIPTION JP2009261501

The present invention relates to a stick-type vacuum cleaner can also be used as a shoulder-type vacuum cleaner, in order to reduce the storage space, as the a configuration that can be free-standing upright and stable at the time of storage, say the improvement of the good and the suction force of the cleaning operability , it aims to satisfy both the conflicting function. A stabilize independence in the bottom of the cleaner body, remove the extension tube at the time of storage, and improve the operability by aggregate weight components such as a cord reel or an electric blower to handle the vicinity of the cleaner body top, circular to reinforce the compressive strength of the housing in the reinforcement tube of, and the reinforcing tube to reduce the number of parts and weight be used also in the outer tube of the cyclone dust collecting part, the increase of the suction force generated by the output increase of the motor I following it is realized. .FIELD 2

Stick-type vacuum cleaner

[0001]

The present invention, there is provided a cyclone system among the general household vacuum cleaner, and more particularly suitable stick-type vacuum cleaner is also to be used as a shoulder type.

[0002]

Conventional stick-type vacuum cleaner, while the manner wipe the floor hold the handle with one hand, the dust is sucked together with the surrounding air, the dust by a cyclone or filter to use in order to separate and recover from the air. Further, when not in use and from its form, stand be stored is determined, for example, it is a case of cyclonic, while preventing performance degradation as short as possible a path of intake air in Patent Document 1 it devised to reduce as much as possible the center of gravity have been proposed. Patent 2003-204907

[0003]

Patent Document 2 further examples of filter expression, also be used, also been proposed devised to improve the operability during the cleaning operation while also ensuring stability in unused state natural as handy as stick ing. Patent No. 2784970

[0004]

Both contrivances have also been included to devise for stabilizing the storage conditions when not in use. That is, if described with respect to the former, in FIG. 5, gripping the handle 51 is in use, by the suction force of the electric blower 53 built in the cleaner body 52, the dust sucked together with ambient air from the nozzle 54, the cyclone dust collecting part to separate and recover at 55. On the other hand in order to stably independence kept in the state of FIG. 5 when not in use, the cleaner body 52 wt parts such as electric fan 53 and cord reel 56 is housed are arranged downward. Particularly low cord reel 56 with relation to the path of the intake air even in proximity to the nozzle 54 of the distal portion is disposed below is also performed devised to increase the stability as low as possible the center of gravity.

[0005]

if it described with reference to FIG. 6 With regard to the latter, during storage if you want to use as a stick-type vacuum cleaner with a normal grip 61 is used by being mounted the extension tube and nozzle to the connecting part 62 the lower end, the figure you remove them the state is shown. Weight parts of the electric blower 63 and the cord reel 64 is collected in the bottom of the cleaner body 65, low center of gravity to constitute a relatively lightweight filter section 66 at the top of the cleaner main body 65 is the end portion of the suction hose 67 configured, also devised the bottom 68 friendly in plan view a and widely stability have been made natural.

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[0006]

The stick type vacuum cleaner to clean with the handle with one hand, to other which is required to stabilize self-supporting when not in use, is possible to reduce the overall weight as much as possible is basically determined. Therefore, of course the ingenuity of the weight and the number of parts diminishing of each part, located close to the handle that becomes the point of action the weight parts, operability at the time of cleaning work in bringing in the vicinity of the only hand can be the center of gravity to improve the device it has been made.

[0007]

Also as in the conventional example of FIG. 5, the cyclone dust collecting part in the case of cyclone, the vacuum cleaner body by arranging together the electric blower in the longitudinal, shortening the route of intake, including the bellows hose by placing in the vicinity of the nozzle to simultaneously prevent a decrease in pressure loss, the relationship devised to improve the stability by lowering the center of gravity of the entire stick vacuum cleaner, the drawback that the handle and the center of gravity operability during cleaning operation is impaired apart There, has been supplemented by adding the parts of the wheel or the like to the nozzle, is a technique that has been used frequently.

[0008]

Or In the described manner, in the conventional stick type vacuum cleaner, when the purpose of stable self-standing during storage, instead of keeping the strong suction force by shortening the path of the intake air, including a bellows hose, spacing of the handle and heavy parts disadvantage of operation at the time of the cleaning work is reduced by the fact that the open, disadvantages and cost of parts is increased by the auxiliary means of a wheel or the like to be added in order to complement that missing point there was a drawback of such increases.

[0009]

Conversely to improve operability at the time of cleaning operation by placing a weight parts in the vicinity of the handle, as the compensation to avoid the increase in component count and cost, by the route of the intake comprising a bellows hose becomes long, the suction force those that disadvantage that leads to a decrease in can not be avoided, it is necessary to configure short as much as possible the route of intake, convenience oriented fee tc as short as possible the bellcws hose is also reduced, the disadvantage that it is difficult to reach the high altitude there were.

[0010]

Further, when used in shoulder type, even when added to belt machine body of FIG. 6, for example, to close the cross-sectional shape of the body is a circular, for the side portion of the cleaning worker attached to the waist it unlike the premise for example cooking utensils or the like, is familiar convex curved surface becomes opposite form each other bad were those sitting is bad. By the way as seen in Patent Document 3, was constructed at a moderate curved surface, but also devised the vacuum cleaner of elliptical shape exists, continues to be a convex curved surface-to-convex curved surface of the degree of difference is what not, be true natural there is a drawback that when compared to the structure of the circle with a decrease in the compressive strength of the short-axis direction can not be avoided. Design registration No. 1202935

[0011]

The present invention has been made in view of the various problems of the prior art described above. that when not in use by removing the suction port and extension tube from the connecting engagement portion, to ensure a stable self-supporting at the bottom of the cleaner body for the purpose. And it aims to to handle that also serves as a cleaning operation and portable to close the weight parts of the cord reel and electric blower housing, configured so that as much as possible become the center of gravity in the vicinity of the handle, to ensure the operability at the time of cleaning work to. Decrease in suction force caused by the path of the intake air, including a bellows hose becomes long, complemented by increasing the output of the motor, increase in weight by increasing the size of the motor to increase the output, the other components and an object thereof is compensated by the weight loss of the components total by reduction and combined. The poor sitting contour convex surface of, by providing a flat portion on the opposite two sides addressed, with the point where the compressive strength as compared to the convex surface by providing a planar portion housing is lowered, the compression the weakened part by the reinforcing barrel of the intensity is large circular cross-section reinforced from the inside, and yet, it is an object that also serves as a reinforcing tube to the outer tube of the cyclone dust collecting part of the garbage bag unnecessary. And an object thereof is to ensure the operability and stability of that to position the cyclone dust collecting part of the lightweight farthest cleaner body bottom from the handle good cleaning. In addition to the bottom of the unit to the closure, it is also used as the bottom lid of the cyclone dust collecting part, to allow the weight and cost reduction by reducing the dust collection mechanism parts, further to achieve a sanitary disposal work in a simple garbage it is also of interest. Further, by increasing the total length of the bellows hose constituting a part of the path of the intake air, and an object thereof is to enable a more altitude cleaning by increasing the stretching length.

[0012]

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First means of the present invention, the two opposite sides of the casing forming the outer shape of the cleaner body, preferably a transparent resin material, constituting the planar integral or separate, use as shoulder formula It is characterized in that to improve the sit against the side of the user at the time.

[0013]

Second means of the present invention, the lower inner portion of the housing for good lubrication of the circular cross-section, preferably on rigidly mounted and fixed to the cylinder body made of a transparent resin, the compressive strength of the cleaner body At the same time the reinforcing tube to increase, characterized in that also serves the stiffening tube as the outer tube of the cyclone dust collecting part for dust removal.

[0014]

A third means of the present invention includes a characterized in that the flat bottom surface of the cleaner body to open and close freely configured by a hinge portion, also serve the bottom surface as the bottom cover of the cyclone dust collecting part, reduces the number of parts to.

[0015]

Fourth means of the present invention, the hinge portion and the positive against the outside of the bottom of the cleaner body, provided with a stopper means having a locking claw to open the locking in one operation, touching a hand to the trash at the touch of a button without it characterized in that it constituted as disposal work can be.

[0016]

A fifth means of the present invention, a cleaner body top of the handle cord reel from the vicinity of the electric blower, by disposed in a vertical order of the cyclone dust collecting part closer to the center of gravity of the cleaner main body portion to the handle , characterized in that to improve the operability during cleaning operations.

[0017]

Sixth means of the present invention is brought about by the substantial reduction of the components due to alternate the cyclone dust collecting part, to enhance the suction force Fumuke the reductions of weight and cost to an output increase of the motor, the bellows hose long Although the suction force for which is characterized in that to avoid the disadvantage that to decrease.

[0018]

Seventh means of the present invention, the bellows hose from the connecting engagement portion provided on the main body side lower part along the groove of the handle upper surface U-shaped, to the inlet of the cyclone dust collecting part provided on the main body opposite by long, increase the amount corresponding to the stretching afford to meet the entire length of the bellows hose, the suction port is characterized by easy to reach up to a high place, such as a ceiling.

[0019]

Therefore, according to the present invention, and it is kept stable free-standing, well operability of the cleaning operation, does not decrease even the suction force by lengthening the extension pipe, reach easily to a high natural part, transparent portion integrated condition of Karagomi is easily able to confirm, garbage disposal work also and simple and hygienic, it is possible to provide a suitable stick-type vacuum cleaner is also to be used as a shoulder type.

[0020]

An example of a stick type vacuum cleaner will be described according to the present invention with reference to the drawings.

[0021]

Figure 1 is a perspective view showing a bird's-eye appearance remove the extension tube 2 and mouthpiece 3 of the cleaner body 1 of the stick type vacuum cleaner according to the present invention, later described in further detail to the resin housing 4 is generally be configured in the inverted conical topped spread, two opposite side surfaces as shown in the drawing, some or all are integrally formed or separately so as to form a planar portion 5 transparent On the side that is perpendicular to the flat portion 5 and 90 degrees, telescopic bellows hose 6 is suitable to fit the upper surface side is attached handle 7 made of a resin molded in a groove-shaped U-shaped, to clean the user is in easy shape grip at the time of the time and carry. Capable length adjustment consisting of and tough material highly flexible belt 8 is used when using the vacuum cleaner main body 1 of the stick-type vacuum cleaner as shoulder type. The bellows hose 6 is fixed to the end portion to the inlet 9, it is directly below the fluid inlet 9, but the knob 10 is placed, added later further detailed description of this and the like.

[0022]

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Next, using a description of FIG 2 showing a cross section perpendicular to the plane part 5 along the center line of the cleaner body 1. Vacuum cleaner made of resin housing 4 constituting the outer shape of the main body 1 is divided into outline three spatial portion. In other words, the upper body rib section 12 to secure the cord reel 11 of the spring-loaded to the winding houses the power cord of the place which is a large-sized parts, increase the rigidity is the cord reel 11 and the integrated, wall thickness for weight reduction and constituting the upper partition wall suitable to complement the thinly formed strength of the housing 4 and the power supply around the parts such as a switch (not shown) constitutes the upper space, including.

[0023]

On the other hand the lower main body rib 13, filter retainer 14 having a circular perforated plate-shaped grating surface in the central portion be formed integrally or separately, complement the strength of the upper body ribs 12 likewise housing 4 of the constitute the lower partition wall which is suitable for. The space between the upper partition wall and the lower partition wall constitute a central space, and has a space for receiving the composed electric blower 17 from the motor 15 and fan 16. The electric blower 17 is secured in the upper partition wall and the lower partition wall in the form of wrap around in anti-vibration rubber 18 for preventing the vibration and noise, in the beyond the deformation allowance of the rubber vibration isolator 18. It acts as also structure high motor 15 and fan 16 of rigidity, of the upper and lower partition wall, is intended to contribute to the function of reinforcing the groundnut of housing 4.

[0024]

Electric blower 17, a heavy motor 15 the upper side to the fan 16 on the lower side, but wrapped in anti-vibration rubber 18 in the downward direction the inlet of the fan 16, filter presser 14 and the positive against part the intake port of the fan 16 by opening the corresponding portion in a cage, the intake air is discharged from one or a plurality of air discharge port 19 provided in a portion of the upper motor 15 to the central space, one disposed further to the housing 4 or the plurality of exhaust it has a structure which is discharged from the mouth 20 to the outside of the cleaner body 1.

[0025]

In addition to the filter presser 14 is in the lower main body rib 13, cross-section a circular, preferably made of lubricity good and transparent resin, reinforcing tube 21 further has a flange portion, the fixed just inside the casing 4 and stay a structure that is, in the visceral parts little lower space compared to the upper space and the central space located underneath the partition wall has a structure for reinforcing the housing 4 from the inside. Although cleaner cyclone inner cylinder 22 on the center axis in which the tubular made of resin of the main body 1 are provided, the upper end of the cyclone inner cylinder 22 is slightly a flange of Tsubahiro, to the flange portion the recess is formed of concentric circular, it has a structure in which a cutout portion of the flange portion outer edge fit notch portion provided corresponding to the internal flange portion of the reinforcing tube 21, to rotate locking detachably. The concentric circular recess provided in the flange, fibrous filters 23 serve dust is placed, is mounted in a manner to sandwich between the perforated plate-shaped grating surface of the filter retainer 14, dust function it plays a part of.

[0026]

On the other hand, the opening portion is provided at one position of the side surface upper side of the reinforcing tube 21, the intake air from the inlet 9 to the end of the bellows hose 6 as described above is fixed, along the inner surface of the reinforcing tube 21, tangentially it is connected so as to flow. Further lower space of the housing 4 by molding a reinforcing tube 21 with a lubricious good resin, a reinforcing tube 21 which serves as a cyclone outer cylinder disposed coaxially, and a cyclone barrel 22 , it is possible to configure as a good cyclone dust portion 24 of the dust collecting efficiency.

[0027]

To describe the bottom of the cleaner body 1, but configured to flat as possible as suitable for stable self-reliance at the time of storage, attached to freely open and close to the hinge portion 25 having a bottom surface to the lower end of the housing 4, cyclone a configuration that also serves as a bottom cover 26 of the dust portion 24. That is, the hinge portion of the bottom lid 26 constitutes a stopper means for stopping engagement hooked claw 27 provided on the opposite outer edge, when opening the bottom lid 26 is formed integrally with the resin slider the knob 10 pushed down and let the tip of the slider is flexing the locking claw 27, constructed as hook engagement is out. In addition, since the lower end portion of the reinforcing tube 21 is in close contact with the bottom cover 26 around the entire circumference, it is usually one in which the cyclone dust collecting part 24 is maintained in a sealed state.

[0028]

Termination suction connection 28 is fixed to the other end portion of the fixed bellows hose 6 to the inlet 9. Near the bottom surface opposite side to the inlet 9 of the cleaner body 1 is vertically optionally connected locking tube 29 which communicates with the pipe-shaped is provided, a stick-type cleaning, as shown in during storage and 3 when used as a machine is the remains of mounting a detachable said suction connection 28 to a connection lock cylinder 29, connects the suction connection 28 when used hung on a shoulder as shown in FIG. 4 have in hand is removed from the locking cylinder 29,

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carry out the cleaning of the place that has accumulated dust stretched the bellows hose 6. Of course, even when in this state, the extension tube 2 and the mouthpiece 3 ahead of the suction connection 28 is inserted is attached, it is also possible to use for the cleaning of the high altitude.

[0029]

If explaining the operation for one embodiment of the present invention configured as described above, FIG. 3 extension tube 2 at the lower end of the connection locking tube 29 of the cleaner body 1 of the stick type vacuum cleaner according to the present invention the insert is attached, and further a mouthpiece 3 inserted is attached at its distal end, with a grip 7 shows a state to be used as a stick-type vacuum cleaner. In addition, FIG. 4 is applied to the shoulder belt 8 as the above-described flat surface portion 5 of the housing backpack as impinging on the part of the waist, remove the suction connection 28 from the connection locking cylinder 29, the cleaning by hand it shows in that state.

[0030]

3 and the operation of the cleaner body 1 in any use condition shown in FIG. 4 is identical, if an operation of it will be described hereinafter, the suction force electric blower 17 is operated is generated Turn, from the suction connection 28 is if you want to use as a shoulder-type, air together suction around the dust from the suction port 3 If you want to use as a stick type.

[0031]

Intake air containing dust flows at high speed in a tangential direction with respect to the wall surface of the reinforcing tube 21 from the inlet 9 through the bellows hose 6, the dust is separated by centrifugal separation effect in the cyclone dust collecting part 24, the the dust is going to be deposited on the bottom of the cyclone chamber 24. On the other hand an intake passes through the cyclone tube, in passing through the filter 23 which is inhibited by the perforated plate-shaped grating surface of the filter presser 14, it is taken strained the remaining fine dust, become more clean state it is sucked into the electric blower 17 through the air inlet.

[0032]

The air dust was cleaned are removed by the operation up to this, it exits the exhaust outlet 19 of the motor 15 rubber vibration isolator enclosed 18 while cooling the motor 15, the cleaner main body 1 inside of the excess waste heat together and it is discharged from the exhaust port 20 provided at an arbitrary position of the housing 4 to the cleaner main body 1 outside.

[0033]

Air and excess waste heat cleaned but is discharged to the outside of the cleaner body 1, once sucked dust remaining is deposited on the bottom of the cyclone dust collecting part 24, the fine dust collected entwined in the filter 23 is to be will be left behind. However if the flat portion 5 and the reinforcing tube 21 is formed transparent, since the deposited dust can be confirmed visually, by depressing the knob 10 When many accumulated, engaging the tip portion of the slider formed integrally remove the caught in the claws 27. Then since the bottom lid 26 lid opening as shown by the two-dot chain line in FIG. 2 as a fulcrum of the hinge portion 25, the dust deposited at the same time to remain adhered to the inner wall of the reinforcing tube 21 made of good lubricity resin no, because the fall in the clean its own weight, simple and clean can be discarded. Also fine dust is entangled in the filter 23 is periodically remove the cyclone inner cylinder 22 together filter 23, perform maintenance by cleaning or replacement.

[0034]

Since constructed and operative in the present invention as described above, according to the present invention, and it is kept stable free-standing, well operability of the cleaning operation, since the longer the extension tube without reducing the suction force reach easily to the high place, and can easily confirm the deposition condition of the dust from the transparent portion, garbage disposal work also natural also hygienic and easy, provide a suitable stick-type vacuum cleaner is also to be used over the shoulder and it is possible.

[0035]

While the best mode for carrying out the present invention has been described based on the drawings, the protection scope of the present invention is not limited to the embodiments described above, also encompasses invention and this with corresponding ones of claims wherein it is intended.

[0036]

Shows another use state of an embodiment of a perspective view the present invention showing the use state of the embodiment of the longitudinal cross-sectional view present invention shown along the center line of the embodiment of external perspective view the present invention showing an embodiment of the present invention vertical sectional view showing another conventional example longitudinal sectional view showing a perspective view a conventional example

Description of the code

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[0037]

1 vacuum cleaner body 4 housing 5 planar portion 6 bellows hose 7 handle 9 inlet 11 cord reel 17 electric blower 21 reinforcement tube 22 cyclone inner cylinder 24 cyclone dust collecting part 25 hinge part 26 bottom lid 27 locking claw 28 suction connection section 29 connection locking cylinder

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CLAIMS JP2009261501

1.

And code reel in the cleaner body take up the code for supplying power, and electric blower consists of a motor and fan, a built-in cyclone dust collecting part which communicates with the intake side of the electric blower, the bottom surface of the cleaner body floor and stay is configured in a suitable plane for rather stationary, the upper end of the cleaner body is also used for cleaning operations and portable, comprising a handle whose upper surface is formed in a groove of U-shaped, vacuum cleaner on a side surface of the main body bottom surface near the inner diameter is connected locking cylinder which communicates with the pipe-shaped are provided vertically, the said connection locking cylinder bellows hose having a suction connection section at the tip is inserted detachably the other end of the bellows hose is connected to a cyclone dust collecting part of the inlet on the side opposite to the connection locking cylinder along said handle, extension tube and suction port at the bottom of the connection locking cylinder in a state of connecting is used as a stick-type vacuum cleaner, suitable for use as a shoulder type when you do not want to use the extension tube and suction port is by far the suction connection of the bellows hose over the belt on the shoulder from the connection locking cylinder in Do cleaner, the cleaner stick type vacuum cleaner is characterized in that configured in the planar portion opposing two sides of the housing body.

2.

Comprising a reinforcement tube of circular cross-section for reinforcing the housing from the inside, on the top reinforcing tube, an opening connecting the inlet port to the bellows hose is connected is provided, also serves as the reinforcement tube as the outer tube of the cyclone dust removal unit stick vacuum cleaner of claim 1, wherein the.

3.

Through planar portion and the transparent portion from the outside of the reinforcing tube of the housing side, the stick-type vacuum cleaner according to claim 1 or 2, characterized in that deposition of internal dust can be confirmed.

4.

With a hinge portion to the lower end of the housing, a planar bottom lid to the hinge portion is rotatably supported, the stopper means on the opposite side for regulating the opening and closing of the bottom cover directly opposite the hinge portion of the bottom cover stick vacuum cleaner of claims 1 3, wherein further comprising a locking pawl as.

5.

Cleaner in close proximity to the handle located at the top of the main body, the cord reel to the upper, the weight parts such as electric fan, the lower part to place the cyclone dust portion, arranged in the vertical to match the respective center axis stick vacuum cleaner of claim 1, wherein the.

6.

Along the bellows hose on the side surface of the cleaner body from the connected locking tube, through the U-shaped groove of the handle, according to claim 1, characterized in that extended up to inflow port provided in the lower portion of the opposite side surfaces of stick-type vacuum cleaner.

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A47L	*5/28*	*(2006.01)*	A47L	5/28		3B057
A47L	*9/16*	*(2006.01)*	A47L	9/16		3B062
A47L	*9/32*	*(2006.01)*	A47L	9/32	Z	
A47L	*9/28*	*(2006.01)*	A47L	9/28	C	

審査請求 未請求　請求項の数 6　OL　（全 9 頁）

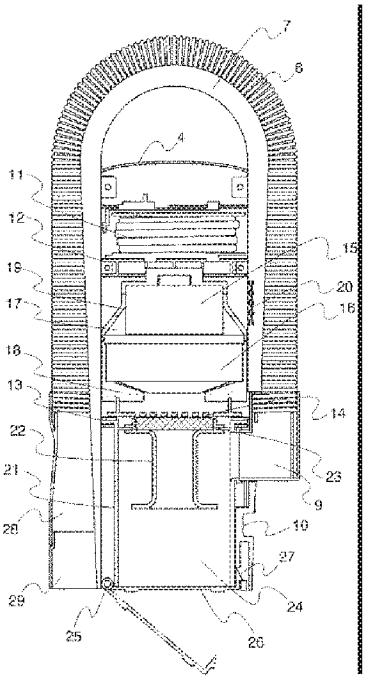
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(54)【発明の名称】スティック型掃除機

(57)【要約】
【課題】　肩掛け式掃除機としても使えるスティック型掃除機に関し、収納スペースを低減する為、保管時に安定して自立直立できる構成とするのに伴い、掃除操作性の良さと吸引力の向上と言う、相反する機能を共に満たすことを目的とする。
【解決手段】　収納時には延長管を外して掃除機本体の底面で安定自立させ、コードリールや電動送風機などの重量部品を掃除機本体上端の把手近傍に集約することで操作性を向上し、円形の補強筒で筐体の圧縮強度を補強し、かつ該補強筒をサイクロン集塵部の外筒に兼用することで部品点数及び重量を削減し、以ってモータの出力増による吸引力の増強を実現するものである。
【選択図】図２



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【特許請求の範囲】
【請求項1】
掃除機本体に電力を供給するコードを巻取るコードリールと、モータ及びファンから構成される電動送風機と、電動送風機の吸気側に連通するサイクロン集塵部を内蔵し、該掃除機本体の底面は床に据置くのに適した平面状に構成されて居て、該掃除機本体の上端部には掃除操作や持運びに兼用される、上面がU字形の溝に形成された把手を備え、掃除機本体底面近傍の側面には内径が上下にパイプ状に連通した接続係止筒が設けられ、該接続係止筒には先端部に吸込接続部を備えた蛇腹ホースが着脱自在に挿入され、該蛇腹ホースの他端は前記の把手に沿って前記接続係止筒の反対側の側面にあるサイクロン集塵部の流入口に接続され、前記接続係止筒の下部に延長管及び吸込口を繋いだ状態ではスティック型掃除機として使用され、延長管及び吸込口を使用しない時はベルトを肩に掛け蛇腹ホースの吸込接続部を接続係止筒から抜いて肩掛け式として使用するのに好適な掃除機において、掃除機本体の筐体の相対する二面を平面部に構成したことを特徴とするスティック型掃除機。
【請求項2】
筐体を内側から補強する円形断面の補強筒を具備し、該補強筒上部に、蛇腹ホースが接続された流入口を接続する開口部を設け、前記補強筒をサイクロン除塵部の外筒として兼用することを特徴とする請求項１記載のスティック型掃除機。
【請求項3】
筐体側面の平面部及び補強筒の外側から透明部分を通し、内部の塵埃の堆積状況が確認出来ることを特徴とする請求項１または２記載のスティック型掃除機。
【請求項4】
筐体の下端部にヒンジ部を備え、該ヒンジ部に平面状の底蓋を回動自在に支承し、該底蓋のヒンジ部に正対する反対側には前記底蓋の開閉を規制するストッパ手段としての係止爪を備えたことを特徴とする請求項1から３記載のスティック型掃除機。
【請求項5】
掃除機本体の最上部に位置する把手に近接させて、上部にコードリール、電動送風機等の重量部品を、下部にはサイクロン除塵部を配置し、夫々中心軸を一致させて縦型に配列したことを特徴とする請求項１記載のスティック型掃除機。
【請求項6】
蛇腹ホースを接続係止筒から掃除機本体の側面に沿い、把手のU字型の溝を経由し、反対側側面の下部に設けられた流入口まで伸ばしたことを特徴とする請求項1記載のスティック型掃除機。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は、一般家庭用の掃除機の中でもサイクロン方式であって、特に肩掛け式として使用するのにも好適なスティック型掃除機に関する。
【背景技術】
【0002】
従来のスティック型掃除機は、片手で把手を握って床面を拭く様にしながら、周囲の空気と一緒に塵埃を吸引し、サイクロンやフィルタによって該塵埃を空気中から分離回収するべく使用する。又、不使用時にはその形態からして、立てて保管することが求められ、例えば、サイクロン式の事例であるが、特許文献１では吸気の経路を可能な限り短くして性能の低下を防ぎつつ重心を出来る限り低くする工夫が提案されている。
【特許文献1】特開２００３－２０４９０７
【0003】
更にフィルタ式の例として特許文献２では、スティック型としてもハンディ型としても使用出来て、然も不使用状態での安定性を確保しながらも清掃作業時の操作性を向上する工夫が提案されている。

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【特許文献2】特許第２７８４９７０
【0004】
いずれの工夫も不使用時の保管状態を安定させる為の工夫が盛り込まれている。即ち、前者に関して説明すれば、図5において、使用時には把手５１を握り、掃除機本体５２に内蔵する電動送風機５３の吸引力により、ノズル５４から周囲の空気とともに吸い込んだ塵埃を、サイクロン集塵部５５で分離回収する。一方で不使用時には図5の状態で安定的に自立保管するために、電動送風機５３およびコードリール５６等の重量部品が収められている掃除機本体５２を、下方に配置している。特に吸気の経路に係わりの少ないコードリール５６も先端部のノズル５４に近接させて下方に配置され、重心を可能な限り低くして安定性を増す工夫も行っている。
【0005】
後者に関して図６で説明すれば、通常把手６１を持ってスティック型掃除機として使用する場合は、接続部６２下端に延長管やノズルを装着して使用するが、図はそれらを外した保管時の状態が示されている。電動送風機６３とコードリール６４の重量部品は掃除機本体６５の下部に集められ、比較的軽量なフィルタ部６６を吸引ホース６７の終端部である掃除機本体６５の上部に構成して重心を低く構成し、然も底面６８が平面的でかつ広く安定性に配慮した工夫がなされている。
【0006】
片手で把手を持って掃除をするスティック型掃除機では、不使用時に安定自立することが求められる他にも、全体重量を極力軽減することが基本的には求められる。従って、各部品の軽量化や部品点数逓減の工夫は当然ながら、重量部品を作用点となる把手の近くに配置し、重心を出来限り手の近くに持って来ることで清掃作業時の操作性を向上する工夫がなされている。
【0007】
また図5の従来例の如く、サイクロン式の場合はサイクロン集塵部、電動送風機を縦に纏めて並べた掃除機本体を、ノズルの近くに配置することで蛇腹ホースを含む吸気の経路を短縮して圧力損失の低下を防止すると同時に、スティック型掃除機全体の重心を下げて安定性を向上する工夫を施した関係上、把手と重心が離れて清掃作業時の操作性が損なわれる欠点が有り、ノズルに車輪等の部品を付加することで補っており、多用されている手法である。
【発明の開示】
【発明が解決しようとする課題】
【0008】
以上説明した様に従来のスティック型掃除機では、保管時の安定自立を目的とした場合に、蛇腹ホースを含む吸気の経路を短縮して強い吸引力を保つ代わりに、把手と重量部品の間隔が開くことによる清掃作業時の操作性が低下する欠点、該欠点を補完するために付加する車輪等の補助手段による部品点数が増加する欠点及びコストが上昇する等の欠点があった。
【0009】
逆に重量部品を把手の近傍に配置して清掃作業時の操作性を向上し、部品点数とコストの上昇を回避する代償としては、蛇腹ホースを含む吸気の経路が長くなることにより、吸引力の低下を招くと言う欠点が避けられないもので、極力吸気の経路を短く構成する必要があり、蛇腹ホースを極力短くする都合上延伸代も小さくなり、高所には届き難いと言う欠点があった。
【0010】
また、肩掛け式で使用する場合に、例えば図６の機体にベルトを付加したとしても、本体の横断面形状が円形に近いために、掃除作業者の体側部に対しては、腰に装着することを前提とする例えば飯盒等とは違って、互いに凸な曲面が相対する形となり馴染が悪く、座りが悪いものであった。因みに特許文献３に見る様に、緩やかな曲面で構成した、楕円

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形状の掃除機の工夫も存在するが、程度の違いはあるものの凸曲面対凸曲面であることに変わりはなく、然も真円の構造に比べると短軸方向の圧縮強度の低下が避けられないと言う欠点がある。

【特許文献3】意匠登録第１２０２９３５

【0011】

本発明は、上述した従来技術の諸問題点に鑑みなされたもので、不使用時には吸込口および延長管を接続係止部から抜去し、掃除機本体の底面での安定自立を確保することを目的とする。掃除操作や持運びを兼用する把手にコードリールや電動送風機の重量部品を近接させ収容し、極力重心を把手の近傍になる様に構成し、清掃作業時の操作性を担保することを目的とする。蛇腹ホースを含む吸気の経路が長くなることに起因する吸引力の低下は、モータの出力を増すことにより補完し、出力を増す為にモータを大型化することによる重量の増加は、他部品の削減や兼用により構成部品トータルの減量で補うことを目的とする。外形の凸曲面の座りの悪さには、相対する二面に平面部を設けて対処し、平面部を設けることにより凸曲面と比較して筐体の圧縮強度が低下する点に付いては、圧縮強度が大きい円形断面の補強筒によって弱くなった部分を内側から補強し、なおかつ、該補強筒をごみ袋不要のサイクロン集塵部の外筒に兼用することを目的とする。軽量のサイクロン集塵部を把手から一番離れた掃除機本体最下部に位置させることで良好な掃除の操作性や安定性を確保することを目的とする。更に本体底面を開閉式にして、サイクロン集塵部の底蓋を兼用させ、集塵機構部品を削減することで軽量化やコスト削減を可能とし、更にごみの簡便で衛生的な廃棄作業を実現することも目的とする。また、吸気の経路の一部を構成する蛇腹ホースの全長を長くすることによって、延伸長を大きくしてより高所の掃除を可能にすることを目的とする。

【課題を解決するための手段】

【0012】

本発明の第一の手段は、掃除機本体の外形を形成する筐体の相対する二面を、好ましくは透明の樹脂材料で、一体若しくは別体の平面状に構成し、肩掛け式として使用する際に使用者の体側部に対する座りを改善することを特徴とする。

【0013】

本発明の第二の手段は、前記筐体の下方内側部分に円形断面の潤滑性の良好な、好ましくは透明な樹脂からなる筒体を固定乃至は堅固に取付て、掃除機本体の圧縮強度を増す補強筒とすると同時に、当該補強筒を除塵のためのサイクロン集塵部の外筒として兼用することを特徴とする。

【0014】

本発明の第三の手段は、掃除機本体の平らな底面をヒンジ部により開閉自在に構成し、当該底面をサイクロン集塵部の底蓋としても兼用し、部品点数を低減することを特徴とする。

【0015】

本発明の第四の手段は、掃除機本体の底面のヒンジ部と正対する外側に、一動作で係止を開放する係止爪を有するストッパ手段を設けて、ワンタッチでごみに手を触れることなく廃棄作業が出来る様に構成することを特徴とする。

【0016】

本発明の第五の手段は、掃除機本体最上部の把手の近傍からコードリール、電動送風機、サイクロン集塵部の順に縦型に配置して掃除機本体部の重心位置を把手に近づけることによって、掃除作業時の操作性を向上することを特徴とする。

【0017】

本発明の第六の手段は、サイクロン集塵部の兼用による構成部品の大幅削減でもたらされる、重量及びコストの削減分をモータの出力増に振向けて吸引力を増強し、蛇腹ホースを長くしたがために吸引力が低下すると言う欠点を回避することを特徴とする。

【0018】

本発明の第七の手段は、蛇腹ホースを本体側面下端部に設けた接続係止部から把手上面

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のU字形の溝に沿って、本体反対側に設けられたサイクロン集塵部の流入口まで長くすることによって、蛇腹ホースの全長に見合う分だけ延伸余裕を大きくし、吸込口が天井などの高所まで届き易くすることを特徴とする。

【発明の効果】

【0019】

従って本発明によれば、安定自立して保管が出来て、掃除作業の操作性が良く、延長管を長くしても吸引力が低下せず、然も高い部分にまで容易に届き、透明部からごみの集積具合が容易に確認出来て、ごみ廃棄作業も衛生的で且つ簡単な、肩掛け式として使用するのにも好適なスティック型掃除機を提供できる。

【発明を実施するための最良の形態】

【0020】

以下図面を用いて本発明に係るスティック型掃除機の一実施例について説明する。

【0021】

図１は、本発明になるスティック型掃除機の掃除機本体１の延長管２及び吸口３を外した外観を俯瞰して示す斜視図であるが、後程さらに詳述する樹脂製の筐体４は、概ね上部が拡がった逆円錐形に構成されていて、図示の如く相対する二つの側面が、一部又は全部が透明な平面部５を形成するように一体又は別体に構成されている。平面部５と９０度に直交する側面には、伸縮自在な蛇腹ホース６が収まるのに適した、上面側がU字状の溝形に成形された樹脂製の把手７が取り付けられ、掃除をする際や持ち運びの際に使用者が握り易い形状になっている。柔軟性に富み且つ強靭な素材からなる長さ調節が可能なベルト８は、スティック型掃除機の掃除機本体１を肩掛け式として使用する際に用いられる。前記蛇腹ホース６は終端部を流入口９に固定されて、該流入口９の直下には摘み１０が配置されるが、これ等については後程さらに詳細な説明を加える。

【0022】

次に、掃除機本体１の中心線に沿い平面部５に対して直角な断面を示した図２を使い説明する。掃除機本体１の外形を構成する樹脂製の筐体４は、概略三つの空間部分に区分される。即ち、大型部品であるところの電源コードを巻き取り収納するばね式のコードリール１１を固定する本体上部リブ部１２は、コードリール１１と一体となって剛性を高め、軽量化の為に肉厚を薄く形成した筐体４の強度を補完するに適した上部仕切壁を構成し、スイッチ等の電源回りの部品（図示せず）も含めて上部空間を構成している。

【0023】

一方本体下部リブ部１３は、中央部分に円形の目皿状の格子面を有するフィルタ押え１４が一体又は別体に形成されていて、前記の本体上部リブ部１２同様に筐体４の強度を補完するに適した下部仕切壁を構成している。上部仕切壁と下部仕切壁との間の空間が中央空間を構成していて、モータ１５及びファン１６から構成される電動送風機１７を収容する空間となっている。電動送風機１７はその振動と騒音を防止する為の防振ゴム１８で周囲を包む形で上部仕切壁と下部仕切壁とで固定されるが、防振ゴム１８の変形代を超えたところでは、剛性の高いモータ１５及びファン１６も構造体として働き、上部及び下部仕切壁の、筐体４の補度を補強する機能に資するものである。

【0024】

電動送風機１７は、重いモータ１５を上側にファン１６を下側に、該ファン１６の吸気口を下向きにして防振ゴム１８で包まれるが、フィルタ押え１４と正対する部分はファン１６の吸気口に対応した部分が開口して居り、吸気は上側のモータ１５の部分に設けられた一個又は複数個の排風口１９から中央空間に排出され、更に筐体４に設けられた一個又は複数個の排気口２０から掃除機本体１の外へと排出される構造となっている。

【0025】

本体下部リブ部１３にはフィルタ押え１４の他にも、断面が円形で、好ましくは潤滑性が良く且つ透明な樹脂製で、更にフランジ部を有する補強筒２１が、筐体４の直ぐ内側に固定される構造となって居て、仕切壁の下に位置する上部空間及び中央空間と比べて内臓部品が殆ど無い下部空間に於いて、筐体４を内側から補強する構造となっている。また、

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掃除機本体１の中心軸線上には樹脂製で筒状をしたサイクロン内筒２２が設けられるが、該サイクロン内筒２２の上端はやや鍔広のフランジとなっており、該フランジ部には同心円形の凹部が形成され、フランジ部外縁の切欠き部を補強筒２１の内側フランジ部に対応して設けられた切欠き部に合わせ、着脱自在に回転係止する構造となっている。前記フランジに設けられた同心円形の凹部には、除塵の機能を果たす繊維質のフィルタ２３が載置され、フィルタ押え１４の目皿状の格子面との間で挟み込む形で装着され、除塵機能の一部を担っている。

【0026】

一方、補強筒２１の側面上側の一箇所に開口部が設けられ、前述した蛇腹ホース６の終端部が固定された流入口９からの吸気が、補強筒２１の内面に沿って、接線方向に流入する様に接続される。さらに該補強筒２１を潤滑性の良好な樹脂で成形することで筐体４の下部空間を、同軸に配置されたサイクロン外筒の役目を果たす補強筒２１と、サイクロン内筒２２とで構成される、集塵効率の良好なサイクロン除塵部２４として構成することが可能となっている。

【0027】

掃除機本体１の底面について説明するに、保管時の安定自立に適する様に出来るだけ平らに構成するが、該底面を筐体４の下端部に設けたヒンジ部２５に開閉自在に取付け、サイクロン集塵部２４の底蓋２６を兼用する構成とする。即ち、底蓋２６のヒンジ部とは反対側の外縁に設けた係止爪２７を引っ掛け係止するストッパ手段を構成し、底蓋２６を開放する時は、樹脂製のスライダーと一体に形成された摘み１０を押し下げるとスライダーの先端部が係止爪２７を撓ませて、引っ掛け係止が外れる様に構成する。また補強筒２１の下端部は全周にわたって底蓋２６に密着しているので、普段はサイクロン集塵部２４が密閉状態に保たれるものである。

【0028】

終端が流入口９に固定され蛇腹ホース６のもう一方の先端部には吸込接続部２８が固定されている。掃除機本体１の前記流入口９とは反対側側面の底面近傍には、上下にパイプ状に連通した接続係止筒２９が設けられていて、保管時や図３に示す様にスティック型掃除機として使用する時は、着脱自在な前記吸込接続部２８を接続係止筒２９に装着したままの状態とし、図４に示す様に肩に掛けて使用する際には吸込接続部２８を接続係止筒２９から外して手に持ち、蛇腹ホース６を伸ばして塵埃の溜まった場所の掃除を行う。勿論この状態の時でも、吸込接続部２８の先に延長管２及び吸口３を挿入装着して、高所の掃除に使用することも可能である。

【0029】

以上の様に構成された本発明の一実施例についてその動作を説明するならば、図３は本発明に基づくスティック型掃除機の掃除機本体１の接続係止筒２９の下端に延長管２を挿入装着し、更にその先端に吸口３を挿入装着し、把手７を持ってスティック型掃除機として使用する状態を示している。また、図４は前述した様にベルト８を肩に掛けて筐体の平面部５が腰の部分に当たる様に背負い、吸込接続部２８を接続係止筒２９から抜き、手で持って掃除をしている状態を示している。

【0030】

図３及び図４に示す何れの使用状態でも掃除機本体１の動作は全く同じであり、以下にその動作を説明するならば、電源を入れて電動送風機１７が作動すると吸引力が発生し、肩掛け式として使用する場合には吸込接続部２８から、スティック型として使う場合は吸込口３から塵埃を周りの空気共々吸引する。

【0031】

塵埃を含んだ吸気は蛇腹ホース６を通って流入口９から補強筒２１の壁面に対して接線方向に高速で流入し、サイクロン集塵部２４に於いて遠心分離作用によって塵埃が分離され、該塵埃はサイクロン室２４の底に堆積されて行く。一方で吸気はサイクロン内筒を通り、フィルタ押さえ１４の目皿状の格子面で押制されたフィルタ２３を通過する際に、残余の微細な塵埃が沪しとられて、より清浄な状態となって吸気口から電動送風機１７に吸

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引される。

【0032】

ここまでの動作により塵埃が除かれ清浄化した空気は、モータ１５を冷却しながら該モータ１５を囲んだ防振ゴム１８の排風口１９を抜けて、掃除機本体１内部の余分な廃熱共々筐体４の任意の箇所に設けられた排気口２０から掃除機本体１外へと排出される。

【0033】

清浄化した空気や余分な廃熱は掃除機本体１の外へ排出されるが、一旦吸引された塵埃はサイクロン集塵部２４の底に堆積されて残り、微細な塵埃はフィルタ２３に絡め取られて残されることになる。然し平面部５や補強筒２１が透明に構成されている場合は、堆積した塵埃は目視で確認できるので、沢山溜まったら摘み１０を押し下げることによって、一体に成形されたスライダーの先端部で係止爪２７の引掛りを外す。すると底蓋２６がヒンジ部２５を支点に図２に二点鎖線で示す様に開蓋するので、同時に堆積した塵埃は潤滑性の良い樹脂製の補強筒２１の内壁に付着して残留することなく、綺麗に自重で落下するので、簡単かつ清潔に廃棄出来る。またフィルタ２３に絡め取られ微細な塵埃は定期的にサイクロン内筒２２共々フィルタ２３を外し、洗浄又は交換によって保守をおこなう。

【0034】

以上説明した様に本発明は構成され動作するので、本発明によれば、安定自立して保管が出来て、掃除作業の操作性が良く、吸引力を低下させることなく延長管を長くしたので高い所まで容易に届き、透明部からごみの堆積具合が容易に確認出来て、ごみ廃棄作業も簡単で然も衛生的な、肩に掛けて使用するのにも好適なスティック型掃除機を提供することが出来る。

【0035】

本発明を実施するための最良の形態を図面に基づき説明したが、本発明の保護範囲は前述の実施形態に限定するものではなく、特許請求範囲記載の発明及びこれと相当の物も包含するものである。

【図面の簡単な説明】

【0036】

【図1】本発明の実施例を示す外観斜視図

【図2】本発明の実施例の中心線に沿って示した縦断面図

【図3】本発明の実施例の使用状態を示す斜視図

【図4】本発明の実施例の他の使用状態を示す斜視図

【図5】従来例を示す縦断面図

【図6】他の従来例を示す縦断面図

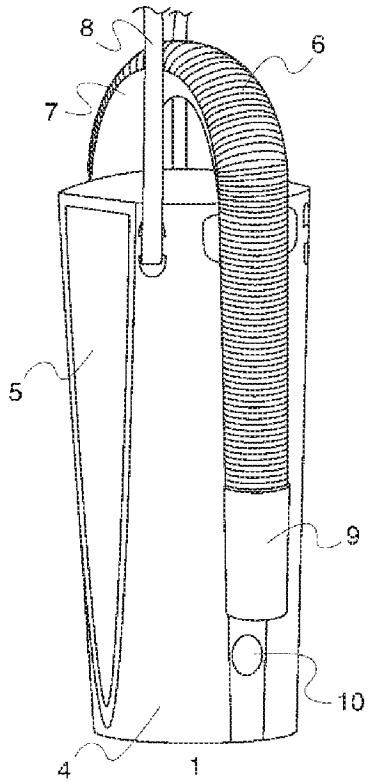
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【0037】

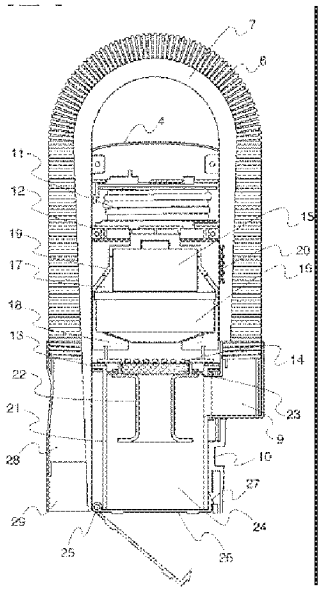
１　掃除機本体
４　筐体
５　平面部
６　蛇腹ホース
７　把手
９　流入口
１１　コードリール
１７　電動送風機
２１　補強筒
２２　サイクロン内筒
２４　サイクロン集塵部
２５　ヒンジ部
２６　底蓋
２７　係止爪
２８　吸込接続部

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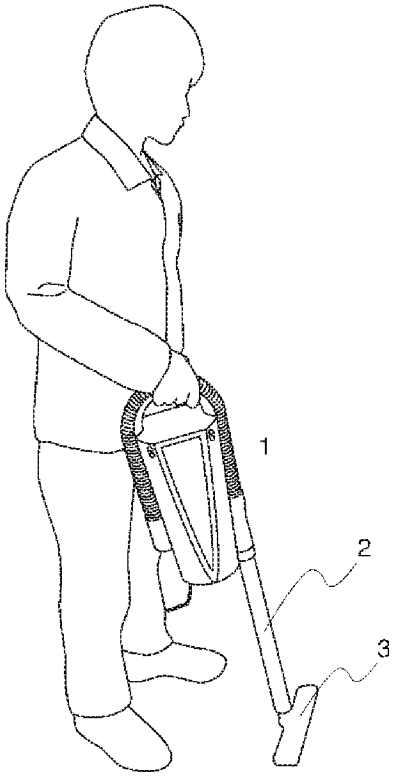
２９　接続係止筒



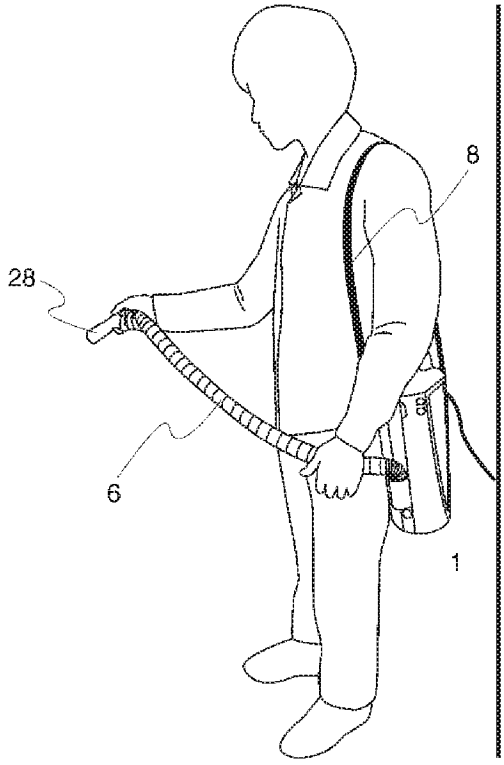
【図1】



【図3】

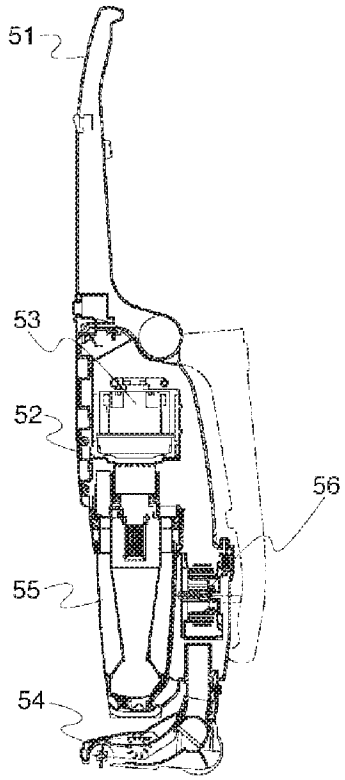


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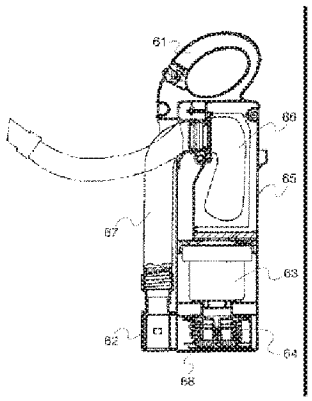


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【図5】



【図6】



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Classification: - international: ***A47L9/16***

- cooperative: A47L5/24; A47L9/1608; A47L9/1658; B04C5/13; B04C5/181

Application number: DE20081044184 20081128

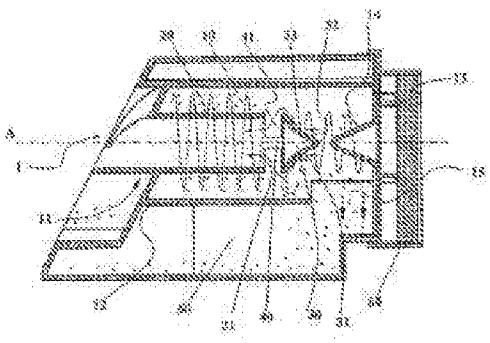
Priority number(s): CN20071190485 20071129

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Abstract of DE102008044184 (A1)

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The device (1) has a turbulence hollow space (10) for possessing an air flow inlet (11), a side wall (12) and a front wall (13). An immersion tube (20) is immersed into the space. An air flow reaches the tube via a tube opening after turbulence separation. A blocking element (30) is arranged between the opening and the front wall. An air inlet (41) is formed between the opening and the element. An outer surface (31) of the element shrinks steplessly in a direction to the front wall gradually up to an upper section (32). The element is connected with the tube via a connecting element (40).



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DESCRIPTION DE102008044184

[Technological field]

[0001]

This invention extends to a vortex separator apparatus for use in a vacuum cleaner, including a vertebral cavity, which has an air flow inlet, a side wall and an end wall, which includes when using the air sucked from the described vacuum cleaner air flow, the dirt, through the described airflow input into the vortex cavity described passes and rotationally moved along the described sidewall; a dip tube which is immersed in the described vortex cavity and has a muzzle, where the airflow by the vortex separation can pass through this pipe opening into the immersion tube described and leaves the vortex cavity described; as well as a locking element, which is arranged between the pipe opening and the end wall described described, wherein between the muzzle described and the locking element described an air inlet is formed. This invention also extends to vacuum cleaner with this vortex separator apparatus.

[Technological background]

[0002]

From this vortex separator device may be obtained from U.S. Patent US 6,696,711 62 note. According to the disclosure of his description, these conventional vortex separator device comprises a dirt blocking element, said locking element has a spherical surface and is structured as a picture board. The inner surface of this locking element is directed towards the end wall of the vertebral cavity. The exiting air flow can collide with the inner surface of the blocking element, which contained in the air flow is blocked by dirt, this blocking element and fall into the hopper. The disadvantage of this vortex separator device is that the blocked by dirt blocking element may be recaptured from below the vertebral cavity leaving airstream. Therefore, there are good opportunities to leave the vertebral cavity for dirt.

[Summary of the invention]

[0003]

Therefore, the object of this invention is to overcome the aforementioned problems of the conventional technology and to separate the absolutely major part of the dirt from the air stream, whereby it must be possible in particular to minimize the risk that fine particles can leave the vertebral cavity.

[0004]

This invention relates to a vortex separator apparatus for use in a vacuum cleaner, including: vertebral cavity which has an air flow inlet, a side wall and an end wall, which includes when using the air sucked from the described vacuum cleaner air flow, the dirt, through the described airflow input into the vortex cavity described passes and rotationally moved along the side wall; Immersion tube immersed in the described vortex cavity and has a muzzle, where the airflow by the vortex separation can pass through this pipe opening into the immersion tube described and leaves the vortex cavity described; and a locking member disposed between the muzzle described and the end wall described, wherein between the muzzle described and the locking element described an air inlet is formed, characterized in that the locking element described has an outer surface, said outer surface continuously and in towards the end wall of the vertebral cavity described gradually shrinks to the upper part.

[0005]

Prior to entry into the immersion tube and leaving the vortex cavity, the air flow collides first with the outer surface of the locking element, whereby at least a portion of the particles contained in the airflow can be separated by the impact of the air stream. In addition, moving to the side wall of the vertebral

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cavity back due to the shape of the outer surface described this dirt. This is about how the side wall moving dirt can be taken by the new entrants and dirt containing airflow and again a vortex separation are subjected. Thereby, the separation effect of the vortex separator device can be significantly increased.

[0006]

Other features which are considered alone or in conjunction with other features as characteristics of this invention, are explained in the following additional claims.

[0007]

An additional feature of this invention is that the described barrier member and the dip tube described are arranged connected to each other.

[0008]

Preferably, the blocking element is described by a connecting element with the described dip tube, the described connection member and the locking member are mounted described integrated, whereby the assembly of the separating apparatus described is simplified.

[0009]

A preferred embodiment of way, according to this invention is that the described locking element and a circular cone are arranged connected to one another, wherein the circular cone described above is mounted adjacent the front wall described.

[0010]

Preferably, the outer surface described has a positive or negative curvature part, whereby the air flow along the described curvature part can be performed without hindrance described side wall.

[0011]

Preferably, the locking member described is cone-shaped, as this shape for the movement of the air flow as described is particularly advantageous.

[0012]

An advantageous embodiment example according to this invention is that the total area of the air inlet described above is greater than or generally equal to the cross sectional area of the dip tube described, whereby the air pressure may not have losses due to the attachment of the locking element described. An especially preferred way is that the total area of the air inlet described generally is equal to the cross sectional area of the dip tube described, whereby the described air inlet and in the described inlet opening of the air pressure is generally identical.

[0013]

Another feature of this invention is that on the described sidewall A dirt output is mounted, the vertebral cavity via this dirt starting with a dirt tank described fluidly connected. Preferably, the sidewall described forms a part of the dirt container described.

[0014]

A particularly preferred embodiment example of this invention is that the dirt output described in the axial direction of the vortex cavity described features in maximum proximity to the described muzzle over a limit, at least a portion of the locking member described is iccated between the muzzle described and the restrictions listed.

[0015]

This invention applies to vacuum cleaner application.

[0016]

The structure of this invention as well as their other invention objectives and benefits are determined by the following, described in conjunction with the figures preferred embodiments ways even clearer and easier to understand.

[Description of Drawings]

[0017]

As a part of the specification and to enable a further understanding of this invention, the figures below illustrate the concrete implementation methods of this invention and together with the description of the representation of the principle of this invention.

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[0018]

fig. shows a sectional view of the vortex separator device of a preferred mode of this invention.

[0019]

shows a three-dimensional illustration of a vacuum cleaner with the vortex separator device one preferred embodiment of this invention.

[Description of the specific exemplary ways]

[0020]

in the following specific description of preferred embodiments ways identical or similar features with identical marks in the drawings are provided.

[0021]

Reference is made to the figures, and in particular first. shows the vortex separator apparatus 1 a preferred method according to this invention. This vortex separator device 1 comprises a tubular vortex cavity 10 and a dip tube 20th The vortex cavity 10 has an air stream inlet 11, a side wall 12 and an end wall. 13 In use, enters the air stream containing dirt, by the described air flow inlet 11 in the described vortex cavity 10 and moves in rotation along the side wall described 12th On the side wall 12 a soil outlet 15 is formed. The vortex cavity 10 is connected via these soil outlet 15 in fluid-conducting with a dirt tank 50, whereby the dirt can be separated from the air stream due to the effect of centrifugal force and is collected in this dirt tank 50th Preferably, the side wall 12 described forms part of the described hopper 50th Besides the described end wall 13 is a circular cone 14 is arranged, which is located in the vortex cavity 10th

Preferably, this circular cone 14 forms a part of the described end wall. 13 In this embodiment, the end wall 13 is provided as an independent part of the vertebral cavity 10th Preferably, the end wall 13 is removable mounted on the vortex separator device. 1 The dip tube 20 dips into this vortex cavity 10 and has a muzzle 21st Through this tube mouth 21, the flow of air which has passed through the vortex separation and was reflected by the end wall 13, enter the dip tube 20, thereby leaving the vortex cavity 10th

[0022]

Between the muzzle 21 of the dip tube 20 and the end wall 13 of the vortex cavity 10 a blocking element 30 is mounted. Between the locking member 30 and the muzzle 21 of the dip tube 20 a distance such that between the described muzzle 21 and the locking element 30 of the air inlet 41 may be formed, whereby the vortex cavity 10 is connected via these air inlet 41 in fluid-conducting the immersion tube 20th By this air inlet 41 of the air stream enters after passing through the vortex separation over the pipe orifice 21 into the dip tube 20 and then leaves the vortex cavity 10th

[0023]

The blocking element 30 has an outer surface 31, this outer surface 31 shrinks continuously and towards the end wall 13 of the described vortex cavity 10 gradually up to the top of the 32nd Preferably, this locking element 30 is hollow and conical.

[0024]

The blocking element 30 and the dip tube 20 are connected. Specifically, the blocking element 30 is connected by the connecting member 40 with the dip tube 20th One end of the described connection member 40 is connected to the wall of the dip tube 20th The other end is connected to the lower edge of the locking element 30th Preferably, the connecting element 40 forms with the locking member 30 an integral structure, whereby the locking element 30 can be mounted in a very simple manner in the vortex cavity 10 by the connecting member 40 is connected to the dip tube 20th are the embodiment in, for example, the locking element 30, the connecting member 40 and the dip tube 20 integrated design. In a substituting exemplary manner, however, the locking element 30 and the dip tube 20 can be separately provided and subsequently assembled together.

[0025]

Although there is no illustration, but the locking member described can be also connected to the 30-described circular cone 14 in a further exemplary manner

[0026]

The connecting element 40 described above is attached in this way: It can be the total area of the air inlet 41, which is located between the locking member 30 and the muzzle 21 of the dip tube 20, as or greater generally equal to the cross sectional area of the dip tube 20, whereby a by attaching of locking element 30 induced loss of air pressure is prevented.

[0027]

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The outer surface 31 of locking element 30 has a bending portion 33, whereby the air flow through the guide this bending member 33 can better move towards the side wall 12 itself. In this embodiment, the curvature part 33 is negative. However, this bending portion 33 can also be positive.

[0028]

In this embodiment, the upper part 32 of locking element 30 extends to this extent: in direction perpendicular to the axis A of the vertebral cavity 10 interpolates the dirt starting 15th However, the blocking element 30 is at least partially not exposed over this dirt starting 15th That is, the locking element 30 is located at least partially between the muzzle 21 and a boundary 16 of the dirt output 15, which limit 16 A of the vortex cavity 10 is in the direction of the axis in maximum proximity to muzzle 21st In a substituting execution, the blocking element 30 is overall not exposed over this dirt starting 15th

[0029]

This invention is applicable to vacuum cleaners. shows a vacuum vacuum cleaner. 2 The vacuum cleaner 2 includes a main body 5, a suction nozzle for suction of air containing dirt (not shown), a fan with an electric motor drive (not shown) and a vortex separator device. 1 Here, the fan driven by an electric motor for generating the suction force is used and is housed in a separate chamber of the main body. a way for the flow of air is created between the suction head and this fan with electric motor drive. Said vortex separator device 1 is mounted in this air flow path and is used to separate prior to entry of the air flow into the separate chamber from the air stream the dirt. The suction nozzle can be connected via a hose to the main body 5, but can also be directly connected to the main body. 5

[0030]

During use, the air sucked from the cleaner 2 and loaded with dirty air flow through the air flow inlet 11 passes into the vortex cavity 10 and then begins the process of vortex separation. Specifically, the loaded with dirty air stream moves helically along the side wall 12 toward end wall. 13 This is the bulk of the soil, especially the dirt with a high weight, due to the effect of centrifugal force on the side wall 12 separated by the soil outlet 15 from the airflow and collected in the hopper 50th The airflow with the remaining dirt (eg As dust particles) is reflected and rotated with a small rotation diameter spirally in the direction of the muzzle 21 of the dip tube 20 from the end wall. 13 Prior to entering the air stream in the dip tube 20 to exit the vortex hollow space 10, the air flow collides with the outer surface 31 of the locking element 30th Characterized a part of the dirt contained in the air stream is at least separated by the collision of the air flow, and moves due to the shape of the locking member 30 toward side wall 12 of the vortex cavity 10th

The air flow after the separation of the dirt passes through the air inlet 41 in the dip tube 20 and leaves the vortex cavity. This is. In the direction of the side wall 12 moving dirt is entrained by the new incoming, along the side wall 12 spirally rotating and loaded with dirty air stream Thus, the separated from the blocking element 30 dirt passes through again the process of vortex separation, whereby the power of the vortex separator separation apparatus 1 of the dirt is significantly increased in another.

[0031]

After leaving the vortex cavity 10 through the dip tube 20 is in the flow direction of the air stream a separate chamber with a fan by an electric motor (not shown) attached. Preferably, in the air path between the vortex separator device 1 and the fan with electric motor drive, a filter 60 is attached to the rest of the finest particles contained in the air stream, filtering. It should be noted that it is possible to arrange a further vortex separator stage before the filter 60, or it is also possible, by means of this further vortex separator stage to replace the filter 60th

[60]

: Vortex separator device 2 : Vacuum cleaner 5 : Main body 10 : Vortex cavity 11 Airflow input 12 : Side wall 13 : Bulkhead 14 : Conical bodies 15 : Soil outlet 20 : Dip tube 21 : Muzzle of the dip tube 20 30 : Blocking element 31 : Outer surface of locking element 30 32 : Upper part of the locking element 30 40 : Fastener 41 : Air inlet 50 : Dirt container 60 : filter

QUOTES INCLUDED IN THE DESCRIPTION

[0032]

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Cited patent literature

[0033]

- US 689671162 [0002]

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CLAIMS DE102008044184

1.

Vortex separator device (1) for use in a vacuum cleaner (2), including: Vortex cavity (10), said vortex cavity (10) via an air stream entrance (11), a side wall (12) and an end wall (13), wherein containing in use of the air sucked by the described vacuum cleaner flow of air, the dirt, by the described air flow input (11) enters the described vortex cavity (10) and is rotationally moved along the side wall (12); immersion tube (20), is immersed in the described vortex cavity (10) and has a tubular mouth (21), wherein the air flow according to the eddy severing by this pipe opening (21) can enter the described dip tube (20) and the vortex cavity described (10) leaves; as Blocking element (30) which is disposed between the muzzle described (21) and the end wall (13) described, wherein between the described tube mouth (21) and the blocking element as described (30), an air inlet (41) is formed, characterized in that the described locking element (30) on an outer surface (31), wherein this outer surface (31) continuously and in the direction towards the end wall (13) of the vortex cavity (10) described gradually up to the upper part (32) shrinks.

2.

Vortex separator device (1) according to claim 1, characterized in that the described locking element (30) and the described dip tube (20) are arranged connected to each other.

3.

Vortex separator device (1) according to claim 1 or 2, characterized in that the described locking element (30) by a connecting element (40) with the described dip tube (20) is connected, wherein the connecting element described (40) and the described locking element (30) are integrally disposed.

4.

Vortex separator device (1) according to any of claims 1 to 3, characterized in that the described locking element (30) and a circular cone (14) connected to one another are arranged, wherein the circular cone-described (14) adjacent the described end wall (13) is mounted ,

5.

Vortex separator device (1) according to any of the preceding claims, characterized in that the outer surface described about a positive or negative curvature part (33) has

6.

Vortex separator device (1) according to any of the preceding claims, characterized in that the described locking element (30) is conical.

7.

Vortex separator device (1) according to any of the preceding claims, characterized in that the total area of the air inlet (41) described generally greater than or equal to the cross sectional area of the dip tube (21) is described.

8.

Vortex separator device (1) according to any of the preceding claims, characterized in that the side wall described (12) with a soil outlet (15) is provided, wherein the vortex cavity described (10) on this soil outlet (15) with a dirt container (50) in fluid-conducting connected is.

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9.

Vortex separator device (1) according to claim 8, characterized in that the soil outlet (15) described in the axial direction of the vortex cavity described (10) in maximum proximity to the described tube mouth (21) has a border (16), wherein at least a portion of the described blocking element (30) is located between the muzzle described (21) and the border (16) described above.

10.

Vortex separator device (1) according to claim 8, characterized in that the side wall (12) described forms a part of the dirt container (50) described above.

11.

Vacuum cleaner, including a vortex separator device (1) according to any of the preceding claims.

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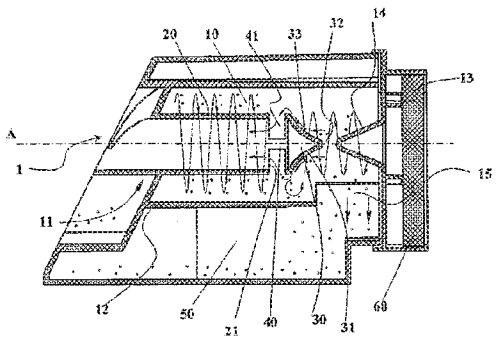
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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Wirbeltrennvorrichtung zur Verwendung in einem Staubsauger sowie Staubsauger mit dieser Vorrichtung**

(57) Zusammenfassung: Diese Erfindung bezieht sich auf eine Wirbeltrennvorrichtung (1) zur Verwendung in eiem Staubsauger (2), einschließlich: Wirbelhohlraum (10), wobei dieser Wirbelhohlraum (10) über einen Luftstromeingang (11), eine Seitenwand (12) sowie eine Stirnwand (13) verfügt, wobei bei der Benutzung der vom beschriebenen Staubsauger eingesaugte Luftstrom, der Schmutz enthält, durch den beschriebenen Luftstromeingang (11) in den beschriebenen Wirbelhohlraum (10) gelangt und sich entlang der beschriebenen Seitenwand (12) rotierend bewegt; Eintauchrohr (20), das in den beschriebenen Wirbelhohlraum (10) eintaucht und über eine Rohrmündung (21) verfügt, wobei der Luftstrom nach dem Wirbeltrennen durch diese Rohrmündung (21) in das beschriebenen Eintauchrohr (20) gelangen kann und den beschriebenen Wirbelhohlraum (10) verlässt; sowie Sperrelement (30), das zwischen der beschriebenen Rohrmündung (21) und der beschriebenen Stirnwand (13) angeordnet ist, wobei zwischen der beschriebenen Rohrmündung (21) und dem beschriebenen Sperrelement (30) ein Lufteinlass (41) gebildet wird. Diese Erfindung wird auf dieser vorhandenen Wirbeltrennvorrichtung (1) basieren, dadurch gekennzeichnet, dass das beschriebene Sperrelement (30) über eine äußere Oberfläche (31) verfügt, wobei diese äußere Oberfläche (31) stufenlos und in Richtung zur Stirnwand (13) des beschriebenen Wirbelhohlraums (10) allmählich bis zum Oberteil (32) des Sperrelements (30) schrumpft. Diese Erfindung findet in Staubsaugern Anwendung.



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Beschreibung

[Technologisches Gebiet]

[0001] Diese Erfindung erstreckt sich auf eine Wirbeltrennvorrichtung zur Verwendung in einem Staubsauger, einschließlich eines Wirbelhohlraums, der über einen Luftstromeingang, eine Seitenwand sowie eine Stirnwand verfügt, wobei bei der Benutzung der vom beschriebenen Staubsauger eingesaugte Luftstrom, der Schmutz enthält, durch den beschriebenen Luftstromeingang in den beschriebenen Wirbelhohlraum gelangt und sich entlang der beschriebenen Seitenwand rotierend bewegt; eines Eintauchrohrs, das in den beschriebenen Wirbelhohlraum eintaucht und über eine Rohrmündung verfügt, wobei der Luftstrom nach dem Wirbeltrennen durch diese Rohrmündung in das beschriebene Eintauchrohr gelangen kann und den beschriebenen Wirbelhohlraum verlässt; sowie eines Sperrelements, das zwischen der beschriebenen Rohrmündung und der beschriebenen Stirnwand angeordnet ist, wobei zwischen der beschriebenen Rohrmündung und dem beschriebenen Sperrelement ein Lufteinlass gebildet wird. Diese Erfindung erstreckt sich außerdem auf Staubsauger mit dieser Wirbeltrennvorrichtung.

[Technologischer Hintergrund]

[0002] Von dieser Wirbeltrennvorrichtung kann aus dem US-Patent US 6.896.711 62 Kenntnis erlangt werden. Gemäß der Offenbarung seiner Beschreibung umfasst diese herkömmliche Wirbeltrennvorrichtung ein Schmutzsperrelement, wobei dieses Sperrelement über eine Kugeloberfläche verfügt und wie eine Bildtafel aufgebaut ist. Die innere Oberfläche dieses Sperrelements ist zur Stirnwand des Wirbelhohlraums gerichtet. Der verlassende Luftstrom kann mit der inneren Oberfläche des Sperrelements kollidieren, wodurch im Luftstrom enthaltener Schmutz durch dieses Sperrelement blockiert wird und in den Schmutzbehälter fällt. Der Nachteil dieser Wirbeltrennvorrichtung besteht darin, dass der vom Sperrelement blockierte Schmutz möglicherweise vom nachfolgend den Wirbelhohlraum verlassenden Luftstrom wieder eingefangen wird. Deshalb bestehen für den Schmutz gute Möglichkeiten zum Verlassen des Wirbelhohlraums.

[Inhalt der Erfindung]

[0003] Das Ziel dieser Erfindung besteht deshalb darin, die genannten Probleme der herkömmlichen Technologie zu überwinden und den absolut größten Teil des Schmutzes aus dem Luftstrom zu separieren, wobei es insbesondere möglich sein muss, das Risiko zu minimieren, dass feinste Teilchen den Wirbelhohlraum verlassen können.

[0004] Diese Erfindung bezieht sich auf eine Wirbeltrennvorrichtung zur Verwendung in einem Staubsauger, einschließlich: Wirbelhohlraum, der über einen Luftstromeingang, eine Seitenwand sowie eine Stirnwand verfügt, wobei bei der Benutzung der vom beschriebenen Staubsauger eingesaugte Luftstrom, der Schmutz enthält, durch den beschriebenen Luftstromeingang in den beschriebenen Wirbelhohlraum gelangt und sich entlang der Seitenwand rotierend bewegt; Eintauchrohr, das in den beschriebenen Wirbelhohlraum eintaucht und über eine Rohrmündung verfügt, wobei der Luftstrom nach dem Wirbeltrennen durch diese Rohrmündung in das beschriebene Eintauchrohr gelangen kann und den beschriebenen Wirbelhohlraum verlässt; sowie ein Sperrelement, das zwischen der beschriebenen Rohrmündung und der beschriebenen Stirnwand angeordnet ist, wobei zwischen der beschriebenen Rohrmündung und dem beschriebenen Sperrelement ein Lufteinlass gebildet wird, dadurch gekennzeichnet, dass das beschriebene Sperrelement über eine äußere Oberfläche verfügt, wobei diese äußere Oberfläche stufenlos und in Richtung zur Stirnwand des beschriebenen Wirbelhohlraums allmählich bis zum Oberteil schrumpft.

[0005] Vor dem Eintritt in das Eintauchrohr und Verlassen des Wirbelhohlraums kollidiert der Luftstrom zuerst mit der äußeren Oberfläche des Sperrelements, wodurch zumindest ein Teil der im Luftstrom enthaltenen Teilchen durch den Aufprall aus dem Luftstrom separiert werden kann. Außerdem kann dieser Schmutz aufgrund der Gestalt der beschriebenen äußeren Oberfläche sich zur Seitenwand des Wirbelhohlraums hin bewegen. Dieser sich zur beschriebenen Seitenwand hin bewegende Schmutz kann durch den neu eintretenden und Schmutz enthaltenden Luftstrom mitgenommen werden und noch einmal einer Wirbeltrennung unterzogen werden. Dadurch kann die Trennwirkung der Wirbeltrennvorrichtung signifikant erhöht werden.

[0006] Andere Merkmale, die allein oder in Verbindung mit anderen Merkmalen als Eigenschaften dieser Erfindung angesehen werden, werden in den folgenden zusätzlichen Ansprüchen erläutert.

[0007] Ein zusätzliches Merkmal gemäß dieser Erfindung besteht darin, dass das beschriebene Sperrelement und das beschriebene Eintauchrohr miteinander verbunden angeordnet sind.

[0008] Vorzugsweise ist das beschriebene Sperrelement durch ein Verbindungselement mit dem beschriebenen Eintauchrohr verbunden, wobei das beschriebene Verbindungselement und das beschriebene Sperrelement integriert angebracht sind, wodurch die Montage der beschriebenen Trennvorrichtung vereinfacht wird.

[0009] Eine bevorzugte Ausführungsweise gemäß dieser Erfindung besteht darin, dass das beschriebe-

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ne Sperrelement und ein Kreiskegel miteinander verbunden angeordnet sind, wobei der beschriebene Kreiskegel neben der beschriebenen Stirnwand angebracht ist.

[0010] Vorzugsweise verfügt die beschriebene äußere Oberfläche über einen positiven oder negativen Krümmungsteil, wodurch der Luftstrom entlang des beschriebenen Krümmungsteils ungehindert zu beschriebenen Seitenwand geführt werden kann.

[0011] Vorzugsweise ist das beschriebene Sperrelement kegelförmig, da diese Gestalt für die Bewegung des beschriebenen Luftstroms besonders vorteilhaft ist.

[0012] Eine vorteilhafte Ausführungsweise gemäß dieser Erfindung besteht darin, dass die Gesamtfläche des beschriebenen Lufteinlasses größer als die oder generell gleich der Querschnittsfläche des beschriebenen Eintauchrohres ist, wodurch der Luftdruck keine Verluste aufgrund der Anbringung des beschriebenen Sperrelements aufweisen kann. Eine besonders bevorzugte Weise besteht darin, dass die Gesamtfläche des beschriebenen Lufteinlasses generell gleich der Querschnittsfläche des beschriebenen Eintauchrohres ist, wodurch am beschriebenen Lufteinlass und an der beschriebenen Eintrittsöffnung der Luftdruck generell identisch ist.

[0013] Ein weiteres Merkmal dieser Erfindung besteht darin, dass auf der beschriebenen Seitenwand ein Schmutzausgang angebracht ist, wobei der beschriebene Wirbelhohlraum über diesen Schmutzausgang mit einem Schmutzbehälter fluidleitend verbunden ist. Vorzugsweise bildet die beschriebene Seitenwand einen Teil des beschriebenen Schmutzbehälters.

[0014] Eine besonders bevorzugte Ausführungsweise gemäß dieser Erfindung besteht darin, dass der beschriebene Schmutzausgang in axialer Richtung des beschriebenen Wirbelhohlraums in maximaler Nähe zur beschriebenen Rohrmündung über eine Grenze verfügt, wobei mindestens ein Teil des beschriebenen Sperrelements sich zwischen der beschriebenen Rohrmündung und der beschriebenen Grenze befindet.

[0015] Diese Erfindung findet auf Staubsauger Anwendung.

[0016] Der Aufbau dieser Erfindung sowie ihre sonstigen Erfindungsziele und Nutzeffekte werden durch die nachfolgenden, in Verbindung mit den Abbildungen beschriebenen bevorzugten Ausführungsweisen noch deutlicher und einfacher verständlich.

[Beschreibung der Abbildungen]

[0017] Als ein Teil der Beschreibung und zur Ermöglichung eines weitergehenden Verständnisses dieser Erfindung erläutern die unten stehenden Abbildungen die konkreten Ausführungsweisen dieser Erfindung und dienen gemeinsam mit der Beschreibung der Darstellung des Prinzips dieser Erfindung.

[0018] Abb. 1 zeigt ein Schnittbild der Wirbeltrennvorrichtung einer bevorzugten Ausführungsweise gemäß dieser Erfindung.

[0019] Abb. 2 zeigt eine dreidimensionale Abbildung eines Staubsaugers mit der Wirbeltrennvorrichtung einer bevorzugten Ausführungsweise dieser Erfindung.

[Beschreibung der konkreten Ausführungsweisen]

[0020] In der folgenden konkreten Beschreibung der bevorzugten Ausführungsweisen sind identische oder ähnliche Merkmale mit identischen Markierungen in den Abbildungen versehen.

[0021] Es wird auf die Abbildungen verwiesen, zuerst insbesondere auf Abb. 1. Abb. 1 zeigt die Wirbeltrennvorrichtung **1** einer bevorzugten Verfahrensweise gemäß dieser Erfindung. Diese Wirbeltrennvorrichtung **1** umfasst einen röhrenartigen Wirbelhohlraum **10** und ein Eintauchrohr **20**. Der Wirbelhohlraum **10** verfügt über einen Luftstromeingang **11**, eine Seitenwand **12** sowie eine Stirnwand **13**. Bei der Benutzung gelangt der Luftstrom, der Schmutz enthält, durch den beschriebenen Luftstromeingang **11** in den beschriebenen Wirbelhohlraum **10** und bewegt sich rotierend entlang der beschriebenen Seitenwand **12**. Auf der Seitenwand **12** wird ein Schmutzausgang **15** gebildet. Der Wirbelhohlraum **10** ist über diesen Schmutzausgang **15** mit einem Schmutzbehälter **50** fluidleitend verbunden, wodurch der Schmutz aufgrund der Wirkung der Fliehkraft aus dem Luftstrom separiert werden kann und in diesem Schmutzbehälter **50** gesammelt wird. Vorzugsweise bildet die beschriebene Seitenwand **12** einen Teil des beschriebenen Schmutzbehälters **50**. Neben der beschriebenen Stirnwand **13** ist ein Kreiskegel **14** angeordnet, der sich im Wirbelhohlraum **10** befindet. Vorzugsweise bildet dieser Kreiskegel **14** einen Teil der beschriebenen Stirnwand **13**. In diesem Ausführungsbeispiel wird die Stirnwand **13** als selbständiges Teil des Wirbelhohlraums **10** bereitgestellt. Vorzugsweise wird die Stirnwand **13** demontierbar auf die Wirbeltrennvorrichtung **1** montiert. Das Eintauchrohr **20** taucht in diesen Wirbelhohlraum **10** ein und verfügt über ein Rohrmündung **21**. Durch diese Rohrmündung **21** kann der Luftstrom, der das Wirbeltrennen durchlaufen hat und von der Stirnwand **13** reflektiert wurde, in das Eintauchrohr **20** gelangen und dadurch den Wirbelhohlraum **10** verlassen.

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[0022] Zwischen der Rohrmündung **21** des Eintauchrohrs **20** und der Stirnwand **13** des Wirbelhohlraums **10** ist ein Sperrelement **30** angebracht. Zwischen dem Sperrelement **30** und der Rohrmündung **21** des Eintauchrohrs **20** besteht ein Abstand, so dass zwischen der beschriebenen Rohrmündung **21** und dem Sperrelement **30** der Lufteinlass **41** gebildet werden kann, wodurch der Wirbelhohlraum **10** über diesen Lufteinlass **41** mit dem Eintauchrohr **20** fluidleitend verbunden ist. Durch diesen Lufteinlass **41** gelangt der Luftstrom nach Durchlaufen der Wirbeltrennung über die Rohrmündung **21** in das Eintauchrohr **20** und verlässt anschließend den Wirbelhohlraum **10**.

[0023] Das Sperrelement **30** verfügt über eine äußere Oberfläche **31**, diese äußere Oberfläche **31** schrumpft stufenlos und in Richtung zur Stirnwand **13** des beschriebenen Wirbelhohlraums **10** allmählich bis zum Oberteil **32**. Vorzugsweise ist dieses Sperrelement **30** hohl und kegelförmig.

[0024] Das Sperrelement **30** und das Eintauchrohr **20** sind miteinander verbunden. Konkret ist das Sperrelement **30** durch das Verbindungselement **40** mit dem Eintauchrohr **20** verbunden. Ein Ende des beschriebenen Verbindungselements **40** ist mit der Wandung des Eintauchrohrs **20** verbunden. Das andere Ende ist mit dem unteren Rand des Sperrelements **30** verbunden. Vorzugsweise bildet das Verbindungselement **40** mit dem Sperrelement **30** eine integrierte Struktur, wodurch das Sperrelement **30** in sehr einfacher Weise im Wirbelhohlraum **10** montiert werden kann, indem das Verbindungselement **40** mit dem Eintauchrohr **20** verbunden wird. Im Ausführungsbeispiel in Abb. 1 werden zum Beispiel das Sperrelement **30**, das Verbindungselement **40** sowie das Eintauchrohr **20** integriert gestaltet. In einer substituierenden Ausführungsweise können jedoch auch das Sperrelement **30** und das Eintauchrohr **20** einzeln bereitgestellt und anschließend zusammenmontiert werden.

[0025] Obwohl es keine Darstellung gibt, kann jedoch in einer weiteren Ausführungsweise das beschriebene Sperrelement **30** auch mit dem beschriebenen Kreiskegel **14** verbunden werden.

[0026] Das beschriebene Verbindungselement **40** wird in dieser Weise angebracht: Es lässt die Gesamtfläche des Lufteinlasses **41**, der sich zwischen dem Sperrelement **30** und der Rohrmündung **21** des Eintauchrohrs **20** befindet, größer als oder generell gleich der Querschnittsfläche des Eintauchrohrs **20** sein, wodurch ein durch die Anbringung des Sperrelements **30** hervorgerufener Verlust des Luftdrucks verhindert wird.

[0027] Die äußere Oberfläche **31** des Sperrelements **30** verfügt über einen Krümmungsteil **33**, wodurch sich der Luftstrom durch die Führung dieses Krümmungsteils **33** noch besser in Richtung Seitenwand **12** bewegen kann. In diesem Ausführungsbeispiel ist der Krümmungsteil **33** negativ. Dieser Krümmungsteil **33** kann jedoch auch positiv sein.

[0028] In diesem Ausführungsbeispiel streckt sich der Oberteil **32** des Sperrelements **30** bis zu diesem Grad: In Richtung senkrecht zur Achse A des Wirbelhohlraums **10** interpoliert er mit dem Schmutzausgang **15**. Allerdings wird das Sperrelement **30** zumindest teilweise nicht gegenüber diesem Schmutzausgang **15** bloßgelegt. Das heißt, das Sperrelement **30** befindet sich zumindest teilweise zwischen der Rohrmündung **21** und einer Grenze **16** des Schmutzausgangs **15**, wobei diese Grenze **16** in Richtung der Achse A des Wirbelhohlraums **10** in maximaler Nähe zur Rohrmündung **21** liegt. In einer substituierenden Ausführungsweise wird das Sperrelement **30** insgesamt nicht gegenüber diesem Schmutzausgang **15** bloßgelegt.

[0029] Diese Erfindung findet Anwendung auf Staubsauger. Abb. 2 zeigt einen Vakuumstaubsauger **2**. Der Staubsauger **2** umfasst einen Hauptkörper **5**, eine Saugdüse zum Einsaugen der Schmutz enthaltenden Luft (nicht abgebildet), einen Ventilator mit Elektromotorantrieb (nicht abgebildet) sowie eine Wirbeltrennvorrichtung **1**. Dabei wird der von einem Elektromotor angetriebene Ventilator zur Erzeugung der Saugkraft verwendet und ist in einer separaten Kammer des Hauptkörpers untergebracht. Zwischen dem Saugkopf und diesem Ventilator mit Elektromotorantrieb entsteht ein Weg für den Luftstrom. Die genannte Wirbeltrennvorrichtung **1** wird in diesen Luftstromweg montiert und dient dazu, vor dem Eintritt des Luftstroms in die separate Kammer aus dem Luftstrom den Schmutz zu separieren. Die Saugdüse kann über einen Schlauch mit dem Hauptkörper **5** verbunden werden, kann aber auch direkt mit dem Hauptkörper **5** verbunden werden.

[0030] Während der Verwendung gelangt der vom Staubsauger **2** eingesaugte und mit Schmutz belastete Luftstrom über den Luftstromeingang **11** in den Wirbelhohlraum **10** und beginnt anschließend den Prozess der Wirbeltrennung. Konkret bewegt sich der mit Schmutz belastete Luftstrom spiralförmig entlang der Seitenwand **12** in Richtung Stirnwand **13**. Dadurch wird der Großteil des Schmutzes, insbesondere der Schmutz mit hohem Gewicht, aufgrund der Wirkung der Fliehkraft durch den Schmutzausgang **15** auf der Seitenwand **12** aus dem Luftstrom separiert und im Schmutzbehälter **50** gesammelt. Der Luftstrom mit dem restlichen Schmutz (z. B. Staubteilchen) wird von der Stirnwand **13** reflektiert und rotiert mit einem kleinen Rotationsdurchmesser spiralförmig in Richtung der Rohrmündung **21** des Eintauchrohres **20**. Vor dem Eintritt des Luftstroms in das Eintauchrohr **20** zum Verlassen des Wirbelhohl-

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raums **10** kollidiert der Luftstrom mit der äußeren Oberfläche **31** des Sperrelements **30**. Dadurch wird mindestens ein Teil des im Luftstrom enthaltenen Schmutzes durch die Kollision aus dem Luftstrom separiert und bewegt sich aufgrund der Gestalt des Sperrelements **30** in Richtung Seitenwand **12** des Wirbelhohlraums **10**. Der Luftstrom nach der Separation des Schmutzes gelangt über den Lufteinlass **41** in das Eintauchrohr **20** und verlässt den Wirbelhohlraum. Dieser sich in Richtung Seitenwand **12** bewegende Schmutz wird von dem neu hereinkommenden, entlang der Seitenwand **12** spiralförmig rotierenden und mit Schmutz belasteten Luftstrom mitgenommen. Dadurch durchläuft der vom Sperrelement **30** separierte Schmutz nochmals den Prozess der Wirbeltrennung, wodurch im weiteren die Leistung der Wirbeltrennvorrichtung **1** zur Trennung des Schmutzes signifikant erhöht wird.

[0031] Nach dem Verlassen des Wirbelhohlraums **10** durch das Eintauchrohr **20** ist in der Fließrichtung des Luftstroms eine separate Kammer mit einem Ventilator mit Elektromotorantrieb (nicht abgebildet) angebracht. Vorzugsweise ist in dem Luftweg zwischen der Wirbeltrennvorrichtung **1** und dem Ventilator mit Elektromotorantrieb ein Filter **60** angebracht, um die restlichen feinsten Teilchen, die im Luftstrom enthalten sind, zu filtern. Es ist zu beachten, dass es möglich ist, vor dem Filter **60** eine weitere Wirbeltrennstufe anzuordnen, oder es ebenso möglich ist, mittels dieser weiteren Wirbeltrennstufe den Filter **60** zu ersetzen.

Bezugszeichenliste

1	Wirbeltrennvorrichtung
2	Staubsauger
5	Hauptkörper
10	Wirbelhohlraum
11	Luftstromeingang
12	Seitenwand
13	Stirnwand
14	Kegelkörper
15	Schmutzausgang
20	Eintauchrohr
21	Rohrmündung des Eintauchrohrs **20**
30	Sperrelement
31	äußere Oberfläche des Sperrelements **30**
32	Oberteil des Sperrelements **30**
40	Verbindungselement
41	Lufteinlass
50	Schmutzbehälter
60	Filter

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ZITATE ENTHALTEN IN DER BESCHREIBUNG

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Zitierte Patentliteratur

- US 689671162 **[0002]**

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Patentansprüche

1. Wirbeltrennvorrichtung (**1**) zur Verwendung in einem Staubsauger (**2**), einschließlich:
Wirbelhohlraum (**10**), wobei dieser Wirbelhohlraum (**10**) über einen Luftstromeingang (**11**), eine Seitenwand (**12**) sowie eine Stirnwand (**13**) verfügt, wobei bei der Benutzung der vom beschriebenen Staubsauger eingesaugte Luftstrom, der Schmutz enthält, durch den beschriebenen Luftstromeingang (**11**) in den beschriebenen Wirbelhohlraum (**10**) gelangt und sich entlang der Seitenwand (**12**) rotierend bewegt;
Eintauchrohr (**20**), das in den beschriebenen Wirbelhohlraum (**10**) eintaucht und über eine Rohrmündung (**21**) verfügt, wobei der Luftstrom nach dem Wirbeltrennen durch diese Rohrmündung (**21**) in das beschriebene Eintauchrohr (**20**) gelangen kann und den beschriebenen Wirbelhohlraum (**10**) verlässt; sowie
Sperrelement (**30**), das zwischen der beschriebenen Rohrmündung (**21**) und der beschriebenen Stirnwand (**13**) angeordnet ist, wobei zwischen der beschriebenen Rohrmündung (**21**) und dem beschriebenen Sperrelement (**30**) ein Lufteinlass (**41**) gebildet wird, **dadurch gekennzeichnet**, dass das beschriebene Sperrelement (**30**) über eine äußere Oberfläche (**31**) verfügt, wobei diese äußere Oberfläche (**31**) stufenlos und in Richtung zur Stirnwand (**13**) des beschriebenen Wirbelhohlraums (**10**) allmählich bis zum Oberteil (**32**) schrumpft.

2. Wirbeltrennvorrichtung (**1**) gemäß Anspruch 1, dadurch gekennzeichnet, dass das beschriebene Sperrelement (**30**) und das beschriebene Eintauchrohr (**20**) miteinander verbunden angeordnet sind.

3. Wirbeltrennvorrichtung (**1**) gemäß Anspruch 1 oder 2, dadurch gekennzeichnet, dass das beschriebene Sperrelement (**30**) durch ein Verbindungselement (**40**) mit dem beschriebenen Eintauchrohr (**20**) verbunden ist, wobei das beschriebene Verbindungselement (**40**) und das beschriebene Sperrelement (**30**) integriert angeordnet sind.

4. Wirbeltrennvorrichtung (**1**) gemäß einem beliebigen der Ansprüche 1 bis 3, dadurch gekennzeichnet, dass das beschriebene Sperrelement (**30**) und ein Kreiskegel (**14**) miteinander verbunden angeordnet sind, wobei der beschriebene Kreiskegel (**14**) neben der beschriebenen Stirnwand (**13**) angebracht ist.

5. Wirbeltrennvorrichtung (**1**) gemäß einem beliebigen der vorstehenden Ansprüche, dadurch gekennzeichnet, dass die beschriebene äußere Oberfläche über einen positiven oder negativen Krümmungsteil (**33**) verfügt.

6. Wirbeltrennvorrichtung (**1**) gemäß einem beliebigen der vorstehenden Ansprüche, dadurch gekennzeichnet, dass das beschriebene Sperrelement (**30**) kegelförmig ist.

7. Wirbeltrennvorrichtung (**1**) gemäß einem beliebigen der vorstehenden Ansprüche, dadurch gekennzeichnet, dass die Gesamtfläche des beschriebenen Lufteinlasses (**41**) größer als die oder generell gleich der Querschnittsfläche des beschriebenen Eintauchrohres (**21**) ist.

8. Wirbeltrennvorrichtung (**1**) gemäß einem beliebigen der vorstehenden Ansprüche, dadurch gekennzeichnet, dass die beschriebene Seitenwand (**12**) mit einem Schmutzausgang (**15**) versehen ist, wobei der beschriebene Wirbelhohlraum (**10**) über diesen Schmutzausgang (**15**) mit einem Schmutzbehälter (**50**) fluidleitend verbunden ist.

9. Wirbeltrennvorrichtung (**1**) gemäß Anspruch 8, dadurch gekennzeichnet, dass der beschriebene Schmutzausgang (**15**) in axialer Richtung des beschriebenen Wirbelhohlraums (**10**) in maximaler Nähe zur beschriebenen Rohrmündung (**21**) über eine Grenze (**16**) verfügt, wobei mindestens ein Teil des beschriebenen Sperrelements (**30**) sich zwischen der beschriebenen Rohrmündung (**21**) und der beschriebenen Grenze (**16**) befindet.

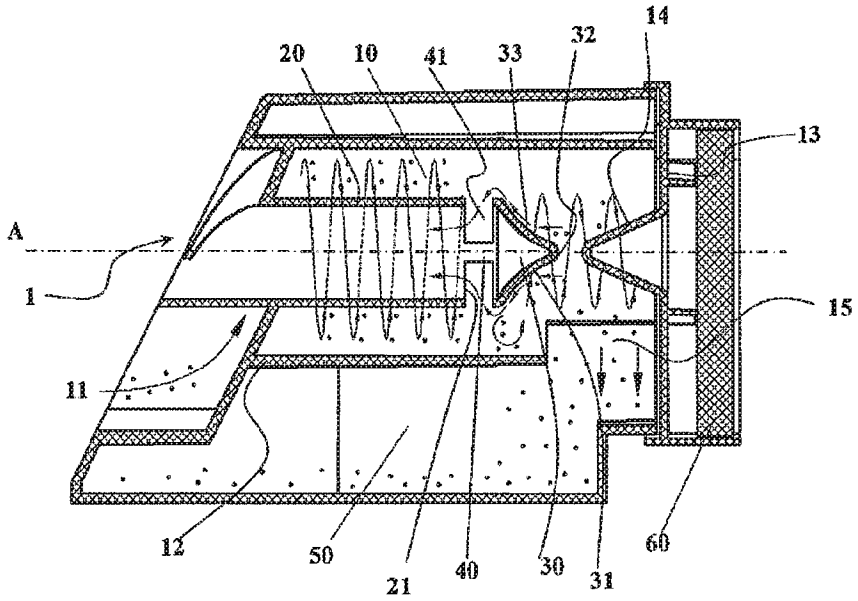
10. Wirbeltrennvorrichtung (**1**) gemäß Anspruch 8, dadurch gekennzeichnet, dass die beschriebene Seitenwand (**12**) einen Teil des beschriebenen Schmutzbehälters (**50**) bildet.

11. Staubsauger, einschließlich einer Wirbeltrennvorrichtung (**1**) gemäß einem beliebigen der vorstehenden Ansprüche.

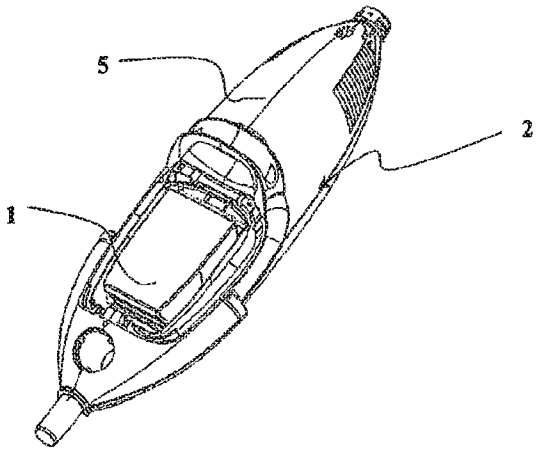
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Anhängende Zeichnungen



Figur 1



Figur 2

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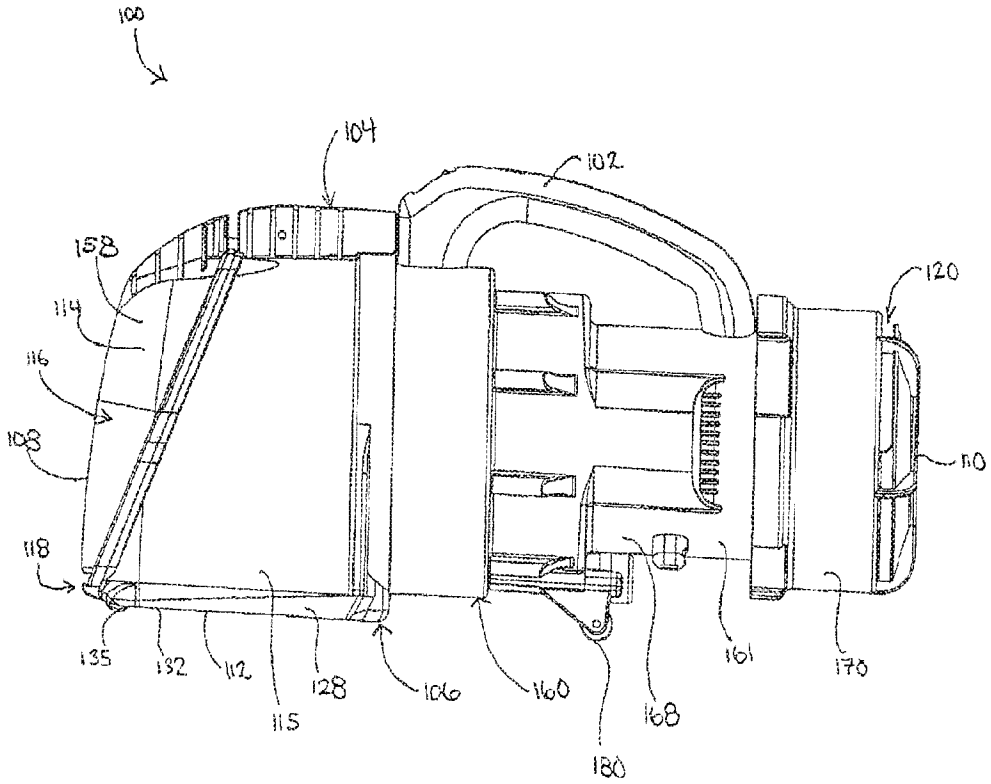
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(54) Titre : APPAREIL DE NETTOYAGE DE SURFACE PORTABLE
(54) Title: PORTABLE SURFACE CLEANING APPARATUS



(57) Abrégé/Abstract:
A portable surface cleaning apparatus, such as a hand vacuum cleaner, having a cyclone and a cleaner body, wherein a pre-motor filter is positioned in the air flow passage upstream from the suction motor and, the cyclone and the cleaner body are separable.

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ABSTRACT

A portable surface cleaning apparatus, such as a hand vacuum cleaner, having a cyclone and a cleaner body, wherein a pre-motor filter is positioned in the air flow passage upstream from the suction motor and, the cyclone and the cleaner body are separable.

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TITLE: PORTABLE SURFACE CLEANING APPARATUS

The specification relates to surface cleaning apparatuses. More specifically, the specification relates to cyclonic surface cleaning apparatuses.

INTRODUCTION

The following is not an admission that anything discussed below is prior art or part of the common general knowledge of persons skilled in the art.

Cyclonic vacuum cleaners utilize one or more cyclones that have an associated dirt collection chamber. The dirt collection chamber may be formed in the bottom of a cyclone chamber. A disc or divider may be positioned in the cyclone casing to divide the cyclone casing into an upper cyclone chamber and a lower dirt collection chamber. In it also known to position a dirt collection chamber exterior to a cyclone casing, such as surrounding the cyclone chamber.

SUMMARY

The following introduction is provided to introduce the reader to the more detailed discussion to follow. The introduction is not intended to limit or define the claims.

According to one broad aspect, a surface cleaning apparatus is provided that utilizes a cyclone having an open end, wherein the open end comprises the dirt outlet of the cyclone. A plate, that preferably has a planar surface facing the open end, is positioned facing the open end. For example, the plate may line in a plane that is perpendicular to the longitudinal axis extending through a cyclone chamber and may be spaced from the open end. Accordingly, a gap is provided between the plate and the open and defines a dirt outlet of the cyclone. In accordance with this aspect, the gap has a non uniform length.

For example, the cyclone casing may have a variable length. The portion that have a shorter length define a gap having a increased height.

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Alternately, or in addition, the plate may be provided with a sidewall on the side of the plate facing the open end of the cyclone. The sidewall may extend part way around the plate. The height of the wall maybe constant or may be variable.

The sidewall is preferably provided on the periphery of the plate. The diameter of the plate is preferably about the same as the diameter of the open end of the cyclone.

In some embodiments, the sidewall of the plate has a constant length. In other embodiments, the sidewall of the plate has a variable length.

In some embodiments, the sidewall of the cyclone has a first end at the open end, the first end has a perimeter, and the gap has a first portion having a first length and a second portion having a second length greater than the first length. The first length and the second length may be constant. Alternately, the first length and the second length may be variable.

In some embodiments, one of the portions extends up to 210° of the perimeter. For example, the second portion may extend up to 210° of the perimeter. In other embodiments, the second portion extends up to 240° of the perimeter.

According to another broad aspect, a surface cleaning apparatus is provided. The surface cleaning apparatus comprises an air flow passage extending from a dirty air inlet to a clean air outlet. A suction motor is positioned in the air flow passage. A cyclone is positioned in the air flow passage. The cyclone comprises an air inlet, an air outlet, an open end, a longitudinal axis and a longitudinally extending sidewall. The side wall has a variable length. A dirt collection chamber is in flow communication with the open end.

In some embodiments, a first portion of the sidewall is longer than a second portion of the sidewall.

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In some embodiments, the sidewall has a first end at the open end, the first end has a perimeter, and the first portion comprises up to 240°of the perimeter and the second portion comprises from up to 120° of the perimeter.

In some embodiments, the surface cleaning apparatus further comprises a plate facing the open end. The plate may be spaced from a front end wall of the surface cleaning apparatus. A first portion of the dirt collection chamber may be provided between the plate and the front end wall. Preferably, a second portion of the dirt collection chamber surrounds at least a portion of the cyclone.

According to another broad aspect, another surface cleaning apparatus is provided. The surface cleaning apparatus comprises an air flow passage extending from a dirty air inlet to a clean air outlet. A suction motor is positioned in the air flow passage. A cyclone is positioned in the air flow passage. The cyclone comprises an air inlet, an air outlet, an open end, a longitudinal axis and a longitudinally extending sidewall. A plate is provided having a cyclone side facing the open end. The plate is positioned to define a gap between the plate and the open end of the cyclone. The plate has a plate sidewall extending towards the open end. A dirt collection chamber is in flow communication with the open end.

In some embodiments, the plate sidewall extends part way around the plate. In some embodiments, the sidewall of the plate has a constant length. In other embodiments, the sidewall of the plate has a variable height.

Any of the surface cleaning apparatuses described herein may comprise a portable vacuum cleaner, and preferably, a hand vacuum cleaner. The portable vacuum cleaner may be removably mountable to an upright vacuum cleaner.

It will be appreciated that an embodiment may contain one or more of features set out in the examples.

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DRAWINGS

In the detailed description, reference will be made to the following drawings, in which:

Figure 1 is a side plan view of an example of a hand vacuum cleaner;

Figure 2 is a top plan view of the hand vacuum cleaner of Figure 1;

Figure 3 is a front plan view of the hand vacuum cleaner of Figure 1;

Figure 4 is a partially exploded rear perspective view of the hand vacuum cleaner of Figure 1;

Figure 5 is a partially exploded front perspective view of the hand vacuum cleaner of Figure 1;

Figure 6 is a cross section taken along line 6-6 in Figure 2;

Figure 7 is a bottom perspective view of the hand vacuum cleaner of Figure 1;

Figure 8 is a perspective illustration of the surface cleaning apparatus of Figure 1 mounted to an upright vacuum cleaner;

Figure 9 is a partially exploded front perspective view of an alternate embodiment of a hand vacuum cleaner; and,

Figure 10 is a cross section taken along line 10-10 in Figure 9.

DESCRIPTION OF VARIOUS EXAMPLES

Various apparatuses or methods will be described below to provide an example of each claimed invention. No example described below limits any claimed invention and any claimed invention may cover processes or apparatuses that are not described below. The claimed inventions are not limited to apparatuses or processes having all of the features of any one apparatus or

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process described below or to features common to multiple or all of the apparatuses described below. It is possible that an apparatus or process described below is not an embodiment of any claimed invention.

Referring to Figures 1 to 7, a first example of a surface cleaning apparatus 100 is shown. Preferably, the surface cleaning apparatus 100 (also referred to herein as cleaner 100 or vacuum cleaner 100) is a portable vacuum cleaner 100, such as a hand vacuum cleaner 100 as shown. The hand vacuum cleaner 100 is movable along a surface to be cleaned by gripping and maneuvering handle 102. In alternate embodiments, the surface cleaning apparatus 100 may be another type of surface cleaning apparatus, such as a stick-vac, an upright vacuum cleaner, or a canister vacuum cleaner.

The exemplified embodiments are hand vacuum cleaners. The design for a cyclone and facing plate having a gap therebetween of non-uniform height may be used in any cyclonic cleaning apparatus. If the feature is used with a portable surface cleaning apparatus such as a hand vacuum cleaner, then the portable surface cleaning apparatus may be of any design. For example, as exemplified, the vacuum cleaner includes an upper portion 104, a lower portion 106, a front 108, and a rear 110. In the example shown, handle 102 is provided at the upper portion 104. In alternate examples, handle 102 may be provided elsewhere on the vacuum cleaner 100, for example at the rear 110 and may be of any design. The vacuum cleaner 100 may be of various configurations (e.g., different positioning and orientation of the cyclone unit and the suction motor and differing cyclone units that may comprise one or more cyclones and one or more filters) and may use any type of nozzle or position of the nozzle.

In the example shown, the vacuum cleaner 100 comprises a nozzle 112, which may be of any design, and a cyclone unit 114, which together form a surface cleaning head 116 of the vacuum cleaner 100. As exemplified, the surface cleaning head 116 is preferably provided at the front 108 of the vacuum cleaner 100.

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Nozzle 112 engages a surface to be cleaned, and comprises a dirty air inlet 118, through which dirty air is drawn into the vacuum cleaner 100. An airflow passage extends from the dirty air inlet 118 to a clean air outlet 120 of the cleaner 100. In the example shown, clean air outlet 120 is at the rear 110 of the cleaner 100.

Cyclone unit 114 is provided in the airflow passage, downstream of the dirty air inlet 118. In the example shown, the cyclone unit 114 comprises one cyclone 122 positioned in the airflow passage, and one dirt chamber 124. In alternate examples, the cyclone unit 110 may include more than one cyclonic stage, wherein each cyclonic stage comprising one or more cyclones and one or more dirt chambers. Accordingly, the cyclones may be arranged in parallel and/or in sequence.

In the example shown, the nozzle 112 is positioned at the lower portion 106 of the vacuum cleaner 100. Preferably, as exemplified, nozzle 112 is positioned at the bottom of the vacuum cleaner 100, and, preferably, beneath the cyclone unit 114. Accordingly, as exemplified, nozzle 112 may be on lower surface 117 of cyclone unit 114. In a particularly preferred design, the upper wall of the nozzle may be a lower wall of the cyclone unit 114. As shown in figure 6, dirt chamber 124 surrounds the lower portion of cyclone 122. Accordingly, the upper wall of nozzle 112 may be part of the lower wall of the dirt chamber. It will be appreciated that if dirt chamber 124 does not extend around the lower portion of cyclone 122, then the upper wall of nozzle 112 may be part of a lower wall of cyclone 122.

Preferably, in the example shown, the nozzle 112 is fixedly positioned at the lower portion 106 of the vacuum cleaner 100. That is, the nozzle 112 is not movable (e.g., rotatable) with respect to the remainder of the vacuum cleaner 100, and is fixed at the lower portion 106 of the vacuum cleaner 100.

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As shown in Figures 3 and 5, nozzle 112 has a width WN, and cyclone unit 114 has a width WC. In the example shown, WN, and WC are about the same. An advantage of this design is that the nozzle may have a cleaning path that is essentially as wide as the hand vacuum itself.

Preferably, nozzle 112 comprises an airflow chamber wherein at least a portion, and preferably a majority, of the lower surface of the chamber is open. In an alternate design , the nozzle may comprise a lower wall, which closes the lower end. Accordingly, nozzle 112 may be of various design and may be an open sided passage or a closed passage.

Nozzle 112 may also share a common wall with another component of cyclone unit 114. As exemplified in Figure 7, nozzle 112 comprises an upper nozzle wall 126, which defines a closed upper end of the airflow chamber 136. In the example shown, the upper nozzle wall 126 comprises a lower portion 119 of a wall 115 of the cyclone unit.

Preferably, one or more depending walls 128 extend downwardly from the upper nozzle wall 126. The depending wall is preferably generally U-shaped. In one embodiment, depending wall is provided rearward of opening 138. In other embodiments, depending walls may alternately or in addition be provided on the lateral sides of opening 138. It is preferred that depending walls are provided on each lateral side of opening 138 and rearward thereof. Further, depending walls 128 may extend a substantial distance to the front end 108 and, preferably, essentially all the way to front end 108. The depending walls may be continuous to define a single wall as shown, or may be discontinuous. The depending walls are preferably rigid (e.g., integrally molded with cyclone unit 114). However, they may be flexible (e.g., bristles or rubber) or moveably mounted to cyclone unit 114 (e.g., hingedly mounted).

Preferably, the lower end 132 of depending wall 128 is spaced above the surface being cleaned when the hand vacuum cleaner is placed on a

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surface to be cleaned. As exemplified in Figure 6, when vacuum cleaner 100 is placed on floor F, lower end 132 of depending wall 128 is spaced a distance H above the floor. Preferably distance H is from 0.01 to 0.175 inches, more preferably from 0.04 to 0.08 inches.

The height of the depending wall (between upper nozzle wall 126 and lower end 132) may vary. In some examples, the depending wall may have a height of between about 0.05 and about 0.875 inches, preferably between about 0.125 and about 0.6 inches and more preferably between about 0.2 and about 0.4 inches. The height of depending wall may vary but is preferably constant.

As exemplified, the open end of the U-shape defines an open side 130 of the nozzle 112, and forms the dirty air inlet 118 of the cleaner 100. In the example shown, the open side 130 is provided at the front of the nozzle 112. In use, when optional wheels 135 are in contact with a surface, the open side 130 sits above and is adjacent a surface to be cleaned (e.g. floor F). Preferably, lower end 132 of depending walls 128 is spaced above floor F. Accordingly, some air may enter nozzle 112 by passing underneath depending wall 132. In such a case, the primary air entry to nozzle 112 is via open side 130 so that dirty air inlet 118 is the primary air inlet, with a secondary air inlet being under depending wall 128. In the example shown, the lower end 132 of the depending wall 128 defines an open lower end 134 of the nozzle 112. The open lower end 134 preferably extends to the front 108 of the cleaner 108, and merges with the open side 130.

In use, the exemplified nozzle has an open lower end 134 that faces a surface to be cleaned. In the example shown, a plurality of wheels 135 are mounted to the depending wall 128, and extend lower than the lower end 132 of the depending wall 128. Accordingly, in use, when wheels 135 are in contact with a surface, the lower end 132 of the depending wall 128 is spaced from a surface to be cleaned, and the space between the lower end of the depending wall 128 and the surface to be cleaned form a secondary dirty air inlet to the

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vacuum cleaner 100. It will be appreciated that wheels 135 are optional. Preferably, wheels 135 are positioned exterior to the airflow path through nozzle 112, e.g., laterally outwardly from depending wall 128. Preferably a pair of front wheels 135 is provided. Preferably, the wheels are located adjacent front 108. Optionally, one or more rear wheels 108 may be provided. In an alternate embodiment, no wheels may be provided.

The upper nozzle wall 126, depending wall 128, and open lower end 134 of the nozzle 112 define an open sided airflow chamber 136 of the nozzle. In use, when wheels 135 are in contact with a horizontal surface, the nozzle 112 and the airflow chamber 136 extend generally horizontally, and preferably linearly along a nozzle axis 113 (see Figure 7).

An opening 138 is provided in the upper nozzle wall 126, and is in communication with the airflow chamber 136. Opening 138 may be of any size and configuration and at various locations in upper nozzle wall 126. In use, when wheels 135 are in contact with a surface, the opening 138 faces a surface to be cleaned, air enters the dirty air inlet 118, passes horizontally through the airflow chamber 136, and passes into the opening 138. Opening 138 is in communication with a cyclone inlet passage 139, which is in communication with an air inlet 140 of cyclone 122.

Referring to Figures 5 and 6, cyclone 122 comprises a longitudinally extending sidewall 142. In the example shown, the longitudinally extending sidewall 142 is substantially cylindrical. The cyclone chamber is located inside chamber wall 142. The cyclone 122 extends along a longitudinal axis 123. Preferably, as shown, axis 123 is parallel to the nozzle axis, and extends generally horizontally when cleaner 100 is in use and wheels 135 are seated on a surface.

Cyclone 122 further comprises an air inlet 140, and an air outlet 145. The cyclone air inlet and cyclone air outlet may be of any configuration

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known in the art. The cyclone 122 further comprises an open end 147. The open end 147 comprises a dirt outlet 146 of the cyclone 122.

As exemplified, the cyclone air inlet 140 is defined by an aperture in the chamber wall 142. As can be seen in Figure 5, the inlet passage 139 is at configured such that air enters the cyclone 122 in a tangential flow path, e.g., passage 139 may be arcuate. The air travels in a cyclonic path in the cyclone, and dirt in the air is separated from the air. The air exits the cyclone via an outlet passage 144, which is in communication with outlet 145. The dirt that is separated from the air exits the cyclone via dirt outlet 146 defined by open end 147, and enters dirt chamber 124.

As exemplified in Figure 6, a shroud 174 may be provided adjacent outlet passage 144, spaced from and facing the inlet 176 to outlet passage 144. Shroud 174 may be mounted to cyclone 122 via legs 178. In the example shown, shroud 174, and legs 178 form an assembly 182 that is removably mounted in cyclone 122. In some examples, a screen may be mounted around legs 178. Shroud 174 may be of any design.

As noted hereinabove, the open end 147 of the cyclone 122 is in communication with a dirt chamber 124. In the example shown, dirt chamber 124 comprises two portions. A first portion 148 is provided forwardly of the dirt outlet 146. A second portion 150 is concentric with the cyclone 122, and surrounds at least a portion of the cyclone 122. A lower portion 152 of the second portion 150 is below the cyclone. As exemplified, nozzle 112 is positioned below first portion 148, and lower portion 152.

Preferably, the surface cleaning apparatus comprises a plate 154 facing the open end 147 of the cyclone. Preferably, the plate 154 has a cyclone side 155 facing the open end 147, and a dirt bin side 157 facing front wall 158. The cyclone side 155 is preferably planar. For example, as exemplified, cyclone side may be oriented to be perpendicular to the cyclone axis 123. Preferably,

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plate 123 is spaced for the open end of the cyclone. Preferably, the diameter of plate 154 and the diameter of the open end are about the same. The plate may be slightly smaller and/or slightly larger (e.g., +/- 10%).

As shown, plate 154 may be provided in the dirt chamber 124, and is spaced from a front wall 158 at the front 108 of the cleaner. Accordingly, the first portion 148 of dirt chamber 124 is provided between dirt bin side 157 of plate 154 and a front end wall 158 of the surface cleaning apparatus.

Preferably, the plate is positioned to define a gap 171 between the plate 154 and the open end 147 of the cyclone 122. More preferably, the gap has a variable length in the direction of the longitudinal axis 123 of the cyclone 122.

For example, as shown in Figures 5 and 6, the sidewall 142 of cyclone 122 has a variable length. That is, as shown, a first portion 184 of the sidewall 142 is longer than a second portion 186 of the sidewall. Accordingly, in this embodiment, the variable length of the sidewall of the cyclone provides the variable length of the gap.

In the embodiment shown, first portion 184 of the sidewall 142 has a first length L1A, and second portion 186 of the sidewall 142 has a second length L2A. Accordingly, the gap has a first length L1B adjacent the first portion 184 of the sidewall, and a second length L2B adjacent the second portion 186 of the sidewall. In the embodiment shown, the second length L2A is greater than the first length L1A. Accordingly, the first length L1B of the gap 171 is greater than the second length L2B of the gap 171.

Preferably, the first length L1A of the first portion 184 and the first length L2A of the second portion are constant. More preferably, the first length L1B of the gap 171 and the second length L2B of the gap 171 are constant. In alternate embodiments, however, one or both of the first length L1B of the gap 171 and the second length L2B of the gap 171 may be variable.

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In the exemplified embodiment, sidewall 142 has a first end 188 at open end 147, and a second end 190 opposed to the first end. The first end has a perimeter. Preferably, in embodiments wherein the first length L1A and the second length L2A are constant, one of first portion 184 and second portion 186 extends up to 210o of the perimeter. For example, the first portion 184 may extend up to 210o of the perimeter. For example, as shown, first portion 184 extends for about 180o of the perimeter (indicated by arrow P1) and the second portion 186 extends for about 180o of the perimeter (indicated by arrow P2).

In alternate embodiments, wherein the first length L1A and/or the second length L2B are variable, one of first portion 184 and second portion 186 preferably extends up to 240o of the perimeter. For example, the first portion may comprise 240o of the perimeter, and the second portion may comprise 120o of the perimeter. In such an embodiment, the face of the wall facing the open end of the cyclone may extend upwardly at an angle.

It will be appreciated that in alternate embodiments, a cyclone 122 having a variable length may be useful, even if a plate 154 is not provided.

Alternately or in addition, as exemplified in Figures 9 and 10, the plate 154 may have a plate sidewall 153 extending towards the open end 147. Preferably, the plate sidewall 153 is at the periphery of the plate. In the embodiment shown, the plate sidewall 153 extends part way around the plate 154. Accordingly, in this embodiment, the space between the plate sidewall and the open end of the cyclone defines the variable length of the gap, and gap 171 has a first length L1B between the plate 154 and the end 188 of cyclone 122, and a second length L2B between the sidewall 153 and the end 188 of cyclone 122 that is less than the first length L1B

In some embodiments, as shown, the sidewall 153 of the plate 154 has a constant length.

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In a alternate embodiments, the plate sidewall 154 may extend all the way around the plate 154, and may have a variable length.

Plate 154 may be mounted by any means to any component in cyclone unit 114. As exemplified, the separation plate is mounted on an arm 156, which extends from a front wall 158 at the front 108 of the cleaner 100.

Cyclone unit 114 may be emptied by any means known in the art. For example, one of the ends of the cyclone unit 114 may be openable. As exemplified in Figures 4 and 5, front wall 158 is pivotably mounted to the cyclone unit wall 115, such that cyclone unit 114 may be opened, and dirt chamber 124 may be emptied. When front wall 158 is pivoted away from the remainder of the cyclone unit 114, separation plate 154 and arm 156 also pivot away from the remainder of the cyclone unit. A latch 159 is provided, which secures front wall 158 to wall 115. In alternate examples, front wall 158 may be removable from cyclone unit wall 115 or the opposed end of the cyclone unit 114 may be openable.

The clean air exiting cyclone 122 passes through outlet passage 144, exits surface cleaning head 116, and passes into the cleaner body 160. The air exiting the cyclone may be subjected to one or more treatment stages (e.g., cyclonic and/or filtration). In the example shown, a cleaner body 160 is positioned rearward of the surface cleaning head 116. The cleaner body comprises a housing 161, which preferably houses an optional pre-motor filter assembly 162, a suction motor 164, and an optional post-motor filter 166.

In the exemplified embodiments, the vacuum cleaner has a linear configuration. Accordingly, pre-motor filter assembly 162 is preferably provided in the airflow path adjacent and downstream of the outlet passage 144. Pre-motor filter assembly 162 serves to remove remaining particulate matter from air exiting the cyclone 122, and may be any type of filter, such as a foam filter. One or more filters may be used, as shown. If the vacuum cleaner is of a non-linear

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configuration, then pre-motor filter assembly 162 need not be located adjacent outlet passage 144.

Suction motor 164 is provided in the airflow path preferably adjacent and downstream of the pre-motor filter 162. The suction motor draws air into the dirty air inlet 118 of the cleaner 100, through the airflow path past the suction motor 164, and out of the clean air outlet 120. The suction motor 164 has a motor axis 165. In the example shown, the motor axis 165 and the cyclone axis 122 extend in the same direction and are generally parallel. The suction motor 164 may be any type of suction motor. If the vacuum cleaner is of a non-linear configuration, then motor 164 need not be located adjacent pre-motor filter 162.

Post motor filter 166 is provided in the airflow path downstream of, and preferably adjacent, the suction motor 164. Post motor filter serves to remove remaining particulate mater from air exiting the cleaner 100. Post-motor filter 166 may be any type of filter, such as a HEPA filter.

Clean air outlet 120 is provided downstream of post-motor filter 166. Clean air outlet 120 comprises a plurality of apertures preferably formed in housing 161.

Preferably, as in the example shown, cleaner body 160 is removably mounted to surface cleaning head 116. For example, cleaner body 160 may be entirely removable from surface cleaning head 116, or pivotably mounted to surface cleaning head 116. Accordingly, cleaner body 160 and surface cleaning head 116 may be separated in order to provide access to the interior of cleaner body 160 or surface cleaning head 116. This may allow pre-motor filter assembly 162 to be cleaned, changed, or serviced, or motor 164 to be cleaned, changed or serviced. Alternately, or in addition, surface cleaning head 116 may be cleaned or serviced. For example, any dirt stuck in outlet passage 144 may be removed. Alternately, a replacement cleaner body 160 or

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surface cleaning head 116 may be provided, and may be mounted to an existing surface cleaning head 116 or cleaner body 160, respectively. If no filter element is fixedly mounted to cleaning head 116, then cleaning head 116 may be removed and washed with water.

As can be seen in Figure 6, housing 161 preferably comprises a first portion 168 housing pre-motor filter assembly 162, and suction motor 164, and a second portion 170 housing post-motor filter 166. Second portion 170 is openable, such as by being removably mounted to first portion 168, such that post-motor filter 166 may be cleaned, changed, or serviced.

One or more additional rear wheels 180 may be mounted to housing 161, preferably at lower portion 106, and may be used in conjunction with wheels 135. Preferably, a single rear wheel 180 is provided. Preferably, rear wheel 180 is located on a centre line of the vacuum cleaner and rearward of the depending wall 128.

As mentioned hereinabove, surface cleaning apparatus 100 is a preferably a portable vacuum cleaner 100, as shown in Figures 1 to 7.

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CLAIMS:

1) A hand vacuum cleaner comprising:

a) an air flow passage extending from a dirty air inlet to a clear air outlet;

b) a main body comprising a suction motor positioned in the air flow passage, a front end, a rear end and a handle, the suction motor having a suction motor inlet end that faces the front end of the main body; and,

c) a cyclone unit positioned in the air flow passage upstream from the suction motor and comprising a first cyclonic stage comprising a cyclone chamber and a dirt chamber, the cyclone unit removably mounted to the front end of the main body wherein the first cyclonic stage faces towards the suction motor inlet end.

2) The hand vacuum cleaner of claim 1, wherein the front end is spaced forwardly from the rear end in a forward direction and the cyclone unit is removable from the main body in the forward direction.

3) The hand vacuum cleaner of claim 1, further comprising a pre-motor filter positioned in the air flow passage and facing the suction motor inlet end, wherein when the cyclone unit is mounted to the front end of the main body the pre-motor filter is disposed between the cyclone chamber and the suction motor.

4) The hand vacuum cleaner of claim 3, wherein the pre-motor filter is exposed when the cyclone unit is removed from main body.

5) The hand vacuum cleaner of claim 1, further comprising a pre-motor filter positioned in the air flow passage, the suction motor has a motor rotation axis

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and air flowing thorough the pre-motor filter travels in a direction that is generally parallel to the motor rotation axis.

6) The hand vacuum cleaner of claim 1, wherein the front end is spaced forwardly from the rear end in a forward direction and the suction motor has a motor rotation axis that extends in the forward direction and a projection of the motor rotation axis intersects the cyclone unit.

7) The hand vacuum cleaner of claim 6, wherein the motor rotation axis intersects the cyclone chamber.

8) The hand vacuum cleaner of claim 6, wherein air exiting the cyclone unit travels in a direction that is generally parallel to the motor rotation axis.

9) The hand vacuum cleaner of claim 1, wherein the suction motor has a motor rotation axis, the cyclone chamber has a longitudinal axis and the longitudinal axis and the motor rotation axis are generally parallel.

10) The hand vacuum cleaner of claim 1, wherein the dirt chamber has a sidewall terminating at an open end, the open end is closed by an openable door, wherein all of the open end is opened when the door is in an open position.

11) The hand vacuum cleaner of claim 1, further comprising a second cyclonic stage downstream from the first cyclonic stage.

12) A hand vacuum cleaner comprising:

a) an air flow passage extending from a dirty air inlet to a clear air outlet;

b) a main body comprising a suction motor positioned in the air flow passage and a handle provided on the top of the main body with a grip portion

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provided between a lower surface of the handle and an upper surface of the main body, the suction motor having a suction motor axis extending in a forward/rearward direction and a suction motor inlet end, the handle extending in the forward/rearward direction and having a front end, a rear end and a handle length that is greater than a length of the suction motor in the forward/rearward direction; and,

c) an air treatment member positioned in the air flow passage upstream from the suction motor and, the air treatment member removably mounted at the suction motor inlet end of the main body.

13)The hand vacuum cleaner of claim 12, wherein the air treatment member has a unit length in the forward/rearward direction that is less than the handle length.

14)The hand vacuum cleaner of claim 12, wherein the air treatment member comprises a cyclone unit comprising a cyclone chamber.

15)The hand vacuum cleaner of claim 14, wherein the cyclone chamber has a cyclone axis about which air circulates within the cyclone chamber and a cyclone chamber length along the cyclone axis that is less than the handle length.

16)The hand vacuum cleaner of claim 12, further comprising a pre-motor filter facing the suction motor inlet end, wherein when the air treatment member is mounted to the main body, the pre-motor filter is disposed between the suction motor and the air treatment member.

17)The hand vacuum cleaner of claim 12, wherein the air treatment member is mounted directly to the main body.

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18)A hand vacuum cleaner comprising:

a) an air flow passage extending from a dirty air inlet to a clear air outlet;

b) a main body positioned in the air flow passage and comprising a front end, a rear end, a handle and a motor housing containing a suction motor having a suction motor axis extending in a forward/rearward direction, the motor housing having a first support member; and,

c) a cyclone unit positioned in the air flow passage upstream from suction motor and comprising a cyclone chamber and a dirt chamber, the cyclone unit removably mounted to a front end of the main body and comprising a second support member;

wherein when the vacuum cleaner is placed on a horizontal surface, the vacuum cleaner is supported on the first and second support members and the suction motor axis is substantially horizontal.

19)The hand vacuum cleaner of claim 18, wherein the second support member is removable from the main body with the cyclone unit.

20)The hand vacuum cleaner of claim 18, wherein the second support member is provided on an outer surface of a dirt chamber sidewall.

21)The hand vacuum cleaner of claim 20, wherein the second support member is integrally formed with the dirt chamber sidewall.

22)The hand vacuum cleaner of claim 18, wherein when the vacuum cleaner is resting on the horizontal surface the, first support member underlies the suction motor.

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23)The hand vacuum cleaner of claim 22, wherein when the vacuum cleaner is resting on the horizontal surface, the second support member underlies the dirt chamber.

24)The hand vacuum cleaner of claim 18, further comprising a pre-motor filter positioned axially between the cyclone chamber and the suction motor and positioned in the air flow passage upstream from the suction motor, and a post-motor filter positioned axially between the suction motor and the rear end of the main body and positioned in the air flow passage downstream from the suction motor, wherein the first support member is positioned axially between the pre-motor filter and the post-motor filter.

25)The hand vacuum of claim 24, wherein the second support member is positioned axially forward of the pre-motor filter.

26)The hand vacuum cleaner of claim 18, wherein a portion of the vacuum cleaner has a generally round cross-sectional shape taken in a plane that is orthogonal to the suction motor axis.

27)A hand vacuum cleaner comprising:

a) an air flow passage extending from a dirty air inlet to a clear air outlet;

b) a main body comprising a motor housing containing a suction motor positioned in the air flow passage and having a suction motor axis extending in a forward/rearward direction, a front end, a rear end and a handle; and,

c) an air treatment member positioned in the air flow passage upstream from the suction motor, the air treatment member is removably mounted to a suction motor inlet end of the main body, the air treatment member having

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a dirt chamber having a height in a direction orthogonal to the suction motor axis; and,

d) a pre-motor filter provided in the air flow passage upstream from the suction motor in the forward/rearward direction when the air treatment member is mounted to the motor housing, the pre-motor filter having a height in a direction orthogonal to the suction motor axis that is about the same as the height of the dirt chamber.

28) The hand vacuum cleaner of claim 27, wherein the air treatment member comprises a cyclone chamber and the dirt chamber and the cyclone chamber remains closed when separated from the pre-motor filter.

29) The hand vacuum cleaner of claim 27, wherein the pre-motor filter covers the entire suction motor inlet end of the main housing.

30) The hand vacuum cleaner of claim 27, wherein the air treatment member comprises a cyclone chamber and the dirt chamber, the cyclone chamber has a cyclone axis about which air circulates within the cyclone chamber and a cyclone cross-sectional area taken in a plane orthogonal to the cyclone axis, wherein the pre-motor filter has a cross-section area taken in a plane that is orthogonal to the motor axis that is larger than the cyclone cross-sectional area.

31) The hand vacuum cleaner of claim 27, wherein the dirt chamber has an openable end that has a height in a direction that is orthogonal to the suction motor axis and the height of the pre-motor filter pre that is about the same as the height of the openable end.

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32)The hand vacuum cleaner of claim 27, wherein the handle extends between a handle front end and a handle rear end, and the handle front end is positioned forward of the suction motor.

33)The hand vacuum cleaner of claim 27, further comprising a post-motor provided in the air flow passage downstream from the suction motor and covering a rear end of the suction motor.

34)The hand vacuum cleaner of claim 32, wherein air travelling through the pre-motor filter flows in the same flow direction as air travelling through the post-motor filter.

35)The hand vacuum cleaner of claim 34, wherein the flow direction is generally parallel to the motor axis.

36)A hand vacuum cleaner comprising:

a) an air flow passage extending from a dirty air inlet to a clear air outlet;

b) a main body comprising a front end, a rear end, a handle and a motor housing containing a suction positioned in the air flow passage and having a suction motor axis extending in a longitudinal direction; and,

c) an air treatment unit positioned in the air flow passage upstream form the suction motor and comprising an air treatment chamber and a dirt chamber, the dirt chamber comprises a longitudinally extending sidewall extending from a first chamber end to a free edge at a second chamber end, the free edge of the sidewall defining an opening that is closeable by an openable door and the free edge extends in a direction that is inclined relative to the longitudinal direction of the sidewall.

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37) The hand vacuum of claim 36, wherein the free edge of the sidewall defines a perimeter of the opening and substantially the entire perimeter lies in a plane that is inclined relative to the longitudinal direction.

38) The hand vacuum of claim 36, wherein when the hand vacuum cleaner is oriented such that the suction motor axis is horizontal, an upper portion of the free edge of the dirt chamber sidewall is offset from a lower portion of the free edge of the dirt chamber sidewall in the longitudinal direction.

39) The hand vacuum cleaner of claim 38, wherein the openable door has a first end which rotates relative to the dirt chamber sidewall and an opposed securable end that is securable to the dirt chamber sidewall by a lock and the securable end is located rearwardly of the first end.

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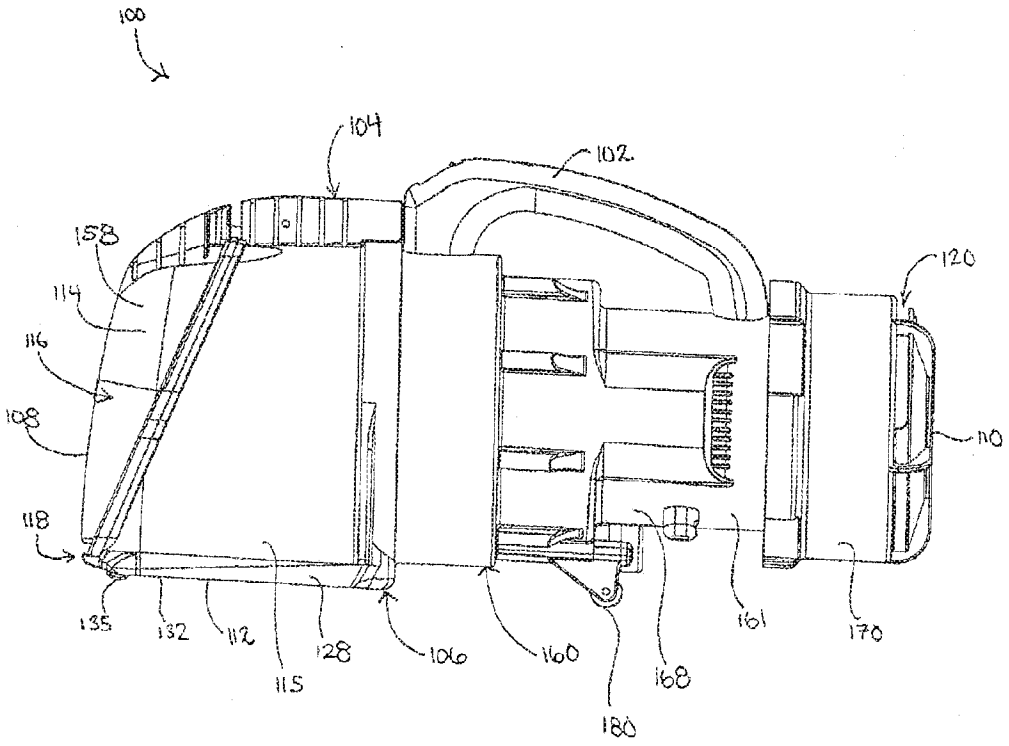

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FIG. 1

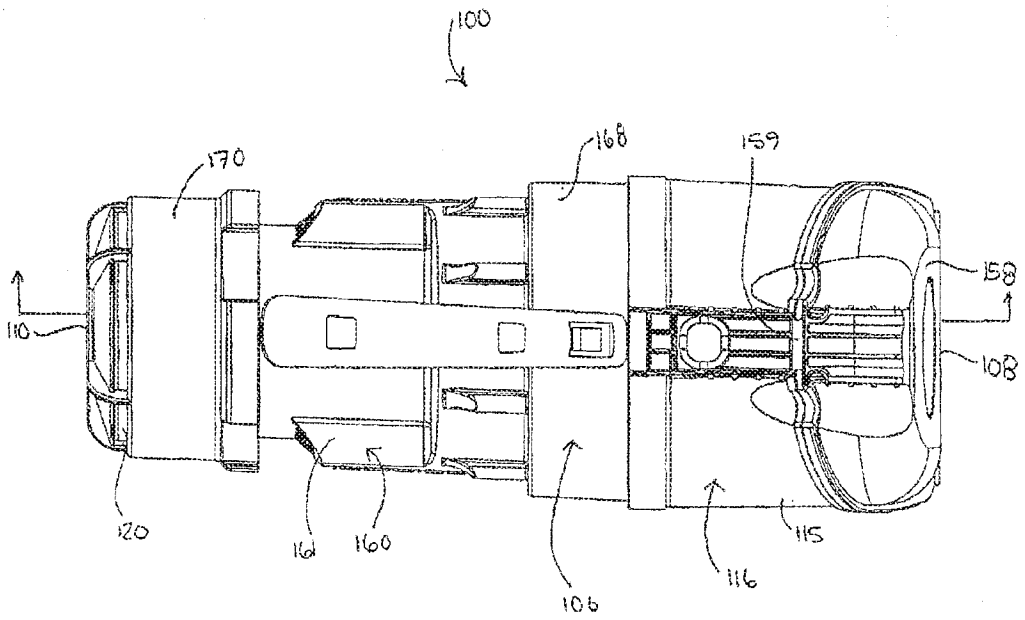


Fig. 2

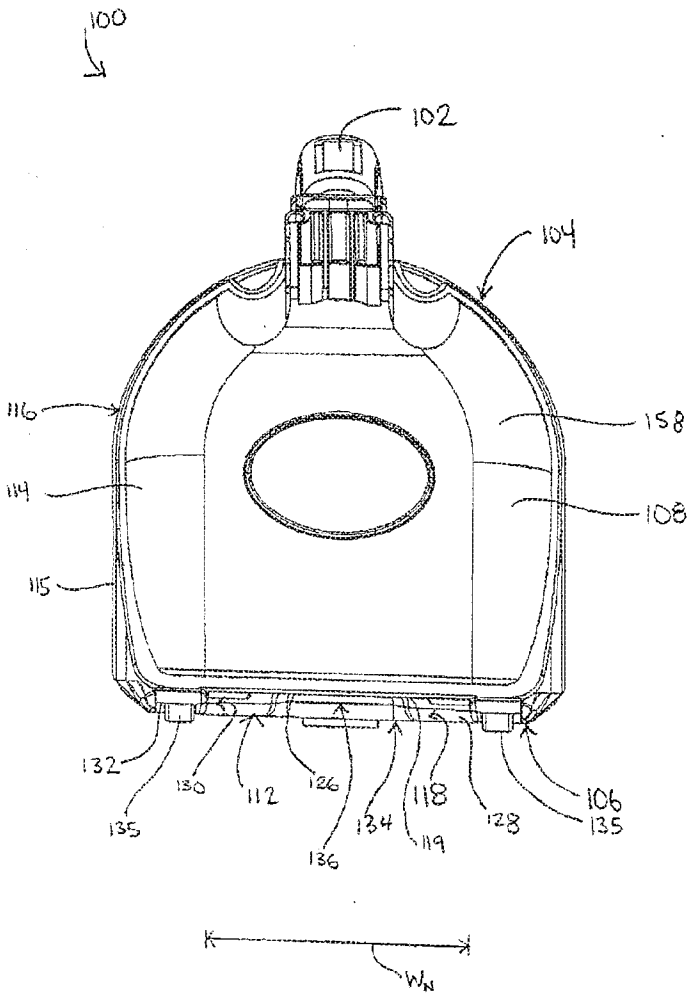

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Fig. 3

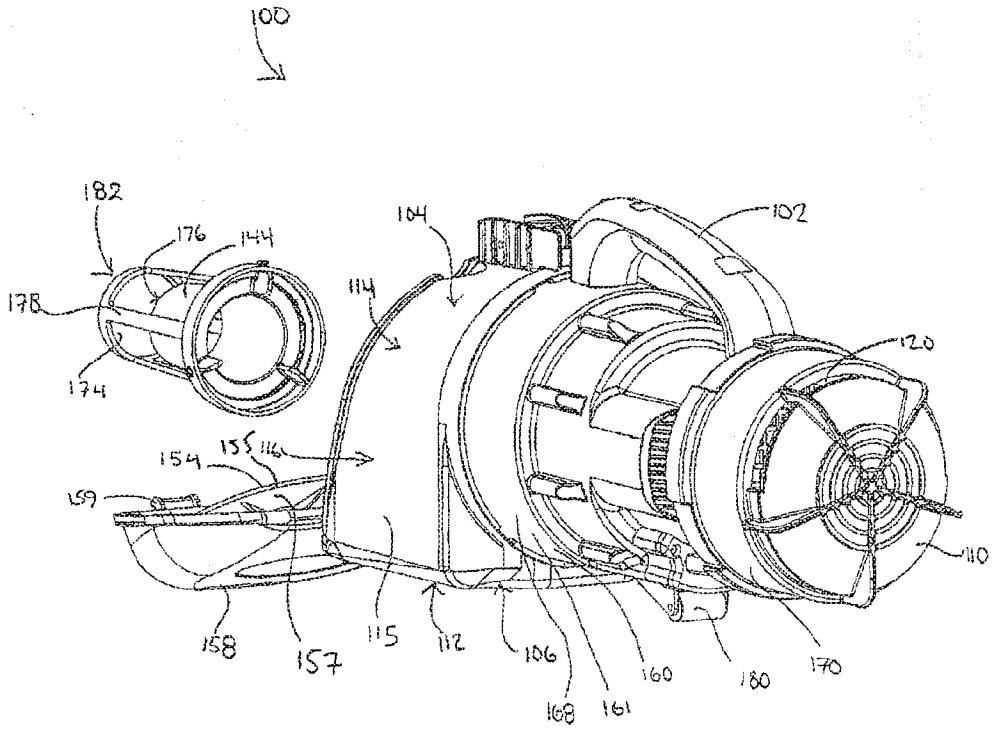

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Fig.4

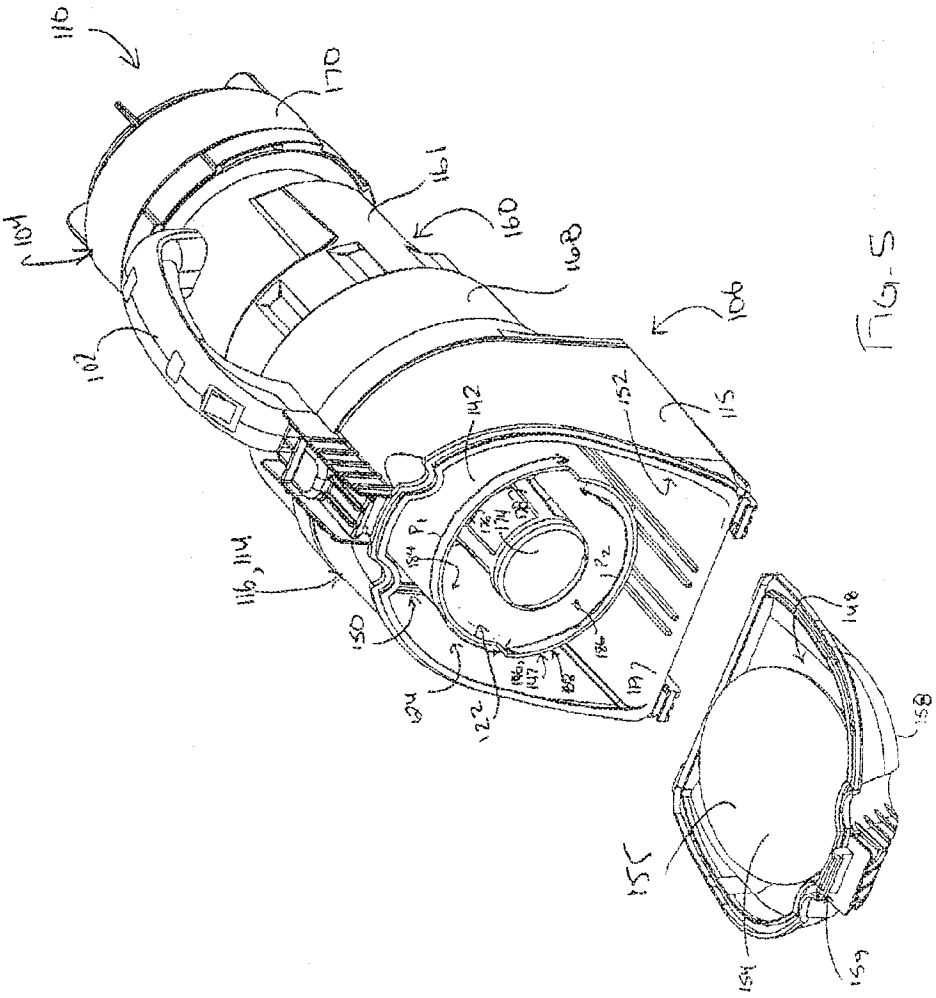

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FIG. 5

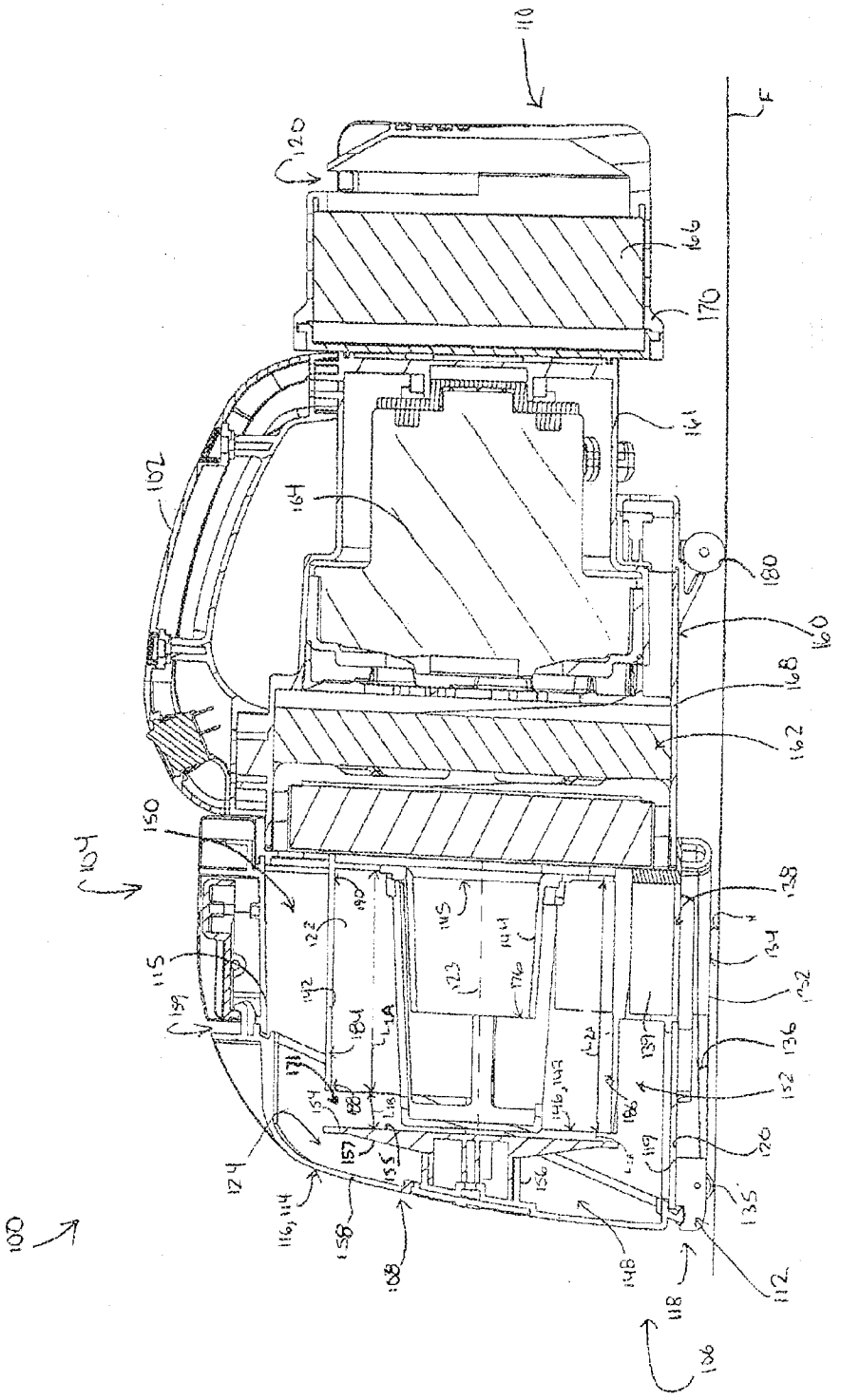


Fig. 6

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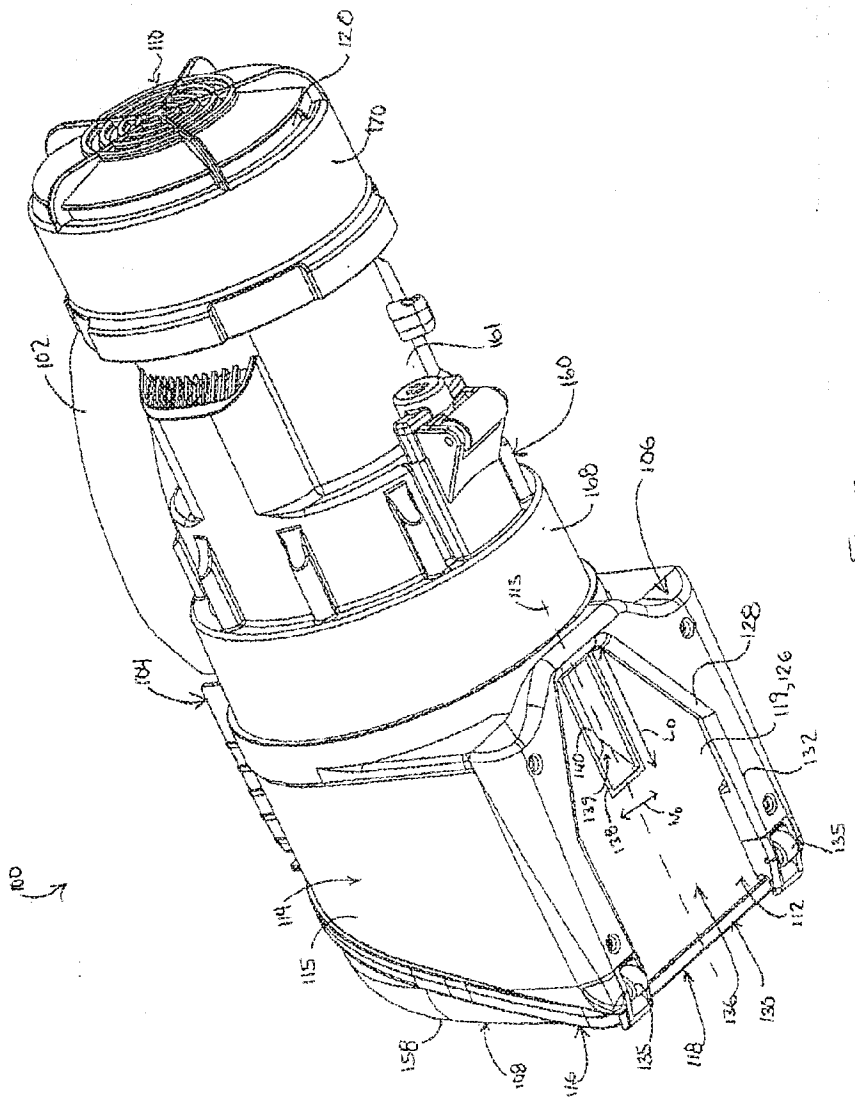

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FIG. 7

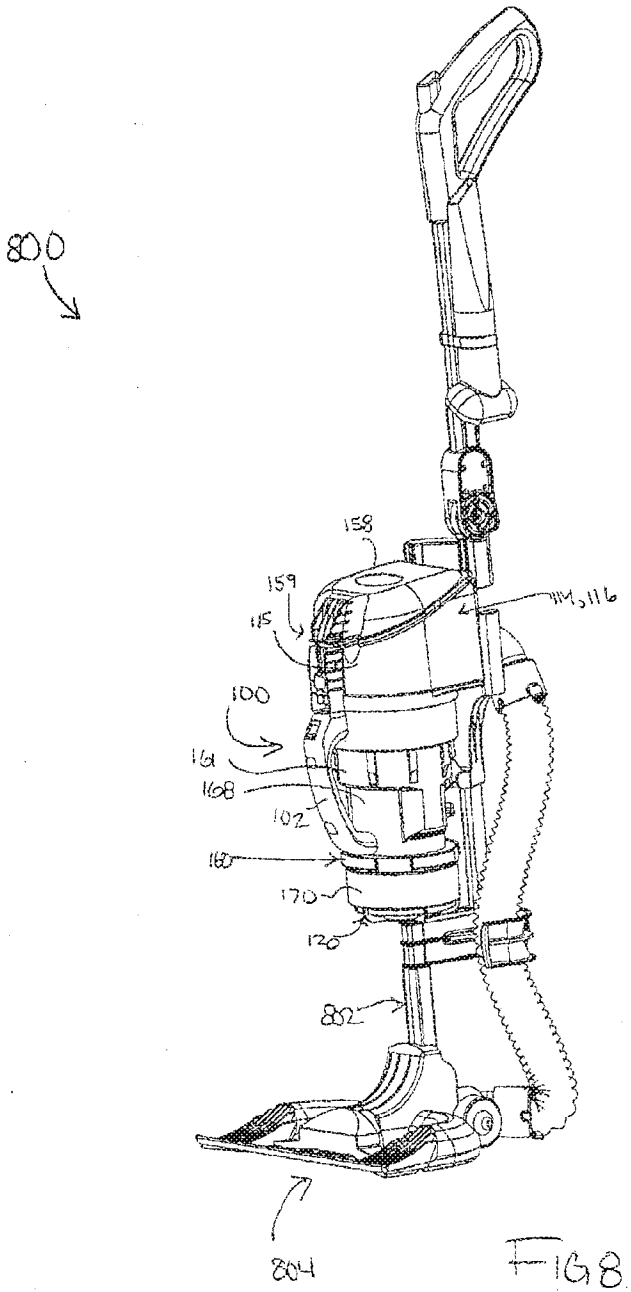


FIG 8

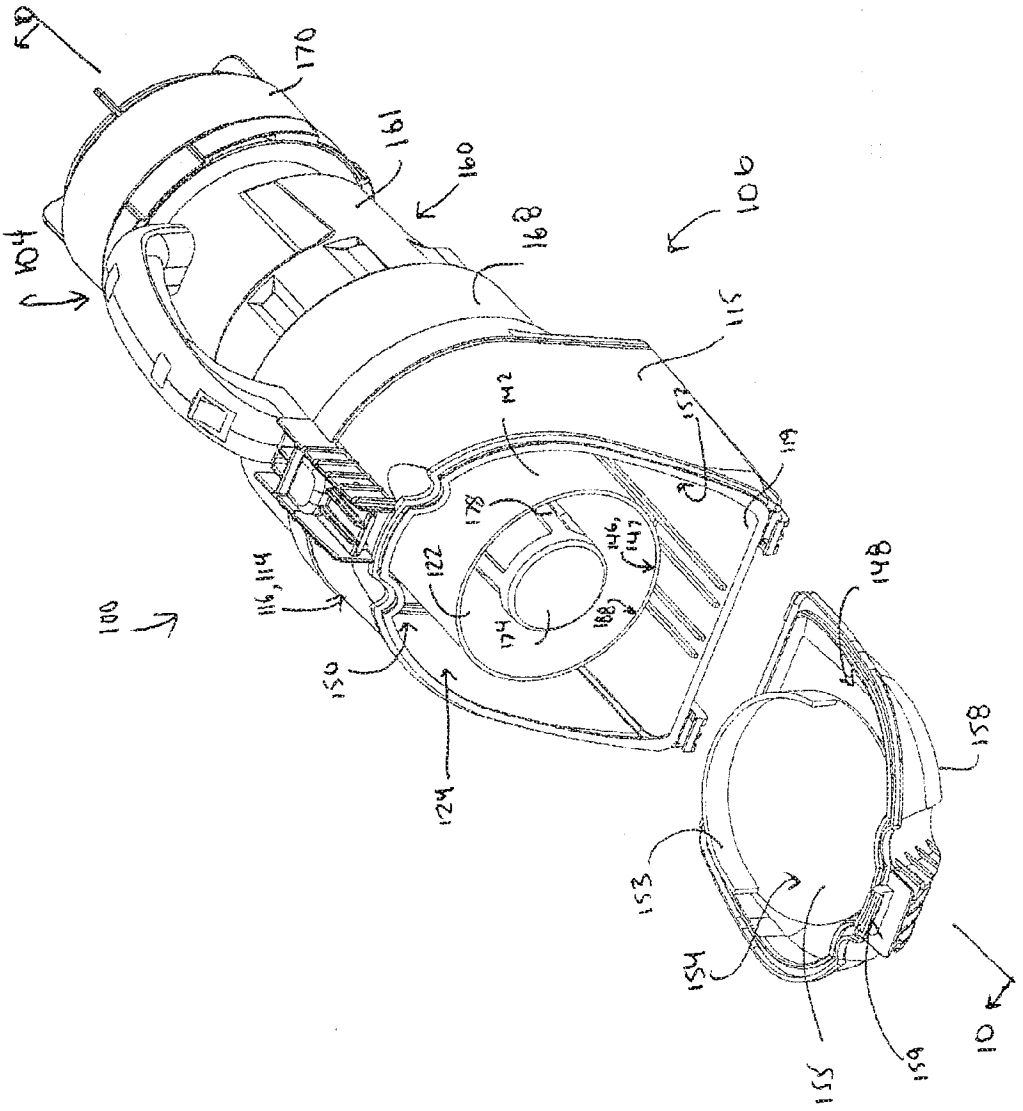

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Fig. 9

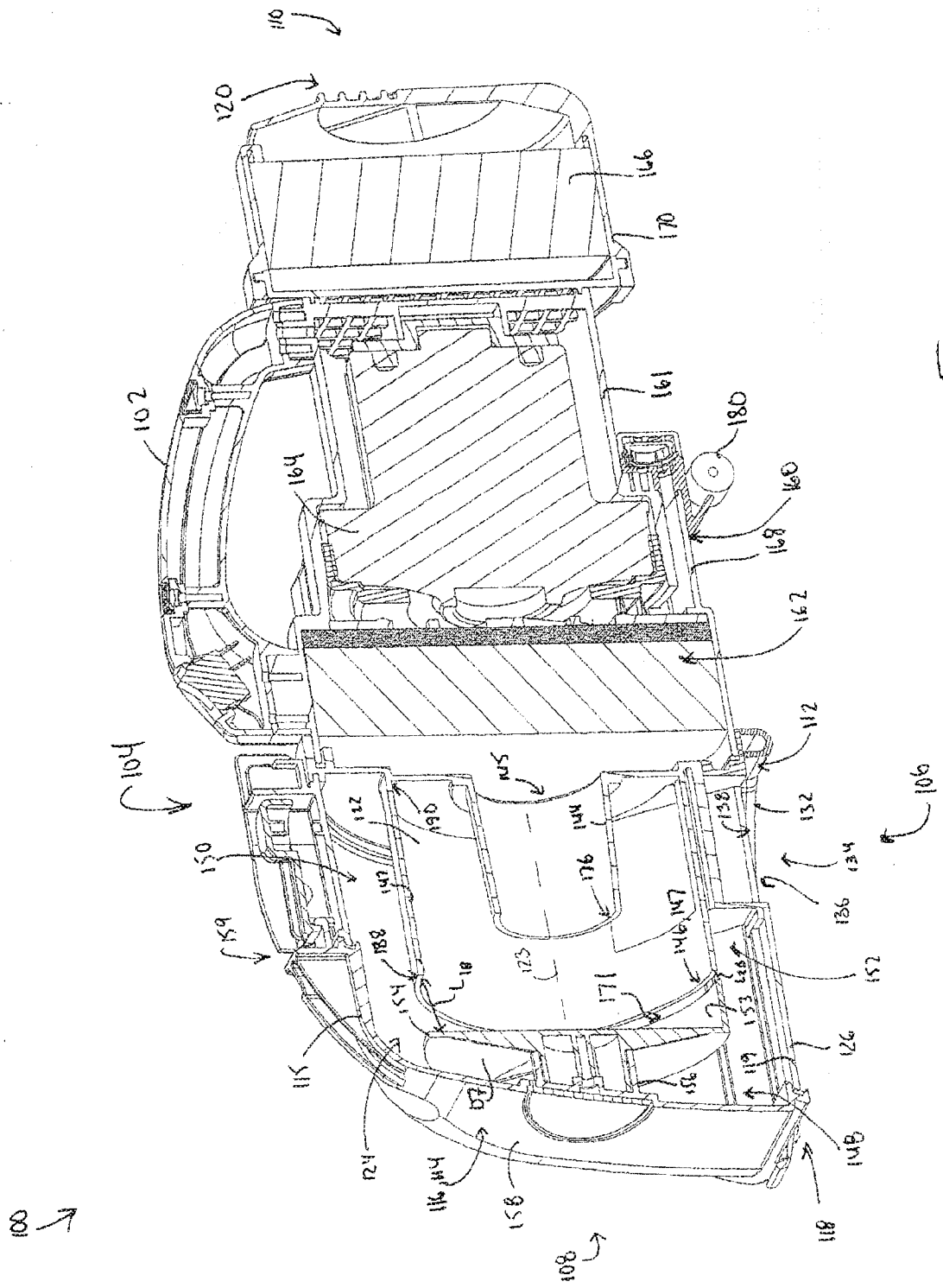
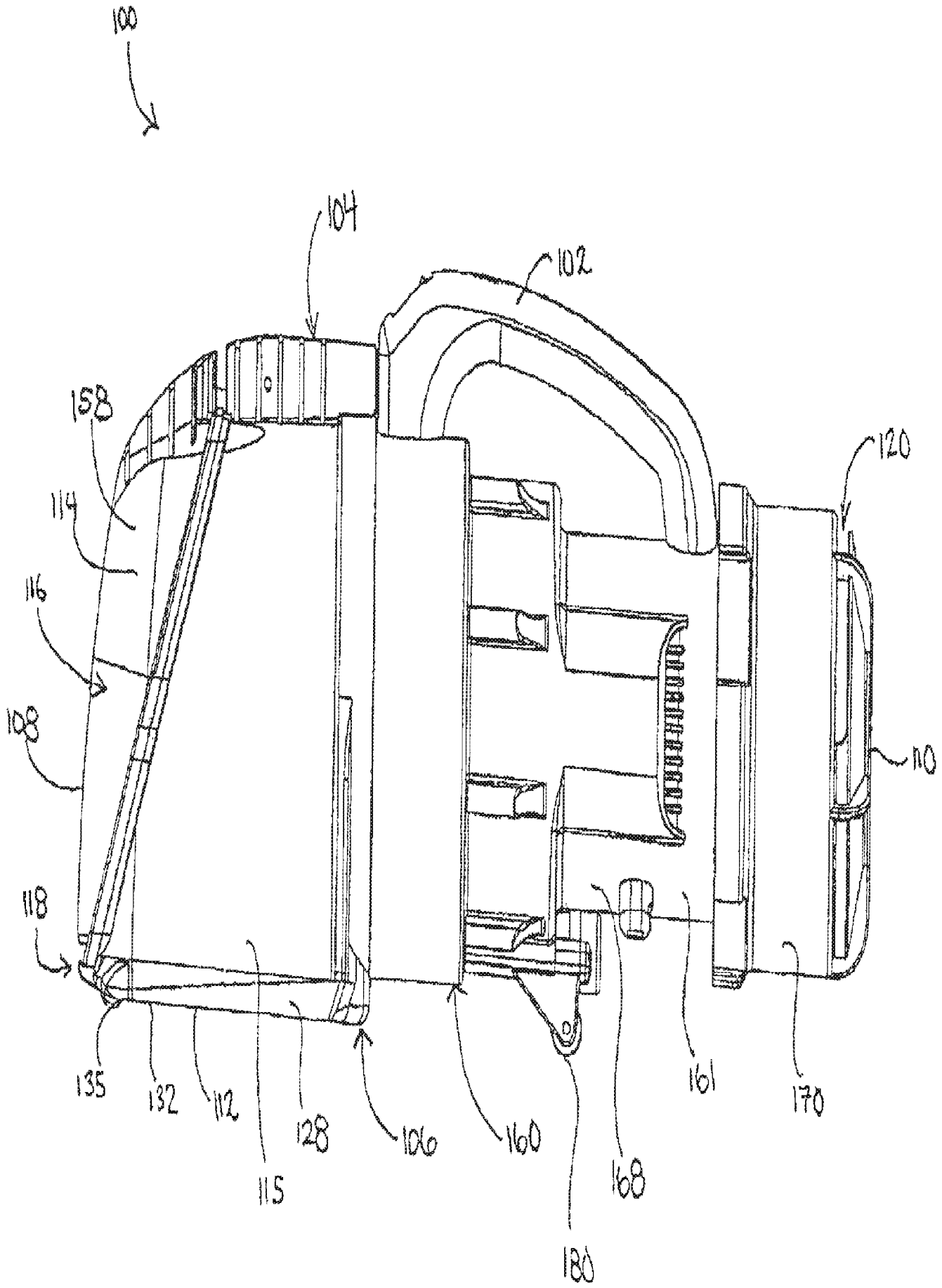


FIG. 10

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Unexamined Patent Publication(A)

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Unexamined Publication No.	1020080110720
Unexamined Publication Date	20081219
Requested Date of Examination	20081201
Inventor	choi jong dae
Applicant	choi jong dae

Title of Invention

The electric cleaner using the roller which is suitable for the bottom cleaning.

Abstract

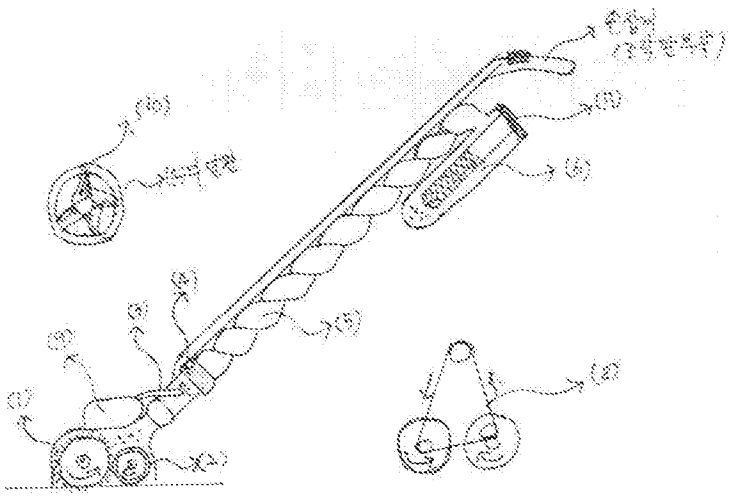
It is the mode which draws in dust and air with the dust collector container and filtered out filter with filter to the attracting force which makes the cleaner inner into the vacuum condition and in which the vacuum cleaner which there should not be no in the daily life is generated. And the fixed on the noise according to ① fine dust re-emitting ② high-capacity motor use and power consumption ③ bottom surface dirt has the disadvantage of being difficult to remove the dirt.

Thus, in the present invention, the dust including the dirt which has two rollers make the rotation is fixed on the bottom surface is collected and the spiral hose is passed through with the fine-waterdrop and the water drop dirt and fine dust is united with the intermediation and the fine dust is conspicuously reduced among air and it is the invention of the electric cleaner separating air and dirt into the cyclone dust collector and discharges air to the airborne.

The roller, rotation, fine-waterdrop, cylindrical pan, spiral hose, the cyclone dust collector .

대표도면(Representative drawing)

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Scope of Claims

Claim 1:

The electric cleaner system of the mode which parallely arranges two rollers in which the b rush (1) and cleaning cloth (2) are adhered and the discharges air. Mode makes each size and number of rotations different and it consists of the one the contaminant of the bottom surface and dust it has make the rotation, the fine-waterdrop atomizer (3) and cylindrical pan (4) it collects, and spiral hose (5) and it passes the spiral hose (5) the air in which dus t and dirt etc. are mixed flowed in from the suction part of the cleaner through ; dirt, and dust mass the water drop with the intermediation and it reduces the fine dust among air ; it separates dirt and air into the cyclone dust collector (7) ; and .

Claim 2:

The suction part of the cleaner which includes the one the contaminant of the bottom surfa ce and dust, and the function it collects ; and of sweeping off to the dirt making the numb er of rotations different and causes the friction by parallely arranging two rollers in which t he brush (1) and cleaning cloth (2) are adhered and having make the rotation, and the fun ction it collects ; and of sweeping off to the dirt making the number of rotations different a nd causes the friction the roller is operated and buries in the roller.

Claim 3:

It is comprised of the fine-waterdrop atomizer (3) (the apparatus inclusion spraying the fin e-waterdrop including the steam generating apparatus etc. from or) and cylindrical pan (4), and the spiral hose (5). And the apparatus for passing the air in which the water drop and contaminant are mixed through and dust etc. uniting with the water drop and reducin g dust among air.

Technical Field

The invention relates to the water drop specifically dirt or dust etc. are mainly removed as the invention of the electric cleaner for the cleaning of the bottom surface including the flo or or the marble etc. sticks to the bottom surface to the ratio, the dustpan and two rollers serving of the mop the spiral hose is passed through, the existing vacuum cleaner as the fr equency of use box the cyclone dust collector dirt, and the fine dust unite with the granule and the fine dust is removed among air, and the invention of the cleaner which improves t

he function including the fine dust emission reduction, the decreasing noise, the dust collector container unnecessary etc. comparatively.

Background Art

Generally, the vacuum cleaner, the steam cleaner, the steam vacuum cleaner etc. have as to the electric cleaner. The vacuum cleaner rotates the fan of the cleaner inner among this at high speed and the air in the dust collector container is outward chosen and the cleaner inner is made into the vacuum condition. If the pneumatic pressure in the cleaner becomes low, the attracting force is generated by the difference of inside and outside atmospheric pressure but the dust of the inlet neighborhood comes in with air into the dust collector container and dirt and dust are strained through filter and air outward lets out.

But the problem of burying in the re-emitting ② high-capacity motor use ③ bottom surface including the dirt removal difficulty etc. has such cleaner of the mode among the atmosphere of ① fine dust.

Specifically, it looks into

So that - vacuum cleaner make the dust collector container into the vacuum condition the pan is rotated at high speed and it has to deflate but the fine dust of the dust collector container cannot help freeing from in the air which at this time, it lures. Since it should not make as much as in order to decrease the fine dust emission it tightly can have the filter of the dust collector container but air is blocked the fine dust emission cannot help being to some extent allowed.

So that -, moreover, the vacuum cleaner make into the vacuum state, it need the high-capacity motor and the electric consumption is many and noise is loud and the motor and fan of the volume which the dust collector container is behind large are mounted the cleaner volume is enlarged.

It is difficult that the dirt which is facilitated that dust or the foreign substance etc. remove but the vacuum cleaner of the form drawing in - air is heaped up in the bottom surface is fixed on the bottom surface easily removes and it is inefficient in the most of building floor cleanings.

Summary of Invention

Problem to be solved

The function of adhering to the brush and the cleaning cloth to two rollers which the invention does and sweeping away the bottom surface and washing and the dirt recovery system which sprays the water drop and which makes dirt, and the fine dust into the granule and collected are integrated and the fine dust emission which is the disadvantage of the vacuum cleaner is minimized and the dirt burying in the defect improvement of the high noise according to the high-capacity motor use and power consumption, and the bottom surface is easily removed and the purpose is in the design of the new cleaner which removes the dust collector container and which is compact.

Means to solve the problem

The mode in which the invention cleans the bottom surface using the ratio and dustpan is adapted to.

The part separating the foreign substance including dust and dirt etc. from the bottom surface in contact with - bottom surface.

The part which sprays - water drop and it passes the spiral hose through unites dirt and fine dust.

The cyclone dust collector collecting - foreign substance and exhausts air.

It comprises the motor making the power driving - roller, the water spray, the fan etc

Specifically each part is looked into.

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1. The part separating the foreign substance including dust and dirt etc. from the bottom surface in contact with the bottom surface.

By two rollers in which the brush (1) and cleaning cloth (2) are adhered being parallely arranged and having make the rotation of front of after serves the role of the ratio of the dustpan and mop. It makes the diameter of each roller different and while dust and dirt are backwards withdrawed by the roller of of the front which the example : rain serves large and the dustpan serving rapidly, box) front and the roller of after rotates the difference in the number of rotations into more rapid speed into the opposite direction dirt is rearwards withdrawed with (it passes between the roller). Then, the different number of rotations of two rollers causes friction and the dirt burying in the roller functions to be shaken off.

2. The part uniting dirt and fine dust.

The teeth comprises the roller, behind, the water drop jet nozzle (3) and the cylindrical pan (4), and the spiral hose (5). And dirt and the dust passing the roller the fine-waterdrop are united with the intermediation with the granule and it functions to push out to the cyclone dust collector (6).

That is, in the nozzle (3), the fine-waterdrop is sprayed and the dirt, dust, water drop, air is passed in the spiral hose (5) using the cylindrical pan (4). While becoming with the eddy A-frame while air etc. pass the spiral hose dust and dirt unite with the water drop and the fine dust is reduced among air.

It is sweet and the cylindrical pan is the rotating blade (10) the structure of rotating at the power of the external motor (9) in the cylinder inside of the pipe shape. And it is the structure of there being no motor part of the center in comparison with the existing fan and air passing through the cylinder center but being made so that there is no impediment.

3. The cyclone dust collector collecting dirt and exhausts air.

While the spiral hose is passed dirt unites with the granule and it is withdrawn in the cyclone dust collector (6) and air is ejected. Finally in order to collect the granule ejected with the some air, the filter (7) is mounted to the air outlet part.

4. The motor supplying the power.

In this cleaner, since the power as to the necessary part, is the force place including rollers (1,2), the fire sprayer (3), the cylindrical pan (4) etc. but it operates this in the proximity distance the roller and cylindrical pan can operate using the belt (8), the gear etc. to one motor and the water spray runs using the small size compressor and it can replace with the steam generating apparatus etc.

Effects of the Invention

The present invention has the effect that two rollers serve of the ratio and mop and the water drop dirt and dust is united with the intermediation and the re-emitting is conspicuously reduced among the air of the fine dust which is the disadvantage of the existing vacuum cleaner by separating dirt and air from the cyclone dust collector and it removes as if it wipes off with the mop to the dirt which is fixed on the bottom surface while reducing the decreasing noise and power consumption using the low capacity motor. Moreover, because of the dust collector container of the existing vacuum cleaner being removed and using it is convenient

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Detailed Description

It is comprised of the contaminant including the dirt which is fixed on the bottom surface t he invention has make the rotation it makes each size and number of rotations different th e brush and the cleaning cloth parallely arrange the roller of the respective attached two a nd the cylindrical pan for collecting dust and rearwards ejecting the fine-waterdrop atomiz

er and air, and the spiral hose. And while the roller and cylindrical pan crawling with the p ower transmission belt and driving using the etc. to one motor the fine-waterdrop injection system uses the small size compressor as the structure of dirt, dust etc. massing the wate r drop with the intermediation and conspicuously reducing the fine dust and separating dirt and air into the cyclone dust collector among air or the steam generating apparatus etc. ca n be used.

Brief explanation of the drawing

1. While the air in which the water drop, dirt, dust etc. are mixed while it collects the dirt o f the bottom surface while rollers (1, 2) of two parts have with the rotation passes the spir al hose (5) dirt unites.
2. Free the connection part of the spiral hose part and suction part controls the angle usin g the rotation joint.
3. Air and dirt lump are separated from the cyclone dust collector (6) and air is exhausted but finally it filters out the filter (7) with the filter (7) and the efficiency of the cleaner is m ade raised.
4.The roller simultaneously does using the rubber belt (8) connected with the motor with t he rotation(the clockwise direction and in counter-coickwise direction).
5. It is sweet and the cylindrical pan rotates the rotating blade (10) at the external motor i n the inside of the tubular cylinder and air is exhausted to the spiral hose (5).
6. The monitoring unit is set up in the grip portion.

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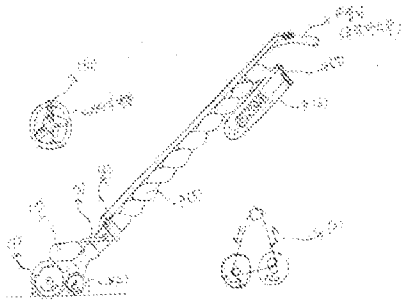
(54) 바닥 청소에 적합한 롤러를 이용한 전기청소기

(57) 요 약

일상생활에서 없어서는 안되는 진공청소기는 청소기 내부를 진공상태로 만들어 발생하는 흡인력으로 먼지와 공기를 집진통으로 빨아들이고 필터로 걸러내는 방식인 바, ① 미세먼지 재방출 ② 고용량모터 사용에 따른 소음과 전력소모 ③ 바닥에 붙어있는 오물을 제거하기 어려운 단점이 있다.

이에 본 발명에서 두 개의 롤러를 맞회전시킴으로서 바닥에 붙어있는 오물을 포함한 먼지를 회수하고 미세물방울과 함께 나선형호스를 통과시켜 물방울을 매개로 오물과 미세먼지를 뭉치게 하여 공기 중 미세먼지를 획기적으로 감소시키고, 사이클론집진기로 공기와 오물을 분리하여 공기를 대기중으로 배출시키는 전기청소기의 발명임.

대 표 도 - 도1



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특허청구의 범위

청구항 1

브러쉬(1)와 세척포(2)가 각각 부착된 두 개의 롤러를 병렬로 배치하고 각각의 크기와 회전수를 다르게 하여 맞회전시킴으로서 바닥의 오염물질과 먼지를 제거, 회수하고 미세물방울분무장치(3)와 원통형 팬(4), 나선형호스(5)로 구성되어 청소기의 흡입부로부터 유입된 먼지와 오물 등이 혼합된 공기를 나선형호스(5)를 통과시켜, 물방울을 매개로 오물, 먼지가 뭉치게 하여 공기 중 미세먼지를 감소시키며, 사이클론집진기(7)로 오물과 공기를 분리하여, 공기를 배출시키는 방식의 전기청소기 체계

청구항 2

브러쉬(1)와 세척포(2)가 각각 부착된 두 개의 롤러를 병렬로 배치하고 맞회전시킴으로써 바닥의 오염물질과 먼지를 제거,회수하며, 회전수를 다르게 하여 롤러 간 마찰을 일으켜 롤러에 묻어있는 오물까지 털어내는 기능을 포함한 청소기의 흡입부

청구항 3

미세물방울분무장치(3)(또는 스팀발생장치 등 미세물방울을 분무할 수 있는 장치 포함)와 원통형 팬(4), 나선형호스(5)로 구성되어 물방울과 오염물질이 혼합된 공기를 통과시켜 먼지 등이 물방울과 뭉치게 하여 공기 중 먼지를 감소시키는 장치.

명 세 서

발명의 상세한 설명

기 술 분 야

<1> 본 발명은 주로 마루나 대리석 등 바닥의 청소를 위한 전기청소기의 발명에 관한 것으로, 구체적으로는 비와 쓰레받기 및 걸레의 역할을 하는 두 개의 롤러로 바닥에 붙어있는 오물이나 먼지 등을 제거하고, 물방울을 분무하여 나선형 호스를 통과시킴으로서 물방울, 오물, 미세먼지가 알갱이로 뭉치게 하여 공기 중 미세먼지를 제거하고 사이클론집진기를 이용 회수함으로서 기존 진공청소기와 비교하여 미세먼지 방출 감축, 소음감소, 집진통 불필요 등 기능을 향상시킨 청소기의 발명에 관한 것이다.

배 경 기 술

<2> 일반적으로 전기청소기는 진공청소기, 스팀청소기, 스팀진공청소기 등이 있는데, 이 중 진공청소기는 청소기 내부의 팬을 고속으로 회전시켜 집진통 속의 공기를 밖으로 뽑아내 청소기 내부를 진공상태로 만드는 것이다. 청소기 안의 공기압이 낮아지면 내외부 기압의 차에 의해 흡인력이 생겨는데 이로 인해 흡입구 부근의 먼지가 공기와 함께 집진통으로 들어오게 되고 오물과 먼지를 필터로 걸러내고 공기는 밖으로 내보내는 것이다.

<3> 그런데 이러한 방식의 청소기는 ① 미세먼지의 대기중 재방출 ② 고용량모터사용 ③ 바닥에 묻어있는 오물제거 어려움 등 문제점이 있다.

<4> 구체적으로 살펴보면,

<5> - 진공청소기는 집진통을 진공상태로 만들기 위해 팬을 고속으로 회전시켜 공기를 빼내야 하는데 이 때 빼내는 공기 속에 집진통의 미세먼지가 같이 빠져 나올 수 밖에 없다. 미세먼지 방출을 줄이기 위해 집진통의 필터를 조밀하게 할 수 있으나 공기를 차단할 정도로 만들어서는 안되므로 어느 정도 미세먼지 방출을 허용할 수 밖에 없는 것이다.

<6> - 또한 진공청소기는 진공상태를 만들기 위해 고용량모터가 필요하며 전기소모량이 많고 소음이 크며 집진통 후방에 큰 부피의 모터와 팬을 장착함으로서 청소기 부피가 커지게 된다.

<7> - 공기를 빨아들이는 형태의 진공청소기는 바닥에 쌓여 있는 먼지나 이물질 등은 비교적 제거하기 용이하나 바닥에 붙어있는 오물은 쉽게 제거하기 어려워 대부분의 건물바닥청소에 비효율적이다.

발명의 내용

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해결 하고자하는 과제

<8> 본 발명은 맞회전하는 두개의 롤러에 각각 브러쉬와 새척포를 부착하여 바닥을 쓸고 닦는 기능과 물방울을 분무하여 오물, 미세먼지를 알갱이로 만들어 회수하는 오물회수장치를 일체화하여 진공청소기의 단점인 미세먼지 방출을 극소화하고, 고용량모터 사용에 따른 높은 소음과 전력소모의 단점 개선, 바닥에 묻어있는 오물을 쉽게 제거하며, 집진통을 제거하여 콤팩트한 새로운 청소기의 고안에 그 목적이 있다.

과제 해결수단

<9> 본 발명은 비와 쓰레받기를 이용하여 바닥을 청소하는 방식을 응용하여

<10> - 바닥과 접촉하여 먼지와 오물 등 이물질을 바닥으로부터 분리하는 부분

<11> - 물방울을 분사하여 나선형호스를 통과시킴으로서 오물과 미세먼지를 뭉치게 하는 부분

<12> - 이물질을 회수하고 공기를 배출하는 사이클론집진기

<13> - 롤러, 물분무기, 팬 등을 구동시키는 동력을 만드는 모터로 이루어진다

<14> 각 부분을 구체적으로 살펴보면

<15> 1. 바닥과 접촉하여 먼지와 오물 등 이물질을 바닥으로부터 분리하는 부분

<16> 브러쉬(1)와 새척포(2)가 부착된 두 개의 롤러를 병렬로 배치하고 맞회전시킴으로써 앞의 것은 비의 역할을, 뒤의 것은 쓰레받기와 걸레의 역할을 한다. 각 롤러의 직경을 다르게 하고 회전수에 차이를 두어(예 : 비 역할을 하는 앞의 것을 크게 하고 쓰레받기 역할을 하는 뒤의 것의 회전수를 빠르게 함) 앞의 롤러가 먼지와 오물을 뒤로 밀어내고 뒤의 롤러가 더 빠른 속도로 반대방향으로 돌면서 오물을 (롤러 사이를 통과하여) 후방으로 밀어낸다. 이 때 두 롤러의 상이한 회전수는 서로 마찰을 일으켜 롤러에 묻어있는 오물을 털어내는 기능을 한다.

<17> 2. 오물과 미세먼지를 뭉치게 하는 부분

<18> 이 부분은 롤러 후방에 물방울분무노즐(3)과 원통형 팬(4), 나선형 호스(5)로 구성되어 있으며 롤러를 통과한 오물과 먼지를 미세물방울을 매개로 알갱이로 뭉치게 하여 사이클론집진기(6)로 밀어내는 기능을 한다.

<19> 즉 노즐(3)에서 미세물방울을 분사하여 오물, 먼지, 물방울, 공기를 원통형 팬(4)을 이용하여 나선형호스(5)로 통과시킨다. 공기 등은 나선형호스를 통과하면서 회오리지게 되며 물방울과 함께 먼지와 오물이 뭉치게 되어 공기 중 미세먼지를 감소시킨다.

<20> 원통형 팬은 파이프형태의 원통 안쪽에 회전날개(10)를 달아 외부모터(9)의 힘으로 회전시키는 구조인 바, 기존 팬에 비해 중앙의 모터부분이 없어 공기가 원통 중앙을 통과하는데 저장이 없도록 만들어진 구조이다.

<21> 3. 오물을 회수하고 공기를 배출하는 사이클론집진기.

<22> 나선형호스를 통과하면서 오물은 알갱이로 뭉치게 되어 사이클론집진기(6)에서 회수되고 공기는 후방으로 배출되게 된다. 일부 공기와 함께 배출되는 알갱이를 최종적으로 회수하기 위해 공기배출구 부분에 필터(7)를 장착한다.

<23> 4. 동력을 공급하는 모터

<24> 본 청소기에서 동력이 필요한 부분은 롤러(1,2), 물분무기(3), 원통형 팬(4) 등 세 곳인데 이 모두가 근접거리에서 작동하게 되므로 롤러와 원통형 팬은 벨트(8), 기어 등을 이용하여 하나의 모터로 작동시킬 수 있으며, 물분무기는 소형콤푸레서를 이용하여 가동시키며, 스팀발생장치 등으로 대체할 수 있다.

<25>

효 과

<26> 본 발명은 두 개의 롤러가 비와 걸레의 역할을 하며, 물방울을 매개로 오물과 먼지를 뭉치게 하여, 사이클론집진기에서 오물과 공기를 분리함으로써 기존 진공청소기의 단점인 미세먼지의 공기 중 재방출을 획기적으로 감소시키고, 저용량모터를 사용하여 소음 감소 및 전력 소모를 줄일 수 있으며 바닥에 붙어있는 오물까지 걸레로 닦아내듯이 확실하게 제거하는 효과가 있다. 또한 기존 진공청소기의 집진통을 없앨 수 있어 사용하기에 편리

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하다

<27> .

발명의 실시를 위한 구체적인 내용

<28> 본 발명은 브러쉬와 세척포가 각각 부착된 두 개의 롤러를 병렬로 배치하고 각각의 크기와 회전수를 다르게 하여 맞회전시킴으로서 바닥에 붙어있는 오물을 포함한 오염물질과 먼지를 회수하고 미세물방울분무장치와 공기를 후방으로 배출하기위한 원통형 팬, 나선형호스로 구성되어 물방울을 매개로 오물, 먼지 등이 뭉치게하여 공기 중 미세먼지를 획기적으로 감소시키고 사이클론집진기로 오물과 공기를 분리하는 구조로, 롤러와 원통형 팬은 동력전달벨트와 기어 등을 이용하여 하나의 모터로 구동시킬 수 있으며 미세물방울분사장치는 소형콤프레셔를 이용하거나 스팀발생장치 등을 사용할 수 있다.

도면의 간단한 설명

<29> 1. 두 대의 롤러(1, 2)가 맞회전하면서 바닥의 오물을 회수하며 물방울, 오물, 먼지 등이 혼합된 공기는 나선형호스(5)를 통과하면서 오물이 뭉치게 된다

<30> 2. 흡입부와 나선형호스부분의 연결부위는 회전관절을 사용하여 자유롭게 각도를 조절할 수 있도록 한다

<31> 3. 공기과 오물덩어리는 사이클론집진기(6)에서 분리되어 공기만 배출되는데 최종적으로 필터(7)로 걸러내어 청소기의 효율을 높여준다.

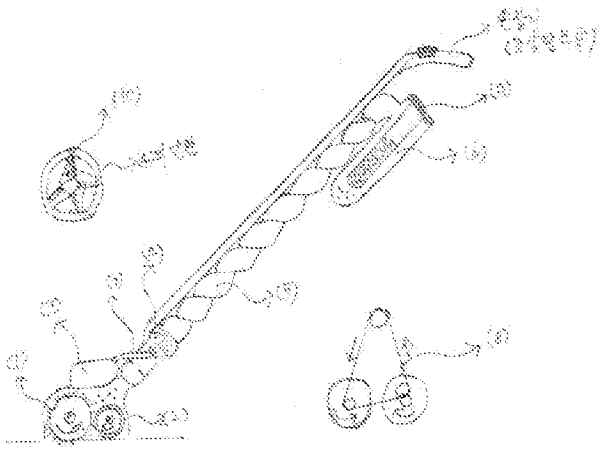
<32> 4. 롤러는 모터와 연결된 고무벨트(8)를 사용하여 동시에 맞회전하도록 한다(시계방향과 시계반대방향).

<33> 5. 원통형 팬은 파이프형 원통의 안쪽에 회전날개(10)를 달아 외부 모터로 회전시켜 공기가 나선형호스(5)로 배출되도록 해준다.

<34> 6. 손잡이 부분에 조작반을 설치한다.

도면

도면1



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VACUUM CLEANER

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Applicant(s): TSUIN BADO KOGYO KK ±

Classification: - international: ***A47L5/24; A47L5/28***

- cooperative:

Application number: JP20070044726 20070223

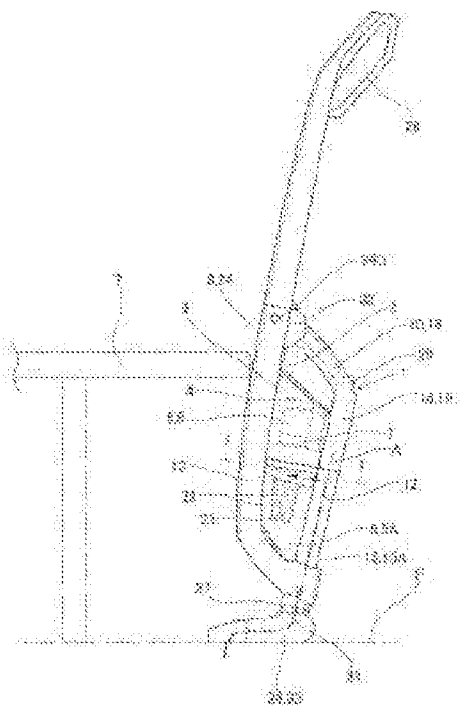
Priority number(s): JP20070044726 20070223

Also published as: JP4895326 (B2) CN101248972 (A)

Abstract of JP2008206613 (A)

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PROBLEM TO BE SOLVED: To provide a separated type vacuum cleaner capable of preventing the vacuum cleaner from being enlarged in size due to protection means for protecting the vacuum cleaner from impact when colliding with an obstacle. ;SOLUTION: The protection means 15A is provided at a front part of a vacuum cleaner body 1, and a housing part 2 is provided to appear on the back side of a support 3. The housing part 2 is composed in such a way that the vacuum cleaner body 1 can be housed with the protection means 15A directed backward. In using the vacuum cleaner body 1 solely, the vacuum cleaner body 1 can be protected from an impact by the protection means 15A even if the vacuum cleaner body 1 is collided with an obstacle ahead of it. In using the vacuum cleaner body 1 as installed on the support 3, the vacuum cleaner body 1 can be protected from an impact by means of the support 3 even if the vacuum cleaner is collided with an obstacle. ;COPYRIGHT: (C)2008,JPO&INPIT



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DESCRIPTION JP2008206613

[Problem] in the separation-type electric vacuum cleaner, as much as possible to prevent to be an increase in the size of the vacuum cleaner by the protection means for protecting the vacuum cleaner from the impact at the time of the collision with the obstacle. A provided an electric vacuum cleaner front protective means 15A of the main body 1, provided with a container 2 as it appears to the rear side of the support body 3, an electric vacuum cleaner in a state in which the protection means 15A is directed behind possible housing the body 1, constituting the housing part 2. And, if you use the vacuum cleaner body 1 alone, it is allowed to collide with this vacuum cleaner body 1 in front of the obstacle, by the protection means 15A, to protect the vacuum cleaner body 1 from the impact can. Also, if you use the install a vacuum cleaner body 1 to the support 3, it is allowed to collide with the vacuum cleaner to the obstacle, by the support 3, to protect the vacuum cleaner body 1 from the impact be able to. .FIELD 2

Vacuum cleaner

[0001]

The present invention relates to a vacuum cleaner, and more particularly to a separation type vacuum cleaner.

[0002]

Conventionally, as an electric vacuum cleaner of this type includes a vacuum cleaner main body with a built-in electric blower has a suction port and a dust collecting unit, and a support member which the vacuum cleaner main body is housed, the support , having a nozzle head at one end, and having a gripping portion at the other end, has a housing portion for housing the vacuum cleaner main body to the front, the nozzle head said at storage of the vacuum cleaner main body through the suction port is configured to be communicated with the dust collection unit, used to accommodate the vacuum cleaner main body alone or in the support, the suction port or the dust sucked from the nozzle head the dust collection unit those that accumulate in is known (for example, Patent documents 1 and 2). Then, such a separation type of vacuum cleaner, the vacuum cleaner body by gripping the grip portion in a state of being received in the receiving portion provided in a front portion of the support, as a stick-type vacuum cleaner or use so as to suck the dust from the nozzle head, or is configured to be able to or used alone the vacuum cleaner main body as a hand-held vacuum cleaner. Patent No. 2527275 Publication Hei 4-364822 JP

[0003]

In the prior art, if you want to use the vacuum cleaner body as a stick type of vacuum cleaner in a state of being housed in the support, when cleaning the floor, for example, are such as a desk or table is put, under such as a desk cr table the insert the nozzle head, and the nozzle head to try cleaning is moved along the floor, will be the front of the vacuum cleaner tc a desk cr table or the like collide, and the vacuum cleaner body by this shock airflow leakage may occur in misaligned relation of the support, in some cases there is a risk that the vacuum cleaner main body or accidentally falling off from the support. In addition, if the crack in the dust collection unit and the like by the impact at the time of collision occurs, airflow leakage was also a fear that is generated by this crack. Furthermore, the impact upon collision, the vacuum cleaner motor blower in the body there is also a fear that damaged. Moreover, such a vacuum cleaner, when used in inclined backward, not only pushes forward along the floor surface, because along the floor sometimes pull rearwardly, the rear of the vacuum cleaner There is fear that collide with the obstacle, also hand away from the grip portion by an impact or the like during a collision, the vacuum cleaner has a fear that dropped on the floor, the shock caused by such a collision or falling , seal failure occurs or shifted the positional relationship of the vacuum cleaner body and the support, cr the vacuum cleaner body tc fall off from the support, also fear that the dust collection unit and the electric blower or damage there were.

[0004]

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On the other hand, using the vacuum cleaner body alone, for example, along the top plate on such as a desk or table to move the vacuum cleaner body to try and cleaned, said the electric stand or the like on the top plate vacuum cleaner body collide, by this impact, the dust collection unit and the electric blower there is also a fear of damage.

[0005]

To solve the problems associated with such impact, the protection means, first, by providing the front portion of the vacuum cleaner body in use, secondly, be provided to the rear of the support Conceivable.

[0006]

By the way, the impact when the vacuum cleaner during cleaning collides with the obstacle, towards the case of using the attach the vacuum cleaner main body to said support, than when using the vacuum cleaner main body alone large. This is the ictai weight of the support and the vacuum cleaner main body, the difference of the weight of the vacuum cleaner body itself, as well as obstacles placed on the floor is placed on the top plate such as a desk or table due to the fact that there is a tendency weight is greater than the obstacles. Accordingly, the at the front of the vacuum cleaner body is attached to the front of the support is not a collision impact during a single use, a protective means for anticipating a collision impact in the state attached to the support there must, as a result, the vacuum cleaner main body should be small ends up size, there is a fear that reduces the usability in using the vacuum cleaner main body by itself.

[0007]

The present invention solves the above problems, an electric vacuum cleaner body and the support is a vacuum cleaner which can be separated, the vacuum cleaner according to protection means for protecting the vacuum cleaner from the impact when colliding with an obstacle and an object thereof is to prevent increase in size of the as much as possible.

[0008]

Claimed invention of claim 1 includes a dust collecting unit first suction port is connected via a first intake passage to the first inlet port while being formed and the electric blower at one end and the other end to the first a vacuum cleaner main body having a grip portion, and a support having a housing portion for detachably accommodating the vacuum cleaner body, this support is, on its other end and having a nozzle head on one end having a second grip portion, wherein the second suction port provided with a nozzle head, communicating the second intake passage connectable with the second suction port in the dust collection unit and the electric blower when storage of the cleaner body in the configuration the vacuum cleaner tc the provided protection means in front of the vacuum cleaner main body, provided with said housing portion so as to appear to the rear side of the support, the housing part, said protective means a vacuum cleaner, characterized in that the housing be capable of forming the electric vacuum cleaner main body so as to be backward.

[0009]

Further, the invention of claim 2, wherein the protective means, the front portion of which is provided in the longitudinal direction of the vacuum cleaner main body, when the housing part is, that houses the vacuum cleaner main body, wherein the protection means it is an electric vacuum cleaner of claim 1, wherein the the length direction is formed along the length direction of the support.

[0010]

Further, the invention of claim 3, the first intake passage is formed by a substantially straight tubular portion, together with provision of the pipe-shaped portion at the front of the vacuum cleaner main body, around said pipe-shaped portion a claim 1 or 2, the electric vacuum cleaner according to characterized by providing said protection means.

[0011]

Further, the invention of claim 4, upon storage of the vacuum cleaner main body, according tc claim 1, wherein the second air intake passage through the first suction port and wherein the communicating with the dust collecting unit and the electric blower to 3 is a vacuum cleaner according to any one of.

[0012]

According to the invention of claim 1, if you use the vacuum cleaner body alone, be allowed to collide with the vacuum cleaner body to the obstacle in front of the vacuum cleaner body, said from the impact at this time the vacuum cleaner main body can be protected by the protective means and, when used in a state fitted with the vacuum cleaner body to the support, also by colliding a vacuum cleaner obstacles in front of the support , together with the vacuum cleaner body from the impact of this case can be protected by the support, or the collide a vacuum cleaner with an obstacle in the rear of the vacuum cleaner, it is dropped the vacuum cleaner during use even or, it is possible to protect the vacuum cleaner body by the protective means of backward. Furthermore, such protection means, the cleaner a

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small impact as compared to the case of collision with an obstacle the body in a state attached to the support, the front of when using the vacuum cleaner main body alone impact when colliding with an obstacle, or the front of the cleaner body those necessary and sufficient size to withstand shock when colliding with the cleaner main body behind the obstacle in the state attached to the support may be provided only on, it can be dispensed protective member with minimal deployment.

[0013]

Also, according to the second aspect of the present invention, even when using the vacuum cleaner main body by itself, even when used by mounting on the support, the shock absorbing means, said vacuum cleaner main body or the electric vacuum by provided along the longitudinal direction of the machine, as a result, it is possible to increase the area to be protected by said protective means as much as possible.

[0014]

Also, according to the invention of claim 3, by providing the protective means around the substantially straight pipe-shaped portion that forms the first intake passage, it is made compact of the vacuum cleaner main body it can.

[0015]

Further, according to the invention of claim 4, when storage of the vacuum cleaner main body, the second intake passage via the first suction port can be easily connected to the dust collection unit and the electric blower.

[0016]

For the preferred embodiments of the present invention will be described with reference to the accompanying drawings. Incidentally, embodiments described below are not intended to limit the content of the present invention described in the appended claims. Further, all of the configurations described below are not necessarily essential requirement of the present invention.

[0017]

Each figure shows the first embodiment. Incidentally, FIG. 1, 2, and 7, the left side is earlier. Vacuum cleaner of the present invention configured in the separation type, as shown in FIG. 1, a vacuum cleaner main body 1, as shown in FIG. 2, housing for detachably accommodating the vacuum cleaner main body 1 and a support 3 with a part 2. The vacuum cleaner main body 1, as shown in FIG. 1, a machine frame casing 4 is configured to have one end rotatably attached are dust collecting unit detachably attached to portion 5 of the machine frame case 4. Then, the inside of the machine frame casing 4, the motor 6 and the electric configured and a fan 7 blower 8 and the rechargeable battery 9 is built, the other end (upper in Fig. 1) the first gripping portion 10 is formed. Further, the front end portion of the dust collection unit 5 (the lower in Fig. 1), a first connecting with the first suction port 11 is formed, the dust collecting part 5 and the first suction port 11 air intake passage 12 is formed integrally with the dust collecting part 5. Further, the focusing in the vessel 5A dust portion 5 and swirl generating means 13 is detachably attached, by the swirl generating means 13, the dust collection unit 5 is in a cyclonic separating apparatus. Further, the dust collection unit 5, via said electric blower 9 is connected to an exhaust passage (not shown) formed in the machine frame casing 4. Then, as shown in FIG. 1, the first intake passage 12, from said first suction port 11 to the inlet port 14, a front hollow which is formed integrally with the dust collecting part 5 of the dust collection unit 5 it is constituted by a first pipe-shaped portion 15. Note that the first pipe-shaped portion 15, has a semicircular shape with flat cross section projecting forward and the center axis A, in a state fitted with the dust collection unit 5 to the machine frame casing 4, wherein as along the longitudinal direction of the vacuum cleaner main body 1, it is formed integrally with the dust collecting part 5. Further, the outer circumference of the first tubular portion 15 is covered with a synthetic resin protective means 15A. Between the protective means 15A and the first tubular portion 15, and a slight gap is formed. Further, the width W1 of the protective means 15A is formed smaller than the lateral width W2 of the dust collection unit 5 (W1 <W2). Furthermore, the first gripping portion 10, the front and rear of the machine frame casing 4, the coupling portion 16 and the rear connecting portion 17 before each projecting obliquely upward and rearward in the posture of FIG. 1, these connecting portions which it was provided with a grip portion 18 which connects the ends of 16 and 17, and these connecting portions 16, 17 and grip 18 is formed in a substantially U-shaped in side view.

And, said before the connecting portion 16 is provided in such a way that the protective means 15A and the flush state. That is, the second pipe-shaped portion 19 forming the front coupling portion 16 provided on a front portion of the machine frame case 4, the and the outer circumferential shape with the protective means 15A coaxially covering said first tubular portion 15 it is substantially the same. Note that the second pipe-shaped portion 19, although formed like a pipe, do not constitute the first intake passage 12. Then, the front end of the upper end in and the grip portion 18 of the front connecting portion 16, the switch 20 for operating the electric blower 8 is provided.

[0018]

Incidentally, the dust collection unit 5 is a cyclonic separating device, in its front upper portion, said inlet port 14 for communicating the the container 5A the first pipe-shaped portion 15 together constitute the first intake passage 12 is formed ing. Then, the central axis X of the inlet port 14 is arranged

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perpendicular to the axis Y of the dust collection unit 5. Moreover, the upper opening of the container 5A of the dust collecting part 5 is attached said vortex generating means 13 is formed airflow guide portion 13A of the swirl generating means 13 is opposite to the inlet port 14 , wherein with the primary side of the airflow guide portion 13A is connected to the inlet port 14 communicates with the secondary side in the container 5A of the dust collecting part 5 oriented in the tangential direction of a circle centered on the axis Y-. Further, substantially at the center of the vortex flow generating means 13, together with the frame body 21 formed in a substantially cylindrical shape as a whole is provided on the axis Y coaxially, filter 22 is provided in the frame body 21 ing. Further, above the axis Y-direction of the container 5A of the frame body 21, an exhaust passage 23 are formed, the exhaust passage 23 is in communication with the electric blower 8.

[0019]

The support 3, as a base for using the vacuum cleaner main body 1 as a stick-type vacuum cleaner. Then, the support body 24 of the support 3, and a front portion 24A and the rear surface portion 24B, a and internally hollow in vertically long, flat sectional shape, has a substantially crescent shape protruding frontward . Incidentally, the supporting body 24 is foldable by a shaft 24C, also the width W3 is larger than the lateral width W1 of small and the protection unit 15A than the lateral width W2 of the dust collection unit 5 (W1 <W3 < W2). Further, the one end of the support body 24 (lower side in FIG. 2), the nozzle head 26 Horizontal suction port 25 is provided is connected rotatably via a universal joint 27. Further, the other end side of the support body 24 of the support body 3 (upper side in FIG. 2), the second grip portion 28 is integrally provided. Furthermore, the the support 3, the said container 2 on the rear side of the one end toward the support body 24 is formed in a concave shape. And, the support body 24 is formed in a bow shape front protrudes slightly forward as a whole. Further, the receiving unit 2, the while being formed so as to appear to the rear side of the support body 3, the container 2 is the second tubular portion 19 continuing in a straight line thereto and said first tubular portion 15 There is formed in a state in which the state became backward electric cleaner body 1 is so made possible housing, rear excluding the front and below the container 2, upper, and right and left open. Further, it said downwardly container 2, the and the vacuum cleaner one end mountable on a mounting receiving part 29 of the main body 1 is provided on the mounting receptacle 29, the universal joint 27 connection port 30 of the secondary side is provided upward. Note that the connection port 30, the first suction port 11 is configured so as to be communicated with hermetically connected to, and more side periphery after the connection port 30, the first of said first tubular section 15 one first fitting receiving portion 31 capable of both the left and right sides and the rear is fitted around the suction port 11 is projected upward become a U-shaped in plan view. On the other hand, in the upper portion of the storage portion 2, a portion corresponding to the rear coupling portion 17 when accommodating the vacuum cleaner main body 1, the connecting portion vicinity of the rear connecting portion 17 and the grip portion 18 in the embodiment to the corresponding point, the second fitting receiving portion 32 of the fixable left and right pair by sandwiching the relevant section from the left and right are provided.

[0020]

Incidentally, the nozzle head 26, the lower surface front portion of the head case 33 of the flat box-type along with a plan view is substantially T-shape, provided the Horizontal inlet port 25 is made longer open in the lateral direction, It communicates with the universal joint 27 The second intake passage 34 is formed between the said obiong suction port 25 to the connection port 30.

[0021]

In the electric vacuum cleaner having the above structure, in order to clean the surface to be cleaned G of the top plate choice of a desk or table, by separating the vacuum cleaner body 1 from the support 3, this vacuum cleaner main body when using 1, the user, with the vacuum cleaner main body 1 holds the grip portion 18 of the first grip portion 11 provided at the other end of the machine frame casing 4. Then, when the user operates the switch 20, the fan 7 rotates the electric air blower 8 by the electric power from the rechargeable battery 9 is operated, whereby, first from the first suction port 11 is sucked through the pipe-like member 15, the dust collection unit 5 and passes through the electric blower 8, a suction air current is discharged to 4 outer said machine frame casing through the exhaust passage (not shown) is generated. Thus, the closer the first suction port 11 to the surface being cleaned G in a state where the electric blower 8 is activated, the electric vacuum cleaner such that said first suction port 11 along the surface to be cleaned G moves by moving the main body 1, a suction air stream including the dust sucked from the first suction port 11, and the first pipe-shaped portion which suction air stream containing the dust constitutes the first intake passage 12 15 through the inlet port 14 from flowing into the container 5A of the dust collection unit 5.

[0022]

Then, air flow containing dust that has entered into the container 5A of the dust collecting part 5 from the inlet port 14, the airflow guide portion 13A of the swirl generating means 13 that is oriented in the tangential direction of the inner surface of the container 5A in, together with the vortex swirling along the inner circumferential surface of the vessel 5A, it is lowered inside the container 5A into a spiral. At this time, among the dust contained in the vortex, at least coarser dust, by being pressed against the inner peripheral surface of the container 5A of the dust collection unit 5 by centrifugal force, will be separated from the vortex. Then, air flow coarse dust is separated by centrifugal force passes through the filter 22 provided at the center of the vortex generating means 13. Then, when said air flow passes through the filter 22, a centrifugal force that is included in said air flow fine dust not separated is filtered. Furthermore, air flow dust is removed by the filter 22, through the exhaust passage 23 is discharged

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from the dust collecting part 5, it is sucked into the electric blower 8. Then, the dust that has been separated in this way from the air flow, are retained in the container 5A of the dust collecting part 5. At this time, in use of FIG. 1, the by inlet 14 is disposed above the container 5A of the dust collecting part 5, said from the inlet port 14 the dust accumulated in the vessel 5A is by its own weight not be back to the first suction port 11. In addition, the retained in the container 5A dust, the dust collecting part 5 together with detached from the machine frame case 4, remove the swirl generating means 13 from the inside of the container 5A, the upper opening of the container 5A by causing opened, it can be discarded.

[0023]

In this way, it said when the vacuum cleaner body 1 used alone to clean the surface to be cleaned G of the top plate choice of a desk or table, this obstacle that is placed on the surface to be cleaned G (for example, a display D the vacuum cleaner body 1 there is a risk of collision to etc.). However, the even the vacuum cleaner main body 1 collides with an obstacle such as a display D, the position of the collision is a protecting means 15A covering said first tubular portion 15. Then, as mentioned above, by a slight gap is formed between the protective means 15A and the first tubular portion 15, the protection means 15A is configured to be deformed by the impact during collision because there, the shock is absorbed by the deformation of the protective means 15A, the impact which the first pipe-shaped portion 15 is subjected is relaxed. Thereby, the first pipe-shaped portion 15 and the container 5A, i.e the dust collecting part 5 is not only able to reduce the possibility that air flow leakage occurs damaged, the machine frame in which the dust collecting part 5 is attached it can reduce the failure or the like due to the impact to the motor 6 and the fan 7 of the electric blower 8 provided in the case 4.

[0024]

On the other hand, when used to clean the surface to be cleaned F of the floor surface or the like under a desk or table, as vacuum cleaner of the stick type with installed the vacuum cleaner main body 1 to the support 3, the user is said to connection port 30 of the support member 3 so that the first suction port 11 of the vacuum cleaner main body 1 is connected, together with the housing the vacuum cleaner main body 1 in the holding section 2 of the support 3, wherein having said second gripping portion 28 provided at the other end of the support body 24 of the support body 3, placing the nozzle head 26 provided at one end of the supporting body 24 onto the surface to be cleaned F. Then, when the user operates the switch 20, the fan 7 rotates the electric air blower 8 by the electric power from the rechargeable battery 9 is operated, whereby, a suction air current second containing the dust wherein a suction port is sucked from the horizontal suction port 25, the nozzle head 26, universal joint 27, the connecting port 30 through (i.e. the second intake passage 34), the first tubular member from said first suction port 11 street 15 (ie, the first intake passage 12), flows into the container 5A of the dust collecting part 5. Then, the first intake passage 12 late and (over to the connection port 30 from the universal joint 27) of the second intake passage 34, as shown in FIG. 2 will be linearly connected. Accordingly, less pressure loss as compared with the case where the intake passage is curved, the suction airflow is not only flows smoothly up the container 5A, dust adheres collides with the wall of the bent portion of the intake passage problem is also less likely to occur, such as. Incidentally, because as described above for the separation and discharge of the air flow of the dust, and a description thereof will be omitted.

[0025]

In this way, when cleaning the surface to be cleaned F of the floor and the like using the vacuum cleaner as a stick type, obstacles that this is put on the surface to be cleaned F (for example, such as the top plate T of a desk or table) there is the possibility that the vacuum cleaner collides with. However, it said even if the vacuum cleaner has collided with an obstacle such as the top plate T of a desk or table, the position that the conflict is a hollow the supporting body 24. Then, as described above, by the supporting body 24 is configured hollow, since the supporting body 24 by the impact at the time of collision is configured to be deformable, impact by deformation of the support body 24 is absorbed is the impact which the vacuum cleaner main body 1 attached to the support member 3 is subjected is relaxed. This makes it possible to reduce the failure or the like due to the impact to the motor 6 and the fan 7 of the provided in the attached above the vacuum cleaner main body 1 of the machine frame casing 4 on the support 3 the electric blower 8 .

[0026]

Also, if you want to clean in a state of mounting the vacuum cleaner body 1 to the support 3, when to draw the vacuum cleaner to the rear along the surface to be cleaned F, collision the rear of the vacuum cleaner to the obstacle not only there is fear that is, wherein the vacuum cleaner fall by the second hand from the grip portion 28 thus away, behind the electric vacuum cleaner is also fear that impinge on the floor F. However, such a case, along with impinging on the protective unit 15A floor F covering the first tubular portion 15 which is attached to the backward, as described above, the protection means 15A and the first pipe-shaped portion by a slight gap is formed between the 15, since the protection unit 15A by the impact at the time of collision is configured to be deformable, impact is absorbed by the deformation of the protecting means 15A, the first impact pipe-like portion 15 is subjected is relaxed. Thereby, the first pipe-shaped portion 15 and the container 5A, i.e. the dust collecting part 5 is not only able to reduce the possibility that air flow leakage occurs damaged, the machine frame in which the dust collecting part 5 is attached it can reduce the failure or the like due to the impact to the motor 6 and the fan 7 of the electric blower 8 provided in the case 4.

[0027]

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incidentally, when used as a stick-type vacuum cleaner in a state of attaching the vacuum cleaner main body 1 to the support 3, impact when the supporting body 24 has collided with an obstacle such as a top plate T of a desk or table , when using said vacuum cleaner main body 1 as a hand-held vacuum cleaner alone, the protection means 15A is greater than the impact when colliding with an obstacle such as a display D. This is the the total weight of the support 3 and the vacuum cleaner main body 1, the difference between the vacuum cleaner main body 1 single weight, obstacles placed on the surface to be cleaned F, such as floor, desk or table of the weight than the obstacles that are placed on the surface to be cleaned G of the top plate or the like is in the larger trend, as well, it is the speed to move the vacuum cleaner of the stick-type on the surface to be cleaned F such as a floor, desk due to be like in and faster trend than the speed of moving the hand-held vacuum cleaner on the surface to be cleaned G of the top plate and the like of the table. Accordingly, the support body 24 of the support 3, although it is necessary to form the shape and size in anticipation large collision impact when used as a stick-type vacuum cleaner, the front part of the vacuum cleaner main body 1 the protection means 15A provided in may be formed in a relatively small collision impact anticipation shape and size of the case of using the vacuum cleaner main body 1 alone, as a result, of the vacuum cleaner main body 1 it can be suppressed in size, usability when using this vacuum cleaner main body 1 alone may be prevented from being lowered.

[0028]

Further, when used as a stick-type vacuum cleaner in a state of attaching the vacuum cleaner main body 1 to the support 3, the support body 24 as the front side of the vacuum cleaner such as a top plate T of a desk or table impact when colliding with an obstacle, said protection means 15A as the rear side of the vacuum cleaner is in the greater tendency than impact when colliding with an obstacle. This is because, as shown in FIG. 2, the by electric vacuum cleaner has fallen backward, the case where along the surface to be cleaned F pushes the vacuum cleaner forward, the supporting body 24 of the vacuum cleaner force acts to press the vacuum cleaner by the impact at the time of the collision with the obstacle of the top plate T such as a desk or table to the surface to be cleaned F, the force at the time of collision between the top plate T or the like and the surface to be cleaned F while there is no escape of, the case that along the surface to be cleaned F draw the vacuum cleaner in the rear, an obstacle with a risk of collision in the protection means 15A is, between the vacuum cleaner and the user because they must be present, since it is relatively low, the force float the vacuum cleaner by impact when colliding with the protection means 15A is low obstacle of the vacuum cleaner from the surface to be cleaned F acts , whereby, because can escape moderately force at the time of collision Moreover, the frequency of collision of the supporting body 24 as the front side of the electric vacuum cleaner is also higher than the collision frequency of the protection unit 15A serving as a rear side of the vacuum cleaner. This is because, as mentioned above, if the obstacle collides with the protective unit 15A, the obstacle is to must exist between said user vacuum cleaner. Therefore, in an electric vacuum cleaner of the state used as a stick, protection means 15A which is located on the rear side of the electric vacuum cleaner, a relatively small collision impact when using the vacuum cleaner main body 1 alone even was formed in anticipation shape and size, it can be protected sufficiently the vacuum cleaner body 1 from the impact by the collision with the obstacle.

[0029]

As described above, in the above embodiment, the first suction port 11 is the first suction port 11 to the dust portion 5 and the electric blower current connected via a first intake passage 12 is formed in a one end portion comprising a vacuum cleaner body 1 and has a first grip portion 10 provided at the other end with 8, and a support member 3 having a container 2 for detachably accommodating the vacuum cleaner main body 1, the support 3, with its one end to have a second gripping portion 23 on its other end and having a nozzle head 26 is provided with a horizontal suction port 25 as a second suction port to the nozzle head 26, the Horizontal inlet port 25 the second intake passage 34 connectable configured to communicate with the dust collecting part 5 and the electric blower 8 when said cleaner main body 1 housing and the protective means 15A at the front of the vacuum cleaner main body 1 provided, the container 2 provided with to appear on the rear side of the support 3, by the protecting means 15A to the housing portion 2 is accommodated capable constituting the electric vacuum cleaner main body 1 such that the backward , if you use the vacuum cleaner body 1 alone to clean on the surface to be cleaned G of the top plate such as a desk or table, by colliding with the obstacle of the display D, etc. in front on the surface to be cleaned G also, due to its from the impact the protection means 15A to protect the dust collecting part 5, the dust collection unit 5, and hence of the electric blower 8 of the dust collecting part 5 is the machine frame casing 4 attached damage can be prevented. In addition, electric vacuum in the case said the support 3 vacuum cleaner be used in a state of mounting the body 1 to clean the surface to be cleaned F of the floor and the like, an obstacle such as the front of the top plate T by the support 3 machine it is possible to protect the vacuum cleaner body 1 by the support 3 is also in conflict, or collide with the vacuum cleaner in the rear of the obstacle of the vacuum cleaner when it pulled along the surface to be cleaned F , the rear portion of the vacuum cleaner away the hand from the second gripping portion 23 during the cleaning be or not to collide with the surface to be cleaned F, by the protection means 15A is located in the rear part of the vacuum cleaner, these the dust collecting part 5 from the impact of the collision, and can protect the electric air blower 8 in turn the dust collecting part 5 is the machine frame casing 4 attached. Furthermore, it is sufficient form the protective means 15A a relatively small collision impact in anticipation shape and size of the case of using the vacuum cleaner main body 1 alone, be dispensed protection means 15A with a minimum of one it can be, as a result, the vacuum cleaner main body 1, can be dispensed remain compact without thus upsizing the entire vacuum cleaner, which makes it possible to maintain the operability of the vacuum cleaner .

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[0030]

Moreover, the protection unit 15A is, the vacuum cleaner main body 1 which is provided in the longitudinal direction of the portion corresponding to the front when used alone, the longitudinal direction of said protection means 15A, i.e. the protective means 15A central axis line a, that the housing part 2 so as to extend along nearly the length direction of the support member 3 is provided, if you use the vacuum cleaner body 1 alone, or used in conjunction with the support 3 in the case of the protective means 15A becomes vertically, as a result, it is possible to increase the effective length of the shock absorption by the protecting means 15A as much as possible.

[0031]

Further, by providing the protective means 15A around the substantially straight first pipe-shaped portion 15 forming the first intake passage 12, reduced in size while avoiding an increase in size of the electric vacuum cleaner main body 1 be able to.

[0032]

Moreover, by the electric vacuum cleaner wherein the second intake passage 34 via the first suction port 11 during storage of the main body 1 is communicated to the dust collecting part 5 and the electric blower 6, the first suction port 11 by accommodating the electric vacuum cleaner main body 1 to be connected to the connection opening 30 to the container 2, the second intake passage 34 to the dust collection unit 5 and the electric blower through the first air intake passage 12 it can be easily connected to the vessel 8.

[0033]

The present invention is not limited to the above embodiments, and various modifications can be implemented within the scope of the invention. For example, in the above embodiment, synthetic resin of the protective means is deformable by interposing a slight gap around the pipe-shaped portion, but without providing such gap, of the pipe-shaped portion to coat a soft synthetic resin surrounding called elastomers may form the protective means.

[0034]

As described above, the electric vacuum cleaner according to the present invention can be applied to various applications. Also the dust collecting unit may be a filter system rather than the cyclonic separating apparatus.

[0035]

It is a side view in use of the vacuum cleaner main body showing a first embodiment of the present invention. Same is a side view in use of a state where the vacuum cleaner body attached to the support. Same, a sectional view taken along line I-I of FIG. Same is a front view at the time of upright state in which the vacuum cleaner main body attached to the support. Same, is a plan view at an upright state in which the vacuum cleaner main body attached to the support. Same, is a bottom view at an upright state in which the vacuum cleaner main body attached to the support. Same, it is a side view of a state where the vacuum cleaner body is detached from the support. Same is a rear view obtained by side-by-side the cleaner body and the support of the state where the vacuum cleaner body is detached from the support. Same is a plan view of the support.

Description of the code

[0036]

1 vacuum cleaner body 2 housing unit 3 support 5 dust collecting part 8 electric blower 10 first gripping part 11 first suction port 12 first intake passage 15 first pipe-shaped portion 15A protection means 25 Horizontal inlet (the second suction port) 26-nozzle head 28 second gripping part 30 connection port 34 second air intake passage

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CLAIMS JP2008206613

1.

Electric vacuum the first suction port is provided with a first grip portion in and the other end provided with a dust portion collector is connected via a first intake passage and the electric blower to the first suction port is formed in a one end portion and the machine body, And a support having a housing portion for detachably accommodating the vacuum cleaner main body, The support has a second grip portion to the other end and having a nozzle head on one end, said provided with a second suction port in the nozzle head, connectable second intake and the second suction port in the configuration electric vacuum cleaner so as to communicate with the road in the dust collection unit and the electric blower at the time of storage of the cleaner body, The protection means provided at the front of the vacuum cleaner main body, said housing portion provided with to appear on the rear side of the support, the housing part, the vacuum cleaner main body so that the protective means is backward vacuum cleaner which is characterized in that housed configured to be able to.

2.

The protection means, the front portion of which is provided in the longitudinal direction of the vacuum cleaner main body, the storage unit is, upon storing the vacuum cleaner main body, a longitudinal direction of said protection means of the support vacuum cleaner according to claim 1, characterized in that it is configured to extend along the length direction.

3.

Wherein a first intake passage formed by the substantially straight pipe-shaped portion, together with provision of the pipe-shaped portion at the front of the vacuum cleaner main body, provided with the protective means around said pipe-shaped portion vacuum cleaner according to claim 1 or 2 wherein the.

4.

When storage of the vacuum cleaner main body, according to any one of claims 1 to 3, wherein the second air intake passage through the first suction port and wherein the communicating with the dust collecting unit and the electric blower electric vacuum cleaner.

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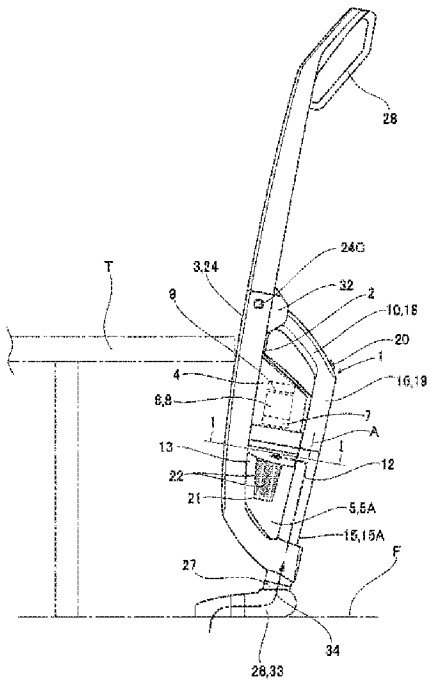
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(54)【発明の名称】電気掃除機

(57)【要約】
【課題】分離型電気掃除機において、障害物に衝突した際の衝撃から電気掃除機を保護するための保護手段による電気掃除機の大型化を可及的に阻止すること。
【解決手段】電気掃除機本体１の前部に保護手段１５Ａを設け、収納部２を支持体３の後側に現れるように設けると共に、前記保護手段１５Ａが後ろを向いた状態で電気掃除機本体１を収納可能に、前記収納部２を構成する。そして、前記電気掃除機本体１を単独で使用する場合、この電気掃除機本体１を前方の障害物に衝突させても、前記保護手段１５Ａにより、その衝撃から前記掃除機本体１を保護することができる。また、前記支持体３に前記電気掃除機本体１を取り付けて使用する場合、障害物に前記電気掃除機を衝突させても、前記支持体３により、その衝撃から前記掃除機本体１を保護することができる。
【選択図】図２



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【特許請求の範囲】
【請求項1】
一端部に第一吸込口が形成されると共にこの第一吸込口に第一吸気路を介して接続される集塵部及び電動送風機を備えかつ他端部に第一把持部を設けた電気掃除機本体と、
この電気掃除機本体を着脱可能に収納する収納部を有する支持体とを備え、
この支持体が、その一端側にノズルヘッドを有すると共にその他端側に第二把持部を有し、前記ノズルヘッドに第二吸込口を設けると共に、この第二吸込口と接続可能な第二吸気路を前記掃除機本体の収納時に前記集塵部及び電動送風機に連通するように構成した電気掃除機において、
前記電気掃除機本体の前部に保護手段を設け、前記収納部を前記支持体の後側に現れるように設けると共に、前記収納部を、前記保護手段が後ろ向きとなるように前記電気掃除機本体を収納可能に構成したことを特徴とする電気掃除機。
【請求項2】
前記保護手段が、前記電気掃除機本体の前部の長さ方向に設けられると共に、前記収納部が、前記電気掃除機本体を収納した際に、前記保護手段の長さ方向が前記支持体の長さ方向に沿うように構成されていることを特徴とする請求項１記載の電気掃除機。
【請求項3】
前記第一吸気路をほぼ直線状のパイプ状部により形成し、このパイプ状部を前記電気掃除機本体の前部に設けると共に、前記パイプ状部の周囲に前記保護手段を設けたことを特徴とする請求項１又は２記載の電気掃除機。
【請求項4】
前記電気掃除機本体の収納時に、前記第一吸込口を介して前記第二吸気路が前記集塵部及び電動送風機に連通することを特徴とする請求項１～３のいずれか１項に記載の電気掃除機。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は電気掃除機に関するものであり、特に、分離型の電気掃除機に関するものである。
【背景技術】
【0002】
従来、この種の電気掃除機として、吸込口及び集塵部を有し電動送風機を内蔵する電気掃除機本体と、この電気掃除機本体が収納される支持体とを有し、この支持体が、一端側にノズルヘッドを有し、他端側に把持部を有すると共に、前記電気掃除機本体を収納する収納部を前部に有し、前記電気掃除機本体の収納時に前記ノズルヘッドが前記吸込口を介して前記集塵部に連通されるように構成され、前記電気掃除機本体を単独或いは前記支持体に収容して使い、前記吸込口或いはノズルヘッドから吸い込んだ塵埃を前記集塵部内に溜めるものが知られている（例えば特許文献１、２）。そして、このような分離型の電気掃除機は、前記電気掃除機本体を前記支持体の前部に設けられた前記収納部に収納した状態で前記把持部を把持し、スティック型の掃除機として前記ノズルヘッドから塵埃を吸引するようにして使用したり、或いは前記電気掃除機本体を手持ち型の掃除機として単独で使用したりすることができるように構成されている。
【特許文献1】特許第２６２７２７５号公報
【特許文献2】特開平４－３６４８２２号公報
【発明の開示】
【発明が解決しようとする課題】
【0003】
従来技術において、前記電気掃除機本体を前記支持体に収納した状態でスティック型の掃除機として使用する場合、例えば机やテーブル等が置いてある床を掃除する際に、机やテーブル等の下に前記ノズルヘッドを差し込み、このノズルヘッドを床に沿って移動させ

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て掃除をしようとすると、机やテーブル等に前記掃除機の前部が衝突してしまい、この衝撃によって前記電気掃除機本体と支持体の位置関係がずれて気流漏れが発生したり、場合によっては前記電気掃除機本体が前記支持体から脱落してしまったりする虞があった。また、衝突時の衝撃によって前記集塵部等に亀裂が生じると、この亀裂によって気流漏れが発生する虞もあった。また、衝突時の衝撃によって、前記電気掃除機本体内の電動送風機が損傷してしまう虞もあった。更に、このような電気掃除機は、後方に傾けて使用する際に、床面に沿って前方に押し出すばかりでなく、床面に沿って後方に引き寄せる場合もあるので、電気掃除機の後方を障害物に衝突させてしまう虞があり、また、衝突時の衝撃等によって前記把持部から手が離れ、電気掃除機を床面に落としてしまう虞があり、このような衝突や落下による衝撃によって、前記電気掃除機本体と支持体の位置関係がずれてシール不良が発生したり、前記電気掃除機本体が前記支持体から脱落したり、前記集塵部や電動送風機が損傷したりする虞もあった。

【0004】

一方、前記電気掃除機本体を単独で使用して、例えば机やテーブル等の天板上に沿って前記電気掃除機本体を移動させて掃除をしようとすると、天板上の電気スタンド等に前記電気掃除機本体が衝突してしまい、この衝撃によって、前記集塵部や電動送風機が損傷する虞もあった。

【0005】

このような衝撃に伴う問題点を解決するには、保護手段を、第一に、使用状態における前記電気掃除機本体の前部に設けること、第二に、前記支持体の後部に設けることが考えられる。

【0006】

ところで、清掃時に前記電気掃除機が障害物に衝突した際の衝撃は、前記支持体に前記電気掃除機本体を取り付けて使用する場合のほうが、前記電気掃除機本体を単独で使用する場合よりも大きい。これは、前記支持体と電気掃除機本体の合計重量と、前記電気掃除機本体単体の重量との相違、並びに、床上に置かれた障害物が机やテーブル等の天板上に置かれた障害物よりも重量が大きい傾向にあることに起因する。従って、前記支持体の前部に取り付けられる前記電気掃除機本体の前部には、単独使用時の衝突衝撃ではなく、前記支持体に取り付けられた状態での衝突衝撃を見込んだ保護手段を設けなければならず、この結果、小型であるべき前記電気掃除機本体が大型化してしまい、この電気掃除機本体を単独で使用する際の使い勝手を低下させてしまう虞があった。

【0007】

本発明は以上の問題点を解決し、電気掃除機本体と支持体が分離可能な電気掃除機において、障害物に衝突した際の衝撃から電気掃除機を保護するための保護手段による電気掃除機の大型化を可及的に阻止することを目的とする。

【課題を解決するための手段】

【0008】

請求項１の発明は、一端部に第一吸込口が形成されると共にこの第一吸込口に第一吸気路を介して接続される集塵部及び電動送風機を備えかつ他端部に第一把持部を設けた電気掃除機本体と、この電気掃除機本体を着脱可能に収納する収納部を有する支持体とを備え、この支持体が、その一端側にノズルヘッドを有すると共にその他端側に第二把持部を有し、前記ノズルヘッドに第二吸込口を設けると共に、この第二吸込口と接続可能な第二吸気路を前記掃除機本体の収納時に前記集塵部及び電動送風機に連通するように構成した電気掃除機において、前記電気掃除機本体の前部に保護手段を設け、前記収納部を前記支持体の後側に現れるように設けると共に、前記収納部を、前記保護手段が後ろ向きとなるように前記電気掃除機本体を収納可能に構成したことを特徴とする電気掃除機である。

【0009】

また、請求項２の発明は、前記保護手段が、前記電気掃除機本体の前部の長さ方向に設けられると共に、前記収納部が、前記電気掃除機本体を収納した際に、前記保護手段の長さ方向が前記支持体の長さ方向に沿うように構成されていることを特徴とする請求項１記

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載の電気掃除機である。

【0010】

また、請求項３の発明は、前記第一吸気路をほぼ直線状のパイプ状部により形成し、このパイプ状部を前記電気掃除機本体の前部に設けると共に、前記パイプ状部の周囲に前記保護手段を設けたことを特徴とする請求項１又は２記載の電気掃除機である。

【0011】

更に、請求項４の発明は、前記電気掃除機本体の収納時に、前記第一吸込口を介して前記第二吸気路が前記集塵部及び電動送風機に連通することを特徴とする請求項１～３のいずれか１項に記載の電気掃除機である。

【発明の効果】

【0012】

請求項１の発明によれば、前記電気掃除機本体を単独で使用する場合、この電気掃除機本体の前方にある障害物に前記電気掃除機本体を衝突させても、この際の衝撃から前記電気掃除機本体を前記保護手段により保護でき、また、前記支持体に前記電気掃除機本体を取り付けた状態で使用する場合、前記支持体の前方にある障害物に電気掃除機を衝突させても、この際の衝撃から前記電気掃除機本体を前記支持体により保護できると共に、前記電気掃除機の後方にある障害物に前記電気掃除機を衝突させたり、使用中に前記電気掃除機を落下させたりしても、後ろ向きの前記保護手段により前記電気掃除機本体を保護することができる。しかも、このような保護手段は、前記掃除機本体を前記支持体に取り付けた状態で障害物に衝突させる場合に比較して衝撃の小さな、前記電気掃除機本体を単独で使用する際に前方の障害物に衝突させる場合の衝撃、或いは前記掃除機本体を前記支持体に取り付けた状態で後方の障害物に衝突させる場合の衝撃に耐えるのに必要充分な規模のものを前記掃除機本体の前側のみに設ければよく、保護部材を最小限の配置で済ますことができる。

【0013】

また、請求項２の発明によれば、前記電気掃除機本体を単独で使用する場合でも、前記支持体に取り付けて使用する場合でも、前記衝撃吸収手段が、前記電気掃除機本体或いは前記電気掃除機の長さ方向に沿って設けられることで、この結果、前記保護手段によって保護される領域を可及的に大きくすることができる。

【0014】

また、請求項３の発明によれば、前記第一吸気路を形成するほぼ直線状のパイプ状部の周囲に前記保護手段を設けたことで、前記電気掃除機本体のコンパクト化を図ることができる。

【0015】

更に、請求項４の発明によれば、前記電気掃除機本体の収納時に、前記第一吸込口を介して前記第二吸気路を前記集塵部及び電動送風機に簡単に接続することができる。

【発明を実施するための最良の形態】

【0016】

本発明における好適な実施の形態について、添付図面を参照して説明する。尚、以下に説明する実施の形態は、特許請求の範囲に記載された本発明の内容を限定するものではない。また、以下に説明される構成の全てが、本発明の必須要件であるとは限らない。

【実施例】

【0017】

各図は実施例１を示している。なお、図１、図２、及び図７では、左側が前である。分離型に構成された本発明の電気掃除機は、図１に示すように、電気掃除機本体１と、図２に示すように、この電気掃除機本体１を着脱可能に収納するための収納部２を有する支持体３とを備える。前記電気掃除機本体１は、図１に示すように、機枠ケース４と、この機枠ケース４の一端部に着脱自在に取り付けられる集塵部５とを有して構成されている。そして、前記機枠ケース４の内部には、モータ６とファン７とを有して構成される電動送風器８及び充電池９が内蔵されていると共に、他端部（図１における上部）には、第一把持

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部１０が形成されている。また、前記集塵部５の一端部（図１における下部）の前部には、第一吸込口１１が形成されると共に、この第一吸込口１１と前記集塵部５を接続する第一吸気路１２が、前記集塵部５と一体に形成されている。また、前記集塵部５の容器５Ａ内には渦流発生手段１３が着脱自在に取り付けられており、この渦流発生手段１３によって、前記集塵部５はサイクロン分離装置となっている。更に、前記集塵部５は、前記電動送風器９を介して、前記機枠ケース４に形成された図示しない排気路に接続されている。そして、図１に示すように、前記第一吸気路１２は、前記第一吸込口１１から導入口１４まで、前記集塵部５の前部にこの集塵部５と一体に形成された中空な第一パイプ状部１５によって構成されている。なお、この第一パイプ状部１５は、平断面が前方へ突出する半円状となっており、その中心軸線Ａは、前記集塵部５を前記機枠ケース４に取り付けた状態において、前記電気掃除機本体１の長手方向に沿うように、前記集塵部５に一体に形成されている。また、前記第一パイプ状部１５の外周は、合成樹脂製の保護手段１５Ａによって覆われている。なお、この保護手段１５Ａと第一パイプ状部１５との間には、僅かな空隙が形成されている。更に、この保護手段１５Ａの横幅Ｗ１は、前記集塵部５の横幅Ｗ２より小さく形成されている（Ｗ１＜Ｗ２）。更に、前記第一把持部１０は、前記機枠ケース４の前部と後部に、図１の姿勢においてそれぞれ斜め上後方に突設する前連結部１６及び後連結部１７と、これらの連結部１６，１７の端部間を接続する握り部１８とを備えたもので、これらの連結部１６，１７及び握り部１８とが、側面視で略コ字形状に形成されている。そして、前記前連結部１６は前記保護手段１５Ａと面一状態となるように設けられている。すなわち、前記機枠ケース４の前部に設けられて前記前連結部１６を構成する第二パイプ状部１９は、前記第一パイプ状部１５を覆う保護手段１５Ａと同軸状で且つ外周形状がほぼ同一である。なお、前記第二パイプ状部１９は、パイプ状に形成されているものの、前記第一吸気路１２を構成するものではない。そして、前記前連結部１６の上端で且つ前記握り部１８の前端には、前記電動送風器８を操作するためのスイッチ２０が設けられている。

【0018】

なお、サイクロン分離装置である前記集塵部５は、その前上部に、前記第一吸気路１２を構成すると共に前記第一パイプ状部１５と容器５Ａとを連通させる前記導入口１４が形成されている。そして、この導入口１４の中心軸線Ｘは、前記集塵部５の軸線Ｙに対して直交するように配置されている。また、前記集塵部５の容器５Ａの上部開口部には前記渦流発生手段１３が取り付けられており、この渦流発生手段１３の気流案内部１３Ａが前記導入口１４と対向して形成されており、前記気流案内部１３Ａの一次側が前記導入口１４に接続されると共に、二次側が軸線Ｙを中心とした円の接線方向に向いて前記集塵部５の容器５Ａ内に連通している。また、前記渦流発生手段１３の略中央には、全体として略円柱状に形成された枠体２１が前記軸線Ｙと同軸状に設けられていると共に、前記枠体２１にはフィルタ２２が設けられている。更に、前記枠体２１における前記容器５Ａの軸線Ｙ方向の上方には、排気路２３が形成されており、この排気路２３が前記電動送風機８と連通している。

【0019】

前記支持体３は、前記電気掃除機本体１をスティック型掃除機として使用する際のベースとなる。そして、前記支持体３の支持本体２４は、前面部２４Ａと後面部２４Ｂとを有し、縦長形状で且つ内部が中空であり、平断面形状が、前方へ突出する略三日月状となっている。なお、前記支持本体２４は軸２４Ｃにより折り畳み可能であり、またその横幅Ｗ３は前記集塵部５の横幅Ｗ２より小さく且つ前記保護手段１５Ａの横幅Ｗ１よりも大きく形成されている（Ｗ１＜Ｗ３＜Ｗ２）。また、前記支持本体２４の一端側（図２における下端側）には、横長吸込口２５が設けられたノズルヘッド２６が自在継手２７を介して回動自在に接続されている。また、前記支持体３の支持本体２４の他端側（図２における上端側）には、第二把持部２８が一体的に設けられる。更に、前記支持体３には、その支持本体２４の一端寄りの後側に前記収納部２が凹状に形成されている。そして、前記支持本体２４は全体として正面がやや前方に突出する弓なり形状に形成されている。また、前記

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収納部２は、前記支持体３の後側に現れるように形成されると共に、前記収納部２は前記第一パイプ状部１５及びこれに一直線状に連なる前記第二パイプ状部１９が後ろ向きとなった状態で前記電気掃除機本体１が収納可能となるように、前記収納部２の前方と下方を除いた後方、上方、及び左右両方が開放された状態に形成されている。また、前記収納部２の下方には、前記電気掃除機本体１の一端部が載置可能な載置受け部２９が設けられており、この載置受け部２９には、前記自在継ぎ手２７の二次側となる接続口３０が上向きに設けられている。なお、この接続口３０には、前記第一吸込口１１が気密に接続して連通可能に構成されており、さらに前記接続口３０の後側周囲には、前記第一パイプ状部１５の第一吸込口１１の周囲における左右両側及び後部が嵌合可能な第一嵌合受け部３１が平面視でU字状となって上方へ突設している。一方、前記収納部２の上部においては、前記電気掃除機本体１を収納した際の前記後連結部１７に対応する部位、実施例では前記後連結部１７と握り部１８との接続箇所近傍に対応する箇所に、該箇所を左右から挟みこんで固定可能な左右一対の第二嵌合受け部３２が設けられている。

【0020】

なお、前記ノズルヘッド２６は、平面視が略T字状であると共に偏平な箱型のヘッドケース３３の下面前部に、前記横長吸込口２５が左右方向に長く開口して設けられており、前記自在継ぎ手２７に連通している。そして、前記横長吸込口２５から接続口３０までの間に第二吸気路３４が形成される。

【0021】

以上の構成を有する電気掃除機において、机やテーブルの天板上等の被清掃面Gを掃除するために、前記支持体３から前記電気掃除機本体１を分離して、この電気掃除機本体１を使用する場合、使用者は、前記機枠ケース４の他端部に設けられた前記第一把持部１１の握り部１８を握って前記電気掃除機本体１を持つ。そして、使用者が前記スイッチ２０を操作することで、前記充電池９からの電力によって前記電動送風器８が作動してそのファン７が回転し、これによって、前記第一吸込口１１から第一パイプ状部材１５を通って吸入されて、前記集塵部５及び前記電動送風器８を通過し、図示しない前記排気路を経て前記機枠ケース４外に排出される吸込気流が発生する。このように、前記電動送風器８が作動した状態で前記第一吸込口１１を被清掃面Gに近付け、この被清掃面Gに沿って前記第一吸込口１１が動くように前記電気掃除機本体１を移動させることで、塵埃を含んだ吸込気流が前記第一吸込口１１から吸い込まれ、そして、この塵埃を含んだ吸込気流が前記第一吸気路１２を構成する前記第一パイプ状部１５から前記導入口１４を経て前記集塵部５の容器５Ａ内に流入する。

【0022】

そして、前記導入口１４から前記集塵部５の容器５Ａ内に入り込んだ塵埃を含む気流は、前記渦流発生手段１３の気流案内部１３Ａによって、前記容器５Ａの内面の接線方向に方向付けられることで、この容器５Ａの内周面に沿って旋回する渦流となると共に、前記容器５Ａ内を螺旋状に下降する。この際、この渦流に含まれる前記塵埃のうち、少なくとも粗い塵埃は、遠心力によって前記集塵部５の容器５Ａの内周面に押し付けられることで、前記渦流から分離されることになる。そして、遠心力によって粗い塵埃が分離された気流は、前記渦流発生手段１３の中央に設けられた前記フィルタ２２を通過する。そして、前記気流が前記フィルタ２２を通過する際、前記気流に含まれている遠心力では分離されなかった細かい塵埃が沪過される。更に、前記フィルタ２２によって塵埃が取り除かれた気流は、前記排気路２３を経て前記集塵部５から排出され、前記電動送風機８に吸い込まれる。そして、このようにして気流から分離された塵埃は、前記集塵部５の容器５Ａ内に溜められる。この際、図１の使用時において、前記導入口１４が前記集塵部５の容器５Ａに対して上方に配置されることで、この容器５Ａに溜まった塵埃が自重で前記導入口１４から前記第一吸込口１１に逆戻りすることはない。また、前記容器５Ａ内に溜められた塵埃は、前記集塵部５を前記機枠ケース４より取り外すと共に、前記渦流発生手段１３を前記容器５Ａ内から取り外して、前記容器５Ａの上部開口部を開放させることで、廃棄することができる。

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【0023】
このように、前記電気掃除機本体１を単独で使用して机やテーブルの天板上等の被清掃面Ｇを掃除する際、この被清掃面Ｇ上に置いてある障害物（例えばディスプレイＤ等）に前記電気掃除機本体１が衝突する虞がある。しかしながら、前記電気掃除機本体１がディスプレイＤ等の障害物に衝突したとしても、その衝突する位置は、前記第一パイプ状部１５を覆う保護手段１５Ａである。そして、前述したように、前記保護手段１５Ａと前記第一パイプ状部１５との間に僅かな空隙が形成されていることによって、衝突時の衝撃によって前記保護手段１５Ａが変形可能に構成されているので、この保護手段１５Ａの変形によって衝撃が吸収され、前記第一パイプ状部１５が受ける衝撃が緩和される。これによって、前記第一パイプ状部１５や容器５Ａ、即ち前記集塵部５が破損して気流漏れが発生する虞を減ずることができるばかりでなく、前記集塵部５が取り付けられる前記機枠ケース４内に設けられた前記電動送風器８のモータ６やファン７への衝撃に伴う故障等を減ずることができる。

【0024】
一方、机やテーブルの下の床面等の被清掃面Ｆを掃除するために、前記支持体３に前記電気掃除機本体１を取り付けた状態でスティック型の掃除機として使用する場合、使用者は、前記支持体３の接続口３０に前記電気掃除機本体１の第一吸込口１１が接続されるよう、前記支持体３の収納部２に前記電気掃除機本体１を収納すると共に、前記支持体３の支持本体２４の他端側に設けられた前記第二把持部２８を持ち、前記支持本体２４の一端側に設けられた前記ノズルヘッド２６を被清掃面Ｆ上に置く。そして、使用者が前記スイッチ２０を操作することで、前記充電池９からの電力によって前記電動送風器８が作動してそのファン７が回転し、これによって、塵埃を含んだ吸込気流が第二吸込口である前記横長吸込口２５から吸い込まれ、前記ノズルヘッド２６、自在継手２７、接続口３０（即ち前記第二吸気路３４）を介して、前記第一吸込口１１から第一パイプ状部材１５（即ち前記第一吸気路１２）を通り、前記集塵部５の容器５Ａ内に流入する。そして、前記第二吸気路３４の後半（前記自在継手２７から前記接続口３０にかけて）と前記第一吸気路１２は、図２に示すように、直線的に接続されることになる。このため、吸気路が曲がっている場合に比べて圧力損失が少なく、吸込気流がスムーズに前記容器５Ａまで流れるばかりでなく、塵埃が吸気路の曲がった部分の壁に衝突して付着してしまうといった問題も起きにくい。なお、塵埃の分離及び気流の排出については前述した通りなので、説明を省略する。

【0025】
このように、前記電気掃除機をスティック型として使用して床等の被清掃面Ｆを掃除する際、この被清掃面Ｆ上に置いてある障害物（例えば机やテーブルの天板Ｔ等）に前記電気掃除機が衝突する虞がある。しかしながら、前記電気掃除機が机やテーブルの天板Ｔ等の障害物に衝突したとしても、その衝突する位置は、中空の前記支持本体２４である。そして、前述したように、前記支持本体２４が中空に構成されていることによって、衝突時の衝撃によって前記支持本体２４が変形可能に構成されているので、この支持本体２４の変形によって衝撃が吸収され、前記支持体３に取り付けられた前記電気掃除機本体１が受ける衝撃が緩和される。これによって、前記支持体３に取り付けられた前記電気掃除機本体１の機枠ケース４内に設けられた前記電動送風器８のモータ６やファン７への衝撃に伴う故障等を減ずることができる。

【0026】
また、前記支持体３に前記電気掃除機本体１を取り付けた状態で掃除する場合、前記電気掃除機を被清掃面Ｆに沿って後方に引き寄せる際に、電気掃除機の後方を障害物に衝突させてしまう虞があるばかりでなく、前記第二把持部２８から手が離れてしまうことで前記電気掃除機が倒れ、この電気掃除機の後方が床Ｆに衝突してしまう虞もある。しかしながら、このような場合、後ろ向きに取り付けられている前記第一パイプ状部１５を覆う前記保護手段１５Ａが床Ｆに衝突すると共に、前述したように、前記保護手段１５Ａと前記第一パイプ状部１５との間に僅かな空隙が形成されていることによって、衝突時の衝撃に

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よって前記保護手段１５Ａが変形可能に構成されているので、この保護手段１５Ａの変形によって衝撃が吸収され、前記第一パイプ状部１５が受ける衝撃が緩和される。これによって、前記第一パイプ状部１５や容器５Ａ、即ち前記集塵部５が破損して気流漏れが発生する虞を減ずることができるばかりでなく、前記集塵部５が取り付けられる前記機枠ケース４内に設けられた前記電動送風器８のモータ６やファン７への衝撃に伴う故障等を減ずることができる。

【0027】

なお、前記支持体３に前記電気掃除機本体１を取り付けた状態でスティック型掃除機として使用する場合に、前記支持本体２４が机やテーブルの天板Ｔ等の障害物に衝突した際の衝撃は、前記電気掃除機本体１を単独で手持ち型掃除機として使用する場合に、前記保護手段１５Ａがディスプレイ Ｄ等の障害物に衝突した際の衝撃よりも大きい。これは、前記支持体３と電気掃除機本体１の合計重量と、前記電気掃除機本体１単体の重量との相違、床等の被清掃面Ｆ上に置かれた障害物が、机やテーブルの天板等の被清掃面Ｇ上に置かれた障害物よりも重量が大きい傾向にあること、並びに、床等の被清掃面Ｆ上でスティック型の電気掃除機を動かす速さが、机やテーブルの天板等の被清掃面Ｇ上で手持ち型の電気掃除機を動かす速さよりも速い傾向にあること等にに起因する。従って、前記支持体３の支持本体２４は、スティック型の電気掃除機として使用する場合の大きな衝突衝撃を見込んだ形状や大きさに形成する必要があるものの、前記電気掃除機本体１の前部に設けられる前記保護手段１５Ａは、前記電気掃除機本体１を単独で使用する場合の比較的小さな衝突衝撃を見込んだ形状や大きさに形成すればよく、この結果、前記電気掃除機本体１の大型化を抑えることができ、この電気掃除機本体１を単独で使用する際の使い勝手を低下させないようにすることができる。

【0028】

また、前記支持体３に前記電気掃除機本体１を取り付けた状態でスティック型掃除機として使用する場合に、前記電気掃除機の前側となる前記支持本体２４が机やテーブルの天板Ｔ等の障害物に衝突した際の衝撃は、前記電気掃除機の後側となる前記保護手段１５Ａが障害物に衝突した際の衝撃よりも大きい傾向にある。これは、図２に示すように、前記電気掃除機が後方に倒れていることで、前記被清掃面Ｆに沿って前記電気掃除機を前方に押し出す場合、前記電気掃除機の支持本体２４が机やテーブルの天板Ｔ等の障害物に衝突した際の衝撃によって前記電気掃除機を被清掃面Ｆに押し付ける力が働き、前記天板Ｔ等と被清掃面Ｆの間で衝突時の力の逃げ場がないのに対し、前記被清掃面Ｆに沿って前記電気掃除機を後方に引き寄せる場合、前記保護手段１５Ａに衝突する虞のある障害物が、使用者と前記電気掃除機の間に存在しなければならないため、比較的低いものであることから、前記電気掃除機の保護手段１５Ａが低い障害物に衝突した際の衝撃によって前記電気掃除機を前記被清掃面Ｆから浮かす力が働き、これによって、衝突時の力を適度に逃がすことができるからである。また、前記電気掃除機の前側となる前記支持本体２４の衝突の頻度も、前記電気掃除機の後側となる前記保護手段１５Ａの衝突頻度よりも高い。これは、前述したように、前記保護手段１５Ａに障害物が衝突する場合、この障害物は、使用者と前記電気掃除機の間に存在しなければならないためである。このため、スティック型として使用される状態の電気掃除機において、この電気掃除機の後側に位置する保護手段１５Ａが、前記電気掃除機本体１を単独で使用する場合の比較的小さな衝突衝撃を見込んだ形状や大きさに形成されていたとしても、障害物との衝突による衝撃から充分に前記電気掃除機本体１を保護することができる。

【0029】

以上のように、前記実施例においては、一端部に第一吸込口１１が形成されると共にこの第一吸込口１１に第一吸気路１２を介して接続される集塵部５及び電動送風器８を備え且つ他端部に第一把持部１０を設けた電気掃除機本体１と、この電気掃除機本体１を着脱可能に収納する収納部２を有する支持体３とを備え、この支持体３が、その一端側にノズルヘッド２６を有すると共にその他端側に第二把持部２８を有し、前記ノズルヘッド２６に第二吸込口としての横長吸込口２５を設けると共に、この横長吸込口２５と接続可能な

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第二吸気路３４を前記掃除機本体１の収納時に前記集塵部５及び電動送風器８に連通するように構成し、前記電気掃除機本体１の前部に保護手段１５Ａを設け、前記収納部２を前記支持体３の後側に現れるように設けると共に、この収納部２に前記保護手段１５Ａが後ろ向きとなるように前記電気掃除機本体１を収納可能に構成したことにより、前記電気掃除機本体１を単独で使用して机やテーブルの天板等の被清掃面Ｇ上を掃除する場合、被清掃面Ｇ上で前方にあるディスプレイＤ等の障害物に衝突しても、その衝撃から前記保護手段１５Ａにより前記集塵部５を保護することで、この集塵部５、ひいてはこの集塵部５が取り付けられた前記機枠ケース４内の前記電動送風器８の損傷を阻止できる。また、前記支持体３に前記電気掃除機本体１を取り付けた状態で使用して床等の被清掃面Ｆを掃除する場合、前記支持体３により前方の天板Ｔ等の障害物に電気掃除機が衝突しても前記支持体３により前記掃除機本体１を保護できると共に、前記電気掃除機を被清掃面Ｆに沿って引き寄せた際に前記電気掃除機の後部を障害物に衝突させたり、清掃中に前記第二把持部２８から手が離れて前記電気掃除機の後部を被清掃面Ｆに衝突させたりしても、前記電気掃除機の後部に位置する前記保護手段１５Ａによって、これらの衝突の衝撃から前記集塵部５、ひいてはこの集塵部５が取り付けられた前記機枠ケース４内の前記電動送風器８を保護できる。更に、前記電気掃除機本体１を単独で使用する場合の比較的小さな衝突衝撃を見込んだ形状や大きさに前記保護手段１５Ａを形成すればよいので、保護手段１５Ａを最小限のもので済ますことができ、この結果、前記電気掃除機本体１，ひいては前記電気掃除機全体を大型化させることなくコンパクトのままで済ますことができ、これによって、前記電気掃除機の操作性を維持することができる。

【0030】

また、前記保護手段１５Ａが、電気掃除機本体１を単独で使用する際の前部に対応する部位における長さ方向に設けられると共に、前記保護手段１５Ａの長さ方向、即ち前記保護手段１５Ａの中心軸線Ａが、前記支持体３の長さ方向にほぼ沿うように前記収納部２が設けられることで、前記電気掃除機本体１を単独で使用する場合、或いは前記支持体３と一緒に使用する場合に、前記保護手段１５Ａが縦向きとなり、この結果、前記保護手段１５Ａによる衝撃吸収の有効長さを可及的に大きくすることができる。

【0031】

また、前記第一吸気路１２を形成するほぼ直線状の第一パイプ状部１５の周囲に前記保護手段１５Ａを設けたことにより、前記電気掃除機本体１の大型化を避けてコンパクト化を図ることができる。

【0032】

更に、前記電気掃除機本体１の収納時に前記第一吸込口１１を介して前記第二吸気路３４が前記集塵部５及び電動送風器８に連通することにより、前記第一吸込口１１を前記接続口３０に接続するように前記電気掃除機本体１を前記収納部２に収納することで、前記第二吸気路３４を前記第一吸気路１２を介して前記集塵部５及び電動送風器８に簡単に接続することができる。

【0033】

なお、本発明は以上の実施例に限定されるものではなく、発明の要旨の範囲内で種々の変形実施が可能である。例えば、上記実施例では、合成樹脂製の保護手段はパイプ状部の周囲に僅かな空隙を介在させることで変形可能とされているが、このような空隙を設けずに、前記パイプ状部の周囲をエラストマー等と呼ばれる軟質合成樹脂で被覆することで、前記保護手段を形成してもよい。

【産業上の利用可能性】

【0034】

以上のように、本発明に係る電気掃除機は、各種の用途に適用できる。また集塵部はサイクロン分離装置ではなくフィルター方式でもよい。

【図面の簡単な説明】

【0035】

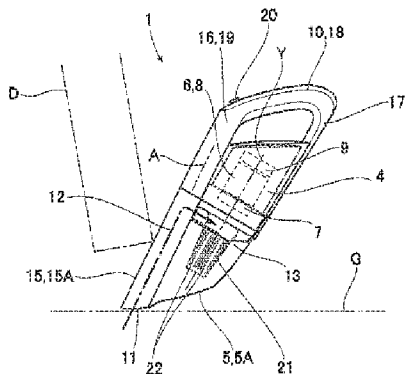
【図1】本発明の実施例１を示す電気掃除機本体の使用時における側面図である。

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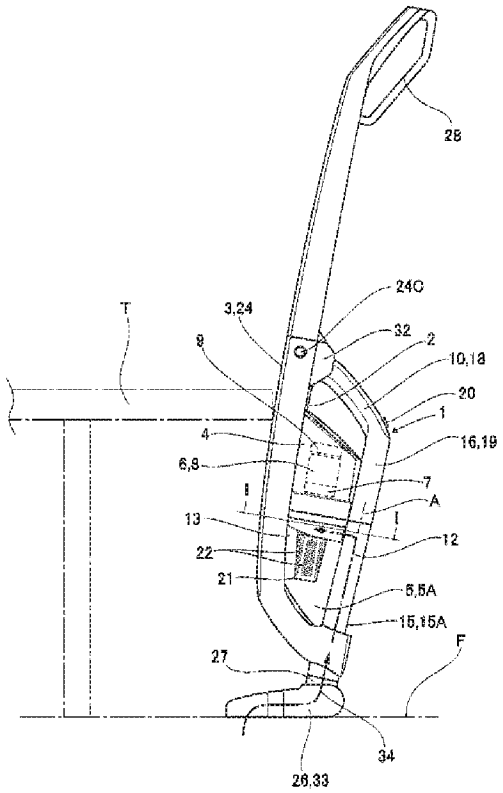
【図2】同、電気掃除機本体を支持体に取り付けた状態の使用時における側面図である。
【図3】同、図２のＩ－Ｉ線断面図である。
【図4】同、電気掃除機本体を支持体に取り付けた状態の直立時における正面図である。
【図5】同、電気掃除機本体を支持体に取り付けた状態の直立時における平面図である。
【図6】同、電気掃除機本体を支持体に取り付けた状態の直立時における底面図である。
【図7】同、電気掃除機本体を支持体より外した状態の側面図である。
【図8】同、電気掃除機本体を支持体より外した状態の掃除機本体と支持体を横並びさせた背面図である。
【図9】同、支持体の平面図である。
【符号の説明】
【0036】
１　電気掃除機本体
２　収納部
３　支持体
５　集塵部
８　電動送風器
１０　第一把持部
１１　第一吸込口
１２　第一吸気路
１５　第一パイプ状部
１５Ａ　保護手段
２５　横長吸込口（第二吸込口）
２６　ノズルヘッド
２８　第二把持部
３０　接続口
３４　第二吸気路

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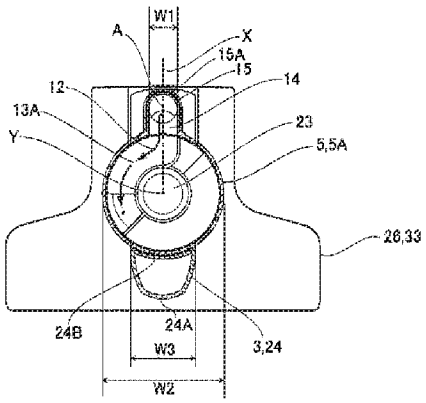
【図1】


1
16,19
20
10,18
Y
D
6,8
17
A
8
4
12
7
13
G
15,15A
11
22
5,5A
21

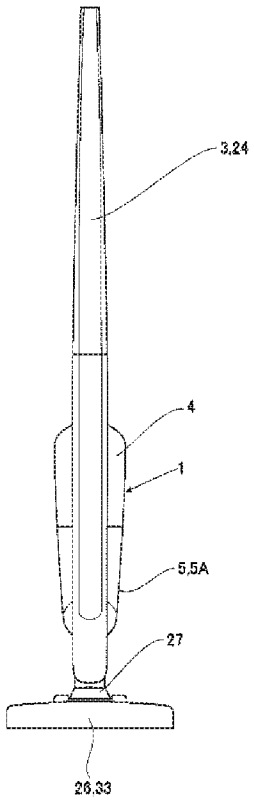
【図2】


28
T
3,24
24C
32
9
2
10,18
20
1
4
16,19
6,8
7
A
13
12
22
21
5,5A
15,15A
F
27
34
26,33

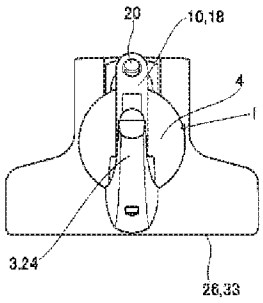
【図3】


W1
A
X
15A
15
14
12
13A
23
Y
5,5A
26,33
24B
24A
3,24
W3
W2

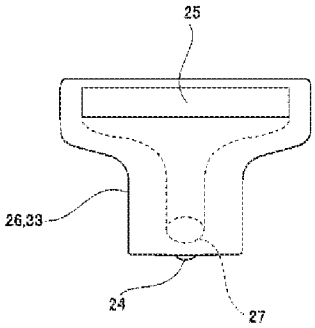
【図4】


3,24
4
1
5,5A
27
26,33

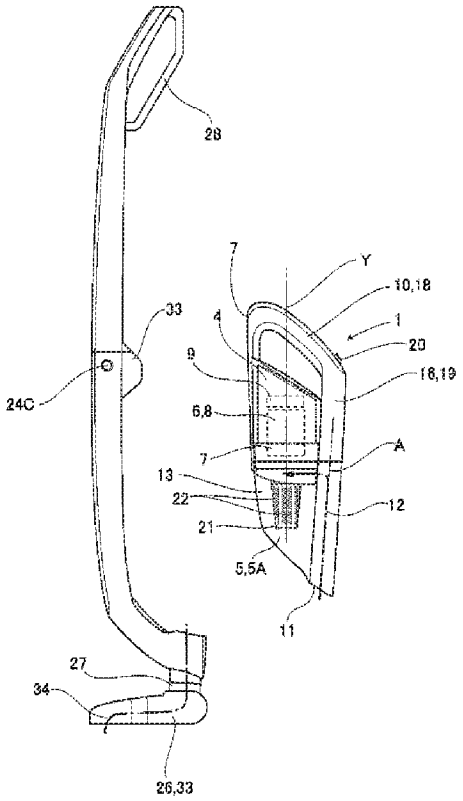
【図5】



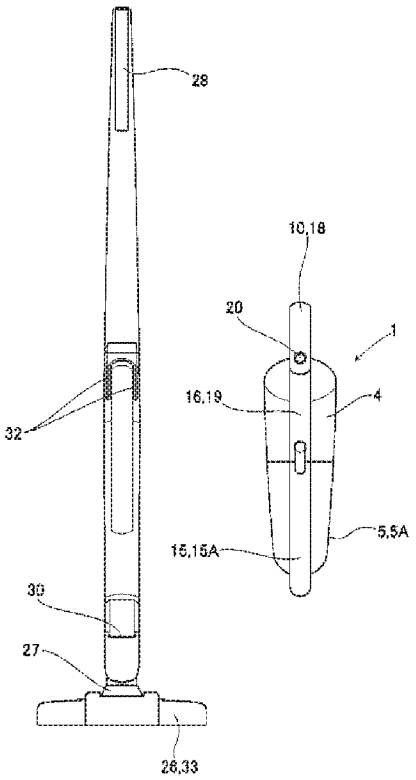
【図6】



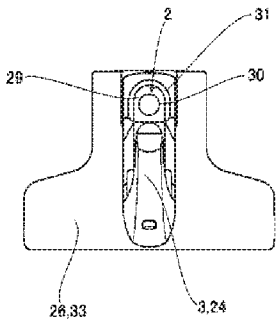
【図7】



【図8】



【図9】



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(54) Hand-held cordless vacuum cleaner

(57) A hand-held vacuum cleaner (10a) with a container (12) for the storage of dirt and debris therein. To provide improved efficiency and performance, the hand-held vacuum may employ a primary HEPA filter (414), a device (22) for swirling a dirt and debris laden air flow and/or a mechanized filter cleaning device. Swirling may be employed to direct entrained dirt and debris in a desired direction relative to the container to slow the rate with which dirt and debris accumulates on the primary filter and/or to centrifugally remove dirt and debris from the air flow. Mechanized cleaning is employed to shake, scrape or otherwise remove accumulated dirt and debris from the primary filter.

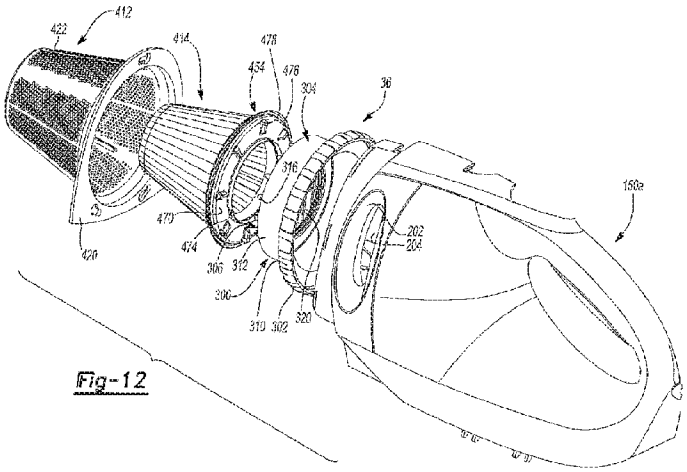


Fig-12

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Description

[0001] The present invention generally relates to hand-held portable vacuum cleaners and improvements thereto.

[0002] Typically, hand-held portable vacuum cleaners employ a motor that is powered by either a main supply of electricity (i.e., a source of alternating current power) or a battery pack, which may be rechargeable, to drive an impeller. Rotation of the impeller generates an air flow which entrains therein dirt and debris which enter the vacuum cleaner via an inlet. One or more filters may be employed to retain the dirt and debris within the vacuum.

[0003] One problem with such vacuum cleaners concerns the relatively rapid rate with which the efficiency and performance of such vacuum cleaners may deteriorate. Specifically, the use of such vacuums to collect relatively small sized particles can rapidly load the filter and substantially reduce the amount of air that passes therethrough. When filter loading is encountered in the known hand vacuum configurations, the user must disassemble the vacuum, remove the filter, clean (or dispose of and replace) the filter and replace the filter. In some situations, the user may be reluctant to perform the tasks of removing and cleaning the filter due to the unwholesomeness of the material that has accumulated on the filter. In situations where the filter is heavily loaded, the vacuum will have a relatively low efficiency and consequently, vacuuming tasks will take longer, the vacuum will experience greater wear, and if battery powered, the user will be able to perform relatively fewer vacuuming tasks per charge.

[0004] In one form, the present teachings provide a hand-held portable vacuum having a housing, an impeller that is at least partially disposed in the housing, a dirt cup and a HEPA filter. The dirt cup, which is removably attached to the housing, includes an inlet and defines a container for storage of dirt and debris therein. The HEPA filter is disposed between the impeller and the inlet.

[0005] In another form, the present teachings provide provides a method for filtering a dirt and debris laden air flow. The method includes: providing a hand-held vacuum with a housing, an impeller, an inlet, a container and a primary filter, the housing including a handle that permits a user to employ the hand-held vacuum for vacuuming with a single hand, the impeller being disposed within the housing, the inlet being configured to receive the dirt and debris laden air flow therethrough, the container being configured to retain dirt and debris removed from the dirt and debris laden air flow and the primary filter being disposed between the impeller and the inlet; rotating the impeller to generate the dirt and debris laden air flow; and swirling the dirt and debris laden air flow about the interior of the container.

[0006] In yet another form, the present teachings provide a hand-held portable vacuum including a housing with a handle, a dirt cup, an impeller at least partially disposed in the housing, a filter and a filter cleaning device. The dirt cup, which is removably attached to the housing, has an inlet and defines a container for storage of dirt and debris therein. The filter, which is disposed between the impeller and the inlet, is formed with a plurality of pleats. The filter cleaning device is coupled to at least one of the housing and the dirt cup and includes at least one rib and a hub. The hub is coupled to one of the filter and the rib and configured to rotate the one of the filter and the rib about the other one of the filter to generate contact between the rib and the filter to at least partially dislodge accumulated dirt and debris from the pleats.

[0007] In a further form, the present teachings provide a hand-held portable vacuum including a housing with a handle, a dirt cup, an impeller, a filter and a means for swirling the dirt and debris laden air in the dirt cup. The dirt cup, which is removably attached to the housing, has an inlet and defining a container for storage of dirt and debris therein. The impeller is at least partially disposed in the housing and operable for generating an air flow that flows through the inlet. The filter is disposed between the impeller and the inlet.

[0008] Further areas of applicability of the present teachings will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

[0009] Additional advantages and features of the present invention will become apparent from the subsequent description and the appended claims, taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a perspective view of a vacuum kit constructed in accordance with the teachings of the present invention;

Figure 2 is a side elevation view of a portion of the vacuum kit of Figure 1 illustrating the vacuum in greater detail;

Figure 3 is a longitudinal section view of the vacuum of Figure 2;

Figure 4 is a perspective view of a portion of the vacuum of Figure 2 illustrating the dirt cup in greater detail;

Figure 5 is a longitudinal section view of the dirt cup of Figure 4;

Figure 6 is a longitudinal section view of a portion of the vacuum of Figure 2 illustrating the dirt cup assembly in greater detail;

Figure 7 is a sectional view taken along the line 7-7 of Figure 6;

Figure 8 is a perspective view illustrating the interior of the dirt cup assembly;

Figure 9 is a perspective view of a portion of the dirt cup assembly illustrating the elbow in greater detail;

Figure 10 is a top view of a portion of the vacuum of Figure 2 illustrating the housing assembly in greater

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detail;
Figure 11 is a side elevation view of a portion of the housing assembly illustrating a housing shell in greater detail;
Figure 12 is an exploded perspective view of a portion of the housing assembly;
Figure 13 is a elevation view of a portion of the vacuum of Figure 2 illustrating the exhaust grille in greater detail;
Figure 14 is section view taken along the line 14-14 of Figure 13;
Figure 15 is a side elevation view of a portion of the vacuum of Figure 2 illustrating the cleaning wheel in greater detail;
Figure 16 is a front elevation view of the housing assembly;
Figure 17 is a side elevation view of the housing assembly;
Figure 18 is a perspective view of a portion of the housing assembly illustrating the prefilter in greater detail;
Figure 19 is a longitudinal section view of the prefilter;
Figure 20 is a longitudinal section view of the primary filter;
Figure 21 is a longitudinal section view of a portion of the housing assembly illustrating the second seal portion of the primary filter in sealing engagement with the prefilter;
Figure 22 is an exploded perspective view of the vacuum and recharging base of Figure 1;
Figure 23 is an exploded perspective view of the vacuum and recharging base illustrating one means by which the vacuum and recharging base may be keyed to one another;
Figure 24 is a schematic illustration of a portion of an injection mold for forming the mating key that is associated with the vacuum in the example provided;
Figure 25 is a perspective view of a family of vacuums and recharging bases constructed in accordance with the teachings of the present invention;
Figure 26 is a perspective view of an alternately constructed prefilter;
Figure 27 is a longitudinal section view similar to that of Figure 3 but illustrating the prefilter of Figure 26;
Figure 28 is a perspective view of another alternately constructed prefilter;
Figure 29 is a perspective view of an alternately constructed vacuum;
Figure 30 is an exploded perspective view of the vacuum of Figure 29;
Figure 31 is a partial longitudinal section view of another alternately constructed vacuum illustrating a lock-out device for inhibiting the operation of the cleaning wheel;
Figure 32 is a schematic illustration of another alternately constructed vacuum illustrating an electronic lock-out device for inhibiting the operation of the motor when the cleaning wheel is rotated;
Figure 33 is a sectional view taken along the line 33-33 of Figure 32;
Figure 34 is a schematic illustration of yet another alternately constructed vacuum illustrating a drive system for rotating the cleaning wheel under a source of power;
Figure 35 is a schematic illustration of still another alternately constructed vacuum illustrating another drive system for rotating the cleaning wheel under a source of power;
Figure 36 is an exploded perspective view of a portion of the vacuum of Figure 2 illustrating the battery pack and motor assembly in greater detail;
Figure 37 is another exploded perspective view of the battery pack and motor assembly;
Figure 38 is an exploded side elevation view of the battery pack and motor assembly;
Figure 39 is a bottom plan view of the battery pack as coupled to the motor assembly;
Figure 40 is an exploded perspective view of an alternately constructed primary filter;
Figure 41 is a longitudinal section view of the primary filter of Figure 40;
Figure 42 is an exploded perspective view of another alternately constructed primary filter;
Figure 43 is a longitudinal section view of the primary filter of Figure 42;
Figure 44 is an exploded perspective view of yet another alternately constructed primary filter;
Figure 45 is a longitudinal section view of the primary filter of Figure 44;
Figure 46 is a rear view of another prefilter constructed in accordance with the teachings of the present invention;
Figure 47 is a bottom view of the prefilter of Figure 46; and
Figure 48 is a perspective view of yet another prefilter constructed in accordance with the teachings of the present invention.

[0010] With reference to Figure 1 of the drawings, a vacuum kit constructed in accordance with the teachings of the present invention is generally indicated by reference numeral 10. The vacuum kit 10 may include a handheld cordless vacuum 10a and an optional set of accessories 10b. With reference to Figures 2 and 3, the vacuum 10a may include a dirt cup assembly 12 and a housing assembly 14. In the particular example provided, the dirt cup assembly 12 includes an inlet housing or dirt cup 20 and an elbow 22, while the housing assembly 14 may include motor assembly 30, an outlet housing or housing 32, a filter system 34, a filter cleaning system 36 and a latch release 38 having a conventional latch mechanism 40 and a conventional retaining tab 42 that may be integrally formed with the housing 32.

[0011] In Figures 4 and 5, the dirt cup 20 includes a wall member 50 that defines a container-like housing structure 52 and an inlet port 54 that may be formed

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through the housing structure 52 and which may extend rearwardly therefrom. A pair of securing apertures 56a and 56b may be formed in and through the housing structure 52, respectively, and a plurality of prefilter locating tabs 58 may extend inwardly from the wall member 50 about the inside perimeter of the housing structure 52. Both the securing apertures 56a and 56b and the prefilter locating tabs 58 will be discussed in additional detail, below.

[0012] The inlet port 54 may have a generally rectangular cross-sectional shape that extends rearwardly from the housing structure 52 and terminates at a rearward face 60. As will be discussed in greater detail, below, the front end of the inlet port 54 may be configured to frictionally engage various components of the accessory set 10b (Fig. 1), while the rear end of the inlet port 54 may be configured to frictionally engage the elbow 22, which is shown in Figure 6.

[0013] With reference to Figures 6 through 9, the elbow 22 may include an attachment portion 62 that may be sized to frictionally but removably engage the rear end of the inlet port 54 and a body portion 64 that turns the incoming air flow in a desired manner as will be discussed in greater detail, below. The body portion 64 may be sized so as not to choke or diffuse the air flow that is provided through the inlet port 54. The interior of the dirt cup 20 (i.e., a cross section taken perpendicular to the longitudinal axis of the dirt cup 20) may be at least somewhat circular in shape (i.e., lacking sharp corners - see, Figure 7) so as to promote the swirling of the inlet air flow about the longitudinal axis of the dirt cup 20.

[0014] In Figure 3, the motor assembly 30 may include a motor 70, a fan assembly 72, a battery pack 74 and a power switch 76. The motor 70 may be a conventional DC motor having a motor output shaft 88. The fan assembly 72 may be a conventional centrifugal fan that includes a fan or impeller 90, which may be coupled for rotation with the output shaft 88, and a fan housing 92. The fan housing 92 includes an inlet aperture 94 that may be centered about the rotational axis of the impeller 90, and one or more discharge apertures 96, which may be located on a bottom side of the fan housing 92 generally transverse to the inlet aperture 94. Air that is discharged from the discharge aperture 96 may be guided through an associated flow channel 98 that is also integrally formed with the fan housing 92 in the particular example provided. The flow channel 98 may direct the air downwardly and somewhat rearwardly.

[0015] The battery pack 74 conventionally includes a plurality of rechargeable batteries 100, which are adapted to be electrically coupled to a source of electrical power, as through the recharging base 75 that is illustrated in Figure 1. The battery pack 74 may be coupled to the motor 70 and the power switch 76 in a conventional and well known manner. In the alternative, the battery pack 74 may be coupled to the motor 70 by way of an integrated snap connector 108 as illustrated in Figures 36 through 39. The snap connector 108 may have a first portion 108a that may be integrated with the motor 70 and a second portion 108b that may be integrated with the battery pack 74. The first portion 108a may include a circuit board 110 with a plurality of terminals, such as blade-type male terminals 112. The circuit board 110 may include all of the integrated circuits and solid state components that are employed for controlling the distribution of electrical power from the battery pack 74 to the motor 70, as well as for controlling the charging of the battery pack 74 (e.g., timers). The second portion 108b may include a plurality of mating terminals, such as blade receiving terminals 114, that matingly engage the terminals of the first portion 108a. In the particular embodiment illustrated, the blade receiving terminals 114 slidably receive the blade-type male terminals 112 to permit the motor assembly 30 to be coupled to the battery pack 74 prior to their installation to the housing 32.

[0016] The battery pack 74 may further include a housing 120 having a pair of engagement features 122 that co-engage mating features 124 (Fig. 11) to permit the battery pack 74 to be coupled to the housing 32 without separate fasteners, etc. In the particular embodiment illustrated, the engagement features 122 are tabs and the mating features 124 are slots that are configured to receive an associated one of the tabs to thereby fixedly but removably couple the battery pack 74 to the housing 32. At least one of the tabs may be a cross-tab (i.e., a tab with two portions that are skewed to one another) that is configured to engage an associated mating feature 124 in a manner that inhibits vertical and horizontal movement of the cross-tab relative to the associated mating feature 124. In the particular embodiment illustrated, the structure into which the cross-tab is received defines a cross-slot (i.e., a slot with two portions for receiving the two portions of the cross-tab), but as those skilled in the art will appreciate from this disclosure, one portion of the cross-tab may be disposed in the slot while the other portion of the cross-tab abuts an end of the structure that defines the slot. Additionally, the housing 120 may house a pair of charging terminals 126 that may be configured to extend through the housing 32 so as to be accessible by the recharging base 75 (Fig. 1) when the vacuum 10a is coupled thereto.

[0017] One suitable power switch 76 is described in detail in U.S. Patent No. 5,544,274, which is hereby incorporated by reference as if fully set forth herein. Briefly, the power switch 76 may include a conventional slide switch 76a that selectively enables or disables the transmission of electric power therethrough to close or open the electrical circuit between the batteries 100 and the motor 70. The slide switch 76a may be fixedly coupled to the circuit board 110 in the particular example provided and employed to move contacts into and out of electrical connection with terminals on the circuit board 110.

[0018] With reference to Figures 3, 10 and 11, the housing 32 of the particular embodiment provided may include a pair of housing shells 150a and 150b and an exhaust deflector 154. The housing shells 150a and 150b

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may be configured to be coupled together in a conventional and well known manner to define a switch mounting structure 160, a switch aperture 162, a latch mounting structure 164, the retaining tab 42 and a handle 168. The switch mounting structure 160 may be conventionally configured to receive therein and support the power switch 76 of the motor assembly 30 such that the power switch 76 extends through the switch aperture 162 so as to be actuate-able by the user of the vacuum 10a.

[0019] The latch mounting structure 164 may be configured to receive therein and support a conventional latch mechanism 40 having a latch member 170 for engaging the securing aperture 56a in the housing structure 52 of the dirt cup assembly 12 and a spring (not shown) for biasing the latch member 170 upwardly relative to the housing 32.

[0020] The retaining tab 42 extends outwardly from the housing 32 and defines an abutting wall 174. The retaining tab 42 may be configured to project through the securing aperture 56b when the dirt cup assembly 12 is coupled to the housing assembly 14 to permit the abutting wall 174 to cooperate with the rear edge of the securing aperture 56b to thereby limit forward movement of the dirt cup assembly 12 relative to the housing assembly 14.

[0021] In the example provided, the handle 168 is integrally formed with the housing shells 150a and 150b and may extend between the forward and rearward portions of the housing 32 and above the body of the housing 32 to define therebetween a handle aperture 180 that is sized to receive the hand of the user of the vacuum 10a. Those skilled in the art will appreciate, however, that the handle 168 may be otherwise positioned and/or a discrete component that is joined or fastened to the remainder of the housing 32 in a known manner.

[0022] Except as noted below, each of the housing shells 150a and 150b may be constructed in an identical manner so that further description of the housing shell 150a will suffice for both. With primary reference to Figure 11 and additional reference to Figure 12, the housing shell 150a includes a wall member 186 that may define a front wall 188, a central cavity 196, an exhaust cavity 200 and a recessed area 202 through which an elliptical through-hole 204 is formed. The wall member 186 may also define a motor mount 206 and a hub mount 208, both of which being disposed in the central cavity 196.

[0023] The motor mount 206 may include first and second mount portions 206a and 206b, respectively, that are employed to fixedly couple the motor 70 to the housing 32. The motor mount 206 may be configured to receive the motor 70 in a snap-fit manner so that discrete fasteners and the like are not required.

[0024] The hub mount 208 may include structure which, in association with the fan housing 92 in the example provided, serves to maintain the filter cleaning system 36 in a desired location along a longitudinal axis of the vacuum 10a relative to the filter system 34. In the example provided, the hub mount 208 includes first and second bearing portions 208a and 208b, respectively, which are axially spaced apart along an axis that is coincident with a rotational axis of the motor 70. The first bearing portion 208a may be semi-circular in shape so as to form a circular aperture when the housing shells 150a, 150b are coupled to one another. The second bearing portion 208b may include a rear wall 210 that may be generally transverse to the rotational axis of the motor 70.

[0025] As is apparent from the discussion above, the fan housing 92 may form the inlet aperture 94 and one or more discharge apertures 96 through which air is introduced and discharged, respectively, from the fan assembly 72. In the particular example provided, the fan housing 92 forms a volute that terminates at the discharge aperture 96. The flow channel 98 may serve as a fluid conduit which couples the discharge aperture 96 with the exhaust cavity 200.

[0026] With specific reference to Figure 13, the exhaust deflector 154 may include a frame 270 and a plurality of flow guiding vanes 272 that are set into the frame 270 and fixedly coupled thereto. The flow guiding vanes 272 of the particular embodiment illustrated are shaped so as to direct the air exiting the exhaust cavity 200 both downwardly and rearwardly.

[0027] With additional reference to Figures 3 and 14, the frame 270 of the exhaust deflector 154 may extend upwardly of the flow guiding vanes 272 to create a pocket 276 into which may be fitted an optional exhaust filter 280. The exhaust filter 280 operates to filter the air that exits the exhaust cavity 200 and thereby prevents fine dust particles from being expelled from the vacuum 10a. The exhaust filter 280 may be formed from a non-woven mesh fabric so as to be washable should it become undesirably dirty or clogged. Those skilled in the art will appreciate from this disclosure, however, that the exhaust filter 280 may be formed from another washable filter media or may alternately be a disposable type filter (e.g., paper). Those skilled in the art will also appreciate from this disclosure that the exhaust filter may be configured to provide HEPA (high efficiency particulate air) filtration or ULPA (ultra low penetration air) filtration. As used herein, a "HEPA" filter will be understood as being capable of removing 99.97% of particles as small as 0.3 μm from an air flow, while a "ULPA" filter will be understood as being capable of removing 99.999% of particles as small as 0.12 μm from an air flow.

[0028] Returning to Figures 3 and 13, the frame 270 may also include a pair of trunnions 284 and a pair of clip structures 286. The trunnions 284 permit the exhaust deflector 154 to be pivotably coupled to the housing 32. More specifically, each of the housing shells 150a and 150b may include a recess (not specifically shown) for receiving an associated one of the trunnions 284. Each trunnion 284 is illustrated as being coupled to a portion of the frame 270 that may be deflected laterally inward (i.e., toward the centerline of the exhaust deflector 154) so that the trunnions 284 may be installed to their respective recess when the housing shells 150a and 150b are coupled to one another. With the trunnions 284 engaged

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to recesses, the exhaust deflector 154 may be pivoted between a closed position, wherein the rear surface of the exhaust deflector 154 covers the exhaust cavity 200, and an open position, wherein the exhaust deflector 154 substantially clears the exhaust cavity 200.

[0029] The clip structures 286 are configured to resiliently deflect in response to the application of a modest force to the exhaust deflector 154 to permit the exhaust deflector 154 to be secured to or released from the wall member 186 when the exhaust deflector 154 is moved into or out of the closed position. As will be apparent to those of ordinary skill in the art, engagement of the clip structures 286 to the wall member 186 effectively maintains the exhaust deflector 154 in the closed position. Those skilled in the art will also appreciate that features such as recesses or tabs 288 may be formed into the wall member 186 to serve as points that enhance or improve the ability of the clip structures 286 to engage the wall member 186.

[0030] Returning to Figures 3 and 13, the top of the frame 270 of the exhaust deflector 154 may be arcuately shaped to define a finger grip 290 that is configured to receive the thumb or finger of the user of the vacuum 10a so that the thumb or finger may be employed to move the exhaust deflector 154 out of the closed position. The finger grip 290 may include a gripping feature, such as a raised lip, that permits the user to pry downwardly and outwardly on the exhaust deflector 154 with their thumb or finger to thereby disengage the clip structures 286 from the wall member 186.

[0031] With renewed reference to Figure 12, the filter cleaning system 36 may include a cleaning wheel 300 that housed by the housing 32. With additional reference to Figures 3, 15 and 16, the cleaning wheel 300 may be generally hollow and may include a gripping portion 302, a hub portion 304, a filter drive portion 306 and a filter engagement portion 308. The gripping portion 302 may be an annular ring that may be coupled to the rearward side of the hub portion 304 and which may include a plurality of circumferentially spaced apart recesses 310. The hub portion 304 may define a bearing surface 312 that may be journally supported by the housing 32. The filter drive portion 306 may be formed on a wall 314 that is coupled to the hub portion 304 generally transverse to the bearing surface 312.

[0032] In the particular example provided, the filter drive portion 306 includes a plurality of radially extending drive tabs 316 that are circumferentially spaced apart from one another and collectively oriented concentric with the bearing surface 312. Those skilled in the art will appreciate from this disclosure, however, that the filter engagement portion 308, through frictional engagement or other engagement with the primary filter 414, may also serve in whole or in part as the filter drive portion 306.

[0033] The filter engagement portion 308 may be an elongated annular structure that may extend forwardly from the wall 314 of the filter drive portion 306. The cleaning wheel 300 may also include a grille 320 which inhibits the passage of relatively large objects from passing through the cleaning wheel 300 and contacting the impeller 90.

[0034] The cleaning wheel 300 may be installed over the fan housing 92 prior to the installation of the motor 70 and fan assembly 72 to the housing 32, thereby permitting these components to be collectively assembled to one of the housing shells (e.g., housing shell 150a) substantially simultaneously. The cleaning wheel 300 may be positioned relative to the housing 32 such that gripping portion 302 partially extends through the elliptical through-holes 204 in the recessed areas 202 of the housing 32 as shown in Figure 17. Once the cleaning wheel 300 has been installed to the housing 32, movement of the cleaning wheel 300 in an axial direction along the rotational axis of the motor 70 may be limited through contact between the gripping portion 302 and housing 32 along the perimeter of the elliptical through-holes 204. Additionally or alternatively, contact with the fan housing 92 and the rear wall 210 of the second bearing portion 208b (Figure 11) may be employed to limit movement of the cleaning wheel 300 axially along the rotational axis of the motor 70.

[0035] The first and second bearing portions 208a and 208b of the hub mount 208, however, cooperate with the bearing surface 312 to limit the movement of the cleaning wheel 300 vertically and horizontally relative to the rotational axis of the motor 70, but permit the cleaning wheel to be rotated about the rotational axis of the motor 70. The recesses 310 in the gripping portion are specifically configured to be gripped by the thumb and/or fingers of a user of the vacuum 10a to rotate the cleaning wheel 300.

[0036] In Figures 3 and 12, the filter system 34 may include an intake filter 400 and the above-discussed optional exhaust filter 280. The intake filter 400 may include a prefilter 412 and a primary filter 414. In Figure 18 and with additional reference to Figures 10 and 16, the prefilter 412 may include a filter flange 420, a prefilter body 422 and a securing means 424 for releasably securing the prefilter 412 to the housing 32. The filter flange 420 may extend radially outwardly from the prefilter body 422 and may be configured to abut the front face 188 of the housing 32. The filter flange 420 may be unitarily formed with the remainder of the prefilter 412 from a material that is structural, such as polyethylene or polpropylene. Those skilled in the art will appreciate, however, that the filter flange 420 could alternatively include a resilient band of material (not shown) that is coupled to the remainder of the filter flange 420, via a mechanical connection, adhesives or overmolding, and employed to sealingly engage at least one of the housing 32 and the dirt cup 20.

[0037] With additional reference to Figure 19, the prefilter body 422 may have a truncated cone shape, with a front wall 430 and a side wall 432 that has a plurality of filtering apertures 434 formed therethrough. The filtering apertures 434 may be sized to prevent relatively coarse

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dirt and debris from contacting the primary filter 414 (Fig. 3). In the example provided, the filtering apertures 434 are about 0.020 inch (0.5 mm) to about 0.040 inch (1.0 mm) in diameter. In the particular embodiment provided, one or more ribs 436 are formed on the interior surface 438 of the side wall 432. The ribs 436 will be discussed in greater detail, below.

[0038] As those of ordinary skill in the art will appreciate from this disclosure, any appropriate means may be employed to removably couple the filter flange 420 to one or both of the housing 32 and the dirt cup 20. Preferably, the securing means 424 will not automatically detach from the housing 32 when the dirt cup 20 is removed from the housing 32.

[0039] In the particular example provided, the securing means 424 is illustrated in Figure 18 to include a plurality of holes 440 that are configured to receive therethrough corresponding pegs 442 that extend from the front face 188 of the housing 32 as illustrated in Figure 16. The holes 440 may be shaped to directly correspond to the shape of the pegs 442, but in the example illustrated, include first and second portions 440a and 440b, respectively, that intersect one another. The first portion 440a is relatively large and configured to receive therethrough an associated peg 442, which is illustrated in Figure 10 to include a relatively large head portion 442a and a somewhat smaller body portion 442b. In contrast, the second portion 440b is configured only to receive therethrough the body portion 442b of the associated peg 442. Accordingly, once the prefilter 412 has been installed over the pegs 442, it may be rotated to position the body portion 442b of the pegs 442 into the second portion 440b of the holes 440. As the head portion 442a of the pegs 442 is relatively larger than the second portion 440b, the filter flange 420 will remain attached to the housing 32 when the dirt cup 20 is removed, unless the filter flange 420 is rotated tc align the pegs 442 with the first portion 440a of the holes 440.

[0040] To guard against undesired rotation of the filter flange 420 relative to the housing 32 when the dirt cup 20 has been removed from the rear housing, the securing means 424 may include a resilient finger 440c that contacts the body portion 442b of an associated peg 442 to inhibit rotation of the filter flange 420 unless a force in excess of a predetermined force has been applied to rotate the filter flange 420 in a desired rotational direction relative to the housing 32.

[0041] In Figure 20, the primary filter 414 may have a filter body 450 with first and second seal portions 452 and 454, respectively, disposed on opposite sides thereof. The filter body 450 may have a shape that is similar to that of the prefilter body 422 (Fig. 19) and in the example provided, is illustrated to have a truncated cone shape. The filter body 450 may be formed from any appropriate filter media, such as paper, plastic or fabric and is preferably formed with a plurality of pleats 460. Also preferably, the filter media is wear resistant or includes a wear resistant outer layer 462. Furthermore, the filter body 450 is preferably formed from a filter media that provides HEPA or ULPA filtration. One such suitable filter media is manufactured by W. L. Gore & Associates, a Delaware Corporation having a place of business in Elkton, Maryland.

[0042] In the example provided, the pleats 460 are formed such that their outer ends or peaks 464 lie along a straight line that intersects the axis of a theoretical cone (not shown) that includes the peak 464 of each pleat 460 on the filter body 450. Alternatively, the pleats 460 may be formed such that their peaks 464 are straight but skewed to the axis of the theoretical cone or generally helical in shape. For reasons that will be apparent from the discussion below, however, the pleats 460 should be formed relative to the theoretical cone in a manner that is consistent with the ribs 436 on the interior surface 438 of the filter housing 432.

[0043] The first seal portion 452, which is coupled to the smaller end of the filter body 450, may be a plate-like structure that is formed from a suitable material and is sealingly bonded to a lower end of the filter body 450. Alternatively, the first seal portion 452 may be wholly or partially formed from an appropriate filter material, such as the material from which the filter body 450 is manufactured, and bonded or otherwise sealingly coupled to the filter body 450.

[0044] The second seal portion 454 may be an annular flange that may be sealingly bonded to an upper end of the filter body 450. With additional reference to Figures 12 and 21, the second seal portion 454 may include a body 470 that defines a receiving aperture 472, a primary seal 474 which is disposed about the perimeter of the receiving aperture 472 and sized to sealingly engage the seal engaging portion 308 of the cleaning wheel 300 (Fig. 15), a secondary seal 476 that sealingly engages the interior surface 438 of the prefilter body 422 of the prefilter 412, and a plurality of drive tabs 478. The drive tabs 478, which extend radially outward and are circumferentially spaced apart from one another, are configured to engage the drive tabs 316 that are formed on the filter drive portion 306 of the cleaning wheel 300.

[0045] With the primary filter 414 installed to the cleaning wheel 300 such that the primary seal 474 sealingly engages the seal engaging portion 308 and the drive tabs 316 and 478 are meshingly engaged with one another, the prefilter 412 may be positioned over the primary filter 414 such that the first portion 440a of the through-holes 204 in the filter flange 420 are aligned to the pegs 442 on the housing 32. The prefilter 412 may be urged toward the housing 32 such that the pegs 442 are fitted through the through-holes 204 and thereafter the prefilter 412 is rotated to position the pegs 442 within the second portion 440b of the through-holes 204. With the dirt cup 20 coupled to the housing assembly 14, the prefilter locating tabs 58 urge the filter flange 420 rearwardly toward the front face 188 of the housing 32 so that the secondary seal 476 sealingly engages the prefilter body 422 of the prefilter 412.

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[0046] While the primary filter 414 has been illustrated and described as including first and second seal portions 452 and 454 which are bonded directly to the filter body 450, the primary filter 414 may be formed in various other manners. For example, the primary filter 414 may include a pair of discretely formed, caps 480a and 480b as illustrated in Figures 40 and 41. The cap 480a may be generally cup shaped, with a closed top 482 and a side wall 484 with a plurality of teeth 486 formed about the inside perimeter of the side wall 484. The cap 480b may be an annular ring that similarly includes a plurality of teeth 488 formed about its inside perimeter. The caps 480a, 480b may be secured to the opposite ends of the filter body 450 through an adhesive, heat staking or sonic welding, for example, so that the teeth 486 and 488 of the caps 480a and 480b meshingly engage the pleats 460 of the filter media. The first seal portion 452 may be integrally formed with, molded onto or bonded to the annular cap 480b. The second seal portion 454 is optional in this embodiment, as the cap 480a may be formed with a closed configuration, rather than the annular shape of the cap 480b.

[0047] The embodiment of Figures 42 and 43 is similar to that discussed above in that it likewise employs a pair of discretely formed caps 480c and 480d. However, the teeth 486 and 488 are formed on the exterior surfaces of the caps 480c and 480d so as to meshingly engage the pleats 460 from the interior of the filter body 450.

[0048] The embodiment of Figures 44 and 45 employs a pair of ring sets 490 and 492. The ring set 490 may include an outer ring 490a, which may be similar to the cap 480a, and an inner ring 490b, which may be similar to the cap 480c. The outer and inner rings 490a and 490b are assembled to the filter body 450 such that the filter media is sandwiched therebetween and secured to the filter body 450 and/or to one another via an adhesive, heat staking or sonic welding, for example. Likewise, the ring set 492 includes an outer ring 492a, which may be similar to the cap 480b, and an inner ring 492b, which may be similar to the cap 480d. The outer and inner rings 492a and 492b are assembled to the filter body 450 such that the filter media is sandwiched therebetween. The outer and inner rings 492a and 492b are secured to the filter body 450 and/or to one another via an adhesive, heat staking or sonic welding, for example.

[0049] With reference to Figures 3 and 8, when the vacuum 10a is operated, the fan assembly 72 expels air from the fan housing 92 which creates a negative pressure differential relative to atmospheric conditions and causes a dirt and debris laden air flow to rush into the dirt cup 20 through the inlet port 54. When coupled to the inlet port 54, the elbow 22 directs the dirt and debris laden air that is flowing through the inlet port 54 toward the interior wall of the dirt cup 20, causing the dirt and debris laden air to swirl about the interior of the dirt cup. In the particular example provided, the outlet 500 of the elbow 22 is configured to direct the dirt and debris laden air flow in a direction to the side and rear of the dirt cup 20. Those of ordinary skill in the art will appreciate from this disclosure, however, that the elbow 22 may be configured to direct the dirt and debris laden air flow in a direction generally transverse to the inlet port 54, that the outlet 500 of the elbow 22 may or may not lie in the same "plane" as the inlet port 54 (i.e., the centerline of the elbow 22 at the outlet 500 may or may not lie in a plane that is contains the centerline of the inlet port 54) and that any portion of the elbow 22 between the outlet 22 and the inlet port 54 may be formed with a desired shape (e.g., helical) to enhance the swirling effect produced by the elbow 22 and the dirt cup 20.

[0050] In some situations, the swirling effect may be so strong as to create centrifugal force that causes the dirt and debris to move outwardly toward and collect against the dirt cup 20. The swirling effect may also slow the collection of dirt and debris on the prefilter 412 and the primary filter 414 to thereby provide improved efficiency of the vacuum 10a. Improved efficiency is particularly important with cordless vacuums, as it permits extended operation on a given battery charge. Those of ordinary skill in the art will readily appreciate in view of this disclosure that the swirling effect may not be desirable under some circumstances and as such, the elbow 22 may be removable from the inlet port 54.

[0051] With reference to Figures 3, 12, 19 and 20, the vacuum 10a may be additionally and further maintained in an efficient state by rotating the cleaning wheel 300 as needed or at a desired interval when the impeller 90 is not rotating to at least partially clear accumulated dirt and debris from the pleats 460 of the primary filter 414. More specifically, as the primary filter may be coupled to the cleaning wheel 300, rotation of the cleaning wheel 300 causes contact between the ribs 436 and an associated set of the pleats 460 which may deflect the pleats 460 and vibrate the pleats 460 after the pleat 460 has rotated past the rib 436. The force of the impact, the deflection of the pleat 460 and its subsequent vibration may cooperate to dislodge particles of dirt and debris from both the prefilter 412 and the primary filter 414.

[0052] Those skilled in the art will appreciate from this disclosure that various modifications may be made to the prefilter 412 to aid in discharging dirt and debris that are dislodged from the primary filter 414 and/or to slow the rate with which the pleats 460 of the primary filter 414 wear. For example, the prefilter 412 may be constructed with one or more apertures 5000 as shown in Figures 46 and 47. The apertures 5000 are relatively larger than the filtering apertures 434 so that dirt and debris that are dislodged from the primary filter 414 (Fig. 20) during cleaning, e.g., rotation of the cleaning wheel 300 (Fig. 15), may more readily fall through the prefilter body 422 and collect in the dirt cup 20 (Fig. 1). In the example of Figure 48, the prefilter body 422 is constructed such that at least a portion of the ribs 436 are shifted along the longitudinal axis of the prefilter body 422. In the particular example provided, each of the ribs 436 is shifted so that no two ribs 436 contact the same area of the pleats 460

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(Fig. 20).

[0053] Returning to Figures 1 and 3, the tool set 10b may include a brush tool 500 and a crevice tool 502 that may be fixedly but removably engaged to the front end of the inlet port 54 via a friction fit. Unlike the known configurations of accessories, the brush tool 500 and crevice tool 502 each employ a body portion 504 having first and second portions 506 and 508 with a U-shaped aperture 510 formed therebetween. The U-shaped aperture 510 permits a relatively large degree of flexure between the first and second portions 506 and 508 so as to ensure high quality friction fit and associated seal between the body portion 504 and inlet port 54 of the dirt cup 20.

[0054] In the particular example provided, the brush tool 500 may be stored in a cavity 518 formed in the rear of the housing 32, while the crevice tool 502 may be coupled to a bottom face 520 of the housing 32. One or more resilient clips 522 may be employed to retain the particular accessory to the housing 32.

[0055] With reference to Figure 22, the recharging base 75 is illustrated in association with the vacuum 10a. The recharging base 75 may include a base 1000, a charging circuit 1002, a pair of terminals 1004 and a key 1006. The base 1000 may be a molded structure and may be configured to slidably receive the vacuum 10a such that a pair of mating terminals 1014 and a mating key 1016 matingly engage the terminals 1004 and the key 1006, respectively. The charging circuit 1002 may be configured in a conventional and well known manner to receive electrical power from a source of A.C. power and provide a source of D.C. power of a predetermined voltage to the terminals 1004.

[0056] In the particular example provided, the terminals 1004, which may be mounted to the base 1000, may extend outwardly from the base 1000 so as to contact associated ones of the mating terminals 1014 when the vacuum 10a is fully received into the base 1000. As the terminals 1014 are electrically coupled to the battery pack 74, contact between the terminals 1004 and 1014 permits electrical energy to be transmitted from the charging circuit 1002 to the batteries 100.

[0057] The key 1006 and the mating key 1016 coordinate with one another to permit the base 1000 to fully receive the vacuum 10a. In the particular example provided, the key 1006 includes a pedestal 1028, a flange 1030 and optionally one or more engagement tabs 1032, while the mating key 1016 includes a receiver 1040. The pedestal 1028 of the key 1006 may be coupled to the base 1000 in any conventional manner, including for example, threaded fasteners and/or features that are integrally formed onto and/or into the pedestal 1028 and base 1000 that permit the pedestal 1028 and the base 1000 to be engaged to one another in a snap-fit manner. The flange 1030 may be coupled to the pedestal 1028, extending upwardly therefrom so as to protrude from a corresponding aperture 1036 in the base 1000 when the key 1006 and the base 1000 are coupled to one another. If employed, the engagement tabs 1032 extend from the flange 1030 in the example provided.

[0058] The receiver 1040 may be coupled to the housing 32 in any conventional manner, including for example, threaded fasteners and/or features that are integrally formed onto and/or into the receiver 1040 and housing 32 that permit the receiver 1040 and the housing 32 to be engaged to one another in a snap-fit manner. The receiver 1040 of the mating key 1016 may optionally include one or more slots 1042 for receiving the engagement tabs 1032. The engagement tabs 1032 and slots 1042 are positioned such that they must engage one another before the terminals 1020 and 1022 may contact one another. Those of ordinary skill in the art will appreciate from this disclosure that although the vacuum 10a has been described thus far as including slots 1042 for receiving engagement tabs 1032 that are associated with the recharging base 75, the slots 1042 and engagement tabs 1032 may alternatively be associated with the recharging base 75 and the vacuum 10a, respectively.

[0059] With reference to Figure 23, the interchangeable nature of the charging system of the present invention is illustrated. Specifically, several terminal block (1004) and key (i.e., 1006a, 1006b, 1006c, 1006d, and 1006e) combinations are illustrated as being interchangeable with the base 1000, while several receivers (1040a, 1040b, 1040c, 1040d, and 1040e) are illustrated in association with the vacuum 10a. Significantly, the injection molds for each of the key and the receiver employ exchangeable tooling segments that permit the molds to be readily converted so that they may be employed to form each of the various key configurations and receiver configurations. With reference to Figure 24, five tooling segments 1050a, 1050b, 1050c, 1050d and 1050e are employed in conjunction with a base mold 1052 to produce each of the receiver combinations.

[0060] One especially significant aspect of providing various key and mating key combinations is the ability to provide a family of similar vacuums having different batteries (i.e., different voltages) yet which utilize as many common components as possible. In this regard, the various key and mating key combinations are employed to "key" a particular vacuum to a particular recharging base so as to prevent a vacuum from being coupled to a recharging base having a charging circuit that provides a charging voltage in excess of that which the batteries of the vacuum are designed to be charged.

[0061] With reference to Figure 25, a family of handheld cordless vacuums is generally indicated by reference numeral 2000. The family of vacuums 2000 includes vacuums 2002a, 2004a, 2006a, 2008a and 2010a, which are associated with recharging bases 2002b, 2004b, 2006b, 2008b and 2010b, respectively. The vacuums 2002a, 2004a and 2006a are generally identical to vacuum 10a and differ from one another only in the design charging voltage of their respective battery packs 74. For example, the vacuum 2002a may have a design charging voltage of 14.4 volts, the vacuum 2004a may have a design charging voltage of 12 volts and the

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vacuum 2006a may have a design charging voltage of 9.6 volts. The vacuums 2008a and 2010a are similar to the vacuum 10a (Fig. 1) except that they lack a filter cleaning system 36 and may have design charging voltages of 7.2 volts and 4.8 volts, respectively. The recharging bases 2002b, 2004b, 2006b, 2008b and 2010b are generally identical to the recharging base 75 (Fig. 1) and differ from one another only in the charging voltage that they output.

[0062] As those skilled in the art will appreciate from this disclosure, the recharging bases (i.e., the keys) may be configured so that they will only engage one vacuum (i.e., mating key). However, it is permissible for a recharging base (i.e., key) to receive more than one type of vacuum (i.e., mating key) so long as the charging voltage provided by the recharging base will not exceed the design charging voltage of any vacuum that may be engaged thereto. In the particular example provided, any member of the family of vacuums 2000 may be engaged to the recharging base 2010b. Furthermore, the vacuum 2004a may also be engaged to the charging bases 2004b, 2006b, and 2008b.

[0063] While the vacuum 10a has been described thus far as employing an elbow to impart a swirling action to an incoming dirt and debris laden air flow and a manually rotatable cleaning wheel for use in dislodging particles of dirt and debris from a filter, those skilled in the art will appreciate that the invention, in its broader aspects, may be constructed somewhat differently. For example, the vacuum 10c may employ one or more vanes to swirl the incoming dirt and debris laden air flow as shown in Figures 26 and 27. In this example, the vacuum 10c is identical to the vacuum 10a described above, except that the elbow 22 (Fig. 3) is not employed and a prefilter 412c has been substituted for the prefilter 412. The prefilter 412c is substantially similar to the prefilter 412, except for the inclusion of a plurality of flow guiding vanes 600 on the front wall 430c of the prefilter body 422c. The flow guiding vanes 600 are disposed axially in-line with the inlet port 54c such that the axially directed incoming dirt and debris laden air flow is turned by the flow guiding vanes 600 outwardly toward the interior surface of the wall of the dirt cup 20c. As with the elbow 22, the flow guiding vanes 600 may be configured aggressively, wherein the entire flow is turned outwardly at the interior surface of the dirt cup 20c, or somewhat less aggressively, wherein the flow is turned outwardly but retains a portion of its original axial velocity.

[0064] As those of ordinary skill in the art will appreciate from this disclosure, vanes 600d for swirling the incoming dirt and debris laden air flow may be additionally or alternatively formed on another surface, such as the exterior surface 620 of the side wall 432d of the prefilter 412d, as illustrated in Figure 28.

[0065] Alternatively, the vacuum 10e may be configured as is shown in Figures 29 and 30. In this embodiment, the housing assembly 14e defines a filter recess 700 into which the filter system 34e is disposed. The filter system 34e includes a hat-shaped prefilter 412e and a hat-shaped primary filter 414e. The prefilter 412e includes a filter flange 420e and a prefilter body 422e, while the primary filter 414e includes a filter flange 710 and a filter body 712. A nozzle 720 is pivotally coupled to the housing assembly 14e and unlike the dirt cup 20 of Figure 1, the nozzle 720 has no capacity for the storage of the dirt and debris that is drawn up by the vacuum 10e. Rather, coarse dirt and debris are retained in the prefilter 412e while finer dirt and debris which pass through the prefilter 412e are contained by the primary filter 414e. Pivoting of the nozzle 720 into the closed position causes the nozzle 720 to compress the filter flange 420e and filter flange 710 against one another such that a seal is formed between the nozzle 720 and the housing assembly 14e.

[0066] The nozzle 720 includes an outlet 730 that directs an incoming flow of dirt and debris laden air tangentially into the prefilter 412e, thereby generating a swirling effect that tends to reduce the accumulation of dirt and debris against the side wall 432e of the prefilter 412e. This configuration is highly advantageous in that it permits the user to not only perform vacuuming operations with a single hand, but also to empty the vacuum 10e of dirt and debris with a single hand. More specifically, the user need only access the latch release 38 to unlatch the nozzle 720 from the housing assembly 14e to permit the nozzle 720 to pivot into the open condition. A detent (not specifically shown) may be employed to retain the nozzle 720 in the open condition. The user need only grasp the handle 168 of the housing assembly 14e and overturn the vacuum 10e to empty the contents of the prefilter 412e.

[0067] As is apparent from the discussion above, rotation of the cleaning wheel 300 when the impeller 90 is rotating renders the cleaning action relatively less effective (as compared to when the impeller 90 is not rotating) since dirt and debris that are dislodged when the cleaning wheel 300 is rotated tends to be immediately drawn back into the primary filter 414. Accordingly, it is within the scope of the present invention to include with the vacuum 10a a device that either locks the cleaning wheel 300 or electrically disables the fan assembly 72 when the cleaning wheel 300 is rotated. In Figure 31, a lock-out device 800 is illustrated to be coupled to the power switch 76 for translation therewith. When the power switch 76 is activated, a lock-out member 802 translates into locking engagement with one of the circumferentially spaced apart recesses 310 in the gripping portion 302 of the cleaning wheel 300 to prevent the cleaning wheel 300 from being rotated. In Figure 32, a sensor 850 is employed to detect the rotation of the cleaning wheel 300 relative to the housing 32 and generate a sensor signal in response thereto. In the particular example provided, the sensor 850 includes a pair of spaced apart contacts 850a and 850b which are normally not in contact with one another but which are urged into electrical contact with one another by actuating features 852 that are formed on the cleaning wheel 300. In response to receipt

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of the sensor signal, a controller 860 is employed to inhibit the flow of electricity from the batteries 100 to the motor 70 to thereby deactivate the fan assembly 72. In the example provided, the controller 860 employs a conventional relay 862 to inhibit the flow of electricity from the batteries 100 to the motor 70. In this latter embodiment, the controller 860 may include a timer 864 which maintains the motor 70 in a deactivated state for a predetermined amount of time after receipt of the sensor signal.

[0068] In the embodiments of Figures 34 and 35, the cleaning wheel is illustrated to be driven by a motor rather than manually operated. In Figure 34, a clutch 900 having an input shaft 902, which is coupled to the output shaft 88 of the motor 70, a first output shaft 904, to which the impeller 90 is coupled for rotation therewith, and a second output shaft 906, which is concentric with the first output shaft 904, which is meshingly engaged with an idler gear 908. A shaft 910 couples an output pinion 912, which is meshingly engaged with teeth 310g formed on the cleaning wheel 300g, for rotation with the idler gear 908. The clutch 900 is normally operable in first condition, wherein rotary power is transmitted to the first output shaft 904 but not the second output shaft 906, and a second condition, wherein rotary power is transmitted to the second output shaft 906 but not the first output shaft 904. The clutch 900 is preferably electronically controlled, so that the user need only press a button to change the condition of the clutch 900 from the first condition to the second condition (such as by translating the power switch 76 (Fig. 3) in a direction opposite that which is normally employed to actuate the vacuum 10a). As noted above, the clutch 900 is normally operable in the first condition, so that when the button is released, the clutch 900 will revert to the first condition. In the embodiment of Figure 35, a second motor 950 is employed to rotate the cleaning wheel 300.

[0069] While the invention has been described in the specification and illustrated in the drawings with reference to various embodiments, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the scope of the invention as defined in the claims. Furthermore, the mixing and matching of features, elements and/or functions between various embodiments is expressly contemplated herein so that one of ordinary skill in the art would appreciate from this disclosure that features, elements and/or functions of one embodiment may be incorporated into another embodiment as appropriate, unless described otherwise, above. Moreover, many modifications may be made to adapt a particular situation or material to the teachings of the invention without departing from the essential scope thereof. Therefore, it is intended that the invention not be limited to the particular embodiment illustrated by the drawings and described in the specification as the best mode presently contemplated for carrying out this invention, but that the invention will include any embodiments falling within the foregoing description and the appended claims.

Claims

1. A hand-held portable vacuum comprising:

   a housing having a handle;
   a dirt cup having an inlet and defining a container for storage of dirt and debris therein, the dirt cup being removably attached to the housing;
   an impeller at least partially disposed in the housing, the impeller being operable for generating an air flow that flows through the inlet;
   a filter disposed between the impeller and the inlet; and
   means for swirling the air flow about the dirt cup.

2. The hand-held vacuum of Claim 1, wherein the swirling means includes a flow deflector associated with the inlet of the dirt cup.

3. The hand-held vacuum of Claim 2, wherein the flow deflector is an elbow.

4. The hand-held vacuum of Claim 1, wherein the swirling means includes a plurality of vanes disposed in an axially spaced relation to the inlet.

5. The hand-held vacuum of Claim 4, wherein the vanes are associated with a prefilter, the vanes being disposed between the inlet and the filter.

6. A hand-held portable vacuum comprising:

   a housing having a handle;
   a dirt cup having an inlet and defining a container for storage of dirt and debris therein, the dirt cup being removably attached to the housing;
   an impeller at least partially disposed in the housing, the impeller being operable for generating an air flow that flows through the inlet;
   a filter disposed between the impeller and the inlet; and
   a flow deflector associated with the inlet of the dirt cup, the flow deflector being configured to direct the air flow toward an interior surface of the dirt cup in a manner that causes dirt and debris entrained in the air flow to swirl about the interior surface of the dirt cup.

7. The hand-held vacuum of Claim 6, wherein the flow deflector is an elbow that is coupled to the inlet.

8. A hand-held portable vacuum comprising:

   a housing;
   an impeller at least partially disposed in the

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housing;
a dirt cup having an inlet and defining a container for storage of dirt and debris therein, the dirt cup being removably attached to the housing; and
a HEPA filter disposed between the impeller and the inlet.

9. The hand-held portable vacuum of Claim 8, wherein the HEPA filter is formed with a plurality of pleats.

10. The hand-held portable vacuum of Claim 9, further comprising a filter cleaning device associated with at least one of the housing and the dirt cup, the filter cleaning device including at least one rib and a hub, the hub being coupled to one of the HEPA filter and the rib and configured to rotate the one of the HEPA filter and the rib about the other one of the HEPA filter to generate contact between the rib and the HEPA filter to at least partially dislodge accumulated dirt and debris from the pleats.

11. The hand-held portable vacuum of Claim 10, wherein the hub is rotatably coupled to the housing.

12. The hand-held portable vacuum of Claim 11, wherein the HEPA filter is sealingly attached to the hub.

13. The hand-held portable vacuum of Claim 11, wherein the hub includes a plurality of drive tabs that meshingly engage a plurality of drive tabs formed on the HEPA filter.

14. The hand-held portable vacuum of Claim 11, further comprising a prefilter, the prefilter having a prefilter body that surrounds the HEPA filter, the prefilter body having an open end which is sealingly engaged with the HEPA filter.

15. The hand-held portable vacuum of Claim 11, further comprising a prefilter, the prefilter having a prefilter body that surrounds the HEPA filter, the rib extending from an interior surface of the prefilter body.

16. The hand-held portable vacuum of Claim 8, further comprising a prefilter, the prefilter having a prefilter body that surrounds the HEPA filter

17. The hand-held portable vacuum of Claim 16, wherein the prefilter body has an open end and the prefilter and HEPA filter are sealingly engaged to close the open end.

18. A method for filtering a dirt and debris laden air flow, the method comprising:

providing a hand-held vacuum with a housing, an impeller, an inlet, a container and a primary filter, the housing including a handle that permits a user to employ the hand-held vacuum for vacuuming with a single hand, the impeller being disposed within the housing, the inlet being configured to receive the dirt and debris laden air flow therethrough, the container being configured to retain dirt and debris removed from the dirt and debris laden air flow and the primary filter being disposed between the impeller and the inlet;
rotating the impeller to generate the dirt and debris laden air flow; and
swirling the dirt and debris laden air flow about the interior of the container.

19. The method of Claim 18, further comprising removing the container from the housing to empty the container.

20. The method of Claim 19, wherein the container and the inlet are fixedly coupled to one another.

21. The method of Claim 18, further comprising pivoting the inlet relative to the housing to gain access to the container.

22. The method of Claim 21, further comprising rotating the housing with the single hand grasping the handle to overturn the vacuum and empty the container.

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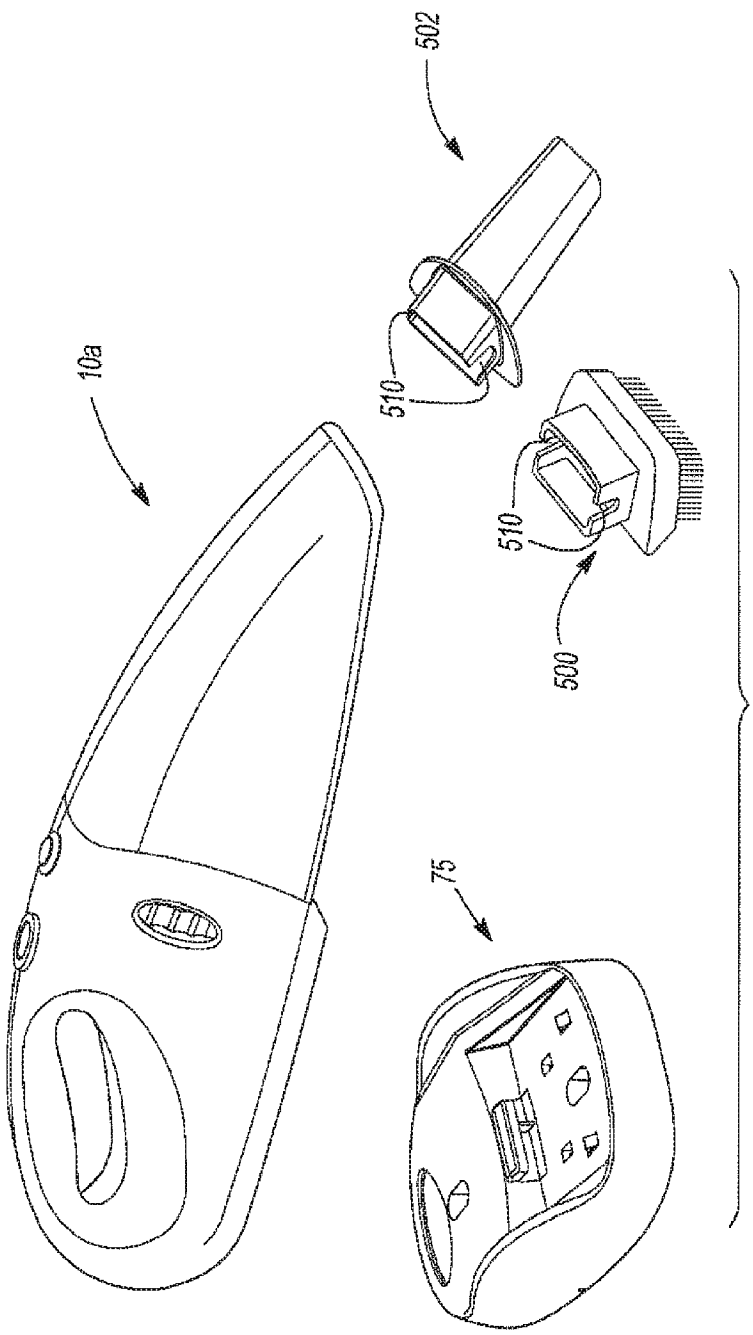


Fig - 1

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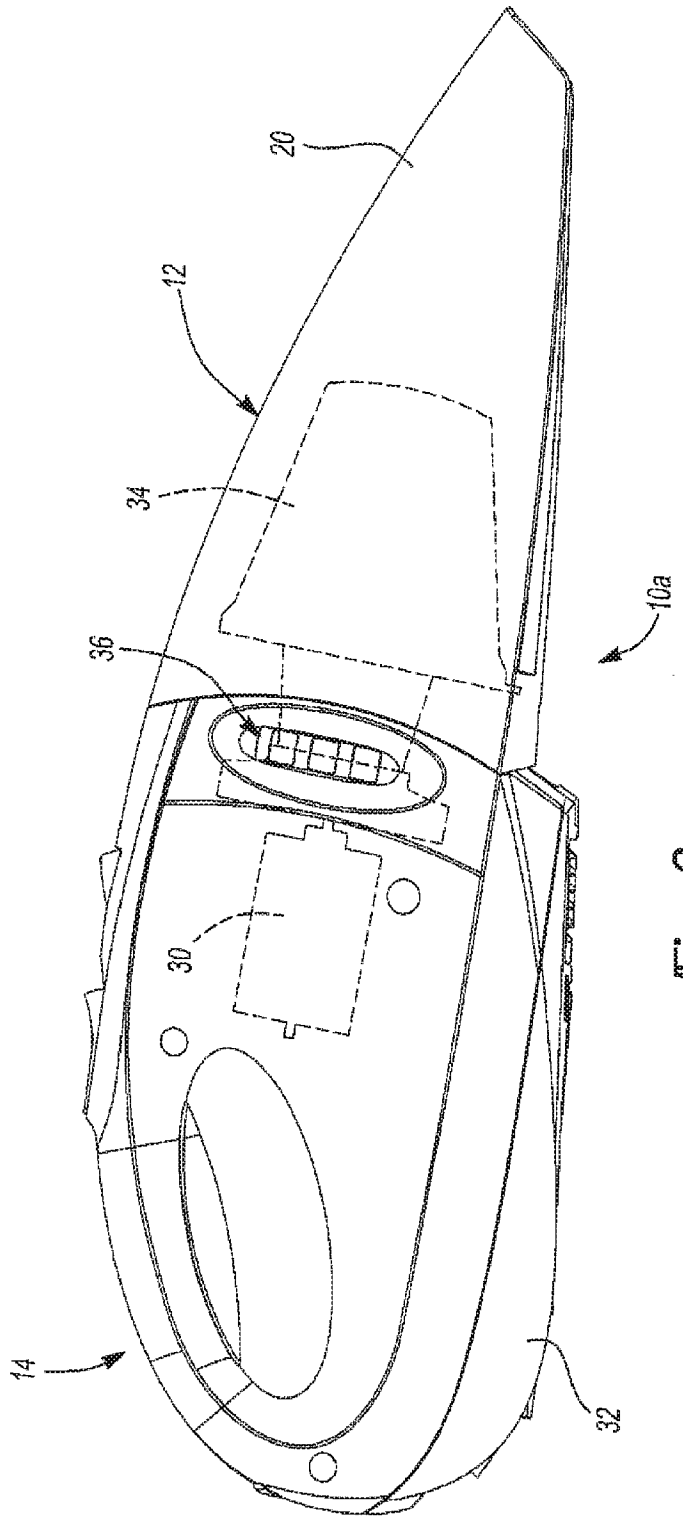


Fig-2

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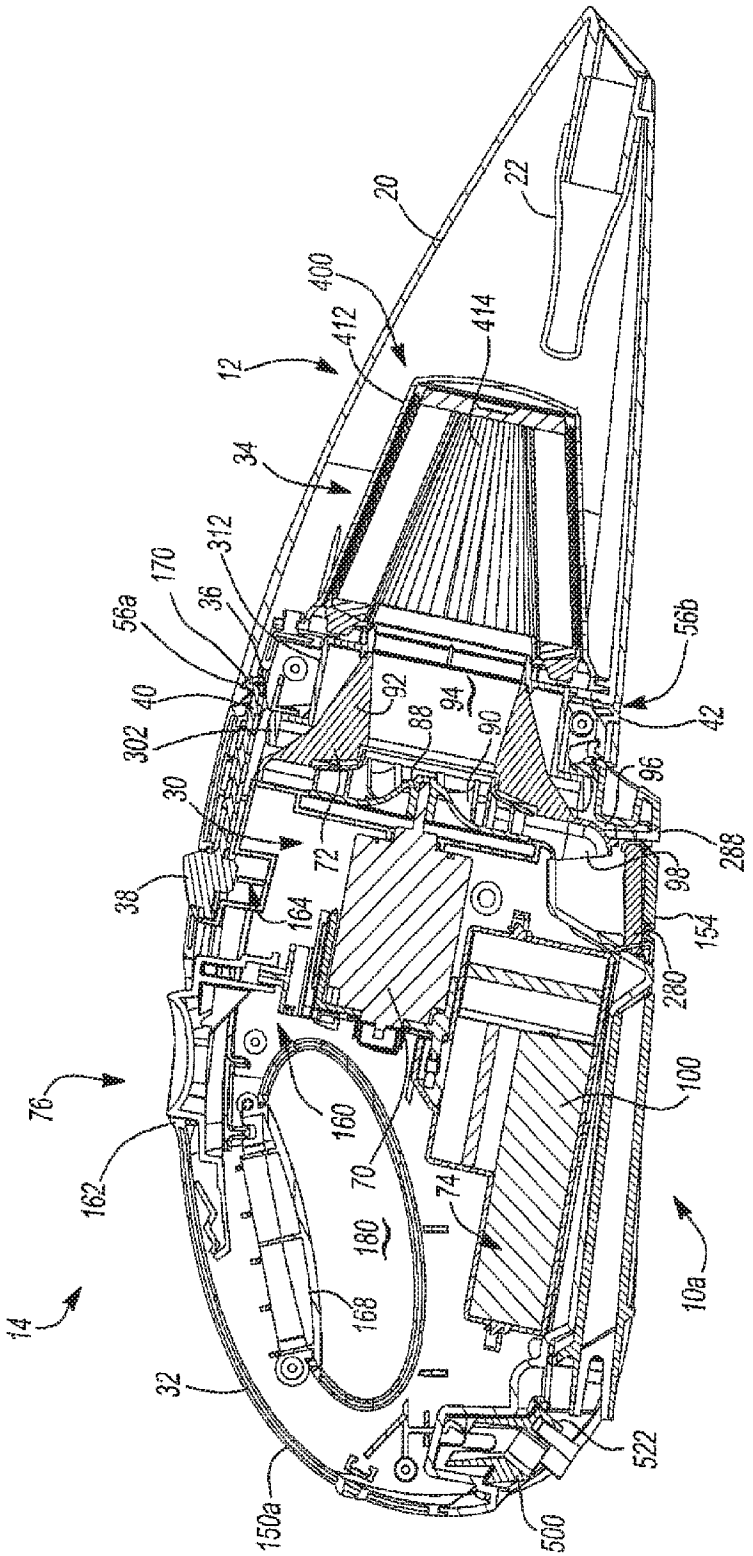


Fig-3

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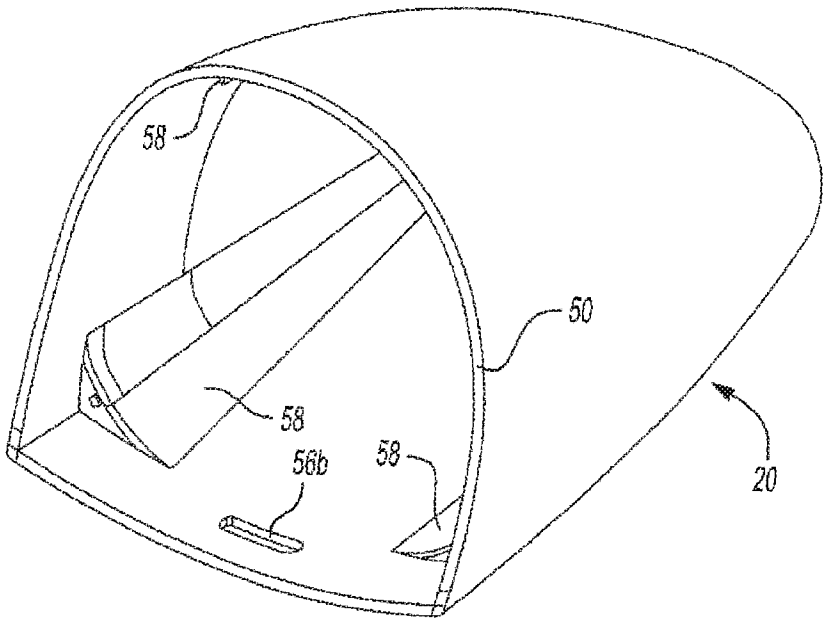


Fig-4

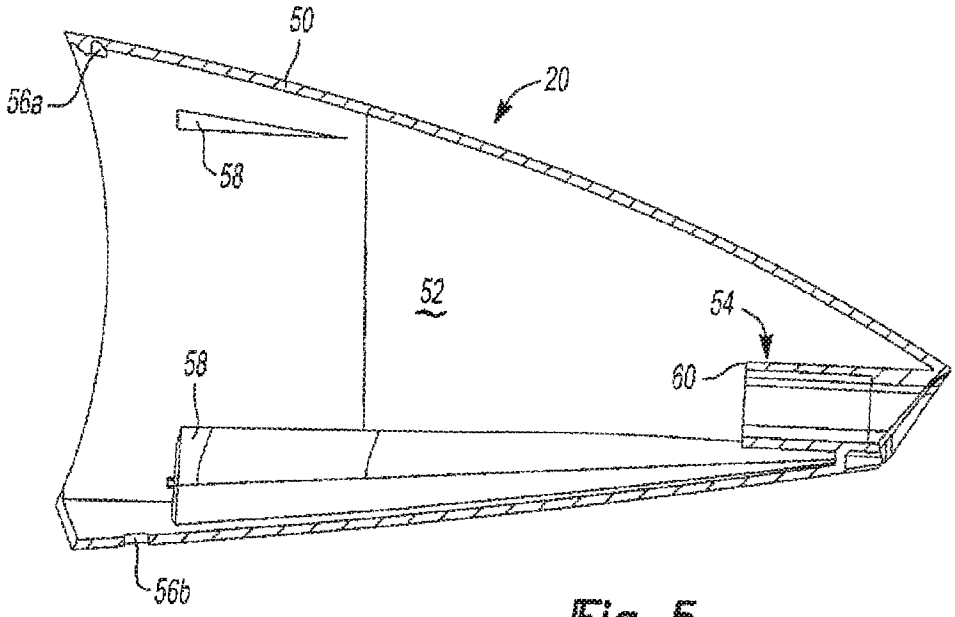


Fig-5

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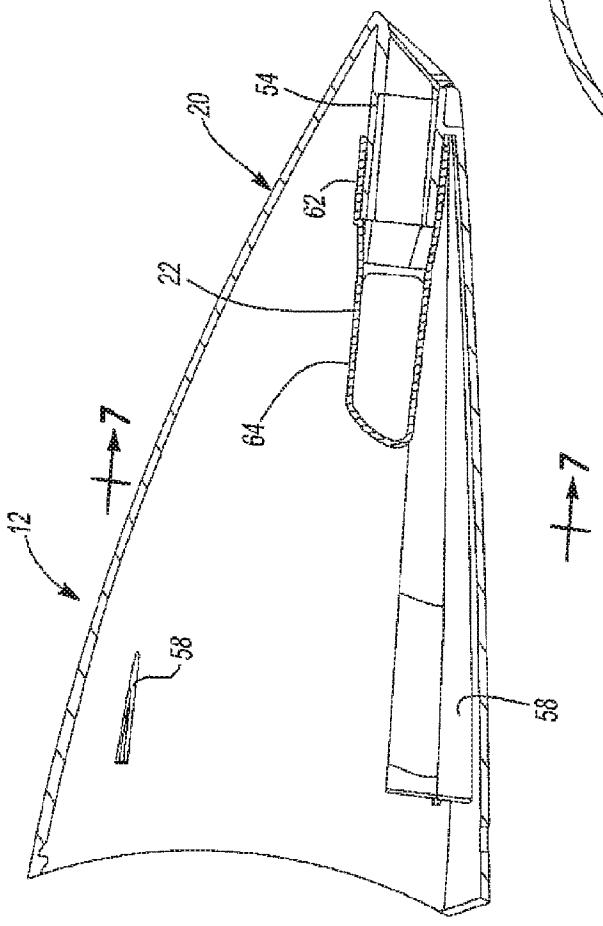


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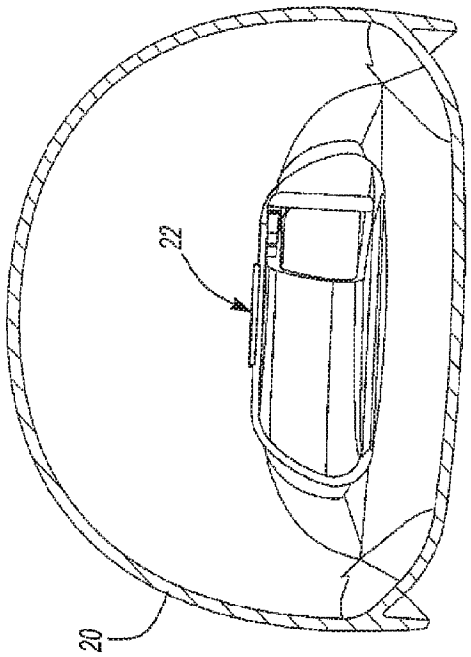


Fig-7

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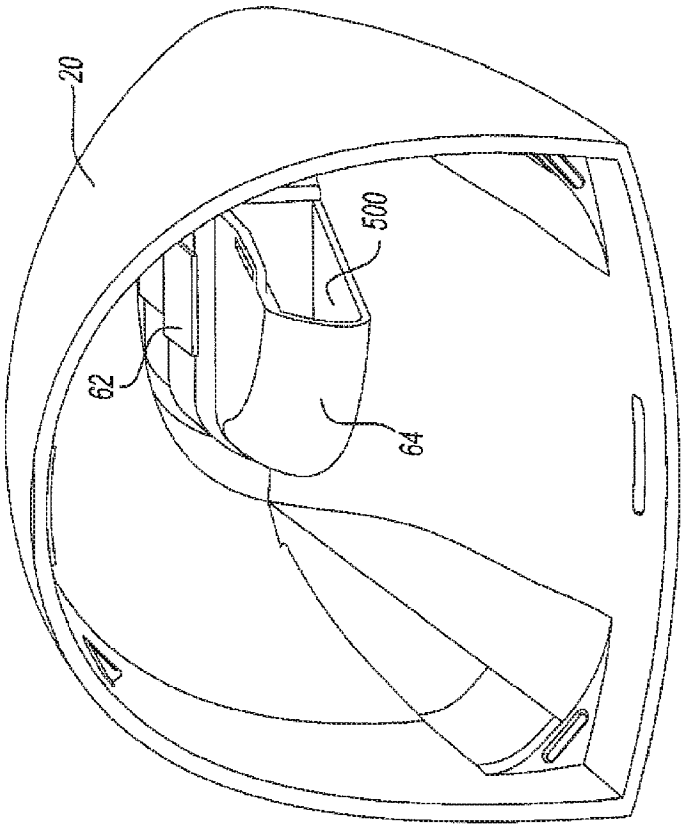


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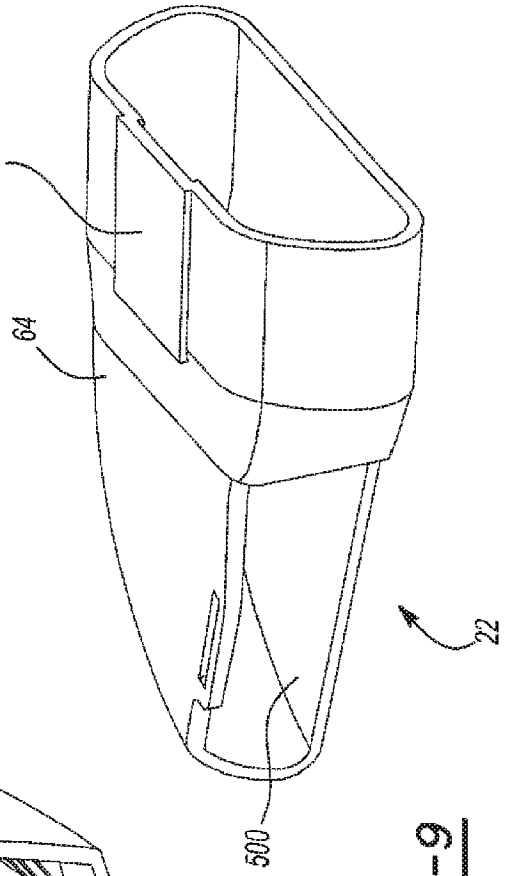


Fig-9

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Fig-10

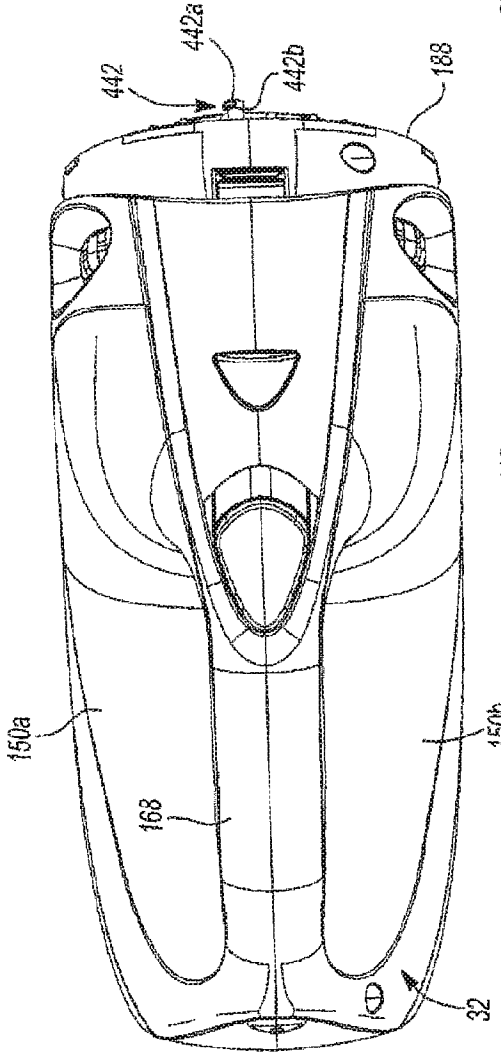
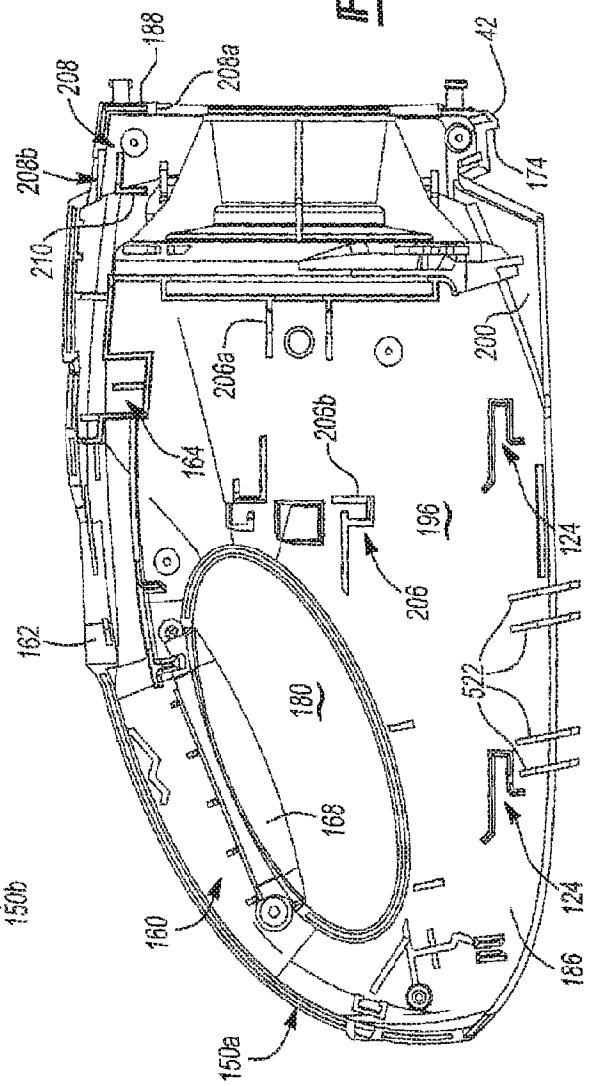


Fig-11



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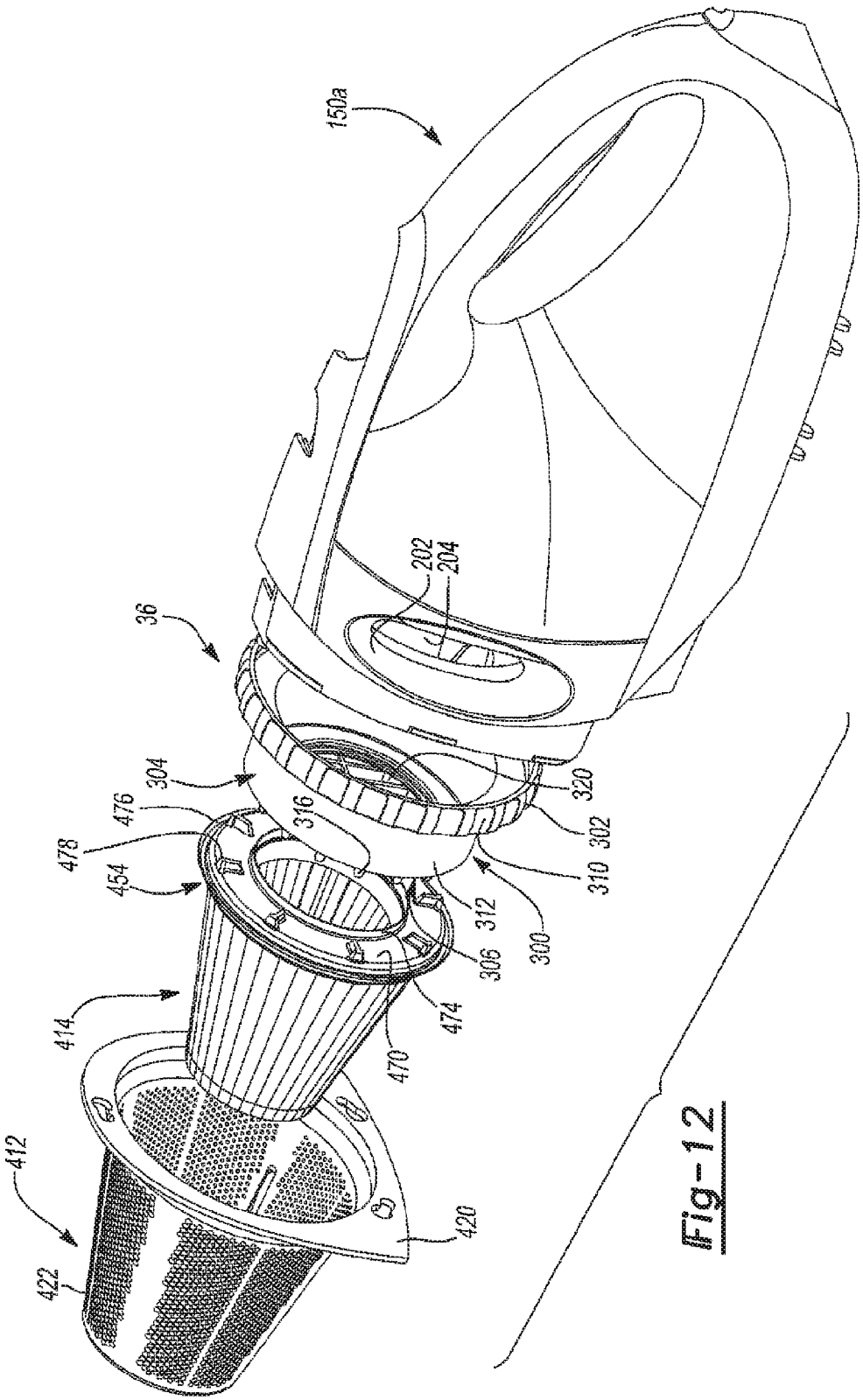


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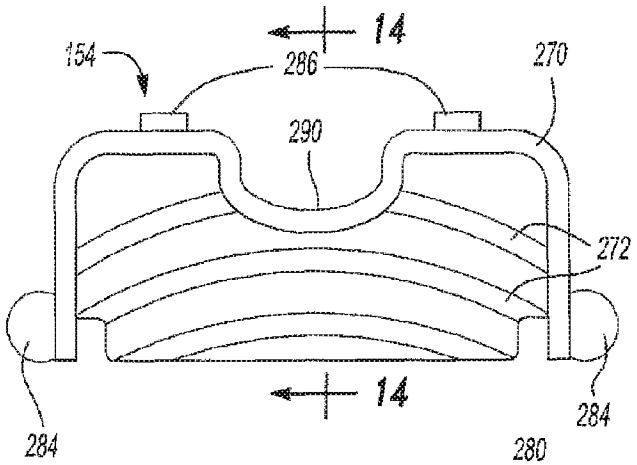


Fig-13

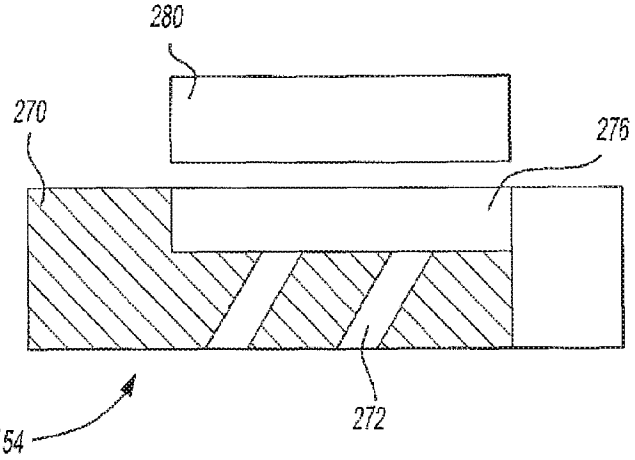


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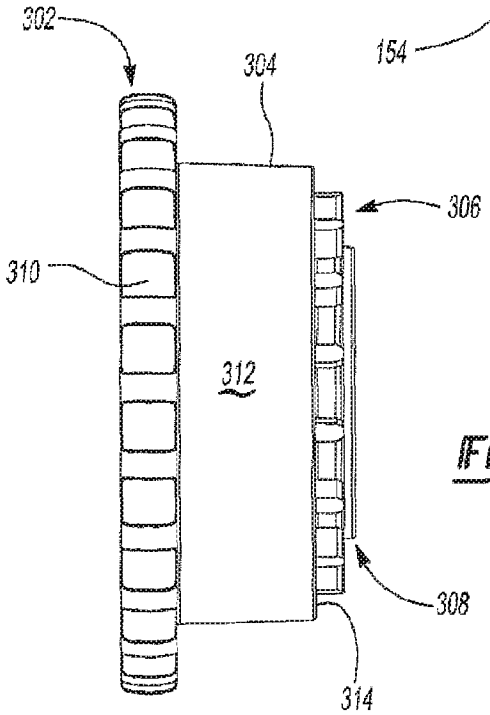


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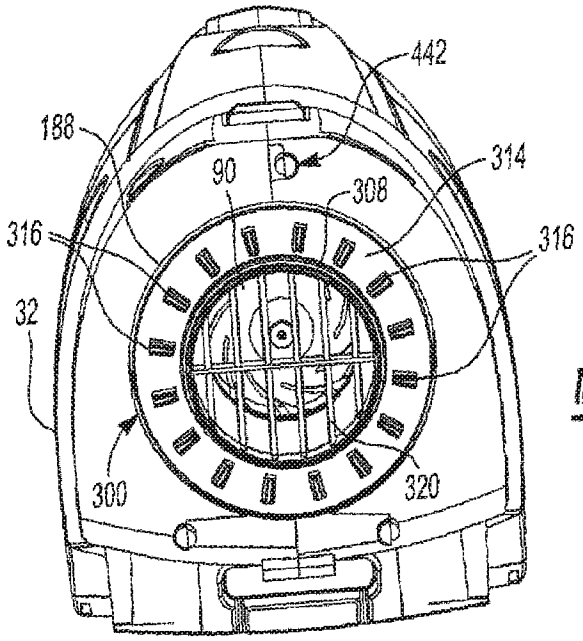


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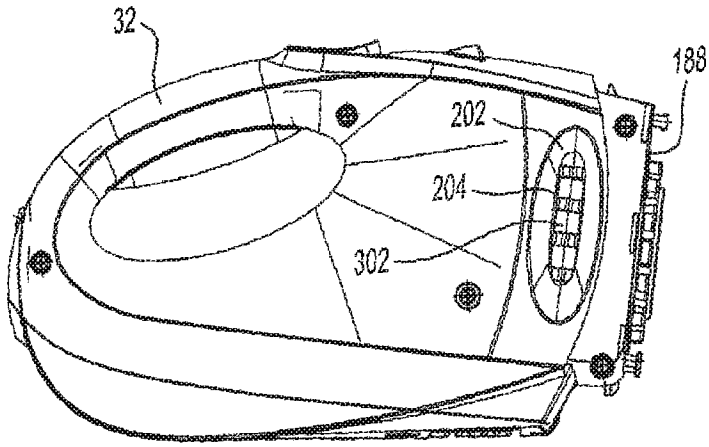


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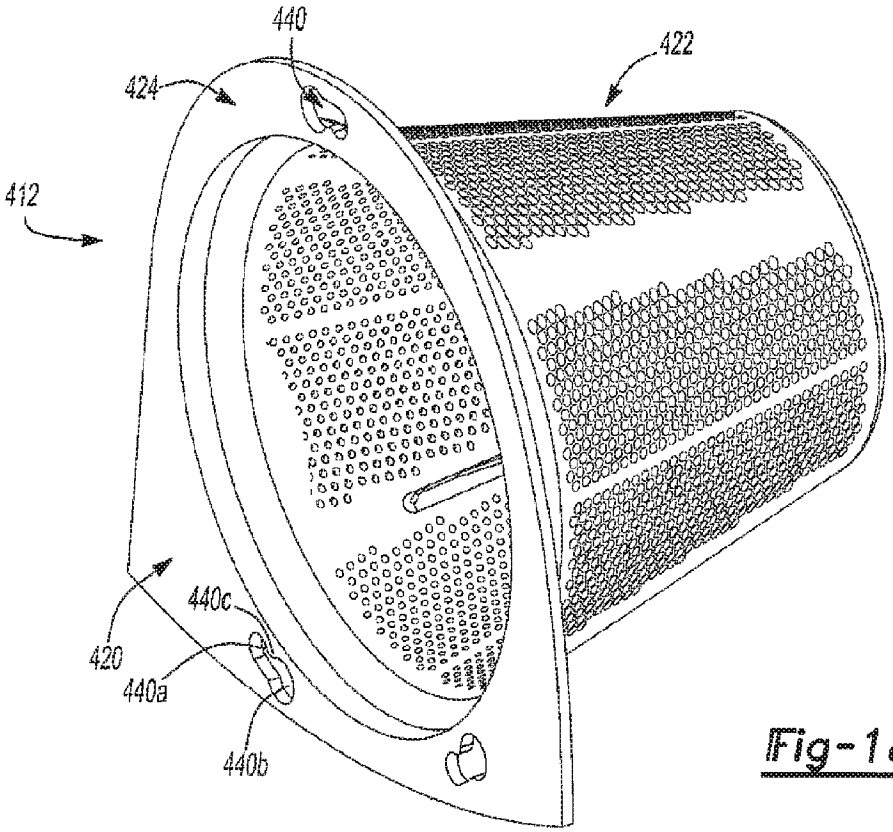


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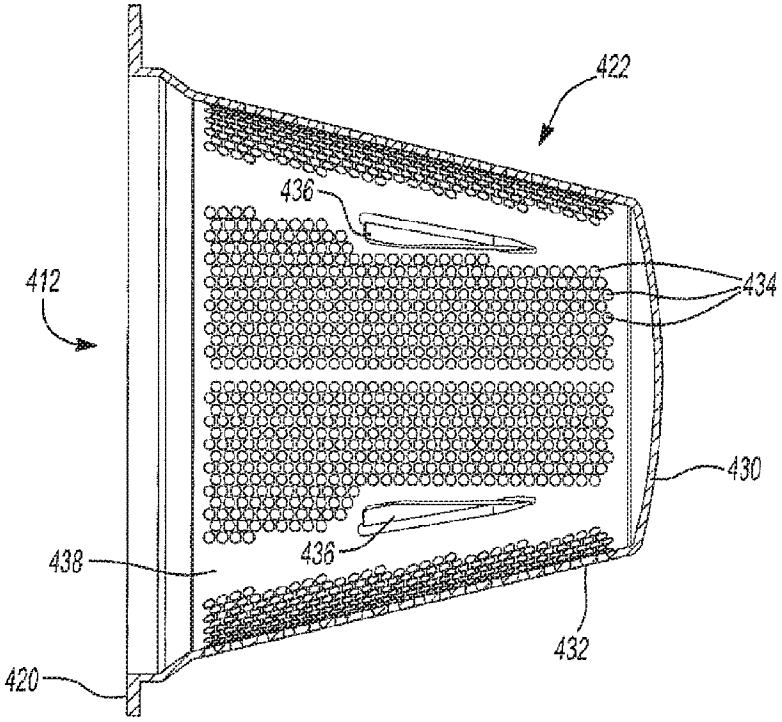


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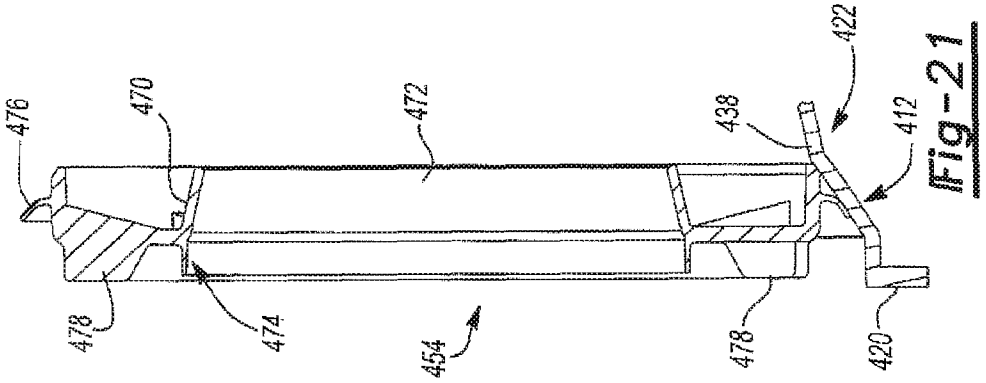


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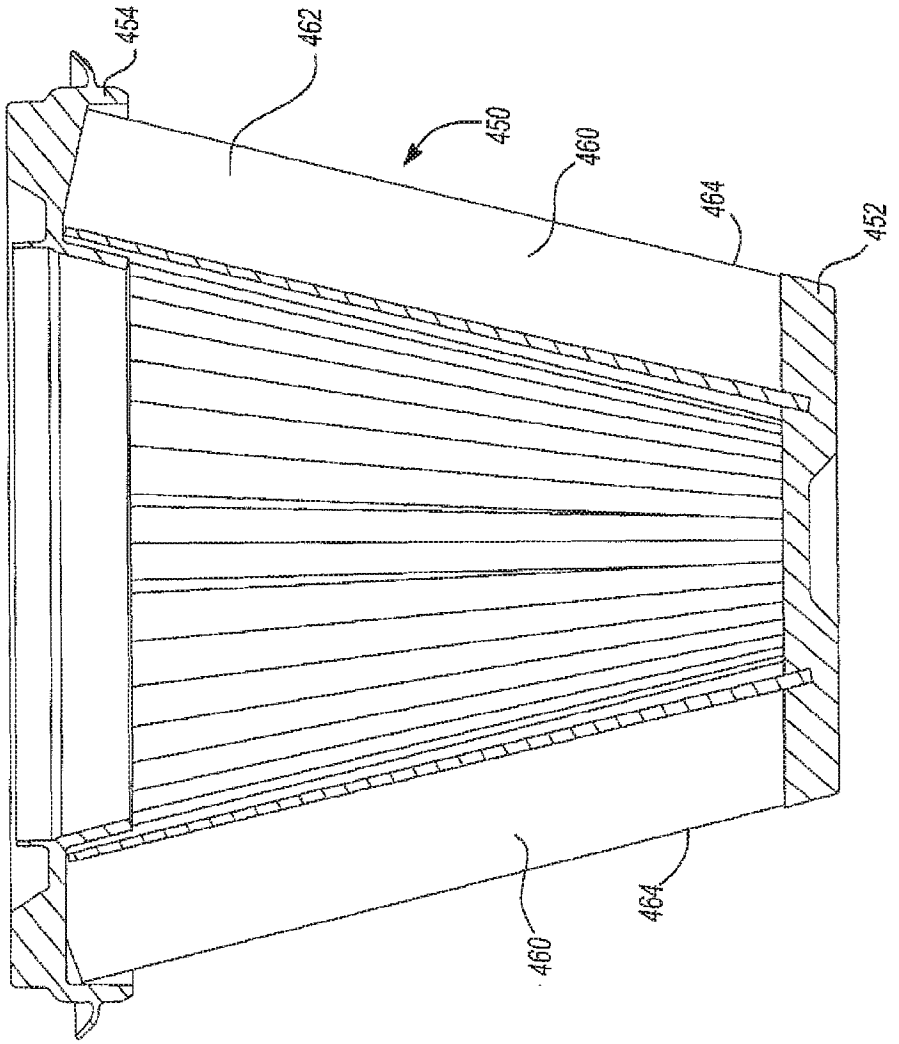


Fig-20

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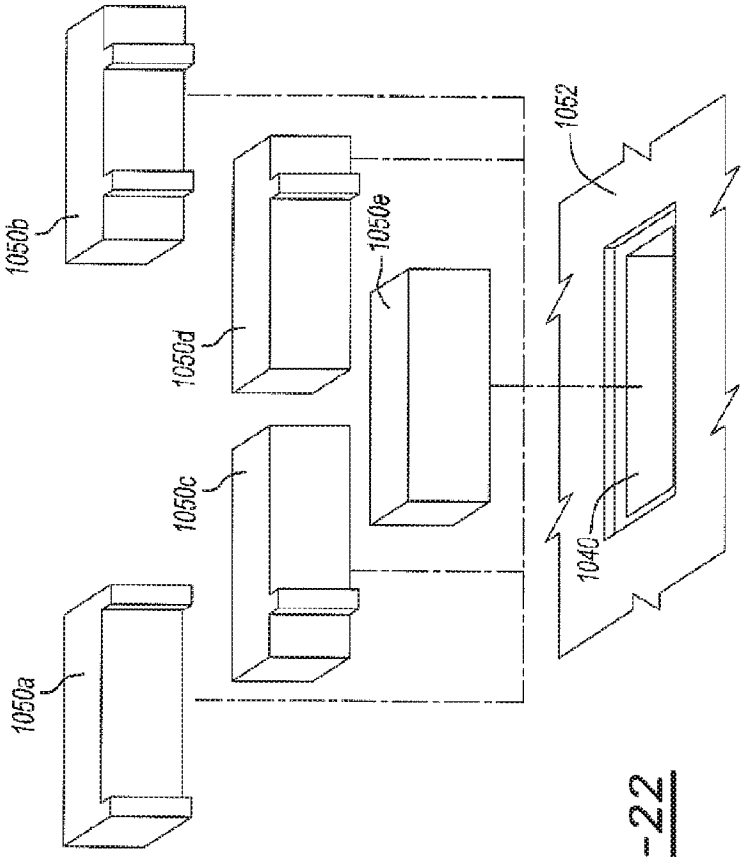


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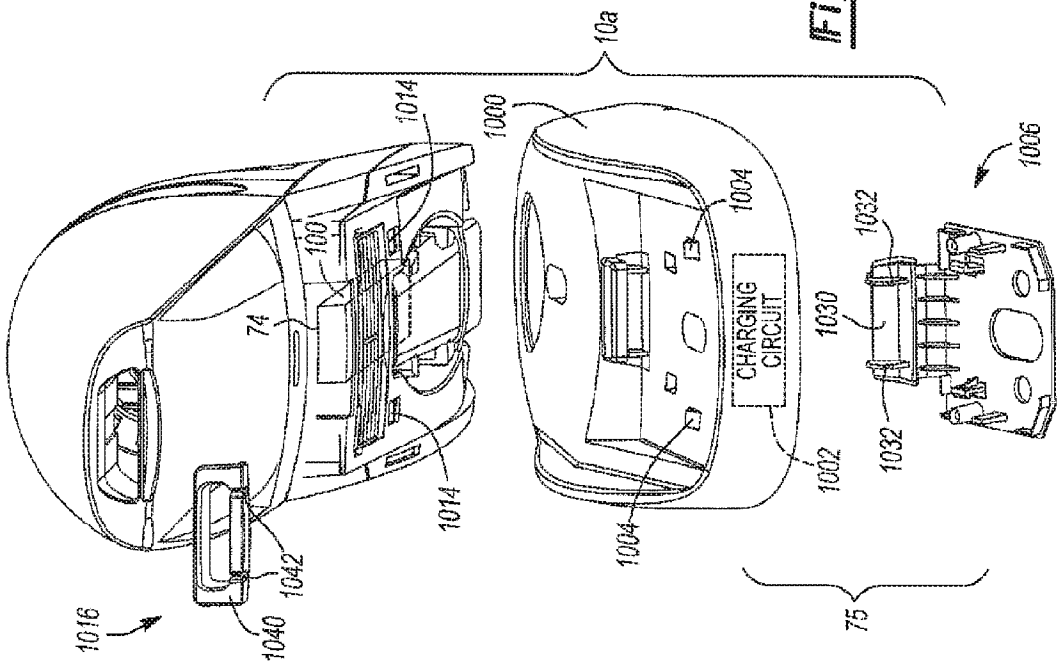


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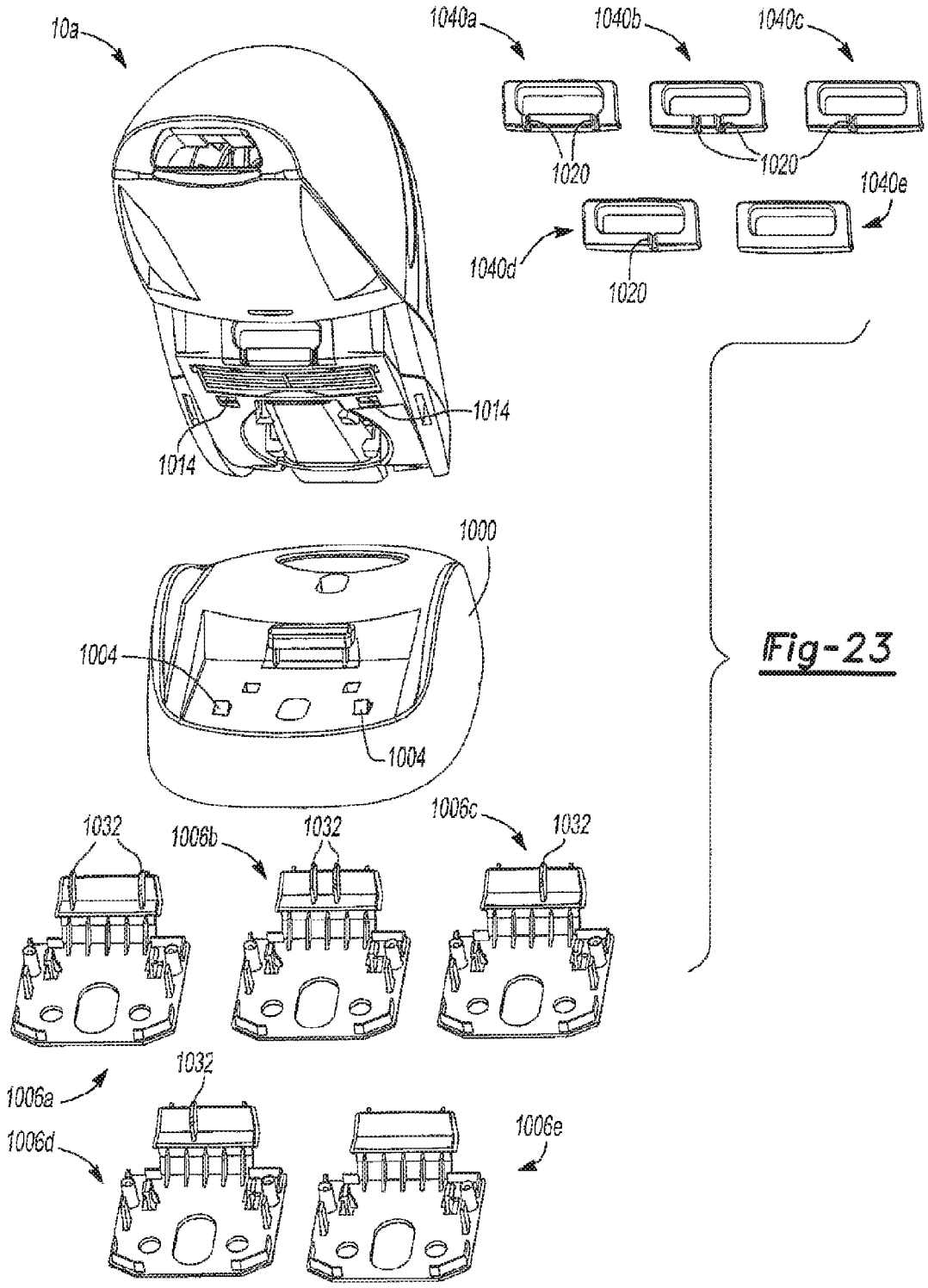


Fig-23

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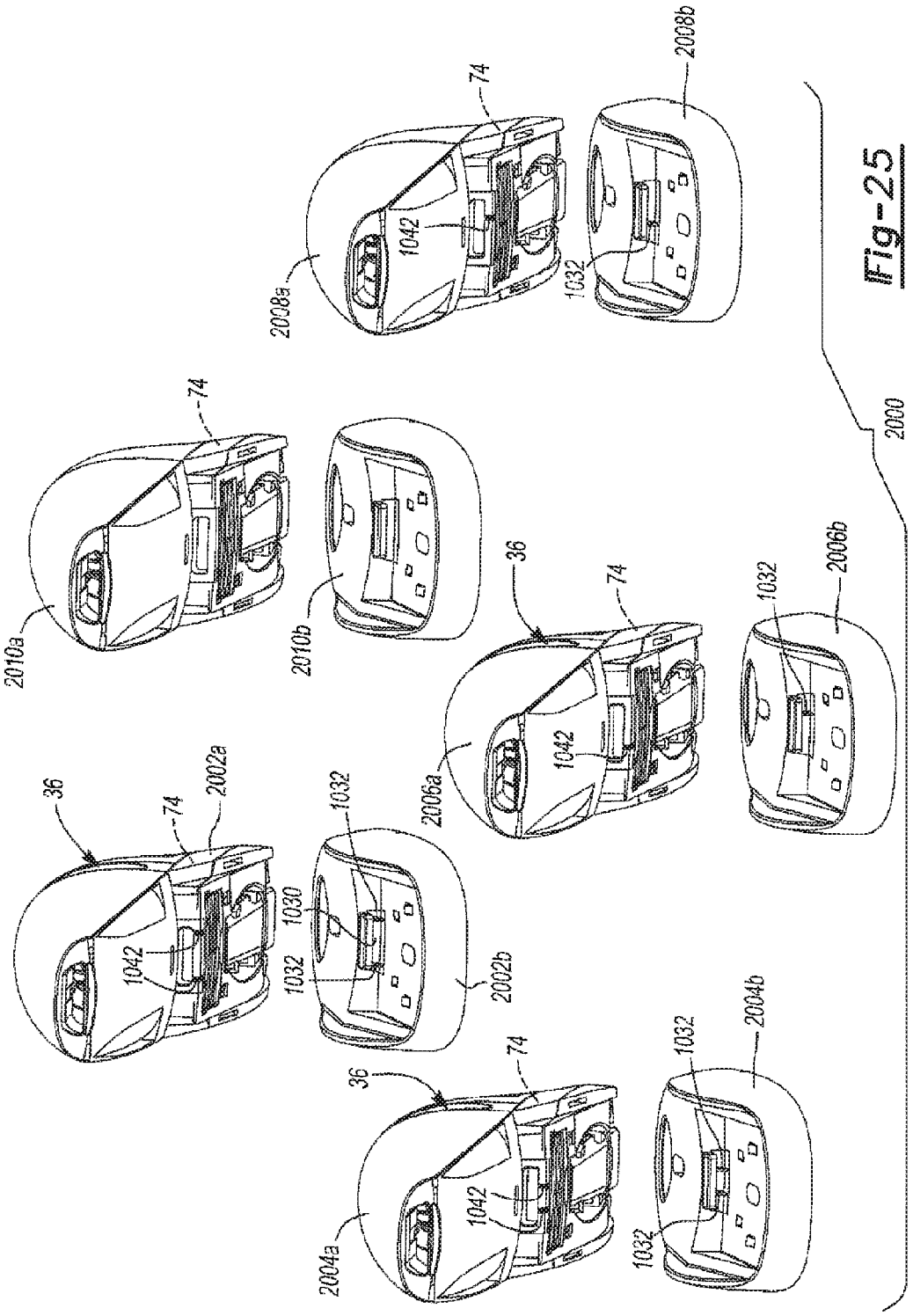


Fig-25

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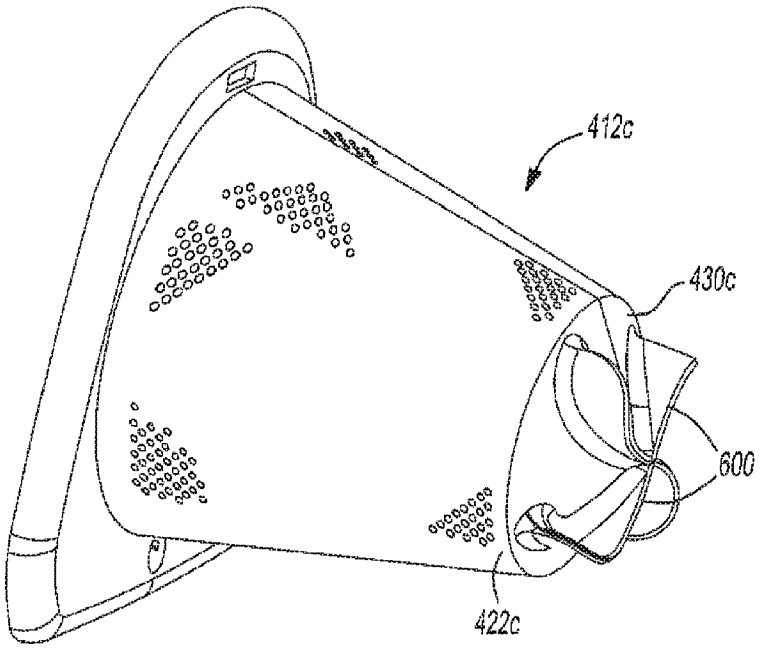


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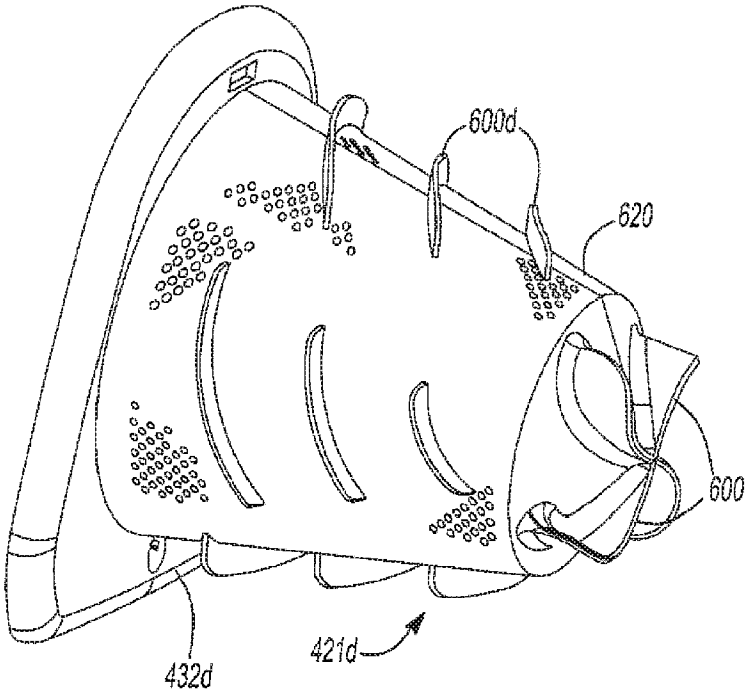


Fig-28

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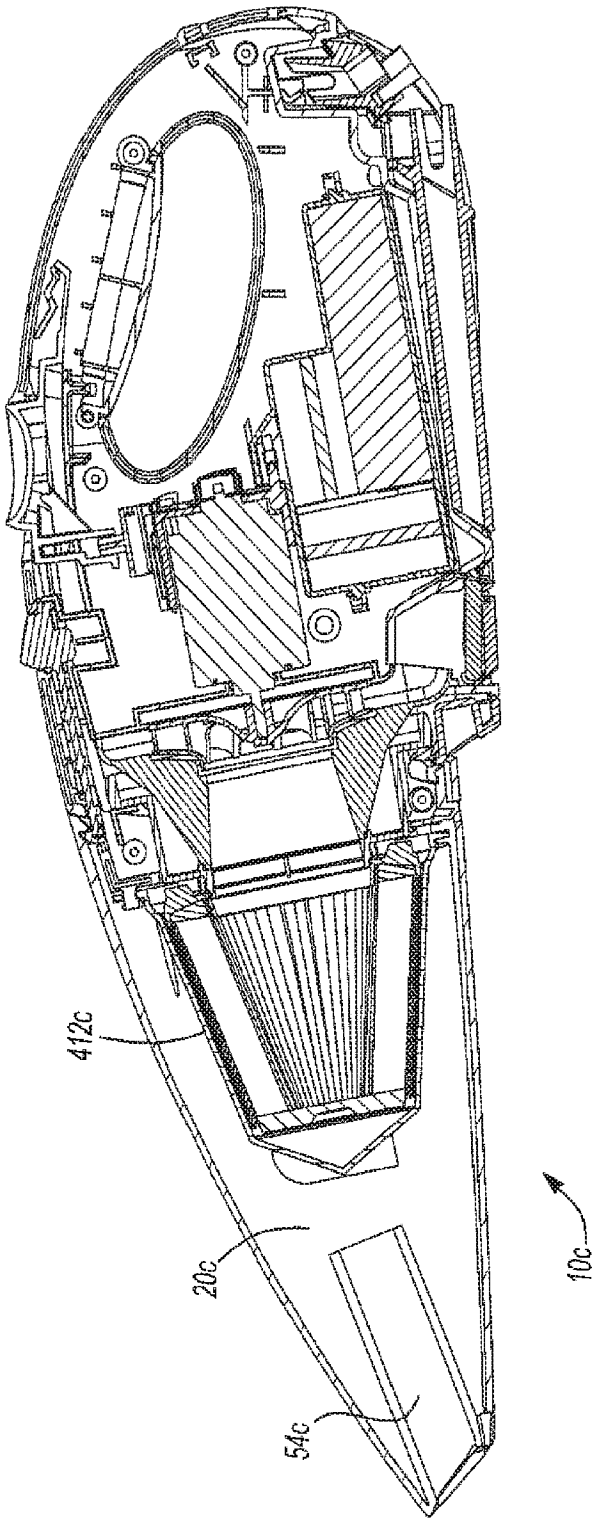


Fig-27

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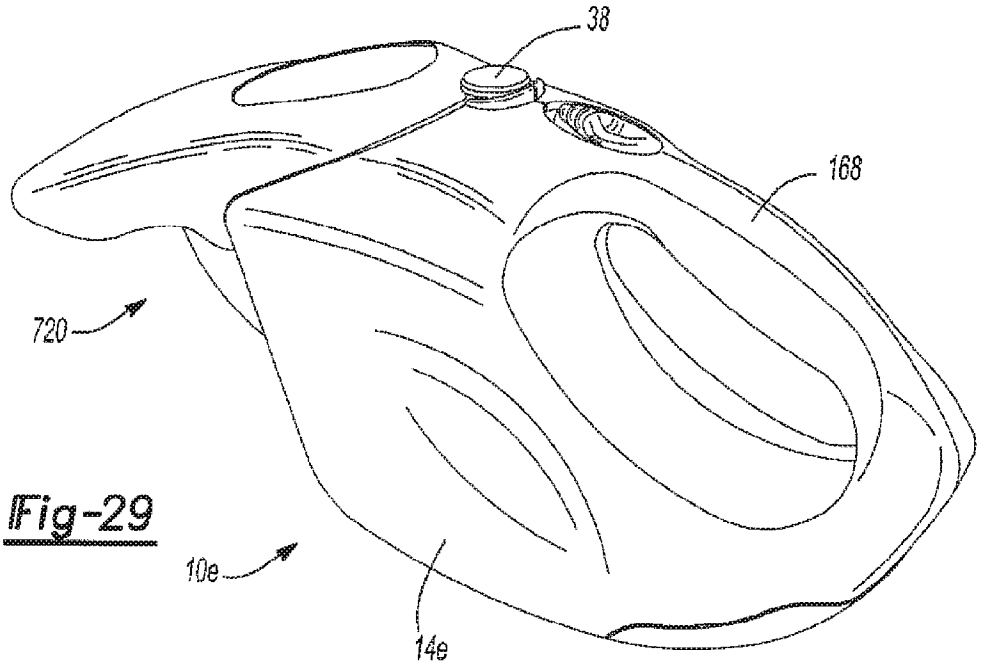


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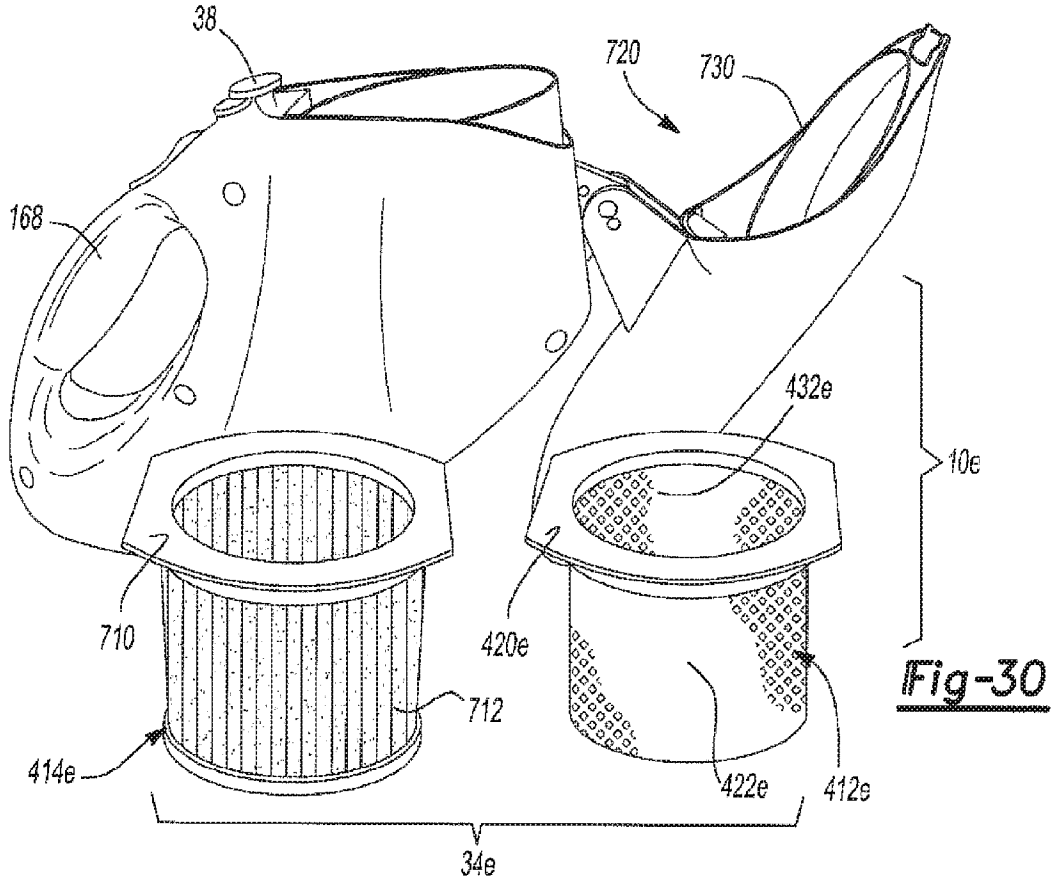


Fig-30

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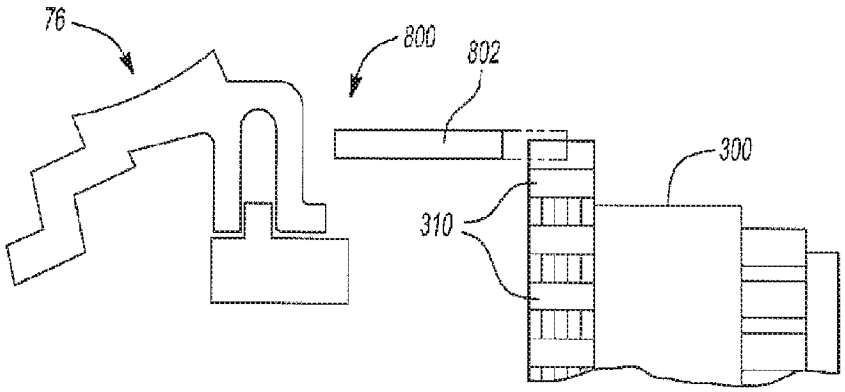


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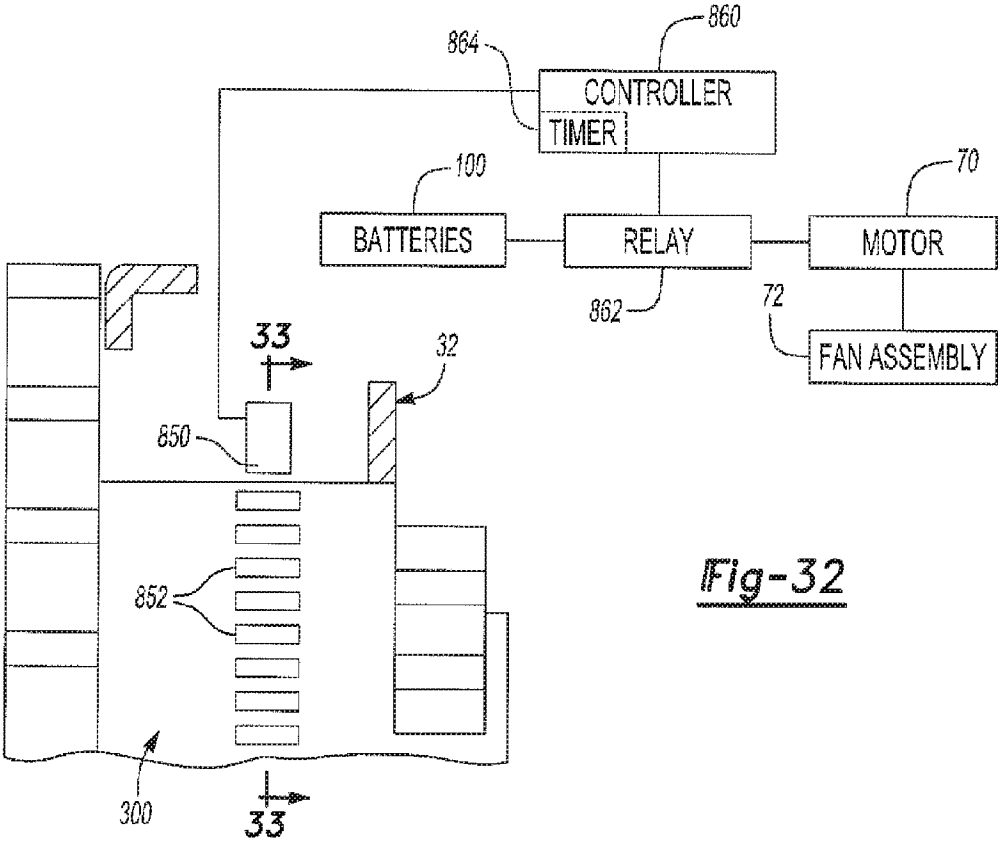


Fig-32

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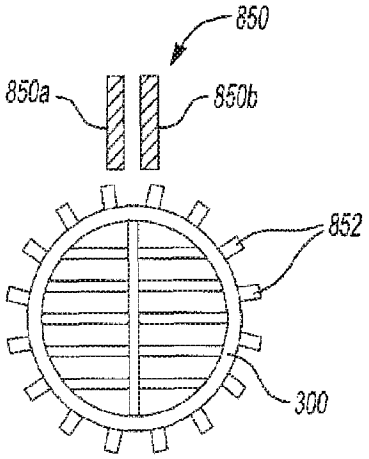


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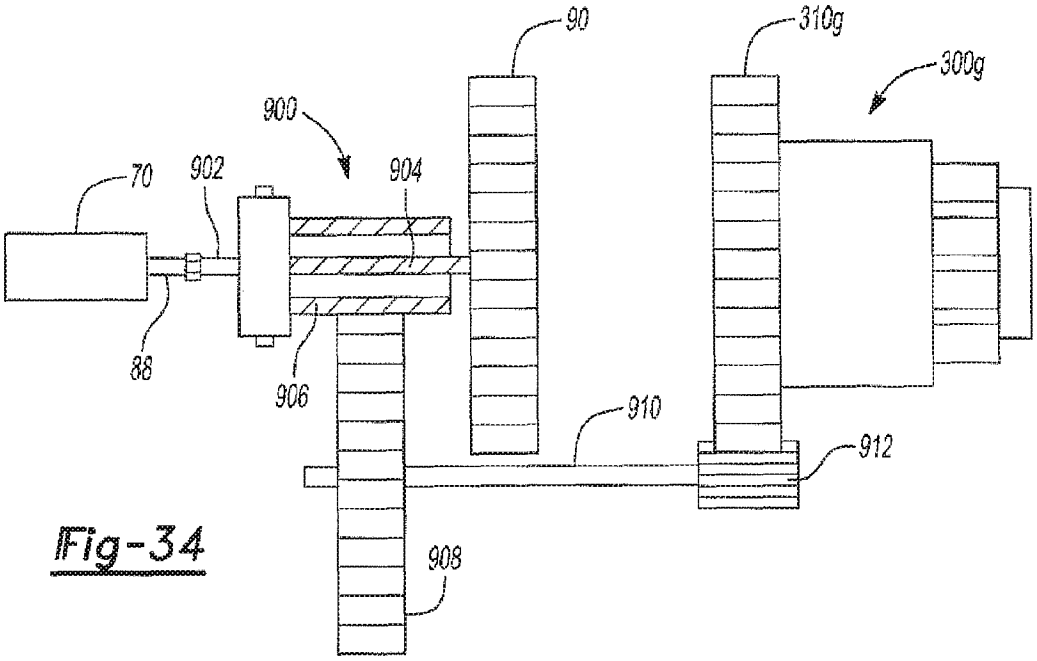


Fig-34

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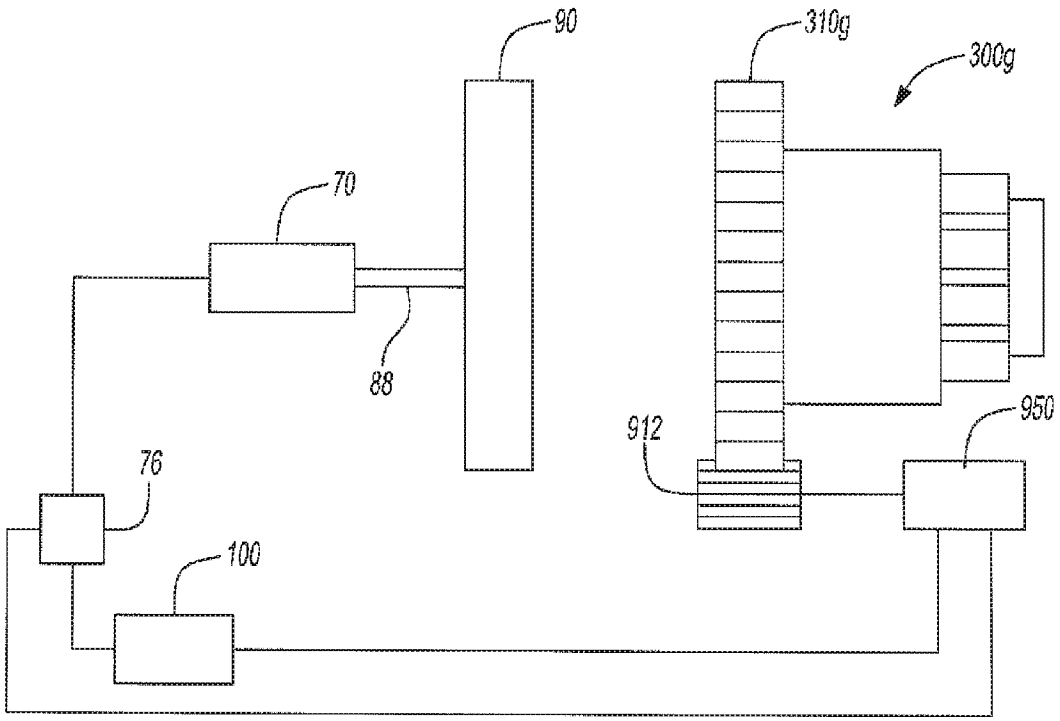


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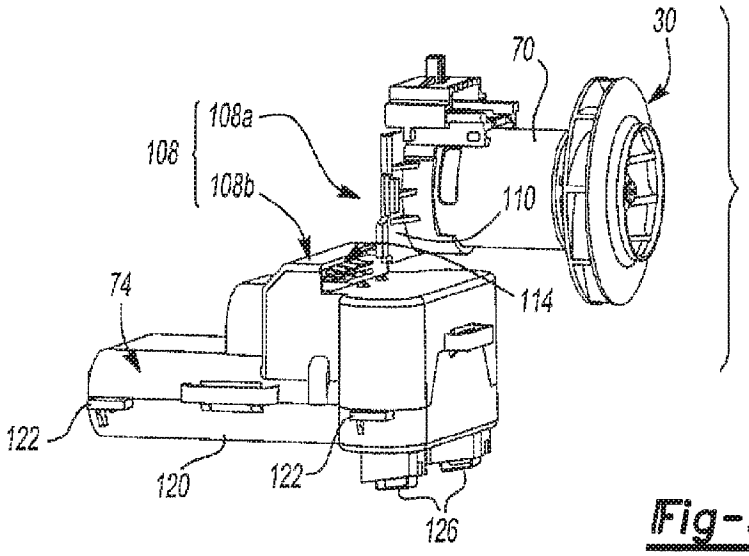


Fig-36

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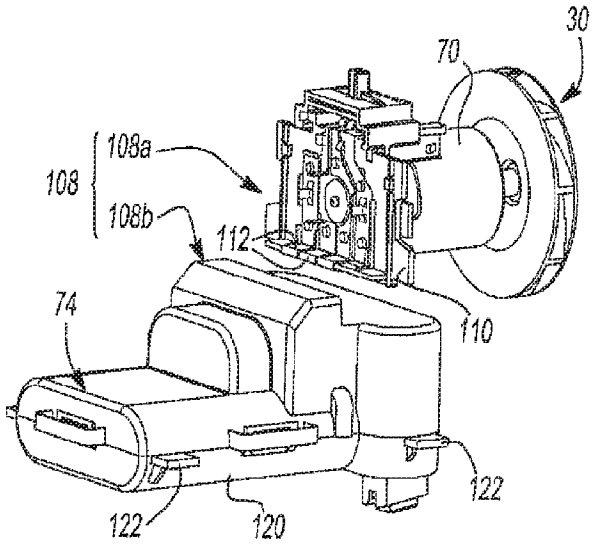


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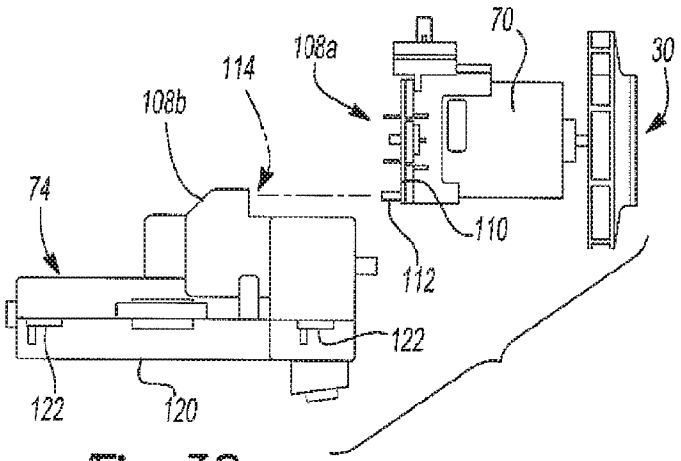


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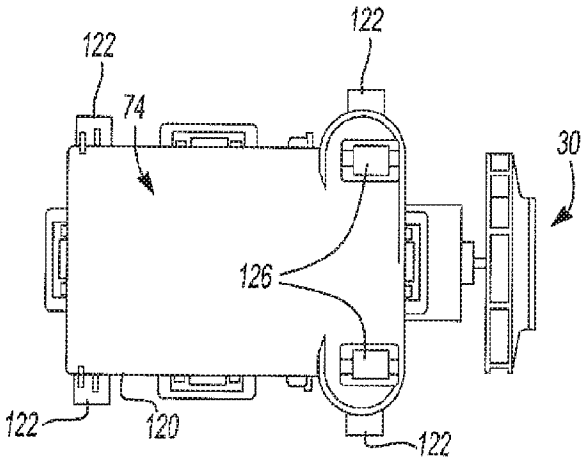


Fig-39

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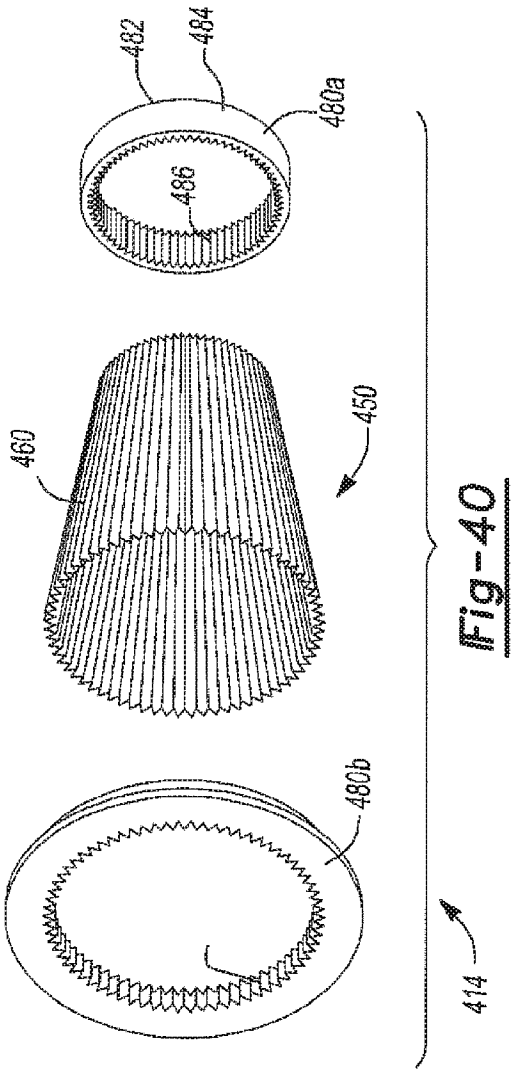


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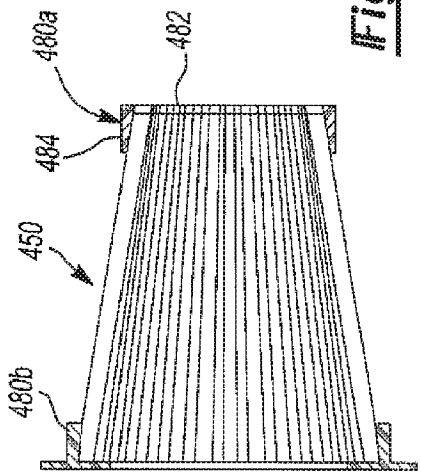


Fig-41

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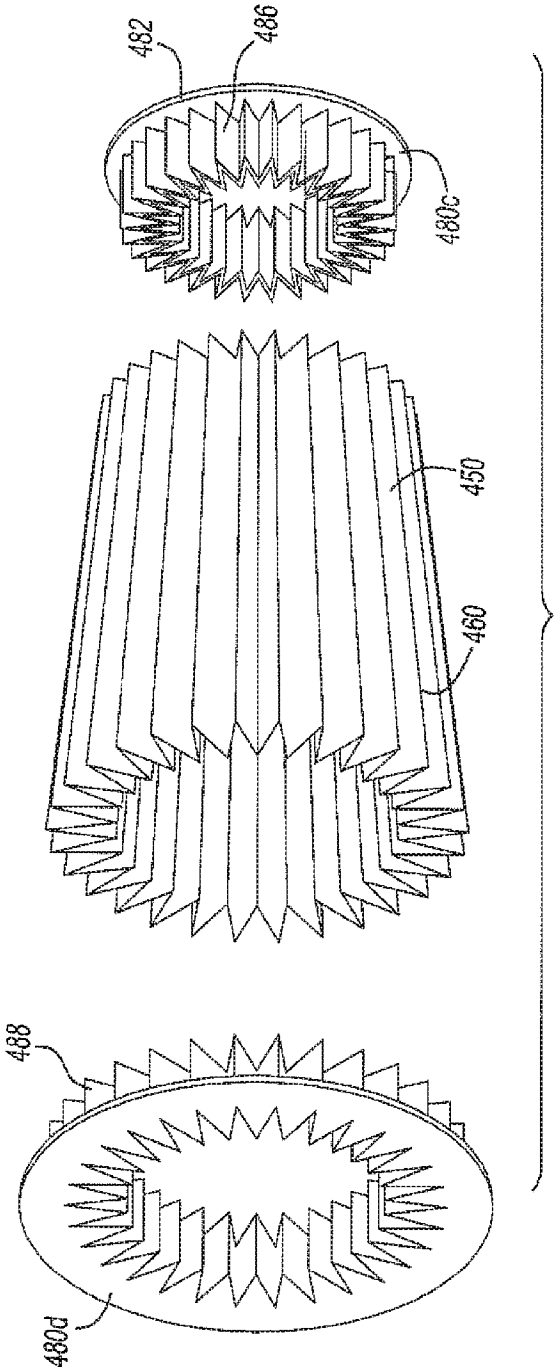


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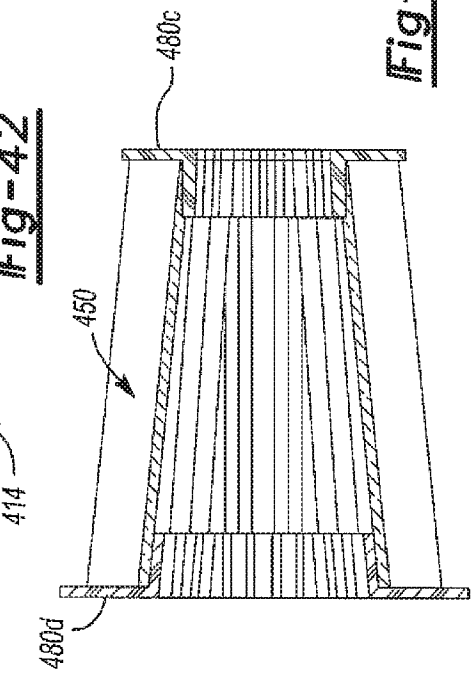


Fig-43

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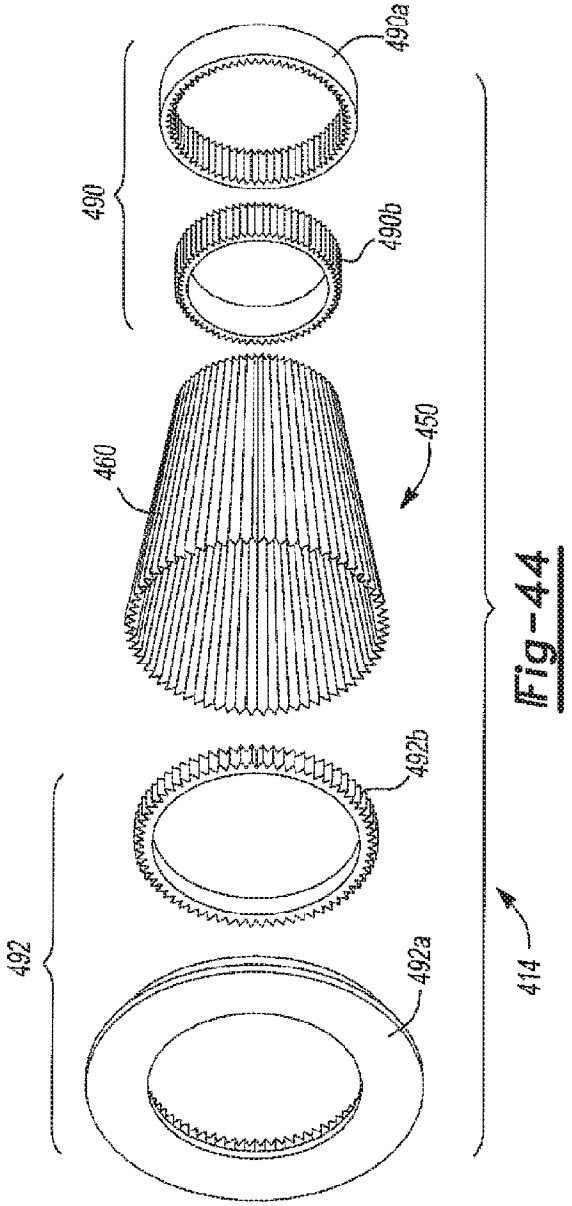


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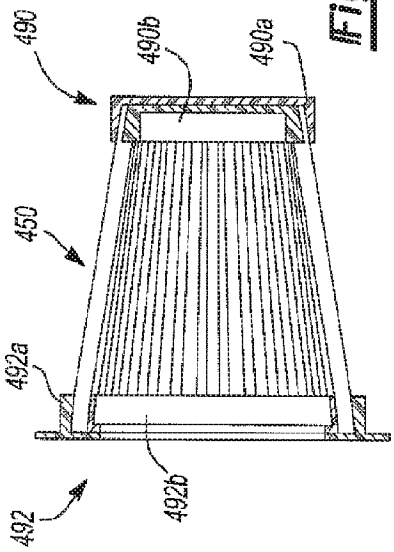


Fig-45

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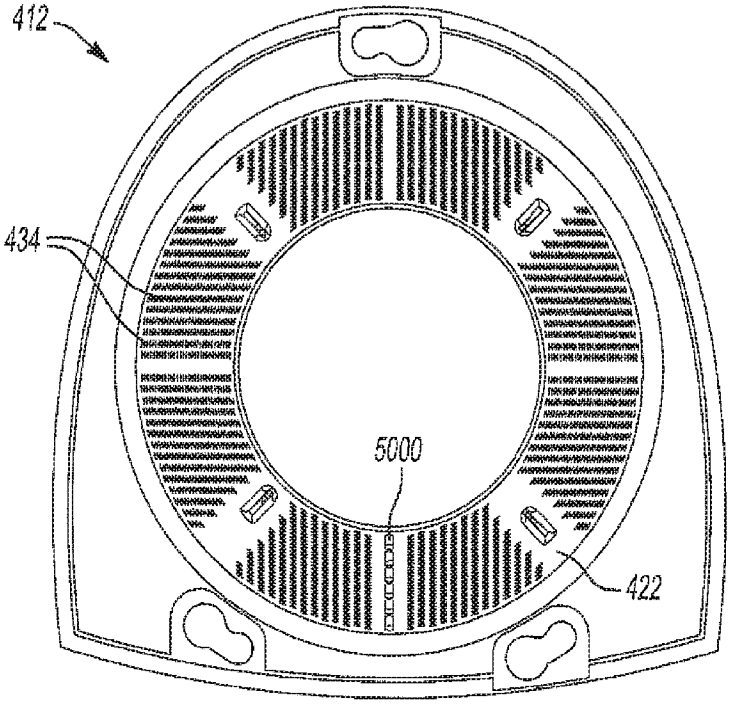


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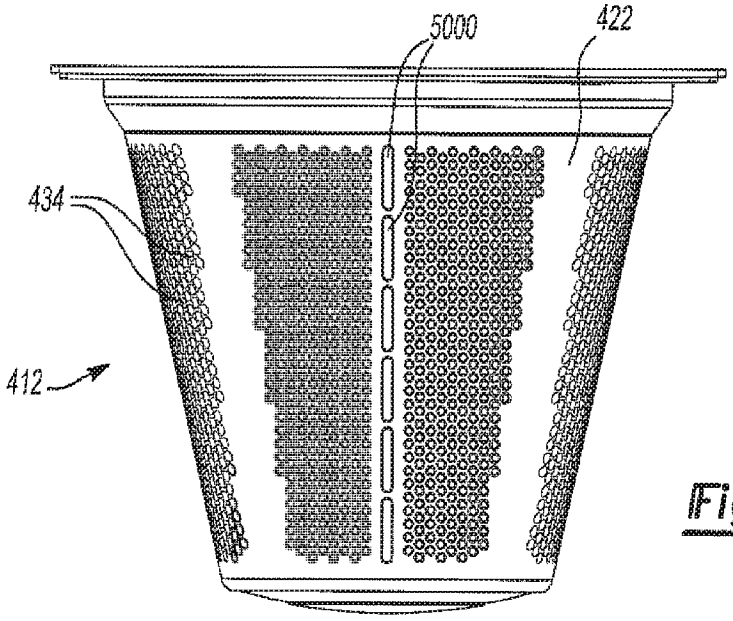


Fig-47

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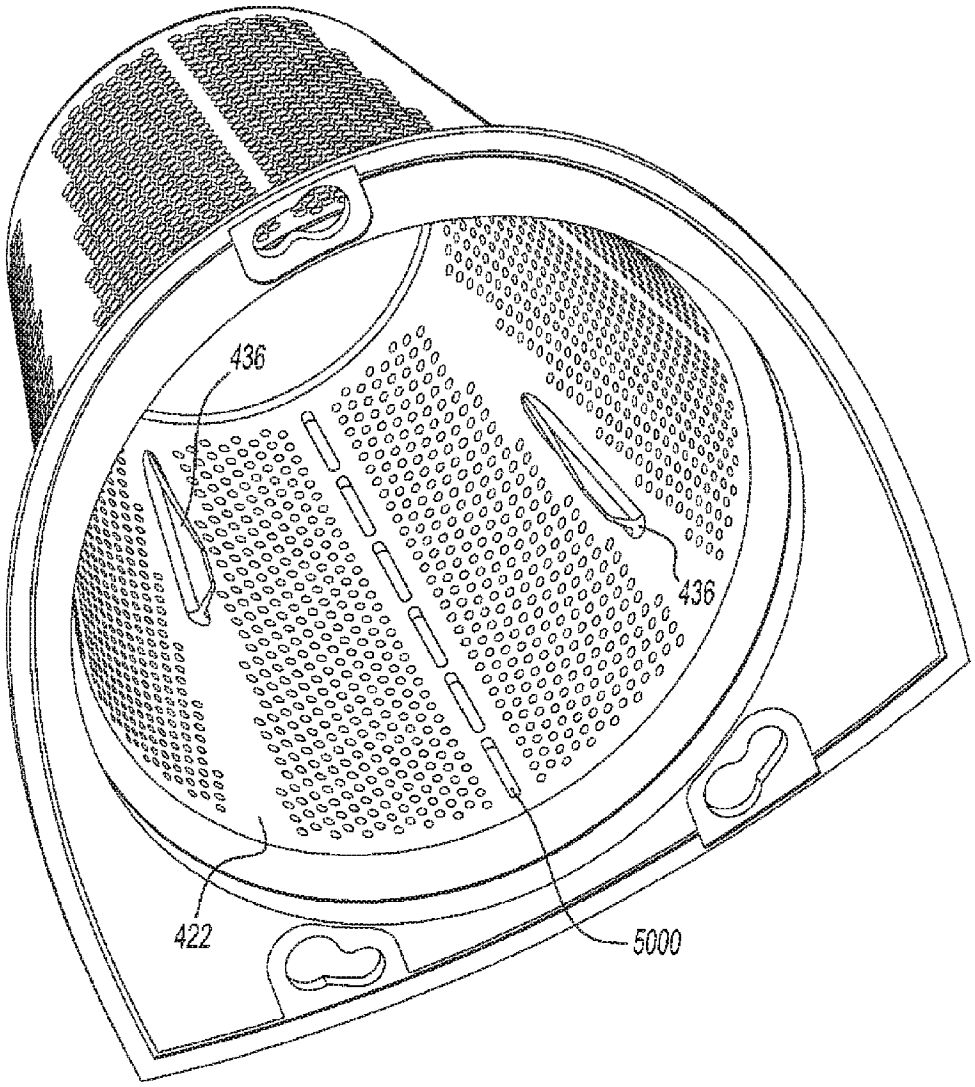


Fig-48

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EUROPEAN SEARCH REPORT

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EP 08 10 3164

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 025 529 A (HULT ET AL) 25 June 1991 (1991-06-25) * column 5, lines 32-46 * * column 6, lines 64-66 * * column 8, lines 12-14 * * column 8, lines 24-30 * * column 8, lines 58-68 * * column 9, lines 15,16 * * column 9, lines 64-67; figures 1-3,15 *	1-3,6,7, 18-22	INV. A47L5/24 A47L9/20 A47L9/12 A47L9/14 A47L9/16 A47L9/28
Y		4,5,9	
Y	US 2 935 158 A (BRAUN DIETER) 3 May 1960 (1960-05-03) * column 3, lines 27-30; figures 1,2 *	4	
Y	EP 1 070 478 A (BLACK & DECKER INC) 24 January 2001 (2001-01-24) * paragraph [0035]; figure 1 *	5,14,16, 17	
X	US 6 434 785 B1 (VANDENBELT RUDY A ET AL) 20 August 2002 (2002-08-20) * column 2, line 61 - column 4, line 26; figures 1,2,4 *	8	TECHNICAL FIELDS SEARCHED (IPC) A47L
Y		9-17	
Y	WO 02/38025 A (MATSUSHITA ELECTRIC CORPORATION OF AMERICA; MCCORMICK, MICHAEL, J; MAR) 16 May 2002 (2002-05-16) * page 13, line 19 - page 14, line 8; figure 6 *	10-13	
Y	EP 1 023 864 A (SANYO ELECTRIC CO., LTD) 2 August 2000 (2000-08-02) * paragraphs [0025], [0036]; figure 9 *	15	
A	US 2002/189048 A1 (MARUYAMA KANAME ET AL) 19 December 2002 (2002-12-19) * paragraph [0021] *		

-/--

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 June 2008	Papadimitriou, S

CATEGORY OF CITED DOCUMENTS

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Application Number
EP 08 10 3164

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 035 024 A (STEINER ET AL) 30 July 1991 (1991-07-30) * column 6, lines 9-20; figure 8 * -----		

TECHNICAL FIELDS SEARCHED (IPC)

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	18 June 2008	Papadimitriou, S

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 10 3164

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18-06-2008

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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Sverige (10) **SE 0702236 L**

(12) **Allmänt tillgänglig patentansökan**

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(74) Ombud: AB Electrolux Group Intellectual Property

(30) Prioritetsuppgifter: —

(54) Benämning: Förbättringar med avseende på luftströmningsförluster i en dammsugare

(57) Sammandrag:

Uppfinningen hänför sig till förbättringar av dammsugare i syfte att minska luftströmningsförluster i luftpassager genom en dammsugare. Närmare bestämt, undvikes genom uppfinningen plötsliga förträngningar eller utvidgningar, ändringar av tvärsnittsformen eller skarpa riktningsändringar hos luftpassagerna, läckage av luft in i luftpassagerna och hopbakning av skräp i luftpassagerna. Uppfinningen är tillämpbar i handburna dammsugarenheter, stångutformade dammsugare, dammsugare av s.k. 2-i-1 typ innefattande en löstagbar handburen enhet och en bärarkropp, och dammsugare med en cyklonliknande typ av skräpbehållare.

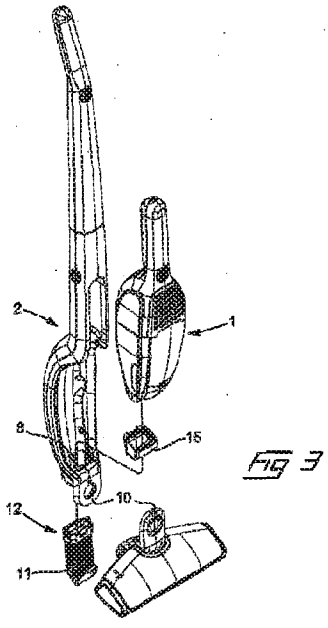


Fig 3

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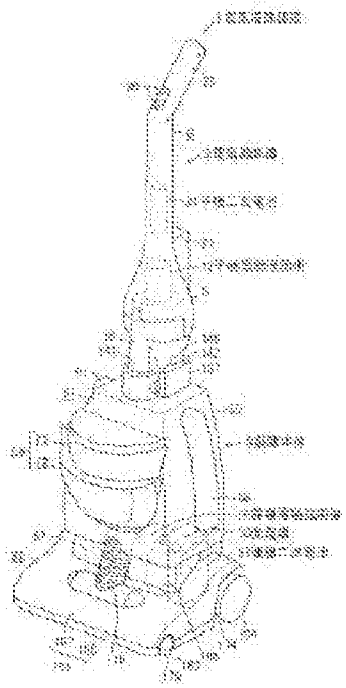
VACUUM CLEANER

Page bookmark	JP2008079920 (A) - VACUUM CLEANER
Inventor(s):	OMOTO SHUHEI; HOSHINO SUSUMU; SATO TAKESHI ±
Applicant(s):	TOSHIBA CORP; TOSHIBA CONSUMER MARKETING; TOSHIBA KADEN SEIZO KK ±
Classification:	- international: ***A47L5/24; A47L9/28***
	- cooperative:
Application number:	JP20060264666 20060928
Priority number(s):	JP20060264666 20060928

Abstract of JP2008079920 (A)

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PROBLEM TO BE SOLVED: To provide a vacuum cleaner where charging efficiency is improved by shortening a time for charging a secondary battery of a slave machine. ;SOLUTION: A vacuum cleaning apparatus main body 3 which the vacuum cleaner 2 provided with an electric blower 12 of a slave machine and a secondary battery 21 of the slave machine for supplying power to the electric blower 12 can be attached to and detached from is provided with an electric blower 56 of a master machine and a secondary battery 57 of the master machine for supplying power to the electric blower 56. When the vacuum cleaner 2 is mounted to the apparatus main body 3, the secondary battery 21 is charged directly by the secondary battery 57 to shorten the time for charging the secondary battery 21 to improve the charging efficiency. ;COPYRIGHT: (C)2008,JPO&INPIT



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DESCRIPTION JP2008079920

The present invention relates to shorten the charging time of the slave unit secondary battery to provide an electric vacuum device with improved charging efficiency To A child machine electric blower 12 and the slave machine electric blower 12 vacuum cleaner 2 a detachable device body 3 with a cordless handset secondary battery 21 for supplying power to, the parent machine electric blower 56 and the base unit electric blower 56 providing a base unit secondary battery 57 to power the. When mounting the vacuum cleaner 2 in the apparatus main body 3, the child machine secondary battery 21 by the parent unit secondary battery 57 to charge directly, it is possible to shorten the charging time of the slave unit secondary battery 21, it is possible to improve the charging efficiency . .FIELD 1

Electric vacuum device

[0001]

The present invention relates to an electric vacuum apparatus having a removable apparatus main vacuum cleaner.

[0002]

Conventionally, as this type of electric vacuum device, the slave unit electric vacuum cleaner provided with a slave unit dust collecting chamber which communicates with the electric blower to the suction side of the electric blower, it is intended to be detachably mountable to the apparatus main body Are known. This electric vacuum apparatus, for example, when a powerful dust collection performance such as cleaning of the floor surface is desired, used by mounting the child device the electric vacuum cleaner in the apparatus main body, for example, such as filters for cleaning the air conditioner If you need ease of handling, use and remove the child device vacuum cleaner from the apparatus body (for example, see Patent Document 1). JP-A-10-127541 Patent Publication No. (2-4 pages, Figure 5-7)

[0003]

However, in the above-described electric vacuum device, in order to use the commercial AC power source to charge the child machine secondary battery for driving the child machine vacuum cleaner, such as charge and converts the commercial AC power to DC power supply, the handset it has a problem that it takes time to charge the secondary battery.

[0004]

The present invention has been made in view of the above problems, and an object thereof is to provide an electric vacuum apparatus can shorten the charging time of the sub-terminal battery.

[0005]

The present invention provides a vacuum cleaner having a subsidiary unit secondary battery that supplies power to the child device the electric blower and the slave unit electric blower, a detachable vacuum cleaner, the master unit electric blower and the master unit electric blower comprising a device body with a master unit secondary battery that supplies power, the base-secondary battery, while wearing the vacuum cleaner for cleaning apparatus, it is those capable of charging the sub-terminal battery.

[0006]

According to the present invention, when attaching the vacuum cleaner in the apparatus main body, since the slave unit secondary battery master unit secondary battery is charged directly, it can shorten the charging time of the sub-terminal battery.

[0007]

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Hereinafter, the configuration of the first embodiment of the electric vacuum device of the present invention with reference to FIGS. 1 to 12

[0008]

1 and 12, 1 denotes a vacuum cleaner apparatus as the master unit, the electric vacuum apparatus 1, a small vacuum cleaner 2 is a child device, by detaching a relatively large apparatus main body 3, and the vacuum cleaner 2 alone, and is capable of cleaning respectively in the overall electric vacuum device 1.

[0009]

Vacuum cleaner 2, FIG. 1, as shown in FIG. 4 and FIG. 12, comprises a cleaner body 5 having a substantially cylindrical shape, and the cleaner main body 5, the handle 6 is extended on one end side in the axial direction Rutotomoni, extends in the axial direction of the other end side, that is the handle 6 and the opposite side extension pipe portion 7 is elongated tubular been reduced in diameter, the tip of the extension pipe unit 7, as a slave unit suction port body the handset floor brush 8 is provided.

[0010]

Also, the cleaner main body 5, together with the slave unit dust collecting chamber 11 communicating with the extension pipe unit 7 is partitioned, the child device the electric blower 12 on the handle 6 end of the slave unit dust collecting chamber 11 and,, slave unit control means (not shown) for controlling the drive of the slave unit electric blower 12 is accommodated, we communicate with the slave unit dust collecting chamber 11 via a filter suction side of the child device the electric blower 12 is not illustrated, the sub unit exhaust side of the electric blower 12, communicates with the slave unit exhaust hole 14 formed in the rear portion of the cleaner body 5

[0011]

Here, the slave unit dust collecting chamber 11 is a hollow space portion that is defined on the front side of the cleaner body 5, comprises a substantially cylindrical main body connecting part 16 that extends on the front side of the extension pipe unit 7 there. The main body connecting part 16 is intended to be fitted to the apparatus main body 3 side vacuum cleaner 2 in a state of being mounted on the apparatus main body 3 side, in its distal end, as shown in FIG. 5, the slave unit round hole-shaped communication opening 17 communicating with the dust collecting chamber 11 is formed open in the communication opening 17, openable lid 18 is provided with the communication opening 17. Further, the distal end portion of the main body connecting portion 16, in the vicinity of the communicating opening 17, the electric vacuum cleaner 2 a device device in a state of being attached to the main body 3 the main body 3 side and the terminals 19 and 19 are electrically connected is provided ing. Further, the both side portions of the main body connecting portion 16, the engagement recess 20 which is engaged to the apparatus main body 3 side vacuum cleaner 2 in a state of being mounted on the apparatus main body 3 (only one is shown) are formed.

[0012]

Lid 18 is outwardly i.e. biased valve body to the lower direction of the communication opening 17 by a biasing means (not shown), while wearing the vacuum cleaner 2 in the apparatus main body 3, the apparatus main body 3 side is opened against the biasing force of the biasing means, along with is opened the communication opening 17, in a state of removing the vacuum cleaner 2 from the apparatus main body 3, and returns to the original state by the biasing force of the biasing means it is to close the communication opening 17.

[0013]

1, back to FIG. 4 and FIG. 12, the slave unit electric blower 12 is relatively has a small output, slave unit cell as a slave unit power supply portion disposed in the handle 6 child operation is controlled by controlled by the child machine control means the power supply from the machine secondary battery 21.

[0014]

Slave unit exhaust hole 14 is a plurality formed in a slit shape in the cleaner protruding portion 23 extending across from the rear to the proximal end of the handle 6 of the body 5.

[0015]

Further, the distal end portion of the handle 6, the gripping portion 25 the operator grips is the bent rearward, a plurality of such the the gripping portion 25, a respective drive of the electric vacuum cleaner 2 and an electric vacuum apparatus 1 the switch 26 is disposed.

[0016]

Moreover, the extension pipe unit 7 rear namely fitted to the back of the apparatus main body 3 while wearing the vacuum cleaner 2 into the apparatus main body 3.

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[0017]

Then, the slave unit floor brush 8 has a communicating pipe 31 that communicates with the extension pipe portion 7, the distal end side of the communicating pipe section 31 is connected pivotally to the pivot holder 32, the rotation holding portion 32 on the distal end side, the child device body portion 33 of the slave unit case body is formed integrally with, on both sides of the child device main unit 33, the slave unit suction unit 34, 34 is rotatably provided .

[0018]

Communication pipe portion 31 is formed in a cylindrical shape, for extension pipe portion 7, and is detachable through the clamping portion 36.

[0019]

Rotation holding portion 32 is rotatably holds the communication pipe portion 31 in the vertical direction and the circumferential direction. Further, the floor surface side of the lower i.e the cleaning surface of the rotation holding portion 32, the first driven wheel 38 the slave unit is rotatably provided.

[0020]

Child device body portion 33 is in communication with the distal end side of the communicating pipe section 31 which is held in the rotation holding portion 32.

[0021]

Each child device the suction unit 34, the bottom facing the floor surface, the round hole-like handset unit suction port 41 which is pivotally connected to a common, both sides of the child device body portion 33 via the communicating pipe (not shown) together are formed open, the brush bristles 42 for cleaning the floor surface is flocked and subsidiary unit second driven wheel 43 is rotatably provided.

[0022]

Then, each child device the suction unit 34, in the circumferential direction, that is the circumferential direction of the slave unit suction port 41 of the communicating conduit is biased via a slave unit suction unit biasing means (not shown), device vacuum cleaner 2 in a state of being attached to the main body 3, both sides of each child device the suction unit 34 is rotated to the extension pipe unit 7 side against this biasing force, as shown in solid line in FIG. 4, each child device suction unit it becomes 34 child machine position to the folded state on both sides of the main body 33 and the rotation holding portion 32, in a state of removing the vacuum cleaner 2 from the apparatus main body 3, the biasing force of the slave unit suction unit biasing means returns to its original state, as shown in the imaginary line in FIG. 4, is configured such that extend out in the folded state is released into both sides of the child device body portion 33 by.

[0023]

Each brush bristle portion 42 may be formed by a synthetic resin having elasticity, on the rear side of each child device the suction unit 34, across from each child device the suction port 41 near both sides of each child device the suction unit 34 wall it is disposed Jo, and projects downward from the lower surface of each child device the suction unit 34.

[0024]

Each child device the second driven wheel 43 is disposed in front of the vicinity of both sides each child device the suction unit 34.

[0025]

On the other hand, the apparatus body 3, FIGS. 1 to 3, and, as shown in FIGS. 10 to 12, a parent device body portion 51 which the vacuum cleaner 2 is detached, relative to this parent device body portion 51 manner and a master unit floor brush 52 as a base is a suction port member provided rotatabiy.

[0026]

Parent device body portion 51, the interior of the parent device main body case 55 as a shell, the base-electric blower 56, the base-secondary serving as a main unit batteries as parent device power supply unit capable of supplying power to the master unit electric blower 56 battery 57, and houses a master unit control section (not shown) for controlling the drive of the master unit the electric blower 56, and the front, the dust collecting unit 59 is a dust collecting unit of a parent machine dust collecting chamber detachably it has become.

[0027]

The parent device body case 55, the lower end portion is formed in a substantially circular arc shape as viewed from the side and downward, the lower end portion is rotatably supported to a relatively front-

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rear direction with respect to the base unit floor brush 52 there. Further, the rear portion of the parent device main body case 55, detachable recess 61 for attaching and detaching the vacuum cleaner 2 is formed.

[0028]

Master unit electric blower 56, one having a greater output than the slave unit electric blower 12 (FIG. 4), disposed along the lateral direction at the lower end portion of the master unit body portion 51, motor as surrounding holding member it has been held by the cushion 63. Further, on the suction side of the master unit electric blower 56, the base-communication air passage 65 cylindrical is communicatively connected to the airtight, the tip of the master unit communication air passage 65 includes a first tubular of a suction pipe 1 through the sides communication air passage 66 is communicatively connected to the gas-tight on the downstream side of the dust collecting unit 59. The exhaust side of the master unit electric blower 56 via the exhaust air path 67, is communicatively connected in an airtight manner from the main unit exhaust hole 68 formed on the side of the rear at detachment recesses 61 in the base unit main body case 55 ing.

[0029]

Master unit communication air passage 65 is extended from the upper portion of the suction side is one side of the master unit the electric blower 56 upwardly, and the master unit two so as not to tip interferes with the master unit secondary battery 57 are bent at the upper of the next cell 57 and to the side of the apparatus main body 3 is substantially L-shaped tube.

[0030]

First side communication air passage 66 is extended upward from the tip of the main terminal communication air passage 65, the parent exposed from one side of the main unit body casing 55 to the outside of the parent device main body case 55 together are disposed along one side of the machine main body case 55, the tip is bent into a parent device body casing 55 in which is connected to the upper portion of the dust collecting unit 59.

[0031]

in addition, exhaust air passage 67, has been extended to the rear to the widening shape from the top of the other side is an exhaust side of the base unit electric blower 56.

[0032]

Furthermore, the base-exhaust hole 68 is formed long slit shape in the lateral direction.

[0033]

Further, the base-secondary battery 57 is a battery pack positioned on one side of the main terminal electric blower 56 has a high rated voltage and greater rated capacity than the slave unit secondary battery 21 (FIG. 4), it has become possible supply power to the slave unit secondary battery 21 while wearing the vacuum cleaner 2 in the apparatus main body 3. Furthermore, the master unit secondary battery 57, by opening the master unit lid portion 69 provided on the rear portion of the body case 55 (FIG. 12) is removable with respect to the parent device main body case 55 . Then, the master unit secondary battery 57, the apparatus charger 70 provided on the main body 3 (FIG. 1), has become chargeable.

[0034]

Charger 70, such as by a power supply cord (not shown) is an external commercial AC power source electrically connected to the apparatus main body 3, the master unit secondary battery 57 and converts AC power from the commercial AC power source to a DC power source it is intended to charge.

[0035]

Master unit control means, by controlling the discharge of the master unit the secondary battery 57, and controls the operation of the master unit the electric blower 56, while wearing the vacuum cleaner 2 in the apparatus main body 3, the base-secondary it controls the charging of the sub-terminal battery 21 by controlling the power supply to the battery 57 slave unit secondary battery 21 has a function of charging control means.

[0036]

Dust collecting unit 59 includes a dust separating unit 71 as a dust separating main body part, and a dust collecting section unit 72 as a dust collecting body portion.

[0037]

Dust separating unit 71, as shown in FIG. 6, a dust separator 75, and a filter portion 76 provided integrally on an upper portion of the dust separator 75.

[0038]

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Dust separator 75 has a square cylindrical guiding air duct 82 having a dust suction port 81 at the distal end, on the downstream side of the guiding air duct 82, separating chamber section 83 centrifuging the dust sucked is provided to communicate the downstream side of the separating chamber section 83, the suction air passage portion 84 (FIG. 3) is provided in communication with carrying the separated dust to the filter unit 76.

[0039]

Guiding air duct 82, the dust separating unit 71 parent device main body case 55 in a state of being mounted (FIG. 1, FIGS. 10 and 12), the cylindrical dust suction inlet 81 is shown in such Figures 2, 3 and 11 is connected through a shaped for communication air passage portion 86 and the cylindrical connecting air passage portion 87 in an airtight manner to the suction side of the base unit floor brush 52 to the dust can be sucked along with the air.

[0040]

Here, communication air passage 86, at the lower end of the dust separator 75 (FIG. 6), substantially horizontally extending toward the other side of the main unit body casing 55 (FIGS. 1, 10 and 12) is, tip, is connected in communication with a cylindrical second side communication air passage 91 as a connecting tube.

[0041]

The second side communication air passage 91 is extended from the distal end of the communication air passage portion 86 upward, similarly to the first side communication air passage 66, the other side of the main unit body casing 55 exposed to the outside of the main terminal body case 55 together is disposed along one side portion of the parent device body casing 55, the tip is bent into a parent device main body case 55 in an upper connection air trunk 93 it is connected to the air-tight to. Accordingly, the second side communication air passage 91 is formed substantially symmetrically with the first side communication air passage 66 and the front view.

[0042]

The upper connection air passage 93 is substantially horizontally extended to the center side in the width direction of the main unit body casing 55, the distal end, a vacuum cleaner bent connecting portion 95 serving as a communicating portion is bent upward .

[0043]

The bent connecting portion 95, while wearing the vacuum cleaner 2 into the apparatus main body 3 is inserted into the communication opening 17 of the vacuum cleaner 2, by pushing the lid 18 provided to the communication opening 17 the slave unit dust collecting chamber 11 through the communication opening 17 is a portion to be connected airtightly to the upstream side of the dust separation unit 71. Therefore, these communication opening 17, the bent connecting portion 95, the upper connecting air passage 93, such as by the second side communication air passage 91 and the communication air passage 86, while wearing the vacuum cleaner 2 in the apparatus main body 3, parent machine electric blower 56 cordless handset dust collecting chamber suction structure 96 capable of sucking the dust of 11 to the dust collection unit 59 through the communicating opening 17 by the drive is configured. in addition, the bent connecting portion 95, although not shown, the connection state between the communication opening 17 of the vacuum cleaner 2, i.e. the mounting detection means such as a sensor for detecting the mounting state to the apparatus main body 3 of the vacuum cleaner 2 It is provided.

[0044]

Further, the connection air passage portion 87, for example, a flexible and formed in a bellows shape by a synthetic resin having an upper end from the proximal end of the communication air passage portion 86 and the extending connection pipe 97 to the front lower side There is airtightly connected to the lower end is connected airtightly to the master unit floor brush portion 52.

[0045]

Here, in the connecting pipe 97, the valve element 98 is provided at a position proximal communicating with the communication air passage 86. The valve element 98 by operating a predetermined switch 26 of the electric vacuum cleaner 2 in a state of being mounted on the apparatus main body 3, the position P1 for closing the communication air passage portion 86 side, and the communication air passage portion 86 connected wind the respective positions of the position P2 for closing the connection air passage portion 87 side in the lower communication part of the road section 87, is switching control by the master unit control means.

[0046]

Separating chamber section 83, together with the circular opening 103 shown in FIG. 10 is bored in the central portion, the periphery of the circular opening 103, fan-shaped openings 104 are provided. Further, the peripheral wall of the separating chamber section 83, introduction hole (not shown)

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communicates with the upstream side of the dust collecting section unit 72 is bored. Further, the separating chamber section 83 can be opened and closed by opening and closing a lid (not shown).

[0047]

Circular opening 103 communicates with the upstream side of the suction air passage portion 84, the dust separating unit is mounted. The dust separation means includes a plurality of communicating apertures are formed in are bored lattice shape on the outer peripheral surface, net filter, not shown in these communication opening is attached.

[0048]

Opening 104 communicates with the upstream side of the suction air passage portion 84, a net filter is installed, not shown.

[0049]

Suction air passage portion 84 via the upstream together with and communicates with the side, not shown, formed in the opposite side of the separating chamber section 83 dust collecting part connecting opening of the filter portion 76 via the connecting opening (not shown) condensing and it communicates with the downstream side of the dust section unit 72.

[0050]

The filter unit 76 includes a housing case 111 is a generally cylindrical filter body which communicates with the suction air passage portion 84 via the connecting opening, as a filter (not shown) rotatably mounted within the housing case 111 the pleated filter body 112, and a sweeping member (not shown) is a rotary member which rotates integrally with the pleated filter body 112.

[0051]

Storage case 111 is formed integrally with the rear portion of the dust separator 75. In addition, the accommodating case 111, the discharge opening of the first discharge opening (not shown) are bored. Further, inside of the housing case 111, dust means (not shown) as a dust removing mechanism is protruded, the front end portion of the dust means is enabled in contact with the pleated filter body 112.

[0052]

Discharge opening is an opening to which the particles are collected is a fine dust which is dropped by the dust removing means from the pleated filter body 112 by the pleated filter body 112, i.e. fine dust is introduced, into the dust separating unit 75 and it is connected in an airtight manner.

[0053]

Further, the pleated filter body 112 has a pleated filter 115 as a filter body that is attached to the radiation pleated substantially cylindrical frame body, not shown. Then, the pleated filter body 112, when the electric vacuum apparatus 1 on-time and off, is arranged to rotate a predetermined time period by the motor 116 as a driving means provided at the rear (Fig. 3), the dust removal accordance with this rotation means that the play pleats pleated filter 115, the collected dust is configured to be removed.

[0054]

Furthermore, sweeping member is provided on the pleated filter body 112 and coaxially, by rotating integrally with the pleated filter body 112, the accumulated in the storage case 111 is removed through a dust removing means from the pleated filter body 112 the fine dust, is intended to discharge into the dust separator 75 through a discharge opening.

[0055]

On the other hand, the dust collecting section unit 72, as shown in FIGS. 6 and 7, the air passage 121 communicating with the downstream side of the dust separator 75, the master unit dust communicating with the downstream side of the air passage portion 121 the chamber portion 122, and a lid case 123 for covering the front side of the air passage portion 121.

[0056]

Air passage 121, a front air passage 125 is positioned on the front side of the dust separation portion 75 of the dust separating unit 71 a dust collecting unit 59 in a state of being mounted on the parent device body casing 55, downstream of the front air passage 125 is formed in a substantially L-shaped having a side air duct 126 which is bent with respect to the front air passage 125 communicates with the side.

[0057]

The front air duct 125 has a square hole-shaped opening portion 128 which is hermetically connected

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to the downstream side of the dust separator 75.

[0058]

Side air passage 126 is located on the side of the dust separation portion 75, the opposite side is communicated with the master unit dust collecting chamber 122 and the dust separator 75. Moreover, this is the side air duct 126, square hole shape of the particulate collection portion connecting opening 129 which communicates with the upstream side of the filter section 78 via the dust collecting unit connection opening is formed. The dust collecting unit connecting opening 129, although not shown, a net filter is provided.

[0059]

Further, the base-dust collecting chamber portion 122 is a portion mainly accommodating a coarse dust are relatively large dust separated in the dust separating unit 71, has a greater capacity than the slave unit dust collecting chamber 11 cage, can be opened and closed by a dust collecting part lid 131. Therefore, the dust collection unit 59, the parent machine dust collecting chamber 122, various net filter, and, due to the pleated filter 115, has a larger capacity than the handset dust collecting chamber 11 as a whole, the handset dust collecting chamber 11 It has a lot of dust and can be collected than.

[0060]

Then, the dust collecting unit lid 131, lower end against the side air passage 126, and is rotatably supported by a hinge portion 132. Further, between the dust collecting unit cover 131 and the side air duct 126, a packing is provided, not shown as a sealing member. The dust collecting unit cover 131 is held against the side air passage 126 by a not-shown hook, that the locking hook is released by the operation of the release button (not shown) provided in the lid case 123, it is opened by pivoting by its own weight, and is configured to open the master unit dust collecting chamber 122.

[0061]

The cover case 123, detachable clamp 133 be removable is provided a dust collecting section unit 72 from the parent device body case 55.

[0062]

Detachable recess 61 has an upper recess 134 extending pipe portion 7 of the vacuum cleaner 2 is fitted is formed on the upper side, continuous to the lower end of the upper recess 134, communication of the slave unit floor brush 8 of the vacuum cleaner 2 intermediate recess 135 is formed in the tube portion 31 is fitted, in succession to the lower end of the intermediate recesses 135, rotation holding portion 32 of the slave unit floor brush 8 of the electric vacuum cleaner 2, the child device body portion 33, and each child lower depression 136 machine suction unit 34 is fitted is formed.

[0063]

The upper recess 134 is formed in a circular arc cross sectional shape which is recessed on the front side, the upper end portion is communicated with the receiving portion 137 of the fitting portion projecting from the top of the substantially parent device body casing 55.

[0064]

Receiving unit 137, as shown in FIGS. 8 and 10, the first fitting portion 141 that the main body connecting portion 16 of the vacuum cleaner 2 (FIG. 4) is fitted, the front of the cleaner body 5 (FIG. 4) partitioning the second fitting portion 142 is fitted, it is formed in a planar view substantially U-shaped.

[0065]

The first fitting portion 141 is formed in a longitudinal shape in the longitudinal direction, the bottom is a top of the main unit body casing 55, the bent connecting portion 95 protrudes to the outside of the parent device body casing 55. Further, in front of the bent connecting portions 95 of the first fitting portion 141, the base-body case 55 on the main body terminal 143 terminals 19 and 19 of the vacuum cleaner 2 (FIG. 4) is electrically connected, 143 is provided. Further, inside both sides of the receiving portion 137 partitioning the first fitting portion 141, the clamping portion 144 is provided for operating the electric vacuum cleaner 2 (FIG. 4) when removing the apparatus body 3 .

[0066]

Each clamp 144 includes a locking retention / releasable clamp body 145 relative to the vacuum cleaner 2 apparatus main body 3, the clamp button to operate the clamp body 145 by being pressed from the outside 146 (FIG. 1) It is equipped with a door.

[0067]

Clamp body 145 is formed in a claw shape to the front end portion to the rear sides at the second fitting portion 142 protrudes to the center side in the width direction of the bent connecting portion 95, the body connection of the electric vacuum cleaner 2 engaging recess 20 of the part 16 respectively

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engaged (FIG. 4) is a part that holds the vacuum cleaner 2, it has been urged by the clamp biasing means (not shown) to the projecting direction.

[0068]

Clamp button 146, 146 is, for example worker to push the operable by the sandwich the receiving unit 137 with one hand from the front side, projecting from the opposite sides of the receiving portion 137, by the pressing operation, with the clamp open the clamp body 145, 145 to both sides against the biasing force of the energizing means, the engaging recesses 20 of the main body connecting portion 16 of the vacuum cleaner 2 is configured so as to release the engagement of the (Fig. 4) there.

[0069]

The second fitting portion 142 is expanded from the side and in the width direction to the rear after the first fitting portion 141, and, along an outer shape of the cleaner body 5 from the lower side to the upper spreader it is formed so as to be. Furthermore, this inner surface of the second fitting portion 142 at the rear of the clamp body 145, guide ribs 148,148 are provided as a guide portion along the vertical direction.

[0070]

These guide ribs 148,148, when attaching and detaching the vacuum cleaner 2 in the apparatus main body 3, is intended to guide the vacuum cleaner 2 in the detachment direction.

[0071]

Intermediate recess 135 relative to the upper recess 134, which is wider in the lateral width direction.

[0072]

Further, the lower recess 136, so that the slave unit floor brush 8 in the folded state is be fitted, are wider in the lateral width direction with respect to the intermediate recess 135. Further, the lower portion of the lower depression 136, the support 151 of the child machine suction unit 34 as a deformable member for deforming the folded state with respect to the child device body portion 33 of the slave unit floor brush 8 is provided.

[0073]

The support 151 is one that is integrally attached to the rear surface of the main unit body casing 55, as shown in FIG. 9, the side holding portion 153 continuous across both side portions of the lower end of the lower depression 136 When, and a protruding deformed portion 154 that protrudes from the central portion in the width direction of the side supporting portion 153 upwardly, is formed in a substantially W-shape in front view.

[0074]

Side supporting portion 153, by instructing the child device suction portion 34, 34 of the slave unit floor brush 8 became folded state from both sides, a portion for holding a folded state of the slave unit floor brush 8. Also, inside both side portions of the upper end of the side supporting portion 153, upper inclined surface portion 156, 156 which is inclined to the upper side widening shape is formed.

[0075]

Protruding deformed portion 154, than the side supporting portion 153 is configured protrusion amount in the vertical direction is small, so that the distal end portion becomes narrow, both sides are formed in an inclined shape

[0076]

Then, the base-floor brush 52, FIGS. 1 to 3, as shown in FIGS. 10 and 12, a hollow parent casing member 161, rotatably housed rotational cleaned this parent casing body 161 a rotary brush 162 as the body, the front driven wheel 163 rotatably provided on the lower portion of the main unit case body 161, a rear driven wheel 164, 164 rotatably provided on the rear sides of the main unit case body 161 the has.

[0077]

Master unit case body 161, the master unit lower case 166 that faces the floor surface, and a master unit upper case 167 covering the upper side of the master unit lower case 166, the center portion of the rear part of the width direction, the parent device body fitting recess 168 the lower end of the case 55 is fitted rotatably are formed.

[0078]

Master unit lower case 166, the position of the front near, oblong master unit suction port 171 opposite the floor surface are formed open. In addition, the master unit lower case 166, the rear of the main unit

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suction port 171, oblong driven wheel fitting recess 173 horizontally intermediate driven wheel 172 is fitted is divided into arc-shaped cross section, fit the driven wheel If the recess 173 is open the lower part to the floor. In addition, the rear both sides of the base unit lower case 166, is formed on the driven wheel fitting portion 174,174 the rear driven wheels 164, 164 recess and the width direction is fitted, these driven wheel fitting portion 174,174 the substantially cylindrical support shaft portion 175, 175 for supporting a rear driven wheel 164, 164 are projected.

[0079]

Master unit upper case 167, the upper connecting opening 176 lower end of the connection air passage portion 87 is hermetically connected to is opened. Then, this is the lower end portion of the connection air passage portion 87 to the upper connecting opening 176 is hermetically connected to a suction space 178 that is defined in the parent casing body 161, via the connection air passage portion 87 converging and it is configured to communicate with the suction side of the dust unit 59.

[0080]

Rotary brush 162 is rotatably mounted to the master unit suction port 171.

[0081]

Then, the front driven wheel 163 are located on both sides of the rotary brush 162 is fitted into the recess 179 that is cut-out formed on both sides of the main unit case body 161.

[0082]

Next, the operation of the first embodiment.

[0083]

First of all, such as the floor of the room, when cleaning a relatively wide range, using an electric cleaning device 1. That is, use while wearing the vacuum cleaner 2 in the apparatus main body 3.

[0084]

At this time, a vacuum cleaner 2 side terminals 19 and 19, and the main body terminal 143 of the apparatus main body 3 side that are electrically connected, the switch 26 and the master unit control means is electrically connected , part of the electric power in the base unit rechargeable battery 57, while being controlled by the master unit control section is supplied to the slave unit the secondary battery 21, the slave unit secondary battery 21 is charged.

[0085]

When the operator operates a predetermined switch 26, together with the power supplied from the main unit secondary battery 57 to the main unit electric blower 56 is controlled, the master unit electric blower 56 is driven by the master unit control means, the valve body state switching the 98 in the position P1 (FIG. 11 (a)) and.

[0086]

Then, the operator, the electric vacuum apparatus 1 by holding the holding portion 25 be to run back and forth on the floor surface, scraped dust of the floor surface rotary brush 162 is rotated, from the main unit suction port 171, sucking the dust together with air by the negative pressure generated by driving the master unit electric blower 56.

[0087]

This sucked the air becomes the intake air, along with the dust, from the suction space portion 178 of the base unit floor brush unit 52, via the upper connecting opening 176, the connection air passage portion 87 and the connecting pipe 97 of the communication air passage portion 86, collecting it is sucked into the dust unit 59.

[0088]

In dust collecting unit 59, the intake air and dust, through the guiding air duct 82 from the dust suction port 81 is sucked into the separating chamber section 83, the periphery of the dust separating means along the inner wall of the separating chamber section 83 by turning the, relatively large dust centrifugation, with flows into the front air passage in the 125 from the introduction holes through the opening 128, small dust, of net filter or dust separation means of opening 104 It is collected by the net filter.

[0089]

The dust that has flowed into the front air passage 125 is housed and to the parent machine dust collecting chamber portion 122, the parent machine dust collecting chamber when the further the air passes through the dust collecting part connecting opening 129 of the side air passage 126 It is

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compressed in part within 122.

[0090]

The intake air that has passed through the dust separation section, the intake air which has passed through the opening 104, and, together with the intake air which has passed through the dust collecting unit connecting opening 129, and flows into the filter portion 76 through a circular opening 103, pleats when passing through the pleated filter 115 of the filter body 112, finer micro dust is collected.

[0091]

Intake air that has passed through the pleated filter 115 via the first side communication air passage 66 and the master unit communication air passage 65 is sucked into the master unit electric blower 56, passes through the master unit electric blower 56 becomes exhaust air, via the exhaust air path 67, and is exhausted from the main unit the exhaust hole 68 to the outside of the main unit body casing 55.

[0092]

Further, when stopping the master unit electric blower 56 by operating a predetermined switch 26, by the master unit control section drives the motor 116 to rotate the pleated filter body 112 is predetermined in the circumferential direction time, dust means pleats by playing the filter 115, the fine dust trapped in the pleated filter 115 is dropped into the storage case 111, this dropped fine dust is transported to the discharge opening by the sweeping body, again dust separation it is returned to the section 76.

[0093]

On the other hand, a relatively narrow location cleaning, an easy cleaning of a short period of time, or, at the time, such as cleaning of the filter of the air conditioning system, to clean with a vacuum cleaner 2 alone. In other words, to use to remove the vacuum cleaner 2 from the main body 3.

[0094]

In this case, during the use time of the electric vacuum apparatus 1, the slave unit secondary battery 21 is in the substantially fully charged state by the master unit secondary battery 57.

[0095]

The operator presses the each clamp button 146 from the left and right, by the operation of each clamp portion 144, open each clamp body 145 to the left and right, the engagement recess 20 of the body connecting portion 16 of these clamp portion 144 and the vacuum cleaner 2 engagement is disengaged with the vacuum cleaner 2 is detachable from the apparatus main body 3.

[0096]

In addition, if the vacuum cleaner 2 completely detached from the main body 3, along with the electrical connection between the terminal 19 and 19 and the main body terminal 143, 143 is released, by the urging force of the child device suction unit biasing means each child to rotate to open in the left-right direction with respect to the machine suction unit 34 child machine main body portion 33.

[0097]

In this state, when the operator grips the grip portion 25 to operate the switch 26, the child device control means the power supply to the slave unit secondary battery 21 to the child machine electric blower 12 that is controlled, the child device electric blower 12 is driven.

[0098]

Then, the operator, the slave unit floor brush 8 by sliding against the surface being cleaned, together with the bristles 42 is wipe off the dust from a cleaning surface, air is sucked together with dust from each child device the suction port 41 .

[0099]

The sucked air becomes an intake air is sucked into the sub unit dust collecting chamber 11 through the communicating pipe and the extension pipe unit 7, when passing through the filter, dust contained are removed, the child device electric blower 12 it sucked in to the suction side.

[0100]

Thereafter, the intake air which has passed through the slave unit electric bicwer 12 includes an exhaust air, and is exhausted from the child device exhaust port 14 to the outside of the cleaner body 5.

[0101]

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Moreover, the vacuum cleaning 2 finishes, the operator, the slave unit electric blower 12 is stopped by the operation of a predetermined switch 26, while fitting the slave unit floor brush 8 in the detachable recess 61 vacuum cleaner 2 the mounting to the device body 3.

[0102]

At this time, the slave unit floor brush 8, each child device the lower end of the suction unit 34, device that comes into contact with the respective upper inclined surface portion 156 of the support 151 of the main body 3 side, both sides slave unit of each child device the suction unit 34 pivots upward around the suction port 41 is housed in a lower depression 136 of the detachable recess 61 becomes folded state.

[0103]

At the same time, the slave unit to the communication pipe portion 31 of the floor brush 8 intermediate recesses 135, together with the extension pipe unit 7 are sequentially accommodated in the upper recess 134, the second cleaner body 5 receives portion 137 along the guide ribs 146,148 by fitting the fitting portion 142, while the body connecting portion 16 push the clamp body 145 to the left and right, the bent connecting portion 95 is inserted into the communicating opening 17, the slave unit dust collecting chamber 11, the communicating opening 17, bent connecting portion 95, the upper connecting air passage 93, the second side communication air passage 91 and the communication air passage portion 86 communicates with the suction side of the dust collecting unit 59, the engagement recess of the clamp body 145 is the main body connecting portion 16 20 to be engaged respectively, the vacuum cleaner 2 is fixed to the device body 3.

[0104]

Then, when the operator operates a predetermined switch 26, connection to the device body 3 of the vacuum cleaner 2 is detected by the connection detection means, based on this detection, the valve 98 is master unit control section to the position P2 switching (FIG. 11 (b)), and power from the base unit secondary battery 57 is transmitted to the parent device electric blower 56.

[0105]

This negative pressure generated by the drive of the base unit electric blower 56, communication air passage portion 86, the second side communication air passage 91, by sequentially acting to the upper connection air passage 93 and the bent connection section 95, the handset the dust contained in the dust collecting chamber 11, bent connection portion 95, the top connection air passage 93, is sucked into the dust collecting unit 59 through the second side communication air passage 91 and the communication air passage portion 86 catching it is collected.

[0106]

Dust trapped in the dust collecting unit 59, a dust collecting section unit 72 by operating the detachable clamp 133 removed from the parent device body casing 55, further, by operating on such trash the release button, the hinge dust collecting unit cover 131 is rotated through a unit 132, dust accumulated in the master unit dust collecting chamber 122 is discarded.

[0107]

In a state that does not use the electric vacuum apparatus 1, by connecting the power cord, such as to a commercial AC power source, the base-secondary battery 57 is charged appropriately by the charger 70.

[0108]

As described above, according to the first embodiment, when attaching the vacuum cleaner 2 in the apparatus main body 3, because the slave unit secondary battery 21 is the master unit secondary battery 57 is charged directly, for example, a commercial AC power and as compared with the case of charging the sub-terminal battery 21 is converted to a DC power source, can reduce the charging time of the sub-terminal battery 21, thereby improving the charging efficiency.

[0109]

In particular, a vacuum cleaner 2 is a slave unit, as compared to the electric vacuum apparatus 1, since it is often used to easily short time use, the ability to charge the sub-terminal battery 21 in a short time , for example, to allow well as possible to complete the charging of the sub-terminal battery 21 while cleaning the floor of the main cleaning portion in the electric vacuum apparatus 1, after the cleaning main parts, details by removing the vacuum cleaner 2 when cleaning from the main unit 3, etc. can be cleaned as it is, ease of use of the vacuum cleaner 2 is improved.

[0110]

Further, by providing the charger 70 for charging the master unit secondary battery 57, the base-secondary battery 57 capacity is large, it can be charged using a commercial AC power source.

[0111]

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Furthermore, by incorporating the charger 70 to the apparatus main body 3, as compared with the case of using a charger separate, can be suppressed storage space of the electric vacuum apparatus 1.

[0112]

When attaching the vacuum cleaner 2 in the apparatus main body 3, since where the child device dust collecting chamber 11 and the dust collecting unit 59 communicates through the communication opening 17, the dust trapped on the slave unit dust collecting chamber 11 the and to the dust collecting unit 59 of the larger capacity than the handset dust collecting chamber 11, because it can be moved by the drive of the parent device electric blower 56, the handset dust collecting chamber 11, if you can temporarily accommodate the dust it is sufficient, or to have a size of more than necessary for this slave unit dust collecting chamber 11, since unnecessary to or install a large-scale filter, a vacuum cleaner 2 can be smaller and lighter.

[0113]

As a result, it is possible to or to clean a small amount of dust by detaching from the apparatus main body 3, a vacuum cleaner 2 or to clean the high position lightweight ones compact, easily use the vacuum cleaner 2 can, ease of use and maneuverability is improved.

[0114]

Further, the communication opening 17 of the sub-terminal dust collecting chamber 11, to open the communication opening 17 communicates with the slave unit dust collecting chamber 11 and the dust collecting unit 59 when equipped with a vacuum cleaner 2 in the apparatus main body 3, by providing the lid member 18 for closing the communicating opening 17 in a state of removing the vacuum cleaner 2 from the apparatus main body 3, while cleaning with vacuum cleaner 2 alone, dust spilling from the slave unit dust collecting chamber 11 or, it can be prevented or dust spilling upon or detaching the vacuum cleaner 2 to the apparatus main body 3.

[0115]

In addition, simply by attaching and detaching the vacuum cleaner 2 with respect to the apparatus body 3, or to communicate with the child machine dust collecting chamber 11 to the dust collection unit 59, or disconnect the child machine dust collecting chamber 11 and the dust collection unit 59 since it becomes possible, behavior and to detachable from the vacuum cleaner 2 a device main body 3, as compared with the case of separately and communication operations of the slave unit dust collecting chamber 11 and the dust collecting unit 59, the operation sex is good.

[0116]

Further, the bent connecting portion 95, the upper connecting air passage 93, the second side communication air passage 91 and the communication air passage 86, while wearing the vacuum cleaner 2 in the apparatus main body 3, the driving of the main terminal electric blower 56 by by forming the suction structure 96 capable of sucking the dust of the handset dust collecting chamber 11 to the dust collection unit 59 through the communicating opening 17, the dust of the handset dust collecting chamber 11, and to the dust collection unit 59 it can be sucked efficiently.

[0117]

And is provided with a valve body 98 to the connecting pipe 97 of the communication air passage portion 86, when inhale the dust of the handset dust collecting chamber 11 to the dust collection unit 59, the dust collecting unit 59 to switch the valve body 98 to a position P2 and the base unit floor brush portion 52 that closes the air passage communicating with, when inhale the dust of this child machine dust collecting chamber 11 to the dust collection unit 59, prevent inhaling the dust from the parent device floor brush portion 52 side and the dust of the slave unit dust collecting chamber 11, into the dust collecting unit 59 can be sucked efficiently.

[0118]

The device body 3, the weight of such master unit electric blower 55 and the master unit secondary battery 57, by accommodating the lower portion of the main terminal body case 55, as compared with a case that accommodates these heavy upward on the operation of the electric vacuum apparatus 1 is improved.

[0119]

Further, the slave unit floor brush 8, the child machine suction portion 34 and foldable with respect to the child device body portion 33, when the electric vacuum cleaner 2 mounted on the apparatus main body 3, the child machine suction portion 34 folded state by such a, while improving the suction performance of the vacuum cleaner 2 can relatively increase the size of the child device floor brush 8, when the electric vacuum cleaner 2 mounted on the apparatus main body 3 to take the space Absent.

[0120]

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Then, the removable recess 61, by providing the support 151 to be deformed into a folded state each child machine suction unit 34, when mounting the electric vacuum cleaner 2 in the apparatus main body 3, folded each child device the suction unit 34 at the same time since the mounting work on the apparatus main body 3 of the vacuum cleaner 2 is facilitated.

[0121]

Moreover, relatively since the weight can configure the electric vacuum apparatus 1 without using a large hose, along with appearance during storage electric vacuum apparatus 1 is improved, constraints in the accommodated state of the electric vacuum apparatus 1 is reduced, various it can respond to the storage state of style.

[0122]

Next, a second embodiment with reference to FIG. Note that the same construction and operation as the first embodiment will be omitted with denoted by the same reference numerals.

[0123]

The second embodiment, in place of the terminal 19, 19 of the first embodiment, provided with a pin 181 to the child device floor brush 8, in place of the main body terminal 143, the main body terminal 182, 182 in which the provision of the support 151 of the detachable recess 61.

[0124]

Each terminal 181 are provided at an end portion in the longitudinal direction of the child device body portion 33 side of each child device the suction unit 34 that face each other in the use state of the electric vacuum cleaner 2. Thus, while wearing the vacuum cleaner 2 in the apparatus main body 3, by each child device the suction portion 34 is folded, together with the terminals 181 are exposed on the lower side a detachable recess 61 side, an electric vacuum cleaner 2 in being removed from the apparatus main body 3, positioned below the child device body portion 33 at the center region in the width direction of the sub-terminal floor brush 8 by the return rotation of each child device the suction unit 34, the terminals 181 child machine bed It is configured so as not to be exposed to the outside of the brush 8.

[0125]

Further, each main body terminal 182, the lower end portion shown in FIG. 13 of each slave suction unit 34 which is attached to the lower depression 136 of the detachable recess 61 is disposed at a position opposite.

[0126]

As a result, according to the second embodiment, by each child device the suction unit 34 a vacuum cleaner 2 in a state of being mounted on the apparatus main body 3 is folded to expose the terminal 181 is downward, by being electrically connected to each body terminal 182, it is possible to obtain the same effects as the first embodiment.

[0127]

In addition, if the child machine suction unit 34 in a state in which the removal of the vacuum cleaner 2 from the main unit 3 is rotated so as to open to the left and right to return deformation, of each child machine suction unit 34 to which the terminal 181 and 181 are provided because terminals 181, 181 at the end portion are opposed to each other is not exposed to the outside, dust is unlikely to adhere to the terminals 181 and 181

[0128]

Moreover, since the terminal 181 and 181 in conjunction with the operation of removing the vacuum cleaner 2 from the apparatus main body 3 is not exposed to the outside, as compared with a case that covers the terminals 181 and 181 in such terminal cover separately, such a terminal cover, such as there is no need, and, even without the need, such as the operation to cover the terminal 181, to improve the workability.

[0129]

In the above embodiments, in place of the charger 70 with a built-in device main body 3, it is also possible to attach the electric vacuum apparatus 1 using a charger separately for charging. In this case, the apparatus body 3 to be not required such as a power cord, since may be provided only to the apparatus main body 3 charging terminals to be connected to the charger, the device body 3, it is possible to further miniaturize .

[0130]

Also, the location of the terminals and the main body terminal, as long as it can electrically detachable by attaching and detaching the vacuum cleaner 2 in the apparatus main body 3, such as the position

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and shape provided that, not limited to the above-described configuration.

[0131]

Further, the suction structure 96, so long as it communicates the slave unit dust collecting chamber 11 and the dust collecting unit 59 through the communication opening 17 is not limited to the above structure.

[0132]

Then, the opening and closing structure of the lid 18 may be, for example like those that opens and closes by sliding, but are not limited to the above structure.

[0133]

Further, the base-two in the example, when battery 57 is set lower than the rated voltage of the sub-terminal battery 21 to the rated voltage, the base-secondary battery 57 during the charging of the sub-terminal battery 21 to allow charging of the sub-terminal battery 21 through the master unit secondary battery 57 provided with a boosting means for boosting the voltage to a voltage higher than the rated voltage of the sub-terminal battery 21.

[0134]

Furthermore, such a connection structure to the apparatus main body 3 of the vacuum cleaner 2, such as apparatus main body 3 or the vacuum cleaner 2 detail, is not limited to the above configuration.

[0135]

The electric vacuum apparatus according to the first embodiment of the present invention is a perspective view illustrating. The main part of the same electric vacuum device is a perspective view showing by omitting the parent device body case. The main part of the same electric vacuum device is a perspective view illustrating from the rear by omitting the parent device body case. Id is a perspective view showing an electric vacuum cleaner of the electric vacuum device. It is a perspective view of a portion of the same electric vacuum cleaner. is a perspective view showing the base unit dust collecting chamber of the same electric vacuum device. It is a perspective view of a portion of the same master unit dust chamber. Id is a perspective view of a portion of the master unit body case of the electric vacuum device. The main part of the apparatus main body of the same electric vacuum device is a perspective view illustrating from the rear. It is a central cross-sectional view showing the same as above the apparatus main body. (A) illustrates the main part of the use state of the same electric vacuum device, (b) is a state in which sucking the dust of the sub-terminal dust collecting chamber of the vacuum cleaner of the same electric vacuum device to the master unit dust collecting chamber is an explanatory view showing the principal part. It is a rear view showing the same as above electric vacuum device. The main part of the apparatus main body of the electric vacuum device of the second embodiment of the present invention is a perspective view illustrating from the rear

Description of the code

[70]

1 electric vacuum device 2 vacuum cleaner 3 the apparatus body 12 Child machine electric blower 21 The handset secondary battery 56 Parent machine electric blower 57 The parent machine secondary battery 70 Charger

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CLAIMS JP2008079920

1.

A vacuum cleaner equipped with a slave unit secondary battery that supplies power to the child device the electric blower and the slave unit electric blower, Detachable The electric vacuum cleaner, comprising a device body with a master unit secondary battery that supplies power to the master unit the electric blower and the master unit electric blower, The master unit secondary battery, in a state in which the vacuum cleaner is attached to the cleaning device, it is possible to charge the child machine rechargeable battery Electric vacuum device is characterized in that.

2.

Master unit battery is set higher voltage rating than the slave unit secondary battery Electric vacuum device according to claim 1 which is characterized in that.

3.

During the charging of the at least sub-terminal battery, the voltage of the master unit secondary battery equipped with boosting can boost means to a voltage higher than the rated voltage of the slave unit battery Electric vacuum device according to claim 1 which is characterized in that.

4.

Equipped with a charger for charging the master unit secondary battery Features and claims 1 to 3 the electric vacuum apparatus of any one describes that.

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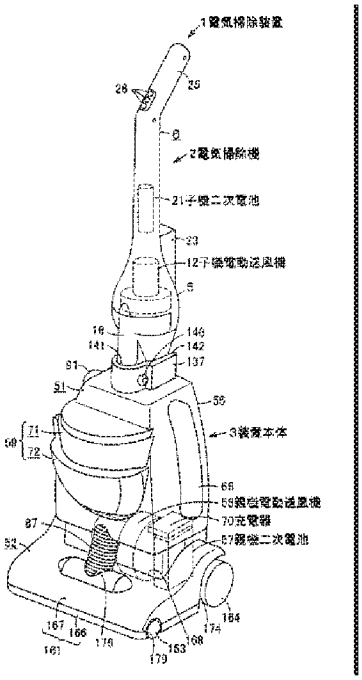
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(54)【発明の名称】電気掃除装置

(57)【要約】
【課題】子機二次電池の充電時間を短縮し充電効率を向上した電気掃除装置を提供する。
【解決手段】子機電動送風機12および子機電動送風機12に給電する子機二次電池21を備えた電気掃除機２を着脱可能な装置本体３に、親機電動送風機56および親機電動送風機56に給電する親機二次電池57を設ける。電気掃除機２を装置本体３に装着すると、子機二次電池21を親機二次電池57が直接充電することで、子機二次電池21の充電時間を短縮でき、充電効率を向上できる。
【選択図】図１



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【特許請求の範囲】
【請求項1】
子機電動送風機およびこの子機電動送風機に給電する子機二次電池を備えた電気掃除機と、
この電気掃除機を着脱可能で、親機電動送風機およびこの親機電動送風機に給電する親機二次電池を備えた装置本体とを具備し、
前記親機二次電池は、前記電気掃除機を前記掃除装置に装着した状態で、前記子機二次電池を充電可能である
ことを特徴とした電気掃除装置。
【請求項2】
親機二次電池は、子機二次電池よりも定格電圧が高く設定されている
ことを特徴とした請求項１記載の電気掃除装置。
【請求項3】
少なくとも子機二次電池の充電の際に、親機二次電池の電圧を前記子機二次電池の定格電圧よりも高い電圧に昇圧可能な昇圧手段を具備した
ことを特徴とした請求項１記載の電気掃除装置。
【請求項4】
親機二次電池を充電する充電器を具備した
ことを特徴とした請求項１ないし３いずれか一記載の電気掃除装置。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は、電気掃除機を着脱可能な装置本体を備えた電気掃除装置に関する。
【背景技術】
【0002】
従来、この種の電気掃除装置としては、電動送風機とこの電動送風機の吸込側に連通する子機集塵室とを備えた子機電気掃除機を、装置本体に対して着脱可能とするものが知られている。この電気掃除装置では、例えば床面上の掃除などの強力な集塵性能が必要な場合には、子機電気掃除機を装置本体に装着して使用し、例えば空調装置のフィルタの掃除などの取り扱いの容易さが必要な場合には、子機電気掃除機を装置本体から取り外して使用する（例えば、特許文献１参照。）。
【特許文献1】特開平１０－１２７５４１号公報（第２－４頁、図５－７）
【発明の開示】
【発明が解決しようとする課題】
【0003】
しかしながら、上述の電気掃除装置では、子機電気掃除機の駆動用の子機二次電池の充電に商用交流電源を用いるため、この商用交流電源を直流電源に変換して充電するなど、子機二次電池の充電に時間を要するという問題点を有している。
【0004】
本発明は、このような点に鑑みなされたもので、子機二次電池の充電時間を短縮できる電気掃除装置を提供することを目的とする。
【課題を解決するための手段】
【0005】
本発明は、子機電動送風機およびこの子機電動送風機に給電する子機二次電池を備えた電気掃除機と、この電気掃除機を着脱可能で、親機電動送風機およびこの親機電動送風機に給電する親機二次電池を備えた装置本体とを具備し、親機二次電池が、電気掃除機を掃除装置に装着した状態で、子機二次電池を充電可能であるものである。
【発明の効果】
【0006】
本発明によれば、電気掃除機を装置本体に装着すると、子機二次電池を親機二次電池が

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直接充電するので、子機二次電池の充電時間を短縮できる。

【発明を実施するための最良の形態】

【0007】

以下、本発明の第１の実施の形態の電気掃除装置の構成を図１ないし図１２を参照して説明する。

【0008】

図１および図１２において、１は親機である電気掃除装置で、この電気掃除装置１は、子機である小型の電気掃除機２を、比較的大型の装置本体３に着脱することで、電気掃除機２単体と、電気掃除装置１全体とでそれぞれ掃除可能なものである。

【0009】

電気掃除機２は、図１、図４および図１２に示すように、略円筒状の掃除機本体５を備え、この掃除機本体５には、軸方向の一端側にハンドル６が延設されるとともに、軸方向の他端側すなわちハンドル６と反対側が縮径されて延長管部７が長尺筒状に延設され、この延長管部７の先端には、子機吸込口体としての子機床ブラシ８が設けられている。

【0010】

また、掃除機本体５内には、延長管部７に連通する子機集塵室11が区画されているとともに、この子機集塵室11のハンドル６側に子機電動送風機12、および、この子機電動送風機12の駆動を制御する図示しない子機制御手段が収容され、子機電動送風機12の吸込側が図示しないフィルタなどを介して子機集塵室11に連通するとともに、この子機電動送風機12の排気側が、掃除機本体５の後部に形成された子機排気孔14に連通している。

【0011】

ここで、子機集塵室11は、掃除機本体５の前側に区画された中空な空間部であり、延長管部７の前側に延設された略筒状の本体連結部16を備えている。この本体連結部16は、電気掃除機２を装置本体３側に装着した状態でこの装置本体３側に嵌合されるものであり、その先端部には、図５に示すように、子機集塵室11内に連通する丸孔状の連通開口17が開口形成され、この連通開口17には、この連通開口17を開閉可能な蓋体18が設けられている。また、本体連結部16の先端部には、連通開口17の近傍に、電気掃除機２を装置本体３に装着した状態で装置本体３側と電気的に接続される端子19，19が設けられている。さらに、本体連結部16の両側部には、電気掃除機２を装置本体３に装着した状態でこの装置本体３側に係合される係合凹部20（一方のみ図示）が形成されている。

【0012】

蓋体18は、図示しない付勢手段により連通開口17の外側方向すなわち下方向へと付勢された弁体であり、電気掃除機２を装置本体３に装着した状態で、装置本体３側により付勢手段の付勢力に抗して開放され、連通開口17を開口させるとともに、電気掃除機２を装置本体３から取り外した状態で、付勢手段の付勢力により元の状態へと復帰して連通開口17を閉塞するものである。

【0013】

図１、図４および図１２に戻って、子機電動送風機12は、比較的小型の出力を有しており、ハンドル６内に配設された子機電源部としての子機電池である子機二次電池21からの給電を子機制御手段により制御することで動作が制御される。

【0014】

子機排気孔14は、掃除機本体５の後部からハンドル６の基端部に亘って突設された突出部23にスリット状に複数形成されている。

【0015】

また、ハンドル６の先端部には、作業者が把持する把持部25が後方へと屈曲形成され、この把持部25には、電気掃除機２および電気掃除装置１のそれぞれの駆動用などの複数のスイッチ26が配設されている。

【0016】

さらに、延長管部７は、電気掃除機２を装置本体３へと装着した状態でこの装置本体３の後部すなわち背面に嵌合する。

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【0017】
そして、子機床ブラシ８は、延長管部７に連通する連通管部31を有し、この連通管部31の先端側が回動保持部32に回動可能に接続され、この回動保持部32の先端側に、子機ケース体としての子機本体部33が一体的に形成され、この子機本体部33の両側部に、子機吸込部34，34が回動可能に設けられている。
【0018】
連通管部31は、円筒状に形成され、延長管部７に対して、クランプ部36を介して着脱可能となっている。
【0019】
回動保持部32は、連通管部31を上下方向および周方向に回動可能に保持している。また、この回動保持部32の下部すなわち被掃除面としての床面側には、子機第１従動輪38が回動自在に設けられている。
【0020】
子機本体部33は、回動保持部32に保持された連通管部31の先端側に連通している。
【0021】
各子機吸込部34は、床面に対向する下部に、図示しない連通管を介して子機本体部33の両側部に回動可能に連通接続された丸孔状の子機吸込口41が開口形成されているとともに、床面の掃除用のブラシ毛部42が植毛され、かつ、子機第２従動輪43が回動自在に設けられている。
【0022】
そして、各子機吸込部34は、連通管の周方向すなわち子機吸込口41の周方向に、図示しない子機吸込部付勢手段を介して付勢されており、電気掃除機２を装置本体３に装着した状態で、この付勢力に抗して各子機吸込部34の両側部が延長管部７側へと回動し、図４の実線に示すように、各子機吸込部34が子機本体部33および回動保持部32の両側部に位置して折り畳み状態になるとともに、電気掃除機２を装置本体３から取り外した状態で、子機吸込部付勢手段の付勢力により元の状態に復帰して、図４の想像線に示すように、子機本体部33の両側へと延出して折り畳み状態が解除されるように構成されている。
【0023】
各ブラシ毛部42は、例えば弾力性を有する合成樹脂などにより形成され、各子機吸込部34の後部側に、各子機吸込口41から各子機吸込部34の両側近傍に亘って壁状に配設されて、各子機吸込部34の下面から下方に突出している。
【0024】
各子機第２従動輪43は、各子機吸込部34の両側近傍の前側に配設されている。
【0025】
一方、装置本体３は、図１ないし図３、および、図１０ないし図１２に示すように、電気掃除機２が着脱される親機本体部51と、この親機本体部51に対して相対的に回動可能に設けられた親機吸込口体としての親機床ブラシ部52とを備えている。
【0026】
親機本体部51は、外郭となる親機本体ケース55の内部に、親機電動送風機56、この親機電動送風機56に給電可能な親機電源部としての親機電池である親機二次電池57、および、親機電動送風機56の駆動を制御する図示しない親機制御手段を収容し、かつ、前部に、親機集塵室としての集塵部である集塵ユニット59が着脱可能となっている。
【0027】
親機本体ケース55は、下端部が下方へと側面視で略円弧状に形成され、この下端部が親機床ブラシ部52に対して相対的に前後方向へと回動可能に軸支されている。また、この親機本体ケース55の後部には、電気掃除機２を着脱する着脱凹部61が形成されている。
【0028】
親機電動送風機56は、子機電動送風機12（図４）よりも大きい出力を有するもので、親機本体部51の下端部に左右方向に沿って配設され、周囲が保持部材としてのモータクッション63により保持されている。また、この親機電動送風機56の吸込側には、筒状の親機連

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通風路65が気密に連通接続され、この親機連通風路65の先端は、吸気管としての筒状の第１側部連通風路66を介して集塵ユニット59の下流側に気密に連通接続されている。また、親機電動送風機56の排気側は、排気風路67を介して、親機本体ケース55の後部にて着脱凹部61の側方に形成された親機排気孔68に気密に連通接続されている。

【0029】

親機連通風路65は、親機電動送風機56の吸込側である一側部の上部から上方へ延設され、かつ、先端部が親機二次電池57と干渉しないようにこの親機二次電池57の上方にて装置本体３の側方へと屈曲された、略Ｌ字状の管体である。

【0030】

第１側部連通風路66は、親機連通風路65の先端から上方へと延設され、親機本体ケース55の一側部からこの親機本体ケース55の外部に露出してこの親機本体ケース55の一側部に沿って配設されているとともに、先端が親機本体ケース55内へと屈曲されて集塵ユニット59の上部へと接続されている。

【0031】

また、排気風路67は、親機電動送風機56の排気側である他側部の上部から後方へと拡開状に延設されている。

【0032】

さらに、親機排気孔68は、左右方向に長いスリット状に形成されている。

【0033】

また、親機二次電池57は、親機電動送風機56の一側方に位置した電池パックであり、子機二次電池21（図４）よりも高い定格電圧および大きい定格容量を有し、電気掃除機２を装置本体３に装着した状態でこの子機二次電池21に給電可能となっている。さらに、この親機二次電池57は、親機本体ケース55の後部に設けられた開閉蓋部69（図１２）を開けることで、この親機本体ケース55に対して着脱可能となっている。そして、この親機二次電池57は、装置本体３内に設けられた充電器70（図１）により、充電可能となっている。

【0034】

充電器70は、例えば図示しない電源コードなどにより装置本体３の外部の商用交流電源と電気的に接続され、この商用交流電源からの交流電源を直流電源に変換して親機二次電池57を充電するものである。

【0035】

親機制御手段は、親機二次電池57の放電を制御することで、親機電動送風機56の動作を制御するとともに、電気掃除機２を装置本体３に装着した状態で、親機二次電池57から子機二次電池21への給電を制御することにより子機二次電池21の充電を制御する、充電制御手段の機能を有している。

【0036】

集塵ユニット59は、塵埃分離本体部としての塵埃分離ユニット71と、集塵本体部としての集塵部ユニット72とを有している。

【0037】

塵埃分離ユニット71は、図６に示すように、塵埃分離部75と、この塵埃分離部75の上部に一体に設けられたフィルタ部76とを備えている。

【0038】

塵埃分離部75は、塵埃吸込口81を先端に有する角筒状の案内風路管82を有し、この案内風路管82の下流側に、吸い込んだ塵埃を遠心分離する分離室部83が連通して設けられ、この分離室部83の下流側に、分離された塵埃をフィルタ部76へと運ぶ吸引風路部84（図３）が連通して設けられている。

【0039】

案内風路管82は、塵埃分離ユニット71を親機本体ケース55（図１、図１０および図１２）に装着した状態で、塵埃吸込口81が図２、図３および図１１などに示す筒状の連通風路部86および筒状の接続風路部87を介して親機床ブラシ部52の吸込側に気密に接続されて塵埃を空気とともに吸い込み可能である。

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【0040】
ここで、連通風路部86は、塵埃分離部75（図６）の下端部にて、親機本体ケース55（図１、図１０および図１２）の他側方へと略水平に延設され、先端が、連結管としての筒状の第２側部連通風路91に連通接続されている。
【0041】
この第２側部連通風路91は、連通風路部86の先端部から上方へと延設され、第１側部連通風路66と同様に、親機本体ケース55の他側部からこの親機本体ケース55の外部に露出してこの親機本体ケース55の一側部に沿って配設されているとともに、先端が親機本体ケース55内へと屈曲されて、上部接続風路93に気密に接続されている。したがって、第２側部連通風路91は、第１側部連通風路66と正面視で略対称に形成されている。
【0042】
この上部接続風路93は、親機本体ケース55の幅方向の中心側へと略水平に延設され、先端に、電気掃除機連通部としての屈曲接続部95が上方へと屈曲されている。
【0043】
この屈曲接続部95は、電気掃除機２を装置本体３へと装着した状態で、電気掃除機２の連通開口17へと挿入され、この連通開口17に設けられた蓋体18を押し上げることで、この連通開口17を介して子機集塵室11を塵埃分離ユニット71の上流側へと気密に接続する部分である。このため、これら連通開口17、屈曲接続部95、上部接続風路93、第２側部連通風路91および連通風路部86などにより、電気掃除機２を装置本体３に装着した状態で、親機電動送風機56の駆動によって連通開口17を介して子機集塵室11の塵埃を集塵ユニット59へと吸い込み可能な吸引構造96が構成されている。また、この屈曲接続部95には、図示しないが、電気掃除機２の連通開口17との接続状態、すなわち電気掃除機２の装置本体３への装着状態を検出するセンサなどの装着検出手段が設けられている。
【0044】
また、接続風路部87は、例えば可撓性を有する合成樹脂などにより蛇腹状に形成されており、連通風路部86の基端から前方下側へと延設された接続管97に上端が気密に接続され、下端が親機床ブラシ部52へと気密に接続されている。
【0045】
ここで、接続管97内には、連通風路部86に連通する基端側の位置に弁体98が設けられている。この弁体98は、電気掃除機２を装置本体３に装着した状態での所定のスイッチ26の操作により、連通風路部86側を閉塞する位置P1と、この連通風路部86と接続風路部87との連通部の下側で接続風路部87側を閉塞する位置P2とのそれぞれの位置に、親機制御手段により切り換え制御される。
【0046】
分離室部83は、図１０に示す円形開口103が中央部に穿設されているとともに、この円形開口103の周囲に、扇形状の開口104が設けられている。また、この分離室部83の周壁には、集塵部ユニット72の上流側へと連通する図示しない導入孔が穿設されている。さらに、この分離室部83は、図示しない開閉蓋により開閉可能となっている。
【0047】
円形開口103は、吸引風路部84の上流側に連通しており、塵埃分離手段が取り付けられている。この塵埃分離手段は、外周面に複数の連通開口が穿設されて格子状に形成され、これら連通開口に図示しないネットフィルタが取り付けられている。
【0048】
開口104は、吸引風路部84の上流側に連通しており、図示しないネットフィルタが取り付けられている。
【0049】
吸引風路部84は、図示しない接続開口を介してフィルタ部76の上流側に連通しているとともに、分離室部83と反対側に穿設された図示しない集塵部接続開口を介して集塵部ユニット72の下流側に連通している。
【0050】

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また、フィルタ部76は、接続開口を介して吸引風路部84と連通する略円筒状のフィルタ部本体である収納ケース111と、この収納ケース111内に回転自在に設けられた図示しないフィルタとしてのプリーツフィルタ体112と、このプリーツフィルタ体112と一体に回転する回転体である図示しない掃出体とを備えている。

【0051】

収納ケース111は、塵埃分離部75の後部に一体に形成されている。また、この収納ケース111には、図示しない第１排出開口としての排出開口が穿設されている。さらに、この収納ケース111の内部には、塵落とし機構としての図示しない除塵手段が突設され、この除塵手段の先端部がプリーツフィルタ体112に接触可能となっている。

【0052】

排出開口は、プリーツフィルタ体112にて捕集されこのプリーツフィルタ体112から除塵手段により落とされた微細な塵埃である粉体、すなわち微細塵が導入される開口であり、塵埃分離部75へと気密に接続されている。

【0053】

また、プリーツフィルタ体112は、図示しない略円筒状の枠体に放射プリーツ状に貼着されたフィルタ体としてのプリーツフィルタ115を有している。そして、このプリーツフィルタ体112は、電気掃除装置１のオン時およびオフ時に、後部に設けられた駆動手段としてのモータ116（図３）により所定時間回転するように構成され、この回転に伴い除塵手段がプリーツフィルタ115のプリーツを弾くことで、捕集した塵埃が除去されるように構成されている。

【0054】

さらに、掃出体は、プリーツフィルタ体112と同軸状に設けられ、プリーツフィルタ体112と一体的に回転することで、プリーツフィルタ体112から除塵手段を介して除去されて収納ケース111に溜まった微細塵を、排出開口を介して塵埃分離部75へと排出するものである。

【0055】

一方、集塵部ユニット72は、図６および図７に示すように、塵埃分離部75の下流側に連通する風路部121と、この風路部121の下流側に連通する親機集塵室部122と、風路部121の前側を覆う蓋ケース123とを備えている。

【0056】

風路部121は、集塵ユニット59を親機本体ケース55に装着した状態で塵埃分離ユニット71の塵埃分離部75の前側に位置する前部風路125と、この前部風路125の下流側に連通しこの前部風路125に対して屈曲された側部風路126とを備えた略Ｌ字状に形成されている。

【0057】

前部風路125には、塵埃分離部75の下流側に気密に接続される角孔状の開口部128を有している。

【0058】

側部風路126は、塵埃分離部75の側部に位置し、この塵埃分離部75と反対側が親機集塵室部122に連通している。また、この側部風路126には、集塵部接続開口を介してフィルタ部76の上流側に連通する角孔状の集塵部接続開口129が形成されている。この集塵部接続開口129には、図示しないが、ネットフィルタが設けられている。

【0059】

また、親機集塵室部122は、塵埃分離ユニット71で分離された比較的大きい塵埃である粗塵を主に収容する部分であり、子機集塵室11よりも大きい容量を有しており、集塵部蓋体131により開閉可能となっている。したがって、集塵ユニット59は、親機集塵室部122、各種ネットフィルタ、および、プリーツフィルタ115などにより、全体として子機集塵室11よりも大きい容量を有し、子機集塵室11よりも多くの塵埃を捕集可能となっている。

【0060】

そして、この集塵部蓋体131は、下端部が側部風路126に対して、ヒンジ部132により回動可能に軸支されている。また、この集塵部蓋体131と側部風路126との間には、シール部

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材としての図示しないパッキンが設けられている。そして、集塵部蓋体131は、図示しないフックにより側部風路126に対して保持され、蓋ケース123に設けられた図示しない解除ボタンの操作によりフックの係止が解除されることで、自重により回動して開放され、親機集塵室部122を開くように構成されている。

【0061】

蓋ケース123には、集塵部ユニット72を親機本体ケース55から取り外し可能とする着脱クランプ133が設けられている。

【0062】

着脱凹部61は、電気掃除機２の延長管部７が嵌合する上側凹部134が上側に形成され、この上側凹部134の下端部に連続して、電気掃除機２の子機床ブラシ８の連通管部31が嵌合する中間凹部135が形成され、この中間凹部135の下端部に連続して、電気掃除機２の子機床ブラシ８の回動保持部32、子機本体部33および各子機吸込部34が嵌合する下側凹部136が形成されている。

【0063】

上側凹部134は、前側に窪んだ断面円弧状に形成され、略親機本体ケース55の上部に突設された嵌合部としての受け部137に上端部が連通している。

【0064】

受け部137は、図８および図１０に示すように、電気掃除機２の本体連結部16（図４）が嵌合される第１嵌合部141と、掃除機本体５の前側（図４）が嵌合される第２嵌合部142とを区画する、平面視略Ｕ字状に形成されている。

【0065】

第１嵌合部141は、前後方向に長手状に形成され、親機本体ケース55の上面である底部に、屈曲接続部95が親機本体ケース55の外部へと突出している。また、第１嵌合部141の屈曲接続部95の前方には、親機本体ケース55上に、電気掃除機２の端子19，19（図４）と電気的に接続される本体端子143，143が設けられている。さらに、第１嵌合部141を区画する受け部137の内部両側には、電気掃除機２（図４）を装置本体３に対して取り外す際に操作するクランプ部144，144が設けられている。

【0066】

各クランプ部144は、電気掃除機２を装置本体３に対して係止保持／解除可能なクランプ本体145と、外部から押し操作されることでクランプ本体145を動作させるクランプボタン146（図１）とを備えている。

【0067】

クランプ本体145，145は、屈曲接続部95の後部両側にて第２嵌合部142内へと先端部が幅方向の中心側へと突出した爪状に形成され、電気掃除機２の本体連結部16の係合凹部20（図４）にそれぞれ係合して電気掃除機２を保持する部分であり、この突出方向へと図示しないクランプ付勢手段により付勢されている。

【0068】

クランプボタン146，146は、例えば作業者が前側から片手で受け部137を挟むようにすることて押し操作可能となるように、受け部137の両側に突設され、この押し操作により、クランプ付勢手段の付勢力に抗してクランプ本体145，145を両側へと開き、電気掃除機２の本体連結部16の係合凹部20（図４）への係合を解除するように構成されている。

【0069】

また、第２嵌合部142は、第１嵌合部141の後側から後方へと幅方向に拡開され、かつ、下側から上側へと掃除機本体５の外側形状に沿って拡開されるように形成されている。さらに、この第２嵌合部142の内面には、クランプ本体145，145の後方にて、上下方向に沿ってガイド部としてのガイドリブ148，148が設けられている。

【0070】

これらガイドリブ148，148は、電気掃除機２を装置本体３に着脱する際に、電気掃除機２を着脱方向に案内するものである。

【0071】

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中間凹部135は、上側凹部134に対して、左右幅方向に広く形成されている。

【0072】

さらに、下側凹部136は、折り畳んだ状態の子機床ブラシ８が嵌合可能となるように、中間凹部135に対して左右幅方向に広く形成されている。また、この下側凹部136の下部には、子機床ブラシ８の各子機吸込部34を子機本体部33に対して折り畳み状態に変形させる変形部材としての支持体151が設けられている。

【0073】

この支持体151は、親機本体ケース55の後面に一体に取り付けられているもので、図９に示すように、下側凹部136の下端部から両側部に亘って連続する側部保持部153と、この側部保持部153の幅方向の中央部から上方へと突出する突出変形部154とを有し、正面視で略Ｗ字状に形成されている。

【0074】

側部保持部153は、折り畳み状態となった子機床ブラシ８の子機吸込部34，34を両側から指示することで、子機床ブラシ８の折り畳み状態を保持する部分である。また、この側部保持部153の上端部の内側両側部には、上側へと拡開状に傾斜した上側傾斜面部156，156が形成されている。

【0075】

突出変形部154は、側部保持部153よりも上下方向の突出量が小さく設定され、先端部が幅狭となるように、両側が傾斜状に形成されている。

【0076】

そして、親機床ブラシ部52は、図１ないし図３、図１０および図１２に示すように、中空な親機ケース体161と、この親機ケース体161内に回転可能に収容された回転清掃体としての回転ブラシ162と、親機ケース体161の下部に回転可能に設けられた前方従動輪163と、親機ケース体161の後部両側に回転可能に設けられた後方従動輪164，164とを有している。

【0077】

親機ケース体161は、床面に対向する親機下部ケース166と、この親機下部ケース166の上側を覆う親機上部ケース167とを備え、後部の幅方向の中央部に、親機本体ケース55の下端部が回動可能に嵌合する嵌合凹部168が形成されている。

【0078】

親機下部ケース166は、前側寄りの位置に、床面に対向して横長の親機吸込口171が開口形成されている。また、この親機下部ケース166には、親機吸込口171の後方に、横長の中間従動輪172が嵌合する横長の従動輪嵌合凹部173が断面円弧状に区画され、この従動輪嵌合凹部173は、下部が床面へと開口している。さらに、この親機下部ケース166の後部両側には、幅方向へと窪み後方従動輪164，164が嵌合する従動輪嵌合部174，174が形成され、これら従動輪嵌合部174，174には、後方従動輪164，164を軸支する略円筒状の支持軸部175，175が突設されている。

【0079】

親機上部ケース167は、接続風路部87の下端部が気密に接続される上部接続開口176が開口されている。そして、この上部接続開口176に接続風路部87の下端部が気密に接続されることで、親機ケース体161内に区画された吸込空間部178が、接続風路部87を介して集塵ユニット59の吸込側に連通するように構成されている。

【0080】

回転ブラシ162は、親機吸込口171に回転可能に取り付けられている。

【0081】

そして、前方従動輪163，163は、回転ブラシ162の両側方に位置し、親機ケース体161の両側に切り欠き形成された凹部179に嵌合している。

【0082】

次に、上記第１の実施の形態の動作を説明する。

【0083】

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まず、部屋の床面など、比較的広い範囲を掃除する際には、電気掃除装置１を用いる。すなわち、電気掃除機２を装置本体３に装着した状態で使用する。

【0084】

このとき、電気掃除機２側の端子19，19と、装置本体３側の本体端子143，143とが電気的に接続されることで、スイッチ26と親機制御手段とが電気的に接続され、親機二次電池57の電力の一部が、親機制御手段により制御されつつ子機二次電池21へと供給され、この子機二次電池21が充電される。

【0085】

作業者が所定のスイッチ26を操作すると、親機制御手段により親機二次電池57から親機電動送風機56へ供給される電力が制御されて、親機電動送風機56が駆動するとともに、弁体98を位置P1に切り換えた状態（図１１(a)）とする。

【0086】

そして、作業者が、把持部25を把持して電気掃除装置１を床面上で前後に走行させることで、回転ブラシ162が回転して床面の塵埃を掻き出し、親機吸込口171から、親機電動送風機56の駆動により発生した負圧によって塵埃を空気とともに吸い込む。

【0087】

この吸い込まれた空気は吸気風となり、塵埃とともに、親機床ブラシ部52の吸込空間部178から、上部接続開口176、接続風路部87、および連通風路部86の接続管97を介して集塵ユニット59に吸い込まれる。

【0088】

集塵ユニット59において、吸気風および塵埃は、塵埃吸込口81から案内風路管82を経由して分離室部83へと吸い込まれ、この分離室部83の内壁に沿って塵埃分離手段の周囲を旋回することで、比較的大きな塵埃が遠心分離され、導入孔から開口部128を介して前部風路125内へと流入するとともに、小さい塵埃は、開口104のネットフィルタあるいは塵埃分離手段のネットフィルタにより捕集される。

【0089】

前部風路125内に流入した塵埃は、親機集塵室部122内へと収容され、さらに空気が側部風路126の集塵部接続開口129を通過する際に親機集塵室部122内で圧縮される。

【0090】

また、塵埃分離手段を通過した吸気風は、開口104を通過した吸気風、および、集塵部接続開口129を通過した吸気風とともに、円形開口103を介してフィルタ部76へと流入し、プリーツフィルタ体112のプリーツフィルタ115を通過する際に、さらに微細な微細塵が捕集される。

【0091】

このプリーツフィルタ115を通過した吸気風は、第１側部連通風路66および親機連通風路65を介して、親機電動送風機56へと吸い込まれ、この親機電動送風機56を通過して排気風となり、排気風路67を介して、親機排気孔68から親機本体ケース55の外部へと排気される。

【0092】

また、所定のスイッチ26を操作して親機電動送風機56を停止させると、親機制御手段がモータ116を駆動させることで、プリーツフィルタ体112が周方向に所定時間回転し、除塵手段がプリーツフィルタ115を弾くことで、このプリーツフィルタ115にて捕集した微細塵が収納ケース111内へと落とされ、この落とされた微細塵は、掃出体により排出開口へと運ばれ、再度塵埃分離部75へと戻される。

【0093】

一方、比較的狭い場所の掃除、短時間の手軽な掃除、あるいは、空調装置のフィルタの掃除などの際には、電気掃除機２単体で掃除をする。すなわち、電気掃除機２を装置本体３から取り外して使用する。

【0094】

このとき、上記電気掃除装置１の使用時間中に、親機二次電池57により子機二次電池21

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が略満充電状態となっている。

【0095】

作業者が、各クランプボタン146を左右から押すと、各クランプ部144の動作により、各クランプ本体145が左右に開き、これらクランプ部144と電気掃除機２の本体連結部16の係合凹部20との係合が外れて、電気掃除機２が装置本体３から取り外し可能となる。

【0096】

さらに、電気掃除機２を装置本体３から完全に取り外すと、端子19，19と本体端子143，143との電気的接続が解除されるとともに、子機吸込部付勢手段の付勢力により各子機吸込部34が子機本体部33に対して左右方向に開くように回動する。

【0097】

この状態で、作業者が把持部25を把持してスイッチ26を操作すると、子機二次電池21から子機電動送風機12への給電を子機制御手段が制御することで、子機電動送風機12が駆動する。

【0098】

そして、作業者は、子機床ブラシ８を被掃除面に対して摺動させることで、ブラシ毛部42が被掃除面の塵埃を拭き取るとともに、各子機吸込口41から塵埃とともに空気が吸い込まれる。

【0099】

この吸い込まれた空気は吸気風となり、連通管および延長管部７を介して子機集塵室11へと吸い込まれ、フィルタを通過する際に、含まれる塵埃が除去され、子機電動送風機12の吸込側へと吸い込まれる。

【0100】

この後、子機電動送風機12を通過した吸気風は、排気風となり、子機排気孔14から掃除機本体５の外部へと排気される。

【0101】

さらに、電気掃除機２での掃除が終了すると、作業者は、所定のスイッチ26の操作により子機電動送風機12を停止させ、子機床ブラシ８を着脱凹部61に嵌合させつつ電気掃除機２を装置本体３へと装着する。

【0102】

このとき、子機床ブラシ８は、各子機吸込部34の下端側が、装置本体３側の支持体151の各上側傾斜面部156に当接することで、各子機吸込部34の両側が子機吸込口41の周囲に上方へと回動し、折り畳み状態となって着脱凹部61の下側凹部136に収容される。

【0103】

同時に、子機床ブラシ８の連通管部31が中間凹部135に、延長管部７が上側凹部134に順次収容されるとともに、ガイドリブ148，148に沿って掃除機本体５が受け部137の第２嵌合部142に嵌合することで、本体連結部16がクランプ本体145を左右に押し広げつつ、屈曲接続部95が連通開口17に挿入され、子機集塵室11が、連通開口17、屈曲接続部95、上部接続風路93、第２側部連通風路91および連通風路部86により、集塵ユニット59の吸込側に連通し、クランプ本体145が本体連結部16の係合凹部20にそれぞれ係合されて、電気掃除機２が装置本体３に固定される。

【0104】

そして、作業者が所定のスイッチ26を操作すると、接続検出手段により電気掃除機２の装置本体３への接続状態が検出され、この検出に基づき、親機制御手段が弁体98を位置P2に切り換え（図１１(b)）、かつ、親機二次電池57からの電力が親機電動送風機56へと伝達される。

【0105】

この親機電動送風機56の駆動により発生した負圧は、連通風路部86、第２側部連通風路91、上部接続風路93および屈曲接続部95へと順次作用することで、子機集塵室11内に収容された塵埃が、屈曲接続部95、上部接続風路93、第２側部連通風路91および連通風路部86を介して集塵ユニット59へと吸い込まれて捕集される。

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【0106】
集塵ユニット59にて捕集した塵埃は、着脱クランプ133を操作することで集塵部ユニット72を親機本体ケース55から取り外し、さらに、解除ボタンをごみ箱などの上で操作することで、ヒンジ部132を介して集塵部蓋体131が回動し、親機集塵室部122内に溜められた塵埃が廃棄される。

【0107】
また、電気掃除装置１を使用しない状態では、電源コードを商用交流電源などに接続することで、充電器70により親機二次電池57が適宜充電される。

【0108】
上述したように、上記第１の実施の形態によれば、電気掃除機２を装置本体３に装着すると、子機二次電池21を親機二次電池57が直接充電するので、例えば商用交流電源などを直流電源に変換してから子機二次電池21を充電する場合と比較して、子機二次電池21の充電時間を短縮でき、充電効率を向上できる。

【0109】
特に、子機である電気掃除機２は、電気掃除装置１と比較して、手軽に短時間使用するために使用されることが多いので、短時間で子機二次電池21を充電できることで、例えば電気掃除装置１で主な掃除箇所の床面を掃除している間などに子機二次電池21の充電を完了させることなども可能になり、主な部分の掃除の後、細部を掃除する際に電気掃除機２を装置本体３から取り外せば、そのまま掃除できるなど、電気掃除機２の使い勝手が向上する。

【0110】
また、親機二次電池57を充電する充電器70を備えることにより、容量が大きい親機二次電池57は、商用交流電源などを用いて充電できる。

【0111】
さらに、充電器70を装置本体３に内蔵することにより、別体の充電器を用いる場合と比較して、電気掃除装置１の収納スペースを抑制できる。

【0112】
そして、電気掃除機２を装置本体３に装着すると、子機集塵室11と集塵ユニット59とが連通開口17を介して連通するため、子機集塵室11に捕集した塵埃をこの子機集塵室11よりも大きな容量の集塵ユニット59へと、親機電動送風機56の駆動により移動させることが可能になるので、子機集塵室11は、一時的に塵埃を収容できれば充分であり、この子機集塵室11に必要以上の大きさを持たせたり、大掛かりなフィルタを取り付けたりせずに済むから、電気掃除機２を小型化および軽量化できる。

【0113】
この結果、装置本体３から取り外すことで少量の塵埃を掃除したり、高い位置を掃除したりする電気掃除機２を小型で軽量なものとすることができるので、電気掃除機２を手軽に使用でき、使い勝手および取り回し性が向上する。

【0114】
また、子機集塵室11の連通開口17に、電気掃除機２を装置本体３に装着した際に連通開口17を開放して子機集塵室11と集塵ユニット59とを連通させ、電気掃除機２を装置本体３から取り外した状態で連通開口17を閉塞する蓋体18を設けることで、電気掃除機２単体で掃除しているときに、子機集塵室11から塵埃がこぼれたり、電気掃除機２を装置本体３に対して着脱したりした際に塵埃がこぼれたりすることを防止できる。

【0115】
しかも、電気掃除機２を装置本体３に対して着脱させるだけで、子機集塵室11を集塵ユニット59に連通させたり、子機集塵室11と集塵ユニット59とを切り離したりすることが可能になるので、電気掃除機２を装置本体３に対して着脱する動作と、子機集塵室11と集塵ユニット59との連通動作とを別個にする場合と比較して、操作性が良好になる。

【0116】
さらに、屈曲接続部95、上部接続風路93、第２側部連通風路91および連通風路部86によ

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り、電気掃除機２を装置本体３に装着した状態で、親機電動送風機56の駆動により連通開口17を介して子機集塵室11の塵埃を集塵ユニット59へと吸い込み可能な吸引構造96を形成することで、子機集塵室11の塵埃を、集塵ユニット59へと効率よく吸い込むことができる。

【0117】

そして、弁体98を連通風路部86の接続管97に設け、子機集塵室11の塵埃を集塵ユニット59に吸い込む際に、弁体98を位置P2へと切り換えて集塵ユニット59と親機床ブラシ部52とを連通する風路を閉塞することで、この子機集塵室11の塵埃を集塵ユニット59に吸い込む際に、親機床ブラシ部52側から塵埃を吸い込むことを防止し、子機集塵室11の塵埃を、集塵ユニット59へと、より効率よく吸い込むことができる。

【0118】

また、装置本体３は、親機電動送風機56および親機二次電池57などの重量物を、親機本体ケース55の下部に収容することで、これら重量物を上側に収容する場合と比較して、電気掃除装置１の操作性が良好になる。

【0119】

さらに、子機床ブラシ８において、各子機吸込部34を子機本体部33に対して折り畳み可能とし、電気掃除機２を装置本体３に装着した際に、各子機吸込部34が折り畳み状態となるようにすることで、子機床ブラシ８を比較的大型化でき電気掃除機２での吸込性能を向上しつつ、電気掃除機２を装置本体３に装着した際にはスペースを取ることがない。

【0120】

そして、着脱凹部61に、各子機吸込部34を折り畳み状態に変形させる支持体151を設けることにより、電気掃除機２を装置本体３に装着する際に、各子機吸込部34が同時に折り畳まれるので、電気掃除機２の装置本体３への装着作業が容易になる。

【0121】

また、比較的重量が大きいホースなどを用いることなく電気掃除装置１を構成できるため、電気掃除装置１の収納時の見栄えが向上するとともに、電気掃除装置１の収納状態の制約が少なくなり、様々なスタイルの収納状態に対応できる。

【0122】

次に、第２の実施の形態を図１３を参照して説明する。なお、上記第１の実施の形態と同様の構成および作用については、同一符号を付してその説明を省略する。

【0123】

この第２の実施の形態は、上記第１の実施の形態の端子19，19に代えて、端子181，181を子機床ブラシ８に設け、本体端子143，143に代えて、本体端子182，182を着脱凹部61の支持体151に設けるものである。

【0124】

各端子181は、電気掃除機２の使用状態で互いに対向する各子機吸込部34の長手方向の子機本体部33側の端部にそれぞれ設けられている。このため、電気掃除機２を装置本体３に装着した状態で、各子機吸込部34が折り畳まれることにより、各端子181は着脱凹部61側である下側に露出するとともに、電気掃除機２を装置本体３から取り外した状態で、各子機吸込部34の復帰回動により子機床ブラシ８の幅方向の中心域で子機本体部33の下側に位置し、これら端子181が子機床ブラシ８の外方に露出しないように構成されている。

【0125】

また、各本体端子182は、着脱凹部61の下側凹部136へと取り付けられた各子機吸込部34の図１３に示す下端部が対向する位置に配設されている。

【0126】

この結果、上記第２の実施の形態によれば、電気掃除機２を装置本体３に装着した状態で各子機吸込部34が折り畳まれることで、端子181，181が下方へと露出し、各本体端子182に電気的に接続されることにより、上記第１の実施の形態と同様の作用効果を奏することができる。

【0127】

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また、電気掃除機２を装置本体３から取り外した状態で各子機吸込部34が復帰変形して左右に開くように回動すると、端子181，181が設けられた各子機吸込部34の端部が互いに対向することで端子181，181が外方に露出しないので、これら端子181，181に塵埃などが付着しにくくなる。

【0128】

しかも、電気掃除機２を装置本体３から取り外す動作と連動して端子181，181が外方に露出しなくなるから、端子181，181を別体の端子カバーなどで覆う場合などと比較して、このような端子カバーなどが必要なく、かつ、端子181，181を覆う動作なども必要なく、作業性が向上する。

【0129】

なお、上記各実施の形態において、装置本体３に内蔵した充電器70に代えて、電気掃除装置１を取り付けて充電する別体の充電器を用いることも可能である。この場合には、装置本体３に電源コードなどが必要なく、充電器に接続する充電用端子のみを装置本体３に設ければよいから、装置本体３を、より小型化することが可能になる。

【0130】

また、各端子および各本体端子の位置は、電気掃除機２を装置本体３に着脱することで電気的に着脱できるものであれば、その設ける位置および形状などは、上記各構成に限定されない。

【0131】

さらに、吸引構造96としては、連通開口17を介して子機集塵室11と集塵ユニット59とを連通させるものであれば、上記構成に限定されない。

【0132】

そして、蓋体18の開閉構造は、例えばスライドにより開閉するものなどでもよく、上記構成に限定されない。

【0133】

また、親機二次電池57の定格電圧を子機二次電池21の定格電圧よりも低く設定している場合などには、子機二次電池21の充電の際に親機二次電池57の電圧を子機二次電池21の定格電圧よりも高い電圧に昇圧する昇圧手段を設けて親機二次電池57により子機二次電池21の充電を可能とする。

【0134】

また、電気掃除機２の装置本体３への接続構造など、装置本体３、あるいは電気掃除機２の細部などは、上記構成に限定されるものではない。

【図面の簡単な説明】

【0135】

【図1】本発明の第１の実施の形態の電気掃除装置を示す斜視図である。

【図2】同上電気掃除装置の要部を親機本体ケースを省略して示す斜視図である。

【図3】同上電気掃除装置の要部を親機本体ケースを省略して後部から示す斜視図である。

【図4】同上電気掃除装置の電気掃除機を示す斜視図である。

【図5】同上電気掃除機の一部を示す斜視図である。

【図6】同上電気掃除装置の親機集塵室を示す斜視図である。

【図7】同上親機集塵室の一部を示す斜視図である。

【図8】同上電気掃除装置の親機本体ケースの一部を示す斜視図である。

【図9】同上電気掃除装置の装置本体の要部を後部から示す斜視図である。

【図10】同上装置本体を示す中央断面図である。

【図11】(a)は同上電気掃除装置の使用状態の要部を示す説明図、(b)は同上電気掃除装置の電気掃除機の子機集塵室の塵埃を親機集塵室へと吸い込む状態の要部を示す説明図である。

【図12】同上電気掃除装置を示す後面図である。

【図13】本発明の第２の実施の形態の電気掃除装置の装置本体の要部を後部から示す斜視

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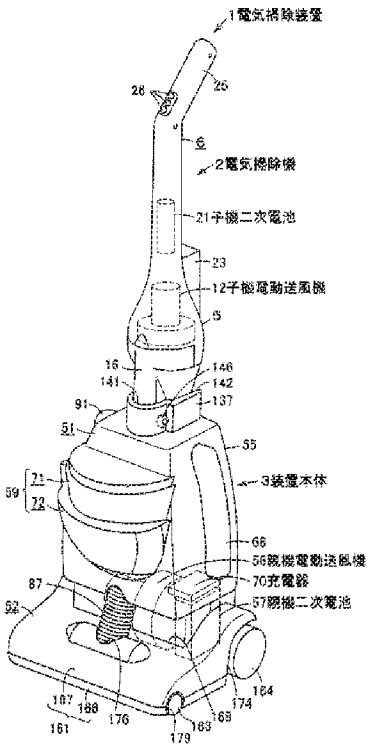
図である。

【符号の説明】

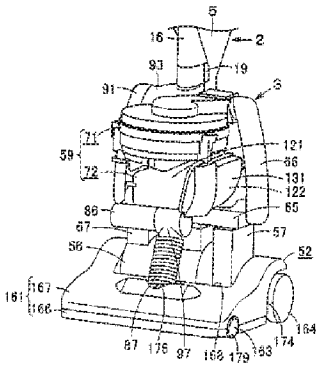
【0136】

1　電気掃除装置
2　電気掃除機
3　装置本体
12　子機電動送風機
21　子機二次電池
56　親機電動送風機
57　親機二次電池
70　充電器

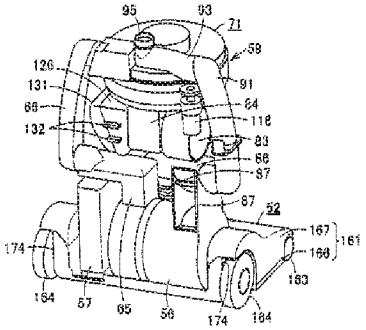
【図1】



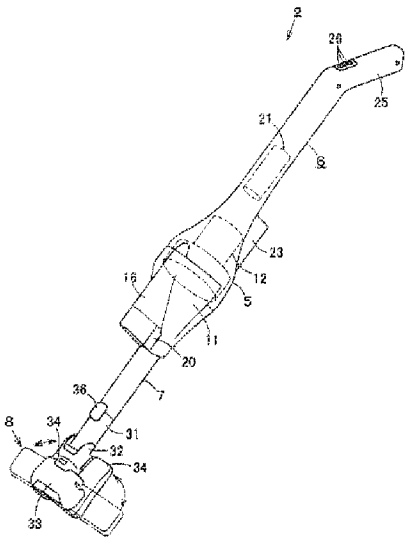
【図2】



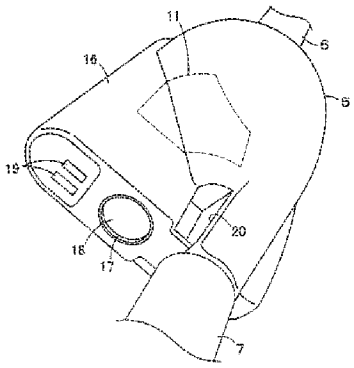
【図3】



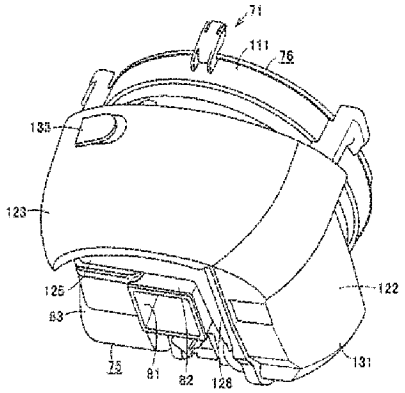
【図4】



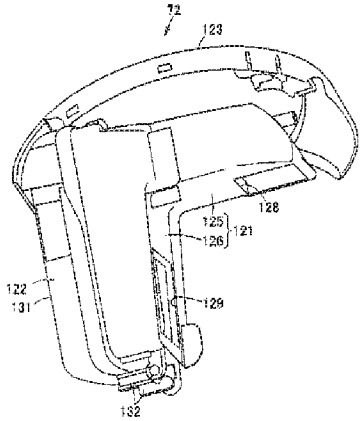
【図5】



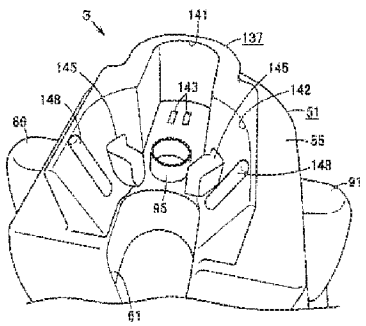
【図6】



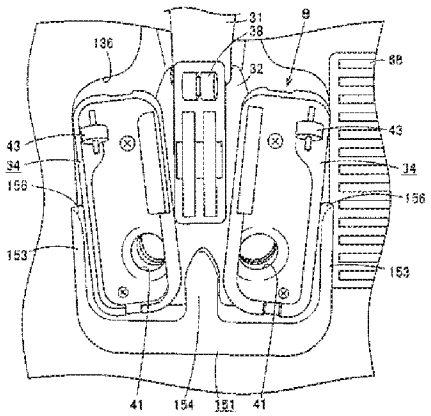
【図7】



【図8】

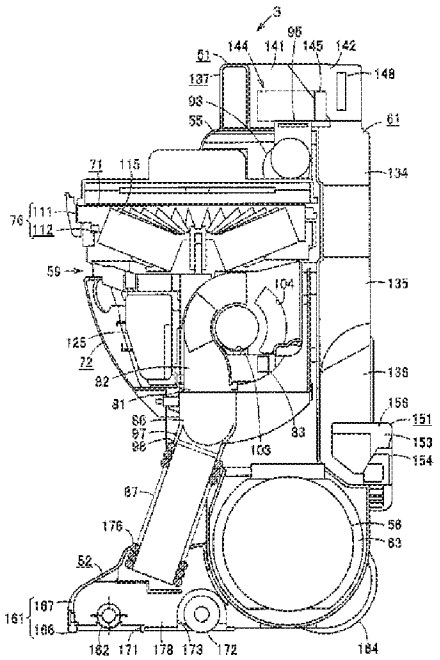


【図9】

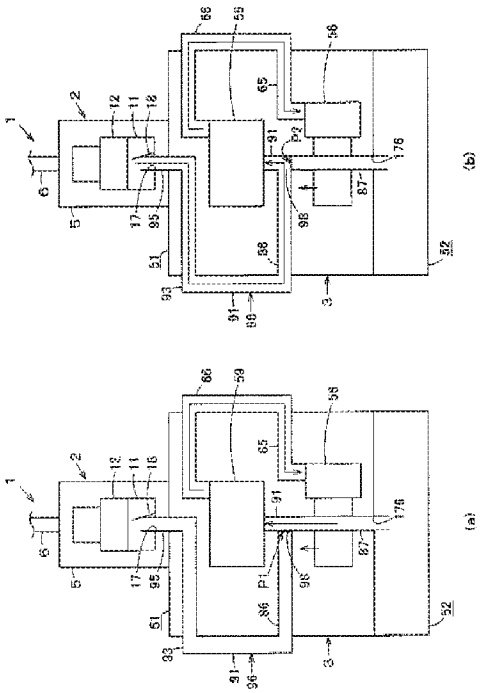


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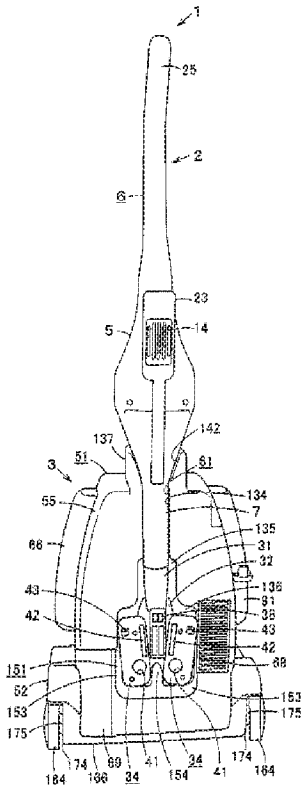
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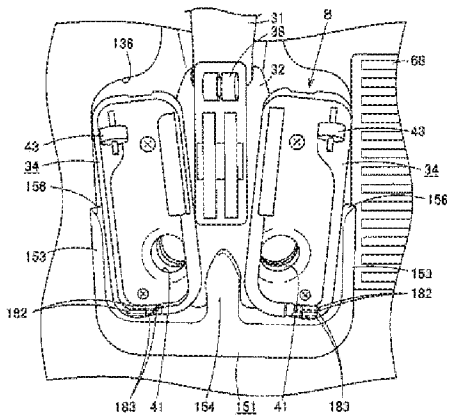
【図11】



【図12】



【図13】



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Claims
Mosaics
Original document
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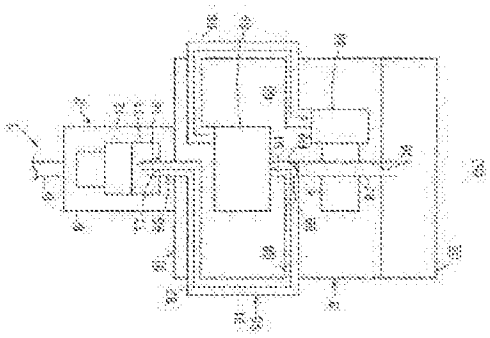
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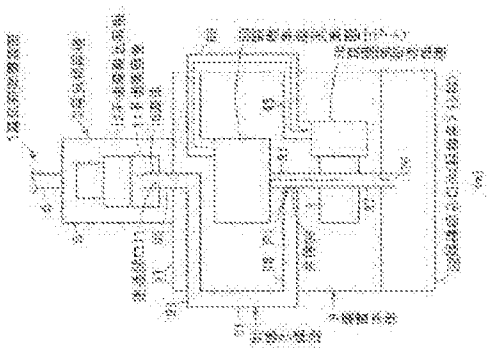
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Priority number(s):	JP20060255757 20060921

Abstract of JP2008073221 (A)

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PROBLEM TO BE SOLVED: To provide a vacuum cleaner apparatus having a vacuum cleaner reduced in size and weight and improved in usability. ;SOLUTION: When the vacuum cleaner 2 is mounted to the mainframe 3, a subsidiary dust-collecting chamber 11 and a dust collecting unit 59 communicate with each other through a communication opening 17. Dust collected in the subsidiary dust-collecting chamber 11 is moved to the dust collecting unit 59 having a capacity larger than the subsidiary dust-collecting chamber 11 by driving a master electric blower 56, so that a subsidiary dust-collecting chamber 11 having a size larger than necessary or a larger filter is eliminated, and the vacuum cleaner 2 is reduced in size and weight to be improved in usability. ;COPYRIGHT: (C)2008,JPO&INPIT





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DESCRIPTION JP2008073221

The present invention relates to a vacuum cleaner to provide an electric vacuum device with improved usability and reduced in size and weight. A When mounting the vacuum cleaner 2 in the apparatus main body 3, and a cordless handset dust collecting chamber 11 and the dust collection unit 59 to communicate with each other through the communication opening 17. To the slave unit dust collecting chamber of larger capacity than the slave unit dust collecting chamber 11 the dust trapped on the 11 dust collecting unit 59, since it is possible to move by driving the master unit electric blower 56, the slave unit Collection because it requires or to have a size of more than necessary to dust chamber 11, without mounting or a large-scale filter, a vacuum cleaner 2 smaller and lighter, thereby enhancing usability. .FIELD 1

Electric vacuum device

[0001]

The present invention relates to an electric vacuum apparatus having a removable apparatus main vacuum cleaner.

[0002]

Conventionally, as this type of electric vacuum device, the slave unit electric vacuum cleaner provided with a slave unit dust collecting chamber which communicates with the electric blower to the suction side of the electric blower, it is intended to be detachably mountable to the apparatus main body Are known. This electric vacuum apparatus, for example, when a powerful dust collection performance such as cleaning of the floor surface is desired, used by mounting the child device the electric vacuum cleaner in the apparatus main body, for example, such as filters for cleaning the air conditioner If you need ease of handling, use and remove the child device vacuum cleaner from the apparatus body (for example, see Patent Document 1). JP-A-10-127541 Patent Publication No. (2-4 pages, Figure 6-7)

[0003]

However, in the above electric vacuum devices, regardless of whether the use by mounting the child device the electric vacuum cleaner in the apparatus main body, the dust sucked by driving the electric blower from collecting in the All Child machine dust collecting chamber in this slave unit dust collecting chamber, include necessary to attach a relatively large filter having sufficient collection performance, there is a problem that increasing the size and weight of the child device electric vacuum cleaner.

[0004]

The present invention has been made in view of the above problems, and an object thereof is to provide an electric vacuum device the electric vacuum cleaner with improved usability and reduced in size and weight.

[0005]

The present invention is child device electric blower, and a vacuum cleaner having a subsidiary unit dust collecting chamber for accommodating the dust sucked by the sub-terminal electric blower, is detachably mountable to the vacuum cleaner, the base-electric blower, and, in larger capacity than the slave unit dust collecting chamber, and includes a device body with a master unit dust collecting chamber for accommodating the dust sucked by the master unit electric blower, the slave unit dust collecting chamber, while wearing the vacuum cleaner in the apparatus main body, in which has a master unit dust collecting chamber and capable of communicating communication opening.

[0006]

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According to the present invention, when attaching the vacuum cleaner in the apparatus main body, communicates and a slave unit dust collecting chamber and the master unit dust collecting chamber through the communication opening, the child dust trapped in the slave unit dust collecting chamber since than aircraft dust collecting chamber becomes possible to move to the main unit dust collecting chamber of large capacity by driving the master unit electric blower, it can avoid to have a more dimensions required for the slave unit dust collecting chamber, the electric vacuum cleaner with compact and lightweight, can improve the usability.

[0007]

Hereinafter, the configuration of the electric vacuum device according to an embodiment of the present invention with reference to FIGS. 1 to 12.

[0008]

11 and 12, 1 denotes a vacuum cleaner apparatus as the master unit, the electric vacuum apparatus 1, a small vacuum cleaner 2 is a child device, by detaching a relatively large apparatus main body 3, and the vacuum cleaner 2 alone, and is capable of cleaning respectively in the overall electric vacuum device 1.

[0009]

Vacuum cleaner 2, 4, 11 and 12, comprises a cleaner body 5 having a substantially cylindrical shape, and the cleaner main body 5, the handle 6 is extended on one end side in the axial direction Rutotomoni, extends in the axial direction of the other end side, that is the handle 6 and the opposite side extension pipe portion 7 is elongated tubular been reduced in diameter, the tip of the extension pipe unit 7, as a slave unit suction port body the handset floor brush 8 is provided.

[0010]

Also, the cleaner main body 5, together with the slave unit dust collecting chamber 11 communicating with the extension pipe unit 7 is partitioned, the child device the electric blower 12 on the handle 6 end of the slave unit dust collecting chamber 11 and,, slave unit control means (not shown) for controlling the drive of the slave unit electric blower 12 is accommodated, we communicate with the slave unit dust collecting chamber 11 via a filter suction side of the child device the electric blower 12 is not illustrated, the sub unit exhaust side of the electric blower 12, communicates with the slave unit exhaust hole 14 formed in the rear portion of the cleaner body 5.

[0011]

Here, the slave unit dust collecting chamber 11 is a hollow space portion that is defined on the front side of the cleaner body 5, comprises a substantially cylindrical main body connecting part 16 that extends on the front side of the extension pipe unit 7 there. The main body connecting part 16 is intended to be fitted to the apparatus main body 3 side vacuum cleaner 2 in a state of being mounted on the apparatus main body 3 side, in its distal end, as shown in FIG. 5, the slave unit round hole-shaped communication opening 17 communicating with the dust collecting chamber 11 is formed open in the communication opening 17, openable lid 18 is provided with the communication opening 17. Further, the distal end portion of the main body connecting portion 16, in the vicinity of the communicating opening 17, the electric vacuum cleaner 2 a device device in a state of being attached to the main body 3 the main body 3 side and the terminals 19 and 19 are electrically connected is provided ing. Further, the both side portions of the main body connecting portion 16, the engagement recess 20 which is engaged to the apparatus main body 3 side vacuum cleaner 2 in a state of being mounted on the apparatus main body 3 (only one is shown) are formed.

[0012]

Lid 18 is outwardly i.e. biased valve body to the lower direction of the communication opening 17 by a biasing means (not shown), while wearing the vacuum cleaner 2 in the apparatus main body 3, the apparatus main body 3 side is opened against the biasing force of the biasing means, along with is opened the communication opening 17, in a state of removing the vacuum cleaner 2 from the apparatus main body 3, and returns to the original state by the biasing force of the biasing means it is to close the communication opening 17.

[0013]

4, back to FIG. 11 and FIG. 12, the slave unit electric blower 12 is relatively has a small output, the child is a child unit cell as a slave unit power supply portion disposed in the handle 6 operation is controlled by controlled by the child machine control means the power supply from the machine secondary battery 21.

[0014]

Slave unit exhaust hole 14 is a plurality formed in a slit shape in the cleaner protruding portion 23 extending across from the rear to the proximal end of the handle 6 of the body 5.

[0015]

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Further, the distal end portion of the handle 6, the gripping portion 25 the operator grips is the bent rearward, a plurality of such the the gripping portion 25, a respective drive of the electric vacuum cleaner 2 and an electric vacuum apparatus 1 the switch 26 is disposed.

[0016]

Moreover, the extension pipe unit 7 rear namely fitted to the back of the apparatus main body 3 while wearing the vacuum cleaner 2 into the apparatus main body 3.

[0017]

Then, the slave unit floor brush 8 has a communicating pipe 31 that communicates with the extension pipe portion 7, the distal end side of the communicating pipe section 31 is connected pivotally to the pivot holder 32, the rotation holding portion 32 on the distal end side, the child device body portion 33 of the slave unit case body is formed integrally with, on both sides of the child device main unit 33, the slave unit suction unit 34, 34 is rotatably provided .

[0018]

Communication pipe portion 31 is formed in a cylindrical shape, for extension pipe portion 7, and is detachable through the clamping portion 36.

[0019]

Rotation holding portion 32 is rotatably holds the communication pipe portion 31 in the vertical direction and the circumferential direction. Further, the floor surface side of the lower i.e. the cleaning surface of the rotation holding portion 32, the first driven wheel 38 the slave unit is rotatably provided.

[0020]

Child device body portion 33 is in communication with the distal end side of the communicating pipe section 31 which is held in the rotation holding portion 32.

[0021]

Each child device the suction unit 34, the bottom facing the floor surface, the round hole-like handset unit suction port 41 which is pivotally connected to a common, both sides of the child device body portion 33 via the communicating pipe (not shown) together are formed open, the brush bristles 42 for cleaning the floor surface is flocked and subsidiary unit second driven wheel 43 is rotatably provided.

[0022]

Then, each child device the suction unit 34, in the circumferential direction, that is the circumferential direction of the slave unit suction port 41 of the communicating conduit is biased via a slave unit suction unit biasing means (not shown), device vacuum cleaner 2 in a state of being attached to the main body 3, both sides of each child device the suction unit 34 is rotated to the extension pipe unit 7 side against this biasing force, as shown in solid line in FIG. 4, each child device suction unit it becomes 34 child machine position to the folded state on both sides of the main body 33 and the rotation holding portion 32, in a state of removing the vacuum cleaner 2 from the apparatus main body 3, the biasing force of the slave unit suction unit biasing means returns to its original state, as shown in the imaginary line in FIG. 4, is configured such that extend out in the folded state is released into both sides of the child device body portion 33 by.

[0023]

Each brush bristle portion 42 may be formed by a synthetic resin having elasticity, on the rear side of each child device the suction unit 34, across from each child device the suction port 41 near both sides of each child device the suction unit 34 wall it is disposed Je, and projects downward from the lower surface of each child device the suction unit 34.

[0024]

Each child device the second driven wheel 43 is disposed in front of the vicinity of both sides each child device the suction unit 34.

[0025]

On the other hand, the apparatus body 3, FIGS. 1 to 3, and, as shown in FIGS. 10 to 12, a parent device body portion 51 which the vacuum cleaner 2 is detached, relative to this parent device body portion 51 manner and a master unit floor brush 52 as a base is a suction port member provided rotatably.

[0026]

Parent device body portion 51, the interior of the parent device main body case 55 as a shell, the base-electric blower 56, the base-secondary serving as a main unit batteries as parent device power supply

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unit capable of supplying power to the master unit electric blower 56 battery 57, and houses a master unit control section (not shown) for controlling the drive of the master unit the electric blower 56, and the front, the dust collecting unit 59 is a dust collecting unit of a parent machine dust collecting chamber detachably it has become.

[0027]

The parent device body case 55, the lower end portion is formed in a substantially circular arc shape as viewed from the side and downward, the lower end portion is rotatably supported to a relatively front-rear direction with respect to the base unit floor brush 52 there. Further, the rear portion of the parent device main body case 55, detachable recess 61 for attaching and detaching the vacuum cleaner 2 is formed.

[0028]

Master unit electric blower 56, one having a greater output than the slave unit electric blower 12 (FIG. 4), disposed along the lateral direction at the lower end portion of the master unit body portion 51, motor as surrounding holding member It has been held by the cushion 63. Further, on the suction side of the master unit electric blower 56, the base-communication air passage 65 cylindrical is communicatively connected to the airtight, the tip of the master unit communication air passage 65 includes a first tubular of a suction pipe 1 through the sides communication air passage 66 is communicatively connected to the gas-tight on the downstream side of the dust collecting unit 59. The exhaust side of the master unit electric blower 56 via the exhaust air path 67, is communicatively connected in an airtight manner from the main unit exhaust hole 68 formed on the side of the rear at detachment recesses 61 in the base unit main body case 55 ing.

[0029]

Master unit communication air passage 65 is extended from the upper portion of the suction side is one side of the master unit the electric blower 56 upwardly, and the master unit two so as not to tip interferes with the master unit secondary battery 57 are bent at the upper of the next cell 57 and to the side of the apparatus main body 3 is substantially L-shaped tube

[0030]

First side communication air passage 66 is extended upward from the tip of the main terminal communication air passage 65, the parent exposed from one side of the main unit body casing 55 to the outside of the parent device main body case 55 together are disposed along one side of the machine main body case 55, the tip is bent into a parent device body casing 55 in which is connected to the upper portion of the dust collecting unit 59.

[0031]

In addition, exhaust air passage 67, has been extended to the rear to the widening shape from the top of the other side is an exhaust side of the base unit electric blower 56.

[0032]

Furthermore, the base-exhaust hole 68 is formed long slit shape in the lateral direction.

[0033]

Further, the base-secondary battery 57 is a battery pack positioned on one side of the main terminal electric blower 56 has a greater rated capacity than the slave unit secondary battery 21 (FIG. 4), vacuum cleaner 2 It has become possible supply power to the slave unit secondary battery 21 while wearing the to the apparatus main body 3. Furthermore, the master unit secondary battery 57, by opening the master unit lid portion 69 provided on the rear portion of the body case 55 (FIG. 11) is removable with respect to the parent device main body case 55 . Then, the master unit secondary battery 57, the apparatus charger 70 provided on the main body 3 (FIG. 12), has a rechargeable.

[0034]

Charger 70, such as by a power supply cord (not shown) is an external commercial AC power source electrically connected to the apparatus main body 3, the master unit secondary battery 57 and converts AC power from the commercial AC power source to a DC power source it is intended to charge.

[0035]

Master unit control means, by controlling the discharge of the master unit the secondary battery 57, and controls the operation of the master unit the electric blower 56, while wearing the vacuum cleaner 2 in the apparatus main body 3, the base-secondary It controls the charging of the sub-terminal battery 21 by controlling the power supply to the battery 57 slave unit secondary battery 21 has a function of charging control means.

[0036]

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Dust collecting unit 59 includes a dust separating unit 71 as a dust separating main body part, and a dust collecting section unit 72 as a dust collecting body portion.

[0037]

Dust separating unit 71, as shown in FIG. 6, a dust separator 75, and a filter portion 76 provided integrally on an upper portion of the dust separator 75.

[0038]

Dust separator 75 has a square cylindrical guiding air duct 82 having a dust suction port 81 at the distal end, on the downstream side of the guiding air duct 82, separating chamber section 83 centrifuging the dust sucked is provided to communicate the downstream side of the separating chamber section 83, the suction air passage portion 84 (FIG. 3) is provided in communication with carrying the separated dust to the filter unit 76.

[0039]

Guiding air duct 82 is, while wearing the dust separating unit 71 from the main unit body casing 55 (FIGS. 10 to 12), the dust suction port 81 is a cylindrical communication air passage 86 shown in FIGS. 1 to 3 and a tubular connected to the hermetically dust suction side of the main terminal floor brush 52 via the connection air passage portion 87 can be sucked together with air.

[0040]

Here, communication air passage 86, at the lower end of the dust separator 75 (FIG. 6), extends substantially horizontally towards the other side of the main unit body casing 55 (FIGS. 10 to 12), the distal end There are communicatively connected to a tubular second side communication air passage 91 as a connecting tube.

[0041]

The second side communication air passage 91 is extended from the distal end of the communication air passage portion 86 upward, similarly to the first side communication air passage 66, the other side of the main unit body casing 55 exposed to the outside of the main terminal body case 55 together is disposed along one side portion of the parent device body casing 55, the tip is bent into a parent device main body case 55 in an upper connection air trunk 93 it is connected to the air-tight to. Thus, the second speed portion communication air passage 91 is formed substantially symmetrically with the first side communication air passage 66 and the front view.

[0042]

The upper connection air passage 93 is substantially horizontally extended to the center side in the width direction of the main unit body casing 55, the distal end, a vacuum cleaner bent connecting portion 95 serving as a communicating portion is bent upward .

[0043]

The bent connecting portion 95, while wearing the vacuum cleaner 2 into the apparatus main body 3 is inserted into the communication opening 17 of the vacuum cleaner 2, by pushing the lid 18 provided to the communication opening 17 the slave unit dust collecting chamber 11 through the communication opening 17 is a portion to be connected airtightly to the upstream side of the dust separation unit 71. Therefore, these communication opening 17, the bent connecting portion 95, the upper connecting air passage 93, such as by the second side communication air passage 91 and the communication air passage 86, while wearing the vacuum cleaner 2 in the apparatus main body 3, parent machine electric blower 56 cordless handset dust collecting chamber suction structure 96 capable of sucking the dust of 11 to the dust collection unit 59 through the communicating opening 17 by the drive is configured. in addition, the bent connecting portion 95, although not shown, the connection state between the communication opening 17 of the vacuum cleaner 2, i.e. the mounting detection means such as a sensor for detecting the mounting state to the apparatus main body 3 of the vacuum cleaner 2 It is provided.

[0044]

Further, the connection air passage portion 87, for example, a flexible and formed in a bellows shape by a synthetic resin having an upper end from the proximal end of the communication air passage portion 86 and the extending connection pipe 97 to the front lower side There is airtightly connected to the lower end is connected airtightly to the master unit floor brush portion 52.

[0045]

Here, in the connecting pipe 97, the valve element 98 is provided at a position proximal communicating with the communication air passage 86. The valve element 98 by operating a predetermined switch 26 of the electric vacuum cleaner 2 in a state of being mounted on the apparatus main body 3, the position P1 for closing the communication air passage portion 86 side, and the communication air passage portion 86 connected wind the respective positions of the position P2 for closing the connection air

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passage portion 87 side in the lower communication part of the road section 87, is switching control by the master unit control means.

[0046]

Separating chamber section 83, together with the circular opening 103 shown in FIG. 10 is bored in the central portion, the periphery of the circular opening 103, fan-shaped openings 104 are provided. Further, the peripheral wall of the separating chamber section 83, introduction hole (not shown) communicates with the upstream side of the dust collecting section unit 72 is bored. Further, the separating chamber section 83 can be opened and closed by opening and closing a lid (not shown).

[0047]

Circular opening 103 communicates with the upstream side of the suction air passage portion 84, the dust separating unit is mounted. The dust separation means includes a plurality of communicating apertures are formed in are bored lattice shape on the outer peripheral surface, net filter, not shown in these communication opening is attached.

[0048]

Opening 104 communicates with the upstream side of the suction air passage portion 84, a net filter is installed, not shown.

[0049]

Suction air passage portion 84 via the upstream together with and communicates with the side, not shown, formed in the opposite side of the separating chamber section 83 dust collecting part connecting opening of the filter portion 76 via the connecting opening (not shown) condensing and it communicates with the downstream side of the dust section unit 72.

[0050]

The filter unit 76 includes a housing case 111 is a generally cylindrical filter body which communicates with the suction air passage portion 84 via the connecting opening, as a filter (not shown) rotatably mounted within the housing case 111 the pleated filter body 112, and a sweeping member (not shown) is a rotary member which rotates integrally with the pleated filter body 112.

[0051]

Storage case 111 is formed integrally with the rear portion of the dust separator 75. In addition, the accommodating case 111, the discharge opening of the first discharge opening (not shown) are bored. Further, inside of the housing case 111, dust means (not shown) as a dust removing mechanism is protruded, the front end portion of the dust means is enabled in contact with the pleated filter body 112.

[0052]

Discharge opening is an opening to which the particles are collected is a fine dust which is dropped by the dust removing means from the pleated filter body 112 by the pleated filter body 112, i.e. fine dust is introduced, into the dust separating unit 75 and it is connected in an airtight manner.

[0053]

Further, the pleated filter body 112 has a pleated filter 115 as a filter body that is attached to the radiation pleated substantially cylindrical frame body, not shown. Then, the pleated filter body 112, when the electric vacuum apparatus 1 on-time and off, is arranged to rotate a predetermined time period by the motor 116 as a driving means provided at the rear (Fig. 3), the dust removal accordance with this rotation means that the play pleats pleated filter 115, the collected dust is configured to be removed.

[0054]

Furthermore, sweeping member is provided on the pleated filter body 112 and coaxially, by rotating integrally with the pleated filter body 112, the accumulated in the storage case 111 is removed through a dust removing means from the pleated filter body 112 the fine dust, is intended to discharge into the dust separator 75 through a discharge opening.

[0055]

On the other hand, the dust collecting section unit 72, as shown in FIGS. 6 and 7, the air passage 121 communicating with the downstream side of the dust separator 75, the master unit dust communicating with the downstream side of the air passage portion 121 the chamber portion 122, and a lid case 123 for covering the front side of the air passage portion 121.

[0056]

Air passage 121, a front air passage 125 is positioned on the front side of the dust separation portion

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75 of the dust separating unit 71 a dust collecting unit 59 in a state of being mounted on the parent device body casing 55, downstream of the front air passage 125 is formed in a substantially L-shaped having a side air duct 126 which is bent with respect to the front air passage 125 communicates with the side.

[0057]

The front air duct 125 has a square hole-shaped opening portion 128 which is hermetically connected to the downstream side of the dust separator 75.

[0058]

Side air passage 126 is located on the side of the dust separation portion 75, the opposite side is communicated with the master unit dust collecting chamber 122 and the dust separator 75. Moreover, this is the side air duct 126, square hole shape of the particulate collection portion connecting opening 129 which communicates with the upstream side of the filter section 76 via the dust collecting unit connection opening is formed. The dust collecting unit connecting opening 129, although not shown, a net filter is provided.

[0059]

Further, the base-dust collecting chamber portion 122 is a portion mainly accommodating a coarse dust are relatively large dust separated in the dust separating unit 71, has a greater capacity than the slave unit dust collecting chamber 11 cage, can be opened and closed by a dust collecting part lid 131. Therefore, the dust collection unit 59, the parent machine dust collecting chamber 122, various net filter, and, due to the pleated filter 115, has a larger capacity than the handset dust collecting chamber 11 as a whole, the handset dust collecting chamber 11 It has a lot of dust and can be collected than.

[0060]

Then, the dust collecting unit lid 131, lower end against the side air passage 126, and is rotatably supported by a hinge portion 132. Further, between the dust collecting unit cover 131 and the side air duct 126, a packing is provided, not shown as a sealing member. The dust collecting unit cover 131 is held against the side air passage 126 by a not-shown hook, that the locking hook is released by the operation of the release button (not shown) provided in the lid case 123, it is opened by pivoting by its own weight, and is configured to open the master unit dust collecting chamber 122.

[0061]

The cover case 123, detachable clamp 133 be removable is provided a dust collecting section unit 72 from the parent device body case 55.

[0062]

Detachable recess 61 has an upper recess 134 extending pipe portion 7 of the vacuum cleaner 2 is fitted is formed on the upper side, continuous to the lower end of the upper recess 134, communication of the slave unit floor brush 8 of the vacuum cleaner 2 intermediate recess 135 is formed in the tube portion 31 is fitted, in succession to the lower end of the intermediate recesses 135, rotation holding portion 32 of the slave unit floor brush 8 of the electric vacuum cleaner 2, the child device body portion 33, and each child lower depression 136 machine suction unit 34 is fitted is formed.

[0063]

The upper recess 134 is formed in a circular arc cross sectional shape which is recessed on the front side, the upper end portion is communicated with the receiving portion 137 of the fitting portion projecting from the top of the substantially parent device body casing 55.

[0064]

Receiving unit 137, as shown in FIGS. 8 and 10, the first fitting portion 141 that the main body connecting portion 16 of the vacuum cleaner 2 (FIG. 4) is fitted, the front of the cleaner body 5 (FIG. 4) partitioning the second fitting portion 142 is fitted, it is formed in a planar view substantially U-shaped.

[0065]

The first fitting portion 141 is formed in a longitudinal shape in the longitudinal direction, the bottom is a top of the main unit body casing 55, the bent connecting portion 95 protrudes to the outside of the parent device body casing 55. Further, in front of the bent connecting portions 95 of the first fitting portion 141, the base-body case 55 on the main body terminal 143 terminals 19 and 19 of the vacuum cleaner 2 (FIG. 4) is electrically connected, 143 is provided. Further, inside both sides of the receiving portion 137 partitioning the first fitting portion 141, the clamping portion 144 is provided for operating the electric vacuum cleaner 2 (FIG. 4) when removing the apparatus body 3 .

[0066]

Each clamp 144 includes a locking retention / releasable clamp body 145 relative to the vacuum

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cleaner 2 apparatus main body 3, the clamp button to operate the clamp body 146 by being pressed from the outside 146 (FIG. 12) It is equipped with a door.

[0067]

Clamp body 145 is formed in a claw shape to the front end portion to the rear sides at the second fitting portion 142 protrudes to the center side in the width direction of the bent connecting portion 95, the body connection of the electric vacuum cleaner 2 engaging recess 20 of the part 16 respectively engaged (FIG. 4) is a part that holds the vacuum cleaner 2, it has been urged by the clamp biasing means (not shown) to the projecting direction.

[0068]

Clamp button 146, 146 is, for example worker to push the operable by the sandwich the receiving unit 137 with one hand from the front side, projecting from the opposite sides of the receiving portion 137, by the pressing operation, with the clamp open the clamp body 145, 145 to both sides against the biasing force of the energizing means, the engaging recesses 20 of the main body connecting portion 16 of the vacuum cleaner 2 is configured so as to release the engagement of the (Fig. 4) there.

[0069]

The second fitting portion 142 is expanded from the side and in the width direction to the rear after the first fitting portion 141, and, along an outer shape of the cleaner body 5 from the lower side to the upper spreader It is formed so as to be. Furthermore, this inner surface of the second fitting portion 142 at the rear of the clamp body 145, guide ribs 148,148 are provided as a guide portion along the vertical direction.

[0070]

These guide ribs 148,148, when attaching and detaching the vacuum cleaner 2 in the apparatus main body 3, is intended to guide the vacuum cleaner 2 in the detachment direction.

[0071]

intermediate recess 135 relative to the upper recess 134, which is wider in the lateral width direction.

[0072]

Further, the lower recess 136, so that the slave unit floor brush 8 in the folded state is be fitted, are wider in the lateral width direction with respect to the intermediate recess 135. Further, the lower portion of the lower depression 136, the support 151 of the child machine suction unit 34 as a deformable member for deforming the folded state with respect to the child device body portion 33 of the slave unit floor brush 8 is provided.

[0073]

The support 151 is one that is integrally attached to the rear surface of the main unit body casing 55, as shown in FIG. 9, the side holding portion 153 continuous across both side portions of the lower end of the lower depression 136 When, and a protruding deformed portion 154 that protrudes from the central portion in the width direction of the side supporting portion 153 upwardly, is formed in a substantially W-shape in front view.

[0074]

Side supporting portion 153, by instructing the child device suction portion 34, 34 of the slave unit floor brush 8 became folded state from both sides, a portion for holding a folded state of the slave unit floor brush 8. Also, inside both side portions of the upper end of the side supporting portion 153, upper inclined surface portion 156, 156 which is inclined to the upper side widening shape is formed.

[0075]

Protruding deformed portion 154, than the side supporting portion 153 is configured protrusion amount in the vertical direction is small, so that the distal end portion becomes narrow, both sides are formed in an inclined shape.

[0076]

Then, the base-floor brush 52, 2, 3, as shown in FIGS. 10 to 12, a hollow parent casing member 161, rotatably housed rotational cleaned this parent casing body 161 a rotary brush 162 as the body, the front driven wheel 163 rotatably provided on the lower portion of the main unit case body 161, a rear driven wheel 164, 164 rotatably provided on the rear sides of the main unit case body 161 the has.

[0077]

Master unit case body 161, the master unit lower case 166 that faces the floor surface, and a master unit upper case 167 covering the upper side of the master unit lower case 166, the center portion of the

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rear part of the width direction, the parent device body fitting recess 168 the lower end of the case 55 is fitted rotatably are formed.

[0078]

Master unit lower case 166, the position of the front near, oblong master unit suction port 171 opposite the floor surface are formed open. In addition, the master unit lower case 166, the rear of the main unit suction port 171, oblong driven wheel fitting recess 173 horizontally intermediate driven wheel 172 is fitted is divided into arc-shaped cross section, fit the driven wheel if the recess 173 is open the lower part to the floor. In addition, the rear both sides of the base unit lower case 166, is formed on the driven wheel fitting portion 174,174 the rear driven wheels 164, 164 recess and the width direction is fitted, these driven wheel fitting portion 174,174 the substantially cylindrical support shaft portion 175, 175 for supporting a rear driven wheel 164, 164 are projected.

[0079]

Master unit upper case 167, the upper connecting opening 176 lower end of the connection air passage portion 87 is hermetically connected to is opened. Then, this is the lower end portion of the connection air passage portion 87 to the upper connecting opening 176 is hermetically connected to a suction space 178 that is defined in the parent casing body 161, via the connection air passage portion 87 converging and it is configured to communicate with the suction side of the dust unit 59.

[0080]

Rotary brush 162 is rotatably mounted to the master unit suction port 171.

[0081]

Then, the front driven wheel 163 are located on both sides of the rotary brush 162 is fitted into the recess 179 that is cut-out formed on both sides of the main unit case body 161.

[0082]

Next, the operation of the above embodiment.

[0083]

First of all, such as the floor of the room, when cleaning a relatively wide range, using an electric cleaning device 1. That is, use while wearing the vacuum cleaner 2 in the apparatus main body 3.

[0084]

At this time, a vacuum cleaner 2 side terminals 19 and 19, and the main body terminal 143 of the apparatus main body 3 side that are electrically connected, the switch 26 and the master unit control means is electrically connected , part of the electric power in the base unit rechargeable battery 57, while being controlled by the master unit control section is supplied to the slave unit the secondary battery 21, the slave unit secondary battery 21 is charged.

[0085]

When the operator operates a predetermined switch 26, together with the power supplied from the main unit secondary battery 57 to the main unit electric blower 56 is controlled, the master unit electric blower 56 is driven by the master unit control means, the valve body 98 and the state is switched to the position P1 (Figure 1 (a)).

[0086]

Then, the operator, the electric vacuum apparatus 1 by holding the holding portion 25 be to run back and forth on the floor surface, scraped dust of the floor surface rotary brush 162 is rotated, from the main unit suction port 171, sucking the dust together with air by the negative pressure generated by driving the master unit electric blower 56.

[0087]

This sucked the air becomes the intake air, along with the dust, from the suction space portion 178 of the base unit floor brush unit 52, via the upper connecting opening 176, the connection air passage portion 87 and the connecting pipe 97 of the communication air passage portion 86, collecting it is sucked into the dust unit 59.

[0088]

In dust collecting unit 59, the intake air and dust, through the guiding air duct 82 from the dust suction port 81 is sucked into the separating chamber section 83, the periphery of the dust separating means along the inner wall of the separating chamber section 83 by turning the, relatively large dust centrifugation, with flows into the front air passage in the 125 from the introduction holes through the opening 128, small dust, of net filter or dust separation means of opening 104 it is collected by the net

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filter.

[0089]

The dust that has flowed into the front air passage 125 is housed and to the parent machine dust collecting chamber portion 122, the parent machine dust collecting chamber when the further the air passes through the dust collecting part connecting opening 129 of the side air passage 126 it is compressed in part within 122.

[0090]

The intake air that has passed through the dust separation section, the intake air which has passed through the opening 104, and, together with the intake air which has passed through the dust collecting unit connecting opening 129, and flows into the filter portion 76 through a circular opening 103, pleats when passing through the pleated filter 115 of the filter body 112, finer micro dust is collected.

[0091]

Intake air that has passed through the pleated filter 115 via the first side communication air passage 66 and the master unit communication air passage 65 is sucked into the master unit electric blower 56, passes through the master unit electric blower 56 becomes exhaust air, via the exhaust air path 67, and is exhausted from the main unit the exhaust hole 68 to the outside of the main unit body casing 55.

[0092]

Further, when stopping the master unit electric blower 56 by operating a predetermined switch 26, by the master unit control section drives the motor 116 to rotate the pleated filter body 112 is predetermined in the circumferential direction time, dust means pleats by playing the filter 115, the fine dust trapped in the pleated filter 115 is dropped into the storage case 111, this dropped fine dust is transported to the discharge opening by the sweeping body, again dust separation it is returned to the section 75.

[0093]

On the other hand, a relatively narrow location cleaning, an easy cleaning of a short period of time, or, at the time, such as cleaning of the filter of the air conditioning system, to clean with a vacuum cleaner 2 alone. In other words, to use to remove the vacuum cleaner 2 from the main body 3.

[0094]

In this case, during the use time of the electric vacuum apparatus 1, the slave unit secondary battery 21 is in the substantially fully charged state by the master unit secondary battery 57.

[0095]

The operator presses the each clamp button 146 from the left and right, by the operation of each clamp portion 144, open each clamp body 145 to the left and right, the engagement recess 20 of the body connecting portion 16 of these clamp portion 144 and the vacuum cleaner 2 engagement is disengaged with the vacuum cleaner 2 is detachable from the apparatus main body 3.

[0096]

In addition, if the vacuum cleaner 2 completely detached from the main body 3, along with the electrical connection between the terminal 19 and 19 and the main body terminal 143, 143 is released, by the urging force of the child device suction unit biasing means each child to rotate to open in the left-right direction with respect to the machine suction unit 34 child machine main body portion 33.

[0097]

In this state, when the operator grips the grip portion 25 to operate the switch 26, the child device control means the power supply to the slave unit secondary battery 21 to the child machine electric blower 12 that is controlled, the child device electric blower 12 is driven.

[0098]

Then, the operator, the slave unit floor brush 8 by sliding against the surface being cleaned, together with the bristles 42 is wipe off the dust from a cleaning surface, air is sucked together with dust from each child device the suction port 41 .

[0099]

The sucked air becomes an intake air is sucked into the sub unit dust collecting chamber 11 through the communicating pipe and the extension pipe unit 7, when passing through the filter, dust contained are removed, the child device electric blower 12 it sucked in to the suction side.

[0100]

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Thereafter, the intake air which has passed through the slave unit electric blower 12 includes an exhaust air, and is exhausted from the child device exhaust port 14 to the outside of the cleaner body 5.

[0101]

Moreover, the vacuum cleaning 2 finishes, the operator, the slave unit electric blower 12 is stopped by the operation of a predetermined switch 26, while fitting the slave unit floor brush 8 in the detachable recess 61 vacuum cleaner 2 the mounting to the device body 3.

[0102]

At this time, the slave unit floor brush 8, each child device the lower end of the suction unit 34, device that comes into contact with the respective upper inclined surface portion 156 of the support 151 of the main body 3 side, both sides slave unit of each child device the suction unit 34 pivots upward around the suction port 41 is housed in a lower depression 136 of the detachable recess 61 becomes folded state.

[0103]

At the same time, the slave unit to the communication pipe portion 31 of the floor brush 8 intermediate recesses 135, together with the extension pipe unit 7 are sequentially accommodated in the upper recess 134, the second cleaner body 5 receives portion 137 along the guide ribs 148,148 by fitting the fitting portion 142, while the body connecting portion 16 push the clamp body 145 to the left and right, the bent connecting portion 95 is inserted into the communicating opening 17, the slave unit dust collecting chamber 11, the communicating opening 17, bent connecting portion 95, the upper connecting air passage 93, the second side communication air passage 91 and the communication air passage portion 86 communicates with the suction side of the dust collecting unit 59, the engagement recess of the clamp body 145 is the main body connecting portion 16 20 to be engaged respectively, the vacuum cleaner 2 is fixed to the device body 3.

[0104]

Then, when the operator operates a predetermined switch 26, connection to the device body 3 of the vacuum cleaner 2 is detected by the connection detection means, based on this detection, the valve 98 is master unit control section to the position P2 switching (FIG. 1 (b)), and power from the base unit secondary battery 57 is transmitted to the parent device electric blower 56.

[0105]

This negative pressure generated by the drive of the base unit electric blower 56, communication air passage portion 86, the second side communication air passage 91, by sequentially acting to the upper connection air passage 93 and the bent connection section 95, the handset the dust contained in the dust collecting chamber 11, bent connection portion 95, the top connection air passage 93, is sucked into the dust collecting unit 59 through the second side communication air passage 91 and the communication air passage portion 86 catching It is collected.

[0106]

Dust trapped in the dust collecting unit 59, a dust collecting section unit 72 by operating the detachable clamp 133 removed from the parent device body casing 55, further, by operating on such trash the release button, the hinge dust collecting unit cover 131 is rotated through a unit 132, dust accumulated in the master unit dust collecting chamber 122 is discarded.

[0107]

In a state that does not use the electric vacuum apparatus 1, by connecting the power cord, such as to a commercial AC power source, the base-secondary battery 57 is charged appropriately by the charger 70.

[0108]

As described above, according to the embodiment described above, when attaching the vacuum cleaner 2 in the apparatus main body 3, since where the child device dust collecting chamber 11 and the dust collecting unit 59 communicates through the communication opening 17, the child the dust trapped in the aircraft dust collecting chamber 11 to the dust collecting unit 59 of larger capacity than the slave unit dust collecting chamber 11, since it is possible to move by driving the master unit electric blower 56, the slave unit collection dust chamber 11 is sufficient if you can temporarily accommodate the dust, or to have a magnitude of more than necessary in this child machine dust collecting chamber 11, because it is not necessary to let or mounting a large-scale filter, vacuum cleaner 2 the possible size and weight.

[0109]

As a result, it is possible to or to clean a small amount of dust by detaching from the apparatus main body 3, a vacuum cleaner 2 or to clean the high position lightweight ones compact, easily use the

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vacuum cleaner 2 can, ease of use and maneuverability is improved.

[0110]

Further, the communication opening 17 of the sub-terminal dust collecting chamber 11, to open the communication opening 17 communicates with the slave unit dust collecting chamber 11 and the dust collecting unit 59 when equipped with a vacuum cleaner 2 in the apparatus main body 3, by providing the lid member 18 for closing the communicating opening 17 in a state of removing the vacuum cleaner 2 from the apparatus main body 3, while cleaning with vacuum cleaner 2 alone, dust spilling from the slave unit dust collecting chamber 11 or, it can be prevented or dust spilling upon or detaching the vacuum cleaner 2 to the apparatus main body 3.

[0111]

in addition, simply by attaching and detaching the vacuum cleaner 2 with respect to the apparatus body 3, or to communicate with the child machine dust collecting chamber 11 to the dust collection unit 59, or disconnect the child machine dust collecting chamber 11 and the dust collection unit 59 since it becomes possible, behavior and to detachable from the vacuum cleaner 2 a device main body 3, as compared with the case of separately and communication operations of the slave unit dust collecting chamber 11 and the dust collecting unit 59, the operation sex is good

[0112]

Further, the bent connecting portion 95, the upper connecting air passage 93, the second side communication air passage 91 and the communication air passage 86, while wearing the vacuum cleaner 2 in the apparatus main body 3, the driving of the main terminal electric blower 56 by by forming the suction structure 96 capable of sucking the dust of the handset dust collecting chamber 11 to the dust collection unit 59 through the communicating opening 17, the dust of the handset dust collecting chamber 11, and to the dust collection unit 59 it can be sucked efficiently.

[0113]

And is provided with a valve body 98 to the connecting pipe 97 of the communication air passage portion 86, when inhale the dust of the handset dust collecting chamber 11 to the dust collection unit 59, the dust collecting unit 59 to switch the valve body 98 to a position P2 and the base unit floor brush portion 52 that closes the air passage communicating with, when inhale the dust of this child machine dust collecting chamber 11 to the dust collection unit 59, prevent inhaling the dust from the parent device floor brush portion 52 side and the dust of the slave unit dust collecting chamber 11, into the dust collecting unit 59 can be sucked efficiently.

[0114]

The device body 3, the weight of such master unit electric blower 56 and the master unit secondary battery 57, by accommodating the lower portion of the main terminal body case 55, as compared with a case that accommodates these heavy upward on the operation of the electric vacuum apparatus 1 is improved.

[0115]

Further, the slave unit floor brush 8, the child machine suction portion 34 and foldable with respect to the child device body portion 33, when the electric vacuum cleaner 2 mounted on the apparatus main body 3, the child machine suction portion 34 folded state by such a, while improving the suction performance of the vacuum cleaner 2 can relatively increase the size of the child device floor brush 8, when the electric vacuum cleaner 2 mounted on the apparatus main body 3 to take the space Absent.

[0116]

Then, the removable recess 61, by providing the support 151 to be deformed into a folded state each child machine suction unit 34, when mounting the electric vacuum cleaner 2 in the apparatus main body 3, folded each child device the suction unit 34 at the same time since the mounting work on the apparatus main body 3 of the vacuum cleaner 2 is facilitated.

[0117]

Moreover, relatively since the weight can configure the electric vacuum apparatus 1 without using a large hose, along with appearance during storage electric vacuum apparatus 1 is improved, constraints in the accommodated state of the electric vacuum apparatus 1 is reduced, various it can respond to the storage state of style.

[0118]

In addition, when mounting the vacuum cleaner 2 in the apparatus main body 3, because the child machine secondary battery 21 is the parent unit secondary battery 57 to charge directly, for example, the slave unit secondary to convert such as the to the DC power supply commercial AC power source as compared with the case of charging the battery 21, it can reduce the charging time of the sub-terminal battery 21, thereby improving the charging efficiency.

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[0119]

In particular, a vacuum cleaner 2 is a slave unit, as compared to the electric vacuum apparatus 1, since it is often used to easily short time use, the ability to charge the sub-terminal battery 21 in a short time , for example, to allow well as possible to complete the charging of the sub-terminal battery 12 while cleaning the floor of the main cleaning portion in the electric vacuum apparatus 1, after the cleaning main parts, details by removing the vacuum cleaner 2 when cleaning from the main unit 3, etc. can be cleaned as it is, ease of use of the vacuum cleaner 2 is improved.

[0120]

Then, by providing the charger 70 for charging the master unit secondary battery 57, the base-secondary battery 57 capacity is large, it can be charged using a commercial AC power source.

[0121]

Further, by incorporating the charger 70 to the apparatus main body 3, as compared with the case of using a charger separate, can be suppressed storage space of the electric vacuum apparatus 1.

[0122]

Incidentally, in the above embodiment, the suction structure 96, so long as it communicates the slave unit dust collecting chamber 11 and the dust collecting unit 59 through the communication opening 17 is not limited to the above structure.

[0123]

Further, the opening and closing structure of the lid 16 may be, for example like those that opens and closes by sliding, but are not limited to the above structure.

[0124]

Further, in place of the charger 70 with a built-in device main body 3, it is also possible to attach the electric vacuum apparatus 1 using a charger separately for charging. In this case, the apparatus body 3 to be not required such as a power cord, since may be provided only to the apparatus main body 3 charging terminals to be connected to the charger, the device body 3, it is possible to further miniaturize .

[0125]

The position of the terminals and the respective body terminals, as long as it can electrically detachable by attaching and detaching the vacuum cleaner 2 in the apparatus main body 3, such as the position and shape provided that, not limited to the above-described configuration.

[0126]

Furthermore, such a connection structure to the apparatus main body 3 of the vacuum cleaner 2, such as apparatus main body 3 or the vacuum cleaner 2 detail, is not limited to the above configuration.

[0127]

(A) illustrates the main part of the use state of the electric vacuum device according to an embodiment of the present invention, (b) the master unit collecting dust handset dust collecting chamber of the vacuum cleaner of the same electric vacuum device is an explanatory view showing an essential portion in a state in which sucking into the dust chamber. The main part of the same electric vacuum device is a perspective view showing by omitting the parent device body case. The main part of the same electric vacuum device is a perspective view illustrating from the rear by omitting the parent device body case. Id is a perspective view showing an electric vacuum cleaner of the electric vacuum device. It is a perspective view of a portion of the same electric vacuum cleaner. is a perspective view showing the base unit dust collecting chamber of the same electric vacuum device. It is a perspective view of a portion of the same master unit dust chamber. Id is a perspective view of a portion of the master unit body case of the electric vacuum device. The main part of the apparatus main body of the same electric vacuum device is a perspective view illustrating from the rear. It is a central cross-sectional view showing the same as above the apparatus main body. It is a rear view showing the same as above electric vacuum device. is a perspective view showing the same as above electric vacuum device.

Description of the code

[98]

1 electric vacuum device 2 vacuum cleaner 3 the apparatus body 11 The handset dust collecting chamber 12 Child machine electric blower 17 Communication opening 18 Lid 52 The parent machine floor brush part of as a master unit suction port body 56 Parent machine electric blower 59 Dust collecting unit as a master unit dust collecting chamber 96 Suction structure 98 Valving element

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CLAIMS JP2008073221

1.

Slave unit electric blower, and a vacuum cleaner having a subsidiary unit dust collecting chamber for accommodating the dust sucked by the sub-terminal electric blower, A detachable vacuum cleaner, the base-electric blower, and, in larger capacity than the child machine dust chamber, and comprises a master unit dust collecting chamber for accommodating the dust sucked by the master unit electric blower apparatus comprising a main body, Child machine dust collecting chamber, in a state in which the vacuum cleaner is attached to the apparatus main body is provided with the master unit dust collecting chamber and capable of communicating communication opening Electric vacuum device is characterized in that.

2.

Vacuum cleaner apparatus main body in communication with the slave unit dust collecting chamber and the master unit dust collecting chamber by opening the communication opening when worn, close the communication opening the vacuum cleaner in a state detached from the apparatus main body was equipped with a lid that Electric vacuum device according to claim 1 which is characterized in that.

3.

While wearing the vacuum cleaner in the apparatus main body, equipped with suction structure capable sucks dust handset dust collecting chamber to the master unit dust collecting chamber through the communication opening by driving the master unit electric blower Electric vacuum device according to claim 1 or 2 wherein the wherein the.

4.

Apparatus main body is provided with a master unit suction port body for sucking dust from a cleaning surface by the driving of the main unit electric blower communicates with the upstream side of the master unit dust collecting chamber, When sucking the dust of the sub-terminal dust collecting chamber to the master unit dust chamber, equipped with valve for closing the air passage which communicates with said master unit suction port body and the master unit dust collecting chamber Electric vacuum device according to claim 3, which is characterized by.

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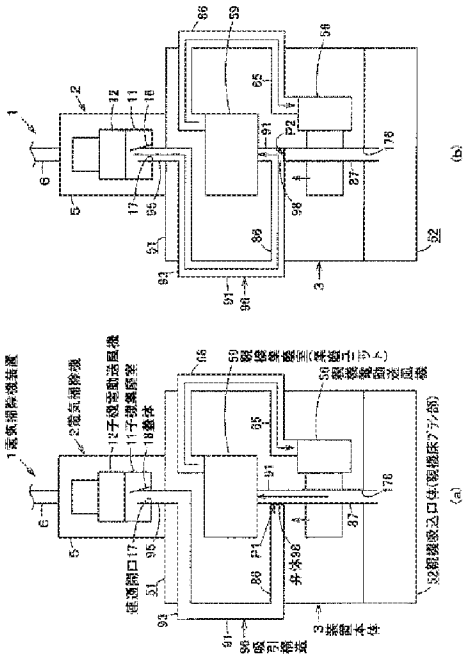
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(54)【発明の名称】電気掃除装置

(57)【要約】
【課題】電気掃除機を小型化および軽量化して使い勝手を向上した電気掃除装置を提供する。
【解決手段】電気掃除機２を装置本体３に装着すると、子機集塵室11と集塵ユニット59とが連通開口17を介して連通する。子機集塵室11に捕集した塵埃を子機集塵室11よりも大きな容量の集塵ユニット59へと、親機電動送風機56の駆動により移動させることが可能になるので、子機集塵室11に必要以上の大きさを持たせたり、大掛かりなフィルタを取り付けたりせずに済むため、電気掃除機２を小型化および軽量化し、使い勝手が向上する。
【選択図】図１



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【特許請求の範囲】
【請求項1】
子機電動送風機、および、この子機電動送風機により吸い込まれた塵埃を収容する子機集塵室を備えた電気掃除機と、
この電気掃除機を着脱可能であり、親機電動送風機、および、前記子機集塵室より大きな容量で、かつ、前記親機電動送風機により吸い込まれた塵埃を収容する親機集塵室を備えた装置本体とを具備し、
前記子機集塵室は、前記電気掃除機を前記装置本体に装着した状態で、前記親機集塵室と連通可能な連通開口を備えている
ことを特徴とした電気掃除装置。
【請求項2】
電気掃除機を装置本体に装着した際に連通開口を開放して子機集塵室と親機集塵室と連通させ、前記電気掃除機を前記装置本体から取り外した状態で前記連通開口を閉塞する蓋体を具備した
ことを特徴とした請求項１記載の電気掃除装置。
【請求項3】
電気掃除機を装置本体に装着した状態で、親機電動送風機の駆動により連通開口を介して子機集塵室の塵埃を親機集塵室へと吸い込み可能な吸引構造を具備した
ことを特徴とした請求項１または２記載の電気掃除装置。
【請求項4】
装置本体は、親機集塵室の上流側に連通し親機電動送風機の駆動により被掃除面の塵埃を吸い込む親機吸込口体を備え、
子機集塵室の塵埃を前記親機集塵室に吸い込む際に、前記親機集塵室と前記親機吸込口体とを連通する風路を閉塞する弁体を具備した
ことを特徴とした請求項３記載の電気掃除装置。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は、電気掃除機を着脱可能な装置本体を備えた電気掃除装置に関する。
【背景技術】
【0002】
従来、この種の電気掃除装置としては、電動送風機とこの電動送風機の吸込側に連通する子機集塵室とを備えた子機電気掃除機を、装置本体に対して着脱可能とするものが知られている。この電気掃除装置では、例えば床面上の掃除などの強力な集塵性能が必要な場合には、子機電気掃除機を装置本体に装着して使用し、例えば空調装置のフィルタの掃除などの取り扱いの容易さが必要な場合には、子機電気掃除機を装置本体から取り外して使用する（例えば、特許文献１参照。）。
【特許文献1】特開平１０－１２７５４１号公報（第２－４頁、図６－７）
【発明の開示】
【発明が解決しようとする課題】
【0003】
しかしながら、上述の電気掃除装置では、子機電気掃除機を装置本体に装着して使用しているか否かに拘らず、電動送風機の駆動により吸い込まれた塵埃は全て子機集塵室に溜まるから、この子機集塵室に、充分な捕集性能を有する比較的大型のフィルタなどを取り付ける必要があり、子機電気掃除機の大型化および重量化を招くという問題点を有している。
【0004】
本発明は、このような点に鑑みなされたもので、電気掃除機を小型化および軽量化して使い勝手を向上した電気掃除装置を提供することを目的とする。
【課題を解決するための手段】

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【0005】
本発明は、子機電動送風機、および、この子機電動送風機により吸い込まれた塵埃を収容する子機集塵室を備えた電気掃除機と、この電気掃除機を着脱可能であり、親機電動送風機、および、子機集塵室より大きな容量で、かつ、親機電動送風機により吸い込まれた塵埃を収容する親機集塵室を備えた装置本体とを具備し、子機集塵室が、電気掃除機を装置本体に装着した状態で、親機集塵室と連通可能な連通開口を備えているものである。
【発明の効果】
【0006】
本発明によれば、電気掃除機を装置本体に装着すると、子機集塵室と親機集塵室とが連通開口を介して連通し、子機集塵室に捕集した塵埃をこの子機集塵室よりも大きな容量の親機集塵室へと親機電動送風機の駆動により移動させることが可能になるので、子機集塵室に必要以上の大きさを持たせずに済み、電気掃除機を小型化および軽量化して、使い勝手を向上できる。
【発明を実施するための最良の形態】
【0007】
以下、本発明の一実施の形態の電気掃除装置の構成を図１ないし図１２を参照して説明する。
【0008】
図１１および図１２において、１は親機である電気掃除装置で、この電気掃除装置１は、子機である小型の電気掃除機２を、比較的大型の装置本体３に着脱することで、電気掃除機２単体と、電気掃除装置１全体とでそれぞれ掃除可能なものである。
【0009】
電気掃除機２は、図４、図１１および図１２に示すように、略円筒状の掃除機本体５を備え、この掃除機本体５には、軸方向の一端側にハンドル６が延設されるとともに、軸方向の他端側すなわちハンドル６と反対側が縮径されて延長管部７が長尺筒状に延設され、この延長管部７の先端には、子機吸込口体としての子機床ブラシ８が設けられている。
【0010】
また、掃除機本体５内には、延長管部７に連通する子機集塵室11が区画されているとともに、この子機集塵室11のハンドル６側に子機電動送風機12、および、この子機電動送風機12の駆動を制御する図示しない子機制御手段が収容され、子機電動送風機12の吸込側が図示しないフィルタなどを介して子機集塵室11に連通するとともに、この子機電動送風機12の排気側が、掃除機本体５の後部に形成された子機排気孔14に連通している。
【0011】
ここで、子機集塵室11は、掃除機本体５の前側に区画された中空な空間部であり、延長管部７の前側に延設された略筒状の本体連結部16を備えている。この本体連結部16は、電気掃除機２を装置本体３側に装着した状態でこの装置本体３側に嵌合されるものであり、その先端部には、図５に示すように、子機集塵室11内に連通する丸孔状の連通開口17が開口形成され、この連通開口17には、この連通開口17を開閉可能な蓋体18が設けられている。また、本体連結部16の先端部には、連通開口17の近傍に、電気掃除機２を装置本体３に装着した状態で装置本体３側と電気的に接続される端子19，19が設けられている。さらに、本体連結部16の両側部には、電気掃除機２を装置本体３に装着した状態でこの装置本体３側に係合される係合凹部20（一方のみ図示）が形成されている。
【0012】
蓋体18は、図示しない付勢手段により連通開口17の外側方向すなわち下方向へと付勢された弁体であり、電気掃除機２を装置本体３に装着した状態で、装置本体３側により付勢手段の付勢力に抗して開放され、連通開口17を開口させるとともに、電気掃除機２を装置本体３から取り外した状態で、付勢手段の付勢力により元の状態へと復帰して連通開口17を閉塞するものである。
【0013】
図４、図１１および図１２に戻って、子機電動送風機12は、比較的小型の出力を有して

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おり、ハンドル６内に配設された子機電源部としての子機電池である子機二次電池21からの給電を子機制御手段により制御することで動作が制御される。

【0014】

子機排気孔14は、掃除機本体５の後部からハンドル６の基端部に亘って突設された突出部23にスリット状に複数形成されている。

【0015】

また、ハンドル６の先端部には、作業者が把持する把持部25が後方へと屈曲形成され、この把持部25には、電気掃除機２および電気掃除装置１のそれぞれの駆動用などの複数のスイッチ26が配設されている。

【0016】

さらに、延長管部７は、電気掃除機２を装置本体３へと装着した状態でこの装置本体３の後部すなわち背面に嵌合する。

【0017】

そして、子機床ブラシ８は、延長管部７に連通する連通管部31を有し、この連通管部31の先端側が回動保持部32に回動可能に接続され、この回動保持部32の先端側に、子機ケース体としての子機本体部33が一体的に形成され、この子機本体部33の両側部に、子機吸込部34，34が回動可能に設けられている。

【0018】

連通管部31は、円筒状に形成され、延長管部７に対して、クランプ部36を介して着脱可能となっている。

【0019】

回動保持部32は、連通管部31を上下方向および周方向に回動可能に保持している。また、この回動保持部32の下部すなわち被掃除面としての床面側には、子機第１従動輪38が回動自在に設けられている。

【0020】

子機本体部33は、回動保持部32に保持された連通管部31の先端側に連通している。

【0021】

各子機吸込部34は、床面に対向する下部に、図示しない連通管を介して子機本体部33の両側部に回動可能に連通接続された丸孔状の子機吸込口41が開口形成されているとともに、床面の掃除用のブラシ毛部42が植毛され、かつ、子機第２従動輪43が回動自在に設けられている。

【0022】

そして、各子機吸込部34は、連通管の周方向すなわち子機吸込口41の周方向に、図示しない子機吸込部付勢手段を介して付勢されており、電気掃除機２を装置本体３に装着した状態で、この付勢力に抗して各子機吸込部34の両側部が延長管部７側へと回動し、図４の実線に示すように、各子機吸込部34が子機本体部33および回動保持部32の両側部に位置して折り畳み状態になるとともに、電気掃除機２を装置本体３から取り外した状態で、子機吸込部付勢手段の付勢力により元の状態に復帰して、図４の想像線に示すように、子機本体部33の両側へと延出して折り畳み状態が解除されるように構成されている。

【0023】

各ブラシ毛部42は、例えば弾力性を有する合成樹脂などにより形成され、各子機吸込部34の後部側に、各子機吸込口41から各子機吸込部34の両側近傍に亘って壁状に配設されて、各子機吸込部34の下面から下方に突出している。

【0024】

各子機第２従動輪43は、各子機吸込部34の両側近傍の前側に配設されている。

【0025】

一方、装置本体３は、図１ないし図３、および、図１０ないし図１２に示すように、電気掃除機２が着脱される親機本体部51と、この親機本体部51に対して相対的に回動可能に設けられた親機吸込口体としての親機床ブラシ部52とを備えている。

【0026】

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親機本体部51は、外郭となる親機本体ケース55の内部に、親機電動送風機56、この親機電動送風機56に給電可能な親機電源部としての親機電池である親機二次電池57、および、親機電動送風機56の駆動を制御する図示しない親機制御手段を収容し、かつ、前部に、親機集塵室としての集塵部である集塵ユニット59が着脱可能となっている。

【0027】

親機本体ケース55は、下端部が下方へと側面視で略円弧状に形成され、この下端部が親機床ブラシ部52に対して相対的に前後方向へと回動可能に軸支されている。また、この親機本体ケース55の後部には、電気掃除機２を着脱する着脱凹部61が形成されている。

【0028】

親機電動送風機56は、子機電動送風機12（図４）よりも大きい出力を有するもので、親機本体部51の下端部に左右方向に沿って配設され、周囲が保持部材としてのモータクッション63により保持されている。また、この親機電動送風機56の吸込側には、筒状の親機連通風路65が気密に連通接続され、この親機連通風路65の先端は、吸気管としての筒状の第１側部連通風路66を介して集塵ユニット59の下流側に気密に連通接続されている。また、親機電動送風機56の排気側は、排気風路67を介して、親機本体ケース55の後部にて着脱凹部61の側方に形成された親機排気孔68に気密に連通接続されている。

【0029】

親機連通風路65は、親機電動送風機56の吸込側である一側部の上部から上方へ延設され、かつ、先端部が親機二次電池57と干渉しないようにこの親機二次電池57の上方にて装置本体３の側方へと屈曲された、略Ｌ字状の管体である。

【0030】

第１側部連通風路66は、親機連通風路65の先端から上方へと延設され、親機本体ケース55の一側部からこの親機本体ケース55の外部に露出してこの親機本体ケース55の一側部に沿って配設されているとともに、先端が親機本体ケース55内へと屈曲されて集塵ユニット59の上部へと接続されている。

【0031】

また、排気風路67は、親機電動送風機56の排気側である他側部の上部から後方へと拡開状に延設されている。

【0032】

さらに、親機排気孔68は、左右方向に長いスリット状に形成されている。

【0033】

また、親機二次電池57は、親機電動送風機56の一側方に位置した電池パックであり、子機二次電池21（図４）よりも大きい定格容量を有し、電気掃除機２を装置本体３に装着した状態でこの子機二次電池21に給電可能となっている。さらに、この親機二次電池57は、親機本体ケース55の後部に設けられた開閉蓋部69（図１１）を開けることで、この親機本体ケース55に対して着脱可能となっている。そして、この親機二次電池57は、装置本体３内に設けられた充電器70（図１２）により、充電可能となっている。

【0034】

充電器70は、例えば図示しない電源コードなどにより装置本体３の外部の商用交流電源と電気的に接続され、この商用交流電源からの交流電源を直流電源に変換して親機二次電池57を充電するものである。

【0035】

親機制御手段は、親機二次電池57の放電を制御することで、親機電動送風機56の動作を制御するとともに、電気掃除機２を装置本体３に装着した状態で、親機二次電池57から子機二次電池21への給電を制御することにより子機二次電池21の充電を制御する、充電制御手段の機能を有している。

【0036】

集塵ユニット59は、塵埃分離本体部としての塵埃分離ユニット71と、集塵本体部としての集塵部ユニット72とを有している。

【0037】

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塵埃分離ユニット71は、図６に示すように、塵埃分離部75と、この塵埃分離部75の上部に一体に設けられたフィルタ部76とを備えている。

【0038】

塵埃分離部75は、塵埃吸込口81を先端に有する角筒状の案内風路管82を有し、この案内風路管82の下流側に、吸い込んだ塵埃を遠心分離する分離室部83が連通して設けられ、この分離室部83の下流側に、分離された塵埃をフィルタ部76へと運ぶ吸引風路部84（図３）が連通して設けられている。

【0039】

案内風路管82は、塵埃分離ユニット71を親機本体ケース55（図１０ないし図１２）に装着した状態で、塵埃吸込口81が図１ないし図３に示す筒状の連通風路部86および筒状の接続風路部87を介して親機床ブラシ部52の吸込側に気密に接続されて塵埃を空気とともに吸い込み可能である。

【0040】

ここで、連通風路部86は、塵埃分離部75（図６）の下端部にて、親機本体ケース55（図１０ないし図１２）の他側方へと略水平に延設され、先端が、連結管としての筒状の第２側部連通風路91に連通接続されている。

【0041】

この第２側部連通風路91は、連通風路部86の先端部から上方へと延設され、第１側部連通風路66と同様に、親機本体ケース55の他側部からこの親機本体ケース55の外部に露出してこの親機本体ケース55の一側部に沿って配設されているとともに、先端が親機本体ケース55内へと屈曲されて、上部接続風路93に気密に接続されている。したがって、第２遠部連通風路91は、第１側部連通風路66と正面視で略対称に形成されている。

【0042】

この上部接続風路93は、親機本体ケース55の幅方向の中心側へと略水平に延設され、先端に、電気掃除機連通部としての屈曲接続部95が上方へと屈曲されている。

【0043】

この屈曲接続部95は、電気掃除機２を装置本体３へと装着した状態で、電気掃除機２の連通開口17へと挿入され、この連通開口17に設けられた蓋体18を押し上げることで、この連通開口17を介して子機集塵室11を塵埃分離ユニット71の上流側へと気密に接続する部分である。このため、これら連通開口17、屈曲接続部95、上部接続風路93、第２側部連通風路91および連通風路部86などにより、電気掃除機２を装置本体３に装着した状態で、親機電動送風機56の駆動によって連通開口17を介して子機集塵室11の塵埃を集塵ユニット59へと吸い込み可能な吸引構造96が構成されている。また、この屈曲接続部95には、図示しないが、電気掃除機２の連通開口17との接続状態、すなわち電気掃除機２の装置本体３への装着状態を検出するセンサなどの装着検出手段が設けられている。

【0044】

また、接続風路部87は、例えば可撓性を有する合成樹脂などにより蛇腹状に形成されており、連通風路部86の基端から前方下側へと延設された接続管97に上端が気密に接続され、下端が親機床ブラシ部52へと気密に接続されている。

【0045】

ここで、接続管97内には、連通風路部86に連通する基端側の位置に弁体98が設けられている。この弁体98は、電気掃除機２を装置本体３に装着した状態での所定のスイッチ26の操作により、連通風路部86側を閉塞する位置P1と、この連通風路部86と接続風路部87との連通部の下側で接続風路部87側を閉塞する位置P2とのそれぞれの位置に、親機制御手段により切り換え制御される。

【0046】

分離室部83は、図１０に示す円形開口103が中央部に穿設されているとともに、この円形開口103の周囲に、扇形状の開口104が設けられている。また、この分離室部83の周壁には、集塵部ユニット72の上流側へと連通する図示しない導入孔が穿設されている。さらに、この分離室部83は、図示しない開閉蓋により開閉可能となっている。

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【0047】
円形開口103は、吸引風路部84の上流側に連通しており、塵埃分離手段が取り付けられている。この塵埃分離手段は、外周面に複数の連通開口が穿設されて格子状に形成され、これら連通開口に図示しないネットフィルタが取り付けられている。
【0048】
開口104は、吸引風路部84の上流側に連通しており、図示しないネットフィルタが取り付けられている。
【0049】
吸引風路部84は、図示しない接続開口を介してフィルタ部76の上流側に連通しているとともに、分離室部83と反対側に穿設された図示しない集塵部接続開口を介して集塵部ユニット72の下流側に連通している。
【0050】
また、フィルタ部76は、接続開口を介して吸引風路部84と連通する略円筒状のフィルタ部本体である収納ケース111と、この収納ケース111内に回転自在に設けられた図示しないフィルタとしてのプリーツフィルタ体112と、このプリーツフィルタ体112と一体に回転する回転体である図示しない掃出体とを備えている。
【0051】
収納ケース111は、塵埃分離部75の後部に一体に形成されている。また、この収納ケース111には、図示しない第１排出開口としての排出開口が穿設されている。さらに、この収納ケース111の内部には、塵落とし機構としての図示しない除塵手段が突設され、この除塵手段の先端部がプリーツフィルタ体112に接触可能となっている。
【0052】
排出開口は、プリーツフィルタ体112にて捕集されこのプリーツフィルタ体112から除塵手段により落とされた微細な塵埃である粉体、すなわち微細塵が導入される開口であり、塵埃分離部75へと気密に接続されている。
【0053】
また、プリーツフィルタ体112は、図示しない略円筒状の枠体に放射プリーツ状に貼着されたフィルタ体としてのプリーツフィルタ115を有している。そして、このプリーツフィルタ体112は、電気掃除装置１のオン時およびオフ時に、後部に設けられた駆動手段としてのモータ116（図３）により所定時間回転するように構成され、この回転に伴い除塵手段がプリーツフィルタ115のプリーツを弾くことで、捕集した塵埃が除去されるように構成されている。
【0054】
さらに、掃出体は、プリーツフィルタ体112と同軸状に設けられ、プリーツフィルタ体112と一体的に回転することで、プリーツフィルタ体112から除塵手段を介して除去されて収納ケース111に溜まった微細塵を、排出開口を介して塵埃分離部75へと排出するものである。
【0055】
一方、集塵部ユニット72は、図６および図７に示すように、塵埃分離部75の下流側に連通する風路部121と、この風路部121の下流側に連通する親機集塵室部122と、風路部121の前側を覆う蓋ケース123とを備えている。
【0056】
風路部121は、集塵ユニット59を親機本体ケース55に装着した状態で塵埃分離ユニット71の塵埃分離部75の前側に位置する前部風路125と、この前部風路125の下流側に連通しこの前部風路125に対して屈曲された側部風路126とを備えた略Ｌ字状に形成されている。
【0057】
前部風路125には、塵埃分離部75の下流側に気密に接続される角孔状の開口部128を有している。
【0058】
側部風路126は、塵埃分離部75の側部に位置し、この塵埃分離部75と反対側が親機集塵

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室部122に連通している。また、この側部風路126には、集塵部接続開口を介してフィルタ部76の上流側に連通する角孔状の集塵部接続開口129が形成されている。この集塵部接続開口129には、図示しないが、ネットフィルタが設けられている。

【0059】

また、親機集塵室部122は、塵埃分離ユニット71で分離された比較的大きい塵埃である粗塵を主に収容する部分であり、子機集塵室11よりも大きい容量を有しており、集塵部蓋体131により開閉可能となっている。したがって、集塵ユニット59は、親機集塵室部122、各種ネットフィルタ、および、プリーツフィルタ115などにより、全体として子機集塵室11よりも大きい容量を有し、子機集塵室11よりも多くの塵埃を捕集可能となっている。

【0060】

そして、この集塵部蓋体131は、下端部が側部風路126に対して、ヒンジ部132により回動可能に軸支されている。また、この集塵部蓋体131と側部風路126との間には、シール部材としての図示しないパッキンが設けられている。そして、集塵部蓋体131は、図示しないフックにより側部風路126に対して保持され、蓋ケース123に設けられた図示しない解除ボタンの操作によりフックの係止が解除されることで、自重により回動して開放され、親機集塵室部122を開くように構成されている。

【0061】

蓋ケース123には、集塵部ユニット72を親機本体ケース55から取り外し可能とする着脱クランプ133が設けられている。

【0062】

着脱凹部61は、電気掃除機２の延長管部７が嵌合する上側凹部134が上側に形成され、この上側凹部134の下端部に連続して、電気掃除機２の子機床ブラシ８の連通管部31が嵌合する中間凹部135が形成され、この中間凹部135の下端部に連続して、電気掃除機２の子機床ブラシ８の回動保持部32、子機本体部33および各子機吸込部34が嵌合する下側凹部136が形成されている。

【0063】

上側凹部134は、前側に窪んだ断面円弧状に形成され、略親機本体ケース55の上部に突設された嵌合部としての受け部137に上端部が連通している。

【0064】

受け部137は、図８および図１０に示すように、電気掃除機２の本体連結部16（図４）が嵌合される第１嵌合部141と、掃除機本体５の前側（図４）が嵌合される第２嵌合部142とを区画する、平面視略U字状に形成されている。

【0065】

第１嵌合部141は、前後方向に長手状に形成され、親機本体ケース55の上面である底部に、屈曲接続部95が親機本体ケース55の外部へと突出している。また、第１嵌合部141の屈曲接続部95の前方には、親機本体ケース55上に、電気掃除機２の端子19，19（図４）と電気的に接続される本体端子143，143が設けられている。さらに、第１嵌合部141を区画する受け部137の内部両側には、電気掃除機２（図４）を装置本体３に対して取り外す際に操作するクランプ部144，144が設けられている。

【0066】

各クランプ部144は、電気掃除機２を装置本体３に対して係止保持／解除可能なクランプ本体145と、外部から押し操作されることでクランプ本体145を動作させるクランプボタン146（図１２）とを備えている。

【0067】

クランプ本体145，145は、屈曲接続部95の後部両側にて第２嵌合部142内へと先端部が幅方向の中心側へと突出した爪状に形成され、電気掃除機２の本体連結部16の係合凹部20（図４）にそれぞれ係合して電気掃除機２を保持する部分であり、この突出方向へと図示しないクランプ付勢手段により付勢されている。

【0068】

クランプボタン146，146は、例えば作業者が前側から片手で受け部137を挟むようにす

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ることで押し操作可能となるように、受け部137の両側に突設され、この押し操作により、クランプ付勢手段の付勢力に抗してクランプ本体145，145を両側へと開き、電気掃除機２の本体連結部16の係合凹部20（図４）への係合を解除するように構成されている。

【0069】

また、第２嵌合部142は、第１嵌合部141の後側から後方へと幅方向に拡開され、かつ、下側から上側へと掃除機本体５の外側形状に沿って拡開されるように形成されている。さらに、この第２嵌合部142の内面には、クランプ本体145，145の後方にて、上下方向に沿ってガイド部としてのガイドリブ148，148が設けられている。

【0070】

これらガイドリブ148，148は、電気掃除機２を装置本体３に着脱する際に、電気掃除機２を着脱方向に案内するものである。

【0071】

中間凹部135は、上側凹部134に対して、左右幅方向に広く形成されている。

【0072】

さらに、下側凹部136は、折り畳んだ状態の子機床ブラシ８が嵌合可能となるように、中間凹部135に対して左右幅方向に広く形成されている。また、この下側凹部136の下部には、子機床ブラシ８の各子機吸込部34を子機本体部33に対して折り畳み状態に変形させる変形部材としての支持体151が設けられている。

【0073】

この支持体151は、親機本体ケース55の後面に一体に取り付けられているもので、図９に示すように、下側凹部136の下端部から両側部に亘って連続する側部保持部153と、この側部保持部153の幅方向の中央部から上方へと突出する突出変形部154とを有し、正面視で略Ｗ字状に形成されている。

【0074】

側部保持部153は、折り畳み状態となった子機床ブラシ８の子機吸込部34，34を両側から指示することで、子機床ブラシ８の折り畳み状態を保持する部分である。また、この側部保持部153の上端部の内側両側部には、上側へと拡開状に傾斜した上側傾斜面部156，156が形成されている。

【0075】

突出変形部154は、側部保持部153よりも上下方向の突出量が小さく設定され、先端部が幅狭となるように、両側が傾斜状に形成されている。

【0076】

そして、親機床ブラシ部52は、図２、図３、図１０ないし図１２に示すように、中空な親機ケース体161と、この親機ケース体161内に回転可能に収容された回転清掃体としての回転ブラシ162と、親機ケース体161の下部に回転可能に設けられた前方従動輪163と、親機ケース体161の後部両側に回転可能に設けられた後方従動輪164，164とを有している。

【0077】

親機ケース体161は、床面に対向する親機下部ケース166と、この親機下部ケース166の上側を覆う親機上部ケース167とを備え、後部の幅方向の中央部に、親機本体ケース55の下端部が回動可能に嵌合する嵌合凹部168が形成されている。

【0078】

親機下部ケース166は、前側寄りの位置に、床面に対向して横長の親機吸込口171が開口形成されている。また、この親機下部ケース166には、親機吸込口171の後方に、横長の中間従動輪172が嵌合する横長の従動輪嵌合凹部173が断面円弧状に区画され、この従動輪嵌合凹部173は、下部が床面へと開口している。さらに、この親機下部ケース166の後部両側には、幅方向へと窪み後方従動輪164，164が嵌合する従動輪嵌合部174，174が形成され、これら従動輪嵌合部174，174には、後方従動輪164，164を軸支する略円筒状の支持軸部175，175が突設されている。

【0079】

親機上部ケース167は、接続風路部87の下端部が気密に接続される上部接続開口176が開

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口されている。そして、この上部接続開口176に接続風路部87の下端部が気密に接続されることで、親機ケース体161内に区画された吸込空間部178が、接続風路部87を介して集塵ユニット59の吸込側に連通するように構成されている。

【0080】

回転ブラシ162は、親機吸込口171に回転可能に取り付けられている。

【0081】

そして、前方従動輪163，163は、回転ブラシ162の両側方に位置し、親機ケース体161の両側に切り欠き形成された凹部179に嵌合している。

【0082】

次に、上記一実施の形態の動作を説明する。

【0083】

まず、部屋の床面など、比較的広い範囲を掃除する際には、電気掃除装置１を用いる。すなわち、電気掃除機２を装置本体３に装着した状態で使用する。

【0084】

このとき、電気掃除機２側の端子19，19と、装置本体３側の本体端子143，143とが電気的に接続されることで、スイッチ26と親機制御手段とが電気的に接続され、親機二次電池57の電力の一部が、親機制御手段により制御されつつ子機二次電池21へと供給され、この子機二次電池21が充電される。

【0085】

作業者が所定のスイッチ26を操作すると、親機制御手段により親機二次電池57から親機電動送風機56へ供給される電力が制御されて、親機電動送風機56が駆動するとともに、弁体98を位置P1に切り換えた状態（図１(a)）とする。

【0086】

そして、作業者が、把持部25を把持して電気掃除装置１を床面上で前後に走行させることで、回転ブラシ162が回転して床面の塵埃を掻き出し、親機吸込口171から、親機電動送風機56の駆動により発生した負圧によって塵埃を空気とともに吸い込む。

【0087】

この吸い込まれた空気は吸気風となり、塵埃とともに、親機床ブラシ部52の吸込空間部178から、上部接続開口176、接続風路部87、および連通風路部86の接続管97を介して集塵ユニット59に吸い込まれる。

【0088】

集塵ユニット59において、吸気風および塵埃は、塵埃吸込口81から案内風路管82を経由して分離室部83へと吸い込まれ、この分離室部83の内壁に沿って塵埃分離手段の周囲を旋回することで、比較的大きな塵埃が遠心分離され、導入孔から開口部128を介して前部風路125内へと流入するとともに、小さい塵埃は、開口104のネットフィルタあるいは塵埃分離手段のネットフィルタにより捕集される。

【0089】

前部風路125内に流入した塵埃は、親機集塵室部122内へと収容され、さらに空気が側部風路126の集塵部接続開口129を通過する際に親機集塵室部122内で圧縮される。

【0090】

また、塵埃分離手段を通過した吸気風は、開口104を通過した吸気風、および、集塵部接続開口129を通過した吸気風とともに、円形開口103を介してフィルタ部76へと流入し、プリーツフィルタ体112のプリーツフィルタ115を通過する際に、さらに微細な微細塵が捕集される。

【0091】

このプリーツフィルタ115を通過した吸気風は、第１側部連通風路66および親機連通風路65を介して、親機電動送風機56へと吸い込まれ、この親機電動送風機56を通過して排気風となり、排気風路67を介して、親機排気孔68から親機本体ケース55の外部へと排気される。

【0092】

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また、所定のスイッチ26を操作して親機電動送風機56を停止させると、親機制御手段がモータ116を駆動させることで、プリーツフィルタ体112が周方向に所定時間回転し、除塵手段がプリーツフィルタ115を弾くことで、このプリーツフィルタ115にて捕集した微細塵が収納ケース111内へと落とされ、この落とされた微細塵は、掃出体により排出開口へと運ばれ、再度塵埃分離部75へと戻される。

【0093】

一方、比較的狭い場所の掃除、短時間の手軽な掃除、あるいは、空調装置のフィルタの掃除などの際には、電気掃除機２単体で掃除をする。すなわち、電気掃除機２を装置本体３から取り外して使用する。

【0094】

このとき、上記電気掃除装置１の使用時間中に、親機二次電池57により子機二次電池21が略満充電状態となっている。

【0095】

作業者が、各クランプボタン146を左右から押すと、各クランプ部144の動作により、各クランプ本体145が左右に開き、これらクランプ部144と電気掃除機２の本体連結部16の係合凹部20との係合が外れて、電気掃除機２が装置本体３から取り外し可能となる。

【0096】

さらに、電気掃除機２を装置本体３から完全に取り外すと、端子19，19と本体端子143，143との電気的接続が解除されるとともに、子機吸込部付勢手段の付勢力により各子機吸込部34が子機本体部33に対して左右方向に開くように回動する。

【0097】

この状態で、作業者が把持部25を把持してスイッチ26を操作すると、子機二次電池21から子機電動送風機12への給電を子機制御手段が制御することで、子機電動送風機12が駆動する。

【0098】

そして、作業者は、子機床ブラシ８を被掃除面に対して摺動させることで、ブラシ毛部42が被掃除面の塵埃を拭き取るとともに、各子機吸込口41から塵埃とともに空気が吸い込まれる。

【0099】

この吸い込まれた空気は吸気風となり、連通管および延長管部７を介して子機集塵室11へと吸い込まれ、フィルタを通過する際に、含まれる塵埃が除去され、子機電動送風機12の吸込側へと吸い込まれる。

【0100】

この後、子機電動送風機12を通過した吸気風は、排気風となり、子機排気孔14から掃除機本体５の外部へと排気される。

【0101】

さらに、電気掃除機２での掃除が終了すると、作業者は、所定のスイッチ26の操作により子機電動送風機12を停止させ、子機床ブラシ８を着脱凹部61に嵌合させつつ電気掃除機２を装置本体３へと装着する。

【0102】

このとき、子機床ブラシ８は、各子機吸込部34の下端側が、装置本体３側の支持体151の各上側傾斜面部156に当接することで、各子機吸込部34の両側が子機吸込口41の周囲に上方へと回動し、折り畳み状態となって着脱凹部61の下側凹部136に収容される。

【0103】

同時に、子機床ブラシ８の連通管部31が中間凹部135に、延長管部７が上側凹部134に順次収容されるとともに、ガイドリブ148，148に沿って掃除機本体５が受け部137の第２嵌合部142に嵌合することで、本体連結部16がクランプ本体145を左右に押し広げつつ、屈曲接続部95が連通開口17に挿入され、子機集塵室11が、連通開口17、屈曲接続部95、上部接続風路93、第２側部連通風路91および連通風路部86により、集塵ユニット59の吸込側に連通し、クランプ本体145が本体連結部16の係合凹部20にそれぞれ係合されて、電気掃除機

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２が装置本体３に固定される。

【0104】

そして、作業者が所定のスイッチ26を操作すると、接続検出手段により電気掃除機２の装置本体３への接続状態が検出され、この検出に基づき、親機制御手段が弁体98を位置P2に切り換え（図１(b)）、かつ、親機二次電池57からの電力が親機電動送風機56へと伝達される。

【0105】

この親機電動送風機56の駆動により発生した負圧は、連通風路部86、第２側部連通風路91、上部接続風路93および屈曲接続部95へと順次作用することで、子機集塵室11内に収容された塵埃が、屈曲接続部95、上部接続風路93、第２側部連通風路91および連通風路部86を介して集塵ユニット59へと吸い込まれて捕集される。

【0106】

集塵ユニット59にて捕集した塵埃は、着脱クランプ133を操作することで集塵部ユニット72を親機本体ケース55から取り外し、さらに、解除ボタンをごみ箱などの上で操作することで、ヒンジ部132を介して集塵部蓋体131が回動し、親機集塵室部122内に溜められた塵埃が廃棄される。

【0107】

また、電気掃除装置１を使用しない状態では、電源コードを商用交流電源などに接続することで、充電器70により親機二次電池57が適宜充電される。

【0108】

上述したように、上記一実施の形態によれば、電気掃除機２を装置本体３に装着すると、子機集塵室11と集塵ユニット59とが連通開口17を介して連通するため、子機集塵室11に捕集した塵埃をこの子機集塵室11よりも大きな容量の集塵ユニット59へと、親機電動送風機56の駆動により移動させることが可能になるので、子機集塵室11は、一時的に塵埃を収容できれば充分であり、この子機集塵室11に必要以上の大きさを持たせたり、大掛かりなフィルタを取り付けたりせずに済むから、電気掃除機２を小型化および軽量化できる。

【0109】

この結果、装置本体３から取り外すことで少量の塵埃を掃除したり、高い位置を掃除したりする電気掃除機２を小型で軽量なものとすることができるので、電気掃除機２を手軽に使用でき、使い勝手および取り回し性が向上する。

【0110】

また、子機集塵室11の連通開口17に、電気掃除機２を装置本体３に装着した際に連通開口17を開放して子機集塵室11と集塵ユニット59とを連通させ、電気掃除機２を装置本体３から取り外した状態で連通開口17を閉塞する蓋体18を設けることで、電気掃除機２単体で掃除しているときに、子機集塵室11から塵埃がこぼれたり、電気掃除機２を装置本体３に対して着脱したりした際に塵埃がこぼれたりすることを防止できる。

【0111】

しかも、電気掃除機２を装置本体３に対して着脱させるだけで、子機集塵室11を集塵ユニット59に連通させたり、子機集塵室11と集塵ユニット59とを切り離したりすることが可能になるので、電気掃除機２を装置本体３に対して着脱する動作と、子機集塵室11と集塵ユニット59との連通動作とを別個にする場合と比較して、操作性が良好になる。

【0112】

さらに、屈曲接続部95、上部接続風路93、第２側部連通風路91および連通風路部86により、電気掃除機２を装置本体３に装着した状態で、親機電動送風機56の駆動により連通開口17を介して子機集塵室11の塵埃を集塵ユニット59へと吸い込み可能な吸引構造96を形成することで、子機集塵室11の塵埃を、集塵ユニット59へと効率よく吸い込むことができる。

【0113】

そして、弁体98を連通風路部86の接続管97に設け、子機集塵室11の塵埃を集塵ユニット59に吸い込む際に、弁体98を位置P2へと切り換えて集塵ユニット59と親機床ブラシ部52と

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を連通する風路を閉塞することで、この子機集塵室11の塵埃を集塵ユニット59に吸い込む際に、親機床ブラシ部52側から塵埃を吸い込むことを防止し、子機集塵室11の塵埃を、集塵ユニット59へと、より効率よく吸い込むことができる。

【0114】

また、装置本体３は、親機電動送風機56および親機二次電池57などの重量物を、親機本体ケース55の下部に収容することで、これら重量物を上側に収容する場合と比較して、電気掃除装置１の操作性が良好になる。

【0115】

さらに、子機床ブラシ８において、各子機吸込部34を子機本体部33に対して折り畳み可能とし、電気掃除機２を装置本体３に装着した際に、各子機吸込部34が折り畳み状態となるようにすることで、子機床ブラシ８を比較的大型化でき電気掃除機２での吸込性能を向上しつつ、電気掃除機２を装置本体３に装着した際にはスペースを取ることがない。

【0116】

そして、着脱凹部61に、各子機吸込部34を折り畳み状態に変形させる支持体151を設けることにより、電気掃除機２を装置本体３に装着する際に、各子機吸込部34が同時に折り畳まれるので、電気掃除機２の装置本体３への装着作業が容易になる。

【0117】

また、比較的重量が大きいホースなどを用いることなく電気掃除装置１を構成できるため、電気掃除装置１の収納時の見栄えが向上するとともに、電気掃除装置１の収納状態の制約が少なくなり、様々なスタイルの収納状態に対応できる。

【0118】

さらに、電気掃除機２を装置本体３に装着すると、子機二次電池21を親機二次電池57が直接充電するので、例えば商用交流電源などを直流電源に変換してから子機二次電池21を充電する場合と比較して、子機二次電池21の充電時間を短縮でき、充電効率を向上できる。

【0119】

特に、子機である電気掃除機２は、電気掃除装置１と比較して、手軽に短時間使用するために使用されることが多いので、短時間で子機二次電池21を充電できることで、例えば電気掃除装置１で主な掃除箇所の床面を掃除している間などに子機二次電池12の充電を完了させることなども可能になり、主な部分の掃除の後、細部を掃除する際に電気掃除機２を装置本体３から取り外せば、そのまま掃除できるなど、電気掃除機２の使い勝手が向上する。

【0120】

そして、親機二次電池57を充電する充電器70を備えることにより、容量が大きい親機二次電池57は、商用交流電源などを用いて充電できる。

【0121】

また、充電器70を装置本体３に内蔵することにより、別体の充電器を用いる場合と比較して、電気掃除装置１の収納スペースを抑制できる。

【0122】

なお、上記一実施の形態において、吸引構造96としては、連通開口17を介して子機集塵室11と集塵ユニット59とを連通させるものであれば、上記構成に限定されない。

【0123】

また、蓋体18の開閉構造は、例えばスライドにより開閉するものなどでもよく、上記構成に限定されない。

【0124】

さらに、装置本体３に内蔵した充電器70に代えて、電気掃除装置１を取り付けて充電する別体の充電器を用いることも可能である。この場合には、装置本体３に電源コードなどが必要なく、充電器に接続する充電用端子のみを装置本体３に設ければよいから、装置本体３を、より小型化することが可能になる。

【0125】

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そして、各端子および各本体端子の位置は、電気掃除機２を装置本体３に着脱することで電気的に着脱できるものであれば、その設ける位置および形状などは、上記各構成に限定されない。

【0126】

また、電気掃除機２の装置本体３への接続構造など、装置本体３、あるいは電気掃除機２の細部などは、上記構成に限定されるものではない。

【図面の簡単な説明】

【0127】

【図1】(a)は本発明の一実施の形態の電気掃除装置の使用状態の要部を示す説明図、(b)は同上電気掃除装置の電気掃除機の子機集塵室の塵埃を親機集塵室へと吸い込む状態の要部を示す説明図である。

【図2】同上電気掃除装置の要部を親機本体ケースを省略して示す斜視図である。

【図3】同上電気掃除装置の要部を親機本体ケースを省略して後部から示す斜視図である。

【図4】同上電気掃除装置の電気掃除機を示す斜視図である。

【図5】同上電気掃除機の一部を示す斜視図である。

【図6】同上電気掃除装置の親機集塵室を示す斜視図である。

【図7】同上親機集塵室の一部を示す斜視図である。

【図8】同上電気掃除装置の親機本体ケースの一部を示す斜視図である。

【図9】同上電気掃除装置の装置本体の要部を後部から示す斜視図である。

【図10】同上装置本体を示す中央断面図である。

【図11】同上電気掃除装置を示す後面図である。

【図12】同上電気掃除装置を示す斜視図である。

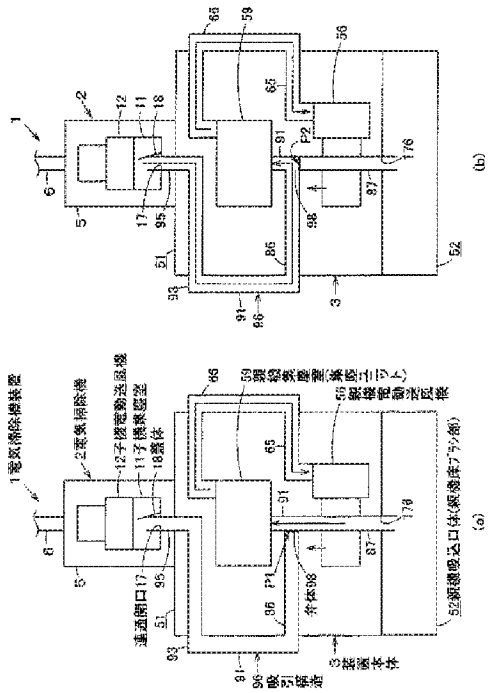
【符号の説明】

【0128】

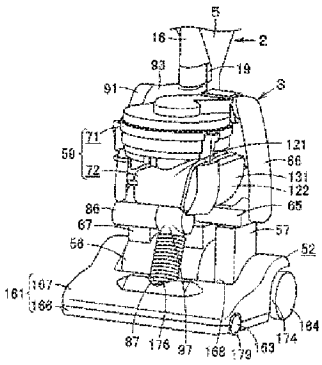
1　電気掃除装置
2　電気掃除機
3　装置本体
11　子機集塵室
12　子機電動送風機
17　連通開口
18　蓋体
52　親機吸込口体としての親機床ブラシ部
56　親機電動送風機
59　親機集塵室としての集塵ユニット
96　吸引構造
98　弁体

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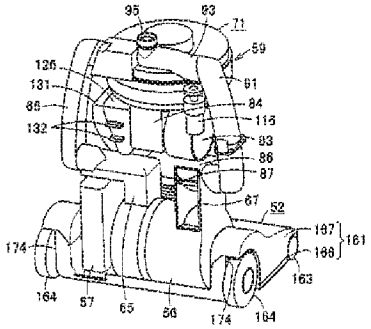
【図1】



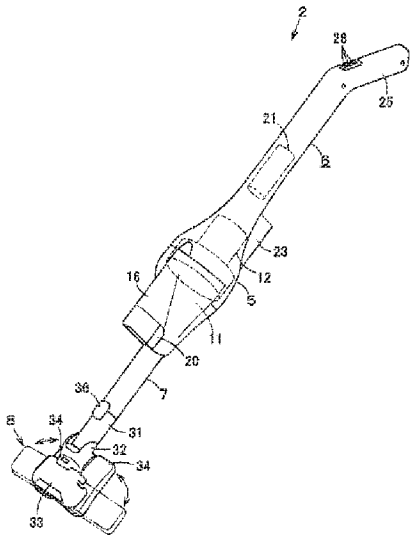
【図2】



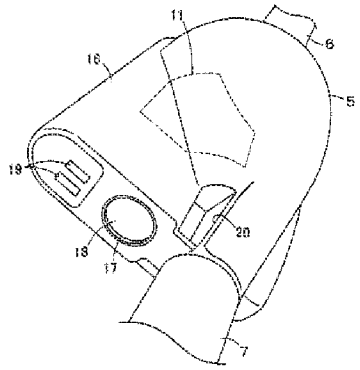
【図3】



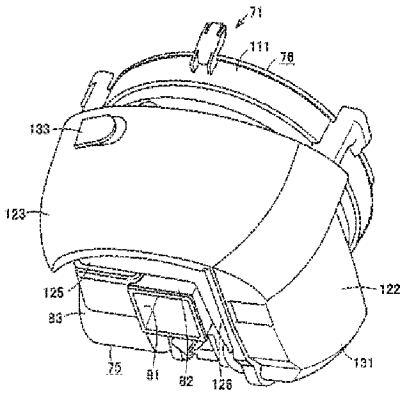
【図4】



【図5】

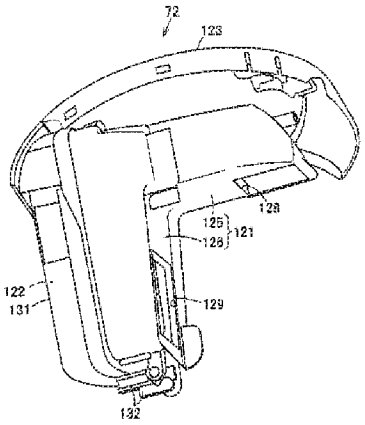


【図6】

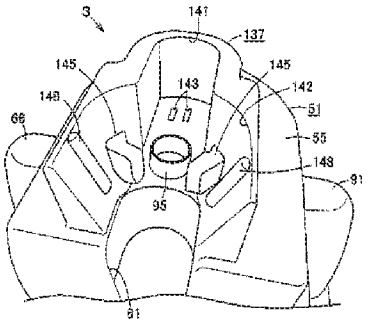


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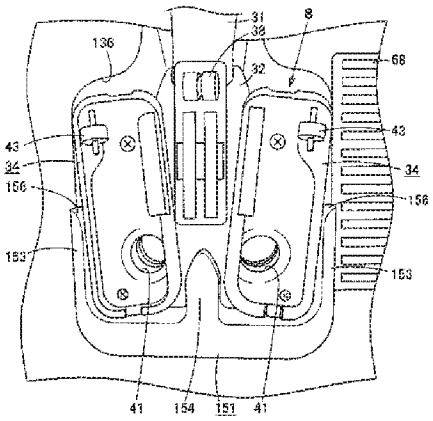
【図7】



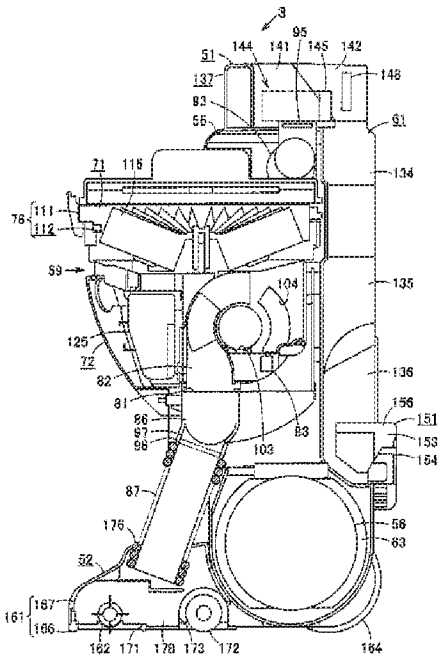
【図8】



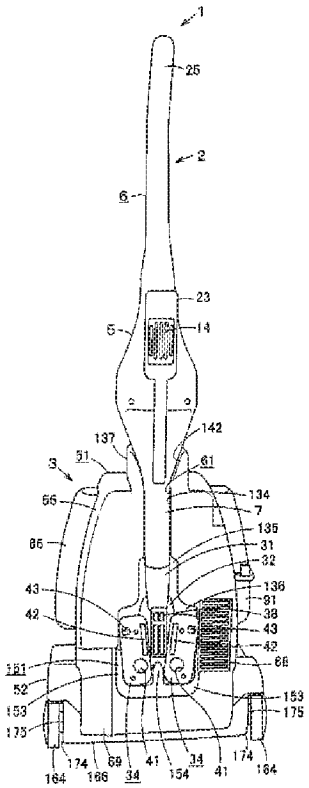
【図9】



【図10】

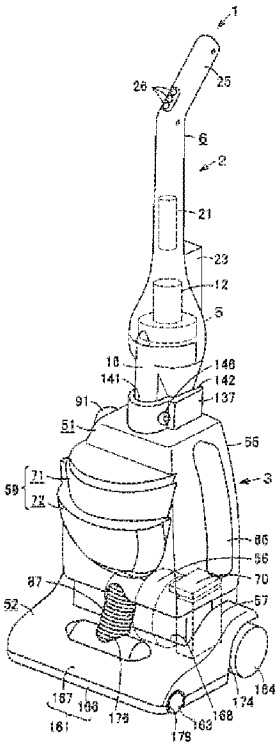


【図11】



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【図12】


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Ｆターム(参考) 3B006 GA00
3B057 BA05 BA09 BA10 BA27

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A47L 9/16 (2006.01)

(52) UK CL (Edition X):
A4F FFD FSCA FSCW FSSB
B2P P10B2A3 P3A

(56) Documents Cited:
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US 20060162117 A1

(58) Field of Search:
UK CL (Edition X) **A4F, B2P**
INT CL **A47L, B04C**
Other: **ONLINE: WPI EPODOC**

(54) Abstract Title: **Hand held cyclone cleaner with openable cyclone base**

(57) A hand held cyclone vacuum cleaner has a pivot opening base, which may be engageable by a catch 120, such as permit the ease of emptying of the cyclone dust container 100.

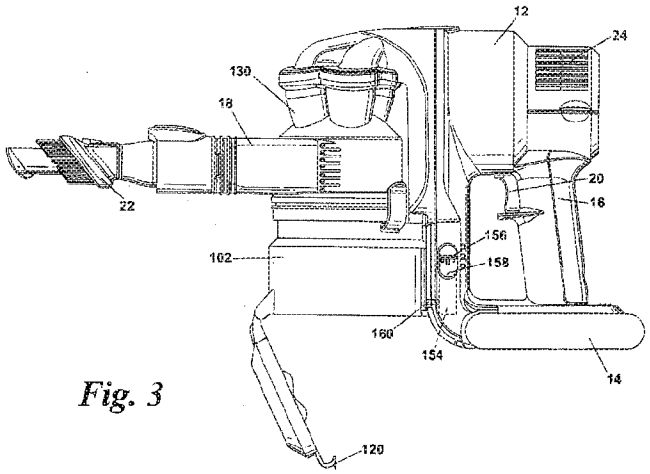


Fig. 3

GB 2 440 111 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

This print takes account of replacement documents submitted after the date of filing to enable the application to comply with the formal requirements of the Patents Rules 1995

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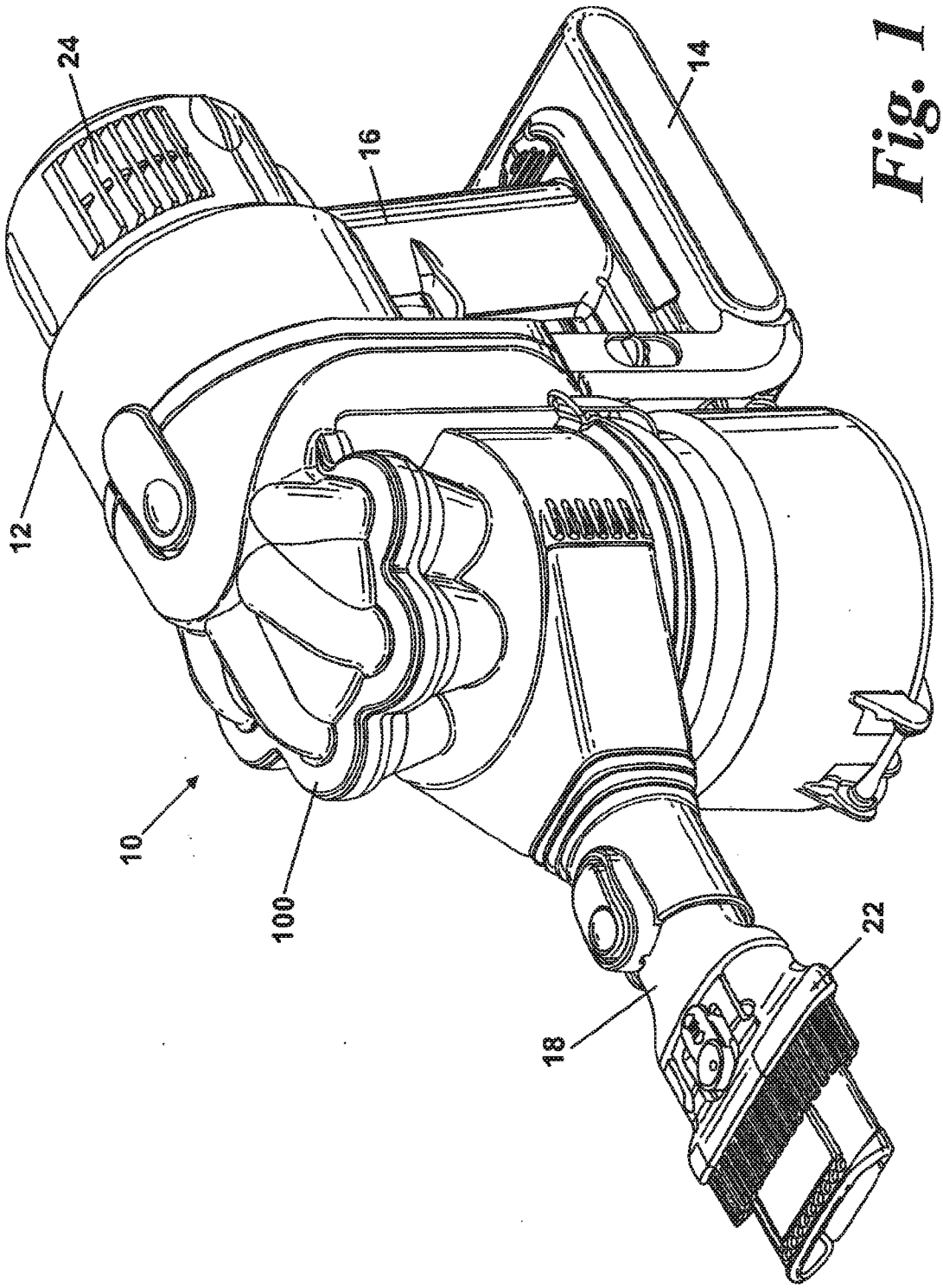


Fig. 1

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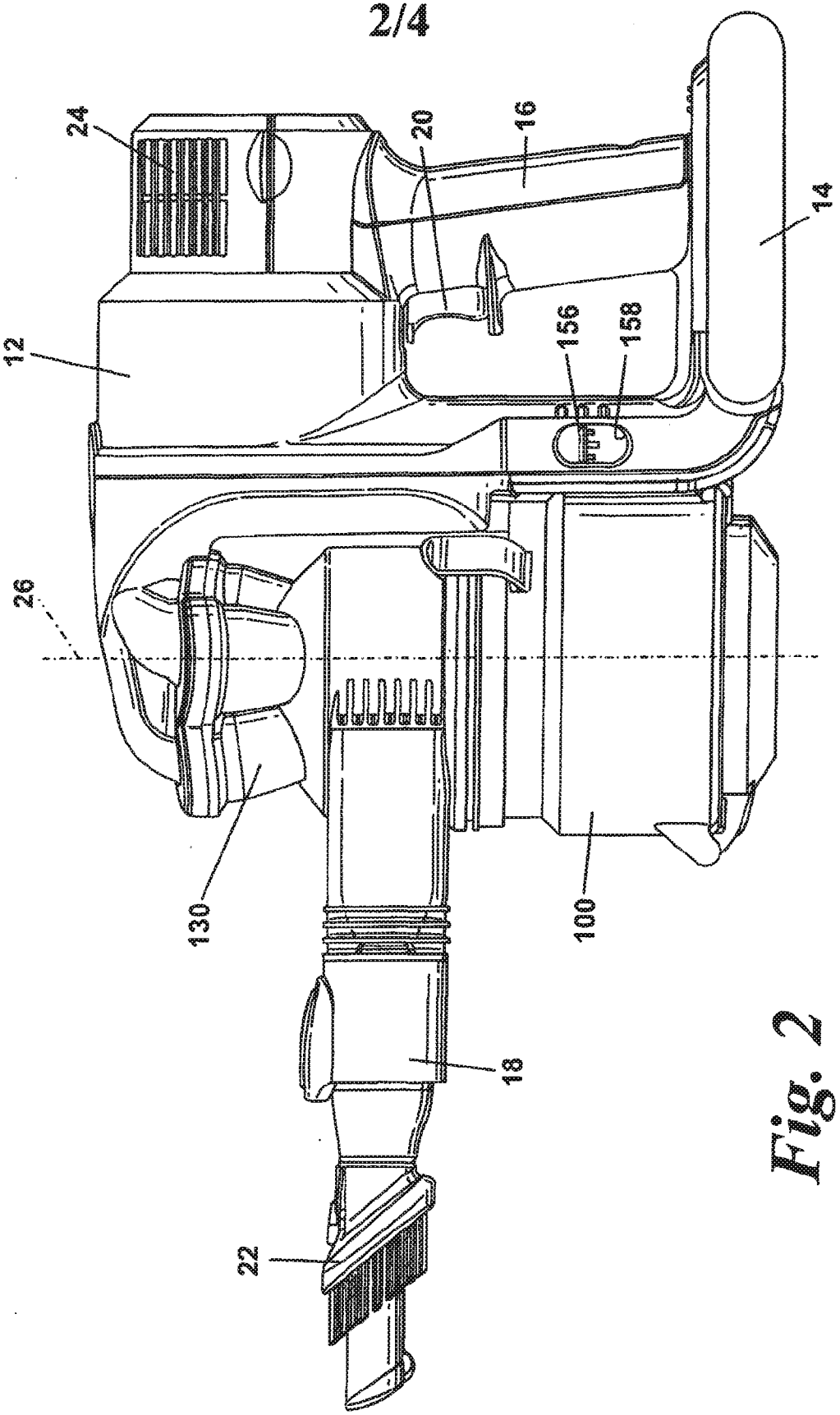


Fig. 2

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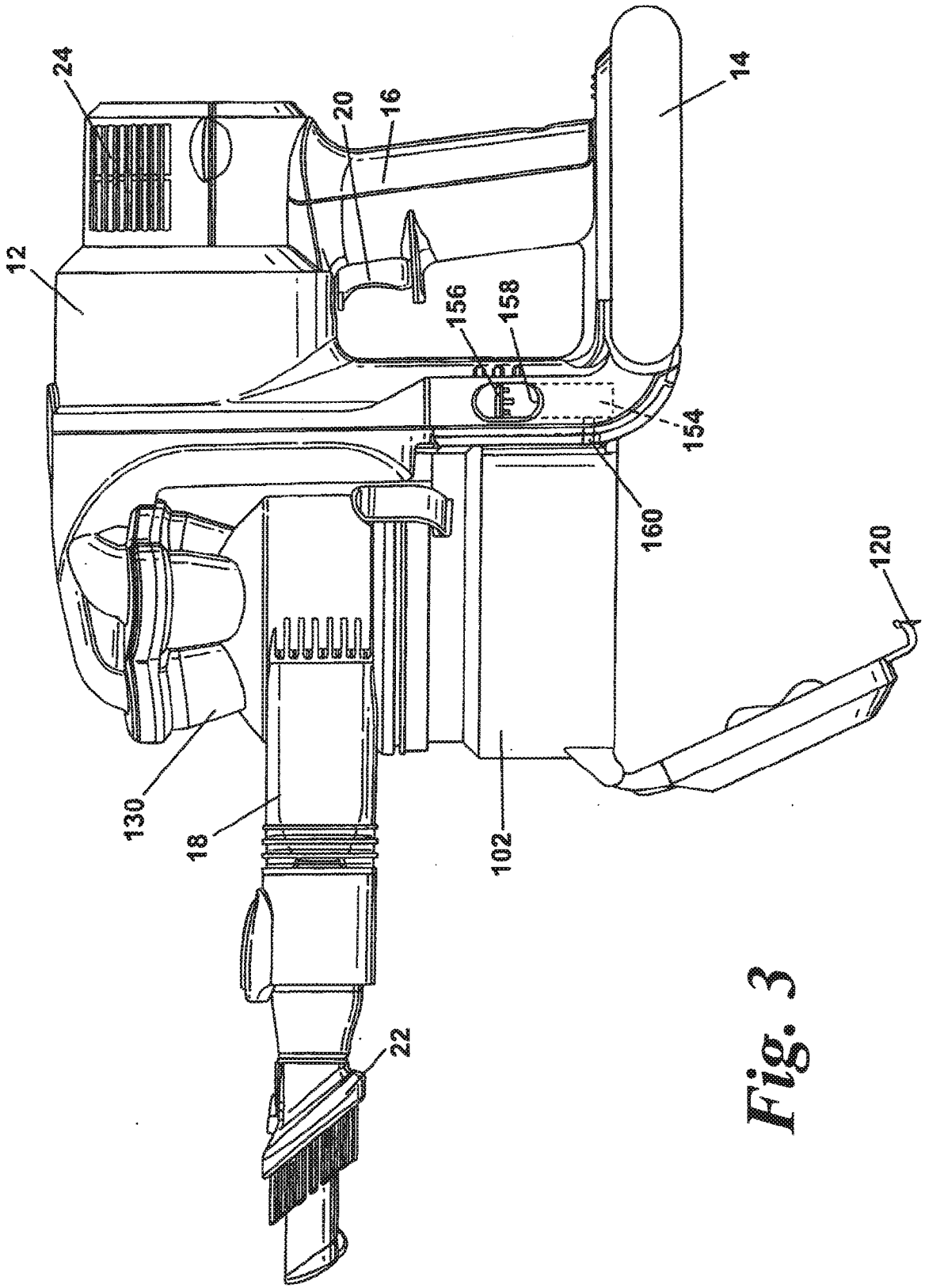


Fig. 3

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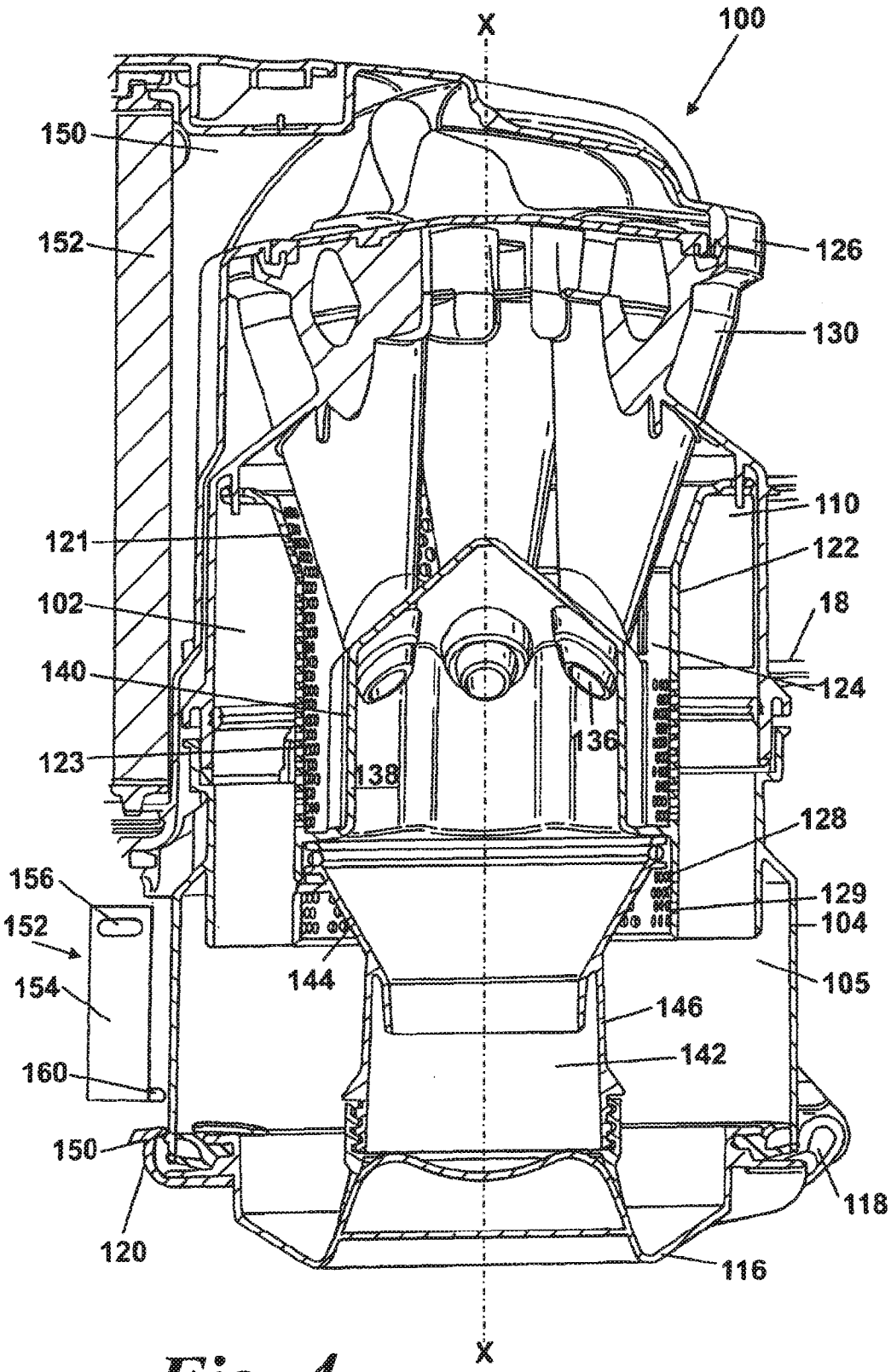


Fig. 4

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Handheld Cleaning Appliance

The invention relates to a handheld cleaning appliance particularly, but not exclusively, to a handheld vacuum cleaner. More particularly, the invention relates to a handheld cleaning appliance having a cyclonic separator.

Handheld vacuum cleaners are well known and have been manufactured and sold by various manufacturers for several years. Typically, a handheld vacuum cleaner comprises a casing which houses a motor and fan unit for drawing air into the cleaner via an inlet, and a separation device such as a filter or bag for separating dirt and dust from the incoming airflow. An example of such a vacuum cleaner is shown in GB1027278.

Handheld vacuum cleaners have more recently been developed to incorporate cyclonic separation systems which are capable of removing larger items of debris from the airflow before removing finer particles using a filter or other barrier means. An example of such a device is sold by Black & Decker under the trade name DUSTBUSTER®. A further example of a handheld vacuum cleaner incorporating a cyclonic separator is shown in GB2035787A.

A disadvantage of known handheld vacuum cleaners which utilise cyclonic separators is that emptying the appliance of dirt and dust collected therein is awkward, inconvenient and messy. In most cases, a compartment of the appliance must be physically removed from the rest of the appliance, transported to a suitable receptacle, emptied and then replaced on the appliance. Removal of a portion of the appliance inevitably carries with it a risk that the portion will not be replaced correctly and this can adversely affect the performance of the appliance. It is therefore an object of the invention to provide a handheld cleaning appliance which is easier and more convenient to empty than known handheld vacuum cleaners. It is a further object of the invention to provide a handheld

cleaning appliance which can be emptied without the risk of subsequent loss of performance due to incorrect replacement of a portion of the appliance.

The invention provides a handheld cleaning appliance comprising a dirty air inlet, a clean air outlet and separating apparatus for separating dirt and dust from an airflow located in an airflow path leading from the air inlet to the air outlet, the separating apparatus comprising a cyclonic separator having at least one cyclone, wherein the cyclonic separator further comprises a collector having a wall and a base member which is pivotably connected to the wall so as to allow the collector to be opened for emptying purposes without removing the collector from the remainder of the appliance.

By providing a cyclonic separator which has a pivotable base forming part of the collector, the collector can be emptied easily and reliably without separating any part of the cyclonic separator from the rest of the appliance. The base can simply be pivoted back into the correct position once emptying has taken place. This reduces the risk of the cleaning appliance operating at less than optimum performance after emptying.

Preferably, the base is hinged to the wall on a first side thereof and a catch is provided for holding the base in a closed position on an opposite side thereof. In a preferred embodiment, the appliance includes a main body which incorporates an actuator for operating the catch. More preferably, the actuator comprises a slidably mounted rod which is movable between an inoperative position and an actuating position in which the rod contacts part of the catch, the rod being biased into the inoperative position. This arrangement allows the catch to be released without the user actually touching the collector. It also provides a compact, reliable mechanism for remotely emptying the collector in a cost-efficient manner.

An embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 shows a handheld cleaning appliance according to the invention;

Figure 2 is a side view of the appliance of Figure 1;

Figure 3 is a side view of the appliance of Figure 1 showing the collector base in an open position; and

Figure 4 is a longitudinal cross section through the cyclonic separating apparatus forming part of the appliance of Figure 1.

Figures 1 to 3 show a handheld vacuum cleaner 10. The handheld vacuum cleaner 10 has a main body 12 which houses a motor and fan unit (not shown). The main body 12 also includes a power source 14 such as a battery. A handle 16 is provided on the main body 12 for manipulating the handheld vacuum cleaner 10 in use. A cyclonic separator 100 is attached to the main body 12. A dirty air inlet 18 extends from a portion of the cyclonic separator 100 remote from the main body 12. A brush tool 22 is slidably mounted on the distal end of the dirty air inlet 18. A set of exhaust vents 24 are provided on the main body 12 for exhausting air from the handheld vacuum cleaner 10.

The cyclonic separator 100 is located between the main body 12 and the dirty air inlet 18. Consequently, the cyclonic separator 100 is located between the handle 16 and the dirty air inlet 18. The cyclonic separator 100 has a longitudinal axis 26 which extends in a generally upright direction so that the axis 26, and therefore the cyclonic separator 100, lies substantially parallel to the direction in which the handle 16 extends.

The orientation of the handle 16 is such that, when the user grips the handle 16, the user's hand forms a fist in a manner similar to that adopted when gripping a saw. This ensures that the user's wrist is not strained more than necessary when manipulating the handheld vacuum cleaner 10 for cleaning purposes. The cyclonic separator 100 is positioned close to the handle 16 which also reduces the moment applied to the user's wrist when the handheld vacuum cleaner 10 is in use. The handle 16 carries an on/off switch 20 in the form of a trigger for turning the vacuum cleaner motor on and off.

The cyclonic separating apparatus 100 forming part of the handheld vacuum cleaner 10 is shown in more detail in Figure 4. The cyclonic separating apparatus 100 comprises a first cyclone 102 which has a longitudinal axis X-X and a collector 105 having a wall 104. An inlet 110 is formed in the upper portion of the wall 104. The inlet 110 is in communication with the dirty air inlet 18 and forms a communication path between the dirty air inlet 18 and the interior of the first cyclone 102. The air inlet 110 is arranged tangentially to the first cyclone 102 so that the incoming air is forced to follow a helical path around the interior of the first cyclone 102.

A base 116 closes the collector 105 at one end of the first cyclone 102. The base 116 is pivotably mounted on the lower end of the wall 104 by means of a hinge 118. The base 116 is retained in a closed position (as shown Figures 1, 2 and 4) by means of a catch 120 which interengages with a lip 150 located on the wall 104. The catch 120 is resiliently deformable so that, in the event that downward pressure is applied to the uppermost portion of the catch 120, the catch will move away from the lip 150 and become disengaged therefrom. In this event, the base 116 will drop away from the wall 104.

An actuator 152 is provided in the main body 12. It is shown schematically in Figures 3 and 4. Essentially, the actuator 152 comprises a rod 154 which is slidably mounted inside a part of the main body 12 so as to be movable between a first, inoperative position and a second, operative or actuating position. The first position is shown in Figure 4. The rod 154 is biased into the first position by a spring or other resilient means which are not shown in the drawings. At or near its upper end, the rod 154 carries a projection 156 which extends laterally away from the rod 154 and projects through an aperture 158 in the main body 12 (see Figures 2 and 3). The rod 154 also carries, at its lower end, another projection 160 which extends towards the collector 105 and the catch 120. It also projects through another aperture in the main body 12 so that, when the rod 154 is moved into the second position, the projection 160 comes into

contact with the catch 120 and presses it downwardly so that the catch 120 is released from the lip 150.

The rod 154 is moved from the first position to the second position manually by means of the user pressing the projection 156 in a downwards direction against the action of the spring. This causes the catch 120 to be released from the lip 150 and the base 116 then swings away from the wall 104. The catch 120 can also be arranged so that further downward movement of the rod 154 will apply an opening force to the catch 120. This is advantageous in that the seal between the base 116 and the wall 104 will then be broken to allow the base to swing open more freely.

Upon release of the pressure applied by the user to the projection 156, the rod 154 returns to the first position under the action of the spring. The base 116 can be returned to the closed position manually by the user whereupon the catch will re-engage with the lip 150. The presence of the hinge 118 means that the base 116 remains automatically aligned with the wall 104 so that there is little or no risk that the base 116 will be incorrectly positioned when it is returned to the closed position.

A shroud 121 is located inwardly of the wall 104 of the first cyclone 102. The shroud 121 comprises a part-cylindrical, part-frustoconical wall 122 having a plurality of through-holes 123. The shroud 121 surrounds an outlet 124 from the first cyclone 102. The outlet 124 provides a communication path between the first cyclone 102 and a second cyclone assembly 126. A lip 128 is provided at the base of the shroud 121. The lip 128 has a plurality of through-holes 129 which are designed to allow air to pass through but to capture dirt and dust.

The second cyclone assembly 126 comprises a plurality of second cyclones 130 arranged in parallel with one another. In this embodiment, six second cyclones 130 are provided. The second cyclones 130 are arranged around the axis X-X of the first cyclone 102. The arrangement of the second cyclones 130 is such that the second cyclones 130 are spaced equi-angularly around the axis X-X. Each second cyclone 130

has a tangentially-arranged air inlet and an air outlet (not shown) located at a first end of the respective second cyclone 130. A cone opening 136 is located at a second end of each second cyclone 130. The plane of the cone opening 136 of each second cyclone 130 is inclined with respect to a longitudinal axis (not shown) of the respective further cyclone 130. The cone opening 136 of each of the second cyclones 130 is in communication with a passageway 138 defined by a wall 140 located inwardly of the shroud 121.

The second end of each second cyclone 130 projects into the interior of the first cyclone 102. However, the first end of each second cyclone 130 lies outside the envelope of the first cyclone 102. In the orientation shown, it is the lower end of each second cyclone 130 which projects into the upper end of the first cyclone 102. The inlet 110 is also arranged at the upper end of the first cyclone 102 so that the inlet 110 is located in the region of the cyclonic separator 100 in which the first and second cyclones 102, 130 overlap. Because the first ends of the second cyclones 130 lie outside the envelope of the first cyclone 102, this region of the cyclone separator 100 lies intermediate the upper end of the cyclone separator 100 and the lower end of the cyclone separator 100. Connecting the dirty air inlet 18 to the cyclone separator 100 at an intermediate portion thereof is beneficial for the manipulation of the handheld vacuum cleaner 10 and avoids the lower extremities of the appliance being accidentally knocked on surfaces away from the area being cleaned.

A collector 142 is located at the lower end of the passageway 138. The collector 142 comprises a frustoconical first portion 144 and a cylindrical second portion 146. The interior of the collector 142 is delimited by the base 116 and the sides of the first and second portions 144, 146 of the collector 142.

Each of the air outlets of the second cyclones 130 is in communication with a duct 150. The duct 150 provides an airflow path from the cyclonic separating apparatus 100 into other parts of the handheld vacuum cleaner 10. Located at the downstream end of the duct 150 is a pre-motor filter 152. The pre-motor filter 152 comprises a porous material

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such as foam and can also include a fine filter material. The pre-motor filter 152 is designed to prevent any fine dust particles from entering the motor and causing damage thereto.

In use, when the on/off switch 20 is depressed, the motor and fan unit draws a flow of dirt-laden air into the dirty air inlet 18 and then into the cyclonic separator 100. Dirt-laden air enters the cyclonic separator 100 through the inlet 110. Due to the tangential arrangement of the inlet 110, the airflow is forced to follow a helical path around the interior of the wall 104. Larger dirt and dust particles are separated by cyclonic motion around the wall 104. These particles are then collected at the base 116 of the first cyclone 102.

The partially-cleaned airflow then flows back up the interior of the first cyclone 102 and exits the first cyclone 102 via the through-holes 123 in the shroud 121. Once the airflow has passed through the shroud 121, it enters the outlet 124 and from there is divided between the tangential inlets of each of the second cyclones 130. Each of the second cyclones 130 has a diameter which is smaller than that of the first cyclone 102. Therefore, the second cyclones 130 are able to separate smaller particles of dirt and dust from the partially-cleaned airflow than the first cyclone 102. Separated dirt and dust exits the second cyclones 130 via the cone openings 136. Thereafter, the separated dirt and dust passes down the passageway 138 and into the collector 142. The separated dirt and dust eventually settles at the bottom of the collector 142 on the base 116.

Cleaned air then flows back up the second cyclones 130, exits the second cyclones 130 through the air outlets and enters the duct 150. The cleaned air then passes from the duct 150 sequentially through the pre-motor filter 152, the motor and fan unit, and a post-motor filter before being exhausted from the vacuum cleaner 10 through the air vents 24.

The first cyclone 102 and the collector 142 can be emptied simultaneously by releasing the catch 120 to allow the base 116 to pivot about the hinge 118 so that the separated

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dirt and dust can fall away from the cyclonic separator 100. This is done by the user pressing the projection 156 in a downwards direction against the biasing action of the spring so as to cause the other projection 160 to come into contact with the catch 120. The catch 120 is resiliently deformed away from the lip 150 and is this released therefrom. Further downward movement of the projection 156 ensures that the seal between the base 116 and the wall 104 is broken and the base 116 then swings downwardly away from the wall 104. The dirt and dust collected in the cyclonic separator 100 then falls out of the first cyclone 102 and the collector 142. By positioning the cleaning appliance 10 above a suitable dirt receptacle such as a dustbin, the dirt and dust collected in the cyclonic separator can be efficiently and reliably emptied.

When the cyclonic separator 100 has been emptied as described above, the user may close the cyclonic separator 100 by moving the base 116 back into the closed position shown in Figures 1 and 2 by hand. Alternatively, the cleaning appliance may be manipulated so as to swing the base 116 into the closed position. A further alternative would be to place the appliance onto a surface so as to apply a closing force to the base 116 and thereby bring the base 116 into latching contact with the lip 150. The presence of the hinge 118 enables the cyclonic separator 100 to be emptied and subsequently closed without any serious risk of misalignment of the base 116. Misalignment of the base 116 would jeopardise the performance of the appliance.

The invention is not limited to the precise details of the embodiment described above. For example, the number of first and second cyclones can be varied, as can the detail of their design, such as their cone angle, axis inclination and cone opening inclination. The shape of the collector and base can be altered, as can the precise location of the hinge and catch and the location of the actuator. The location of the on/off switch may also be varied.

CLAIMS

1. A handheld cleaning appliance comprising a dirty air inlet, a clean air outlet and separating apparatus for separating dirt and dust from an airflow located in an airflow path leading from the air inlet to the air outlet, the separating apparatus comprising a cyclonic separator having at least one cyclone, wherein the cyclonic separator further comprises a collector having a wall and a base member which is pivotably connected to the wall so as to allow the collector to be opened for emptying purposes without removing the collector from the remainder of the appliance.

2. A handheld cleaning appliance as claimed in claim 1, wherein the base is hinged to the wall on a first side thereof.

3. A handheld cleaning appliance as claimed in claim 2, wherein a catch is provided for holding the base in a closed position.

4. A handheld cleaning appliance as claimed in claims 2 and 3, wherein the catch is provided at a location which is diametrically opposed to the hinge.

5. A handheld cleaning appliance as claimed in claim 3 or 4, wherein the appliance includes a main body which incorporates an actuator for operating the catch.

6. A handheld appliance as claimed in claim 5, wherein the actuator comprises a slidably mounted rod which is movable between an inoperative position and an actuating position in which the rod contacts part of the catch, the rod being biased into the inoperative position.

7. A handheld appliance as claimed in claim 6, wherein the rod comprises a projection which is manually movable with respect to the main body.

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8. A handheld appliance as claimed in any one of claims 5 to 7, wherein a portion of the collector lies adjacent a portion of the main body.

9. A handheld cleaning appliance substantially as hereinbefore described with reference to the accompanying drawings.

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Application No: GB0618494.9 **Examiner:** Mr Michael Young

Claims searched: 1-9 **Date of search:** 18 December 2006

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1 at least	WO 2006/076363 A2 (ROYAL APPLIANCE...) See figs.7-11 & corresponding passages.
X	1 at least	US 5692262 A (HAUPT) See feature 36, fig.1 & corresponding passages.
Y	1 at least	GB 2035787 A (L & H DESIGNS) Whole document relevant.
Y	1 at least	US 2006/0162117 A1 (THOMAS) See feature 21, fig.2B & corresponding passages.
Y	1 at least	JP 2004049792 A (TOSHIBA) See feature 50, fig.5 & provided translated abstract.

Categories:

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Field of Search:

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Whirlwind hand-held type vacuum dust collector

Page bookmark	CN101061932 (A) - Whirlwind hand-held type vacuum dust collector
Inventor(s):	JIANAN HE [HK] ±
Applicant(s):	KWONNIE ELECTRICAL PRODUCTS LT [HK] ±
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Application number:	CN2006177262 20060428
Priority number(s):	CN2006177262 20060428

Abstract of CN101061932 (A)

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The invention discloses a chargeable hand-held vacuum aspirator, which is characterized by the following: possessing mounting or dismounting dust cup section; setting the dust cup as two parallel cyclones and two collecting dust chamber; connecting the collecting dust chamber to the cyclone body; using smaller cyclone because of two parallel cyclones; realizing better dust separating property; setting the cyclone body without filter and collecting dust chamber; increasing cyclone action efficiency with the two parallel cyclones; needing very simple filter; protecting blade wheel in the aspirator. This invention does not appear gradually clogging situation.

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DESCRIPTION CN101061932

Rechargeable handheld vacuum cleaner of the present invention having a removable dust cup portion, said dirt cup portion comprises two parallel cyclone and two baghouse. Cyclone dust chamber is connected to the body via dust release hole. As a result of two parallel cyclone design, it is possible to use a smaller cyclone, it does not affect the performance of the air at the same time, but also to achieve better dust separation performance. And the cyclone body neither filters nor dust chamber, making it easier and more hygienic way to clean the dust chamber. Two parallel cyclone application improves the efficiency of the cyclone effect, requiring only a simple filter to protect the impeller inside the vacuum cleaner. Therefore, based on the above-described structure, the situation will not be gradually clogged filter, which means that the sucking power can be maintained at a fixed level.

Cyclone vacuum cleaner handheld device

TECHNICAL FIELD

The present invention relates to a rechargeable hand-held vacuum cleaners, and more particularly relates to a parallel Cyclone separation device used rechargeable handheld vacuum cleaner.

Background technique

A typical hand-held vacuum cleaner having a motor and an impeller connected to the motor by the main Driving power supply or a rechargeable battery, said impeller to produce a gas stream, said gas stream through the first nozzle. Then flows through the dust cup and then into the impeller. In the dust cup, most of them will set up a simple filter, Sometimes the filter with cyclone air movement together with application for causing dirt and dust from Air separation. Another filter may be provided after the impeller for cleaner exhaust emissions before Filtering fine dust or carbon dust from the motor.

In one simple question dust cup filter settings typical hand-held vacuum cleaner , When receiving excessive dust filter, the filter will soon be clogged up, thus reducing the Vacuum cleaner performance. Allowing the user must remove and clean the filter, which is used to make a User feel inconvenient step.

One problem is connected with the filter dust is usually disposed within the cup, and in order to clean the dust Cup, the user must first move came from the dust cup filter. This step will often make the environment dirty, and And may stain the user's hand, causing health problems.

in another problem typical handheld vacuum cleaner equipped with a so-called cyclone effect is inefficient Cyclone effect can make most of the dirt and dust accumulate on top of the filter. As the filter is more To the more clogged with dust suction corresponding gradually lost. In the vacuum cleaner, the user must still Dismantle and clean the filter regularly, so that the purpose of the application of the cyclone has been questioned.

Cyclones in the art and are well known. It is applied in a vacuum cleaner is also known (For example, in EP 0942723B). Set up a single cyclone and a plurality of downstream upstream Parallel cyclone application has also been described in US 3425192. Use two or more parallel Cyclone can bring out the less air resistance and improve overall cyclone performance. Improved separation performance It stems from the principle that for a given suction source, an air path may be divided into several having Smaller cross-sectional area of the air path, while yet maintaining the same total flow rate. This means that each The inner diameter of the individual cyclone can be reduced, so that when particles in the air

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in rotation by spin There will be a greater radial acceleration when the wind is. Thus, with respect to the use of only a single cyclone, use A plurality of cyclones can also make finer separation of dust from the air. However, due to the suction vacuum cleaner The particle sizes, the actual design there are aisc disadvantages. Some volume is greater than the individual into the spin Particulate air filter air route will be stuck. To overcome this problem, a single large pre-post-cyclone Surface connecting multiple smaller parallel arrangement of the cyclone has been used.

in this theme we have a large number of patents have been published. EP 0042723 discusses a cyclone or a single Two cyclones arranged in series. GB 2372435 describes a plurality of separators, connect them An air path, and the outer surface of the arrangement relationship with the vacuum cleaner. And WO 00/24519 is Another example of a more narrow range of characterization of the air path.

Exist on the market with dual-cyclone vacuum cleaner, a way is upright, one column Body mode. Are arranged in two parallel double cyclone is characterized by an upstream splitter and no order segment. Two cyclone has a straight body and in communication with the separate dust collecting chamber. Leading to the cyclone Air inlet T-shaped, so that the air flow is split into two individual and two into the tangential direction into a cyclone. US 3425192 also describes the application of the second stage straight and parallel to the cyclone Device. Therefore, parallel cyclones are known in the art, and the present invention is also based correlation The principle of operation.

SUMMARY

Technical problem to be solved by the present invention is to provide an improved hand-held vacuum cleaner, the main It includes a housing portion and a dust cup portion, and provides efficient cyclone effect, clean and convenient Process, and a constant inhalation of the dust removal performance.

Both sides of the main housing part by the composition of the housing, which both sides of the case are held together by a fastening means. shell A body portion for the convenience of a handle engageable with the other member, thereby providing Comfortable soft grip effect. Disposed within the housing on both sides of this are: a motor connected to the impeller; Rechargeable battery pack; air inlet portion for directing air from the dust cup portion to the impeller; Switch; release mechanism for releasing the dust cup portion; and a control device for an electronic component. An air inlet for directing air into the portion having a funnel-shaped portion of the center of the impeller, said funnel Section fitted with a protective bar to prevent users from contacting the impeller. Removable battery cover is attached to the main housing under Side, in order to facilitate recycling or repair purposes and to remove the battery. The bottom portion of the main housing has Storage recess fitting tool. Further, the battery cover having a slit extending longitudinally along the body, these narrow Seam acts as a connecting means to connect the accessories, such as handlebar attachments.

Dust cup portion comprising an air inlet nozzle in which is formed the dust cup, a cylindrical geometry Cyclone body, said body having two parallel and separate cyclone dust receiving chamber, and including Cyclone top portions of the two return pipe. Reflux tube having a tapered end and an air inlet slit-shaped into a rough security filter cover. Other alternatives thereof, may be slit as a grid or the like over Filter means substituted or used in conjunction. Let the top of the cyclone also has two air return path in which you will Poly cavity, said cavity adapted to receive the filter. When sharp or hard objects hard by the cyclone system Time system, the filter can protect the motor and impeller. The shape of the nozzle is designed to allow accessory tool insert into the form

in order to obtain good suction and cyclone performance, fully sealed air path is important, because Here, the main components of the dust cup portion, dust cup, and the cyclone body permanently bonded together, and Also fit tightly between the top of the cyclone body and a cyclone.

During normal operation, the vacuum cleaner of the present invention in a manner described below operations. By the power The battery pack to power the motor and impeller and intake air through the mouthpiece with dust. The air passes through the Into the trachea channel until it reaches the T-shaped double bifurcation, where the air flow is divided into two shares of gas per share Stream is directed to a cyclone in a tangential direction. Within each cyclone, air and dust particles Along the cylindrical body spiral forward, making heavier than air and dirt particles moving outward through centrifugal force. in The end of the cyclone body has a hole cut, dust particles by inertia escaping into the hole cutting Mouth, while the cleaned air continues to follow the return pipe into the vortex. Dust particles are collected separately in the two dust collecting chamber, each for a cyclone dust collecting chamber and connected to the incision through the hole Cyclone body.

Cleaned air flow along the two return pipe, downstream of the cyclone and after the top of the cyclone Cavities converging at the top of the cyclone may receive a filter. The filter is used to remove empty The object has not been any gas cyclone separator and serves as security for the motor and impeller

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Member. The filter fineness not sufficient to block any tiny particles. Via the top of the cyclone Airtight seal is connected to the main body. Cleaned air through a funnel-shaped entrance and through the impeller, Re-entering the body of the vacuum cleaner. in the main housing, the motor and the battery surrounded by walls forming a long empty Gas path for guiding air from the main housing, while helping to reduce noise and cooling components.

To dismantle the dust cup portion for emptying accumulated dust, according to user needs a front portion of the handle Button, so that the release of dust cup. The user need not touch or remove any portion in contact with dust Points or filters, can be removed and empty the dust cup. This is one aspect of the present invention improves. Another improvement is the efficiency of the cyclone; because most of the dust gathered in a separate dust receiving chamber, So no need to clean the filter after each use. Further improvement is related with the suction performance; Since most of the dust in the air is filtered instead of the cyclone, so basically there is no Clogging of the filter, the user will experience solid constant suction performance.

BRIEF DESCRIPTION

The following preferred embodiments of the present invention is described in detail with accompanying drawings, wherein:

FIG. 1 is a perspective view of a hand-held vacuum cleaning apparatus constructed in accordance with a preferred embodiment of the diagram in which the ash Dust cup portion is connected to the main housing;

Figure 2a is a perspective view of a portion of the vacuum cleaner dust cup means.

Figure 2b is a perspective view of a vacuum cleaning apparatus of the cup portion of the dust separated in FIG;

Figure 3 is a side sectional view of a vacuum cleaning device;

Figure 4 is a side sectional view of another vacuum cleaning apparatus, showing part of the dust cup and The locking mechanism between the main housing;

Figure 5 is equipped with a dust cup filter and funnel-shaped inlet Figure 2a vacuum cleaning device Partial side sectional view;

Figure 6 is equipped with dust cup filter and funnel-shaped inlet Figure 2a vacuum cleaning device A plan sectional view of the portion;

FIG. 7 is connected to the floor nozzle and a perspective view of the vacuum cleaning device lever;

Figure 8 is a filter device in the body of the cyclone conventional cyclone system.

detailed description

[7]

As shown, the vacuum cleaning device 1 includes the main housing 1 and the dust cup 6. Dust Cup 6Part of the vacuum cleaner body is formed when connected to the main housing 1. 1 is the upper portion of the main housing A dust cup release button on the handle 4, including 2, 8 located in front of the dust cup 6 into the gas passage opening Side and bottom dust cup portion 6 is formed dust collection chamber 9. Example, in a preferred embodiment the dust collecting chamber 9it made of transparent material, which can be observed within the aggregate amount of dust. Removable battery cover 10Connected to the bottom portion of the rear of the main housing 1, in order to facilitate recycling or repair purposes away in addition to the battery. Accessories 11 when not in use can be stored in the lower side of the main body 1. Both sides of the main housing 1 The exhaust port is used having a slit 5. A cyclone body 7 is located in the dust cup 6, and shape As part of the surface of the vacuum cleaning device. In a preferred embodiment, the cyclone body 7 A transparent material, so that the cyclone effect is observed inside the cyclone body 7. Cyclone body 7it may be present within the plurality of cyclones. In a preferred embodiment, there are two cyclone.

[34]

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Figures 2a and 2b show, respectively, the vacuum cleaner dust cup means 6 and the main body 1 2a shows The main housing separating dust cup 6 can be seen, including baghouse dust collection chamber 9 and the opening 35 Partition 21. Intermediate wall 21 of the cavity of the dust collecting chamber 9 is divided into twc parts, forming a cavity 30 and the cavity 31. As shown in Figure 2a, top separator into the dust cup 65 sets an upper 6. Top of the separator 65With 48, 49, and surrounded by the filter seal surface 22 of the end of the return pipe return pipe end 34. Filter seal 22 is preferably made of a resilient material.

Figure 2b shows the dismantled dust cup vacuum cleaning device 6 of the main housing 1. Filter 18 1 on the contact surface of the main housing portion 33. In a preferred embodiment, the filter 18 Made of a breathable material such as foam plastics The movable pin 12 is located before the top surface of the main housing 1 The front of the handle 2. The movable pin 12 in response to movement of the dust cup release button 4. Convex surface 36 Under the main housing portion position of the front portion 1 protrudes forward, and the dust chamber seal 19 surrounding the convex surface 36 Edge settings. Dust collecting chamber sealing strip 19 is preferably made of an elastic material such as rubber or the like.

Figure 3 shows a cross-sectional view of the present invention. In the main memory in the housing 1 and is connected to the battery pack 14 Motor 16 of the impeller 15. Impeller 16 is provided with a protective bar 50 of the funnel-shaped entrance 27 covered to prevent Only the user touches the impeller 16. 2 has a handle on the switch knob 3, the switch knob 3 and the switch 28 engages Together to control PCB assembly disposed within the vacuum cleaner 29 at the rear position. 1 below the main housing, Accessories can be used to store the presence of the grooves 11 17.

The following describes the internal structure of any one of the cyclone. In Figure 3, there is shown a gray located Dust inside the cup 6 into the air passage 20, one end into the gas passage opening 8 and the other end to the T-shaped double Bifurcation 51. Into the intake passage 20 through the opening 40 and the cyclone in the cyclone T-shaped bifurcated at 51 46 communication. In the presence of the return pipe 46 inside the cyclone 37 and the end of the cyclone 44. In normal operation During the top as with the return pipe 37 and return pipe 38 (not shown) is connected to the separator 65 and gray Dust cup 6 integration to complete the cyclone system. 6 between the dust cup and a funnel-shaped entrance 27 exist Filter 18, when a sharp or hard objects hard by the cyclone system, the filter 18 can protect Protect impeller 16 and a motor 15. For cleaning purposes, the top of the separator 65 can be removed from the dust cup 6.

[16]

Figure 3 shows the airflow within the vacuum cleaning device is generally how it works. When the switch 26 is in the "open" Position, PCB assembly 29 controls the battery 14 to provide electrical power to the motor 15. Then the motor 15 Rotating impeller 16 in the air passage opening 8 generates suction, and the suction passage 20 through the air with Dust-laden air and into the cyclone 46 and the cyclone 47 (not shown). Dust laden air Followed by separation is cleaned by the cyclone, 27 flows into the main body 1 through the filter 18 and the funnel-shaped entrance All converging funnel-shaped inlet 27 of the cyclone downstream of the air route, and guides the airflow into the impeller 16center of. Within the main housing 1, surrounding wall of the motor 15 and batteries 14 forming a long empty Gas route guidance clean air, which helps reduce noise and the cocling member. Finally, through the air 5 slit discharge housing.

Figure 4 shows the dust cup 6 by fixing pins 13 and the movable pin 12 is connected to the main housing 1, The movable pin 12 in response to movement of the dust cup release button 4. The figure shows the movable pin 12 Provided on the lock end 25 of the dust cup, the dirt cup latch 25 rotatably mounted in the hinge 24 On, and at the other end of the rod 61 contacts. As shown, rotatably mounted on the hinge 62 One end of the lever 61 in contact with the dust cup lock 25, extending from the other end of the dust cup 4 pushing the release button Rod 23 contacts. Spring 26 is disposed between the fixed wall 52 and lock dust cup 25 to exert upward The force of the dust cup 25 on the lower surface of the lock. Thus, without pressing the dust cup release button 4, The spring 26 pushes the dust cup lock 25 upwards, and forces the movable pin 12 remain in the locked position, from And lock dust cup 6.

[6]

To 6, you must walk in the dust cup release button from the main housing 1 Remove the dust cup 4, so that Push rod 23 applies a downward force on the end of the rod 61, and force it in as shown in Figure 4 Hinge 62 in the clockwise direction about the pivotal movement of the view. Then, the other end of the rod 61 is forced gray Dust cup lock 25 in a counterclockwise direction from the view shown in FIG. 4 about the hinge 24 for pivotal movement. Then, the movable pin 12 is released from the dust cup 6 being. At this time, only the fixed pin 13 and the dust cup 6Engagement, so dust cup 6 may be separated from the main body 1.

[22]

In order to obtain good suction and cyclone performance, fully sealed air path is important. The In the filter seal 22 and baghouse dust seal between the cup 6 and the main body 1 set 19 To ensure that no

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air leaks. Referring to Figure 4, when the dust cup 6 is connected to the main housing 1, the filter 18 located on the surface between 34 and 50 bar protection. And around the filter seal surface 34 22Contact with the contact surface 33. Since the filter 22 is made of an elastic sealing material, over There is no air leakage between the contact surfaces 22 and 33 filter seal. When the dust cup 6 is connected to The main housing 1, the air inlet converging chamber 60 will be formed between 27 and 65 at the top of the funnel-shaped separator into the air path from individual cyclone in which converge into a single air path, and is Directed to the funnel-shaped entrance 27 into. At the same time, the convex surface 36 and the collecting chamber opening 35 engaged. Since the convex surface 36 and baghouse dust chamber opening flexible sealing strip 19 between the 35 and therefore Cavity 30 and the cavity 31 is sealed.

[6]

In the present invention, the dust cup 6 includes a cyclone system with two parallel cyclone. 5 and FIG 6, the dust laden air into the air passage through the opening 8 into the gas passage through 20T-shaped bifurcated flow at 51, where the gas stream is divided into two shares. As shown in Figure 5, there is Wall 55 present in the T-shaped bifurcated at below 51, which makes the air with dust divided into two shares Airflow, and respectively the opening 40 and the opening 41 into the cyclone cyclone 46 and a spin by the cyclone Wind 47. The wall 55 is preferably flat, to avoid fouling substances stuck here. FIG. 6In, the air flowing along the tangential direction of the cyclone 47 and the cyclone dust in the table with 46 Surface and form a vortex respectively 43 and 42 in individual vortex cyclone. This makes it heavier than air The dust particles toward the outside by the centrifugal force of the vortex, this phenomenon is commonly referred to as Tornado stars From, and are known to those of skill in the art.

[57]

The following describes a cyclone wherein any of the air flow path. Shown in Figure 5, the cyclone The presence of vortex stop 64 on the end wall 56 inside the 46. Eddy eddy stop 64 and the vessel 42 Heart accounting are concentric, therefore, in the center of the vortex 42, relatively clean air will first vortex Stop 64 collision, then reverse the air flow to the opposite direction and into the return pipe 37, the same time, gray Dust 39 continues to move in the end wall 56 and flow into the dust collection chamber 9 tangentially Fang Xiangyi. As mentioned earlier, set Dust chamber 9 is connected to the cyclone body via dust release hole. Figure 39 shows the dust through inertia for Use by the end of the cyclone 44 from escaping into the cavity 30. During normal operation, the dust cup 6 is connected to the main The housing 1, so that the cavity 30 is sealed. Figure 6 also shows the construction of the gas inside the cyclone 47 flow. In the cyclone 47, there is a cyclone opening 41, the end of the cyclone 45, and at the end of the wall 57Eddy on the stop 63. Principle cyclone vortex 43 by the cyclone also represented 46 The same.

Figure 6 shows the presence of the return pipe having both ends tapered in each cyclone. In the cyclone 46 For example, the return pipe 37 having a tapered end 58. In a preferred embodiment, the tapered end 58 having several A slit 54, the slit 54 to allow airflow into the return pipe 37. Another function is to serve as slits As a rough security filters, ensure that no large particles into the return pipe 37. And, e.g. Filter mesh and other means may be used instead of the slits and the slits or in combination to provide a better over Filter effect. In the cyclone 47, a slit 53 tapered end 59 has the same configuration.

As shown in Figure 6, the air to be cleaned by the end of the return conduit and the return conduit 48, respectively End 49 leaving the cyclone 46 and the cyclone 47. Top of the separator 65 and the funnel-shaped inlet 27 is formed Converging air chamber 60 to the convergence of the cyclone and the cyclone 46 downstream of the air path 47, making it Single air path. Filter 18 is located at the rear of the dust cup position 6.

[9]

In the present invention, the system is designed as a cyclone dust collected in 39 separate dust collecting chamber 9 , And the dust collection chamber 9 away from the cyclone 46 and the cyclone 47. In Figure 5, you can see the cyclone system System baghouse structure and a clear illustration of 9, and Figure 8 shows a conventional cyclone dust deposit system Discharge method and system of the present invention, the cyclone is different. In a conventional cyclone system, in general, The absence of a separate dust collecting chamber, and the motor pre-filter 32 is located inside the cyclone body 68. thus See, the cyclone body and the dust chamber is actually the same parts. This makes it more and more dust 39 Accumulate on top of the filter, but does not really be separated by the cyclone effect. The present invention uses a far Independent from the cyclone dust font settings, and with high efficiency cyclone system. As a result, most of the Number of dust will be separated by a cyclone, only a handful of dust (mainly very small ash Dust) will pass through the filter into the system. Therefore, the user will not have to regularly clean the filter, And experience constant suction, and more convenient way to clean the dust cup.

[9]

The present invention provides a clean and fast dust removal process, which is the traditional hand-

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held vacuum Dust is an improvement in comparison. Baghouse dust collection chamber having an opening 35, 9 and vacuum cleaning device Dust cup 6 set together. Therefore, if the dust cup 6 easily separated from the main body 1, can be Drain accumulated in the cavity 30 and the cavity 31 of the dust from the baghouse 39 9. This made to clean the dust chamber 9Becomes easier and more hygienic procedure, because the user does not have to touch or to remove any dust that The contact part or filter. Another alternative for the opening of the dust chamber opening device 35 may be a bit Movable in the dust chamber 9 on the door.

in the present invention, a number of useful accessory tools are designed to improve the vacuum cleaning device Function. Figure 7 shows the rod 67 and the floor nozzle 66.

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CLAIMS CN101061932

[1]

1. A hand-held vacuum cleaning device comprising a main housing, a detachable battery cover and connect to Impeller motor, funnel-shaped inlet, detachable dust cup portion for release from the main housing The dust discharge portion of the cup release mechanism, characterized in that said air inlet comprises a dirt cup portion Mouth, leading to the cyclone air path, in parallel with each of at least two cyclones connected to the individual To separate cyclone dust chamber, and connecting the air convergence chamber air return duct, each cyclone Having an air return duct.

[2]

2. The hand-held vacuum cleaning apparatus according to claim 1, wherein said dust collecting chamber having At least one opening for emptying dirt.

[3]

3. The hand-held vacuum cleaning apparatus as claimed in claim 2, wherein said dust collecting chamber having Alternative means of at least one opening for emptying dirt, for example, door opening and closing device.

[4]

4. Hand-held vacuum cleaning apparatus according to claim 1, wherein the top of the separator And the funnel-shaped inlet cavity formed between an air chamber to suit convergence converging multiple spin An air path downstream of the wind.

[5]

5. Hand-held vacuum cleaning apparatus according to claim 4, wherein said space for condensing Converging air chamber gas path adapted to receive filter.

[6]

6. The hand-held vacuum cleaning device according to claim 4, wherein said funnel-shaped inlet Tube also forms part of the impeller housing.

[7]

7. The hand-held vacuum cleaning apparatus according to claim 1, wherein the converging having a lower Converging air chamber air travel path of the air return duct can be removed from the dust cup portion.

[8]

8. The hand-held vacuum cleaning apparatus according to claim 1, wherein said air path Bifurcated form openings leading to the cyclone.

[9]

9. The hand-held vacuum cleaning apparatus 1, the air return pipe claims wherein a End is tapered and has a hole.

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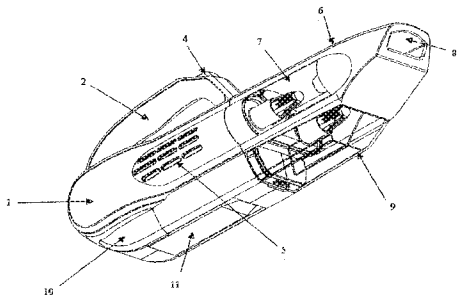
权利要求书 1 页 说明书 10 页 附图 8 页

[54] 发明名称

旋风手持真空吸尘装置

[57] 摘要

本发明的可充电手持式真空吸尘器具有可装拆的灰尘杯部分，所述灰尘杯部分包括两个平行的旋风器和两个集尘室。集尘室经由灰尘释放孔连接至旋风器本体。由于采用了两个平行旋风器的设计，所以能使用较小的旋风器，不影响空气性能的同时，又能实现较好的灰尘分离性能。而且旋风器本体内既无过滤器，亦无集尘室，从而可以更方便和更卫生的方式清理集尘室。两个平行旋风器的应用提高了旋风作用的效率，从而仅需要非常简单的过滤器来保护吸尘器内的叶轮。所以，基于上述的构造，不会出现过滤器被逐渐堵塞的情况，这意味着吸入功率能保持在一个固定水平。



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1.一种手持式真空吸尘装置，包括主壳体、可装拆的电池盖、连接至叶轮的马达、漏斗形入口管、可装拆的灰尘杯部分、用于从所述主壳体释放所述灰尘杯部分的释放机构，其特征在于，所述灰尘杯部分包括空气入口、通向旋风器的空气路径、彼此平行设置的至少两个旋风器、个别连接至旋风器的独立的集尘室、和连接空气会聚室的空气回流管，每个旋风器具有一个空气回流管。

2.根据权利要求 1 所述的手持式真空吸尘装置，其中所述集尘室具有至少一个用于倒空污垢的开口。

3.根据权利要求 2 所述的手持式真空吸尘装置，其中所述集尘室具有至少一个用于倒空污垢的开口的替代装置为例如门等的开合装置。

4.根据权利要求 1 所述的手持式真空吸尘装置，其中所述分离器顶部和所述漏斗形入口管之间的空腔形成一空气会聚室以适合于会聚多个旋风器的下游空气路径。

5.根据权利要求 4 所述的手持式真空吸尘装置，其中所述用于会聚空气路径的空气会聚室适合于容纳过滤器。

6.根据权利要求 4 所述的手持式真空吸尘装置，其中所述漏斗形入口管也形成所述叶轮壳体的部分。

7.根据权利要求 1 所述的手持式真空吸尘装置，其中具有用于会聚下游空气路径的空气会聚室的所述空气回流管可从所述灰尘杯部分拆除。

8.根据权利要求 1 所述的手持式真空吸尘装置，其中所述空气路径以分叉形式通向所述旋风器开口。

9.根据权利要求 1 所述的手持式真空吸尘装置，空气回流管的其中一端为锥形，并且具有孔。

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旋风手持真空吸尘装置

技术领域

本发明涉及一种可充电手持式真空吸尘器，更具体地涉及一种将平行旋风器用作分离装置的可充电手持式真空吸尘器。

背景技术

典型的手持式真空吸尘器具有与叶轮相连接的马达，所述马达可由主电源或可充电电池驱动，所述叶轮能产生一气流，所述气流先通过吸嘴，再流经灰尘杯然后进入叶轮。在灰尘杯内，大多数会设置简单的过滤器，所述过滤器有时与空气的旋风运动配合在一起应用，用于使污垢和灰尘从空气中分离。另一过滤器可设置在叶轮之后，用于在废气排出吸尘器之前过滤来自马达的细小灰尘或碳尘。

在灰尘杯中设置简单的过滤器的典型手持式真空吸尘器的一个问题是，当过滤器接收过多灰尘时，过滤器会很快地被堵塞起来，从而降低了吸尘器的性能。这样使得用户必须拆除并清洁所述过滤器，这是一个令用户感到不方便的步骤。

一个相连带的问题是，过滤器通常设置在灰尘杯内，而为了清洁灰尘杯，用户必须首先从灰尘杯移走过滤器。这个步骤常常会令环境变脏，并且可能弄脏用户的手，从而造成卫生问题。

在配备了所谓旋风作用的典型手持式真空吸尘器的另一问题是，低效能的旋风作用使得大部分污垢和灰尘积聚于过滤器之上。随着过滤器被越来越多的灰尘堵塞，吸力相应逐渐丧失。在所述的吸尘器中，用户仍必须经常拆除和清洁过滤器，从而令到应用旋风器的目的被质疑。

旋风式分离在本领域中是公知的。它应用在真空吸尘器中也是公知的（例如，在 EP 0042723B 中）。在上游设置单个旋风器和在下游设置多个平行旋风器的应用亦已经在 US 3425192 中被描述。应用两个或多个平行旋风器可带出较少的总空气阻力和改善旋风式分离性能。改善的分离性能

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源于以下的原理，对于一给定的吸入源，一个空气路径可被分成几个具有较小截面面积的空气路径，而又同时保持相同的总流速。这意味着，每个单独的旋风器的内径可以减小，这样，当空气中的颗粒以旋转方式通过旋风器时便有较大的径向加速度。因此，相对于只使用单一个旋风器，使用多个旋风器可令较细小的灰尘也能从空气中分离。但由于真空吸尘器所吸入的颗粒大小不一，所述设计也存在实际缺点。一些体积大于进入个别旋风器的空气路径的颗粒会被卡住。为了克服此问题，单个大的预旋风器后面连接多个较小的平行的旋风器的布置已被使用。

在此主题上已有大量的专利被公布。EP 0042723 讨论了单个旋风器或串联布置的两个旋风器。GB 2372435 描述了多个分离器、将它们连接的空气路径、和与真空吸尘器的外侧表面的关系的布置。而 WO 00/24519 是以更窄的范围描述空气路径的特性的另一实例。

市场上存在着双旋风分离器真空吸尘器，一个是直立方式，一个是柱体方式。两个都以平行布置的双旋风分离器为特征，而且无上游分离器阶段。两个旋风器具有直的本体，并且与单独的集尘室连通。通向旋风器的空气入口为 T 形，从而使空气分成两股个别的气流并沿切线方向进入这两个旋风器之中。US 3425192 也描述了于第二阶段中应用直而平行的旋风器。所以，平行的旋风器在本领域中是已知的，而本发明亦是建基于相关的运作原理。

发明内容

本发明要解决的技术问题是提供一种改良的手持式真空吸尘器，主要包括壳体部分和灰尘杯部分，并且提供了高效的旋风作用、干净和方便的灰尘去除过程、和不变的吸入性能。

主壳体部分由两边外壳组成，这两边外壳由紧固装置保持在一起。壳体的上部分为一个便利的手柄，所述手柄可与另一部件相配合，从而提供舒适柔软的握持效果。设置在这两边外壳之内的是：马达，连接至叶轮；可充电电池组；空气入口部分，用于将空气从灰尘杯部分引导到叶轮内；开关；释放机构，用于释放灰尘杯部分；以及用于控制装置的电子组件。空气入口部分具有用于引导空气进入叶轮中心的漏斗形部分，所述漏斗形

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部分装有保护杆，以防止用户接触叶轮。可拆卸的电池盖连接至主壳体下侧，以便于为了循环再用或修理目的而去除电池。主壳体的底部部分具有存放配件工具的凹槽。并且，电池盖具有沿本体纵向延伸的狭缝，这些狭缝充当连接装置，以连接附件，例如把杆附件。

灰尘杯部分包括在其中形成空气入口吸嘴的灰尘杯、柱形几何形状的旋风器本体，所述本体具有两个平行旋风器和单独的灰尘接收室、和包括两个回流管的旋风器顶部部分。回流管具有一锥形端和空气入口狭缝，形成一个粗略的安全过滤保护盖。狭缝可由其它的可选物如网格或类似的过滤装置取代或配合使用。旋风器顶部也具有让两股空气回流路径在其中会聚的空腔，所述空腔适于容纳过滤器。当尖硬的物体或硬物通过旋风器系统时，所述过滤器能保护叶轮和马达。吸嘴的形状设计成可让附件工具插入的形式。

为了获得良好的吸入和旋风性能，完全密封的空气路径是重要的。因此，灰尘杯部分的主要部件、灰尘杯、和旋风器本体永久结合在一起。而旋风器本体和旋风器顶部之间也紧密地配合。

在正常操作期间，本发明的真空吸尘器以下面所述的方式运作。由电池组供电给马达和叶轮，并通过吸嘴吸入带有灰尘的空气。这些空气经过入气管通道，直到它到达 T 形双分叉处，气流在这里被分成两股，每股气流都沿切线方向引导到一个旋风器中。在每个旋风器内，空气和灰尘颗粒沿柱形本体螺旋前进，使得比空气重的污垢颗粒透过离心力向外移动。在旋风器本体末端设有一个孔切口，灰尘颗粒通过惯性作用逸入所述孔切口，同时，清洁过的空气继续跟随涡流进入回流管。灰尘颗粒被分别收集在两个集尘室内，每个集尘室用于一个旋风器，并透过所述孔切口连接至旋风器本体。

清洁过的空气沿两个回流管流动，并在旋风器顶部之后的旋风器下游的空腔中会聚，所述旋风器顶部可接收一过滤器。所述过滤器用以去除空气中仍未被旋风器分离的任何物体，并且充当用于叶轮和马达的安全保护件。所述过滤器的精细度并未足以阻挡任何微小的颗粒。旋风器顶部经由气密密封条连接至主体。清洁过的空气通过漏斗形入口进入并通过叶轮，再进入吸尘器的本体。在主壳体中，环绕马达和电池的壁形成一道长的空

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气路径，用以引导空气排出主壳体，同时有助于冷却部件和减少噪音。

若要拆除灰尘杯部分用于倒空积聚的灰尘，用户须要按着手柄前部的按钮，这样就释放了灰尘杯。而用户无须接触或去除任何与灰尘接触的部分或过滤器，就可去除和倒空灰尘杯。这是本发明的其中一方面的改进。另一改进是旋风器的效率；因大部分的灰尘聚集在独立的灰尘接收室中，从而不需要在每次使用后清洁过滤器。进一步的改进是与吸入性能有关；由于空气中大部分的灰尘是被旋风式分离而不是过滤，所以基本上不存在堵塞过滤器的情况，固此用户将体验到不变的吸入性能。

附图说明

下面结合附图详细描述本发明的优选实施例，其中：

图 1 是根据优选实施例构造的手持式真空吸尘装置的透视图，其中灰尘杯部分与主壳体相连接；

图 2a 是真空吸尘装置的灰尘杯部分的透视图；

图 2b 是灰尘杯部分被分离的图 1 中的真空吸尘装置的透视图；

图 3 是图 1 中的真空吸尘装置的侧视截面图；

图 4 是图 1 中的真空吸尘装置的另一侧视截面图，示出灰尘杯部分和主壳体之间的锁定机构；

图 5 是装有过滤器和漏斗形入口的图 2a 中的真空吸尘装置的灰尘杯部分的侧视截面图；

图 6 是装有过滤器和漏斗形入口的图 2a 中的真空吸尘装置的灰尘杯部分的俯视截面图；

图 7 是连接了地板吸嘴和把杆的真空吸尘装置的透视图；

图 8 是过滤器装置在旋风器本体内的传统式旋风器系统。

附图标记	中文名称
1	主壳体
2	手柄
3	开关钮
4	灰尘杯释放按钮
5	狭缝
6	灰尘杯

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7	旋风器本体
8	入气通道开口
9	集尘室
10	电池盖
11	配件
12	可移动销
13	固定销
14	电池组
15	马达
16	叶轮
17	凹槽
18	过滤器
19	集尘室密封条
20	入气通道
21	中间壁
22	过滤器密封条
23	推杆
24	铰链
25	灰尘杯锁
26	弹簧
27	漏斗形入口
28	开关
29	PCB 组件
30	空腔
31	空腔
32	马达前过滤器
33	接触表面
34	表面
35	集尘室开口
36	凸面
37	回流管
38	回流管
39	灰尘
40	旋风器开口
41	旋风器开口
42	涡流
43	涡流

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44	旋风器末端
45	旋风器末端
46	旋风器
47	旋风器
48	回流管末端
49	回流管末端
50	保护杆
51	T 形双分叉处
52	固定壁
53	狭缝
54	狭缝
55	壁
56	末端壁
57	末端壁
58	锥形端
59	锥形端
60	空气会聚室
61	杆
62	铰链
63	涡流停止器
64	涡流停止器
65	分离器顶部
66	地板吸嘴
67	把杆
68	旋风器本体

具体实施方式

如图 1 中所示，真空吸尘装置主要包括主壳体 1 和灰尘杯 6。灰尘杯 6 在连接至主壳体 1 时形成真空吸尘器本体的一部分。主壳体 1 的上部为一个包括灰尘杯释放按钮 4 的手柄 2，入气通道开口 8 位于灰尘杯 6 的前端，且灰尘杯 6 的底部部分形成集尘室 9。在一个优选实施例中，集尘室 9 由透明材料制成，从而可观察到聚集在内部的灰尘量。可拆卸的电池盖 10 连接至主壳体 1 的后部底部部分，以便于为了循环再用或修理目的而去除电池。配件 11 可在不用时存放在主壳体 1 的下侧。主壳体 1 的两侧都具有用作废气排气口的狭缝 5。一旋风器本体 7 位于灰尘杯 6 中，并且形

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成真空吸尘装置的表面的一部分。在一个优选实施例中，旋风器本体 7 由透明材料制成，从而可观察到旋风器本体 7 内部的旋风作用。旋风器本体 7 内可存在多个旋风器。在一个优选实施例中，存在两个旋风器。

图 2a 和图 2b 分别示出真空吸尘装置的灰尘杯 6 和主壳体 1。图 2a 示出与主壳体 1 分离的灰尘杯 6，可看到，集尘室 9 包括集尘室开口 35 和中间壁 21。中间壁 21 将集尘室 9 的空腔分成两个部分，形成空腔 30 和空腔 31。如图 2a 中所示，分离器顶部 65 套进灰尘杯 6 的上部中。分离器顶部 65 具有回流管末端 48、回流管末端 49、和由过滤器密封条 22 围绕的表面 34。过滤器密封条 22 优选由弹性材料制成。

图 2b 示出已拆除灰尘杯 6 的真空吸尘装置的主壳体 1。过滤器 18 位于主壳体 1 上的接触表面 33 的上部份。在一个优选实施例中，过滤器 18 由例如泡沫塑料等透气材料制成。可移动销 12 位于主壳体 1 的前顶面上的手柄 2 的前面。可移动销 12 响应灰尘杯释放按钮 4 的运动。凸面 36 在主壳体 1 的前部的下部份位置向前凸出，且集尘室密封条 19 环绕凸面 36 的边沿设置。集尘室密封条 19 优选由例如橡胶等弹性材料制成。

图 3 中示出本发明的截面图。在主壳体 1 内存在电池组 14 和连接至叶轮 16 的马达 15。叶轮 16 被设有保护杆 50 的漏斗形入口 27 覆盖，以防止用户接触叶轮 16。手柄 2 上设有开关钮 3，所述开关钮 3 与开关 28 啮合，以控制设置在吸尘器内后部位置处的 PCB 组件 29。在主壳体 1 下面，存在可用于存放配件 11 的凹槽 17。

下面描述其中任何一个旋风器的内部结构。在图 3 中，示出一位于灰尘杯 6 内部的入气通道 20，其一端到入气通道开口 8 而另一端到 T 形双分叉处 51。入气通道 20 透过在 T 形双分叉处 51 的旋风器开口 40 与旋风器 46 连通。在旋风器 46 内部存在回流管 37 和旋风器末端 44。在正常操作期间，与回流管 37 和回流管 38（未示出）相连接的分离器顶部 65 与灰尘杯 6 整合，以完成旋风器系统。在灰尘杯 6 和漏斗形入口 27 之间存在过滤器 18，当尖硬的物体或硬物通过旋风器系统时，所述过滤器 18 能保护叶轮 16 和马达 15。为了清洁目的，分离器顶部 65 可从灰尘杯 6 拆除。

图 3 示出真空吸尘装置内的气流的一般运作原理。当开关 28 处于“开”位置时，PCB 组件 29 控制电池组 14 以提供电能给马达 15。马达 15 接着

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旋转叶轮 16，在入气通道开口 8 产生吸力，并通过入气通道 20 吸入带有灰尘的空气并使其进入旋风器 46 和旋风器 47（未示出）。带有灰尘的空气接着透过旋风分离被清洁，通过过滤器 18 和漏斗形入口 27 流入主壳体 1。漏斗形入口 27 会聚所有旋风器的下游空气路径，并且引导气流进入叶轮 16 的中心。在主壳体 1 内，围绕马达 15 和电池组 14 的壁形成一道长的空气路径引导清洁的空气，这有助于冷却部件和减少噪音。最终，空气通过狭缝 5 排出壳体。

图 4 中示出灰尘杯 6 通过固定销 13 和可移动销 12 连接至主壳体 1，所述可移动销 12 响应灰尘杯释放按钮 4 的运动。所述图示出可移动销 12 设置在灰尘杯锁 25 的一端上，所述灰尘杯锁 25 可旋转地固定在铰链 24 上，并且以另一端与杆 61 接触。如图中所示，可旋转地固定在铰链 62 上的杆 61 一端与灰尘杯锁 25 接触，另一端与从灰尘杯释放按钮 4 延伸的推杆 23 接触。弹簧 26 设置在固定壁 52 和灰尘杯锁 25 之间，以施加一向上的力于灰尘杯锁 25 的下表面上。因此，如果没有按着灰尘杯释放按钮 4，则弹簧 26 向上推灰尘杯锁 25，并且迫使可移动销 12 停留在锁定位置，从而锁上灰尘杯 6。

若要从主壳体 1 拆除灰尘杯 6，则必须按着灰尘杯释放按钮 4，使得推杆 23 施加一向下的力在杆 61 的一端上，并且迫使它在从图 4 中所示的视图的顺时针方向上绕铰链 62 作枢轴运动。接着，杆 61 的另一端迫使灰尘杯锁 25 在从图 4 中所示的视图的逆时针方向上绕铰链 24 作枢轴运动，接着，可移动销 12 从灰尘杯 6 之中被释放。此时，仅固定销 13 与灰尘杯 6 啮合，因此灰尘杯 6 可与主壳体 1 分离。

为了获得良好的吸入和旋风性能，完全密封的空气路径是重要的。所以在灰尘杯 6 和主壳体 1 之间设置了过滤器密封条 22 和集尘室密封条 19 以确保没有空气泄漏。参看图 4，当灰尘杯 6 连接到主壳体 1 上时，过滤器 18 位于表面 34 和保护杆 50 之间。并且，围绕表面 34 的过滤器密封条 22 与接触表面 33 相接触。由于过滤器密封条 22 由弹性材料制成，所以过滤器密封条 22 和接触表面 33 之间不存在空气的泄漏。当灰尘杯 6 连接至主壳体 1 时，空气会聚室 60 便在分离器顶部 65 和漏斗形入口 27 之间形成，来自个别的旋风器的空气路径在其中会聚成单一的空气路径，并且被

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引导到漏斗形入口 27 之中。与此同时，凸面 36 与集尘室开口 35 啮合。由于凸面 36 和集尘室开口 35 之间存在着富弹性的集尘室密封条 19，因此空腔 30 和空腔 31 被密封。

在本发明中，灰尘杯 6 中包括了具有两个平行旋风器的旋风器系统。如图 5 和图 6 中所示，带有灰尘的空气透过入气通道开口 8，经入气通道 20 流向 T 形双分叉处 51，在这里，气流被分成两股。如图 5 中所示，有一壁 55 存在于 T 形双分叉处 51 的下面，这使得带有灰尘的空气分成两股气流，并且分别通过旋风器开口 40 和旋风器开口 41 进入旋风器 46 和旋风器 47。所述壁 55 优选是平坦的，以避免污垢物质在此处被卡住。如图 6 中所示，带有灰尘的空气沿切线方向流到旋风器 47 和旋风器 46 的内表面上，并且分别在个别旋风器内形成涡流 43 和涡流 42。这使得比空气重的灰尘颗粒透过离心力的作用移向涡流外面，这现象通常称为旋风式分离，并且为本领域的技术人员所公知。

下面描述其中任何一个旋风器中的气流路径。如图 5 中所示，在旋风器 46 内的末端壁 56 上存在涡流停止器 64。涡流停止器 64 和涡流 42 的中心占是同心的，因此，处于涡流 42 中心，较为清洁的空气将首先与涡流停止器 64 碰撞，气流随即反向到相反方向并进入回流管 37，同时间，灰尘 39 继续向着末端壁 56 流动并沿切线方向逸入集尘室 9。如前所述，集尘室 9 经由灰尘释放孔连接至旋风器本体。图中示出灰尘 39 透过惯性作用，经旋风器末端 44 逸入空腔 30。在正常操作期间，灰尘杯 6 连接到主壳体 1 上，从而使空腔 30 被密封。图 6 也示出旋风器 47 内部的构造和气流。在旋风器 47 内，存在旋风器开口 41、旋风器末端 45、和位于末端壁 57 上的涡流停止器 63。用涡流 43 表示的旋风式分离的原理也与旋风器 46 中相同。

图 6 示出在每个旋风器内都存在具有锥形端的回流管。以旋风器 46 为例，回流管 37 具有锥形端 58。在一个优选实施例中，锥形端 58 具有几个狭缝 54，所述狭缝 54 允许气流进入回流管 37。狭缝的另一功能是充当为一粗略的安全过滤器，确保没有大颗粒进入回流管 37 内。并且，例如网格等其它过滤装置可用于代替狭缝或与狭缝组合使用以提供更好的过滤效果。在旋风器 47 内，设有狭缝 53 的锥形端 59 具有相同构造。

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如图 6 中所示，被清洁过的空气通过分别的回流管末端 48 和回流管末端 49 离开旋风器 46 和旋风器 47。分离器顶部 65 和漏斗形入口 27 形成空气会聚室 60，以会聚旋风器 46 和旋风器 47 的下游空气路径，使之成为单一空气路径。过滤器 18 位于灰尘杯 6 的后部位置处。

在本发明中，旋风器系统被设计成为将灰尘 39 收集于独立的集尘室 9，且所述集尘室 9 远离旋风器 46 和旋风器 47。在图 5 中可看到旋风器系统和集尘室 9 的构造的清楚图示，而图 8 示出传统的旋风器系统的灰尘存放方法与本发明的旋风器系统不同。在传统的旋风器系统中，一般而言，不存在独立的集尘室，而马达前过滤器 32 则位于旋风器本体 68 内。由此看到，旋风器本体和集尘室其实是相同的部分。这使得越来越多的灰尘 39 积聚于过滤器之上，而并没有真正透过旋风作用被分离。本发明采用了远离旋风器设置的独立灰尘存放器，并配合高效的旋风器系统。结果，大多数的灰尘将透过旋风器而被分离，只有少数的灰尘（主要是非常微小的灰尘）会经过所述系统进入过滤器中。因此，用户将不必经常清洁过滤器，并体验到恒定的吸力，以及更便利的清洁灰尘杯的方法。

本发明提供了干净而快速的灰尘去除过程，这与传统的手持式真空吸尘器相比是一项改进。具有集尘室开口 35 的集尘室 9 与真空吸尘装置的灰尘杯 6 一起设置。因此，只要将灰尘杯 6 简单地从主壳体 1 分离，便可从集尘室 9 排出积聚在空腔 30 和空腔 31 内的灰尘 39。这令到清洁集尘室 9 变成为更方便和更卫生的过程，因为用户不必接触或去除任何与灰尘所接触的部分或过滤器。用于替代集尘室开口 35 的另一开口装置可以是位于集尘室 9 上的可移动的门。

在本发明中，一些有用的配件工具被设计出来，以提高真空吸尘装置的功能。图 7 示出把杆 67 和地板吸嘴 66。

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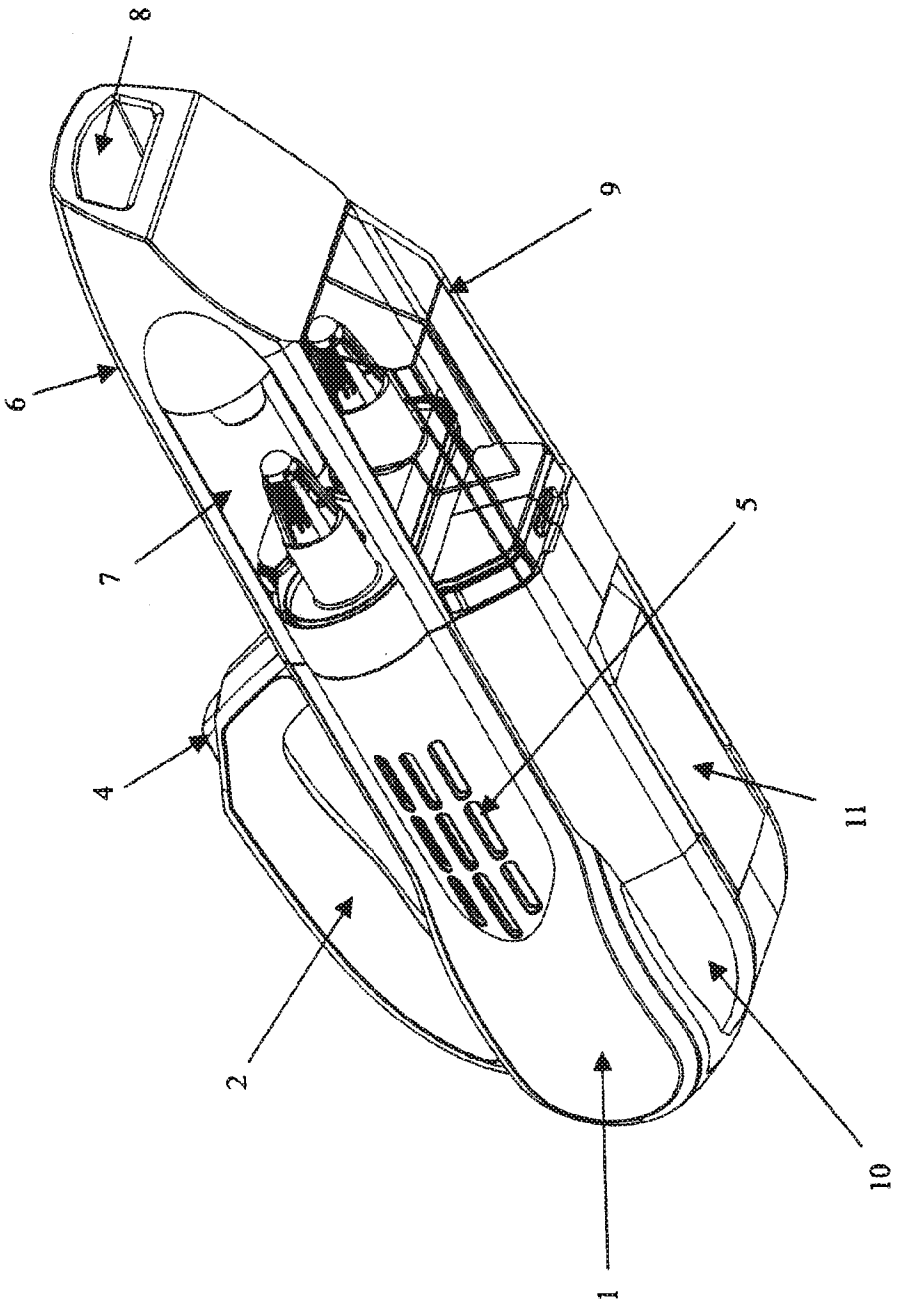


图 1

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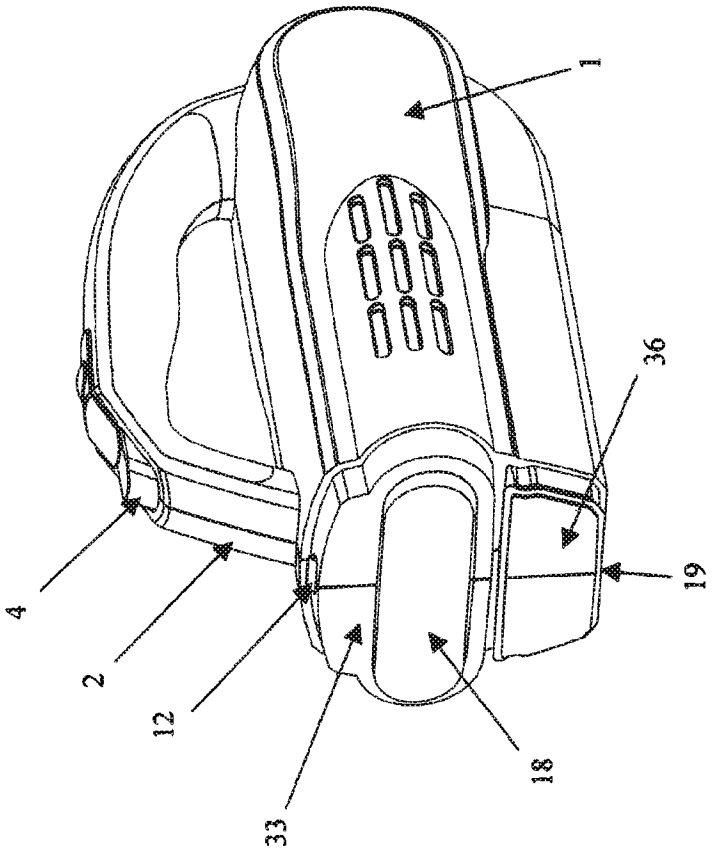


图 2b

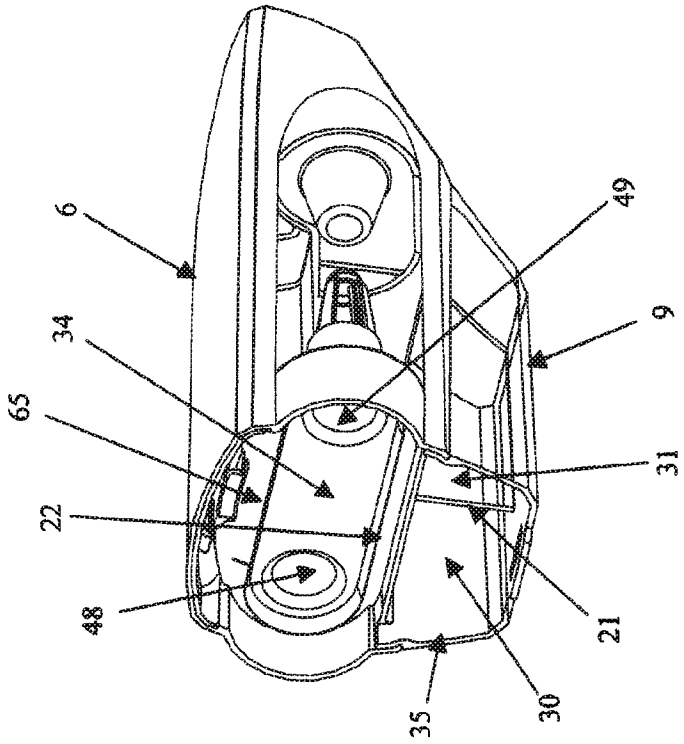


图 2a

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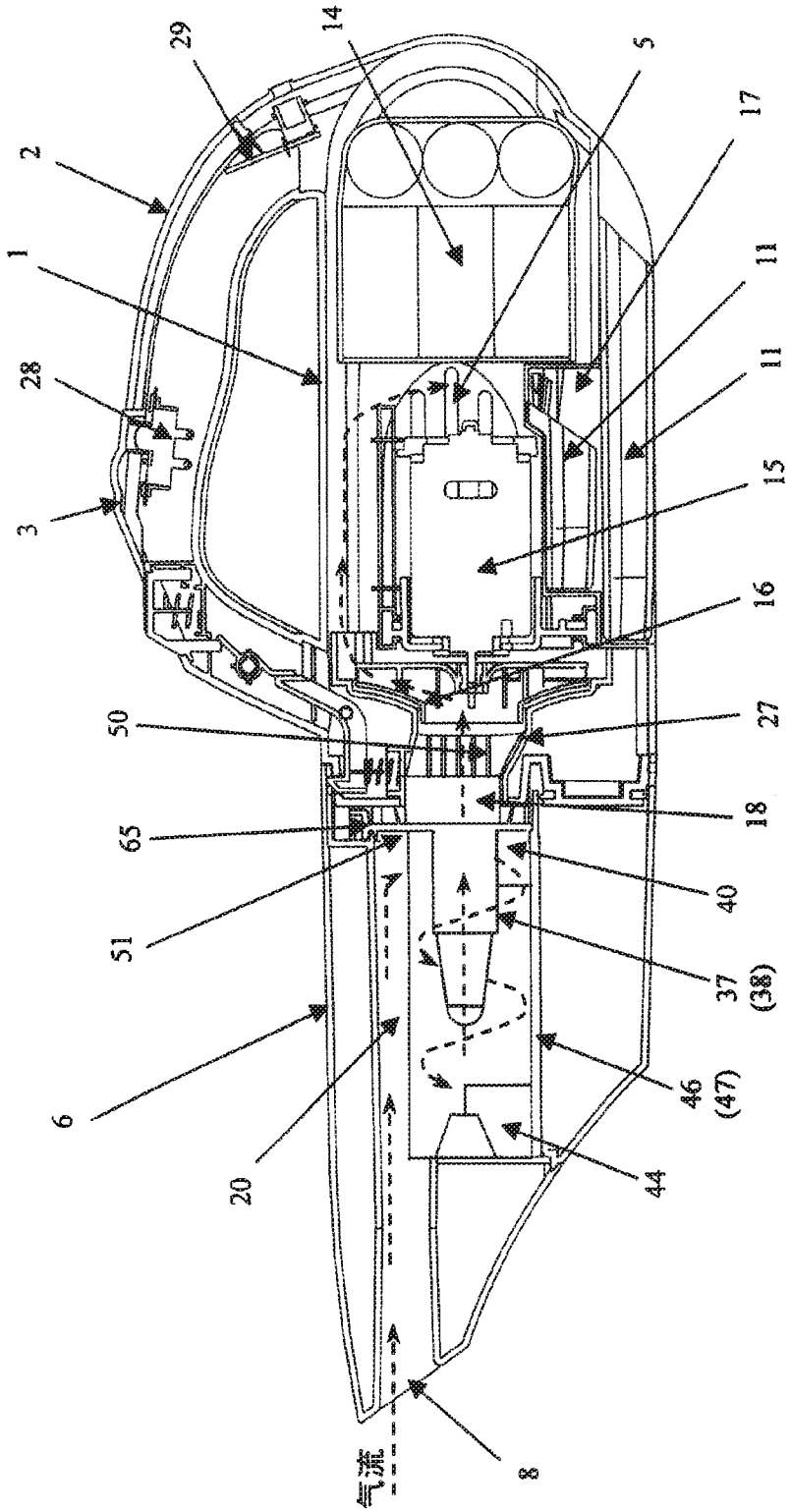


图 3

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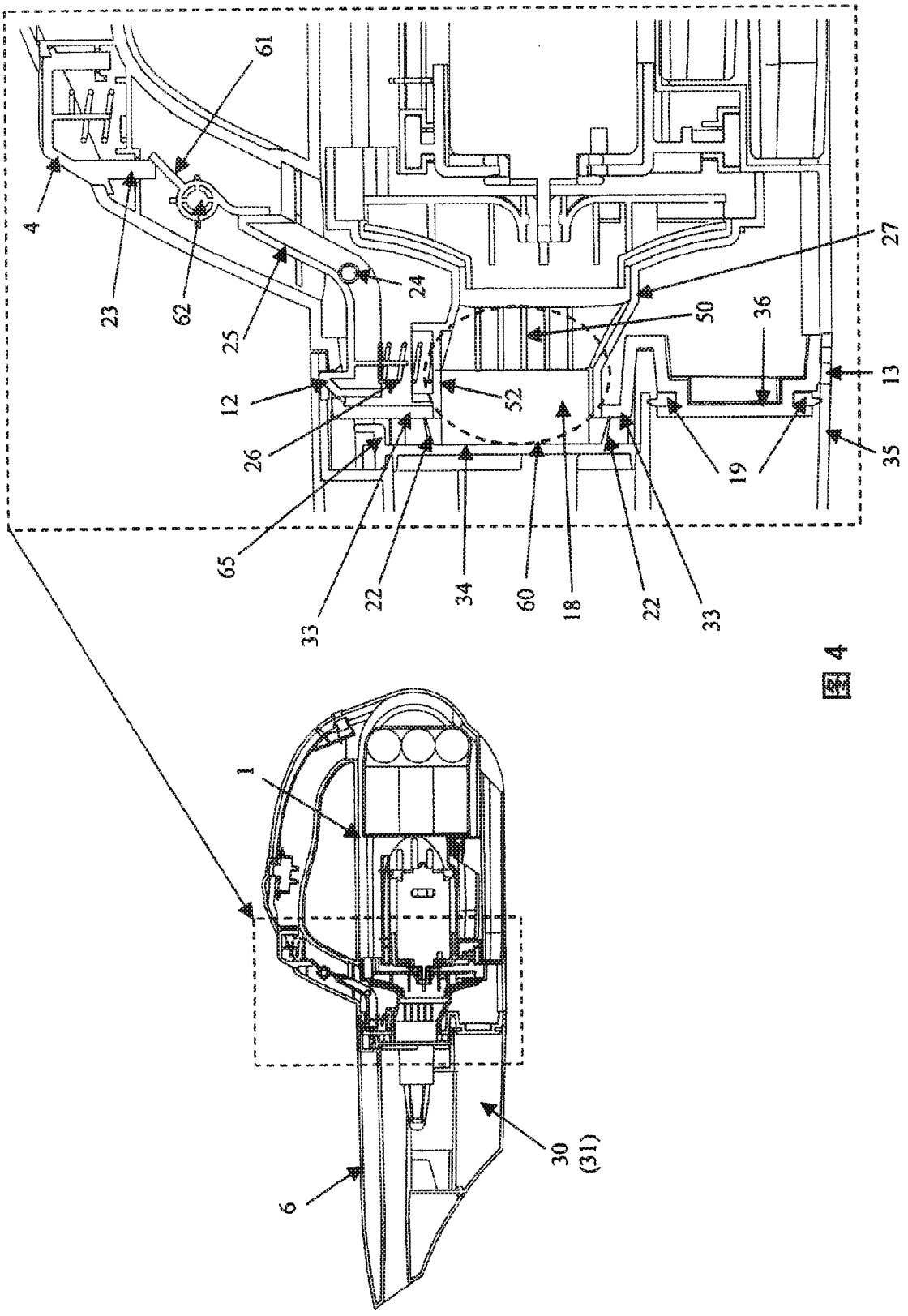


图 4

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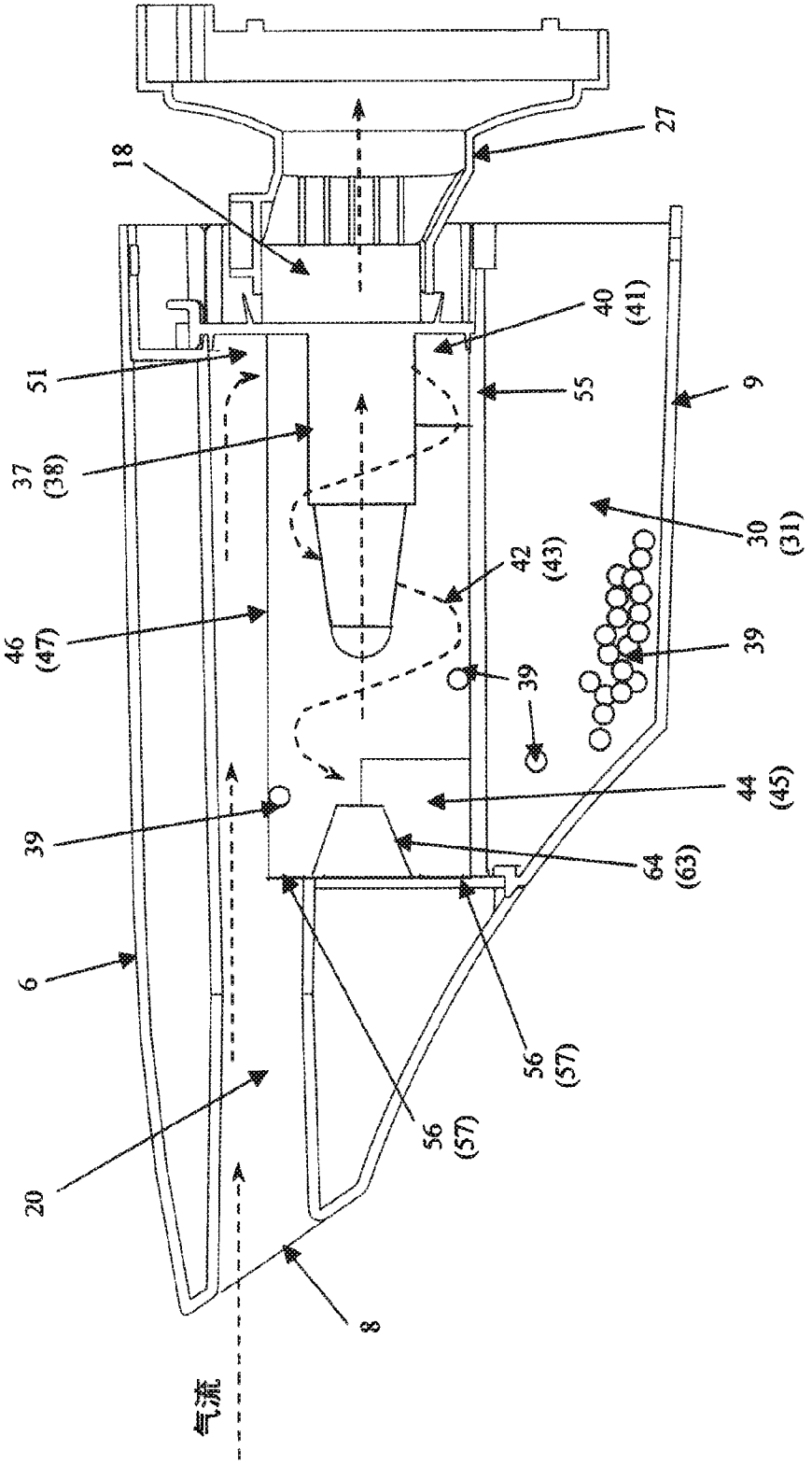


图 5

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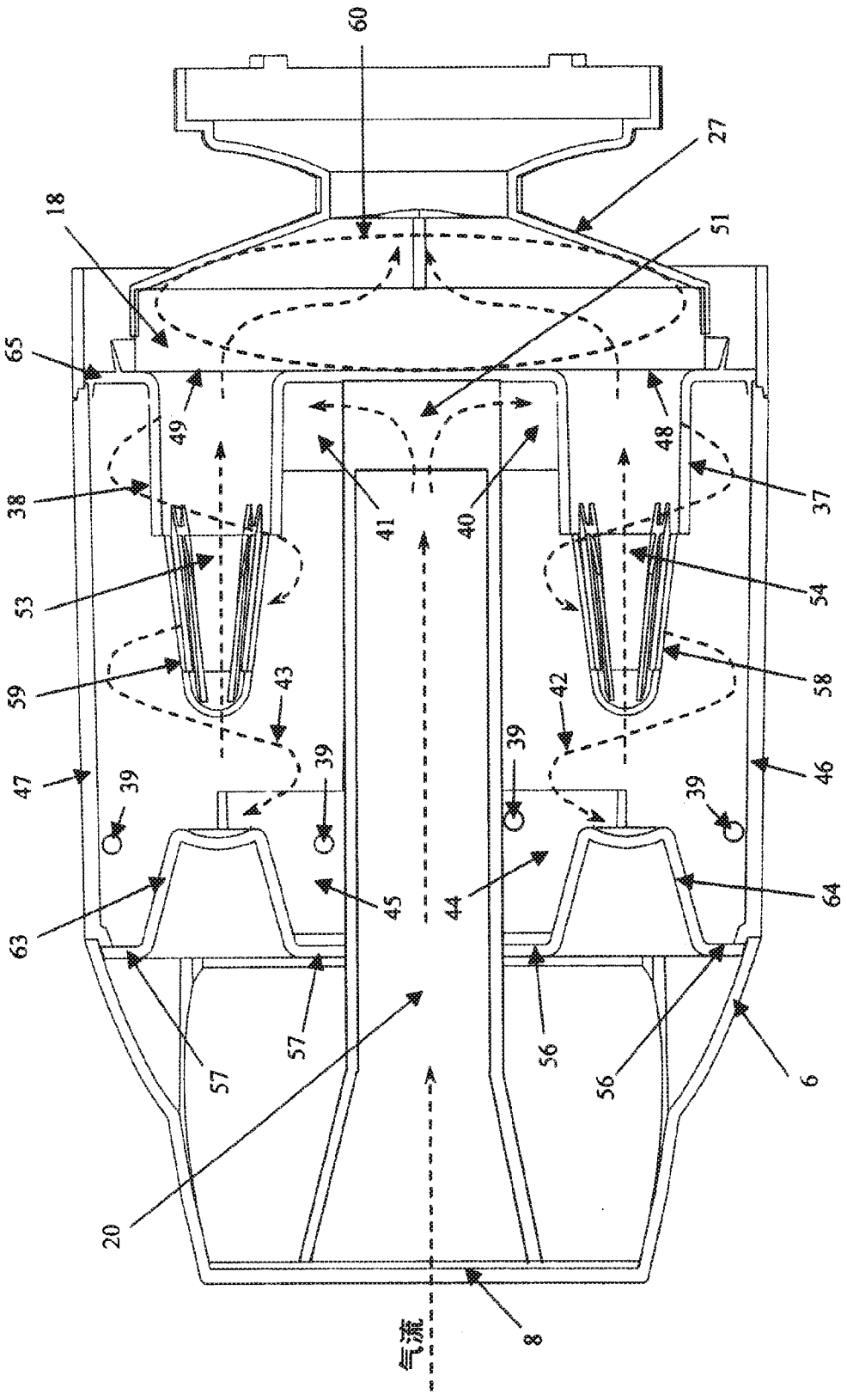


图 6

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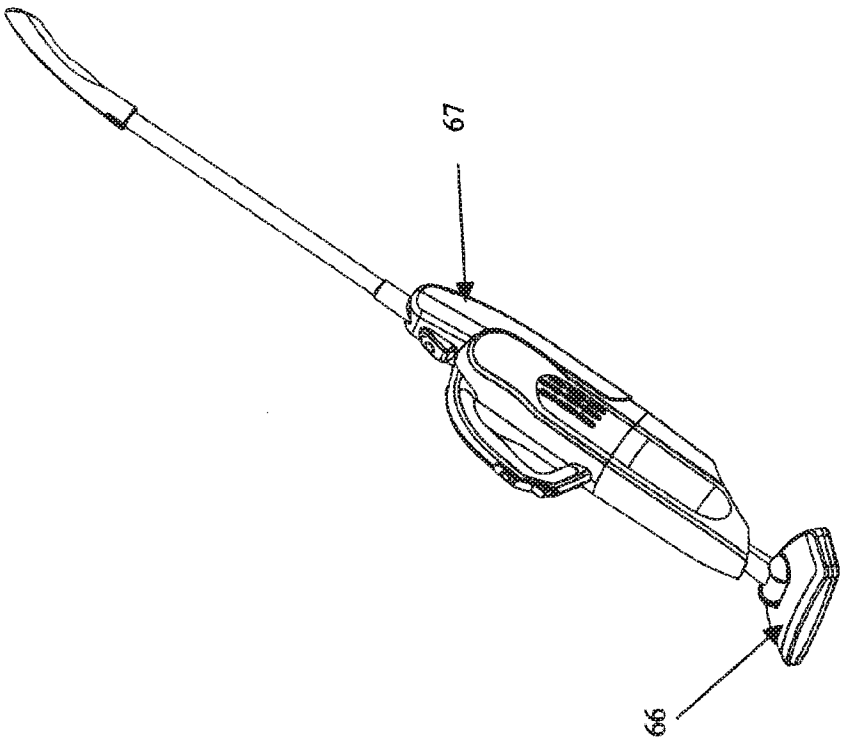


图 7

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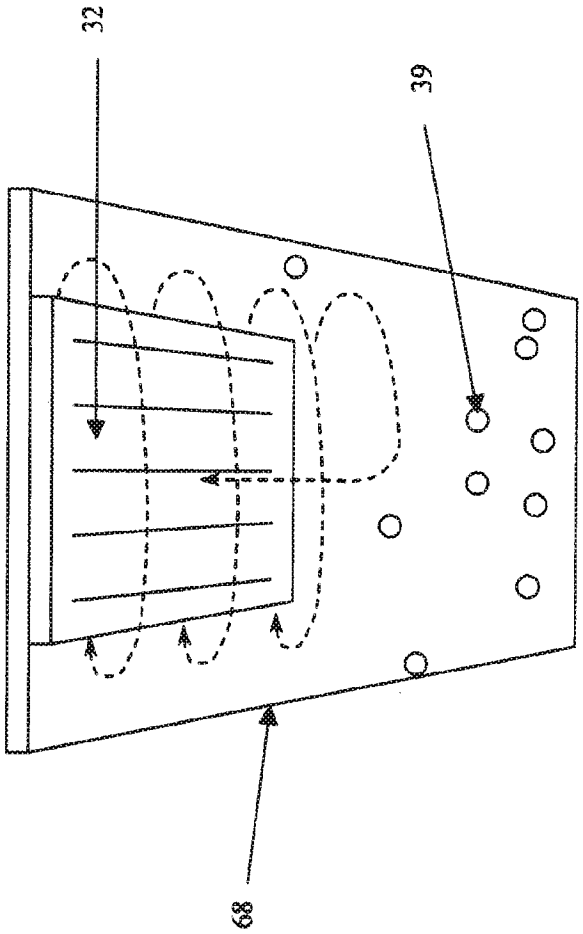


图8

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Bibliographic data
Description
Claims
Mosaics
Original document
Cited documents
Citing documents
INPADOC legal status
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Portable vacuum cleaner

Page bookmark	CN2927961 (Y) - Portable vacuum cleaner
Inventor(s):	CHEN CHENGZHONG QANNY [CN] ±
Applicant(s):	BAOSHIDE ELECTRIC TOOL CO LTD [CN] ±
Classification:	- international: ***A47L5/22; A47L9/10; A47L9/16***
	- cooperative:
Application number:	CN20062130748U 20060728
Priority number(s):	CN20062130748U 20060728

Abstract of CN2927961 (Y)

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The utility model discloses a potable vacuum cleaner, comprising a shell, a removable dust chamber connected with the shell, a handle arranged on the shell, an electric motor arranged in the shell, a fan driven by the electric motor, and a power supply unit connected with the electric motor through a switch, wherein the dust chamber is provided with a whirlwind disconnecting gear, characterized in that the whirlwind disconnecting gear comprises at least two side by side cone separator. As the side by side dust separator is adopted, with the same volume of dust collection, the remoteness dust can be effectively absorbed, preventing the leakage of dust, thereby improving the efficiency of dust collection of the vacuum cleaner.

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DESCRIPTION CN2927961

The utility model discloses a portable vacuum cleaner, comprising a housing, removable dust box is connected to the housing, the handle is provided on the housing, is accommodated in the housing of the motor by the said motor-driven fan and electrically powered through a switch to the mechanical and electrical connection means, the cyclone dust box provided with means, characterized in that said cyclone separation means comprises at least two juxtaposed conical separation unit. As a result of the dust separation portion arranged side by side, the dust collected in the same amount, the fine dust can be more effectively absorbed so that no dust leakage circumstances, improve the collection efficiency of the vacuum cleaner.

Portable vacuum cleaner

TECHNICAL FIELD

The utility model relates to a portable vacuum cleaner, in particular a cyclone dust separating apparatus has Portable vacuum cleaner.

Background technique

Currently, there are a variety of portable vacuum cleaner on the market. Portable vacuum cleaner with its convenient lightweight and wide The application for home dust, but dust and dust means the existing use of inconvenience, high cost, can not meet consumption The needs. For example, Chinese Patent Publication No. CN1626025A discloses a dust separation unit Set and achieve gray pleats formed by setting includes filters and a cup-shaped filter HEPA filter Efficient separation of dust, the cyclone dust-collecting case wall to form a structure, initial separation of dirty air suction vacuum cleaner, But this separation device comprises a plurality of components, compiex, and require frequent cleaning, use a long time Words, pleats likely to fail. As another example, the first Chinese Utility Model Patent Publication No. disclosed CN2631412Y A secondary cyclone vacuum cleaner, including dust cup, cup whirlwind, cyclone dust cup provided in the cup, cup and dust in the cyclone With a whirlwind cup between the cup to form a spiral duct between the dust cup and dust cup holder, cyclones and cyclone cup cup Also formed between the spiral duct, the dust cup this separation unit, dust mixed together, is likely to cause a spin It means reducing wind dust separation effectiveness.

Utility Model Content

To overcome these deficiencies and shortcomings, the utility model has a simple structure, the dust separation efficiency more High portable vacuum cleaner.

The utility model is a technical solution: a portable vacuum cleaner, comprising a housing, removable connected to the The housing dust box, located in one of the housing and the dust container handle on both accommodated in the housing The motor, the motor is driven by a fan, and power supply device is connected through a switch and the electromechanical power, The cyclone dust box provided with means, wherein said separating means comprises a cyclone dust air Export mixture inlet, the dust and debris, at least two separate portions disposed side by side conical, and with the Said air outlet fan communicating.

In particular, the cyclone separating means includes a cylindrical portion and the separating portion connected to the conical separation, the Said dust air mixture inlet along the cylindrical separation unit tangential; the entrance outside the screen; the Said dust box includes a first chamber and a second

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dust dust container volume chamber, the outlet of the dust and debris in the first set Two dust container chamber; the second dust container chamber comprises a removable sealing cap; the second accommodating chamber provided in the dust The first dust container chamber; separating said conical portion substantially parallel to each other; said cyclone separation means Entrance means located in the same example of the cylindrical portion of the separator; the inlet of said cyclone separation means may also be On opposite sides of the cylindrical portion of the separator; the cyclone separation means comprises a plastic material; the Power supply means may be a battery or AC power.

As a result of the dust separation portion arranged side by side, in the same circumstances as the collection amount of dust, more subtle The dust can be effectively absorbed so that no dust leakage situation, improved dust cleaner effectiveness. At the same time, the inlet portion of the periphery of the dust separation filter is provided, the initial separation of large dust suction vacuum cleaner Granules, and the cyclone filter means only take on the work of small dust particles of different sizes to achieve the dust Particles can be effectively separated. In particular, small dust particles and large dust particles at different points of dust Yung indoor housing, easy to clean, easy to operate.

BRIEF DESCRIPTION

FIG. 1 is a cross-sectional side of the utility model portable vacuum cleaner schematic view;

Figure 2 is a side of the utility model in the cyclone apparatus one embodiment of a schematic diagram;

Figure 3 is a cyclone separation apparatus shown in FIG. 2 a schematic plan view;

Figure 4 is a schematic right side view shown in Figure 2 cyclone separation device;

Figure 5 is another aspect of the present utility model cyclone apparatus embodiment of the schematic;

Figure 6 is a cyclone separation apparatus shown in FIG. 5 a schematic plan view;

Figure 7 is a schematic right side view shown in Figure 5 cyclone separation apparatus;

Figure 8 is another side cross-sectional schematic view of an embodiment of the present utility model cyclone separation device.

among them,

[1]

12 3 housing the dust container handle

[4]

45 6 fan motor drive mechanism

[7]

79 the switching power supply apparatus cyclone separation apparatus 8

[10]

10Filter means 12 is connected to the exhaust port 11

[13]

13The first connection wall connection wall 14 of the second opening 15

[16]

1621 received 17 snaps dust container chamber means

[22]

22Dust accommodating chamber 23 closures dust inlet 24

[71]

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71a export outlet 72a 71b entrance

[72]

72b separating the inlet 73a of the cylindrical portion 73b of the cylindrical separation unit

[74]

74a conical portion 74b conical separation separation unit air outlet 75a

[75]

75b air outlet connecting portion 76

detailed description

Below in conjunction with the accompanying drawings and specific embodiments of the utility model is further described in detail.

Referring to Figure 1, the utility model discloses a portable vacuum cleaner. A preferred embodiment of the utility model Example, a portable vacuum cleaner comprising a housing, detachably attached to the housing 1 on the dust container 2, provided in the housing 1 on the handle body 3, accommodated in the housing 1 of the motor 4, the motor 4 driven by a fan 6, and by 9 and 4 power switch means electrically connected to the motor 8. 2 dust box equipped with a cyclone separator device 7 for collecting And isolating the tiny dust particles.

Typically, portable vacuum cleaner fan 5 through a transmission mechanism 6, the motor 4 is driven by the motor 4 Power supply unit 8 may be a battery or AC power. The battery pack is rechargeable, can be repeatedly used. Preferably, the utility model uses a battery pack as the power supply unit 8, the power supply unit 8 is disposed on the vacuum cleaner housing Body 1.

The vacuum cleaner handle 3 may be provided on the housing 1, may be provided in the dust container 2.

[2]

Case 1 is provided with an exhaust port 11 for discharging air stream generated by the fan 6. Housing 1 and the dust box 2 12 and associated connecting means. Typically, attachment means 12 includes a dust box disposed in the wall 132 of the first connector. The second connecting wall 14 provided in the casing 1, and the gripping means 17. By gripping means 17, a first connecting wall 13Connecting wall 14 and the second contact, whereby the dust box 2 is connected to the housing 1. 1 for housing the dust container 2The side has a receiving opening 16, the cyclone device 7 communicates through the receiving opening 16 and the fan 6.

Referring to Figure 2 to 7, the cyclone dust separating apparatus 7 comprises a mixture of air inlet 72a, 72b, and dust Debris outlet 71a, 71b, at least two separate juxtaposed conical portion 74a, 74b, and with the Said fan air outlet 6 communicating 75a, 75b. By connecting portion 76, air in the cyclone separation apparatus 7 Ports 75a, 75b and the receiving port disposed on the housing 1 of 16 in communication. Depending on the size of the dust box 2, You can also set a plurality of conical separation unit in parallel to increase the collection efficiency of the vacuum cleaner. As a result of parallel Dust separation section disposed in the same dust collection amount, the fine dust can be more effectively Absorption so that no dust leakage situation, improve the collection efficiency of the vacuum cleaner.

[73]

7 further comprises a cyclone separation apparatus 74a, 74b connected to the cylindrical portion of the conical separation separating portion 73a, 73b, a mixture of dust and air inlet 72a, 72b separated along the cylindrical portion 73a, 73b tangential. gray Dust-air mixture is drawn into the cylindrical separation unit 73a, rear 73b, forming a swirl flow in as the centrifugal force Use, the dust particles are separated from the gas stream and the dust and debris from the outlet 71a, 71b run out, 2 falls in the collecting case. Clean air in the direction of the arrow A from the air outlet 75a, 75b flows 4 out of the flow of motor-driven fan 6.

Referring to Figure 2-4, the utility model cyclone device 7 a preferred embodiment, the cyclone 7 from the inlet means 72a, 72b located on the same side of the cylindrical separation portion 73a, 73b of. Air dust After passing through the filter 10 tangentially from the inlet 72a, 72b into the cylindrical separation unit 73a, 73b in.

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Referring to Figure 5-7, the utility model cyclone another device of Example 7, the cyclone 7 inlet means 72a, 72b are located on opposite sides of the cylindrical separation portion 73a, 73b of.

Vacuum cleaner dust box 2 comprises a first dust accommodating chamber 21 and a second dust accommodating chamber 22, the front portion is provided with ash Dust inlet 24 for collecting and directing a mixture of dust and air. Suitable accessories can be connected to the dust inlet 24, for cleanup work at different occasions. When the cleaner work, from the exhaust fan 6 Air discharge port 11, the fan 6 is generated in the receiving housing 1 for the negative pressure relative to atmospheric pressure, so that The mixture of dust through the air inlet 24 into the dust from the dust box 2. 2 a cross-sectional shape of substantially dust box It was a "D" after the mixture forms a spiral-shaped airflow, dust and air is sucked in flows provided within the dust box 2 Cyclone device 7, a large accumulation of debris falling dust content in the first chamber 21. Meanwhile, the cyclone inlet means 7 72a, 72b has a peripheral filter 10, primary separation of large dust particles sucked vacuum cleaner, Cyclone separation means 7 bear only a small load filtering dust particles, and thus, different sizes of dust particles it can be effectively separated. A plurality of through holes on the filter 10, the fine dust particles from the through hole through the feed 7 into the cyclone inlet means 72a, 72b.

[74]

The utility model is a preferred embodiment, the outlet dust and debris 71a, 71b provided in the second dust container 22 rooms. Referring to Figure 1, the second dust chamber 22 may be individually removable container, including removable closure cap 23, with In the collected fine dust particles sealed in the second dust accommodating chamber 22 so that the dust particles do not Mixed with the first dust container chamber 21, to avoid the occurrence of the cyclone separation means 7 again. ability Skilled easy to think that the second dust accommodating chamber 22 may be provided only in the first dust container chamber 21, it may be provided in the first dust container 21 outside the chamber. Referring to Figure 7, a second dust accommodating chamber 22 is provided in the first dust container 21 outside the chamber. 21 with an opening 15 on the first dust container chamber, conical cyclone separation unit device 7 74a, an outlet end portion 74b of the connecting portion, dust and debris 71a, 71b extend through the first opening 15 from Two dust accommodating chamber 22, the connecting portion may be dust accommodating chamber 22 opposite the second seal. When you need to clean up the dust box 2 When the dust box 2 whole removed from the housing 1, it can clean up the first chamber 21 and the dust container Second dust accommodating chamber 22. At the same time, small dust particles and larger dust particles at different points of the dust container chamber Receiving, respectively, you can clean up, easy to operate.

The utility model is a preferred embodiment, the conical separation unit 74a, 74b substantially parallel to each other, By permitting spatial dimensions, may be disposed at an angle to each other.

In order to facilitate the operator to observe the dust box to collect dust within the condition 2, preferably, the dust box 2 and spin Air separation device 7 may be formed of a transparent material, preferably a lightweight plastic material. Thus, the entire suction Not because of the weight of the dust cyclone unit 7 is set to increase, the operator operates convenient and comfortable.

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CLAIMS CN2927961

[1]

1. A portable vacuum cleaner comprising a housing (1), is detachably connected to the housing (1) of the dust collecting Box (2), provided in the housing (1) and the dust box (2) either on the handle (3), is accommodated in Said housing (1) of the motor (4) by said motor (4) driven fan (6), and by Switch (9) and the motor (4) is electrically connected to the power supply means (8), the dust box (2) equipped There cyclone separation means (7), characterized in that said cyclone separation means (7) comprises an air dust Mixture inlet (72a, 72b), the dust and debris outlet (71a, 71b), at least two juxtaposed Conical separation unit (74a, 74b), and with the fan (6) communicating with an air outlet (75a, 75b).

[2]

2. Portable vacuum cleaner according to claim 1, characterized in that said cyclone separation means (7) Comprising a cylindrical separation unit (73a, 73b) of said conical separating portions (74a, 74b) connected said Dust air mixture inlet (72a, 72b) separated along the cylindrical portion (73a, 73b) tangential.

[3]

3. The portable vacuum cleaner according to claim 2, characterized in that the inlet (72a, 72b) outside With strainer (10).

[4]

4. The portable vacuum cleaner according to claim 3, characterized in that the dust box (2) including The first dust container chamber (21) and second dust container chamber (22), dust and debris of the outlet (71a, 71b) Provided in the second dust container chamber (22).

[5]

5. The portable vacuum cleaner according to claim 4, characterized in that said second dust container chamber (22) including removable sealing lid (23).

[6]

6. The portable vacuum cleaner according to claim 5, characterized in that said second dust container chamber (22) Disposed on the first dust container chamber (21)

[74]

7. Portable vacuum cleaner according to claim 1, characterized in that said conical separation unit (74a, 74b) substantially parallel to each other.

[8]

8. According 2-7 portable vacuum cleaner according to any one of the preceding claims, characterized in that the cyclone The same as the inlet (72a, 72b) separating means (7) located in said cylindrical separation part (73a, 73b) of Side.

[9]

9. According 2-7 portable vacuum cleaner according to any one of the preceding claims, characterized

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in that the cyclone An inlet (72) separating means (7) located in said cylindrical separation part (73a, 73b) of twc opposite side.

[10]

10. According 2-7 portable vacuum cleaner according to any one of the preceding claims, characterized in that the cyclone Separating means (7) consists of a plastic material.

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[19] 中华人民共和国国家知识产权局

[51] Int. Cl.
A47L 9/10 (2006.01)
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A47L 5/22 (2006.01)

[12] 实用新型专利说明书

专利号 ZL 200620130748.4

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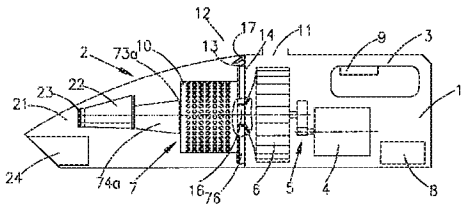
权利要求书 1 页 说明书 5 页 附图 4 页

[54] 实用新型名称

便携式吸尘器

[57] 摘要

本实用新型公开一种便携式吸尘器，包括壳体，可拆装的连接到所述壳体的集尘盒，设于所述壳体上的手柄，容纳于所述壳体中的电机，由所述电机驱动的风扇，以及通过开关与所述电机电连接的供电装置，所述集尘盒内设有旋风分离装置，其特征在于，所述旋风分离装置包括至少两个并列设置的圆锥形分离部。由于采用了并列设置的灰尘分离部，在同样的灰尘收集量的情况下，更细微的灰尘能够被有效的吸收，从而不会产生灰尘外泄的情况，提高了吸尘器的除尘效率。



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1. 一种便携式吸尘器，包括壳体（1），可拆装的连接到所述壳体（1）的集尘盒（2），设于所述壳体（1）及集尘盒（2）二者之一上的手柄（3），容纳于所述壳体（1）中的电机（4），由所述电机（4）驱动的风扇（6），以及通过开关（9）与所述电机（4）电连接的供电装置（8），所述集尘盒（2）内设有旋风分离装置（7），其特征在于，所述旋风分离装置（7）包括灰尘空气混合物入口（72a,72b），灰尘和碎屑的出口（71a,71b），至少两个并列设置的圆锥形分离部（74a,74b），以及与所述风扇（6）连通的空气出口（75a,75b）。
2. 根据权利要求 1 所述的便携式吸尘器，其特征在于，所述旋风分离装置（7）包括与所述圆锥形分离部（74a,74b）相连的圆柱形分离部（73a,73b），所述灰尘空气混合物入口（72a,72b）沿所述圆柱形分离部（73a,73b）切向设置。
3. 根据权利要求 2 所述的便携式吸尘器，其特征在于，所述入口（72a,72b）外设有滤网（10）。
4. 根据权利要求 3 所述的便携式吸尘器，其特征在于，所述集尘盒（2）包括第一灰尘容室（21）和第二灰尘容室（22），所述灰尘和碎屑的出口（71a,71b）设于所述第二灰尘容室（22）内。
5. 根据权利要求 4 所述的便携式吸尘器，其特征在于，所述第二灰尘容室（22）包括可拆装的密封盖（23）。
6. 根据权利要求 5 所述的便携式吸尘器，其特征在于，所述第二灰尘容室（22）设于所述第一灰尘容室（21）内。
7. 根据权利要求 1 所述的便携式吸尘器，其特征在于，所述圆锥形分离部（74a,74b）基本上相互平行设置。
8. 根据权利要求 2 至 7 任意一项所述的便携式吸尘器，其特征在于，所述旋风分离装置（7）的入口（72a,72b）位于所述圆柱形分离部（73a,73b）的相同的一侧。
9. 根据权利要求 2 至 7 任意一项所述的便携式吸尘器，其特征在于，所述旋风分离装置（7）的入口（72）位于所述圆柱形分离部（73a,73b）的相对的两侧。
10. 根据权利要求 2 至 7 任意一项所述的便携式吸尘器，其特征在于，所述旋风分离装置（7）由塑料材料构成。

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便携式吸尘器

技术领域

本实用新型涉及一种便携式吸尘器，特别是一种具有旋风式灰尘分离装置的便携式吸尘器。

背景技术

目前，市场上有各种各样的便携式吸尘器。便携式吸尘器以其方便轻巧而广为家庭除尘所应用，但现有的吸尘及滤尘装置使用不便，成本高，不能满足消费者的需求。比如，中国发明专利公开第 CN1626025A 号揭示了一种灰尘分离装置，通过设置包括褶状物形成的过滤器和杯形滤网的高效微粒空气过滤器实现灰尘的高效分离，集尘箱内壁形成旋风分离结构，将吸尘器吸入的脏空气初步分离，但这种分离装置包括了多个构件，结构复杂，而且需要经常清洗，使用时间长的话，褶状物容易失效。再比如，中国实用新型专利公告第 CN2631412Y 号揭示了一种二次旋风吸尘器，包括尘杯、旋风杯，旋风杯设于尘杯中，在旋风杯与尘杯之间设有旋风杯罩，从而尘杯与尘杯架之间形成螺旋风道，旋风杯与旋风杯罩之间也形成螺旋风道，这种分离装置的集尘杯中，灰尘混杂在一起，容易造成旋风分离装置除尘效力的降低。

实用新型内容

为了克服上述不足和缺点，本实用新型提供一种结构简单，灰尘分离效率更高的便携式吸尘器。

本实用新型的技术方案是：一种便携式吸尘器，包括壳体，可拆装的连接到所述壳体的集尘盒，设于所述壳体及集尘盒二者之一上的手柄，容纳于所述壳体中的电机，由所述电机驱动的风扇，以及通过开关与所述电机电连接的供电装置，所述集尘盒内设有旋风分离装置，其特征在于，所述旋风分离装置包括灰尘空气混合物入口、灰尘和碎屑的出口、至少两个并列设置的圆锥形分离部、以及与所述风扇连通的空气出口。

特别的，所述旋风分离装置包括与所述锥形分离部相连的圆柱形分离部，所述灰尘空气混合物入口沿所述圆柱形分离部切向设置；所述入口外设有滤网；所述集尘盒包括第一灰尘容室和第二灰尘容室，所述灰尘和碎屑的出口设于所述第

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二灰尘容室内；所述第二灰尘容室包括可拆装的密封盖；所述第二灰尘容室设于所述第一灰尘容室内；所述圆锥形分离部基本上相互平行设置；所述旋风分离装置的入口位于所述圆柱形分离部的相同的一侧；所述旋风分离装置的入口也可以位于所述圆柱形分离部的相对的两侧；所述旋风分离装置由塑料材料构成；所述供电装置可以是电池组或者交流电。

由于采用了并列设置的灰尘分离部，在同样的灰尘收集量的情况下，更细微的灰尘能够被有效的吸收，从而不会产生灰尘外泄的情况，提高了吸尘器的滤尘效率。同时，灰尘分离部的入口外围设有滤网，初步分离吸尘器吸入的大的灰尘颗粒，使旋风分离装置仅担负小的灰尘颗粒的过滤工作，实现了不同尺寸的灰尘颗粒都能够被有效分离。特别的，小的灰尘颗粒和大的灰尘颗粒分在不同的灰尘容室内容纳，容易清理，操作方便。

附图说明

图 1 是本实用新型便携式吸尘器的侧剖示意图；

图 2 是本实用新型中旋风分离装置的一种实施例的侧面示意图；

图 3 是图 2 中所示旋风分离装置的俯视示意图；

图 4 是图 2 中所示旋风分离装置的右视示意图；

图 5 是本实用新型中旋风分离装置的另一种实施例的侧面示意图；

图 6 是图 5 中所示旋风分离装置的俯视示意图；

图 7 是图 5 中所示旋风分离装置的右视示意图；

图 8 是本实用新型中旋风分离装置的另一种实施例的侧剖示意图。

其中，

1 壳体	2 集尘盒	3 手柄
4 电机	5 传动机构	6 风扇
7 旋风分离装置	8 供电装置	9 开关
10 滤网	11 排气口	12 连接装置
13 第一连接壁	14 第二连接壁	15 开口
16 接收口	17 卡扣装置	21 灰尘容室
22 灰尘容室	23 密封盖	24 灰尘入口
71a 出口	71b 出口	72a 入口
72b 入口	73a 圆柱形分离部	73b 圆柱形分离部

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74a 圆锥形分离部 74b 圆锥形分离部 75a 空气出口

75b 空气出口 76 连接部

具体实施方式

下面结合附图和具体的实施例对本实用新型进行进一步详细说明。

参见附图 1，本实用新型揭示了一种便携式吸尘器。本实用新型的优选实施例中，便携式吸尘器包括壳体 1，可拆装的附着到壳体 1 上的集尘盒 2，设于壳体 1 上的手柄 3，容纳于壳体 1 中的电机 4，由电机 4 驱动的风扇 6，以及通过开关 9 与电机 4 电连接的供电装置 8。集尘盒 2 内设有旋风分离装置 7 用于收集和分离微小的灰尘颗粒。

通常，便携式吸尘器的风扇 6 通过传动机构 5 由电机 4 驱动，为电机 4 提供电能的供电装置 8 可以是电池组或者交流电。电池组是可充电的，能够反复利用。优选的，本实用新型采用电池组作为供电装置 8，该供电装置 8 设于吸尘器的壳体 1 中。

吸尘器的手柄 3 可以设于壳体 1 上，也可以设于集尘盒 2 上。

壳体 1 上设有排气口 11，用于排出由风扇 6 产生的气流。壳体 1 与集尘盒 2 通过连接装置 12 相连。通常，连接装置 12 包括设于集尘盒 2 的第一连接壁 13、设于壳体 1 的第二连接壁 14、以及卡扣装置 17。通过卡扣装置 17，第一连接壁 13 与第二连接壁 14 相接，从而将集尘盒 2 连接到壳体 1 上。壳体 1 面向集尘盒 2 的一侧设有接收口 16，旋风分离装置 7 通过该接收口 16 与风扇 6 连通。

参见附图 2~7，旋风分离装置 7 包括灰尘空气混合物入口 72a，72b，灰尘和碎屑的出口 71a，71b，至少两个并列设置的圆锥形分离部 74a，74b，以及与所述风扇 6 连通的空气出口 75a，75b。通过连接部 76，旋风分离装置 7 的空气出口 75a，75b 与壳体 1 上设置的接收口 16 相连通。根据集尘盒 2 的尺寸的不同，也可以设置多个并列的圆锥形分离部以提高吸尘器的除尘效率。由于采用了并列设置的灰尘分离部，在同样的灰尘收集量的情况下，更细微的灰尘能够被有效的吸收，从而不会产生灰尘外泄的情况，提高了吸尘器的除尘效率。

旋风分离装置 7 还包括与圆锥形分离部 74a，74b 相连的圆柱形分离部 73a,73b，灰尘空气混合物入口 72a，72b 沿圆柱形分离部 73a，73b 切向设置。灰尘空气混合物被吸入圆柱形分离部 73a，73b 后，形成螺旋气流，在离心力的作用下，灰尘微粒被从气流中分离出来并且从灰尘和碎屑的出口 71a，71b 跑出来，

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落入集尘盒 2 中。干净的空气沿着箭头 A 所指的方向从空气出口 75a，75b 中流出流向电机 4 驱动的风扇 6。

参见附图 2~4，本实用新型的旋风分离装置 7 的一个优选实施例中，旋风分离装置 7 的入口 72a，72b 位于圆柱形分离部 73a，73b 的相同的一侧。灰尘空气穿过滤网 10 后沿切向由入口 72a，72b 进入圆柱形分离部 73a，73b 中。

参见附图 5~7，本实用新型的旋风分离装置 7 的另一个实施例中，旋风分离装置 7 的入口 72a，72b 分别位于圆柱形分离部 73a，73b 的相对的两侧。

吸尘器的集尘盒 2 包括第一灰尘容室 21 和第二灰尘容室 22，其前部设有灰尘入口 24，用于收集和引导灰尘和空气的混合物。合适的附件可以连接到灰尘入口 24，以便在不同的场合下进行清理工作。当吸尘器工作时，风扇 6 从排气口 11 排出空气，在容纳风扇 6 的壳体 1 内产生相对于大气压为负压的气压，使灰尘空气的混合物通过灰尘入口 24 进入集尘盒 2。集尘盒 2 的剖面形状基本上呈“D”形，灰尘和空气的混合物被吸入后形成螺旋气流，流向设于集尘盒 2 内的旋风分离装置 7，大的碎屑在第一灰尘容室 21 内落下堆积。同时，旋风分离装置 7 的入口 72a，72b 外围设有滤网 10，初步分离吸尘器吸入的大的灰尘颗粒，旋风分离装置 7 仅担负小的灰尘颗粒的过滤工作，从而，不同尺寸的灰尘颗粒都能够被有效分离。滤网 10 上设有多个通孔，细小的灰尘颗粒会从通孔中穿过进入旋风分离装置 7 的入口 72a，72b。

本实用新型的优选实施例中，灰尘和碎屑的出口 71a，71b 设于第二灰尘容室 22 内。参见图 1，第二灰尘容室 22 可单独拆卸，包括可拆装的密封盖 23，用于将收集起来的细小的灰尘微粒密封于第二灰尘容室 22 内，从而灰尘微粒不会混入第一灰尘容室 21 中，避免了旋风分离装置 7 再次分离的情况的发生。本领域技术人员容易想到的是，第二灰尘容室 22 不仅可以设于第一灰尘容室 21 内，也可以设于第一灰尘容室 21 之外。参见图 7，第二灰尘容室 22 设于第一灰尘容室 21 之外。第一灰尘容室 21 上设有开口 15，旋风分离装置 7 的圆锥形分离部 74a，74b 的端部设有连接部，灰尘和碎屑的出口 71a，71b 自开口 15 延伸至第二灰尘容室 22 中，连接部可将第二灰尘容室 22 相对密封。当需要清理集尘盒 2 时，将集尘盒 2 整个的从壳体 1 上拆下来，就可以同时清理第一灰尘容室 21 和第二灰尘容室 22。同时，小的灰尘颗粒和大的灰尘颗粒分在不同的灰尘容室内容纳，可以分别清理，操作方便。

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本实用新型的优选实施例中，圆锥形分离部 74a，74b 基本上相互平行设置，空间尺寸允许的情况下，也可以相互成一定的角度设置。

为了方便操作者观察集尘盒 2 内的灰尘收集状况，优选的，集尘盒 2 以及旋风分离装置 7 可以由透明的材料构成，最好是轻的塑料材料构成。这样，整个吸尘器的重量不会因为旋风分离装置 7 的设置而增加，操作者操作方便舒适。

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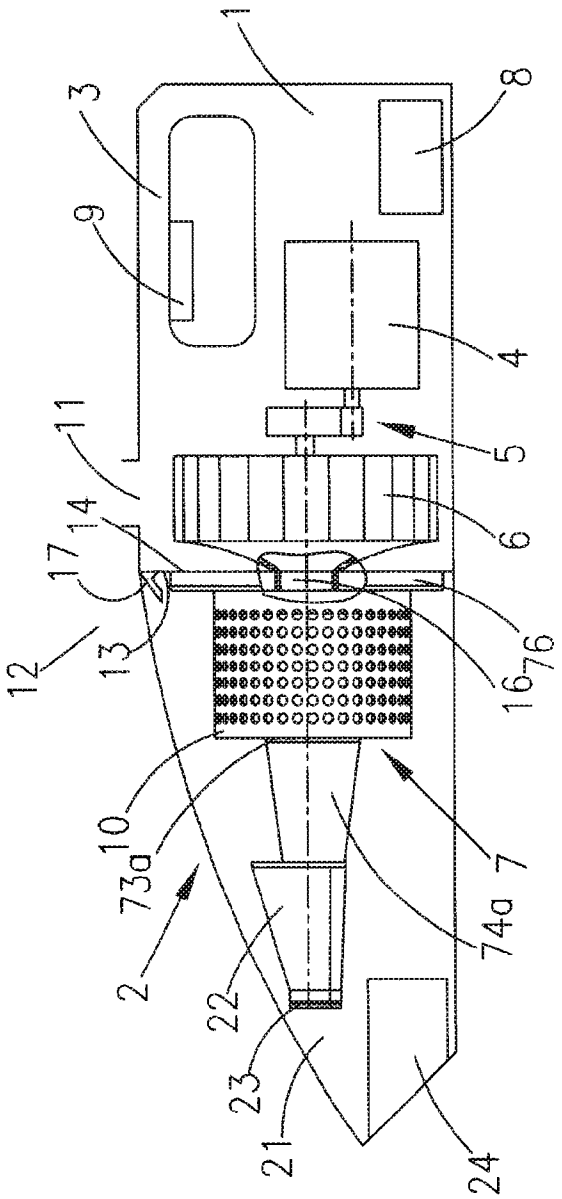


图 1

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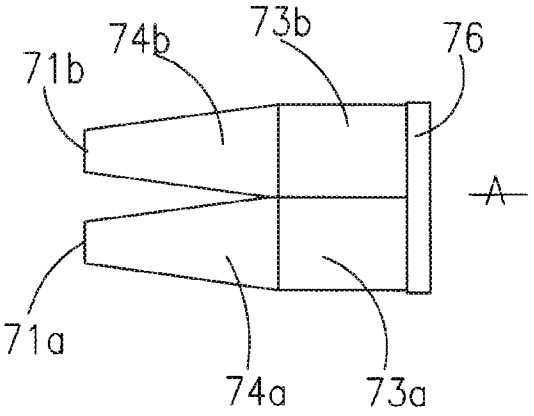


图 2

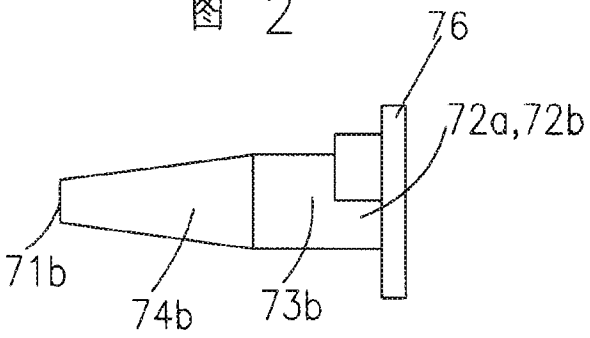


图 3

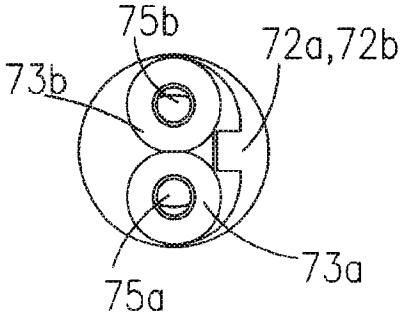


图 4

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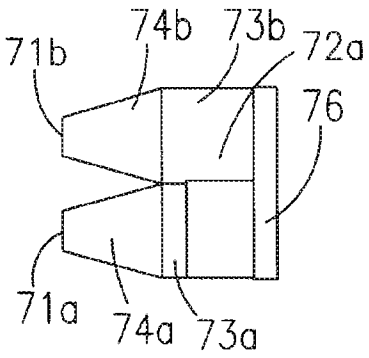


图 5

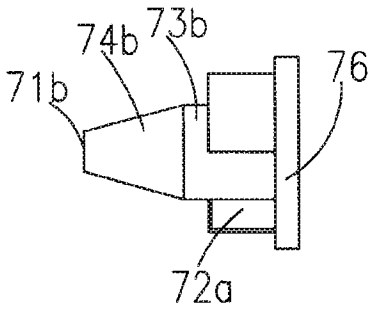


图 6

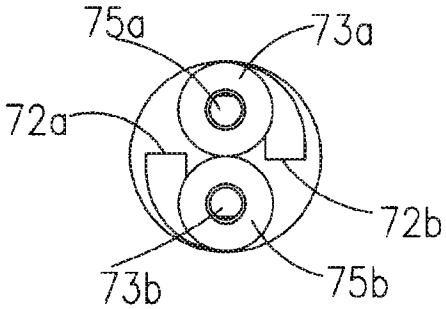


图 7

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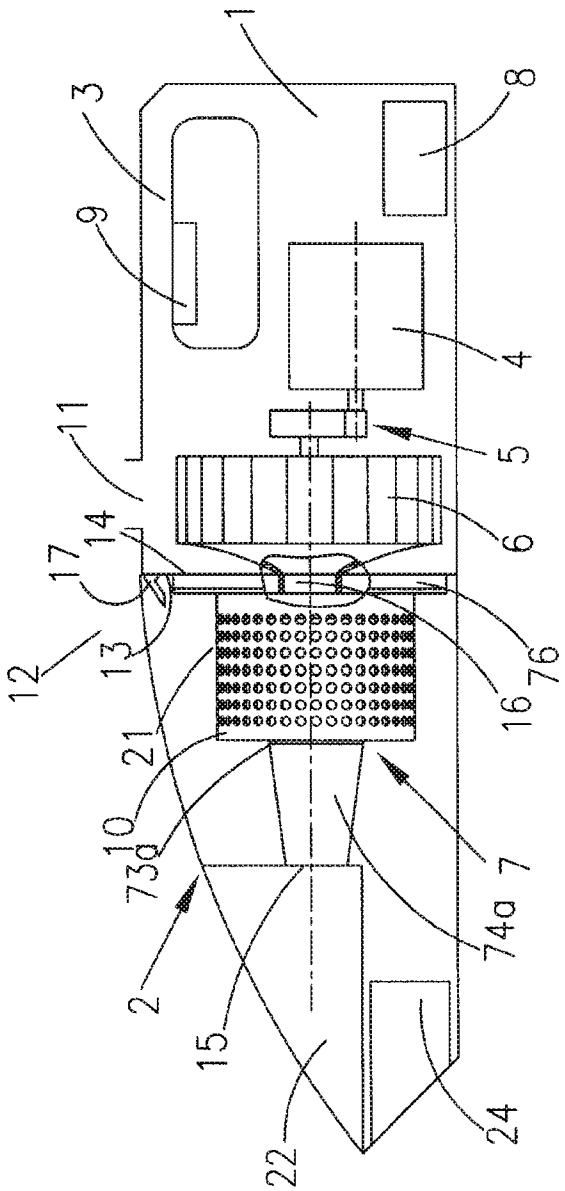


图 8

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PORTABLE CLEANER

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Inventor(s): BORINATO GIANNI [IT]; CHEN CHENGZHONG [CN] ±

Applicant(s): POSITEC POWER TOOLS SUZHOU CO [CN]; BORINATO GIANNI [IT]; CHEN CHENGZHONG [CN] ±

Classification: - international: ***A47L5/24; A47L5/28; A47L9/16***

- cooperative: A47L5/24; A47L9/1616

Application number: WO2007CN00733 20070307

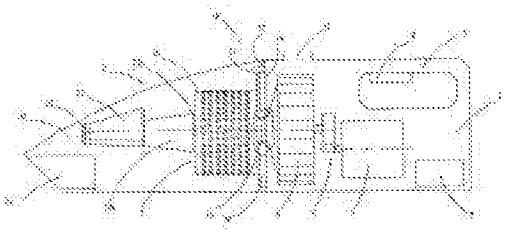
Priority number(s): CN2006167288 20060310

Also published as: CN101032384 (A)

Abstract of WO2007104238 (A1)

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A portable cleaner includes a case (1), a dust collecting box (2) which can detachably connected to the said case, a handle which is fixed on the said case, a motor which is contained in the said case, a fan which is driven by the said motor and a power supply device which is electrically connected to the said motor by a switch. A cyclone device is fixed in the said dust collecting box. The said cyclone device includes at least two coniform separating parts set abreast. With the separating parts set abreast, for the same amount of dust, further smaller dust can be absorbed effectively, so that it can prevent the dust from leaking and improve the dust catching efficiency of the cleaner.



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DESCRIPTION CN101032384

The present invention discloses a portable vacuum cleaner comprising a housing, detachably connected to the housing of the dust box handle provided on said housing, said housing accommodating the motor, by the motor driven fan and electrically powered through a switch to the mechanical and electrical connection means, the dust box provided with separation means comprises at least two portions juxtaposed conical separation cyclone separation means, characterized in that the cyclone . As a result of the dust separation portion arranged side by side, the dust collected in the same amount, the fine dust can be more effectively absorbed so that no dust leakage circumstances, improve the collection efficiency of the vacuum cleaner.

Portable vacuum cleaner

TECHNICAL FIELD

The present invention relates to a portable vacuum cleaner, in particular a cyclone dust separating apparatus has it Portable vacuum cleaner.

Background technique

Currently, there are a variety of portable vacuum cleaner on the market. Portable vacuum cleaner with its lightweight and convenient Widely applied to household dust, but dust and dust means the existing use of inconvenience, high cost, can not meet Consumer demand. For example, Chinese Patent Publication No. CN1626025A discloses a dust points Off means, including by setting formed pleats HEPA filters and filter bowl screen Achieve efficient separation of dust, the cyclone dust-collecting case wall to form the structure of the vacuum cleaner sucked dirty air Preliminary separation, but the separation device comprises a plurality of components, complex, and require frequent cleaning, Use a long time, the pleats likely to fail. As another example, the first Chinese Utility Model Patent Publication CN2631412Y No. discloses a secondary cyclone vacuum cleaner, including dust cup, cup whirlwind, cyclone cup provided in Dust cup, between the cyclone and the dust cup cup cup with a cyclone to form a spiral between the dust cup and dust cup holder Duct, spiral duct is also formed between the cup and the cyclone cyclone cup, cup of this dust separation device, gray Dust mixed together, making it easy cyclone dust reduction device effectiveness.

SUMMARY

To overcome these deficiencies and shortcomings, the present invention provides a simple structure, higher dust separation efficiency Portable vacuum cleaner.

Aspect of the present invention: a portable vacuum cleaner comprising a housing, detachably connected to the Said housing of the dust box, located in one of the housing and the handle on the dust container both accommodated in the housing The motor, the motor is driven by the fan, and switch power supply installed by the electrical mechanical and electrical connection Position, provided the cyclone dust collecting box means, wherein said separating means comprises a cyclone ash Dust air mixture inlet, an outlet dust and debris, at least two parallel conical separation unit settings, And an air outlet in communication with said fan.

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In particular, the cyclone separating means includes a cylindrical portion with the conical separation separating portion connected Tangential inlet of the dust-air mixture along the cylindrical separation unit; the entrance outside the screen; The dust box includes a first chamber and a second dust container dust container chamber, the outlet is provided in the dust and debris of the Said second dust container chamber; the second dust container chamber comprises a removable sealing cap; the second dust content The first dust chamber provided in the container chamber, separating said conical portion substantially parallel to each other; said spin Separating the air inlet means located at the same side of the cylindrical portion of the separator; the cyclone separating apparatus The inlet may be on opposite sides of the cylindrical portion of the separator; the cyclone separation means made of a plastic material Feed composition; said power supply means may be a battery or AC power.

As a result of the dust separation portion arranged side by side, in the same circumstances as the collection amount of dust, finer Micro dust can be effectively absorbed so that no dust leakage situation improved cleaner Dust filtration efficiency. At the same time, the inlet portion of the periphery of the dust separation filter is provided with a preliminary separation of large suction vacuum cleaner Dust particles, so that the cyclone filter means only take on the work of small dust particles, to achieve a different scale Inch of dust particles can be effectively separated. In particular, small dust particles and larger dust particles in points Different dust container chamber housing, easy to clean, easy to operate.

BRIEF DESCRIPTION

Figure 1 is a side cross-sectional schematic view of the present invention, a portable vacuum cleaner;

Figure 2 is a side cyclone of the present invention, an isolated schematic view of the apparatus of the embodiment,

Figure 3 is a cyclone separation apparatus shown in FIG 2 a schematic plan view;

Figure 4 is a schematic right side view shown in Figure 2 cyclone separation device;

Figure 5 is a side cyclone separation apparatus of the present invention, a schematic view of another embodiment;

Figure 6 is a cyclone separation apparatus shown in FIG. 5 a schematic plan view;

Figure 7 is a schematic right side view shown in Figure 5 cyclone separation apparatus;

Figure 8 is another side cross-sectional schematic view of an embodiment of the present invention, the cyclone separation apparatus.

among them,

[1]

12 3 housing the dust container handle

[4]

45 6 fan motor drive mechanism

[7]

79 the switching power supply apparatus cyclone separation apparatus 8

[10]

10Filter means 12 is connected to the exhaust port 11

[13]

13The first connection wall connection wall 14 of the second opening 15

[16]

1621 dust container chamber receiving opening 17 gripping means

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[22]

22Dust accommodating chamber 23 closures dust inlet 24

[71]

71a export outlet 72a 71b entrance

[72]

72b separating the inlet 73a of the cylindrical portion 73b of the cylindrical separation unit

[74]

74a conical portion 74b conical separation separation unit air outlet 75a

[75]

75b air outlet connecting portion 76

detailed description

Below in conjunction with the accompanying drawings and specific embodiments of the present invention will be described in further detail.

Referring to Figure 1, the present invention discloses a portable vacuum cleaner. A preferred embodiment of the present invention, Portable vacuum cleaner comprising a housing, detachably attached to the dust box 1 on the housing 2, is provided on the housing 1 Handle 3, accommodated in the housing 1 of the motor 4, the motor 4 driven by a fan 5, and via the switch 9 4 electrical power supply and motor connection device 8. 2 dust box equipped with a cyclone separator device 7 for collecting and From tiny dust particles.

Typically, portable vacuum cleaner fan 5 through a transmission mechanism 6 driven by the motor 4, the motor 4 as mentioned Power supply means 8 can be battery or AC power. The battery pack is rechargeable, can be repeated use. Preferably, the present invention uses a battery pack as a power supply means 8, the power supply device 8 provided in the vacuum cleaner The housing 1.

The vacuum cleaner handle 3 may be provided on the housing 1, may be provided in the dust container 2.

[2]

Case 1 is provided with an exhaust port 11 for discharging air stream generated by the fan 6. Case 1 and the dust box 212 and associated connecting means. Typically, attachment means 12 includes a dust box disposed in the wall 132 of the first connector, The second connecting wall 14 provided in the casing 1, and the gripping means 17. By gripping means 17, a first connection Wall 13 is connected with the second contact wall 14, whereby the dust box 2 is connected to the housing 1. 1 set for housing 2 is provided with the cartridge side of the dust-receiving opening 16, cyclone separation apparatus 7 through the receiving opening 16 communicates with the fan 6.

Referring to Figure 2 to 7, the cyclone dust separating apparatus 7 comprises a mixture of air inlet 72a, 72b, the dust And debris outlet 71a, 71b, at least two parallel conical separation unit set 74a, 74b, and with The fan air outlet 6 communicating 75a, 75b. By connecting portion 76, the air cyclone device 7 Outlet 75a, 75b and the receiving opening 16 provided on the housing 1 communicates. According to dust box size 2 is not The same may be provided a plurality of conical separation unit in parallel to increase the collection efficiency of the vacuum cleaner. Thanks A dust separation portion juxtaposed in the same dust collection amount, more fine dust can it is effectively absorbed so that no dust leakage situation, improve the collection efficiency of the vacuum cleaner.

[73]

7 further comprises a cyclone separation apparatus 74a, 74b connected to the cylindrical portion of the conical separation separating portion 73a, 73b, a mixture of dust and air inlet 72a, 72b separated along the cylindrical portion 73a, 73b tangential. After 73a, 73b dust-air mixture is sucked into the cylindrical separation unit, swirl flow is formed in the centrifugal force The role of dust particles are separated from the gas stream and out of the dust and debris from the outlet 71a, 71b ran To, falling into the dust box 2. Clean air in the direction of the arrow A from the air outlet 75a, 75b The effluent flows to the motor-driven fan 4 6.

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Referring to Figure 2-4, the cyclone separating apparatus of the present invention, a preferred embodiment 7, the cyclone inlet means 7 72a, 72b located on the same side of the cylindrical separation portion 73a, 73b of. Air dust After passing through the filter 10 tangentially from the inlet 72a, 72b into the cylindrical separation unit 73a, 73b in.

Referring to Figure 5-7, the cyclone separator of the present invention, another embodiment of the apparatus 7, the cyclone separating means 7 Set inlet 72a, 72b respectively, on opposite sides of the cylindrical separation portion 73a, 73b of.

Vacuum cleaner dust box 2 comprises a first dust accommodating chamber 21 and a second dust accommodating chamber 22, the front portion Dust inlet 24 for collecting and directing a mixture of dust and air. Suitable accessories can be connected to ash Dust inlet 24, for cleanup work at different occasions. When the cleaner work, from the exhaust fan 6 Air ejection port 11, the fan 6 is generated in the receiving housing 1 for the negative pressure relative to atmospheric pressure, The mixture of dust and air through the dust inlet 24 into the dust box 2. Basic cross-sectional shape of the dust box 2 It was on the "D" form a spiral-shaped gas stream mixture, dust and air is sucked in flows provided in the dust box 2 Within the cyclone separation apparatus 7, a large accumulation of debris to fall within the first dust accommodating chamber 21. Meanwhile, the cyclone 7 from the inlet means 72a, 72b provided with a peripheral filter 10, a preliminary separation of large dust suction vacuum cleaner Particles, the cyclone 7 assume only small dust particles of the filter means working, thus, different sizes of ash Dust particles can be efficiently separated. A plurality of through holes on the filter 10, the fine dust particles from the through-hole 7 through the entrance to the cyclone means 72a, 72b.

[2]

Preferred embodiment of the invention, the outlet dust and debris 71a, 71b provided in the second dust accommodating chamber 22 inside. Referring to Figure 1, the second dust chamber 22 may be individually removable container, including removable closure cap 23, for Collected fine dust particles dust seal in the second container chamber 22, so that the dust particles do not mix The first dust container chamber 21, to avoid the occurrence of cyclonic separating means 7 is again separated situation. Those skilled in Art will readily recognize that the capacity of the second dust chamber 22 may be provided only in the first dust container chamber 21, also it may be provided in the first dust container 21 outside the chamber. Referring to Figure 7, a second dust accommodating chamber 22 is provided in the first dust container 21 outside the chamber. 21 with an opening 15 on the first dust container chamber, conical cyclone separation unit device 7 74a, an outlet end portion 74b of the connecting portion, dust and debris 71a, 71b extend through the first opening 15 from Two dust accommodating chamber 22, the connecting portion may be dust accommodating chamber 22 opposite the second seal. When you need to clean up the dust box 2When the dust box 2 whole removed from the housing 1, it can clean up the dust content of the first chamber 21 And a second dust accommodating chamber 22. At the same time, small dust particles and larger dust particles at different points of the dust container chamber Accommodated, respectively, you can clean up, easy to operate

Preferred embodiment of the present invention, the conical separator portion 74a, 74b substantially parallel to each other, the empty Under a dimension between permitted to be disposed at an angle to each other.

In order to facilitate the operator to observe the dust box to collect dust within the condition 2, preferably, 2 and dust box Cyclone separation means 7 may be formed of a transparent material, preferably a lightweight plastic material. Thus, the whole By weight of a cyclone vacuum cleaner will not set the device 7 is increased, convenient and comfortable operator operates

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CLAIMS CN101032384

[75]

1. A portable vacuum cleaner comprising a housing (1), is detachably connected to the housing (1) of the dust collecting Box (2), provided in the housing (1) and the dust box (2) either on the handle (3), to accommodate Said housing (1) of the motor (4) by said motor (4) driven fan (6), and Via a switch (9) and the motor (4) is electrically connected to the power supply means (8), the dust box (2) Equipped with cyclone separation means (7), characterized in that said cyclone separation means (7) comprises a dust Air mixture inlet (72a, 72b), the dust and debris outlet (71a, 71b), at least two parallel Conical separation unit (74a, 74b) of the set, and with the fan (6) communicating with an air outlet (75a, 75b).

[2]

2. Portable vacuum cleaner according to claim 1, characterized in that said cyclone separation means (7) Comprising a cylindrical separation unit (73a, 73b) of said conical separating portions (74a, 74b) connected by Said dust air mixture inlet (72a, 72b) separated along the cylindrical portion (73a, 73b) disposed tangential Home.

[3]

3. The portable vacuum cleaner according to claim 2, characterized in that the inlet (72a, 72b) Outside the filter (10).

[4]

4. The portable vacuum cleaner according to claim 3, characterized in that the dust box (2) including The first dust container chamber (21) and second dust container chamber (22), dust and debris of the outlet (71a, 71b) Provided in the second dust container chamber (22).

[5]

5. The portable vacuum cleaner according to claim 4, characterized in that said second dust container chamber (22) including removable sealing lid (23).

[6]

6. The portable vacuum cleaner according to claim 5, characterized in that said second dust container chamber (22) Disposed on the first dust container chamber (21)

[74]

7. Portable vacuum cleaner according to claim 1, characterized in that said conical separation unit (74a, 74b) substantially parallel to each other.

[8]

8. According 2-7 portable vacuum cleaner according to any one of the preceding claims, characterized in that said rotary inlet air separation unit (7) (72a, 72b) located on said cylindrical separation part (73a, 73b) of On the same side.

[9]

9. According 2-7 portable vacuum cleaner according to any one of the preceding claims, characterized in that said rotary inlet air separation unit (7) (72) in said cylindrical separation part (73a, 73b) of the

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opposite Both sides.

[10]

10. According 2-7 portable vacuum cleaner according to any one of the preceding claims, characterized in that said rotary Air separation means (7) consists of a plastic material.

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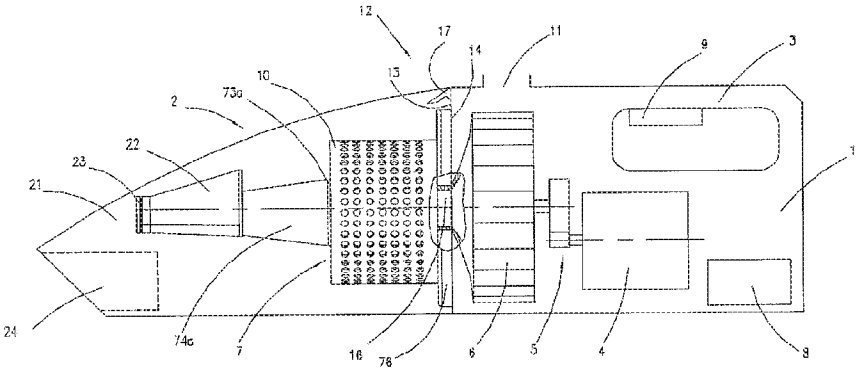
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[见续页]

(54) Title: PORTABLE CLEANER

(54) 发明名称: 便携式吸尘器



(57) Abstract: A portable cleaner includes a case (1), a dust collecting box (2) which can detachably connected to the said case, a handle which is fixed on the said case, a motor which is contained in the said case, a fan which is driven by the said motor and a power supply device which is electrically connected to the said motor by a switch. A cyclone device is fixed in the said dust collecting box. The said cyclone device includes at least two coniform separating parts set abreast. With the separating parts set abreast, for the same amount of dust, further smaller dust can be absorbed effectively, so that it can prevent the dust from leaking and improve the dust catching efficiency of the cleaner.

[见续页]

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(57) 摘要:

一种便携式吸尘器，包括壳体(1)、可拆装地连接到所述壳体的集尘盒(2)、设于所述壳体上的手柄、容纳于所述壳体中的电机、由所述电机驱动的风扇，以及通过开关与所述电机电连接的供电装置，所述集尘盒内设有旋风分离装置。所述旋风分离装置包括至少两个并列设置的圆锥形分离部。由于采用了并列设置的灰尘分离部，在同样的灰尘收集量的情况下，更细微的灰尘能够被有效地吸收，从而不会产生灰尘外泄的情况，提高了吸尘器的除尘效率。

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便携式吸尘器

技术领域

本发明涉及一种便携式吸尘器，特别是一种具有旋风式灰尘分离装置的便携式吸尘器。

背景技术

目前，市场上有各种各样的便携式吸尘器。便携式吸尘器以其方便轻巧而广为家庭除尘所应用，但现有的吸尘及滤尘装置使用不便，成本高，不能满足消费者的需求。比如，中国发明专利公开第 CN1626025A 号揭示了一种灰尘分离装置，通过设置包括褶状物形成的过滤器和杯形滤网的高效微粒空气过滤器实现灰尘的高效分离，集尘箱内壁形成旋风分离结构，将吸尘器吸入的脏空气初步分离，但这种分离装置包括了多个构件，结构复杂，而且需要经常清洗，使用时间长的话，褶状物容易失效。再比如，中国实用新型专利公告第 CN2631412Y 号揭示了一种二次旋风吸尘器，包括尘杯、旋风杯，旋风杯设于尘杯中，在旋风杯与尘杯之间设有旋风杯罩，从而尘杯与尘杯架之间形成螺旋风道，旋风杯与旋风杯罩之间也形成螺旋风道，这种分离装置的集尘杯中，灰尘混杂在一起，容易造成旋风分离装置除尘效力的降低。

发明内容

为了克服上述不足和缺点，本发明提供一种结构简单，灰尘分离效率更高的便携式吸尘器。

本发明的技术方案是：一种便携式吸尘器，包括壳体，可拆装的连接到所述壳体的集尘盒，设于所述壳体及集尘盒二者之一上的手柄，容纳于所述壳体中的电机，由所述电机驱动的风扇，以及通过开关与所述电机电连接的供电装置，所述集尘盒内设有旋风分离装置，其特征在于，所述旋风分离装置包括灰尘空气混合物入口、灰尘和碎屑的出口、至少两个并列设置的圆锥形分离部、以及与所述风扇连通的空气出口。

特别的，所述旋风分离装置包括与所述锥形分离部相连的圆柱形分离部，所述灰尘空气混合物入口沿所述圆柱形分离部切向设置；所述入口外设有滤网；所述集尘盒包括第一灰尘容室和第二灰尘容室，所述灰尘和碎屑的出口设于所述第二灰尘容室内；所述第二灰尘容室包括可拆装的密封盖；所述第

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二灰尘容室设于所述第一灰尘容室内；所述圆锥形分离部基本上相互平行设置；所述旋风分离装置的入口位于所述圆柱形分离部的相同的一侧；所述旋风分离装置的入口也可以位于所述圆柱形分离部的相对的两侧；所述旋风分离装置由塑料材料构成；所述供电装置可以是电池组或者交流电。

由于采用了并列设置的灰尘分离部，在同样的灰尘收集量的情况下，更细微的灰尘能够被有效的吸收，从而不会产生灰尘外泄的情况，提高了吸尘器的滤尘效率。同时，灰尘分离部的入口外围设有滤网，初步分离吸尘器吸入的大的灰尘颗粒，使旋风分离装置仅担负小的灰尘颗粒的过滤工作，实现了不同尺寸的灰尘颗粒都能够被有效分离。特别的，小的灰尘颗粒和大的灰尘颗粒分在不同的灰尘容室内容纳，容易清理，操作方便。

附图说明

图 1 是本发明便携式吸尘器的侧剖示意图；

图 2 是本发明中旋风分离装置的一种实施例的侧面示意图；

图 3 是图 2 中所示旋风分离装置的俯视示意图；

图 4 是图 2 中所示旋风分离装置的右视示意图；

图 5 是本发明中旋风分离装置的另一种实施例的侧面示意图；

图 6 是图 5 中所示旋风分离装置的俯视示意图；

图 7 是图 5 中所示旋风分离装置的右视示意图；

图 8 是本发明中旋风分离装置的另一种实施例的侧剖示意图。

其中，

1 壳体	2 集尘盒	3 手柄
4 电机	5 传动机构	6 风扇
7 旋风分离装置	8 供电装置	9 开关
10 滤网	11 排气口	12 连接装置
13 第一连接壁	14 第二连接壁	15 开口
16 接收口	17 卡扣装置	21 灰尘容室
22 灰尘容室	23 密封盖	24 灰尘入口
71a 出口	71b 出口	72a 入口
72b 入口	73a 圆柱形分离部	73b 圆柱形分离部
74a 圆锥形分离部	74b 圆锥形分离部	75a 空气出口

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75b 空气出口 76 连接部

具体实施方式

下面结合附图和具体的实施例对本发明进行进一步详细说明。

参见附图 1，本发明揭示了一种便携式吸尘器。本发明的优选实施例中，便携式吸尘器包括壳体 1，可拆装的附着到壳体 1 上的集尘盒 2，设于壳体 1 上的手柄 3，容纳于壳体 1 中的电机 4，由电机 4 驱动的风扇 6，以及通过开关 9 与电机 4 电连接的供电装置 8。集尘盒 2 内设有旋风分离装置 7 用于收集和分离微小的灰尘颗粒。

通常，便携式吸尘器的风扇 6 通过传动机构 5 由电机 4 驱动，为电机 4 提供电能的供电装置 8 可以是电池组或者交流电。电池组是可充电的，能够反复利用。优选的，本发明采用电池组作为供电装置 8，该供电装置 8 设于吸尘器的壳体 1 中。

吸尘器的手柄 3 可以设于壳体 1 上，也可以设于集尘盒 2 上。

壳体 1 上设有排气口 11，用于排出由风扇 6 产生的气流。壳体 1 与集尘盒 2 通过连接装置 12 相连。通常，连接装置 12 包括设于集尘盒 2 的第一连接壁 13、设于壳体 1 的第二连接壁 14、以及卡扣装置 17。通过卡扣装置 17，第一连接壁 13 与第二连接壁 14 相接，从而将集尘盒 2 连接到壳体 1 上。壳体 1 面向集尘盒 2 的一侧设有接收口 16，旋风分离装置 7 通过该接收口 16 与风扇 6 连通。

参见附图 2~7，旋风分离装置 7 包括灰尘空气混合物入口 72a，72b，灰尘和碎屑的出口 71a，71b，至少两个并列设置的圆锥形分离部 74a，74b，以及与所述风扇 6 连通的空气出口 75a，75b。通过连接部 76，旋风分离装置 7 的空气出口 75a，75b 与壳体 1 上设置的接收口 16 相连通。根据集尘盒 2 的尺寸的不同，也可以设置多个并列的圆锥形分离部以提高吸尘器的除尘效率。由于采用了并列设置的灰尘分离部，在同样的灰尘收集量的情况下，更细微的灰尘能够被有效的吸收，从而不会产生灰尘外泄的情况，提高了吸尘器的除尘效率。

旋风分离装置 7 还包括与圆锥形分离部 74a，74b 相连的圆柱形分离部 73a,73b，灰尘空气混合物入口 72a，72b 沿圆柱形分离部 73a，73b 切向设置。灰尘空气混合物被吸入圆柱形分离部 73a，73b 后，形成螺旋气流，在离心

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力的作用下，灰尘微粒被从气流中分离出来并且从灰尘和碎屑的出口 71a，71b 跑出来，落入集尘盒 2 中。干净的空气沿着箭头 A 所指的方向从空气出口 75a，75b 中流出流向电机 4 驱动的风扇 6。

参见附图 2~4，本发明的旋风分离装置 7 的一个优选实施例中，旋风分离装置 7 的入口 72a，72b 位于圆柱形分离部 73a，73b 的相同的一侧。灰尘空气穿过滤网 10 后沿切向由入口 72a，72b 进入圆柱形分离部 73a，73b 中。

参见附图 5~7，本发明的旋风分离装置 7 的另一个实施例中，旋风分离装置 7 的入口 72a，72b 分别位于圆柱形分离部 73a，73b 的相对的两侧。

吸尘器的集尘盒 2 包括第一灰尘容室 21 和第二灰尘容室 22，其前部设有灰尘入口 24，用于收集和引导灰尘和空气的混合物。合适的附件可以连接到灰尘入口 24，以便在不同的场合下进行清理工作。当吸尘器工作时，风扇 6 从排气口 11 排出空气，在容纳风扇 6 的壳体 1 内产生相对于大气压为负压的气压，使灰尘空气的混合物通过灰尘入口 24 进入集尘盒 2。集尘盒 2 的剖面形状基本上呈“D”形，灰尘和空气的混合物被吸入后形成螺旋气流，流向设于集尘盒 2 内的旋风分离装置 7，大的碎屑在第一灰尘容室 21 内落下堆积。同时，旋风分离装置 7 的入口 72a，72b 外围设有滤网 10，初步分离吸尘器吸入的大的灰尘颗粒，旋风分离装置 7 仅担负小的灰尘颗粒的过滤工作，从而，不同尺寸的灰尘颗粒都能够被有效分离。滤网 10 上设有多个通孔，细小的灰尘颗粒会从通孔中穿过进入旋风分离装置 7 的入口 72a，72b。

本发明的优选实施例中，灰尘和碎屑的出口 71a，71b 设于第二灰尘容室 22 内。参见图 1，第二灰尘容室 22 可单独拆卸，包括可拆装的密封盖 23，用于将收集起来的细小的灰尘微粒密封于第二灰尘容室 22 内，从而灰尘微粒不会混入第一灰尘容室 21 中，避免了旋风分离装置 7 再次分离的情况的发生。本领域技术人员容易想到的是，第二灰尘容室 22 不仅可以设于第一灰尘容室 21 内，也可以设于第一灰尘容室 21 之外。参见图 7，第二灰尘容室 22 设于第一灰尘容室 21 之外。第一灰尘容室 21 上设有开口 15，旋风分离装置 7 的圆锥形分离部 74a，74b 的端部设有连接部，灰尘和碎屑的出口 71a，71b 自开口 15 延伸至第二灰尘容室 22 中，连接部可将第二灰尘容室 22 相对密封。当需要清理集尘盒 2 时，将集尘盒 2 整个的从壳体 1 上拆下来，就可以同时清理第一灰尘容室 21 和第二灰尘容室 22。同时，小的灰尘颗粒

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和大的灰尘颗粒分在不同的灰尘容室内容纳，可以分别清理，操作方便。

本发明的优选实施例中，圆锥形分离部 74a，74b 基本上相互平行设置，空间尺寸允许的情况下，也可以相互成一定的角度设置。

为了方便操作者观察集尘盒 2 内的灰尘收集状况，优选的，集尘盒 2 以及旋风分离装置 7 可以由透明的材料构成，最好是轻的塑料材料构成。这样，整个吸尘器的重量不会因为旋风分离装置 7 的设置而增加，操作者操作方便舒适。

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权 利 要 求

1. 一种便携式吸尘器，包括壳体（1），可拆装的连接到所述壳体（1）的集尘盒（2），设于所述壳体（1）及集尘盒（2）二者之一上的手柄（3），容纳于所述壳体（1）中的电机（4），由所述电机（4）驱动的风扇（6），以及通过开关（9）与所述电机（4）电连接的供电装置（8），所述集尘盒（2）内设有旋风分离装置（7），其特征在于，所述旋风分离装置（7）包括灰尘空气混合物入口（72a,72b），灰尘和碎屑的出口（71a,71b），至少两个并列设置的圆锥形分离部（74a,74b），以及与所述风扇（6）连通的空气出口（75a,75b）。
2. 根据权利要求 1 所述的便携式吸尘器，其特征在于，所述旋风分离装置（7）包括与所述圆锥形分离部（74a,74b）相连的圆柱形分离部（73a,73b），所述灰尘空气混合物入口（72a,72b）沿所述圆柱形分离部（73a,73b）切向设置。
3. 根据权利要求 2 所述的便携式吸尘器，其特征在于，所述入口（72a,72b）外设有滤网（10）。
4. 根据权利要求 3 所述的便携式吸尘器，其特征在于，所述集尘盒（2）包括第一灰尘容室（21）和第二灰尘容室（22），所述灰尘和碎屑的出口（71a,71b）设于所述第二灰尘容室（22）内。
5. 根据权利要求 4 所述的便携式吸尘器，其特征在于，所述第二灰尘容室（22）包括可拆装的密封盖（23）。
6. 根据权利要求 5 所述的便携式吸尘器，其特征在于，所述第二灰尘容室（22）设于所述第一灰尘容室（21）内。
7. 根据权利要求 1 所述的便携式吸尘器，其特征在于，所述圆锥形分离部（74a,74b）基本上相互平行设置。
8. 根据权利要求 2 至 7 任意一项所述的便携式吸尘器，其特征在于，所述旋风分离装置（7）的入口（72a,72b）位于所述圆柱形分离部（73a,73b）的相同的一侧。
9. 根据权利要求 2 至 7 任意一项所述的便携式吸尘器，其特征在于，所述旋风分离装置（7）的入口（72）位于所述圆柱形分离部（73a,73b）的相对的两侧。
10. 根据权利要求 2 至 7 任意一项所述的便携式吸尘器，其特征在于，所述旋风分离装置（7）由塑料材料构成。

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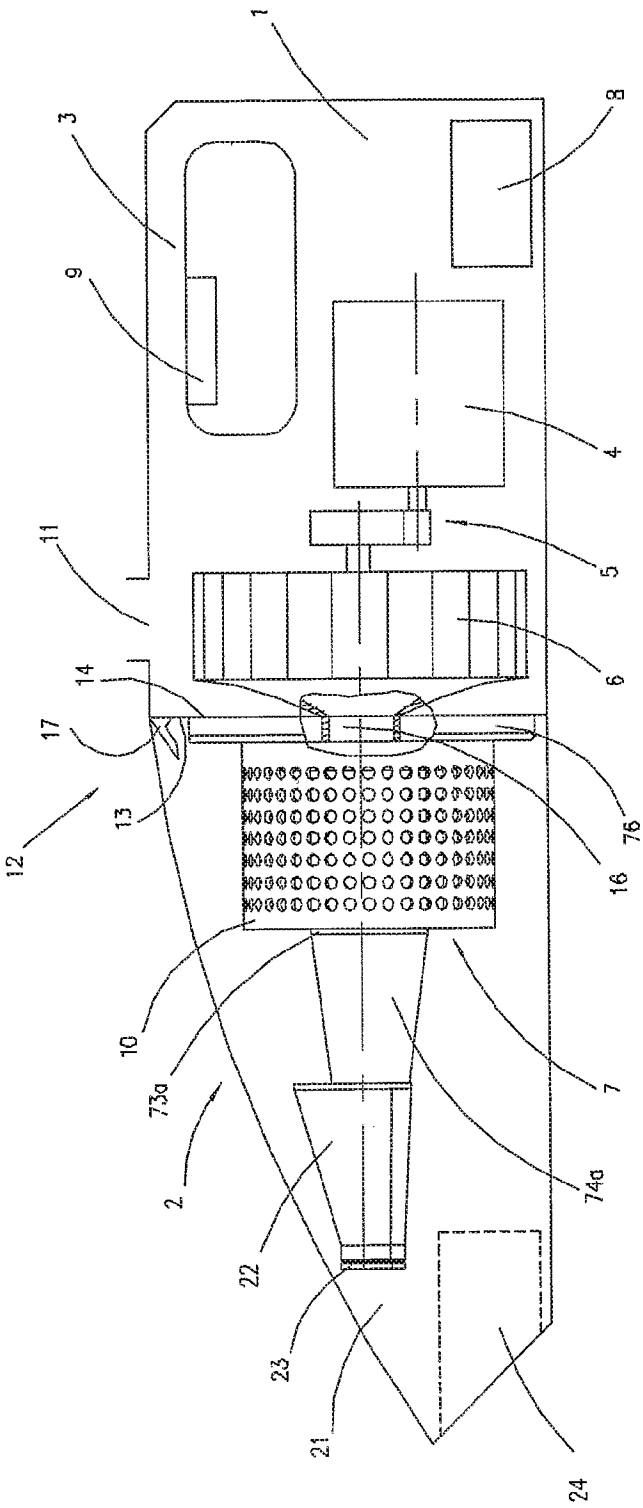


图1

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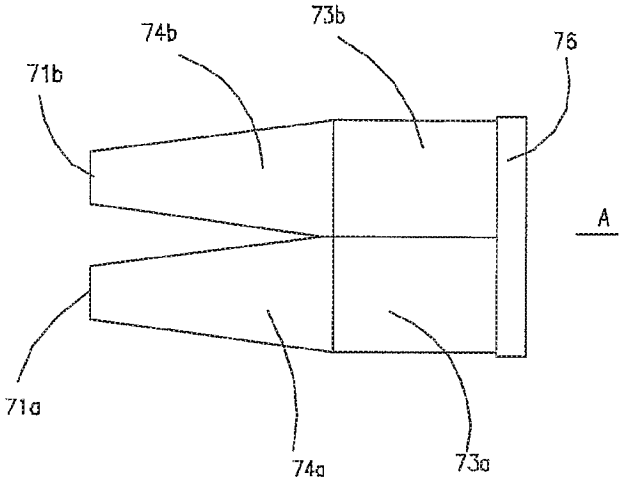


图2

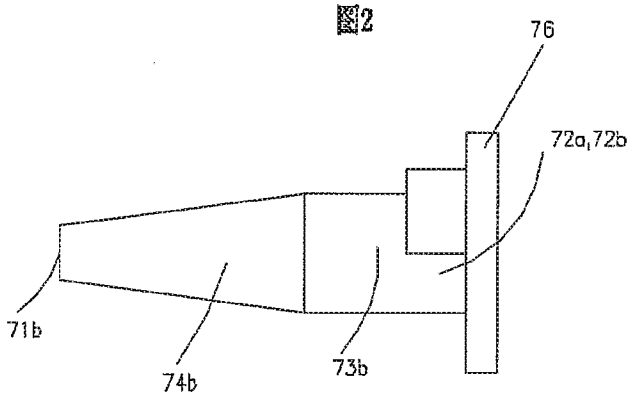


图3

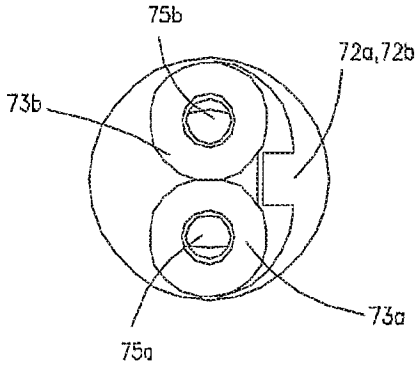


图4

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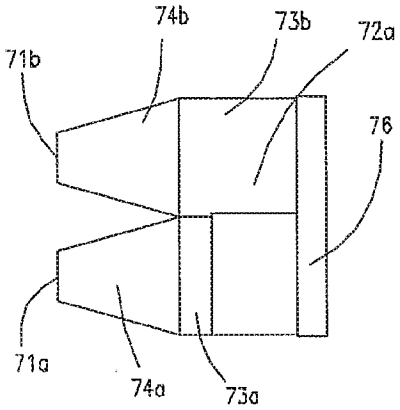


图5

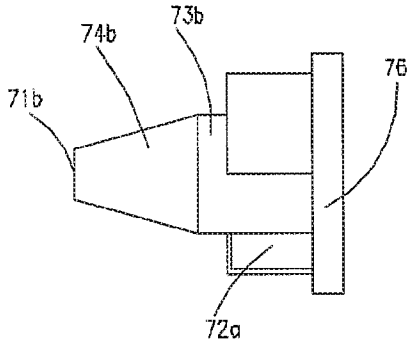


图6

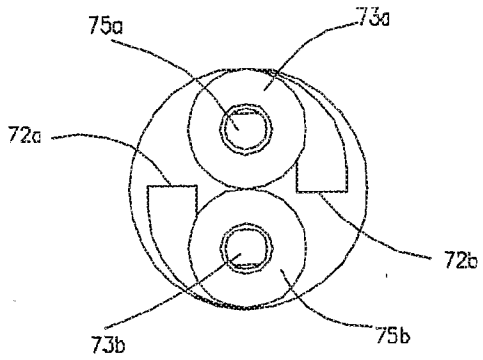


图7

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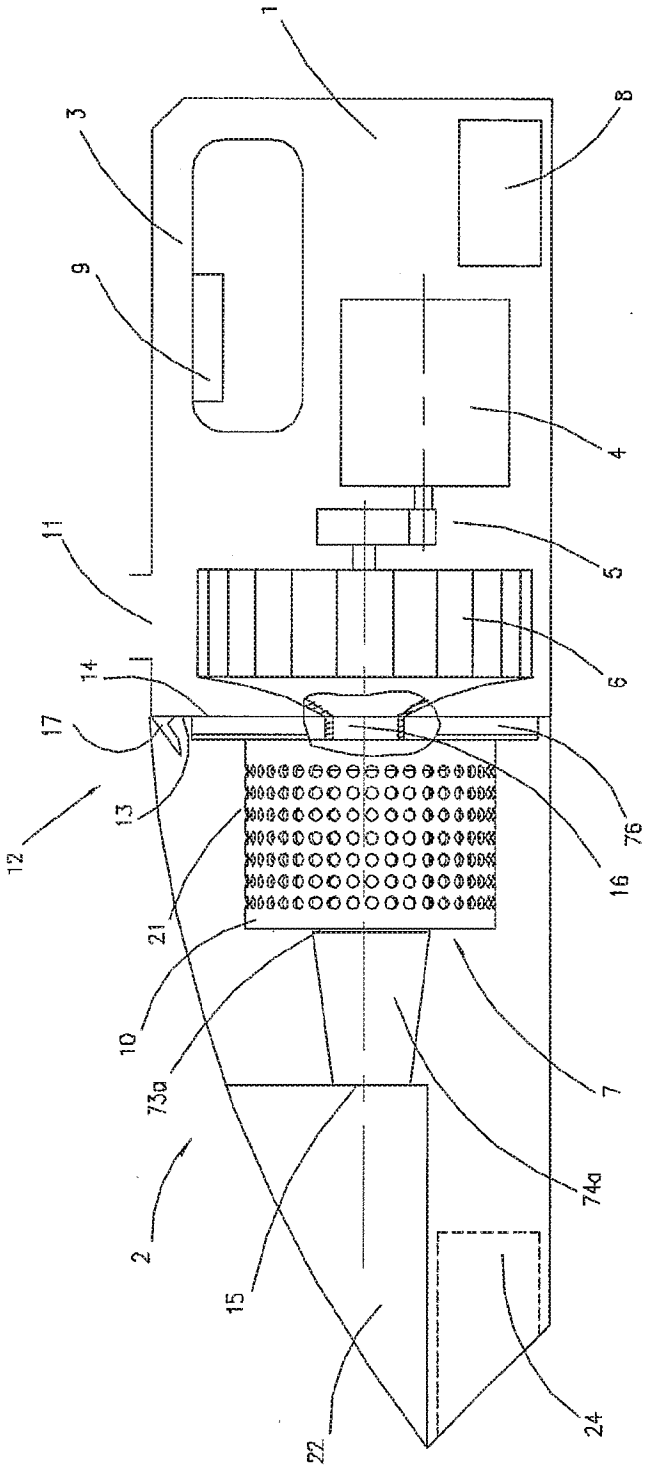


图8

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2007/000733

A. CLASSIFICATION OF SUBJECT MATTER

SEE EXTRA SHEET

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: A47L5, A47L9, B01D45, B01D46, B04B3, B04B5, B04B7, B04C3, B04C5, B04C7

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CNPAT, WPI, EPODOC, PAJ

IW: Cleaner(collector),syclon+,separat+,parallel,taper+(coniform,conoid)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	CN2762738Y (TAIYIKAI ELECTRICAL APPLIANCE) 08 Mar.2006 (08.03.2006) page 1 the last line-page 2 the last line, figures 1-3	1-10
Y	CN1600222A(GLDS)30 Mar. 2005(30.03.2005)page 1 line 7-page 3 line 15,figures 1,2	1-10
Y	US2005028675A1 (FANT-N) 10 Feb.2005 (10.02.2005) par. 72-par. 104,figures1-11	1-10
Y	US2004088956A1 (DYSON LTD et al.) 13 May 2004 (13.05.2004) par.17-par.42,figures1-5b	1-10
A	GB2399780A (DESON LTD) 29 Sep. 2004 (29.09.2004) the whole document	1-10
A	CN1729924A (SUZHOU KINGCLEAN FLOORCARE CO.) 08 Feb. 2006 (08.02.2006) the whole document	1-10

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim (S) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
01 Jun. 2007(01.06.2007)	**14 Jun. 2007 (14.06.2007)**
Name and mailing address of the ISA/CN The State Intellectual Property Office, the P.R.China 6 Xitucheng Rd., Jimen Bridge, Haidian District, Beijing, China 100088 Facsimile No. 86-10-62019451	Authorized officer LI, Meng Telephone No. (86-10)62085831

Form PCT/ISA /210 (second sheet) (April 2007)

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2007/000733

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
CN2762738Y	08.03.2006	none	
CN1600222A	30.03.2005	none	
US2005028675A1	10.02.2005	CA2293984A	08.07.2000
		WO0040135A	13.07.2000
		US6238451B	29.05.2001
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		US2002066366A	06.06.2002
		US6740144B	25.05.2004
		US6482252B	19.11.2002
US2004088956A1	13.05.2004	GB2360719A	03.10.2001
		WO0174493A	11.10.2001
		AU4089401A	15.10.2001
		EP1268076A	02.01.2003
		EP20010911975A	19.03.2001
		CN1422187A	04.06.2003
		CN1257016C	24.05.2006
		JP2003528704T	30.09.2003
		US6835222B	28.12.2004
		AT279263T	15.10.2004
		DE60106407D	18.11.2004
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		ES2228819T	16.04.2005
		DE60106407T	13.10.2005
GB2399780A	29.09.2004	none	
CN1729924A	08.02.2006	WO2007022664A	01.03.2007

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2007/000733

CLASSIFICATION OF SUBJECT MATTER

A47L5/24（2006.01）i
A47L5/28（2006.01）i
A47L9/16（2006.01）i

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国际检索报告

国际申请号
PCT/CN2007/000733

A. 主题的分类

参见附加页

按照国际专利分类表(IPC)或者同时按照国家分类和 IPC 两种分类

B. 检索领域

检索的最低限度文献(标明分类系统和分类号)

IPC：A47L5，A47L9，B01D45，B01D46，B04B3，B04B5，B04B7，B04C3，B04C5，B04C7

包含在检索领域中的除最低限度文献以外的检索文献

在国际检索时查阅的电子数据库(数据库的名称，和使用的检索词（如使用）)

CNPAT，WPI，EPODOC，PAJ

IW：吸尘器（集尘器），分离装置，旋风，并列（并排，平行），过滤（滤网），风筒，圆锥（锥形）

Cleaner(collector),syclon+,separat+,parallel,taper+(coniform,conoid)

C. 相关文件

类　型*	引用文件，必要时，指明相关段落	相关的权利要求
Y	CN2762738Y（泰怡凯电器（苏州）有限公司）08.3 月 2006（08.03.2006）说明书第 1 页最后一行至第 2 页最后一行，附图 1-3	1-10
Y	CN1600222A（乐金电子（天津）电器有限公司）30.3 月 2005（30.03.2005）说明书第 1 页第 7 行至第 3 页第 15 行，附图 1，2	1-10
Y	US2005028675A1（FANT-N）10.2 月 2005（10.02.2005）说明书第 72 段至第 104 段，附图 1-11	1-10
Y	US2004088956A1（DYSON LTD et al.）13.5 月 2004（13.05.2004）说明书第 17 段至第 42 段，附图 1-5b	1-10
A	GB2399780A（DESON LTD）29.9 月 2004（29.09.2004）全文	1-10
A	CN1729924A（苏州金莱克清洁器具有限公司）08.2 月 2006（08.02.2006）全文	1-10

☐ 其余文件在 C 栏的续页中列出。　　☒ 见同族专利附件。

* 引用文件的具体类型：

"A" 认为不特别相关的表示了现有技术一般状态的文件

"E" 在国际申请日的当天或之后公布的在先申请或专利

"L" 可能对优先权要求构成怀疑的文件，或为确定另一篇引用文件的公布日而引用的或者因其他特殊理由而引用的文件

"O" 涉及口头公开、使用、展览或其他方式公开的文件

"P" 公布日先于国际申请日但迟于所要求的优先权日的文件

"T" 在申请日或优先权日之后公布，与申请不相抵触，但为了理解发明之理论或原理的在后文件

"X" 特别相关的文件，单独考虑该文件，认定要求保护的发明不是新颖的或不具有创造性

"Y" 特别相关的文件，当该文件与另一篇或者多篇该类文件结合并且这种结合对于本领域技术人员为显而易见时，要求保护的发明不具有创造性

"&" 同族专利的文件

国际检索实际完成的日期	国际检索报告邮寄日期
01.6 月 2007（01.06.2007）	**14.6 月 2007 (14.06.2007)**
中华人民共和国国家知识产权局(ISA/CN) 中国北京市海淀区蓟门桥西土城路 6 号 100088 传真号：　(86-10)62019451	受权官员 李萌 电话号码：(86-10) **62085831**

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主题的分类

A47L5/24（2006.01）i

A47L5/28（2006.01）i

A47L9/16（2006.01）i

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Method for extracting dust particles from the suction air stream of a vacuum cleaner has a centrifugal separator by which the particles enter a dust collection system and the cleaned air is returned to the environment

Page bookmark DE102005056922 (A1) - Method for extracting dust particles from the suction air stream of a vacuum cleaner has a centrifugal separator by which the particles enter a dust collection system and the cleaned air is returned to the environment

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Abstract of DE102005056922 (A1)

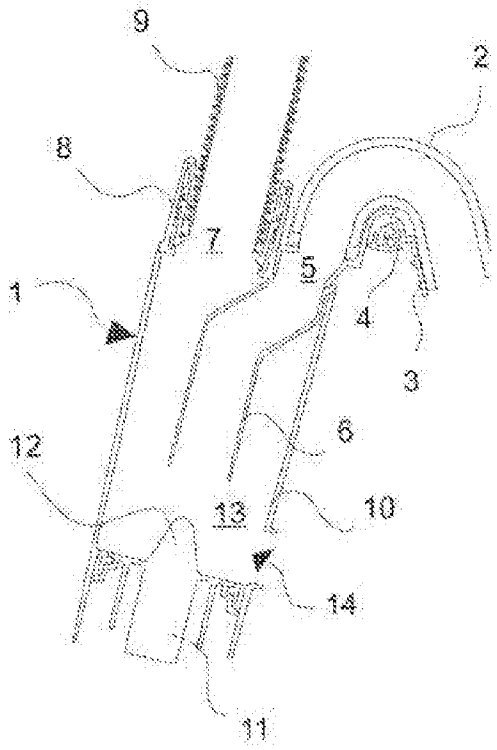
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The suction tube (9) is connected (8) to the centrifugal separator (1) which has a conical (12) base to induce swirling of the air by which the dust is separated and delivered to a collection system (14) and the clean air is delivered through a tube (5) to the atmosphere.

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DESCRIPTION DE102005056922

The invention relates to a vacuum cleaner with a centrifugal separator according to the preamble of Claim first

Such vacuum cleaners are known from a variety of applications. Components of such a vacuum cleaner are essentially one or more nozzles for sucking the dust, a suction tube, which is designed depending on the structure of the vacuum cleaner as a floor, hand or Upright cleaner shorter or longer or rigid or flexible, one or more centrifugal , may be a dust container, the part of or the centrifugal separator or is designed as a separate dust collection container, a negative pressure space, via which the air is sucked in by a fan, and optionally a fine dust filter for end-polishing of the exiting air.

A generic vacuum cleaner is known from. The vacuum cleaner described therein essentially comprises the usual components of a conventional canister vacuum cleaner. The housing is formed of a lower shell and a dust chamber cover. In the dust chamber, however, is in place of the dust bag, a dust box, consisting of a centrifugal separator comprises of a dip tube, a dust collection chamber and a filter. It is very popular to develop such vacuum cleaners of conventional dust bag vacuum cleaners, so development costs can be saved by all usable components of the conventional vacuum cleaner can also be used in the bagless variant on. So it is proposed in the dust box simply insert in place of the previous dust bag in a conventional vacuum cleaner so as to use the known housing. The disadvantage here is that the plenum is now available for collecting dust disposal, is significantly reduced due to the space required in particular of the centrifugal separator.

Therefore, vacuum cleaners have been developed with the centrifugal separator such as described in the 10 2005 047 075.0, in which the or each centrifugal separator are placed on the dust chamber. The fact that the centrifugal separator is arranged outside the housing, prevents the dust collecting capacity is limited by the centrifugal additionally required. Another similarly constructed vacuum cleaner is described in the. However, the dust is collected directly into the separation space itself and taken together with the entire centrifugal emptying in this model

In all of these vacuum cleaners, the problem occurs that may lay down dirt particularly in the area of the connecting lines to and from the centrifugal separator; particularly with long hair contaminated, moist dust caused here often causes problems. Faults or blockages can even result in poor performance of the vacuum cleaner or at worst failures.

The invention is therefore aims to provide a vacuum cleaner with centrifugal separator, in which the risk of blockage is at least reduced the task.

The object is achieved according to the invention by a vacuum cleaner with cyclone with the features of claim. 1

According to the invention of the centrifugal separator of the vacuum cleaner to a Axialeinlauf for dust-laden air. Characterized both the air inlet and subsequent to this the intake manifold is oriented in the same direction as the centrifugal separator itself. This results in between all these ingredients smooth unproblematic transitions that do not provide any basis for the formation of dirt, so that blockages in this area can be largely avoided due to the inventive arrangement. In conventional vacuum cleaners with cyclone of air entering the cyclone is usually arranged radially, so that the intake manifold and air inlet are perpendicular to the centrifugal separator. Characterized an air deflection by 90 ° in the connection region of the intake manifold and the separator is necessary. This turbulence may occur, which may cause unwanted formation of dirt at the connecting edges of the coupled elements. This is avoided by the invention by reacting the compound is carried out in a straight line, and the deflection takes place even only in the centrifugal separator, in which no longer occur joint edges.

Another advantage of the invention is that the air inlet of the centrifugal separator, which represents the connection to the intake manifold and the intake manifold itself fluent fit in an axial arrangement with the centrifugal separator in the vacuum cleaner housing. This brings design benefits and also leads to a better handling of the vacuum cleaner, since no bulky, protruding into the space tube parts are no longer present. These protruding parts run in conventional vacuum cleaners often for clamping of the vacuum cleaner on low shelves or the like, under which the vacuum cleaner needs to be performed during vacuuming.

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In an advantageous embodiment, the introduced air is deflected at a kraftabscheiders arranged in the interior of the centrifugal spiral Luftumlenkkörper and placed in a centrifugal separator to the radially aligned eddy motion. The deflection of the air takes place according to the invention no longer Abkoppelbereich the suction pipe but only in the cyclone itself instead, where the deflection unit can be configured so that no edges occur where dirt can settle. This is made possible that the connection of the centrifugal separator and the intake manifold and the air deflection spatially separable from each other due to the Axialeinlaufes.

Advantageously, the Luftumlenkeinheit is in the form of an Archimedean screw. This can achieve a very smooth transition from the axially inflowing air in a radial vortex.

In a further advantageous embodiment of the dip tube, which serves to the outlet of the purified air, cranked formed. This ensures that the air outlet is offset from the center of the centrifugal away laterally, so that there is sufficient room in the center of the centrifugal separator in order to dimension the arranged in the centrifugal Luftumlenkeinheit enough

In a further advantageous embodiment extend air inlet and arranged at the same end of the centrifugal air outlet partially parallel. In particular, they run in the connecting area to the centrifugal separator in parallel so that the rectilinear structure of centrifugal and air carrying connecting parts is maintained here consistently, which supports the aforementioned design and handling advantages.

Advantageously, dip tube and Luftumlenkeinheit are integrally formed by means of an air-tight partition in the interior of the centrifugal separator. As a result, the dip tube may be used as part of the air deflection. In addition, the one-piece design simplifies particularly in injection molding production, which reduces the production costs of the centrifugal separator.

Further details and advantages of the invention emerge from the dependent claims in connection with the description of an embodiment, which is explained in detail with reference to the drawings.

Show it:

Fig. 1 shows a centrifugal separator constructed according to the invention in cross-section and

FIG. 2 is a schematic top plan view of the cyclone in the air inlet area.

Fig. 1 shows a section through a centrifugal separator according to the invention 1, which is connected via a connecting hose 2 with the tube connection 3 of the vacuum cleaner, not shown here. The centrifugal separator 1 is pivotably mounted about the fulcrum 4 so that it can be pivoted away for removal of the beneath it in the vacuum cleaner dust box separate from the vacuum cleaner. The connecting tube 2 opens the air outlet 5 in the dip tube 6 of the centrifugal separator. 1 In addition to the air outlet region 5 is hermetically separated from it the air inlet area 7 of the centrifugal separator 1 This is arranged in parallel to the air outlet 5 in the region of the connecting piece 8 of the suction tube 9th Thereby, the air in the axial direction occurs over the air inlet in the cyclone 7 1st To provide space for the air inlet 7 and taking place at this training of Abscheidewirbels to obtain, the dip tube 6 is cranked formed.

This opens the outlet 5 of the dip tube 6 in the outer wall region of the swirl tube 10 of the centrifugal separator. 1 Where the air inlet 7 and air outlet 5 of the centrifugal separator 1 opposite end of the swirl tube 10 into the interior of the centrifugal separator 1 in reaching Apexkegel 12 is formed on a cover detachably fastened eleventh That by the vortex tube 10 flowing from the air inlet 7 to the opposite end air swirl inside the cyclone 1 to the dip tube 6 is deflected towards. Through the dip tube of the deflected air swirling in the air outlet 5 to the vacuum cleaner, not shown, is discharged. In the field of air deflection 13 is located laterally on the wall of the swirl tube 10 a debris ejector 14, which is formed as an opening in the swirl tube 10th About this the swirling of the air through centrifugal dust deposited to a separate dust collector, not shown, is delivered Due to the axial arrangement of the air inlet 7 enters the connection via the connection 8 with the centrifugal separator 1 connected suction pipe 9 straight into the cyclone 1 a.

Thus, the incoming air is rectilinearly guided past the resultant unavoidable due to the connection edge between the suction pipe and the separator, so that no potential for setting of entrained air in the larger dust particles is provided. Turbulence caused by the air deflection and can cause clogging when passing such edges, occur only inside the vortex tube 10, where no edges occur. Here, the air in the lower region of the air inlet 7 with a means in Fig. 2 suggestively visible Archimedean screw will be redirected 15th

FIG. 2 shows a cyclone according to the invention 1 in a plan with air inlet 7 and air outlet 5 is open. inside the cyclone the Luftumlenkeinheit as an Archimedes screw 15 spirally constructed here in the air inlet region 7 partially visible. This formed part of the cranked shaped dip tube 6 and is preferably made as an injection molding in one piece with the dip tube. 6

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CLAIMS DE102005056922

Vacuum cleaner with a centrifugal separator (1) having an air inlet (7), which is connected to a dust-laden air introductory suction pipe (9), a separating chamber (10) in which the offset in a rotational movement air the dust by means of centrifugal forces in the dust collecting region of the separating chamber (10) is deposited or via a dust outlet (14) in a separate, isolated from the separation space (10) removable dust container ejects and an air outlet (5) communicating via a dip tube (6) with the separation chamber (10) in connection and purified air discharges into the environment, characterized in that the air inlet (7) is arranged axially aligned with the cyclone (1).

Vacuum cleaner with a centrifugal separator (1) according to claim 1, characterized in that the air inlet (7) comprises a helical Luftumlenkeinheit (15).

Vacuum cleaner with a centrifugal separator (1) according to claim 2, characterized in that the Luftumlenkeinheit (15) is formed as an Archimedes screw.

Vacuum cleaner with a centrifugal separator (1) according to claim 1, characterized in that the immersion tube (6) is formed cranked.

Vacuum cleaner with a centrifugal separator (1) according to claim 1, characterized in that the air outlet (5) and the air inlet (7) extend at least partially parallel.

Vacuum cleaner with a centrifugal separator (1) according to claim 5, characterized in that the immersion tube (6) and the Luftumlenkeinheit (15) are joined together air-tightly separated.

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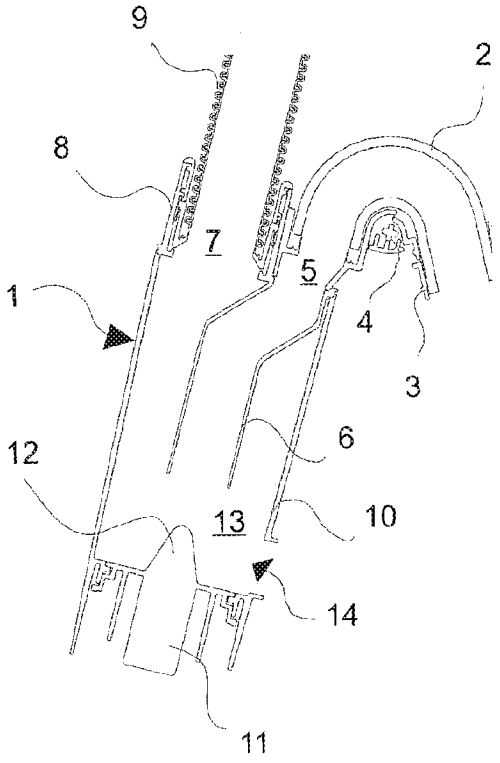
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Die folgenden Angaben sind den vom Anmelder eingereichten Unterlagen entnommen

(54) Bezeichnung: **Staubsauger mit Fliehkraftabscheider**

(57) Zusammenfassung: Die Erfindung betrifft einen Staubsauger mit einem Fliehkraftabscheider (1). Dieser weist einen Lufteinlass (7) auf, der mit einem staubbeladene Luft einleitenden Saugrohr (9) verbunden ist. Ferner umfasst er einen Abscheideraum (10), in dem die in eine Drehbewegung versetzte Luft den Staub mittels Zentrifugalkräften in den Staubsammelbereich des Abscheideraumes (10) abscheidet oder über einen Staubauslass (14) in einen separaten, getrennt vom Abscheideraum (10) entnehmbaren Staubsammelbehälter auswirft, sowie einen Luftauslass (5), der über ein Tauchrohr (6) mit dem Abscheideraum (10) in Verbindung steht und die gereinigte Luft an die Umgebung abführt. Erfindungsgemäß ist der Lufteinlass (7) axial ausgerichtet an dem Fliehkraftabscheider (1) angeordnet.



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Beschreibung

[0001] Die Erfindung betrifft einen Staubsauger mit einem Fliehkraftabscheider nach dem Oberbegriff von Anspruch 1.

[0002] Derartige Staubsauger sind aus verschiedensten Anmeldungen bekannt. Bestandteile eines derartigen Staubsaugers sind im Wesentlichen eine oder mehrere Düsen zum Einsaugen des Staubes, ein Saugrohr, welches je nach Aufbau des Staubsaugers als Boden-, Hand- oder Upright-sauger kürzer oder länger bzw. starr oder flexibel ausgeführt ist, ein oder mehrere Fliehkraftabscheider, ein Staubbehälter, der Bestandteil des oder der Fliehkraftabscheider sein kann oder als separater Staubsammelbehälter ausgebildet ist, ein Unterdruckraum, über den die Luft von einem Gebläse angesaugt wird, sowie gegebenenfalls ein Feinstaubfilter zum Endreinigen der austretenden Luft.

[0003] Ein gattungsgemäßer Staubsauger ist aus der DE 100 21 594 A1 bekannt. Der dort beschriebene Staubsauger umfasst im Wesentlichen die gewöhnlichen Bauteile eines herkömmlichen Bodenstaubsaugers. Das Gehäuse wird von einer Unterschale und einem Staubraumdeckel gebildet. In dem Staubraum befindet sich jedoch anstelle des Staubbeutels eine Staubbox, bestehend aus einem Fliehkraftabscheider der ein Tauchrohr umfasst, einem Staubsammelraum und einem Filter. Es ist sehr beliebt, derartige Staubsauger aus herkömmlichen Staubbeutel-Staubsaugern zu entwickeln, wodurch Entwicklungskosten gespart werden können, indem alle verwendbaren Bauteile des herkömmlichen Staubsaugers auch in der beutellosen Variante weiter verwendet werden. So wird in der DE 100 21 594 A1 vorgeschlagen, die Staubbox einfach an Stelle des bisherigen Staubbeutels in einen herkömmlichen Staubsauger einzufügen um so das bekannte Gehäuse wieder zu verwenden. Nachteilig ist dabei, dass der Sammelraum, der nunmehr für das Sammeln des Staubes zur Verfügung steht, aufgrund des Platzbedarfes insbesondere des Fliehkraftabscheiders deutlich verringert ist.

[0004] Deshalb wurden Staubsauger mit Fliehkraftabscheider wie der in der 10 2005 047 075.0 beschriebene entwickelt, bei denen der oder die Fliehkraftabscheider auf den Staubraum aufgesetzt sind. Dadurch dass der Fliehkraftabscheider außerhalb des Gehäuses angeordnet wird, wird vermieden, dass die Staubsammelkapazität durch den zusätzlich benötigten Fliehkraftabscheider beschränkt wird. Ein weiterer ähnlich aufgebauter Staubsauger ist in der GB 2 402 047 A beschrieben. Bei diesem Modell wird jedoch der abgeschiedene Staub direkt im Abscheideraum selbst gesammelt und zusammen mit dem gesamten Fliehkraftabscheider zum Entleeren entnommen.

[0005] Bei all diesen Staubsaugern tritt das Problem auf, dass sich insbesondere im Bereich der Verbindungsleitungen zu und vom Fliehkraftabscheider Schmutz festsetzen kann; besonders mit langen Haaren kontaminierter, feuchter Staub verursacht hier oftmals Probleme. Dabei auftretende Verstopfungen können zu Leistungseinbußen des Staubsaugers bzw. im schlimmsten Fall sogar zu Ausfällen führen.

[0006] Der Erfindung deshalb liegt die Aufgabe zugrunde, einen Staubsauger mit Fliehkraftabscheider zu entwickeln, bei dem die Gefahr der Verstopfung zumindest reduziert wird.

[0007] Gelöst wird die Aufgabe gemäß der Erfindung durch einen Staubsauger mit Fliehkraftabscheider mit den Merkmalen von Anspruch 1.

[0008] Erfindungsgemäß weist der Fliehkraftabscheider des Staubsaugers einen Axialeinlauf für die staubbeladene Luft auf. Dadurch ist sowohl der Lufteinlass als auch das an diesen anschließende Saugrohr in dieselbe Richtung ausgerichtet wie der Fliehkraftabscheider selbst. Dadurch ergeben sich zwischen all diesen Bestandteilen glatte unproblematische Übergänge, die keinerlei Basis zum Festsetzen von Schmutz bieten, so dass Verstopfungen in diesem Bereich aufgrund der erfindungsgemäßen Anordnung weitgehend vermieden werden können. Bei herkömmlichen Staubsaugern mit Fliehkraftabscheider ist der Lufteintritt in den Fliehkraftabscheider üblicherweise radial angeordnet, so dass Saugrohr und Lufteintritt senkrecht auf den Fliehkraftabscheider stehen. Dadurch ist eine Luftumlenkung um 90° im Verbindungsbereich von Saugrohr und Abscheider nötig. Hierbei können Verwirbelungen auftreten, die zu unerwünschtem Festsetzen von Schmutz an den Verbindungskanten der gekoppelten Elemente führen können. Dies wird durch die Erfindung vermieden indem die Verbindung geradlinig ausgeführt ist und die Umlenkung erst im Fliehkraftabscheider selbst erfolgt, in dem keine Verbindungskanten mehr auftreten. Ein weiterer Vorteil der Erfindung besteht darin, dass der Lufteinlass des Fliehkraftabscheiders, der die Verbindung zum Saugrohr darstellt und das Saugrohr selbst sich bei einer axialen Anordnung mit dem Fliehkraftabscheider fließend in das Staubsaugergehäuse einpassen. Dies bringt Designvorteile mit sich und führt auch zu einer besseren Handhabbarkeit des Staubsaugers, da keine sperrigen, in den Raum abstehenden Rohrteile mehr vorhanden sind. Diese abstehenden Teile führen bei herkömmlichen Staubsaugern oft zum Festklemmen des Staubsaugers an niedrigen Regalen oder Ähnlichem, unter denen der Staubsauger beim Saugen durchgeführt werden muss.

[0009] In einer vorteilhaften Ausführungsform wird die eingeführte Luft an einem im Inneren des Flieh-

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kraftabscheiders angeordneten spiralförmigen Luftumlenkkörper umgelenkt und in eine radial zum Fliehkraftabscheider ausgerichtete Wirbelbewegung versetzt. Die Umlenkung der Luft findet erfindungsgemäß nicht mehr im Abkoppelbereich des Saugrohres sondern erst im Fliehkraftabscheider selbst statt, in dem die Umlenkeinheit so ausgebildet werden kann, dass keine Kanten auftreten, an denen sich Schmutz festsetzen könnte. Dies wird dadurch ermöglicht, dass die Verbindung von Fliehkraftabscheider und Saugrohr und die Luftumlenkung aufgrund des Axialeinlaufes räumlich voneinander trennbar sind.

[0010] Vorteilhafterweise ist die Luftumlenkeinheit in Form einer archimedischen Schraube ausgebildet. Hierdurch kann ein besonders glatter Übergang von der axial einströmenden Luft in einen radialen Wirbel erreicht werden.

[0011] In einer weiteren vorteilhaften Ausführungsform ist das Tauchrohr, welches zum Auslass der gereinigten Luft dient, gekröpft ausgebildet. Dadurch wird gewährleistet, dass der Luftaustritt aus dem Zentrum des Fliehkraftabscheiders weg seitlich versetzt wird, so dass im Zentrum des Fliehkraftabscheiders genügend Platz entsteht, um die im Fliehkraftabscheider angeordnete Luftumlenkeinheit ausreichend groß zu dimensionieren.

[0012] In einer weiteren vorteilhaften Ausführungsform verlaufen Lufteinlass und der an demselben Ende des Fliehkraftabscheiders angeordnete Luftauslass teilweise parallel. Insbesondere verlaufen sie im Anschlussbereich an den Fliehkraftabscheider parallel, so dass der geradlinige Aufbau von Fliehkraftabscheider und Luft führenden Verbindungsteilen auch hier durchgängig aufrechterhalten wird, was die bereits erwähnten Design- und Handhabungsvorteile unterstützt.

[0013] Vorteilhafterweise sind Tauchrohr und Luftumlenkeinheit einteilig mittels einer luftdichten Trennwand im Inneren des Fliehkraftabscheiders ausgebildet. Dadurch kann das Tauchrohr als Bestandteil der Luftumlenkung verwendet werden. Außerdem vereinfacht die einteilige Ausführung insbesondere bei Spritzgussverfahren die Herstellung, was die Produktionskosten des Fliehkraftabscheiders senkt.

[0014] Weitere Einzelheiten und Vorteile der Erfindung ergeben sich aus den Unteransprüchen im Zusammenhang mit der Beschreibung eines Ausführungsbeispiels, das anhand der Zeichnungen eingehend erläutert wird.

[0015] Es zeigen:

[0016] Fig. 1: einen erfindungsgemäß aufgebauten Fliehkraftabscheider im Querschnitt und

[0017] Fig. 2: eine schematische Oberaufsicht auf den Fliehkraftabscheider im Lufteintrittsbereich.

[0018] Fig. 1 zeigt einen Schnitt durch einen erfindungsgemäßen Fliehkraftabscheider **1**, der über einen Verbindungsschlauch **2** mit dem Schlauchstutzen **3** des hier nicht dargestellten Staubsaugers verbunden ist. Der Fliehkraftabscheider **1** ist schwenkbar um den Drehpunkt **4** gelagert, so dass er zur Entnahme der unter ihm im Staubsauger befindlichen separaten Staubbox vom Staubsauger weggeschwenkt werden kann. Der Verbindungsschlauch **2** mündet im Luftauslassbereich **5** in das Tauchrohr **6** des Fliehkraftabscheiders **1**. Neben dem Luftaustrittsbereich **5** befindet sich luftdicht von diesem getrennt der Lufteintrittsbereich **7** des Fliehkraftabscheiders **1**. Dieser ist im Bereich des Verbindungsstutzens **8** des Saugrohres **9** parallel zum Luftauslass **5** angeordnet. Dadurch tritt die Luft in axialer Richtung über den Lufteinlass **7** in den Fliehkraftabscheider **1** ein. Um genügend Platz für den Lufteinlass **7** und die an diesem erfolgende Ausbildung des Abscheidewirbels zu erhalten, ist das Tauchrohr **6** gekröpft ausgebildet. Dadurch mündet der Luftauslass **5** des Tauchrohres **6** im äußeren Wandbereich des Wirbelrohres **10** des Fliehkraftabscheiders **1**. An dem dem Lufteinlass **7** und Luftauslass **5** des Fliehkraftabscheiders **1** gegenüberliegenden Ende des Wirbelrohres **10** ist an einem lösbar befestigten Deckel **11** ein ins Innere des Fliehkraftabscheiders **1** hineinreichender Apexkegel **12** ausgeformt. An diesem wird der vom Lufteinlass **7** durch das Wirbelrohr **10** zum gegenüberliegenden Ende strömende Luftwirbel ins Innere des Fliehkraftabscheiders **1** zum Tauchrohr **6** hin umgelenkt. Durch das Tauchrohr wird der umgelenkte Luftwirbel über den Luftauslass **5** an den nicht dargestellten Staubsauger abgegeben. Im Bereich der Luftumlenkung **13** befindet sich seitlich an der Wand des Wirbelrohres **10** ein Schmutzauswurf **14**, welcher als Öffnung im Wirbelrohr **10** ausgebildet ist. Über diesen wird der aus der verwirbelten Luft über Zentrifugalkräfte abgeschiedene Staub an einen nicht dargestellten separaten Staubsammelbehälter abgegeben. Aufgrund der axialen Anordnung des Lufteinlasses **7** tritt das über den Verbindungsstutzen **8** mit dem Fliehkraftabscheider **1** verbundene Saugrohr **9** geradlinig in den Fliehkraftabscheider **1** ein. Dadurch wird die einströmenden Luft geradlinig an den aufgrund der Verbindung entstehenden unvermeidbaren Kanten zwischen dem Saugrohr und dem Abscheider vorbeigeführt, so dass kein Potential zum Festsetzen von in der Luft mitgeführten größeren Staubpartikeln gegeben ist. Verwirbelungen die durch die Luftumlenkung entstehen und die beim Passieren derartiger Kanten Verstopfungen verursachen können, entstehen erst im Inneren des Wirbelrohres **10**, wo keine Kanten mehr auftreten. Hier wird die Luft im unteren Bereich des Lufteinlasses **7** mit-

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tels einer in Fig. 2 andeutungsweise sichtbaren archimedischen Schnecke **15** umgelenkt wird.

[0019] Fig. 2 zeigt einen erfindungsgemäßen Fliehkraftabscheider **1** in einer Aufsicht mit geöffnetem Lufteinlass **7** und Luftauslass **5**. Im Inneren des Fliehkraftabscheiders ist hier im Lufteinlassbereich **7** die als archimedische Schnecke **15** spiralförmig aufgebaute Luftumlenkeinheit teilweise sichtbar. Diese wird zum Teil von dem gekröpft geformten Tauchrohr **6** gebildet und ist vorzugsweise als Spritzgussteil einteilig mit dem Tauchrohr **6** hergestellt.

Bezugszeichenliste

1	Fliehkraftabscheider
2	Verbindungsschlauch
3	Schlauchstutzen
4	Drehpunkt
5	Luftauslassbereich
6	Tauchrohr
7	Lufteintrittsbereich
8	Verbindungsstutzen
9	Saugrohr
10	Wirbelrohr
11	Deckel
12	Apexkegel
13	Luftumlenkbereich
14	Schmutzauswurf
15	archimedische Schnecke

Patentansprüche

1. Staubsauger mit einem Fliehkraftabscheider (**1**), der einen Lufteinlass (**7**) aufweist, der mit einem staubbeladene Luft einleitenden Saugrohr (**9**) verbunden ist, einen Abscheideraum (**10**) in dem die in eine Drehbewegung versetzte Luft den Staub mittels Zentrifugalkräften in den Staubsammelbereich des Abscheideraumes (**10**) abscheidet oder über einen Staubauslass (**14**) in einen separaten, getrennt von Abscheideraum (**10**) entnehmbaren Staubsammelbehälter auswirft und einen Luftauslass (**5**), der über ein Tauchrohr (**6**) mit dem Abscheideraum (**10**) in Verbindung steht und die gereinigte Luft an die Umgebung abführt, **dadurch gekennzeichnet**, dass der Lufteinlass (**7**) axial ausgerichtet an dem Fliehkraftabscheider (**1**) angeordnet ist.

2. Staubsauger mit Fliehkraftabscheider (**1**) nach Anspruch 1, dadurch gekennzeichnet, dass der Lufteinlass (**7**) eine schraubenförmige Luftumlenkeinheit (**15**) aufweist.

3. Staubsauger mit Fliehkraftabscheider (**1**) nach Anspruch 2, dadurch gekennzeichnet, dass die Luftumlenkeinheit (**15**) als archimedische Schnecke ausgebildet ist.

4. Staubsauger mit Fliehkraftabscheider (**1**) nach Anspruch 1, dadurch gekennzeichnet, dass das Tauchrohr (**6**) gekröpft geformt ist.

5. Staubsauger mit Fliehkraftabscheider (**1**) nach Anspruch 1, dadurch gekennzeichnet, dass der Luftauslass (**5**) und der Lufteinlass (**7**) zumindest bereichsweise parallel verlaufen.

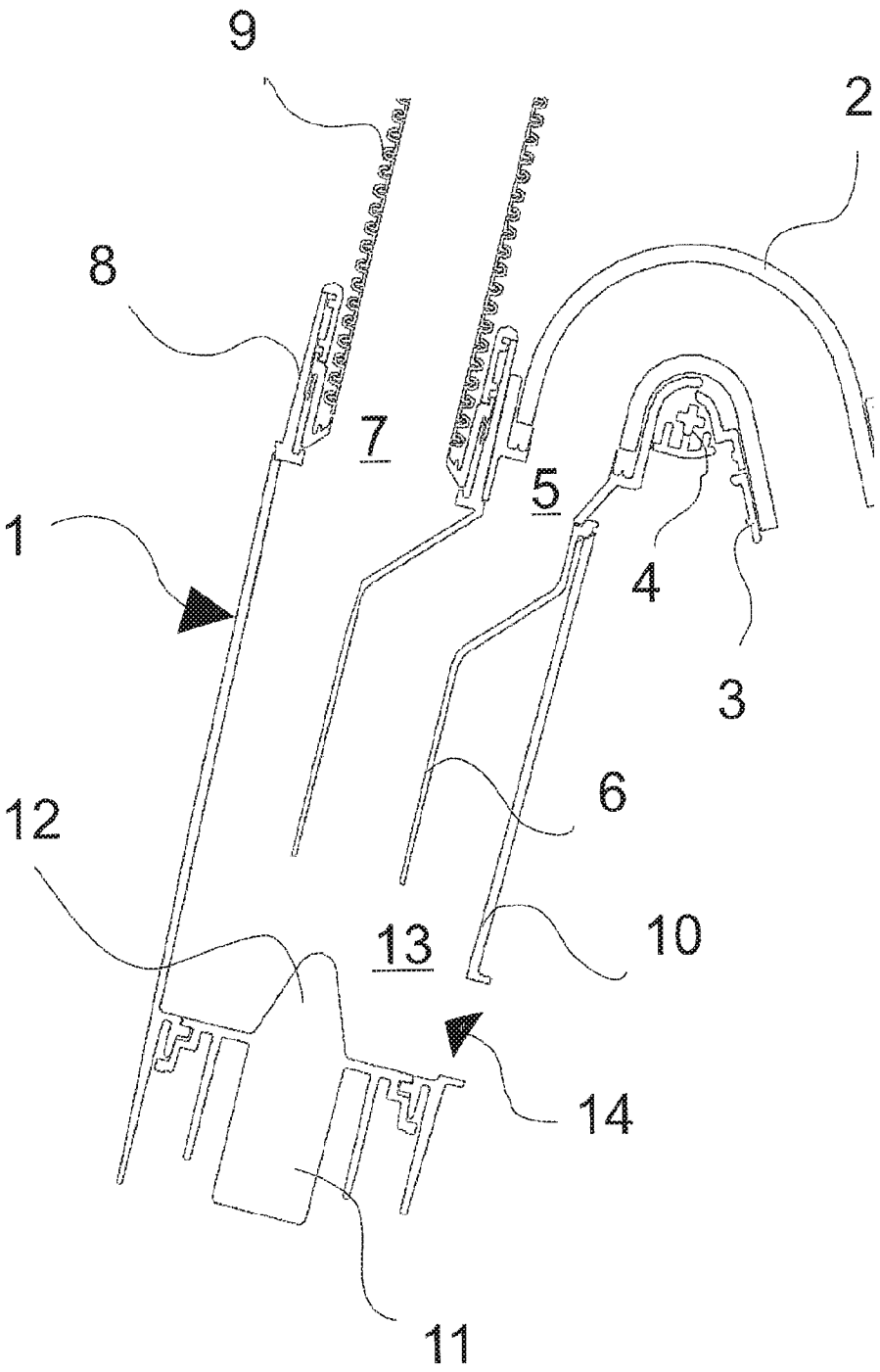
6. Staubsauger mit Fliehkraftabscheider (**1**) nach Anspruch 5, dadurch gekennzeichnet, dass das Tauchrohr (**6**) und die Luftumlenkeinheit (**15**) luftdicht getrennt miteinander verbunden sind.

Es folgen 2 Blatt Zeichnungen

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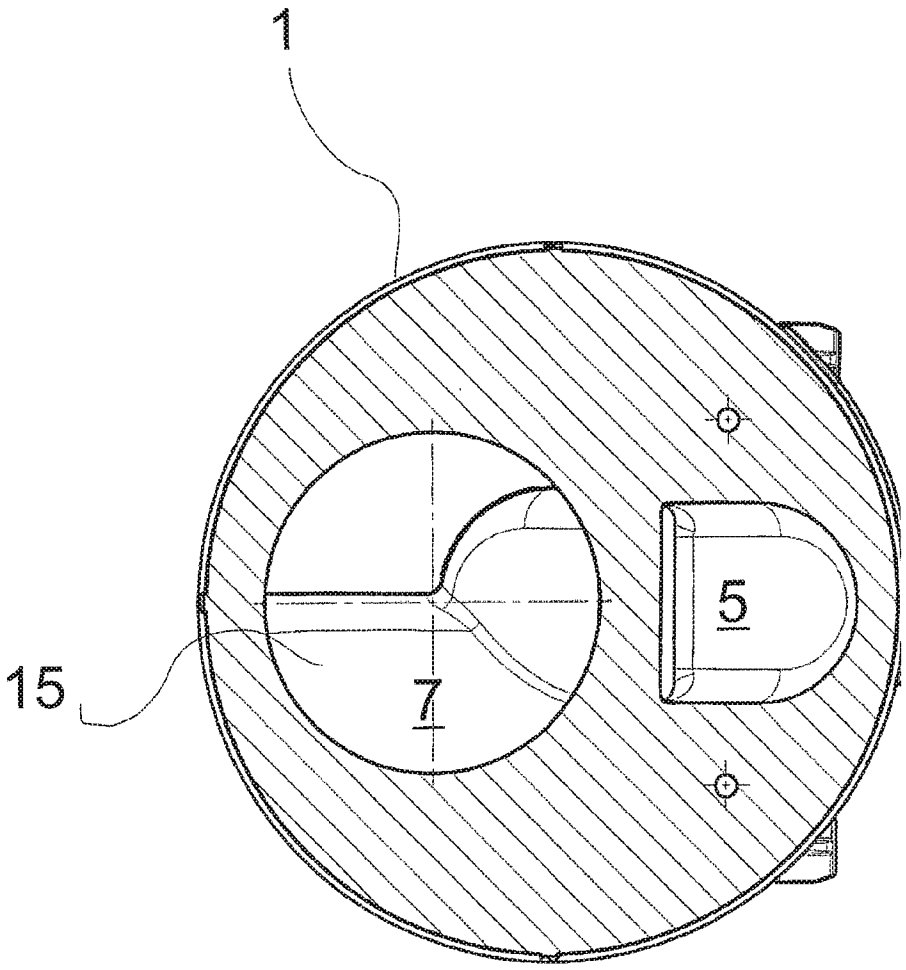
Anhängende Zeichnungen

Fig. 1



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Fig. 2



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(54) Hand-holdable vacuum cleaners

(57) There is provided a hand-holdable vacuum cleaner, comprising: an electric motor (12); an electrical on-off switch (42) for operating said motor; a fan (14) connected to an output shaft (16) of said motor; an airflow pathway comprising an inlet for dirty air (32), an outlet for clean air, and a collection chamber (20) located in fluid communication between said inlet and said outlet; means for separating out debris entrained with dirty air entering via said inlet and depositing the debris in said collection chamber; and means for adjusting an angle of said inlet relative to a main axis of said vacuum cleaner, wherein the vacuum cleaner further comprises a rigid, elongate nose (30) having said inlet at one end thereof, said nose being pivotable relative to said main axis through an angle of at least 135 degrees. The elongate nose can be pivoted from a first, folded position in which it is angled alongside the main axis of the vacuum cleaner, substantially parallel thereto, allowing the vacuum cleaner to be stored in a very compact overall space, to a second, extended position in which it is angled by only a small amount or not at all from the main axis of the vacuum cleaner to provide an extension thereof. Secondly, since the nose is rigid and elongate and has the dirty air inlet (32) located at one end thereof, it may be introduced into narrow spaces without any need to be supported by a hand of a user, unlike a flexible hose extension known from prior art hand-holdable vacuum cleaners.

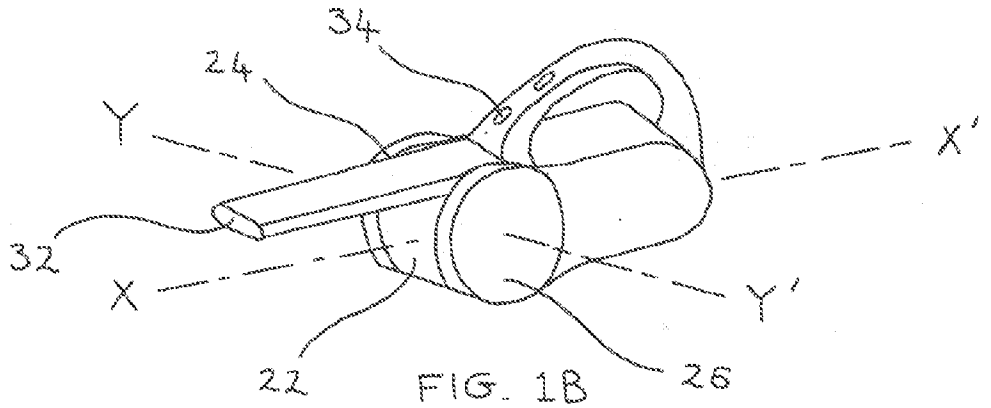


FIG. 1B

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Description

[0001] The present invention relates to hand-holdable vacuum cleaners. Such vacuum cleaners are well known for collecting dust and dirt, although wet-and-dry variants which can collect spilled liquids as well are also known. Typically, they are intended for use in a domestic environment, although they also find uses in other environments, such as worksites. Generally, hand-holdable vacuum cleaners are electrically powered and comprise an electric motor, an electrical on-off switch for a user to operate said motor, a fan connected to an output shaft of said motor, an inlet for dirty air, an outlet for clean air and a collection chamber for dust, dirt and possibly also liquids. Electrical power for the motor may be provided by a source of mains electricity, in which case the vacuum cleaner will further comprise an electrical power cable, by a removable and replaceable battery pack, or by one or more in-built rechargeable cells, in which case the vacuum cleaner will further comprise some means, such as a jack plug, for connecting the vacuum cleaner to a recharging unit. When the vacuum cleaner is provided with electrical power from one of these sources and the on-off switch is set to the "on" position, the electric motor drives the fan to draw dirty air along an airflow pathway in through the dirty air inlet, via the collection chamber to the clean air outlet. Interposed at some point along the airflow pathway, there is also provided some means for separating out dust and dirt (and possibly also liquids) entrained with the dirty air and depositing these in the collection chamber. This separation means may comprise one or more filters and/or a cyclonic separation device. An example of such a hand-holdable vacuum cleaner in which the separation means comprises a filter is disclosed in European patent application no. EP 1 523 916 in the name of the present applicant.

[0002] More specifically, the present invention relates to hand-holdable vacuum cleaners comprising a component part which can be adjusted to allow the dirty air inlet of the vacuum cleaner to be pointed in different directions, whilst a user of the vacuum cleaner is able to hold the vacuum cleaner in the same orientation. This has the advantages that the vacuum cleaner may be used to access awkward spaces and can be held more comfortably by orienting a main axis of the vacuum cleaner to suit the user and adjusting the position of the dirty air inlet to be in proximity to a surface to be cleaned, rather than orienting the main axis of the vacuum cleaner to best suit the surface to be cleaned and requiring the user to hold the vacuum cleaner in whichever orientation this demands. A hand-holdable vacuum cleaner of this type, which has a pivotable nose comprising the dirty air inlet, is disclosed in US patent no. 4,573,237.

[0003] Hand-holdable vacuum cleaners provided with a flexible hose attachment which give the same advantages as these are also known. An example of a hand-holdable vacuum cleaner with such a flexible hose attachment is described in German utility model no. DE 203 14 544 U. However, these vacuum cleaners have other disadvantages over vacuum cleaners of the type disclosed in US 4,573,237, which are as follows. Firstly, the hose attachment must either be stored on the vacuum cleaner itself, as in DE 203 14 544 U, which takes up valuable room, or if it is removable, it must be stored elsewhere, in which case it may become lost or may not be readily to hand when required. Secondly, the flexible hose attachment must be supported in use by a hand of a user.

[0004] However, whereas vacuum cleaners of the type disclosed in US 4,573,237 are advantageous for these reasons over hand-holdable vacuum cleaners provided with a flexible hose attachment, there is still room for considerable improvement over the type of vacuum cleaner disclosed in US 4,573,237. Specifically, in spite of the disadvantages of flexible hose attachments just stated, a flexible hose attachment can access a wider range of angles than a vacuum cleaner of the type disclosed in US 4,573,237 and can also access narrower spaces in comparison thereto.

[0005] Accordingly, the present invention has as its object the provision of an improved hand-holdable vacuum cleaner comprising means for adjusting an angle of the dirty air inlet thereof relative to a main axis of the vacuum cleaner, which has improved reach in comparison to a vacuum cleaner of the type disclosed in US 4,573,237, but which need not comprise a flexible hose attachment to achieve the same.

[0006] The present invention aims to achieve this object by providing a hand-holdable vacuum cleaner comprising an electric motor; an electrical on-off switch for operating said motor; a fan connected to an output shaft of said motor; an airflow pathway comprising an inlet for dirty air, an outlet for clean air, and a collection chamber located in fluid communication between said inlet and said outlet; means for separating out debris entrained with dirty air entering via said inlet and depositing the debris in said collection chamber; and means for adjusting an angle of said inlet relative to a main axis of said vacuum cleaner; further comprising a rigid, elongate nose having said inlet at one end thereof, said nose being pivotable relative to said main axis through an angle of at least 135 degrees.

[0007] A hand-holdable vacuum cleaner with these features has several advantages, as follows. Firstly, the elongate nose may be pivoted from a first, folded position in which it is angled alongside the main axis of the vacuum cleaner, allowing the vacuum cleaner to be stored in a very compact overall space, to a second, extended position in which it is angled by only a small amount or not at all to the main axis of the vacuum cleaner to provide an extension thereof. Secondly, since the nose is rigid and elongate and has the dirty air inlet located at one end thereof, it may be introduced into narrow spaces without any need to be supported by a hand of a user. This is advantageous over a flexible hose attachment of the prior art, which must be supported by a hand of a user

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and consequently cannot be introduced into spaces which are too narrow or awkward to provide access to a human hand. Thirdly, since the nose can pivot through an angle relative to the main axis of the vacuum cleaner of at least 135 degrees, this allows the vacuum cleaner to be held comfortably by a user in a single orientation, but have the dirty air inlet thereof directed in a very wide variety of different directions.

[0008] Preferably, the nose is pivotable relative to the main axis of the vacuum cleaner through an angle of more than 180 degrees. This allows the nose not only to be bent at an acute or obtuse angle relative to the main axis of the vacuum cleaner, but also at a reflex angle, allowing the vacuum cleaner to be held by a user in the same orientation as for acute and obtuse angles, but for the dirty air inlet to be directed upwardly towards the user, which allows the vacuum cleaner to be comfortably used for cleaning under furniture, for example.

[0009] It is also desirable that the pivotable nose can be releasably engaged in one or more fixed positions throughout its full range of angles of pivot, for example in the folded-back position of 0 degrees, in the straight-line position of 180 degrees and in a number of other positions such as 45, 90, 135, 225 and 270 degrees. This can be achieved by providing the pivotable nose or a part of the vacuum cleaner rigidly connected thereto with first engagement means and a part of the vacuum cleaner rigidly connected to a main body thereof housing the motor and the fan with second engagement means adapted to engage with the first engagement means, and also by providing the vacuum cleaner with a resiliently biassed button which a user can depress to disengage the first engagement means from the second engagement means, thereby releasing the pivotable nose from engagement in one of the aforementioned positions.

[0010] In a preferred embodiment which gives the vacuum cleaner even greater access to restricted spaces, the nose can further comprise a rigid telescopic extension tube. Such an extension tube on the nose of a hand-holdable vacuum cleaner is known, for example, from US patent no. 4,610,048 and international patent publication no. WO2004/069021. However, the combination of such an extension tube with a nose which can pivot through an angle relative to the main axis of the vacuum cleaner of at least 135 degrees is not known from the prior art and gives the vacuum cleaner greatly increased versatility in its ability to access awkward spaces.

[0011] The separating means of the vacuum cleaner may comprise one or more filters and/or a cyclonic separation device. In a preferred embodiment, the separating means comprises a filter located within the collection chamber, and the collection chamber has a substantially cylindrical shape about a central axis oriented at right angles to the main axis of the vacuum cleaner, with the filter arranged in an axially symmetric fashion concentric with the central axis of the collection chamber. In this embodiment, the pivotable nose is also arranged to pivot about the central axis of the collection chamber and a dirty air outlet from the nose is arranged to enter the collection chamber on a cylindrical side wall thereof. Finally, the clean air outlet from the collection chamber is located within said filter. Thus during operation of the vacuum cleaner of this embodiment, dirty air enters the collection chamber from the dirty air outlet of the nose at a tangent to the cylindrical side wall of the collection chamber regardless of the angle of the pivotable nose relative to the main axis of the vacuum cleaner, and swirls around the centrally located filter which separates out dust and dirt entrained with the dirty air and deposits these in the collection chamber, before the clean air exits the collection chamber from the clean air outlet located within the filter. This arrangement has several advantages, as follows. Firstly, before it enters the collection chamber, the dirty air travels in a straight line regardless of the angle of the pivotable nose, which has the effect of maximising the velocity of the dirty air and minimising turbulence, therefore improving the vacuum cleaner's ability to pick up dirt. Secondly, the dirty air always enters the collection chamber tangentially and since the collection chamber has a substantially cylindrical shape, this enables the collection chamber to act as a cyclonic separator, flinging the entrained dirt outwards centrifugally as it swirls around the centrally located filter. This cyclonic separation aids the operation of the filter and may be optimised still further by the filter being provided with a conical or frusto-conical shape, which helps to separate out different sizes of dirt particle at different locations along the central axis of the filter.

[0012] In a further preferred embodiment of the embodiment of the vacuum cleaner just described, the collection chamber comprises a hinged door on an end face thereof opposite to said clean air outlet. This allows the collection chamber to be emptied of accumulated dust and dirt by a user merely opening the hinged door and tipping the contents of the collection chamber out. This has the advantage that the user does not have to touch either the dust and dirt or any components of the vacuum cleaner which come into contact with dust and dirt in order to empty the vacuum cleaner.

[0013] Preferably the door is held by a main body of the vacuum cleaner which houses the motor and the fan. Thus the door maintains the same orientation relative to the main body of the vacuum cleaner regardless of the angle of the pivotable nose. This is more convenient and less confusing for a user.

[0014] If the door is held by the main body of the vacuum cleaner in this fashion, it is also preferable for the filter located within the collection chamber to be rotatable relative to the door when the nose is pivoted and for an interior face of the door to be provided with a series of radial tangs and for an end face of the filter adjacent to the interior face of the door to have a corresponding set of radial tangs. If the combined height of the tangs on the interior face of the door and on the end face of the filter is greater than the separation between the interior face of the door and the end face of the filter, the two facing

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sets of tangs will overlap each other, such that when the pivotable nose is rotated relative to main axis of the vacuum cleaner, the tangs of the filter will engage with the tangs on the door and agitate the filter, thereby dislodging dust and dirt adhering to the filter and causing it to be deposited in the collection chamber. This filter cleaning mechanism has the advantage that it allows the filter to be cleaned by a user merely pivoting the nose of the vacuum cleaner relative to the main body thereof and without the need to touch the dirty filter at all.

[0015] Alternatively, the same filter cleaning effect may be achieved by the filter being held immovable relative to the main body of the vacuum cleaner during operation and the door being rotatable relative to the filter when the nose is pivoted, provided that sets of opposing tangs are provided on the interior face of the door and on the end face of the filter in a similar fashion.

[0016] Alternatively, the collection chamber may comprise a door on the cylindrical side wall thereof instead of on an end face thereof opposite to the clean air outlet. This is less preferred because the collection chamber is less easy to empty and the door opening mechanism may interfere with rotation of the pivotable nose. However, in this case, the same filter cleaning effect may be achieved by providing a series of radial tangs on the end face of the collection chamber opposite to the clean air outlet instead of on the door.

[0017] All of the above alternative arrangements for filter cleaning are unified by the common inventive concept of opposing and overlapping sets of radial tangs provided on the filter and on another part of the vacuum cleaner which are caused to rotate relative to each other when the nose of the vacuum cleaner is pivoted in order to agitate the filter. However, in yet another alternative arrangement of a filter cleaning mechanism, regardless of whether a door is located on the end face of the collection chamber opposite to the clean air outlet or on the cylindrical side wall thereof, instead of the set of radial tangs on the filter and the set of tangs on another part of the vacuum cleaner being caused to rotate relative to each other when the nose is pivoted, one of the sets of tangs may instead be coupled to a filter cleaning wheel which a user can rotate in order to cause the set of tangs coupled thereto to rotate relative to the other set of tangs, in the manner already disclosed in EP 1 523 916 in the name of the present applicant.

[0018] Notwithstanding the foregoing, the filter may still be removable and replaceable when the vacuum cleaner is not in use, so that a worn, damaged or permanently clogged filter may be substituted by a new one.

[0019] The filter may also comprise a plurality of filter elements, such as a course filter for filtering larger particles of dirt and a fine filter contained therein for filtering finer particles of dust from the airflow pathway. The filter elements may themselves be independently removable and replaceable.

[0020] In embodiments in which the collection chamber has a substantially cylindrical shape about a central axis oriented at right angles to the main axis of the vacuum cleaner, it is also preferable for the motor and the fan to be oriented in the main body of the vacuum cleaner with the output shaft of the motor and the fan's axis of rotation parallel to the central axis of the collection chamber and at right angles to the main axis of the vacuum cleaner. This is in contrast to the conventional orientation of the motor and the fan in a hand-holdable vacuum cleaner, which is usually along or parallel to the main axis of the vacuum cleaner (as in, for example, EP 1 523 916). This new arrangement has several advantages over the conventional layout, as follows. Firstly, it is beneficial for the overall compactness of the vacuum cleaner, considering that the collection chamber is already oriented at right angles to the main axis of the vacuum cleaner. Secondly, it means that the fan can be located on the same side of the vacuum cleaner as the clean air outlet from the collection chamber and in close proximity thereto, thereby shortening the airflow pathway between these two components, which improves the overall speed and efficiency of the vacuum cleaner in operation. Thirdly, if the fan is configured as an impeller which draws air in axially thereto and expels air out radially therefrom, the main body of the vacuum cleaner can also be provided with one or more exhaust vents on the rear of the main body, i.e. in a location opposite to the dirty air inlet of the pivotable nose when the nose is in its fully extended or 180-degree position. In this way, air expelled by the fan will travel in a straight-line path from the fan to the exhaust vents without having to be directed around any corners, but is nonetheless also directed away from a surface to be cleaned in completely the opposite direction to the dirty air inlet to the nose, which avoids disturbing dust and dirt on the surface to be cleaned with the exhausted air. The same desirable objective of not disturbing dust and dirt on a surface to be cleaned with clean air from the exhaust vents on a hand-holdable vacuum cleaner of a conventional layout can only be achieved if the exhaust vents are also located on the rear of the main body of the vacuum cleaner. However in this case, air expelled by the impeller has to be directed around one or more corners within the body in order to reach the exhaust vents, since the orientation of the fan's axis of rotation parallel to the main axis of the vacuum cleaner means that the fan expels air at right angles to the main axis, sideways to the main body. This both increases the length of the airflow pathway between the fan and the exhaust vents in the conventional arrangement and also increases the turbulence of the exhausted air. Accordingly, the proposed new arrangement has improved speed and efficiency of airflow in comparison thereto, as well as reduced noise, which is generated by turbulent air.

[0021] In another preferred embodiment, the vacuum cleaner may be adapted to stand on the rear end of the main body of the vacuum cleaner. This allows the vacuum cleaner to be stood in a very small surface area, and if the nose is pivoted to its folded-back position at 0 degrees to the main axis of the vacuum cleaner, this can be

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achieved without the vacuum cleaner having an excessive height. Moreover, if the vacuum cleaner is a rechargeable model, the rear end of the main body of the vacuum cleaner can also be provided with means for connecting the vacuum cleaner to a recharging unit, such as a jack plug, which allows the vacuum cleaner to be stood on its rear end on a recharging unit also occupying a small surface area.

[0022] Finally, the nose of the vacuum cleaner may be provided with an one-way valve in the form of a flap composed of a resilient material, such as rubber, which allows dirty air to enter the nose via the dirty air inlet when the vacuum cleaner is in operation, but which prevents dust and dirt from leaving the nose via the dirty air inlet under the influence of gravity if the nose is directed downwards when the vacuum cleaner is not in operation. Such a one-way valve in the form of a rubber flap is known from conventional hand-holdable vacuum cleaners, but is particularly desirable in embodiments of the present vacuum cleaner, considering that it is likely to be stored with the pivotable nose directed downwards when the vacuum cleaner is not in operation.

[0023] Further features and advantages of the present invention will be better understood from the following detailed description, which is given by way of example and in association with the accompanying drawings, in which:

Figs. 1A, 1B, 1C and 1D are schematic perspective views of a hand-holdable vacuum cleaner according to a first embodiment of the invention, respectively showing the pivotable nose thereof in 90, 180, 210 and 0 degree positions relative to the main axis of the vacuum cleaner;

Figs. 2A, 2B and 2C are schematic side views of a hand-holdable vacuum cleaner according to a second embodiment of the invention, respectively showing the pivotable nose thereof in 210, 135 and 160 degree positions relative to the main axis of the vacuum cleaner;

Fig. 3 is a longitudinal cross-section through the nose of a hand-holdable vacuum cleaner according to a third embodiment of the invention, showing a telescopic extension tube thereof;

Fig. 4 is a schematic perspective view of the collection chamber of a hand-holdable vacuum cleaner according to a fourth embodiment of the invention, having a hinged door and shown with the door in an open condition;

Fig. 5 is a schematic perspective view of an exterior face of the door shown in Fig. 4;

Fig. 6 is a longitudinal cross-section through the collection chamber of a hand-holdable vacuum cleaner according to a fifth embodiment of the invention;

Fig. 7 is a schematic plan view of the main body and collection chamber of a hand-holdable vacuum cleaner according to a sixth embodiment of the invention; and

Fig. 8 is a schematic perspective view of a hand-holdable vacuum cleaner according to a seventh embodiment of the invention, shown with the pivotable nose thereof in the 0 degree position relative to the main axis of the vacuum cleaner and standing on a recharging unit.

[0024] Referring firstly to Figs. 1A, 1B, 1C and 1D of the accompanying drawings, these show a hand-holdable vacuum cleaner according to a first embodiment of the invention, comprising a main body 10, a collection chamber 20 for dust and dirt, a rigid, elongate nose 30 and a handle 40. The nose 30 has an inlet 32 for dirty air located at one end thereof. Mounted on handle 40 is an electrical on-off switch 42 for operating an electric motor housed within main body 10. In this embodiment, switch 42 has three settings, namely a first position for switching the motor off, a second position for low-speed operation of the motor and a third position for high-speed operation of the motor.

[0025] In all of Figs. 1A, 1B, 1C and 1D, broken line X-X' represents a main axis of the vacuum cleaner and broken line Y-Y' represents a central axis of the collection chamber 20, which in this embodiment has a substantially cylindrical shape. Central axis Y-Y' of the collection chamber 20 is oriented at right angles to the main axis X-X' of the vacuum cleaner. As can be seen from these four figures, the elongate nose 30 is pivotable about axis Y-Y' through a range of angles from 0 degrees (as shown in Fig. 1D) through acute angles up to 90 degrees (as shown in Fig. 1A) through obtuse angles between 90 and 180 degrees (the latter of which is shown in Fig. 1B) and up to a reflex angle of 210 degrees (as shown in Fig. 1C). Thus in this embodiment, nose 30 is pivotable through a range of angles relative to the main axis X-X' of more than 180 degrees. With the nose pivoted to the reflex angle shown in Fig. 1C, this allows the vacuum cleaner to be comfortably used for cleaning under furniture. On the other hand, with the nose folded back to the 0 degree position shown in Fig. 1D, the vacuum cleaner can also be stored in a very compact space. The underside of main body 10 is also provided with a corresponding groove 11 for receiving nozzle 30 in this folded-back position. This improves the overall compactness of the vacuum cleaner for storage still further. With the nose positioned at an in-between angle, as shown in Fig. 1A, the vacuum cleaner can be used for cleaning in gaps between objects, but can still be held in a comfortable orientation by a user.

[0026] In this embodiment, the nose 30 is rigidly connected to a central portion 22 of the collection chamber 20. End faces 24, 26 of the collection chamber on the other hand are rigidly connected to the main body 10 of

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the vacuum cleaner, so that as nose 30 pivots about axis Y-Y', central portion 22 of the collection chamber 20 rotates relative to the end faces 24, 26. The outer surface of central portion 22 is provided with two sets of teeth on each end thereof adjacent end faces 24 and 26, and the inner surfaces of end faces 24, 26 are each provided with second sets of teeth which are adapted to engage with respective ones of the two sets of teeth provided on central portion 22. Accordingly, nose 30 cannot pivot relative to main body 10 because the interengaging sets of teeth prevent movement of central portion 22 relative to end faces 24, 26. However, mounted on handle 40, in addition to electrical on-off switch 42, is a further button 34, which is resiliently biassed and which when depressed by a user, will disengage the sets of teeth mounted on end faces 24, 26 from the two sets of teeth provided on central portion 22, thereby allowing nose 30 to pivot freely relative to main body 10. Nose 30 can therefore be locked in position at whatever angle the user desires from across the full range of angles available for the nose to pivot through, until such time as the user wishes to unlock the nose and adjust it to a new angle by depressing button 34.

[0027] Figs. 2A, 2B and 2C show a hand-holdable vacuum cleaner according to a second embodiment of the invention, in which the collection chamber 20 has a substantially cylindrical shape and a filter 50 is located within the collection chamber, arranged in an axially symmetric fashion concentric with the central axis Y-Y' of the collection chamber. Since Figs. 2A, 2B and 2C are side elevational views, they all show axis Y-Y' of the collection chamber and the filter 50 end-on. In this embodiment, nose 30 is also arranged to pivot about the central axis Y-Y' and a dirty air outlet 36 from nose 30 enters the collection chamber 20 on a cylindrical side wall 28 thereof. Thus as Figs. 2A, 2B and 2C show, regardless of the angle of nose 30 relative to main body 10, dirty air always enters the collection chamber 20 from dirty air outlet 36 at a tangent to cylindrical side wall 28, and swirls around centrally located filter 50 in the manner indicated by the arrows in Figs. 2A, 2B and 2C. This separates out dust and dirt entrained with the dirty air and deposits them in the collection chamber 20, before clean air exits the collection chamber from within the filter via a clean air outlet located on the opposite side from the end face of filter 50 visible in Figs. 2A, 2B and 2C.

[0028] Fig. 3 shows a third embodiment of the invention, in which nose 30 comprises a rigid telescopic extension tube 38, which dirty air enters in the direction indicated by arrow A in Fig. 3 during operation of the vacuum cleaner. In this embodiment, nose 30 also comprises an inner tube 31 and an outer tube 33. Telescopic extension tube 38 can therefore slide within a space 35 provided between inner and outer tubes 31, 33 in the directions indicated by double-headed arrow J-K in Fig. 3, but is prevented from being removed from space 35 completely by end stops 37 which abut against corresponding lips 39 provided on inner tube 31. In this way, the overall length of nose 30 may be adjusted by a user by sliding extension tube 38 to a location where dirty air inlet 32 is positioned as required. Extension tube 38 has a larger transverse cross-sectional area than inner tube 31. This decreasing cross-sectional area in the direction of the airflow during operation of the vacuum cleaner ensures that use of extension tube 38 does not cause a corresponding drop in air pressure. It is also beneficial for avoiding dirt becoming trapped at the interface between extension tube 38 and inner tube 31, in comparison to the converse arrangement, in which the cross sectional area of inner tube 31 would be larger than the cross-sectional area of extension tube 38. On the other hand, outer tube 33 is provided in addition to inner tube 31 largely for aesthetic reasons: firstly in order to create an outward impression of decreasing cross-sectional area towards dirty air inlet 32 (which looks more natural to the human eye), and secondly to cover any scratches on the outer surface of inner tube 31 which may be created by repeated sliding of extension tube 38 over the outer surface of inner tube 31.

[0029] Fig. 4 shows the collection chamber 20 of a hand-holdable vacuum cleaner according to a fourth embodiment of the invention. In this embodiment, the collection chamber has a substantially cylindrical shape and comprises end faces 24, 26 and a cylindrical side wall 28. Arranged in an axially symmetric fashion concentric with the central axis of the collection chamber is a filter 50. Filter 50 has a frusto-conical shape and comprises an end face 52 and a conical side wall 54. End face 52 is impervious to air, but conical side wall 54 is provided with a plurality of fine pores 56 through which air can pass. A clean air outlet from collection chamber 20 is located within filter 50, allowing air to exit the collection chamber through end face 24. Thus during operation of the vacuum cleaner, dirty air enters the collection chamber at a tangent to cylindrical side wall 28 and swirls around filter 50. The entrained dirt is flung outwardly as it swirls around filter 50 under the action of centrifugal force, strikes side wall 28 and is deposited in collection chamber 20. Side wall 28 is transparent, allowing a user to see how much dirt has accumulated within the collection chamber and therefore when it needs emptying. The frusto-conical shape of filter 50 helps to separate out different sizes of dirt particle from the dirty air at different locations along the central axis of the filter, which in turn helps to prevent the filter pores 56 from becoming blocked. Clean air is then able to pass through pores 56 and thence to the clean air outlet from collection chamber 20 located within filter 50.

[0030] A user can gain access to collection chamber 20 to empty the accumulated dust and dirt therefrom by means of a door 60 mounted on end face 26 opposite to said clean air outlet. Door 60, which is shown in an open condition in Fig. 4, opens by means of a hinge 62 which connects it to collection chamber 20. However in an alternative embodiment, hinge 62 may instead connect door 60 to a main body 10 of the vacuum cleaner, in which case door 60 will maintain the same orientation

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relative to main body 10 regardless of the orientation of collection chamber 20 relative thereto. Door 60 can also be securely closed by means of a latch 64 mounted thereon. This latch interengages with a catch 66 provided in a suitable location on end face 26 of collection chamber 20. The locations of latch 64 and catch 66 may however be interchanged as between the door 60 and the collection chamber 20.

[0031] In this embodiment, an interior face 68 of door 60 is provided with a series of radial tangs 70. These tangs 70 cooperate with a corresponding set of radial tangs 72 provided on the end face 52 of filter 50. The combined height of tangs 70 and 72 is greater than the separation between the interior face 68 of the door 60 and the end face 52 of the filter 50, so that the two facing sets of tangs 70,72 will overlap each other when door 60 is in a closed condition. Tangs 70 are coupled to a filter cleaning wheel 74 which is movable within door 60, such that it can be rotated relative thereto. As can be seen in Fig. 5, which shows an exterior face 69 of the door 60 of Fig. 4, filter cleaning wheel 74 projects outwardly of door 60 and is provided with a knurled outer surface. A user can therefore grip this knurled surface and rotate filter cleaning wheel 74 relative to door 60 in either of the directions indicated in Fig. 5 by double-headed arrow P-Q. This has the effect of rotating tangs 70 relative to door 60 and also relative to the set of tangs 72 on end face 52 of filter 50, which is held immovable in collection chamber 20 and is therefore unable to rotate relative thereto. As the tangs 70 are rotated, they engage with tangs 72 and agitate filter 50, thereby dislodging dust and dirt adhering to the filter and causing it to be deposited in collection chamber 20.

[0032] In an alternative embodiment not shown in Figs. 4 and 5, tangs 70 may instead be rigidly mounted to door 60 and unable to rotate relative thereto, but the door itself may be rotatable relative to the immovable filter 50 when a nose of the vacuum cleaner is pivoted in the manner described previously in relation to Figs. 1A, 1B, 1C and 1D. This dispenses with the need for filter cleaning wheel 74 and means that in this alternative embodiment, tangs 70 will engage with tangs 72 and agitate filter 50 whenever the nose of the vacuum cleaner is pivoted. In another alternative embodiment also not shown in Figs. 4 and 5, filter 50 may instead be free to rotate within collection chamber 20 whenever the nose of the vacuum cleaner is pivoted and door 60 may instead be held immovable relative to the main body of the vacuum cleaner. This other alternative embodiment, which also dispenses with the need for filter cleaning wheel 74, also means that tangs 70 will engage with tangs 72 and agitate filter 50 whenever the nose of the vacuum cleaner is pivoted. In both of these alternative embodiments, therefore, filter 50 is cleaned automatically during normal use of the vacuum cleaner by pivoting of the nose thereof, without a user having to pay particular attention to performing a filter cleaning operation.

[0033] In a still further alternative embodiment also not shown in the figures, the door may instead be provided on the cylindrical side wall 28 of collection chamber 20, and may, for example, be a sliding, rather than a hinged door, thereby allowing a user to gain access to collection chamber 20 to empty dust and dirt therefrom. In this further alternative embodiment, only one of end face 26 and filter 50 is caused to rotate when a nose of the vacuum cleaner is pivoted, but the other of the end face 26 and filter 50 is held immovable, so that filter 50 and end face 26 are rotated relative to each other when the nose is pivoted. This alternative embodiment therefore also dispenses with the need for filter cleaning wheel 74, and means that the tangs 70 will engage with tangs 72 and agitate filter 50 whenever the nose of the vacuum cleaner is pivoted.

[0034] Referring now to Fig. 6, there is shown yet another alternative embodiment in which filter cleaning is effected by means of a filter cleaning wheel 74 which a user can rotate about central axis Y-Y' of collection chamber 20. In this embodiment, filter 50 comprises a course filter element 51 and a fine filter element 53. Course filter element 51 is typically made of a stiff plastics material and is provided with a plurality of fine pores in the manner already represented in Fig. 4 by reference numeral 56. Fine filter element 53 on the other hand is made of a soft fabric material and is folded into pleats 55 in the manner shown in Fig. 6 in order to increase its surface area to volume ratio. Thus dirty air entering collection chamber 20 passes firstly through pores 56 in course filter 51 before encountering pleats 55 of fine filter element 53 and exiting collection chamber 20 via a clean air outlet 21 formed in its end face 24.

[0035] As can also be seen from Fig. 6, course filter element 51 comprises a circumferential flange 57 which is retained by a lip 25 formed on end face 24 of collection chamber 20. Course filter element 51 is therefore free to rotate about central axis Y-Y'. Fine filter element 53 on the other hand comprises an annular frame 58 which is attachable to end face 24, such that fine filter element 53 is held immovable in collection chamber 20. Course filter element 51 further comprises a number of wings 59 formed on the inner surface thereof which overlap with the pleats 55 of fine filter element 53. Thus if a user rotates filter cleaning wheel 74 about axis Y-Y', tangs 70 provided on the interior face 68 of door 60 which are coupled to filter cleaning wheel 74 are caused to rotate in the same direction, and push against tangs 72 provided on the end face 52 of course filter element 51. This in turn causes course filter element 51 to rotate about central axis Y-Y' by flange 57 sliding under lip 25, and the wings 59 of the course filter element to ride over successive pleats 55 of fine filter element 53. This agitates fine filter element 53, thereby dislodging fine dust adhering to fine filter element 53, which falls through the pores 56 formed in course filter element 53 and is deposited in collection chamber 20. This has the effect of cleaning fine filter element 53 of fine dust. Course filter element 51 may also be cleaned of larger dirt particles because the stiff plastics material

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of which it is made is also resilient. This allows a user to flex course filter element 51 until flange 57 disengages from under lip 25, and to remove the course filter element from collection chamber 20 through door 60. Course filter element 51 may then be cleaned (for example, by washing) and replaced. When course filter element 51 is removed from collection chamber 20, this also gives a user direct access to fine filter element 53, which may be detached from end face 24 and also removed through door 60. Finally, Fig. 6 also shows how door 60 is maintained in an airtight seal when in the closed condition by the provision of an annular sealing element 65 permanently attached to the interior face 68 of door 60. Sealing element 65 is made of a resilient elastomeric material, such as rubber, which deforms elastically when compressed between door 60 and collection chamber 20.

[0036] Fig. 7 shows the main body 10 and collection chamber 20 of a hand-holdable vacuum cleaner according to another embodiment of the invention, in which main body 10 houses both a motor 12 and a fan 14 mounted on an output shaft 16 of the motor 10. In this embodiment, motor 12 and fan 14 are oriented in the main body 10 with the output shaft 16 and the axis of rotation of the fan 14 aligned on an axis Z-Z', which is parallel to the central axis Y-Y' of collection chamber 20 and at right angles to a main axis X-X' of the vacuum cleaner. Clean air outlet 21 of collection chamber 20 is also linked to main body 10 via a duct 80, which transports clean air during operation of the vacuum cleaner in the direction indicated by the arrows in Fig. 7 and onto the face of fan 14. Fan 14 is configured as an impeller, such that when the fan rotates, air is drawn in axially thereto and expelled radially therefrom. Main body 10 further comprises an exhaust vent 18 formed on a rear end 19 thereof. Thus when the pivotable nose of the vacuum cleaner (which is not shown in Fig. 7) is in a fully extended position, at 180 degrees to the main axis X-X' of the vacuum cleaner and at a location to the right of Fig. 7, exhaust vent 18 is located opposite to the dirty air inlet to the nose. Air expelled by the fan 14 during operation of the vacuum cleaner therefore travels in a straight-line path out of exhaust vent 18 in completely the opposite direction to the dirty air inlet to the nose and away from a surface to be cleaned. The space in main body 10 between motor 12 and fan 14 on the one hand and collection chamber 20 on the other is occupied in this embodiment by a bank of rechargeable electric cells (not shown in Fig. 7) to power the motor 12 of the vacuum cleaner, which is a rechargeable model in this embodiment. In an alternative embodiment to that shown in Fig. 7, motor 12 may instead be mains powered, in which case the main body 10 houses an electrical transformer instead of a bank of rechargeable electric cells. In either case, however, main body 10 is adapted to fit the contents thereof as compactly as possibly, thereby minimizing the length of duct 80 and the overall length of main body 10. In particular, motor 12 and fan 14 may be located next to collection chamber 20 and a bank of rechargeable electric cells or an electrical transformer, as appropriate, being located either above or below the motor 12 and fan 14, in order to make the length of duct 80 as short as possible, whilst also allowing exhaust vent 18 to be provided on a rear end 19 of main body 10.

[0037] Finally, Fig. 8 shows an embodiment of the invention in which the vacuum cleaner is rechargeable and has been stood on the rear end 19 of the main body 10 thereof. Fig. 8 also shows this vacuum cleaner in a condition in which its nose 30 has been pivoted to its folded-back position at 0 degrees to the main axis of the vacuum cleaner, in order to give the vacuum cleaner a very compact overall profile. Moreover, rear end 19 of main body 10 comprises means, such as a jack plug (not visible in Fig. 8), for connecting the vacuum cleaner to a recharging unit 90, which allows the vacuum cleaner to be stood on recharging unit 90 on its rear end 19 for recharging.

Claims

1. A hand-holdable vacuum cleaner comprising:

   an electric motor (12);
   an electrical on-off switch (42) for operating said motor;
   a fan (14) connected to an output shaft (16) of said motor;
   an airflow pathway comprising an inlet for dirty air (32), an outlet for clean air, and a collection chamber (20) located in fluid communication between said inlet and said outlet;
   means for separating out debris entrained with dirty air entering via said inlet and depositing the debris in said collection chamber; and
   means for adjusting an angle of said inlet relative to a main axis (X-X') of said vacuum cleaner;

   characterized by:

   a rigid, elongate nose (30) having said inlet at one end thereof, said nose being pivotable relative to said main axis (X-X') through an angle of at least 135 degrees.

2. A vacuum cleaner according to claim 1, wherein the nose (30) is pivotable relative to the main axis (X-X') of the vacuum cleaner through an angle of more than 180 degrees.

3. A vacuum cleaner according to claim 1 or claim 2, wherein:

   the nose (30) or a part (22) of the vacuum cleaner rigidly connected thereto comprises first engagement means;
   a part (24,26) of the vacuum cleaner rigidly connected to a main body (10) thereof housing the motor and the fan comprises second engage-

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ment means adapted to engage with said first engagement means; and
the vacuum cleaner further comprises a resiliently biassed button (34) operable to disengage the first engagement means from the second engagement means.

4. A vacuum cleaner according to any one of the preceding claims, wherein the nose (30) further comprises a rigid telescopic extension tube (36).

5. A vacuum cleaner according to any one of the preceding claims, wherein:

the separating means comprises a filter (50) located within the collection chamber (20);
the collection chamber (20) has a substantially cylindrical shape about a central axis (Y-Y') oriented at right angles to the main axis (X-X') of the vacuum cleaner;
the filter (50) is arranged in an axially symmetric fashion concentric with the central axis (Y-Y') of the collection chamber (20);
the pivotable nose (30) is arranged to pivot about the central axis (Y-Y') of the collection chamber;
a dirty air outlet (36) from the nose (30) is arranged to enter the collection chamber (20) on a cylindrical side wall (28) thereof; and
a clean air outlet (21) from the collection chamber (20) is located within said filter (50).

6. A vacuum cleaner according to claim 5, wherein the filter (50) has a conical or frusto-conical shape.

7. A vacuum cleaner according to claim 5 or claim 6, wherein the collection chamber (20) comprises a hinged door (60) on an end face (26) thereof opposite to said clean air outlet (21).

8. A vacuum cleaner according to claim 7, wherein the door (60) is held by a main body (10) of the vacuum cleaner which houses the motor (12) and the fan (14).

9. A vacuum cleaner according to claim 8, wherein:

the filter (50) located within the collection chamber (20) is rotatable relative to the door (60) when the nose (30) is pivoted;
an interior face (68) of the door (60) is provided with a series of radial tangs (70);
an end face (52) of the filter (50) adjacent to the interior face (68) of the door (60) has a corresponding set of radial tangs (72); and
the combined height of the tangs (70, 72) on the interior face of the door and on the end face of the filter is greater than the separation between the interior face (8) of the door and the end face (52) of the filter.

10. A vacuum cleaner according to claim 7, wherein:

the filter (50) is held immovable relative to the main body (10) of the vacuum cleaner during operation thereof;
the door (60) is rotatable relative to the filter (50) when the nose (30) is pivoted;
an interior face (68) of the door is provided with a series of radial tangs (70);
an end face (52) of the filter adjacent to the interior face of the door has a corresponding set of radial tangs (72); and
the combined height of the tangs (70, 72) on the interior face of the door and on the end face of the filter is greater than the separation between the interior face (68) of the door and the end face (52) of the filter.

11. A vacuum cleaner according to claim 5 or claim 6, wherein:

the collection chamber (20) comprises a door on the cylindrical side wall (28) thereof;
the filter (50) and an end face (26) of the collection chamber opposite to the clean air outlet (21) are rotatable relative to each other when the nose (30) is pivoted;
an interior surface of the end face (26) of the collection chamber is provided with a series of radial tangs (70);
an end face (52) of the filter adjacent to the interior surface of the end face (26) of the collection chamber has a corresponding set of radial tangs (72); and
the combined height of the tangs (70, 72) on the interior surface of the end face of the collection chamber and on the end face of the filter is greater than the separation between the interior surface of the end face (26) of the collection chamber and the end face (52) of the filter.

12. A vacuum cleaner according to any one of claims 5 to 11, wherein the filter (50) is removable and replaceable.

13. A vacuum cleaner according to any one of claims 5 to 12, wherein the filter (50) comprise a plurality of filter elements (51, 53).

14. A vacuum cleaner according to any one of claims 5 to 13, wherein the motor (12) and the fan (14) are oriented in the main body (10) of the vacuum cleaner with the output shaft (16) of the motor and the fan's axis of rotation (Z-Z') parallel to the central axis (Y-Y') of the collection chamber (20) and at right angles to the main axis (X-X') of the vacuum cleaner.

15. A vacuum cleaner according to claim 14, wherein

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the fan (14) is configured as an impeller and the main body (10) of the vacuum cleaner comprises one or more exhaust vents (18) on the rear (19) thereof, in a location opposite to the dirty air inlet (32) of the pivotable nose (30) when the nose is in a fully extended position at 180 degrees to the main axis (X-X') of the vacuum cleaner.

16. A vacuum cleaner according to any one of the preceding claims, wherein the vacuum cleaner is adapted to stand on a rear end (19) of the main body (10) of the vacuum cleaner.

17. A vacuum cleaner according to claim 16, wherein the vacuum cleaner is a rechargeable model, and the rear end (19) of the main body (10) of the vacuum cleaner comprises means for connecting the vacuum cleaner to a recharging unit (90).

18. A vacuum cleaner according to any one of the preceding claims, wherein the nose comprises a one-way valve in the form of a hinged flap composed of a resilient material.

19. A hand-holdable vacuum cleaner substantially as hereinbefore described with reference to the accompanying drawings.

20. A recharging unit (90) adapted to recharge a vacuum cleaner according to claim 17.

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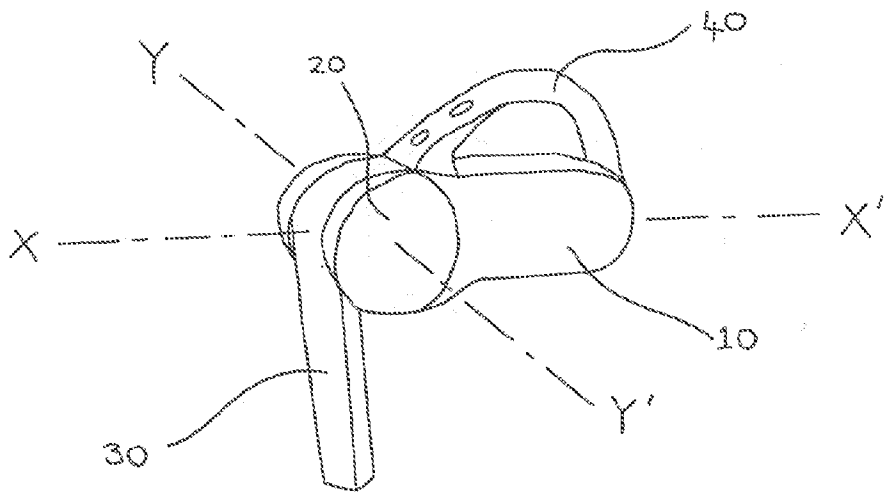


FIG. 1A

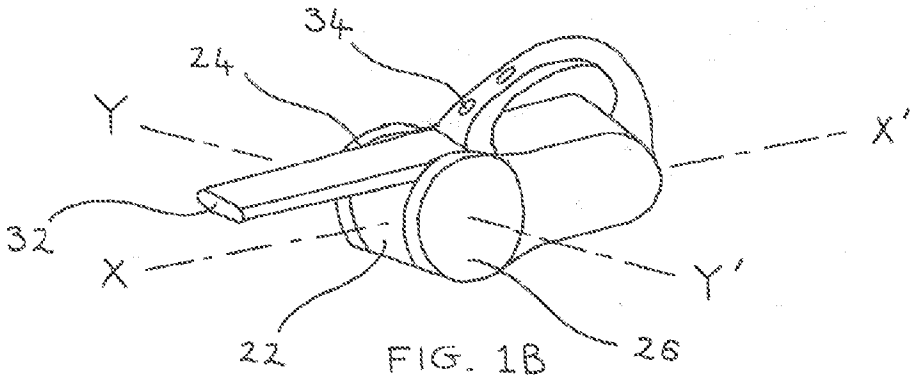


FIG. 1B

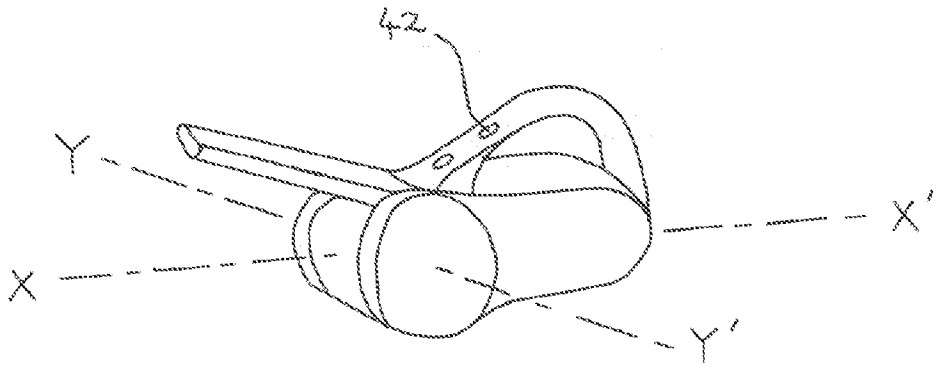


FIG. 1C

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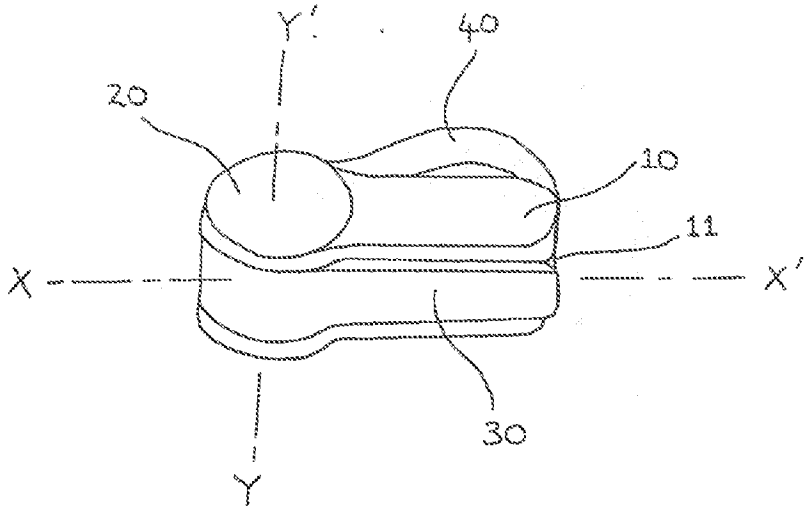


FIG. 1D

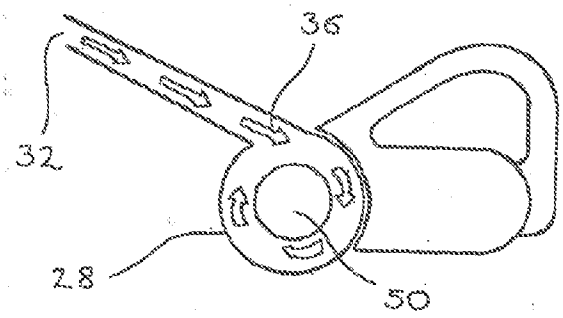


FIG. 2A

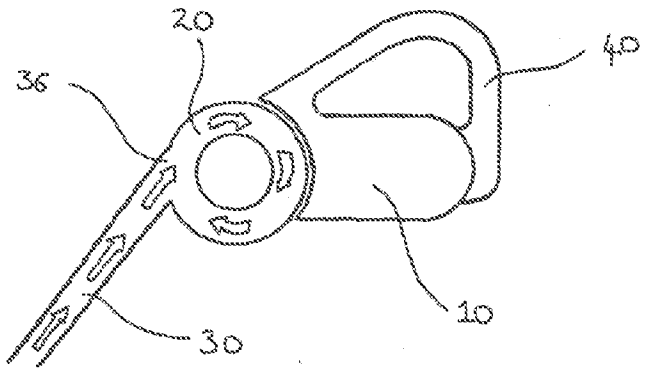


FIG. 2B

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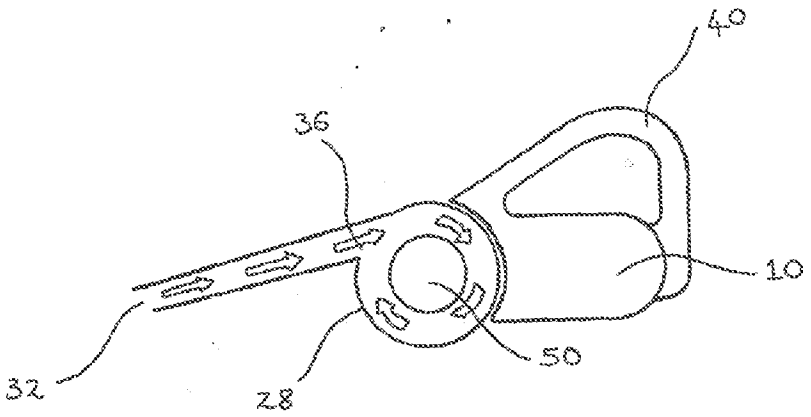


FIG. 2C

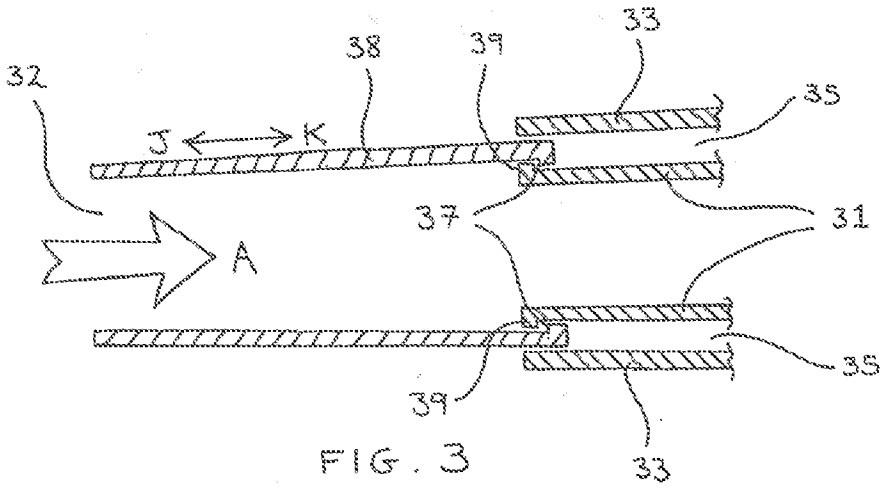


FIG. 3

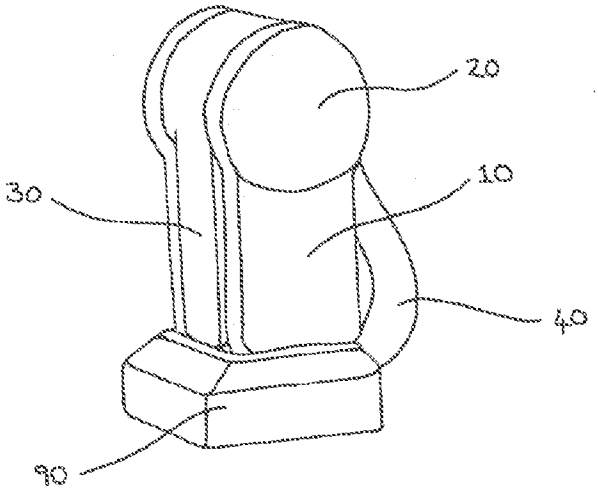


FIG. 8

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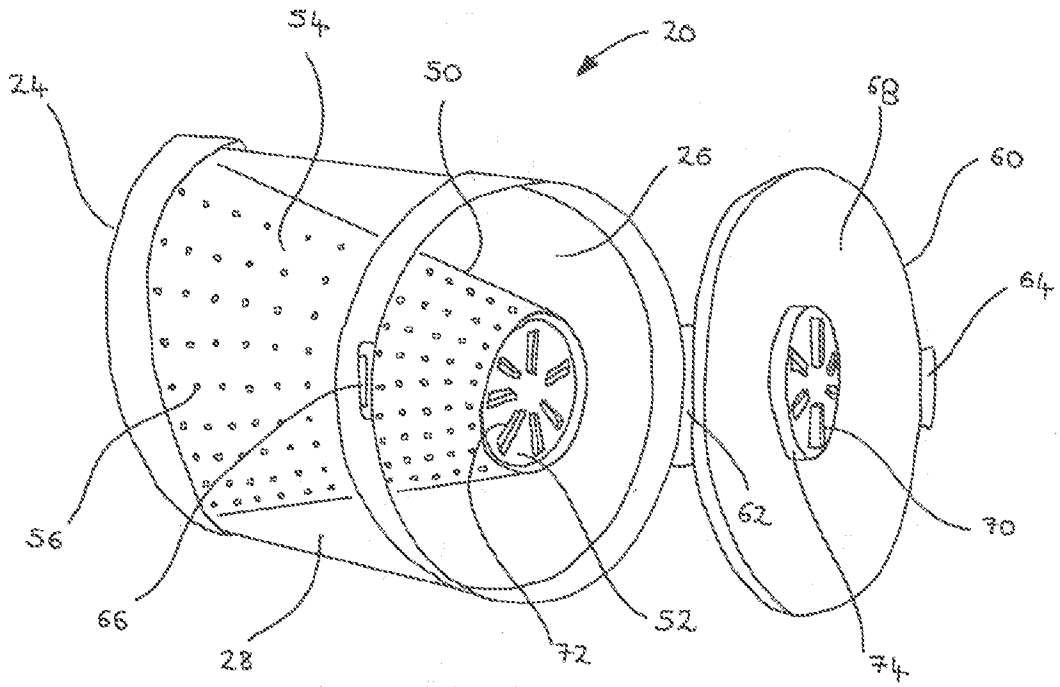


FIG. 4

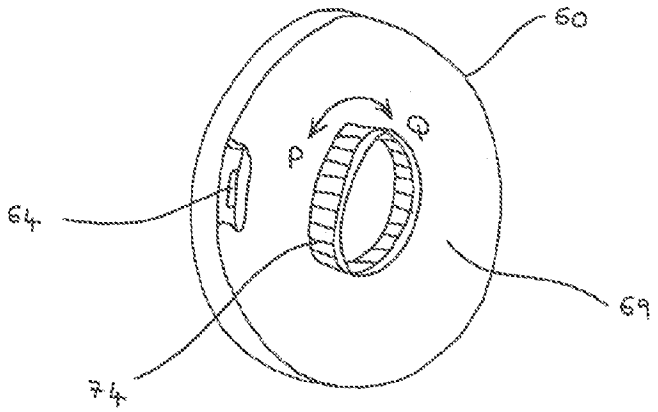


FIG. 5

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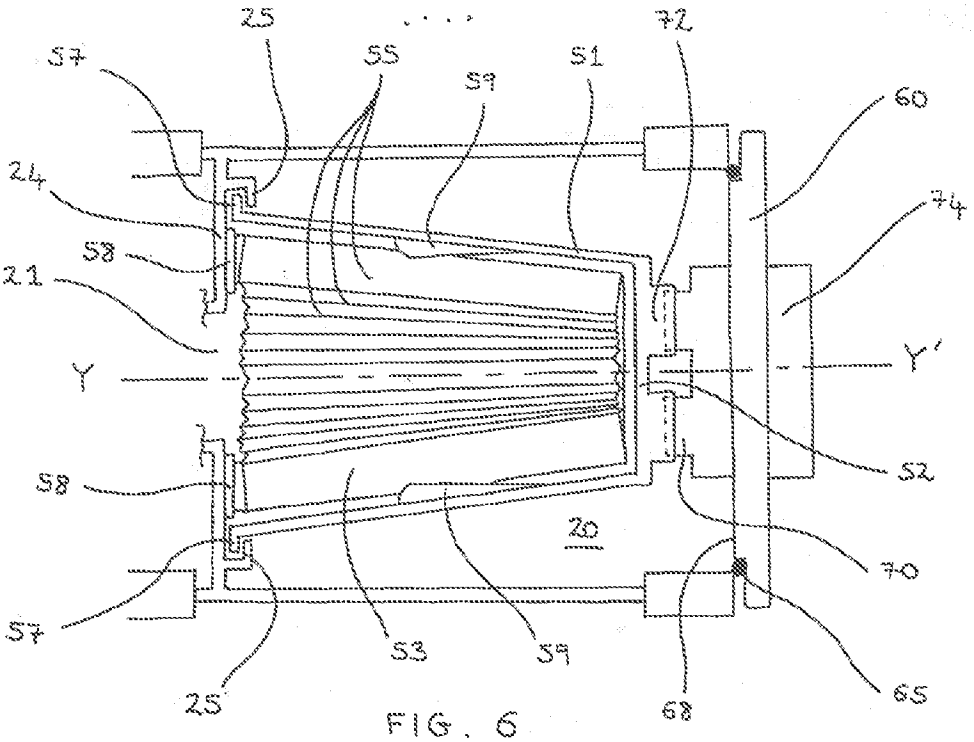


FIG. 6

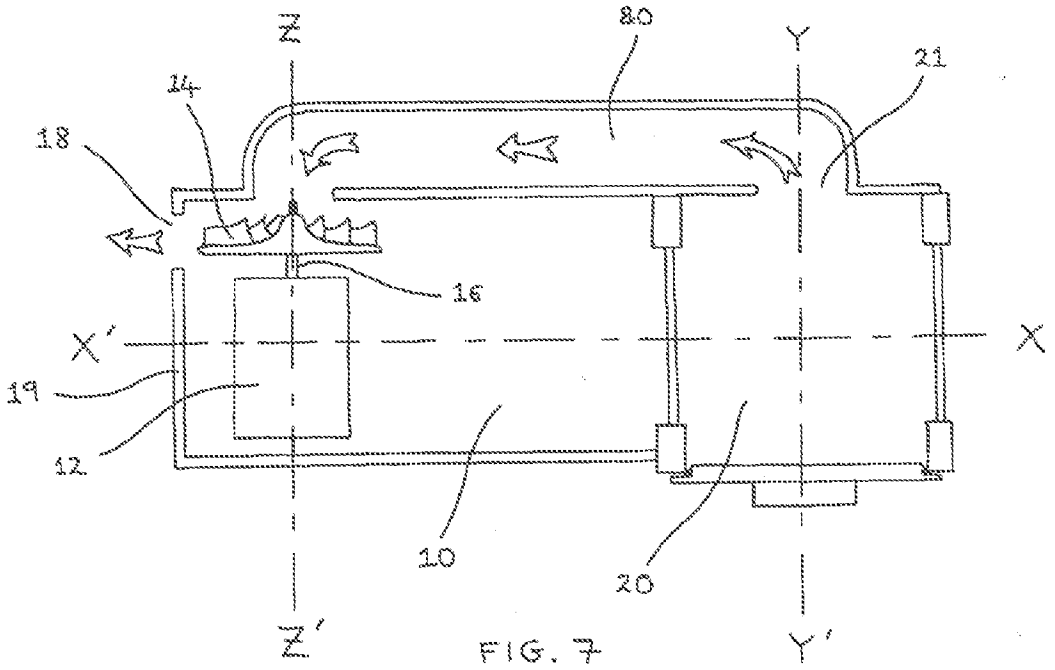


FIG. 7

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 05 25 5024

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TECHNICAL FIELDS SEARCHED (IPC)
A47L
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	11 January 2006	Lopez Vega, J

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X : particularly relevant if taken alone
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A : technological background
O : non-written disclosure
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A47L	9/28	(2006.01)	A47L	9/28	U	

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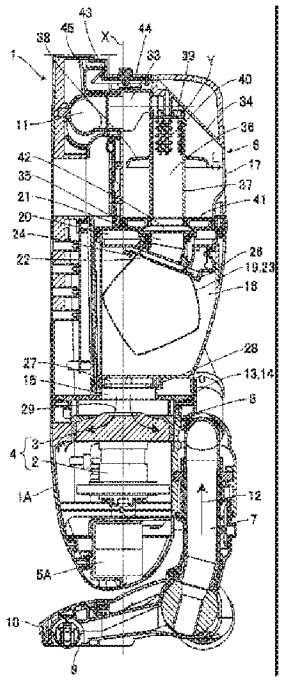
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最終頁に続く

(54)【発明の名称】スティック型掃除機

(57)【要約】
【課題】　遠心分離式のスティック型掃除機において、フィルターの目詰まりの心配をなくすと共に、掃除機全体の重心を可及的に低くする。
【解決手段】　掃除機本体１の下内部に電動送風機４を設け、この電動送風機４の上方且つ上流側に吸塵口18が上方となるようにして集塵袋19を着脱自在に取り付ける集塵室16を設け、この集塵室16の上方且つ上流側に遠心分離装置としてのサイクロン分離装置６を前記掃除機本体１に対し着脱自在に取り付け、更に、前記サイクロン分離装置６と連通するノズル10を前記掃除機本体１に対して取り付けたことにより、前記サイクロン分離装置６を通過した塵埃を前記集塵袋19により捕捉して塵埃による気流の流通阻害を抑制する。また、重量の大きい前記電動送風機４が低位置となることで、掃除機全体の重心が下がり安定性が向上される。更に、前記集塵袋19からの塵埃の流出が防止される。
【選択図】図１



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【特許請求の範囲】
【請求項1】
内部に電動送風機を有する掃除機本体と、この掃除機本体に対して取り付けられるノズルとを有するスティック型掃除機において、
前記ノズルと連通する遠心分離装置を前記掃除機本体の上部に対して着脱自在に取り付け、この遠心分離装置の下方において集塵袋を吸塵口が上方となるようにして着脱自在に取り付ける集塵室を設けると共に、この集塵室の下方で且つ前記掃除機本体の下部に前記電動送風機を設けたことを特徴とするスティック型掃除機。
【請求項2】
前記遠心分離装置が、集塵容器と、前記ノズルに連通して前記集塵容器の上部に設けられる導入口と、前記集塵容器の軸方向と略平行に設けられて上部に内外を連通する連通路を設けると共に下部が前記吸塵口に連通する排気用の筒体とを備えたことを特徴とする請求項１記載のスティック型掃除機。
【請求項3】
前記集塵室の上部開口部に天蓋を設けると共に、この天蓋の下面に前記集塵袋の吸塵口が形成されたフランジ部を取り付けることを特徴とする請求項１記載のスティック型掃除機。
【請求項4】
前記集塵室に前記電動送風機の一次側通気路を連通し、前記電動送風機の二次側通気路を外部に開放すると共に、前記通気路の途中を前記電動送風機の電池に接して設けることを特徴とする請求項１記載のスティック型掃除機。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は、掃除機本体にノズルが一体的或いは着脱自在に設けられる遠心分離式のスティック型掃除機に関するものである。
【背景技術】
【0002】
従来、この種の掃除機として、ノズルと連通するサイクロン分離装置を掃除機本体の下部に取り付け、この掃除機本体内の上部に電動送風機を設けることで、ノズルから吸い込まれた塵埃を含む空気を前記サイクロン分離装置内で渦流とし、このサイクロン分離装置内で比較的重い（粗い）塵埃を遠心分離して貯留する一方、比較的粗い塵埃が分離された後の比較的軽い（細かい）塵埃を含む気流が上昇してフィルターを通過することで、気流から塵埃を除去し、この塵埃が除去された気流が前記電動送風機を通過して大気中に放出されるものが知られている（例えば特許文献１）。
【0003】
また、塵埃を吸引する吸引手段と、前記吸引手段の前方に配され集塵袋を内包した集塵室を備え、前記集塵室に連通すると共に塵埃を捕集する集塵トラップを前記集塵室の上流に配し、比較的大きい塵埃を前記集塵トラップで捕捉する電気掃除機も公知である（例えば特許文献２）。
【特許文献1】特開２００２－２５３４５５号公報
【特許文献2】特開２００１－２５８８０４号公報
【発明の開示】
【発明が解決しようとする課題】
【0004】
前者の従来技術においては、比較的粗い塵埃が分離された空気は前記フィルターを通過して大気中へ放出されるものであるが、前記フィルターを通過する空気中において、僅かながら比較的細かい塵埃が残っている場合があるので、このような比較的細かい塵埃によ

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ってフィルターが詰まることを防止するため、掃除機を比較長時間使用した後には前記フィルターを清掃する必要がある。

【0005】

このようなフィルターの詰まりの問題は、後者の従来技術のように、遠心分離装置と電動送風機との間に交換可能な集塵袋を内包した集塵室を備えることで解決することができる。しかしながら、掃除機本体の下部に遠心分離装置を取り付け、前記掃除機本体の上部に電動送風機を設けるようなスティック型掃除機に、さらに集塵袋を備える集塵室を設けるような場合には、掃除機本体の全高が高くなって、この結果掃除機本体の重心が高くなるばかりでなく、掃除機本体内における気流経路等が複雑になってしまう虞があり、本来移動操作性に優れるスティック型掃除機の利点を阻害する要因となる。

【0006】

本発明が解決しようとする問題点は、遠心分離式のスティック型掃除機において、遠心分離装置を通過した比較的細かい塵埃による気流の流通阻害を抑制し、内部に電動送風機を有する掃除機本体の重心を可及的に低くすると共に、前記掃除機本体内の気流経路等を単純化する点である。

【課題を解決するための手段】

【0007】

請求項１の発明は、内部に電動送風機を有する掃除機本体と、この掃除機本体に対して取り付けられるノズルとを有するスティック型掃除機において、前記ノズルと連通する遠心分離装置を前記掃除機本体の上部に対して着脱自在に取り付け、この遠心分離装置の下方において集塵袋を吸塵口が上方となるようにして着脱自在に取り付ける集塵室を設けると共に、この集塵室の下方で且つ前記掃除機本体の下部に前記電動送風機を設けたことを特徴とするスティック型掃除機である。

【0008】

請求項２の発明は、前記遠心分離装置が、集塵容器と、前記ノズルに連通して前記集塵容器の上部に設けられる導入口と、前記集塵容器の軸方向と略平行に設けられて上部に内外を連通する連通路を設けると共に下部が前記吸塵口に連通する排気用の筒体とを備えたことを特徴とする請求項１記載のスティック型掃除機である。

【0009】

請求項３の発明は、前記集塵室の上部開口部に天蓋を設けると共に、この天蓋の下面に前記集塵袋の吸塵口が形成されたフランジ部を取り付けることを特徴とする請求項１記載のスティック型掃除機である。

【0010】

請求項４の発明は、前記集塵室に前記電動送風機の一次側通気路を連通し、前記電動送風機の二次側通気路を外部に開放すると共に、前記通気路の途中を前記電動送風機の電池に接して設けることを特徴とする請求項１記載のスティック型掃除機である。

【発明の効果】

【0011】

請求項１の発明によれば、前記遠心分離装置では捕捉されずに空気と共に前記遠心分離装置から排出された比較的細かい塵埃を、前記遠心分離装置の下流で且つ下方に設けられた前記集塵室内の交換可能な集塵袋により捕捉して溜めるので、従来のように細かい塵埃を捕捉したフィルターの掃除を行う必要がなく、塵埃による気流の流通阻害を抑制することができる。また、重量物である前記電動送風機が前記掃除機本体内の下方に配置されるので、掃除機全体の重心を下げて安定性を向上することができ、この結果、スティック型掃除機における移動操作性を確保することができる。更に、前記集塵袋の吸塵口が上方を向いていることで、前記集塵袋からの塵埃の流出を防止するための逆止弁等の要素が不要となる。

【0012】

また、請求項２の発明によれば、前記遠心分離装置を通過した気流が、前記筒体の下部からこの筒体下部と連通する前記集塵袋の吸塵口に流入するので、前記遠心分離装置から

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前記集塵袋への気流経路を単純化して、掃除機全体の大型化を防ぐことができる。

【0013】

また、請求項３の発明によれば、前記集塵室に対して着脱自在な前記天蓋に前記集塵袋の吸塵口が形成されたフランジ部を取り付けることで、前記集塵室に対して前記集塵袋を簡単に着脱することができるばかりでなく、前記集塵袋の吸塵口が前記天蓋を介して前記筒体の下部と連通するので、前記筒体の下部と前記集塵袋の吸塵口の位置合わせを正確に行うことができる。

【0014】

更に、請求項４の発明によれば、蓄電池を用いる充電式掃除機であっても、前記電動送風機が発生させた気流によって前記蓄電池が冷却されるので、前記蓄電池の寿命及び１回当たりの掃除時間を長くすることができる。

【発明を実施するための最良の形態】

【0015】

本発明における好適な実施の形態について、添付図を参照して説明する。なお、以下に説明する実施の形態は、特許請求の範囲に記載された本発明の内容を限定するものではない。また、以下に説明される構成の全てが、本発明の必須要件であるとは限らない。

【実施例】

【0016】

本実施例について、図１乃至図４に基づいて説明する。なお、本実施例においては、図１の姿勢を基準として、長手方向を上下と規定する。また、図１において、左側が前、右側が後と規定する。図１乃至図４において、１は掃除機本体である。この掃除機本体１内の下方には、電動機２と、この電動機２の回転軸に取り付けられたファン３が設けられており、これら電動機２及びファン３とで電動送風機４が構成されている。また、前記掃除機本体１内における電動送風機４の下方及び側方には、上部蓄電池５及び下部蓄電池５Ａが設けられている。なお、前記上部蓄電池５は、前記電動送風機の両側部に設けられていると共に、前後にそれぞれ二段設けられている。即ち、本例では、前記上部蓄電池５及び下部蓄電池５Ａは、合計で１６本設けられている。一方、前記掃除機本体１の上方には、遠心分離装置としてのサイクロン分離装置６が設けられている。

【0017】

さらに、前記掃除機本体１の背面側下部には、吸引管７を設けた突出部８が一体的に設けられている。そして、前記吸引管７の下端は、吸込口９を設けた吸込部たるノズル10に連通しており、このノズル10は前記掃除機本体１の下端に対して着脱自在に取り付けられている。また、前記吸引管７の上端は前記突出部の上部近傍で開口しており、この開口した吸引管７の上端に対して、可撓管７Ａの下端が接続されている。なお、この可撓管７Ａの下端は、前記吸引管７の上端に対して着脱自在に接続されている。更に、前記可撓管７Ａの上端は、前記掃除機本体１の側面側の上部に形成された吸引管連通路11に接続されており、これら吸込口９から吸引管７及び可撓管７Ａを経て吸引管連通路11に至る通風路12が形成されている。

【0018】

そして、前記掃除機本体１の突出部８における横向きの上面13には取付部14が形成されており、この取付部14における左右方向のほぼ中央に、吸引口15が上向きに設けられている。また、前記取付部14の上方には集塵室16が固定されていると共に、この集塵室16の上方には、前記サイクロン分離装置６を形成する集塵容器17が着脱自在に取り付けられている。

【0019】

前記集塵室16には、吸塵口18が上方となるようにして、掃除機における所謂紙パック等と称される使い捨ての集塵袋19が着脱自在に収容されている。なお、前記集塵室16自体は上下が開口しており、その上部開口に対して天蓋20が気密可能となって着脱自在に設けられている。この天蓋20は、上部固定板20Ａと、下部固定板20Ｂと、これらの間に介在する中間シール部材20Ｃからなる。そして、前記天蓋20のほぼ中央には、上下方向を貫通する

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貫通孔21が形成されている。更に、前記天蓋20の下面には、前記吸塵口18が前記貫通孔21の下端と連通するように、前記集塵袋19が着脱自在に取り付けられている。そして、この集塵袋19を前記天蓋20の下面に対して気密に取り付けるために、前記貫通孔21の周囲には、この貫通孔21を囲むように気密用の下部シール部材22がリング状に設けられている。そして、前記集塵袋19の吸塵口18は、前記天蓋20に取り付けられた状態において、下部シール部材22の内側に配置されるようになっている。なお、本実施例の場合、前記集塵袋19は薄紙製の袋本体23の開口端部に厚紙製のフランジ部24を設けると共に、この略中心に前記吸塵口18が形成されているものである。そして、前記天蓋20の下面の正面側に形成された爪状の係止受け部25に、前記フランジ部24の前端縁を着脱可能に係止させると共に、前記フランジ部24の後端縁を前記天蓋20の背面側の下面に揺動自在に設けたノブ状ストッパー26に係止することで、前記フランジ部24を前記天蓋20の下面に対して気密に取り付けることができるように構成されている。

【0020】

前記集塵室16の底面に形成されて上下方向に貫通する下部開口27の下面には、この下部開口27を囲むようにリング状のシール部材28が取り付けられている。そして、前記シール部材28によってシールされて、前記下部開口27が前記吸引口15、ひいては前記電動送風機４の一次側通気路29と連通している。また、前記電動送風機４の二次側通気路30は前記突出部８の下部の左右両側に形成された排気口31と連通している。そして、前記掃除機本体１における前記電動送風機４の左右側方に、前記電動機２を作動させるためのＮｉ－Ｃｄ電池等の前記上部蓄電池５がフィルム32等でパックされた状態で収容されていると共に、前記電動送風機４の下方にも、前記下部蓄電池５Ａがフィルム32等でパックされた状態で収容されている。そして、このフィルム32等でパックされた蓄電池５，５Ａの外側と掃除機本体１の本体ケース１Ａの内側との隙間が前記二次側通気路30の一部を構成し、この二次側通気路30を通過する気流が前記フィルム32を介して前記蓄電池５，５Ａを冷却するように構成されている。

【0021】

一方、前記サイクロン分離装置６を構成する前記集塵容器17の上部の側面には、前記吸引管連通路11と連通する導入口33が形成されている。そして、この導入口33の中心軸線Ｙは、前記集塵容器17の軸心Ｘに対して直交するように、ほぼ横向きに配置されている。また、前記集塵容器17の後上部には、前記導入口33と対向して傾斜部34が形成されている。この傾斜部34の上端は、前記軸心Ｘよりもやや前方となっており、また、前記傾斜部34の下端は、前記集塵容器17の後部において、この集塵容器17の高さのほぼ半分程度となっている。また、前記集塵容器17の底面開口部には、この底面開口部を開閉自在に塞ぐ底蓋35が設けられている。また、前記集塵容器17の略中央には、この集塵容器17の軸心Ｘ方向に通気経路36が形成された略円柱状の筒体37が着脱自在に取り付けられている。なお、筒体37の外周には、外縁が下向きとなった円板部38が一体に設けられている。また、前記円板部38は、前記筒体37における前記傾斜部34の下端よりもやや下方に位置しており、その外縁が前記集塵容器17の内周面との間に隙間Ｌを隔てて設けられている。なお、前記円板部38は、本実施例では外縁が下向きとなったものを示したが、全体として外側ほど低くなるような形状に構成してもよい。そして、前記筒体37の上端は、前記集塵容器17の上部内側に固定された取付部39に対して着脱自在に取り付けられる。更に、前記筒体37の上端と前記円板部38との間には、前記筒体37の内外を連通する複数の連通孔40が形成されている。また、前記筒体37の下端は、前記底蓋35の略中央に形成された開口部41の周囲に当接することで、この開口部41と連通している。更に、前記開口部41は、前記天蓋20の貫通孔21の上部周囲に設けられた気密用の上部シール部材42を介して連通できるようになっている。このような構成とすることにより、塵埃（図示せず）を含んだ空気が前記導入口33より前記集塵容器17に流入すると、この集塵容器17の内部で、空気は前記集塵容器17の内周面に沿って旋回し、前記傾斜部34に沿って流れることで下降し、更に前記集塵容器17の底部に至ると前記筒体37の外面に沿うように上昇し、更に前記円板部38の外縁を越えて上昇し、前記連通孔40及び前記通気経路36を経て、前記開口部41から排出される。なお、前記集塵

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容器17の上面にはストッパー43が設けられている。そして、このストッパー43は、前記集塵容器17とカバー44との間に配されている。更に、前記ストッパー43は、前記掃除機本体１の背面に形成されたストッパー受け部45に対して係合可能に構成されている。

【0022】

なお、46は前記掃除機本体１の上方に延長して設けられた、折り畳み可能な把持部である。

【0023】

次に、本実施形態の作用について説明する。まず、前記集塵室16を区画する前記天蓋20の下面に、前記集塵袋19を取り付ける。この取り付けは、前記フランジ部24の前端縁を前記係止受け部25に挿入して係止すると共に、揺動させた前記ストッパー26を前記フランジ部24の後端縁に係止して、前記吸塵口18の周囲に前記下部シール部材22が密着するように前記集塵袋19を前記天蓋20の下面に対して気密に取り付けることで行われる。そして、前記集塵袋19が取り付けられた前記天蓋20を、前記集塵室16の上部開口に嵌合して取り付ける。そして、このように前記集塵室16に対して着脱自在な前記天蓋30に前記集塵袋19の吸塵口18が形成されたフランジ部24を取り付けることで、前記集塵室16に対して前記集塵袋19を簡単に取り付けることができるばかりでなく、前記集塵袋19の吸塵口18が前記天蓋20を介して前記筒体37の下部と連通するので、前記筒体37の下部と前記集塵袋19の吸塵口18の位置合わせを正確に行うことができる。

【0024】

更に、前記集塵容器17の取付部39に対して前記筒体37を取り付け、前記底蓋35を閉じることで、前記筒体37の下端が前記底蓋35の開口部41の周囲に接する。この際、前記筒体37の上端が前記取付部39に取り付けられることで、前記筒体37が前記集塵容器17の軸心Ｘ上に配置される。そして、このようにして組み立てられた前記サイクロン分離装置６を、前記掃除機本体１に取り付ける。この取り付けは、前記サイクロン分離装置６を集塵室16に載置するようにして前記掃除機本体１と一体化するもので、前記底蓋35を前記天蓋20に載置した後、前記掃除機本体１の背面に前記集塵容器17の正面側を当接させ、この集塵容器17の上部に設けられたストッパー43を前記掃除機本体１のストッパー受け部45に係止することにより行われる。この取り付けに伴い、前記導入口33が前記吸引管連通路11と連通すると共に、前記底蓋35の開口部41と前記天蓋20の貫通孔21とが連通する。そして、このように前記サイクロン分離装置６から気流を排出させる前記通気経路36を構成する前記筒体37が、前記サイクロン分離装置６の下部に設けられた前記底蓋35の開口部41、上部シール部材42、及び前記集塵室16の上部に設けられた前記天蓋20の貫通孔21を介して前記集塵袋19の吸塵口18に接続されるので、前記サイクロン分離装置６から前記集塵袋19へ流れる気流の経路が単純化され、これによって、掃除機全体の大型化が防がれる。

【0025】

更にまた、前記吸引管７の下端部に、前記ノズル10を取り付ける。そして、このように前記掃除機本体１にサイクロン分離装置６と集塵袋19とノズル10を装着した状態で、図示しない充電台等に掃除機を載置することで、予め上部蓄電池５及び下部蓄電池５Ａを充電する。

【0026】

次に、掃除を行う場合、使用者は図示しない充電台等から掃除機を取り外し、把持部46を把持し、図示しないスイッチを操作する。これによって、前記上部蓄電池５及び下部蓄電池５Ａから前記電動送風機４の電動機２に電力が供給されることで、前記電動送風機４が作動する。そして、前記電動送風機４が作動すると、塵埃を含んだ空気が前記ノズル10の吸込口９から吸い込まれ、前記通風路12を経て、前記導入口33から前記サイクロン分離装置６の集塵容器17に流入する。そして、前記導入口33から前記集塵容器17内に入り込んだ空気は、前記集塵容器17の内周面に沿って旋回する渦流となると共に、前記傾斜部34に沿って流れることで、螺旋状に下降する。この際、この渦流に含まれる塵埃は、遠心力によって前記集塵容器17の内周面に押し付けられることになる。そして、前記渦流が前記集塵容器17の底部に至ると、前記集塵容器17の内周面側で下降していた渦流は、前記集塵容

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器17の内側に向かって流れると共に、前記筒体37の外面に沿うように上昇し、更に前記円板部38の外縁を越えて上昇し、前記連通孔40及び前記通気経路36を経て、前記開口部41から排出される。このとき、前述したように、渦流に含まれている塵埃のうち比較的粗い（重い）塵埃は、遠心力によって前記集塵容器17の内周面に押し付けられているので、渦流が前記集塵容器17の内周面側から内側に向かって流れたとしても、そのまま前記集塵容器17の内周面付近に留まることになる。これによって、比較的粗い（重い）塵埃は、渦流から分離される。一方、綿埃等の比較的軽い塵埃や細かい塵埃等は、比較的遠心分離されにくいので、前記集塵容器17の内周面側から内側に向かって流れる気流に混じって集塵容器17の中央付近まで移動し、気流の上昇に伴って集塵容器17内を上昇しようとするが、上昇する気流が前記円板部38の外縁を越える際に、上昇気流に含まれている比較的軽い塵埃や細かい塵埃の大部分が上昇気流と共に前記円板部38の外縁を超えることが阻止される。そして、軽い塵埃や細かい塵埃を僅かに含む、前記円板部38を超えた上昇気流は、前記連通孔40を通過して前記筒体37内に入り、前記通気経路36を経て、前記開口部41から前記集塵室16内の集塵袋19内に流れる。

【0027】

そして、前記集塵室16において、前記サイクロン分離装置６を通過した気流に僅かに含まれる軽い塵埃や細かい塵埃は、気流が前記集塵袋19を通過する際にこの集塵袋19によって捕捉され、この集塵袋19の内側に溜まることとなる。なお、前記集塵袋19は、気流に含まれる塵埃の大部分が前記集塵室16の前段のサイクロン分離装置６で既に取り除かれているので、僅かな量の塵埃を捕捉するに留まる。このため、前記集塵袋19には塵埃が殆ど溜まらず、前記集塵袋19が目詰まりを起こす可能性が低いばかりでなく、前記集塵袋19を交換する頻度も低い。また、前記集塵袋19は、前記吸塵口18が形成されたフランジ部24が上方となるように、このフランジ部24が前記天蓋20に取り付けられた状態で前記集塵室16内に収容されているので、内部に溜まった塵埃をこぼさないようにすることができる。

【0028】

そして、前記集塵袋19を通過した空気は、前記下部開口27から前記吸引口15を経て前記電動送風機４の一次側通気路29に吸引されると共に、前記電動送風機４から前記二次側通気路30へ排出される。更に、この電動送風機４の二次側通気路30へ排出された空気は、前記掃除機本体１に形成された前記排気口31から前記掃除機本体１の外部に排出される。この際、前記二次側通気路30を通る気流は、前記掃除機本体１の本体ケース１Ａの内側で、上部蓄電池５及び下部蓄電池５Ａの周囲を流れるので、この気流によって前記蓄電池５，５Ａを冷却することができる。

【0029】

清掃終了後、前記ストッパー43を操作して、このストッパー43と前記ストッパー受け部45との係止を解いて前記サイクロン分離装置６を前記掃除機本体１から取り外した後、前記底蓋35を開放することで、前記サイクロン分離装置６の集塵容器17内に溜められた塵埃をゴミ箱等に捨てる。更に、前記筒体37を前記取付部39から取り外すことで、前記集塵容器17の内壁や前記筒体37に付着した塵埃を取り除くことができる。一方、前述したように前記集塵袋29には殆ど塵埃が溜まらないが、交換が必要な程度に前記集塵袋29に塵埃が溜まった場合、前記集塵袋19を交換する。この交換は、前記サイクロン分離装置６が前記掃除機本体１から取り外された状態で、前記天蓋20を前記集塵室16の上部開口から取り外し、前記天蓋20に設けられたストッパー26を揺動させて前記集塵袋29のフランジ部24の後端縁との係止を解除して、前記フランジ部24の前端縁を前記係止受け部25から引き抜いて使用済みの集塵袋19を取り外した後、上述した手順で新たな前記集塵袋19を取り付けることで行われる。そして、このように前記集塵室16に対して着脱自在な前記天蓋30に前記集塵袋19の吸塵口18が形成されたフランジ部24を取り付けることで、前記集塵室16に対して前記集塵袋19を簡単に取り外すことができる。

【0030】

以上のように、本実施例は、掃除機本体１の下内部に電動送風機４を設け、この電動送風機４の上方で且つ上流側に吸塵口18が上方となるようにして集塵袋19を着脱自在に取り

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付ける集塵室16を設け、この集塵室16の上方で且つ上流側にサイクロン分離装置６を前記掃除機本体１の上部に対して着脱自在に取り付け、更に、前記サイクロン分離装置６と連通するノズル10を前記掃除機本体１に対して取り付けたことにより、前記サイクロン分離装置６では捕捉されずに空気と共に前記サイクロン分離装置６から排出された比較的細かい塵埃を、前記サイクロン分離装置６の下流で且つ下方に設けられた前記集塵室16内の交換可能な集塵袋19により捕捉して溜め、前記集塵袋19に塵埃が充分溜まってから前記集塵袋19を廃棄して新たな集塵袋19を取り付けることで、従来のように細かい塵埃を捕捉したフィルターの掃除を行う必要がなく、塵埃による気流の流通阻害を抑制することができる。しかも、一般的に前記集塵袋19はその表面積が大きく、従って、沪過性能に優れるばかりでなく、目詰まりも起こしにくい。また、重量の大きい前記電動送風機４が前記掃除機本体１内の下方に配置され、前記掃除機本体１の上部に、空洞部分の割合が大きく比較的軽い前記集塵室16及びサイクロン分離装置６を上下２段に配置することで、掃除機全体の重心を下げて安定性を向上することができるので、この結果、スティック型掃除機における移動操作性を確保することができる。更に、前記集塵袋19の吸塵口18が上方を向いていることで、前記集塵袋19からの塵埃の流出を防止するための逆止弁等の要素を不要とすることができる。

【0031】

また、前記サイクロン分離装置６の内部に排気用の筒体37を設け、前記サイクロン分離装置６を通過した気流が、前記筒体37の下部からこの筒体37の下部と連通する前記集塵袋19の吸塵口18に流入するので、前記サイクロン分離装置６から前記集塵袋19への気流経路を単純化して、掃除機全体の大型化を防ぐことができる。

【0032】

また、前記集塵室16の上部開口部に対して着脱自在な前記天蓋20に前記集塵袋19の吸塵口18が形成されたフランジ部24を取り付けることで、前記集塵室16に対して前記集塵袋19を簡単に着脱することができるばかりでなく、前記集塵袋19の吸塵口18が前記天蓋20を介して前記筒体37の下部と連通するので、前記筒体37の下部と前記集塵袋19の吸塵口18の位置合わせを正確に行うことができる。

【0033】

更に、蓄電池５，５Ａを用いる充電式掃除機であっても、前記電動送風機４が発生させた気流によって前記蓄電池５，５Ａが冷却されるので、前記蓄電池５，５Ａの寿命及び１回当たりの掃除時間を長くすることができる。

【0034】

なお、本発明は以上の実施例に限定されるものではなく、発明の要旨の範囲内で種々の変形実施が可能である。例えば、本実施例では、遠心分離装置としてサイクロン分離装置を用いたが、サイクロン分離装置以外の遠心分離装置を用いてもよい。

【産業上の利用可能性】

【0035】

以上のように、本発明にかかるスティック型掃除機は、家庭用、室内用に限らず、種々の用途に適用できる。

【図面の簡単な説明】

【0036】

【図1】本発明の実施例１を示す要部の断面図である。

【図2】本発明の実施例１を示す図１とは異なる向きの要部の断面図である。

【図3】本発明の実施例１を示す全体側面図である。

【図4】本発明の実施例１を示す要部の分解斜視図である。

【符号の説明】

【0037】

1　掃除機本体

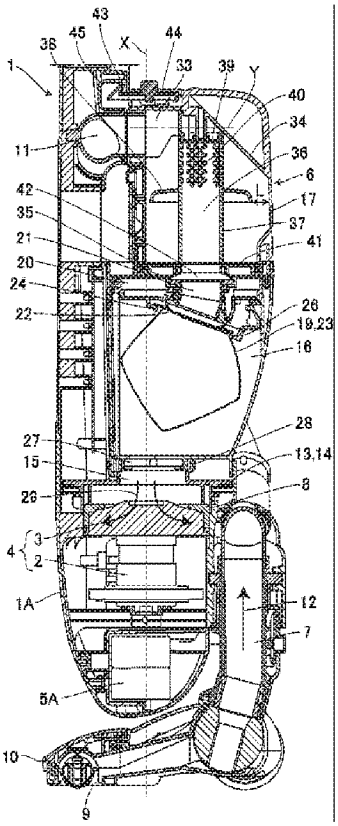
4　電動送風機

5　上部蓄電池

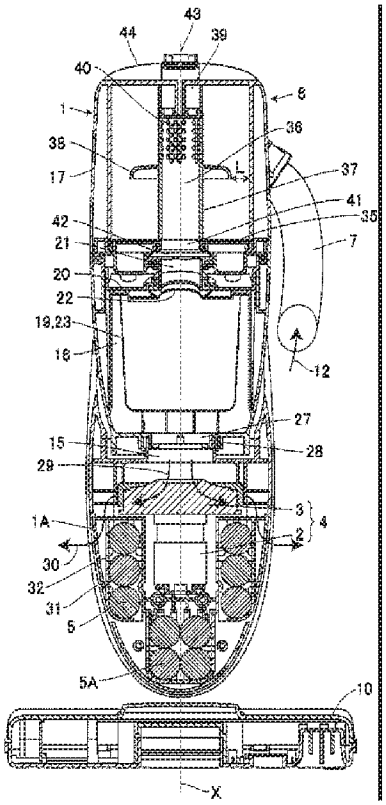
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５Ａ　下部蓄電池
６　サイクロン分離装置（遠心分離装置）
１０　ノズル
１６　集塵室
１７　集塵容器
１８　吸塵口
１９　集塵袋
２０　天蓋
２４　フランジ部
２９　一次側通気路
３０　二次側通気路
３３　導入口
３５　底蓋(底部)
３７　筒体
４０　連通孔

【図1】

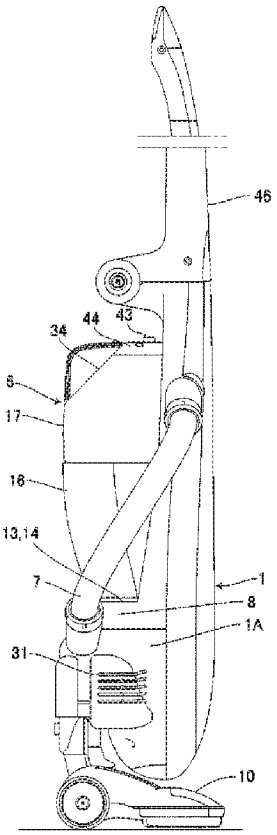


【図2】

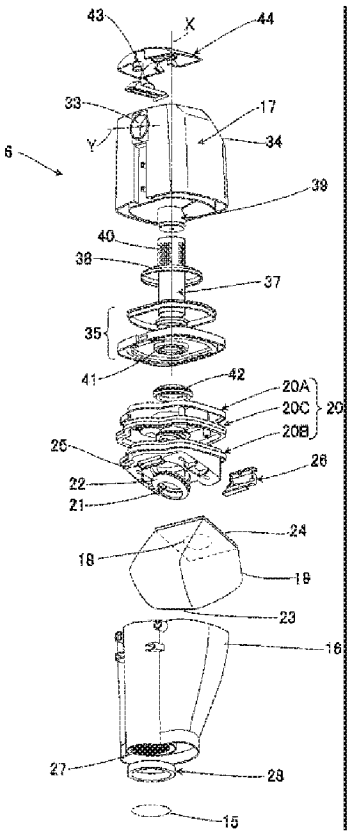


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【図3】


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【図4】


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Ｆターム(参考) 3B057 DE06
3B062 AH02

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Hand-held suction cleaner cyclone separator

Page bookmark CN2812826 (Y) - Hand-held suction cleaner cyclone separator

Inventor(s): NI ZUGEN [CN] ±

Applicant(s): JINLAIKE CLEANING IMPLEMENTS C [CN] ±

Classification: - international: ***A47L9/16***

- cooperative:

Application number: CN2005274314U 20050805

Priority number(s): CN2005274314U 20050805

Abstract of CN2812826 (Y)

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The utility model discloses a cyclone separator of a hand-held suction cleaner, which comprises an air inlet arranged on a front cover casing, and a filtering device arranged on the front end surface of a host device body and is covered in the front cover casing, wherein the periphery of the filtering device is provided with a cyclone cover, a tangential air inlet and a dust outlet are arranged on the cyclone cover, and the tangential air inlet is connected with the air inlet of the front cover casing. The utility model not only increases separating efficiency and dust removing efficiency, but also causes the dust and the filtering device to be mutually separated. The utility model prolongs service life of the filtering device, and can avoid secondary pollution for air discharge.

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DESCRIPTION CN2812826

The utility model discloses a hand-held vacuum cleaner cyclone separation means, including setting on the front cover of the inlet and provided at the front face of the main body housing and cover within the first filter device, the filter peripheral device cover mounted cyclone, cyclone cover is provided with a tangential inlet port and Chu Chen, tangential inlets inlet connections on the front cover; the utility model not only improves the dust separation efficiency and effectiveness, but also dust and filter means isolated from each other, extending the life of the filter device, but also to avoid secondary contamination of the wind.

Handheld vacuum cleaner cyclonic separation apparatus

TECHNICAL FIELD

The utility model relates to a hand-held vacuum cleaner cyclonic separation apparatus.

Background technique

The prior art, the cyclone separation apparatus due to its outstanding advantages in the dust separation effect, is Widely used in various types of vacuum cleaners, however, a handheld vacuum cleaner because the volume is relatively small, knot Structure more compact and difficult to use cyclonic separation apparatus, and are still used to filter Hai Pa. current Handheld vacuum cleaner can be divided into two parts front and rear, the front air inlet is provided with a casing which is also the same When the dust cup having a role in the rear of the main body has a handle, the front end surface of the main body has been Haipa Filter means, the filtered dust can remain in the enclosure, use over a period of time, the user can open the cover Clean up dust. The disadvantage is that the dust filter device and not isolated, the shorter the life of Hai Pa, easily Dust blocked.

SUMMARY

The utility model is intended: to provide a hand-held vacuum cleaner cyclone separation means, not only to improve the The dust separation efficiency and effectiveness, but also dust and filter means isolated from each other, extending the filtration device Of life, but also to avoid the secondary pollution of the wind

The utility model is a technical solution: A hand-held vacuum cleaner cyclone separation means, including setting On the front cover of the inlet and provided at the front face of the main body and the front cover filter is mounted within the enclosure Set the filter peripheral device attached to cover cyclone, cyclone cover is provided with a tangential inlet port and Chu Chen, Tangential inlets inlet connection on the front cover.

The utility model is a further technical solution: A hand-held vacuum cleaner cyclone separation means, including Including housing provided on the front of the inlet and provided at the front face of the main body and the front hood enclosure Filtration device, the filtration device is attached peripheral cover cyclone, cyclone cover is provided with a tangential inlet and Chu Chen mouth, tangential inlets inlet connections on the front cover; the cyclone cover tapered tangential inlet Chu Chen and outlet ports provided in the side walls of the cyclone cover, and the tangential inlet and outlet are located at the opposite side of Chu Chen position.

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The utility model is a more detailed technical proposal: A hand-held vacuum cleaner cyclone separation means, including including housing provided on the front of the inlet and provided at the front face of the main body and the front hood enclosure Filtration device, the filtration device is attached peripheral cover cyclone, cyclone cover is provided with a tangential inlet and Chu Chen mouth, tangential inlets inlet connections on the front cover; the cyclone cover tapered tangential inlet Chu Chen and outlet ports provided in the side walls of the cyclone cover, and the tangential inlet and outlet are located at the opposite side of Chu Chen Position; the air inlet on the front cover of the front end portion of the inner wall of the front cover, an intake duct of the air intake Mouth introduced tangential inlet is connected to a right angle shape of the curved tangential inlet pipe, inlet pipe and tangentially inlet pipe connection fixed.

The utility model has the advantages:

[1]

1. The utility model is applied to the cyclone device on the handheld vacuum cleaner, not only improves the points Dust separation efficiency and effectiveness, but also dust and filter means isolated from each other, extending the filtering device so With life, but also to avoid the secondary pollution of the wind.

[2]

2. The utility model is based on a hand-held vacuum cleaner volume is relatively small, relatively compact structure features to Tornado cover design, maintaining the original structure, reduce production costs.

BRIEF DESCRIPTION

The accompanying drawings and the following embodiments of the utility model is further described:

Figure 1 is a schematic view of the structure of the utility model;

Figure 2 is a schematic view of the assembly of the utility model.

Wherein: the front casing 1; 2 air inlet; 3 of the main body; 4 filter means; 5 cyclone cover; 6 tangential inlet, 7 Chu Chen mouth; 8 intake duct; 9 tangential inlet pipe.

detailed description

Example: in FIG. 1, shown below, a hand-held vacuum cleaner cyclone 2 means including Set on the front of the housing 1 and inlet 2 provided at the front end surface of the main body 3 and the front cover inside casing 1 The Haipa filter device 4, the filter is attached to the peripheral device 4 cyclone cover 5 is provided on the cover 5 cyclone Tangential inlet port 6 and 7 Chu Chen, cyclone cover 5 is tapered tangential inlet port 6 and 7 is provided Chu Chen Set in the cyclone cover the side walls 5 and 6 and the tangential inlet port 7 are located in Chu Chen contralateral position, into 2 front end portion of the front housing 1 of the air, before the housing is provided with an inner wall into the air inlet duct 8 2 introduced tangential inlet 6 is connected at right angles to the curved shape of the tangential inlet pipe 9, 8 and the inlet pipe Tangential inlet pipe 9 is connected fixed.

The utility model is applied to the cyclone device on the handheld vacuum cleaner, not only improves the separation efficiency Rate and dust effects, but also dust and filter means 4 isolation, extended filter device using life 4 Life, but also to avoid the secondary pollution of the wind; the utility model based on a relatively small volume of hand-held vacuum cleaner, Relatively compact structure features designed cyclone cover 5, to maintain the original structure, reduce production costs.

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CLAIMS CN2812826

[5]

1. A hand-held vacuum cleaner cyclone separation means, including setting the casing (1) front air intake The front end surface of the opening in the main body (3) (2) and set the cover and housing (1) within the first filter device (4)Characterized in that: the periphery of the filter means (4) is attached to the cyclone cover (5), the cyclone cover (5)Provided with tangential air inlet (6) and Chu Chen port (7), the tangential air inlet (6) and the front cover (1) On the inlet (2) is connected.

[2]

2. The hand-held vacuum cleaner cyclone separation apparatus according to claim 1, characterized in that: The cyclone cover (5) is tapered tangential inlet (6) and Chu Chen port (7) disposed in the cyclone cover (5) Side walls and a tangential inlet (6) and Chu Chen mouth (7) are located at the opposite side of the position.

[3]

3. Separating device according to claim 1 or 2 hand-held vacuum cleaner cyclone, characterized in that in: the air inlet (2) at the front housing (1) of the front end portion of the front cover (1) is disposed within a side wall There inlet pipe (8) The air inlet (2) is introduced, the tangential inlet is connected (6) on the shape of a right angle Curved tangential inlet pipe (9), inlet pipe (8) with a tangential inlet duct (9) secure the connection.

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[19] 中华人民共和国国家知识产权局

[51] Int. Cl.
A47L 9/16 (2006.01)

[12] 实用新型专利说明书

专利号 ZL 200520074314.2

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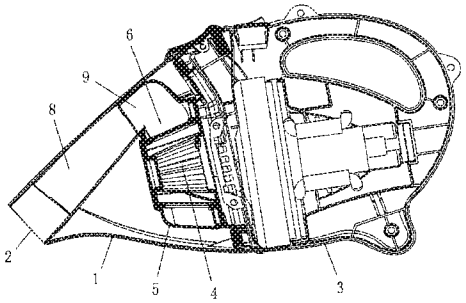
权利要求书 1 页 说明书 2 页 附图 2 页

[54] 实用新型名称

手持式吸尘器旋风分离装置

[57] 摘要

本实用新型公开了一种手持式吸尘器旋风分离装置，包括设置在前罩壳上的进风口和设置在主机体的前端面上并罩在前罩壳内的过滤装置，所述过滤装置的外围安装有旋风罩，旋风罩上设有切向进风口和出尘口，切向进风口与前罩壳上的进风口连接；本实用新型不仅提高了分离效率和除尘效果，而且使灰尘与过滤装置互相隔离，延长了过滤装置的使用寿命，还可避免出风的二次污染。



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1．一种手持式吸尘器旋风分离装置，包括设置在前罩壳（1）上的进风口（2）和设置在主机体（3）的前端面上并罩在前罩壳（1）内的过滤装置（4），其特征在于：所述过滤装置（4）的外围安装有旋风罩（5），旋风罩（5）上设有切向进风口（6）和出尘口（7），切向进风口（6）与前罩壳（1）上的进风口（2）连接。

2．根据权利要求 1 所述的手持式吸尘器旋风分离装置，其特征在于：所述旋风罩（5）呈锥形，切向进风口（6）和出尘口（7）设置在旋风罩（5）的侧壁，并且切向进风口（6）和出尘口（7）分别位于对侧位置。

3．根据权利要求 1 或 2 所述的手持式吸尘器旋风分离装置，其特征在于：所述进风口（2）位于前罩壳（1）的前端部，前罩壳（1）的内侧壁设有进风管（8）将进风口（2）引入，切向进风口（6）上连接有呈直角形状弯曲的切向进风管（9），进风管（8）与切向进风管（9）连接固定。

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手持式吸尘器旋风分离装置

技术领域

本实用新型涉及一种手持式吸尘器旋风分离装置。

背景技术

现有技术中，旋风分离装置由于其在除尘分离效果上的突出优点，而被广泛地用于各种类型的吸尘器上，但是，手持式吸尘器由于体积比较小、结构比较紧凑而难于采用旋风分离装置，而仍然沿用海帕来进行过滤。目前的手持式吸尘器可分为前后两大部分，前部为设有进风口的罩壳，该罩壳也同时具有尘杯作用，后部为设有把手的主机体，主机体的前端面上设有海帕过滤装置，经过滤的灰尘留在罩壳中，使用过一段时间以后，用户可打开罩壳清理灰尘。其缺点是过滤装置与灰尘未隔离，海帕的使用寿命较短，容易被灰尘堵死。

发明内容

本实用新型的目的是：提供一种手持式吸尘器旋风分离装置，不仅提高了分离效率和除尘效果，而且使灰尘与过滤装置互相隔离，延长了过滤装置的使用寿命，还可避免出风的二次污染。

本实用新型的技术方案是：一种手持式吸尘器旋风分离装置，包括设置在前罩壳上的进风口和设置在主机体的前端面上并罩在前罩壳内的过滤装置，所述过滤装置的外围安装有旋风罩，旋风罩上设有切向进风口和出尘口，切向进风口与前罩壳上的进风口连接。

本实用新型进一步的技术方案是：一种手持式吸尘器旋风分离装置，包括设置在前罩壳上的进风口和设置在主机体的前端面上并罩在前罩壳内的过滤装置，所述过滤装置的外围安装有旋风罩，旋风罩上设有切向进风口和出尘口，切向进风口与前罩壳上的进风口连接；所述旋风罩呈锥形，切向进风口和出尘口设置在旋风罩的侧壁，并且切向进风口和出尘口分别位于对侧位置。

本实用新型更详细的技术方案是：一种手持式吸尘器旋风分离装置，包括设置在前罩壳上的进风口和设置在主机体的前端面上并罩在前罩壳内的过滤装置，所述过滤装置的外围安装有旋风罩，旋风罩上设有切向进风口和

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出尘口，切向进风口与前罩壳上的进风口连接；所述旋风罩呈锥形，切向进风口和出尘口设置在旋风罩的侧壁，并且切向进风口和出尘口分别位于对侧位置；所述进风口位于前罩壳的前端部，前罩壳的内侧壁设有进风管将进风口引入，切向进风口上连接有呈直角形状弯曲的切向进风管，进风管与切向进风管连接固定。

本实用新型的优点是：

1．本实用新型将旋风分离装置应用到手持式吸尘器上，不仅提高了分离效率和除尘效果，而且使灰尘与过滤装置互相隔离，延长了过滤装置的使用寿命，还可避免出风的二次污染。

2．本实用新型根据手持式吸尘器体积比较小、结构比较紧凑的特点来设计旋风罩，保持了原有的结构，降低了生产成本。

附图说明

下面结合附图和实施例对本实用新型作进一步的描述：

图 1 为本实用新型的结构示意图；

图 2 为本实用新型的装配示意图。

其中：1 前罩壳；2 进风口；3 主机体；4 过滤装置；5 旋风罩；6 切向进风口；7 出尘口；8 进风管；9 切向进风管。

具体实施方式

实施例：如图 1、图 2 所示，一种手持式吸尘器旋风分离装置，包括设置在前罩壳 1 上的进风口 2 和设置在主机体 3 的前端面上并罩在前罩壳 1 内的海帕过滤装置 4，所述过滤装置 4 的外围安装有旋风罩 5，旋风罩 5 上设有切向进风口 6 和出尘口 7，旋风罩 5 呈锥形，切向进风口 6 和出尘口 7 设置在旋风罩 5 的侧壁，并且切向进风口 6 和出尘口 7 分别位于对侧位置，进风口 2 位于前罩壳 1 的前端部，前罩壳 1 的内侧壁设有进风管 8 将进风口 2 引入，切向进风口 6 上连接有呈直角形状弯曲的切向进风管 9，进风管 8 与切向进风管 9 连接固定。

本实用新型将旋风分离装置应用到手持式吸尘器上，不仅提高了分离效率和除尘效果，而且使灰尘与过滤装置 4 隔离，延长了过滤装置 4 的使用寿命，还可避免出风的二次污染；本实用新型根据手持式吸尘器体积比较小、结构比较紧凑的特点来设计旋风罩 5，保持了原有的结构，降低了生产成本。

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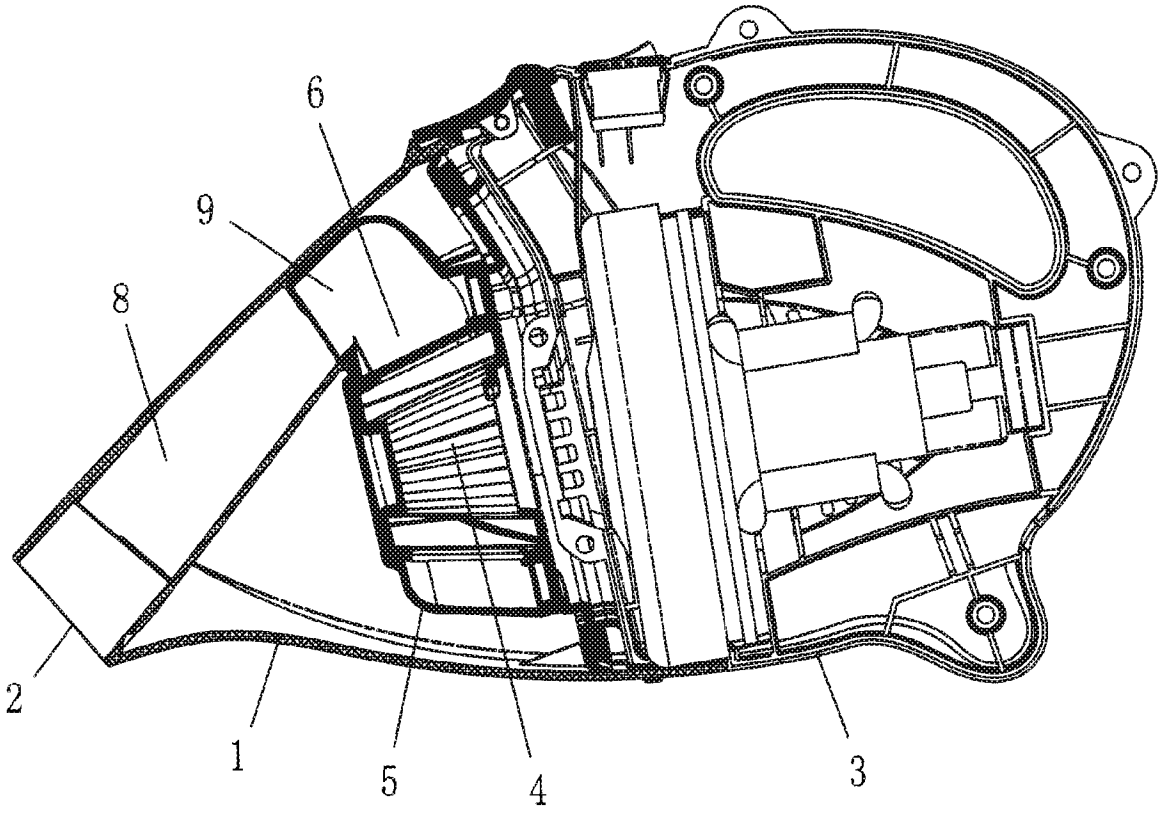


图 1

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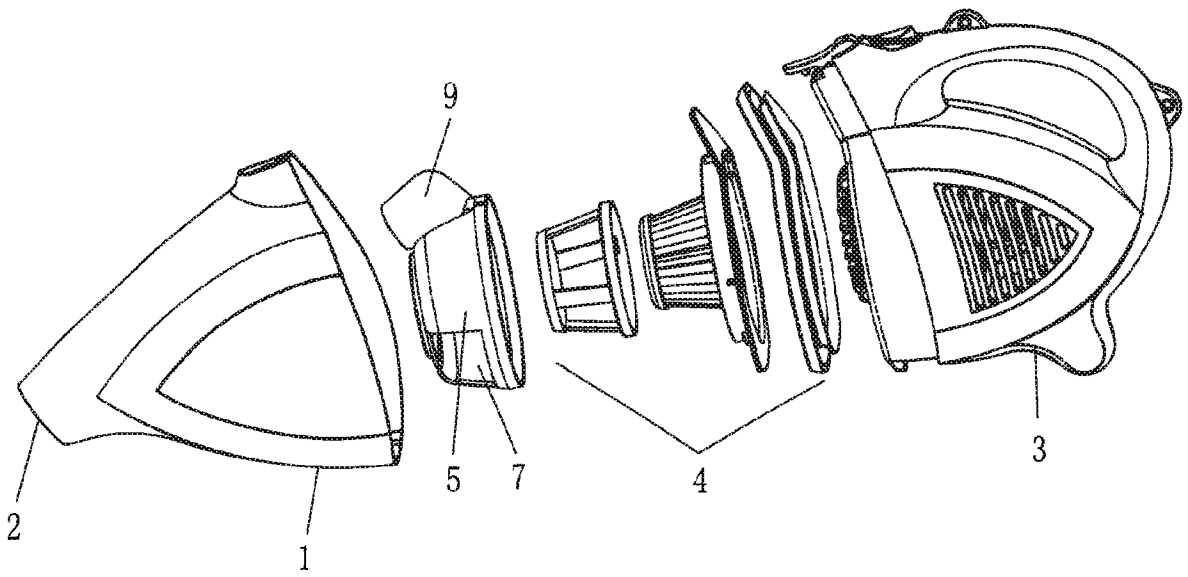


图 2

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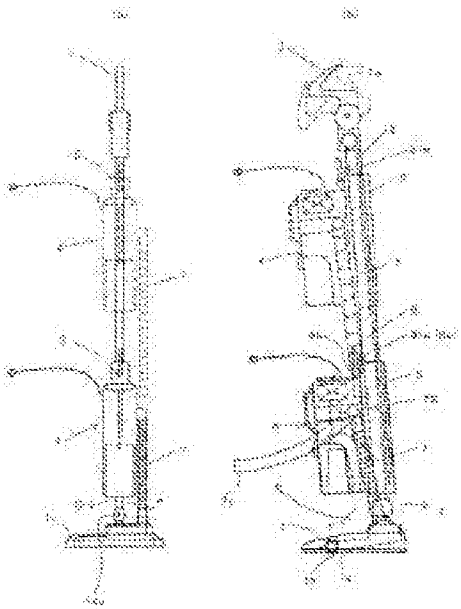
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PROBLEM TO BE SOLVED: To provide a vacuum cleaner, inserting a suction port part into the deepest part of a space as much as possibly. ;SOLUTION: This vacuum cleaner includes: an operating rod 3, one end of which is provided with the suction port part 1 for sucking dust, the other end thereof being provided with a handle part 2; and a vacuum cleaner body 4 incorporating a cyclone type dust collector 6 for separating dust sucked with air from the suction port part 1 from the air by centrifugal force and accumulating the same and provided to be freely slid along the operating rod 3 between the suction port part 1 and the handle part 2 and to fixed in a position, wherein the suction port part 1 is connected to the operating rod 3 to freely turn in the longitudinal direction, and the vacuum cleaner body 4 is provided in front of the operating rod 3. ;COPYRIGHT: (C)2006,JPO&NCIPI



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DESCRIPTION JP2006087961

An object of the present invention is to provide an intake opening as much as possible gap vacuum cleaner that can be inserted in the back of. An intake opening for sucking the dust to one end 1, an operation rod 3 which arranged the handle portion 2 at the other end, and the dust intake air from the intake opening 1 along with the air separated from the air by centrifugal force integration a built-in cyclone-type dust collecting apparatus 6, and the inlet section 1 and the handle portion 2 cleaner body 4 between the provided the operating rod slidably and to be a fixed position along three of the, the a, the intake port unit 1 is rotatably coupled to the front-rear direction of the operation rod 3, the cleaner main body 4 is provided in front of the operating rod 3. .FIELD 1

Vacuum cleaner

[0001]

The present invention mainly adopts relates vacuum cleaner for use in domestic, especially together with the dust collector body is slidably provided on the operation rod, the cleaner body high cyclonic suction device with a suction function with compact and lightweight as it relates to the vacuum cleaner.

[0002]

Conventional, air intake opening for sucking the dust on one end, and an operating rod which arranged the handle portion to the other end, as a vacuum cleaner; and a dust collection unit that integrated the dust intake air from the intake opening with air, said that the dust collecting portion slidably disposed the operation rod is known (see Patent Document 1). The electric vacuum cleaner wherein in Patent Document 1, air inlet portion is locked to one end of the operating rod, the cleaner body for removing dust and air flow was filtered with a cloth bag containing dust, forming an intake passage it is slidably engaged in the hollow of the operation rod to be. And, when you clean the floor is fixed the cleaner body in a location close to the intake opening on the operating rod, do the cleaning at that position Further, at the time of cleaning, such as clearance, the cleaner body position farther from the air inlet portion, i.e. is moved to a position near the upper end of the operating rod, the intake the cleaner main body so as not to interfere with the periphery and it is configured to clean by inserting the mouth portion to the clearance. In this conventional example, the configuration as described above, and the normal cleaning to clean a wide where, at the time of the temporary cleaning to clean a narrow place, as can alter the position of the cleaner body, operation We are working to the convenience. Hei 2-74225 JP

[0003]

However, according to a conventionally known vacuum cleaner of the, for the air stream containing dust was filtered through a cloth bag adopts the cleaner body to remove dust suction by sack of resistance when the intake air passes through the cloth bag There is fated that force is reduced, require an electric motor having a large output in order to compensate its resistance, therefore a cleaner body becomes large, or the like noise is large, say lack usability, convenience problems the had. In addition, last for inhalation of the dust was a structure that can not be only from the intake opening, clearance and like inlet section does not pass, a desk and 縁, cleaning of high position, such as a ceiling, and further, the back of the deep gap there is a problem to say not suitable for cleaning. The present invention is intended to solve the above problems inherent in the conventional vacuum cleaner as described above.

[0004]

in order to achieve the above object, an intake opening for sucking dust at one end, an operating rod which arranged handle portion at the other end, and air dust suction from the suction opening with air by centrifugal force separation and a built-in cyclone type dust collecting apparatus for stacking, anda cleaner body which is provided slidably and to be positioned and fixed along said operation rod between said inlet opening and said handle portion , the intake port portion is rotatably connected to

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the front-rear direction of the operation rod, said cleaner main body is constructed as an electric vacuum cleaner, characterized in that provided in front of the operating rod. Cyclone type dust collecting apparatus used here, since separating the air and dust by a centrifugal force generated by the swirling flow efficient, since less Quietness very usability as cleaner for use indoors, convenience it can be said that the good thing. Moreover, since such vacuum cleaner body is mounted freely and can position fixing slide along between said inlet opening and said handle portion of said operating rod to said operating rod, a cleaner main body to the handle portion by fixing to close, it can also be freely used in high places such as narrow place and curtains, convenience is further improved. Also, the cleaner body via a holding table between provided slidably and to be positioned and fixed along said operation rod and said air inlet portion and said handle portion, detachably attached to the front of the operating rod to be able to be provided. in this case, because the cleaner body can to be used separately from the holder, the cleaner body can be carried freely, convenience as a vacuum cleaner can be further improved. Also in this case, attachment to the operating rod is a robust, thereby is prolonged life. Furthermore, in the case where the cleaner body comprises a biasing means for constantly biased to the handle portion direction, will be able to be moved gently along the cleaner body to the operating rod burden of the operator mitigation it is. As the biasing means, the biasing force of a substantially constant load it is possible to adopt the spring to be given to the cleaner body. With this configuration, a simple device, it is possible to provide a fluctuation-free device of force when moving along the cleaner body to the operating rod. In this case, the above-mentioned biasing force by the biasing means, by almost the same as the load of the sliding body sliding on the operating rod, it is possible to eliminate the force required for movement of the cleaner body almost completely , the operator's burden is significantly reduced. in addition, with the inlet portion, and the communication with the intake pipe of the telescopic and bending the inlet of the cyclcne-type dust collector, and removably coupled to one end of the intake pipe to the intake opening, the inlet it can be assumed that arranged on the side of the cleaner body.

Thereby, it is possible to flexibly connect the the cyclone type dust collecting apparatus air inlet portion, by further separating the connection between the inlet port portion of the intake pipe, can suck dust in the intake pipe itself, further it is possible to clean the narrow gap. As another structure for operating rod, the operating rod and the hollow form, the air inlet of the cyclone type dust collecting apparatus disposed to the rear of the cleaner body, wherein the said cleaner main body and the intake port portion it is considered to be configured to communicate with a hollow portion of the operation rod. In this case, it is possible to omit the intake pipe itself, it is possible to significant simplification of the operation rod section. In addition, by constituting telescopically the operation rod, such as the location of a problem at the time of storage is eliminated. By providing the grip portion to the cleaner body, operability is improved in one fell swoop. Changes to this structure also belong to the scope of the present invention.

[0005]

According to the present invention, due to the use of the cyclone type dust collecting apparatus, since for separating air and dust by a centrifugal force generated by the swirling flow efficient, since less Quietness, as vacuum cleaner to be used indoors very usability can be said to have excellent convenience. Moreover, it said because the cleaner body is mounted slidably and to be positioned and fixed along between the handle portion and the inlet portion of the operation rod to the operating rod, located close to the cleaner body to the handle portion by fixing to, it can also be freely used in high places such as narrow place and curtains, convenience is further improved. Also, the cleaner body via a holding table between provided slidably and to be positioned and fixed along said operation rod and said air inlet portion and said handle portion, detachably attached to the front of the operating rod to be able to be provided. In this case, because the cleaner body can to be used separately from the holder, the cleaner body can be carried freely, convenience as a vacuum cleaner can be further improved. Also in this case, attachment to the operating rod is a robust, thereby is prolonged life. Furthermore, in the case where the cleaner body comprises a biasing means for constantly biased to the handle portion direction, will be able to be moved gently along the cleaner body to the operating rod burden of the operator mitigation it is. As the biasing means, the biasing force of a substantially constant load it is possible to adopt the spring to be given to the cleaner body. With this configuration, a simple device, it is possible to provide a fluctuation-free device of force when moving along the cleaner body to the operating rod. In this case, the above-mentioned biasing force by the biasing means, by almost the same as the load of the sliding body sliding on the operating rod, it is possible to eliminate the force required for movement of the cleaner body almost completely , the operator's burden is significantly reduced. in addition, with the inlet portion, and the communication with the intake pipe of the telescopic and bending the inlet of the cyclone-type dust collector, and removably coupled to one end of the intake pipe to the intake opening, the inlet it can be assumed that arranged on the side of the cleaner body. Thereby, it is possible to flexibly connect the the cyclone type dust collecting apparatus air inlet portion, by further separating the connection between the inlet port portion of the intake pipe, can suck dust in the intake pipe itself, further it is possible to clean the narrow gap. As another structure for operating rod, the operating rod and the hollow form, the air inlet of the cyclone type dust collecting apparatus disposed to the rear of the cleaner body, wherein the said cleaner main body and the intake port portion it is considered to be configured to communicate with a hollow portion of the operation rod.

In this case, it is possible to omit the intake pipe itself, it is possible to significant simplification of the operation rod section. In addition, by constituting telescopically the operation rod, such as the location of a problem at the time of storage is eliminated. By providing the grip portion to the cleaner body, operability is improved in one fell swoop.

[0006]

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With reference to the accompanying drawings for an embodiment of the present invention, it describes the embodiments embodying the present invention, subjected to the understanding of the present invention. Here, FIG. 1 is an external view of a cyclonic vacuum cleaner according to an embodiment of the present invention (FIG. (A) is a front view, and FIG. (B) is a side view), FIG. 2, FIG. 1 sectional view of the cleaner body shown in (FIG. (a) is a longitudinal sectional view, (b) are an a-a sectional view in (a). As shown in FIG. 1, the air inlet section 1 is locked to one end, inside the operating rod 3 to the handle portion 2 is rotatably provided at the other end, a cyclone type dust collecting apparatus 6 (see FIG. 2) cleaner body 4 comprising is locked slidably. The inlet port portion 1 and the cleaner body 4 is connected with an intake pipe 7 which is formed telescopically and bending the like bellows hose, to move the intake pipe 7 along the operating rod 3 of the cleaner body 4 with expands and contracts.

[0007]

1b is a rotary brush disposed rotatably the inlet section 1, is rotated by an electric motor, or an air stream, scraping the hair inside the dust, such as carpet. Also, 64 shown in FIG. 2, a control unit for controlling the vacuum cleaner main body 4, 65 denotes an operation unit for operating the driving of the cleaner body 4. The intake pipe 7 has one end connected to the inlet port portion 1 and the other end is connected to the intake port 72 of the cyclone type dust collecting device 6. As a result, the suction port 1a and the cyclone type dust collecting device 6 of the inlet section 1 is communicated, the dust is sucked into the intake opening intake pipe 7 the street cyclone type dust collecting device 6 than 1. Suction air flow is turning in the dust cup 83 inside, the dust is separated is deposited in the dust cup 83 within the centrifugal force The dust and was isolated and purified air enters the stack exhaust cylinder H than the exhaust port Ha of H, is sucked into the upper portion of the electric blower M, and is discharged to the outside from the slit S. Further, the exhaust port Ha and mesh of the filter F is fixed, to capture could not be separated dust. Since the cyclone type dust collecting apparatus 6 removes the dust in the course of the air flow, which merely has passed to generate an air flow, the occurrence of loss less, can be miniaturized and lightweight, also noise less usability, which has excellent operability, lightweight when used by particularly moved at hand, use of the small feeling, is excellent in operability. One end of the intake pipe 7, fitting by tapering, or the like by the locking is detachably connected to the intake port portion 1 and the other end cyclone type dust collecting apparatus provided in 6 suction port 72 (FIG. 1 (b)) rotation is rotatably connected to. Thus, one end of the intake pipe 7 is removed from the inlet port portion 1, free to be able to move to be cleaned position, as shown by the broken line 7a in Fig. 1, it is possible to clean the vertical and horizontal anywhere. As a result, the gap in any position or curtain, can be even more to clean, such as the easy to the desk of the high position.

[0008]

In this embodiment, the cleaner body 4 is engaged with the holding base 5 which slides on the operation rod 3. The Between operation rod 3 and the supporter 5 is provided with a locking means for fixing the holding base 5 on the operating rod 3, the holding base 5 is held in position on the operation rod 3. The lock Teto is provided with a plurality in any position on the operation rod 3. For example groove 31a on the operation rod 3 shown in FIGS. 1 and 2, 31b is part of the lock unit, the lock lever 8 provided around the pin 8b rotatably holding base 5 has the groove by meshing with the 31a or 31b, is holding base 5 is fixed on the operation rod 3. Locking lever 8, the spring is elastically biased in a direction to fit all times the groove 31a in the (not shown), the engagement state with the locking lever 8 biasing direction of the spring to operate in the opposite direction it can be released by. When moving along a cleaner body 4 to the operation rod 3, the unlock lever 8 as to move with the gripper 82. Thus cleaner body 4 can easily be moved together with the holding base 5 can be fixed by engaging the lock lever 8 to the other recess 31b. Thus, the recess 31a, the cleaner main body 4 to the position of the multi-step by adding a 31b to the appropriate location can be 固定. The locking means, the shoe having a frictional force engages on the holding base 5, may be a method of fastening the operating rod 3 outer periphery. When moving the cleaner main body 4 in this case, the moving loosen the shoe. According to this recess 31a, 31b can be fixed cleaner body 4 in the desired position of the stepless not require. By moving in this way the vacuum cleaner body 4 in place, when cleaning the floor surface, a fixed center of gravity of the cleaner body 4 the inlet section 1 side on the floor side, and as shown in FIG. 3 clearance , or deep location of the cleaning at the time is longer with the cleaner body 4 to move to the handle portion 2 side between inlet section 1 can be used efficiently usability, convenience is improved. At this time, it is possible to clean efficiently even in a narrower location by rotating the handle portion 2 to the position where does not contact the floor. In particular, small, cyclone type dust collecting apparatus 6 burden of the load be moved to the handle portion 2 side by attaching slidably the cleaner body 4 consisting comprise is reduced comfort of use of light weight can be obtained .

[0009]

Next, a description will be given of the structure for attaching and detaching the holding base 5 a cleaner body 4. 2, engages the protruding portion 6a protruding cleaner body 4 bottom end concave portion 5a provided in the holding stand 5 lower, also cleaner holding lever 9 provided rotatably to the main body 4 upper end are resiliently urged constantly downward, by fit convex portion 5b and meshes provided at the upper end of the holding base 5, the cleaner main body 4 has the recess 5a and the convex portions 6a at its lower end to the holding base 5 and the convex portions 5b and the holding lever 9 is fixed to the holding base 5 in mesh at the upper end. Thus, a holding base 5 and the cleaner body 4, slides on the operation rod 3 in the axial direction together. In addition, the vacuum cleaner main body 4 to release the holding lever 9 along with the removed from the holder 5, by removing the one end of the intake pipe 7 from the inlet section 1, the operation rod 3 and the inlet section 1 and separated by vacuum cleaner it can be used as a vacuum cleaner in the body 4 alone. In other words,

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it can be used for cleaning, such as high altitude or in a motor vehicle as a handy type. On the other hand, holding stand 5, the upward direction by the spring 10 of the belt-shaped, here are always biased in the direction of the handle portion 2. That is, ichimizu the cleaner body 4 of the spring 10, wherein the locked to the holding base 5 and the other end is wound around the rotating wheel unit 11, for urging the cleaner body 4 in the direction of the handle part 2. The spring 10 itself, the operation rod is covered with a cover 31c which constitutes an outer shell of 3, and appearance retention is achieved together with the spring 10 is prevented from exposure to human finger touches or or damage.

[0010]

The spring 10 urges the constant load at a constant force spring. Biasing force of the spring 10 is set substantially equal to or slightly smaller value as the weight of the suspending body made of the cleaner main body 4 and the holding stand 5. Thus, the along with unlocking lever 8, since the cleaner body 4 by tilting the operating rod 3 can be moved automatically to the direction of the handle portion 2 by the urging force of the spring 10, the cleaner main body 4 need without operability to raise a person, and to improve the convenience. In addition, the vacuum cleaner when the body 4 to move in a counter-handle part two directions, the anti-handle by the weight of the suspended body such as a vacuum cleaner main body 4 a provision for operation rod 3 to open the lock lever 8 only set up vertically part 2 moves in the direction and operability, convenience is improved. Moreover, since the move at a constant load of only the difference of the load of the suspended body such as a vacuum cleaner body 4 and the biasing force of the spring 10, that the speed of movement of the cleaner body 4 by the inclination of about operation rod 3 changes rather, during the moving period of the cleaner body 4 does not rise to a movement to a sense of crisis and sense of discomfort smoothly at a constant speed. Also, even when moving the cleaner main body 4 by hand, a load of the cleaner main body 4 since it is canceled by a spring 10, a force of moving the cleaner main body 4 is iess comer operability is improved. Further, to secure the movement along the operating rod 3 of the cleaner body 4, it may be fixed to hold the spring 10 so as to restrain the movement of the spring 10. Thus, the movement of the spring 10 is prevented can be fixed cleaner body 4. The operation rod 3, as shown in FIG. 2 (a), a hollow moving operation rod 31, as a dual structure of the fixed operation rod 32 slidably fitted in the hollow portion of the moving operation rod 31 good. This operation rod 3 is telescopically constructed. 2 (a) shows a state diagram that extend the operating rod 3, movement operation rod 31 shown by a broken line shows a state in which housing the moving operation rod 31 to the inlet port portion 1 side. The fixed operation rod 32 the outer periphery and the mobile operating rod 31 while being configured to be smoothly slid through the sliding member 33a, 33b. Further, fixing of the movement operation rod 31 and the fixed operating rod 32 may be locked in a predetermined length is provided a locking means (not shown) in place. Thus, to use in a state of setting the handle portion 2 in place, it can be housed storing the vacuum cleaner to shorten lower overall length.

[0011]

Cleaner body 4 and the holding stand 5, the movement operation rod 31 the outer periphery of one and the other fixed operating rod 32 the outer periphery slidably held by the slide member 12 such as a bearing (see FIG. 2 (b)) , the fixed operation rod 32 the lower end while freely locking detachable, etc. fitted and fixed in the second connecting pipe 14 and the taper of the inlet section 1, inlet section 1 of the spherical and the first of the connecting tube 13 XY direction at the sliding portion 13a rotatably connected to (see FIG. 1 (b)), the first connecting pipe 13 PQ direction the rotation axis 14a and the second connecting pipe 14 (FIGS. 1 (a) rotatably connected to the reference), the air inlet unit 1 is preferably configured to freely rotate the XY, and PQ direction with respect to the operation rod 3. Connecting portion to the inlet port portion 1 of the intake pipe 7 is anywhere better if part which communicates with the suction port 1a of the inlet section 1, an intake port portion 1 and the operation rod 3 as described above X--Y-and since rotated in the P-Q direction, it is desirable to connect the intake pipe 7 to the second connection pipe 14 movable integrally with the operation rod 3. Accordingly, the intake pipe 7 by expansion and contraction due to movement of the cleaner 4 is performed, fatigue due to twisting, bending, breakage is reduced. Further, in the example shown in FIG 2, the second connection pipe 14 is connected to the first connection pipe 13, in this case, the first connection when the movable operation rod 3 to X--Y-direction since the swings in tube 13 and the integral, fatigue due to the direction of twist and bend, damage is reduced.

[0012]

4, in such a vacuum cleaner to an embodiment of the present invention provided with an intake passage 71 into the interior of the operating rod 3, a longitudinal sectional view showing the air intake passage portion of the cleaner body 4. Therefore details other structure is FIG. 1, is similar to the embodiment shown in FIG. 2 will be omitted. In this case, the operation rod 3 is composed of the fixed operation rod 32 and the moving operation rod 31 similarly to the above embodiment, the move operation rod 31 slides to stretch within the fixed operation rod 32. Here, the fixed operation rod 32 is formed of a hollow to form an intake passage 71. Near the upper end of the fixed operation rod 32 is opening 35 toward the outside is formed in communication with the space 36 formed in the holding base 5. 361 and 362 is a sealing member provided on said holding base 5 for forming the space 36 to the closed room conditions. The space 36 provided in the holding base 5, communicates with the cyclone type dust collecting device 6 via the intake port 66 as shown. Therefore, by mounting the inlet section 1 to the lower end of the intake passage 71 of the fixed operation rod 32, opening the inlet port 1a and the operation rod 3 inside of the intake passage 71 and is communicated to the floor surface of the inlet section 1 air intake passage of the cyclone type dust collecting device 6 and the intake opening 1 is formed. Since the space 36 is formed long in the vertical direction of the holding base 5, a state cleaner body 4 is positioned in the vicinity of the inlet port portion 1 as shown in FIG. 4 (a), the as

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shown in FIG. (B) When you move to a state that is located at the top, said since the fixed operation rod 32 is always communicated with the space 36 through the opening 35, even where there is a vacuum cleaner main body 4, driving the electric blower M Then the floor of the dust from the suction port 1a of the inlet section 1 is sucked along with the air through the air intake passage 71 of the fixed operation rod 32, suction from the opening 35 in the cyclone type dust collecting device 6 from the intake port 66 through the space 36 It is. Air stream containing the sucked dust flows into the cyclone type dust collecting apparatus 6 the dust separated by pivoting, the purified air flow enters the interior exhaust pipe H from the exhaust port Ha of the exhaust pipe H, the upper part of the It is sucked into the electric blower M, and is discharged to the outside from the slit S. The separated dust is deposited in the dust cup 63. Further, the point where the mesh filter to the exhaust port Ha is mounted is the same as embodiment, capture was not completely separated dust. Figure in the 4 (b) state, without between vacuum cleaner body 4 is disturbing because between the inlet section 1 and the vacuum cleaner body 4 L becomes longer, be clean and can be inserted into a narrow Sukimahe inlet section 1 can. Further, by removing the air inlet section 1, it can be cleaned by suction from the opening at the tip by inserting the distal end of the operating rod 3 into narrower gaps.

It is possible to clean efficiently narrow gap by further removing the inlet section 1 to connect a variety of suction port at the tip of this operation rod 3. Having thus explained the various embodiments and examples of the present invention, so far what has been shown is illustrative of the arrangement of the invention, the scope of the present invention is not limited to this, in FIG. 5 a plurality of operation rods 3a, as shown, comprises a 3b, operation rod 3a of the plurality of, such as the holding stand 5 over 3b having a structure to slide, by adding various modifications without departing from the gist of the invention it can be carried out.

[0013]

External view of a cyclonic vacuum cleaner according to an embodiment of the present invention (FIG. (A) is a front view, and FIG. (B) is a side view). Sectional view of the cleaner main body shown in FIG. 1 (FIG. (A) is a longitudinal sectional view, (b) is, A-A sectional view of (a)). Conceptual diagram showing a state of cleaning the narrow gap in the vacuum cleaner. Sectional view showing an embodiment of the operation rod itself as an intake pipe ((a) shows a state where the cleaner body is located in the vicinity of an intake port portion, (b), the cleaner body is located in the handle portion diagram showing the state that you are). Front view of a vacuum cleaner showing an embodiment relating to a vacuum cleaner having two operating rod.

Description of the code

[0014]

1 ... inlet section 2 ... the handle portion 3 ... operation rod 4 ... the cleaner body 5 ... holder 6 ... cyclone dust collector 7 ... the intake pipe 8 ... lock lever 9 ... retention lever 10 ... spring 12 ... the sliding member 13, 14 ... connecting pipe

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CLAIMS JP2006087961

1.

Air intake opening for sucking the dust on one end, and an operating rod which arranged the handle portion to the other end. The dust suction from the suction opening with air incorporates a cyclone type dust collecting apparatus for stacking separately from the air by centrifugal force, slide between the inlet port portion and the handle portion along said operation rod freely and having position and fixably cleaner body which is provided, and The air inlet portion is rotatably coupled to the front-rear direction of the operation rod, The cleaner main body, an electric vacuum cleaner, characterized in that provided in front of the operating rod.

2.

The intake opening and has a holding table between the provided slidably and to be positioned and fixed along the operating rod between the handle portion. The cleaner body through the holding table, the electric vacuum cleaner of claim 1 comprising detachably provided in front of the operating rod.

3.

And the intake opening, said communicating with the intake pipe of the telescopic and bending the inlet of the cyclone-type dust collector, and removably coupled to one end of the intake pipe to the intake opening, the intake port, said the vacuum cleaner according to claim 1 or 2 are arranged in a side of the cleaner body.

4.

The hollow forming operation rod, said air inlet of the cyclone type dust collecting apparatus disposed to the rear of the cleaner body, communicates the said cleaner body and the intake opening in the hollow portion of the operating rod the vacuum cleaner according to claim 1 or 2 comprising.

5.

The vacuum cleaner according to any one of claims 1 to 4 wherein the operating rod is telescopic.

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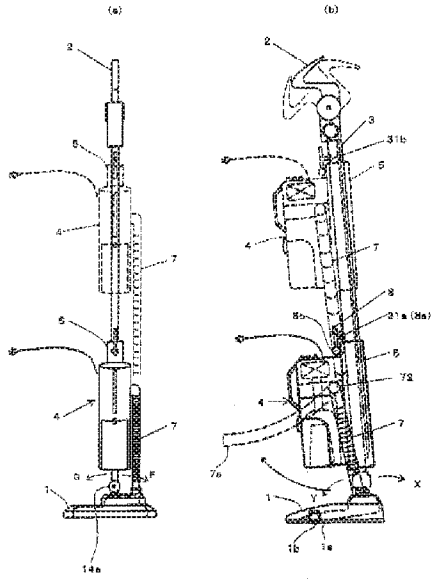
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最終頁に続く

(54)【発明の名称】電気掃除機

(57)【要約】
【課題】吸気口部をできるだけスキマの奥に挿入することが可能な電気掃除機を提供すること。
【解決手段】一端に塵埃を吸引する吸気口部１，他端にハンドル部２を配した操作竿３と，空気とともに前記吸気口部１より吸気した塵埃を遠心力で空気と分離して集積するサイクロン式集塵装置６を内蔵し，前記吸気口部１と前記ハンドル部２との間を前記操作竿３に沿って摺動自在且つ位置固定可能に設けられた掃除機本体４と，を有し，前記吸気口部１は，前記操作竿３の前後方向に回動自在に連結され，前記掃除機本体４は，前記操作竿３の前方に設けられる。
【選択図】図１



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【特許請求の範囲】
【請求項1】
一端に塵埃を吸引する吸気口部，他端にハンドル部を配した操作竿と，
空気とともに前記吸気口部より吸気した塵埃を遠心力で空気と分離して集積するサイクロン式集塵装置を内蔵し，前記吸気口部と前記ハンドル部との間を前記操作竿に沿って摺動自在且つ位置固定可能に設けられた掃除機本体と，を有し，
前記吸気口部は，前記操作竿の前後方向に回動自在に連結され，
前記掃除機本体は，前記操作竿の前方に設けられたことを特徴とする電気掃除機。
【請求項2】
前記吸気口部と前記ハンドル部との間を前記操作竿に沿って摺動自在且つ位置固定可能に設けられた保持台を有し，
前記掃除機本体は，前記保持台を介して，前記操作竿の前方に着脱可能に設けられてなる請求項１に記載の電気掃除機。
【請求項3】
前記吸気口部と，前記サイクロン式集塵装置の吸気口を伸縮および屈曲自在の吸気管で連通し，該吸気管の一端を前記吸気口部に着脱自在に連結し，前記吸気口は，前記掃除機本体の側方に配置されてなる請求項１又は２に記載の電気掃除機。
【請求項4】
前記操作竿を中空に形成し，前記サイクロン式集塵装置の吸気口を前記掃除機本体の後方に配置し，前記吸気口部と前記掃除機本体とを前記操作竿の中空部で連通してなる請求項１又は２に記載の電気掃除機。
【請求項5】
前記操作竿が伸縮自在である請求項１～４のいずれかに記載の電気掃除機。

【発明の詳細な説明】
【技術分野】
【0001】
本発明は，主に家庭用に用いられる電気掃除機に関し，特に集塵機本体が操作竿に摺動自在に設けられていると共に，掃除機本体として小型軽量で吸込み機能の高いサイクロン式吸引装置を採用した電気掃除機に関するものである。
【背景技術】
【0002】
従来，一端に塵埃を吸引する吸気口部，他端にハンドル部を配した操作竿と，空気とともに前記吸気口部より吸気した塵埃を集積する集塵部とを具備する電気掃除機として，前記集塵部を前記操作竿に摺動自在に設けたものが知られている（特許文献１参照）。
前記特許文献１に示された電気掃除機では，吸気口部が操作竿の一端に係止され，塵埃を含む空気流を布袋で沪過して塵埃を除去する掃除機本体が，吸気路を形成する中空の操作竿に摺動自在に係止されている。
そして，床面を掃除する時には前記掃除機本体を前記操作竿上の吸気口部に近い場所に固定し，その位置で掃除を行う。
また，スキマなどの掃除時には，前記掃除機本体を前記吸気口部より遠い位置，即ち前記操作竿の上端部に近い位置に移動させて，前記掃除機本体が周囲に干渉しないようにして前記吸気口部をスキマに挿入して掃除をするように構成されている。
この従来例では，前記のような構成により，広い場所を掃除する通常の掃除時と，狭い場所を掃除する一時的な掃除時とで，前記掃除機本体の位置を変えうるようにして，操作の利便を図っている。
【特許文献1】特開平２－７４２２５号公報
【発明の開示】
【発明が解決しようとする課題】
【0003】
しかしながら，前記の従来公知の電気掃除機によると，塵埃を含む空気流を布袋で沪過

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して塵埃を除去する掃除機本体を採用しているため，吸気が布袋を通過する時に布袋の抵抗により吸込み力が低下するという宿命があり，その抵抗を補うために大きな出力を有する電動機を必要とし，そのために掃除機本体が大きくなり，或いは騒音が大きくなるなど，使用性，利便性に欠けると言う課題を有していた。

また，あくまでも上記吸気口部からしか塵埃の吸入が出来ない構造であったため，吸気口部が通らないような隙間や，机上や壁，天井などの高い位置の掃除，さらには，奥深い隙間の奥の掃除に適していないと言う課題を有していた。

本発明は上記したような従来の電気掃除機に内在する上記課題の解消を目的とするものである。

【課題を解決するための手段】

【0004】

前記目的を達成するために本発明は，一端に塵埃を吸引する吸気口部，他端にハンドル部を配した操作竿と，空気とともに前記吸気口部より吸気した塵埃を遠心力で空気と分離して集積するサイクロン式集塵装置を内蔵し，前記吸気口部と前記ハンドル部との間を前記操作竿に沿って摺動自在且つ位置固定可能に設けられた掃除機本体と，を有し，前記吸気口部は，前記操作竿の前後方向に回動自在に連結され，前記掃除機本体は，前記操作竿の前方に設けられたことを特徴とする電気掃除機として構成されている。

ここで用いられるサイクロン式集塵装置は，旋回流により生じる遠心力で空気と塵埃とを分離するので効率がよく，騒音についても低いので，室内で用いられる掃除機として極めて使用性，利便性に優れたものということができる。しかも，そのような掃除機本体が前記操作竿の前記吸気口部と前記ハンドル部との間を前記操作竿に沿って摺動自在且つ位置固定可能に取り付けられるので，掃除機本体をハンドル部に近い位置に固定することで，狭い場所やカーテンなどの高い場所にも自在に使用することが出来，利便性が更に向上する。

また，前記掃除機本体は，前記吸気口部と前記ハンドル部との間を前記操作竿に沿って摺動自在且つ位置固定可能に設けられた保持台を介して，前記操作竿の前方に着脱可能に設けられてもよい。

この場合，前記掃除機本体を前記保持台から切り離して使用することが出来るので，前記掃除機本体を自由に持ち運ぶことが出来，掃除機としての利便性が更に向上する。またこの場合，前記操作竿への取付けが堅牢となり，寿命の長期化が図れる。

更に，上記掃除機本体を上記ハンドル部方向に常時付勢する付勢手段を具備した場合には，掃除機本体を操作竿に沿って軽く移動させることができるようになり操作者の負担が軽減される。上記付勢手段として，略一定荷重の付勢力を上記掃除機本体に与えるバネを採用することができる。このように構成することで，簡素な装置で，掃除機本体を操作竿に沿って移動させるときの力の変動のない装置を提供することができる。この場合，上記付勢手段による上記付勢力を，上記操作竿上を摺動する摺動体の荷重とほぼ同一とすることで，上記掃除機本体の移動に要する力をほぼ完全に無くすことが出来，操作者の負担は著しく軽減される。

また，前記吸気口部と，前記サイクロン式集塵装置の吸気口を伸縮および屈曲自在の吸気管で連通し，該吸気管の一端を前記吸気口部に着脱自在に連結し，前記吸気口を前記掃除機本体の側方に配置したものとする事ができる。これによって，吸気口部とサイクロン式集塵装置とを柔軟に接続することが出来，さらに前記吸気管の吸気口部との接続を離す事で，吸気管そのもので塵埃を吸込むことが出来，更に狭い隙間の掃除が可能となる。

また操作竿に関する別の構造として，前記操作竿を中空に形成し，前記サイクロン式集塵装置の吸気口を前記掃除機本体の後方に配置し，前記吸気口部と前記掃除機本体とを前記操作竿の中空部で連通するように構成することが考えられる。この場合，前記吸気管そのものを省略することが出来，操作竿部について著しい簡素化が可能である。

更に，前記操作竿を伸縮自在に構成することで，収納時の場所の問題などが解消される。掃除機本体に把持部を設けることで，操作性は一挙に向上する。このような構造に関する変更も本発明の範囲に属するものである。

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【発明の効果】

【0005】

本発明によれば，前記サイクロン式集塵装置を用いているため，旋回流により生じる遠心力で空気と塵埃とを分離するので効率がよく，騒音についても低いので，室内で用いられる掃除機として極めて使用性，利便性に優れたものということができる。しかも，前記掃除機本体が前記操作竿の前記吸気口部と前記ハンドル部との間を前記操作竿に沿って摺動自在且つ位置固定可能に取り付けられるので，掃除機本体をハンドル部に近い位置に固定することで，狭い場所やカーテンなどの高い場所にも自在に使用することが出来，利便性が更に向上する。

また，前記掃除機本体は，前記吸気口部と前記ハンドル部との間を前記操作竿に沿って摺動自在且つ位置固定可能に設けられた保持台を介して，前記操作竿の前方に着脱可能に設けられてもよい。

この場合，前記掃除機本体を前記保持台から切り離して使用することが出来るので，前記掃除機本体を自由に持ち運ぶことが出来，掃除機としての利便性が更に向上する。またこの場合，前記操作竿への取付けが堅牢となり，寿命の長期化が図れる。

更に，上記掃除機本体を上記ハンドル部方向に常時付勢する付勢手段を具備した場合には，掃除機本体を操作竿に沿って軽く移動させることができるようになり操作者の負担が軽減される。上記付勢手段として，略一定荷重の付勢力を上記掃除機本体に与えるバネを採用することができる。このように構成することで，簡素な装置で，掃除機本体を操作竿に沿って移動させるときの力の変動のない装置を提供することができる。この場合，上記付勢手段による上記付勢力を，上記操作竿上を摺動する摺動体の荷重とほぼ同一とすることで，上記掃除機本体の移動に要する力をほぼ完全に無くすことが出来，操作者の負担は著しく軽減される。

また，前記吸気口部と，前記サイクロン式集塵装置の吸気口を伸縮および屈曲自在の吸気管で連通し，該吸気管の一端を前記吸気口部に着脱自在に連結し，前記吸気口を前記掃除機本体の側方に配置したものとする事ができる。これによって，吸気口部とサイクロン式集塵装置とを柔軟に接続することが出来，さらに前記吸気管の吸気口部との接続を離す事で，吸気管そのもので塵埃を吸込むことが出来，更に狭い隙間の掃除が可能となる。

また操作竿に関する別の構造として，前記操作竿を中空に形成し，前記サイクロン式集塵装置の吸気口を前記掃除機本体の後方に配置し，前記吸気口部と前記掃除機本体とを前記操作竿の中空部で連通するように構成することが考えられる。この場合，前記吸気管そのものを省略することが出来，操作竿部について著しい簡素化が可能である。

更に，前記操作竿を伸縮自在に構成することで，収納時の場所の問題などが解消される。掃除機本体に把持部を設けることで，操作性は一挙に向上する。

【発明を実施するための最良の形態】

【0006】

本発明の実施の一形態について添付図を参照して，本発明を具体化した実施の形態について説明し，本発明の理解に供する。

ここに図１は，本発明の一実施形態にかかるサイクロン式電気掃除機の外観図（同図（ａ）はその正面図，同図（ｂ）はその側面図），図２は，図１に示した掃除機本体の断面図（同図（ａ）は縦断面図，（ｂ）は，（ａ）のＡ－Ａ断面図である。

図１に示すように，一端に吸気口部１が係止され，他端にハンドル部２が回動自在に設けられた操作竿３に，サイクロン式集塵装置６（図２参照）を内部に具備する掃除機本体４が摺動自在に係止されている。

前記吸気口部１と前記掃除機本体４は蛇腹ホースなどからなる伸縮及び屈曲自在に形成した吸気管７で連結され，該吸気管７は掃除機本体４の前記操作竿３に沿った移動にともなって伸縮する。

【0007】

１ｂは，吸気口部１に回転自在に配された回転ブラシで，電動機，あるいは空気流により回転し，絨毯などの毛内部の塵埃を掻き出す。また，図２に示す６４は，掃除機本体４

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を制御する制御装置，６５は掃除機本体４の運転を操作する操作部である。

前記吸気管７は，一端が吸気口部１に連結され，他端が前記サイクロン式集塵装置６の吸気口７２に連結されている。これにより，吸気口部１の吸込口１ａとサイクロン式集塵装置６内が連通され，塵埃は吸気口部１より吸気管７を通りサイクロン式集塵装置６内に吸引される。吸引された空気流はダストカップ８３内で旋回し，遠心力で塵埃が分離されてダストカップ８３内に堆積する。塵埃を分離され浄化された空気は排気筒Ｈの排気口Ｈａより排気筒Ｈ内に入り，上部の電動送風機Ｍに吸引され，スリットＳより外部へ排出される。また，排気口Ｈａにはメッシュ状のフィルターＦが固定されており，分離しきれなかった塵埃を捕獲する。

このようにサイクロン式集塵装置６は空気の流れの過程で塵埃を除去し，単に空気流を発生させ通過させているだけであるので，ロスの発生も少なく，軽量で小型化でき，騒音も少なく，使用性，操作性に優れたものであり，特に手元に移動させて使用する時の軽量，小型感により使用性，操作性に優れたものである。

また，前記吸気管７の一端は，テーパによる勘合，あるいはロックなどにより吸気口部１と着脱自在に連結され，他端はサイクロン式集塵装置６に設けたの吸気口７２（図１（ｂ））に回動自在に連結される。従って，前記吸気口部１より外した吸気管７の一端を，図１に破線７ａで示すように掃除すべき位置へ自由に動かすことが出来，上下左右任意の場所を掃除することができる。これにより，任意の位置にある隙間，あるいはカーテン，更には高い位置の机上などを手軽に掃除することができる。

【0008】

本実施形態では，前記掃除機本体４は，操作竿３上を摺動する保持台５に係着されている。前記操作竿３と保持台５間には，保持台５を前記操作竿３上で固定するロック手段が設けられ，保持台５が操作竿３上の所定の位置に保持される。

前記ロック手段は，操作竿３上の任意の位置に複数設けられる。例えば図１及び図２に示す操作竿３上の凹溝３１ａ，３１ｂがこのロック手段の一部であり，保持台５にピン８ｂを中心に回動自在に設けたロックレバー８が前記凹溝３１ａ又は３１ｂに噛合することで，保持台５が操作竿３上で固定される。ロックレバー８は，バネ（不図示）で常時前記凹溝３１ａに嵌る方向に弾性付勢されているので，前記噛合状態はロックレバー８を前記バネの付勢方向とは反対の方向に操作することにより解除できる。

掃除機本体４を操作竿３に沿って移動させる時は，前記のようにロックレバー８を解除し，把持部６２を持って移動させる。これにより掃除機本体４は，保持台５とともに容易に移動でき，他の凹部３１ｂにロックレバー８を係合させて固定することができる。従って，該凹部３１ａ，３１ｂを適当位置に増設することにより多段階の位置に掃除機本体４を固定することができる。このロック手段は，摩擦力を有するシューを保持台５に係止し，操作竿３外周を締め付ける方式でもよい。この場合に掃除機本体４を移動させる時には，前記シューを緩めて移動させることになる。これによると凹部３１ａ，３１ｂを必要とせず無段階の好みの位置に掃除機本体４を固定することができる。

このように掃除機本体４を所定位置に移動することにより，床面の掃除時には，掃除機本体４を吸気口部１側に固定し重心を床側に，また，図３に示すようにスキマ，あるいは奥深い場所の掃除時にはハンドル部２側に移動して掃除機本体４と吸気口部１間を長くして効率よく使用でき使用性，利便性が向上する。

また，この時，ハンドル部２を床に当接しない位置に回動することにより更に狭い場所でも効率よく掃除することができる。特に，小型，軽量のサイクロン式集塵装置６を備えてなる掃除機本体４を摺動可能に取り付けることによりハンドル部２側に移動させても荷重の負担が軽減され快適な使用性が得られる。

【0009】

次に掃除機本体４を保持台５に着脱するための構造について説明する。図２において，保持台５下端に設けた凹部５ａに掃除機本体４下端に突出した凸部６ａを係合し，また，掃除機本体４上端部に回動自在に設けられた保持レバー９は常時下向きに弾性付勢されており，保持台５の上端に設けられた凸部５ｂと噛合うことで，前記掃除機本体４は保持台

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５にその下端部において前記凹部５ａと凸部６ａが，また上端部で凸部５ｂと保持レバー９が噛合して保持台５に固定される。こうして，掃除機本体４と保持台５とは，一体となって操作竿３上を軸方向に摺動する。

また，保持レバー９を解除して掃除機本体４を保持台５から外すと共に，吸気管７の一端を吸気口部１から取り外すことにより，操作竿３や吸気口部１と分離して掃除機本体４単体で電気掃除機として使用することができる。すなわち，ハンディタイプとして高所や自動車内などの掃除に使用することができる。

一方，保持台５は，ベルト状のバネ１０で上方向，ここではハンドル部２の方向に常時付勢されている。即ち，バネ１０の一端は掃除機本体４，ここでは保持台５に係止され，他端は回転車輪部１１に巻き付けられ，掃除機本体４をハンドル部２の方向に付勢する。バネ１０自身は，操作竿３の外殻を構成するカバー３１ｃでカバーされ，バネ１０が露出し人の指が触れたり或いは破損することを防止するとともに美観の保持が図られている。

【0010】

前記バネ１０は定荷重バネで一定荷重を付勢する。バネ１０の付勢力は掃除機本体４や保持台５などからなる被懸架体の重量とほぼ同等，あるいは若干小さい値に設定されている。これにより，前記ロックレバー８を外すと共に，操作竿３を傾斜させることで掃除機本体４はバネ１０の付勢力で自動的にハンドル部２の方向に移動させることができるので，掃除機本体４を人が引き上げる必要がなく操作性，利便性が向上する。

また，掃除機本体４を反ハンドル部２方向に移動する時は，前記ロックレバー８を開放して繰作竿３を垂直に立てるだけで掃除機本体４などの被懸架体の自重で反ハンドル部２方向に移動し操作性，利便性が向上する。しかも，バネ１０による付勢力と掃除機本体４などの被懸架体の荷重の差分だけの一定した荷重で移動するので，操作竿３の傾斜程度により掃除機本体４の移動する速度が変化することなく，掃除機本体４の移動期間中は一定速度でスムーズに移動し危機感や違和感を生じない。また，掃除機本体４を手で移動させる場合も，掃除機本体４の荷重がバネ１０にて相殺されるので，掃除機本体４を移動させる力が少なくてすみ操作性が向上する。

また，掃除機本体４の操作竿３に沿う移動を固定するには，バネ１０の移動を制止するようにバネ１０を保持して固定してもよい。これにより，バネ１０の移動が阻止されるので掃除機本体４を固定することができる。

また，操作竿３は図２（ａ）に示すように，中空の移動操作竿３１と，この移動操作竿３１の中空部に摺動自在に嵌合する固定操作竿３２の２重構成としてもよい。これにより操作竿３は，伸縮自在に構成される。図２（ａ）は，操作竿３を伸長した状態図で，破線で示す移動操作竿３１は，該移動操作竿３１を吸気口部１側に収納した状態を示す。固定操作竿３２外周と移動操作竿３１間は摺動材３３ａ，３３ｂを介して円滑に摺動できるように構成されている。また，この移動操作竿３１と固定操作竿３２の固定は，所定位置にロック手段（不図示）を設け所定長さでロックするようにしてもよい。これにより，ハンドル部２を適当な位置に設定した状態で使用したり，全長を低く短縮して電気掃除機を収納格納することができる。

【0011】

掃除機本体４と前記保持台５は，一方を移動操作竿３１外周に，他方を固定操作竿３２外周にベアリングなどの摺動部材１２で摺動自在に保持し(図２（ｂ）参照)，前記固定操作竿３２下端は吸気口部１の第２の接続管１４とテーパで嵌合固定するなどで着脱自在に係止する一方，吸気口部１は第１の接続管１３と球状の摺動部１３ａでＸＹ方向（図１（ｂ）参照）に回動自在に連結し，該第１の接続管１３は第２の接続管１４と回転軸１４ａでＰＱ方向（図１（ａ）参照）に回動自在に連結し，吸気口部１は操作竿３に対してＸＹ，およびＰＱ方向に自在に回動できるように構成することが好ましい。

吸気管７の吸気口部１への接続部位は，吸気口部１の吸込口１ａに連通する部位であればどこでもよいが，前述のように吸気口部１と操作竿３はＸ－ＹおよびＰ－Ｑ方向に回動するので，操作竿３と一体に可動する第２の接続管１４に吸気管７を接続させることが望ましい。これにより，吸気管７は掃除機４の移動による伸縮だけが行われ，捩れや屈曲に

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よる疲労，破損が軽減される。また，図２に示す例では，第２の接続管１４は，第１の接続管１３に接続しているが，この場合にはＸ－Ｙ方向に操作竿３が可動するときには第１の接続管１３と一体に揺動するので，この方向の捩れや屈曲による疲労，破損が軽減される。

【実施例】

【0012】

図４は，吸気路７１を操作竿３の内部に設けた本発明の実施例にかかる電機掃除機で，掃除機本体４の吸気路部を示す縦断面図である。他の構成は前記図１，図２に示す実施形態と同様であるので詳細は省略する。

この場合，操作竿３は前記実施の形態と同様に移動操作竿３１と固定操作竿３２で構成され，移動操作竿３１が固定操作竿３２内を摺動し伸縮する。ここでは固定操作竿３２が中空で形成され吸気路７１を形成する。

固定操作竿３２の上端部近傍には外部に向かう開口部３５が形成され，保持台５に形成された空間３６と連通している。３６１，３６２は，前記空間３６を密室状態に構成するために前記保持台５に設けられたシール材である。前記保持台５に設けた空間３６は，図示のように吸気口６６を介してサイクロン式集塵装置６に連通する。従って，固定操作竿３２の吸気通路７１の下端に吸気口部１を装着することにより，吸気口部１の床面に対して開口した吸込口１ａと操作竿３内部の吸気路７１とが連通してサイクロン式集塵装置６と吸気口部１との吸気路が形成される。

前記空間３６は保持台５の上下方向に長く形成されているので，掃除機本体４が図４（ａ）のように吸気口部１付近に位置する状態から，同図（ｂ）のように最上部に位置する状態まで移動しても，前記固定操作竿３２は常に開口部３５を介して前記空間３６と連通しているので，掃除機本体４がどこにあっても，電動送風機Ｍを駆動すると吸気口部１の吸込口１ａより床上の塵埃が空気とともに吸引され固定操作竿３２の吸気路７１を通り，開口部３５から空間３６を経て吸気口６６よりサイクロン式集塵装置６内に吸引される。吸引されたサイクロン式集塵装置６に流入した塵埃を含んだ空気流は旋回して塵埃を分離し，浄化された空気流は排気筒Ｈの排気口Ｈａより排気筒Ｈ内部に入り，上部の電動送風機Ｍに吸引され，スリットＳより外部へ排出される。分離された塵埃はダストカップ６３内に堆積する。また，排気口Ｈａにはメッシュ状のフィルターが装着されている点は実施形態と同様であり，分離しきれなかった塵埃を捕獲する。

図４（ｂ）の状態では，吸気口部１と電気掃除機本体４間しが長くなるので電気掃除機本体４間が邪魔することなく，狭いスキマへ吸気口部１を挿入できて掃除することができる。

また，吸気口部１を取り外すことにより，更に狭いスキマに操作竿３の先端を挿入して先端の開口部より吸気して掃除することができる。更に吸気口部１を外してこの操作竿３の先端に種々の吸込口を接続することにより効率よく狭いスキマの掃除をすることができる。

以上，本発明の各種実施形態及び実施例につき説明してきたが，これまでに示してきたものは発明の構成の例示であり，本発明の範囲はこれに限定されるものではなく，図５に示すように複数の操作竿３ａ，３ｂを具備し，該複数の操作竿３ａ，３ｂ上を保持台５が摺動する構成のものなど，発明の主旨を逸脱しない範囲で種々の変更を加えて実施することができる。

【図面の簡単な説明】

【0013】

【図1】本発明の一実施形態にかかるサイクロン式電気掃除機の外観図（同図（ａ）はその正面図，同図（ｂ）はその側面図）。

【図2】図１に示した掃除機本体の断面図（同図（ａ）は縦断面図，（ｂ）は，（ａ）のＡ－Ａ断面図）。

【図3】掃除機で狭い隙間を掃除している状態を示す概念図。

【図4】操作竿自身を吸気管として実施例を示す断面図（（ａ）は，掃除機本体が吸気口

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部近傍に位置している状態を示し，（ｂ）は，掃除機本体がハンドル部側に位置している状態を示す図）。

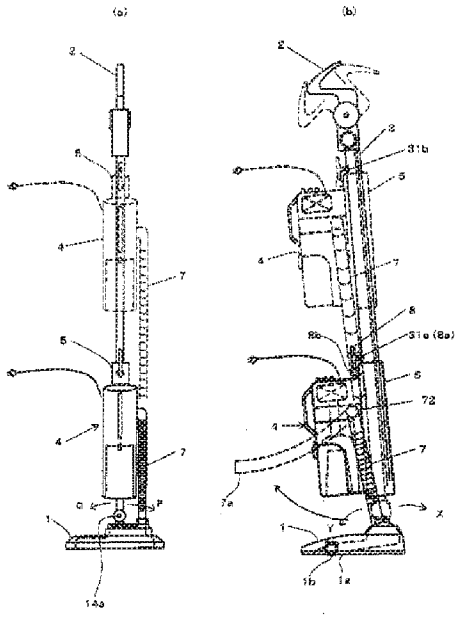
【図5】操作竿を２個有する掃除機に関する実施例を示す掃除機の正面図。

【符号の説明】

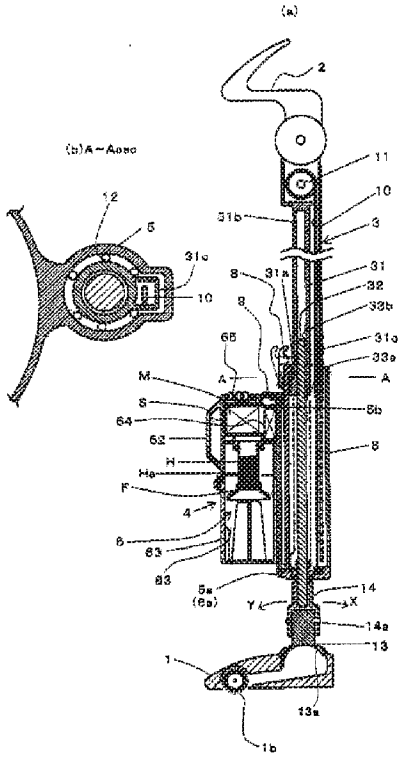
【0014】

１…吸気口部
２…ハンドル部
３…操作竿
４…掃除機本体
５…保持台
６…サイクロン式集塵装置
７…吸気管
８…ロックレバー
９…保持レバー
１０…バネ
１２…摺動部材
１３，１４…接続管

【図1】

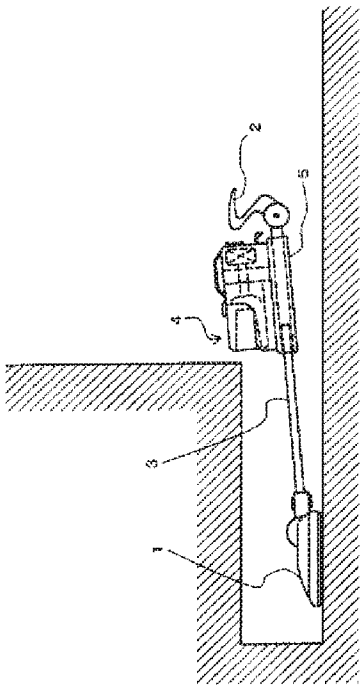


【図2】

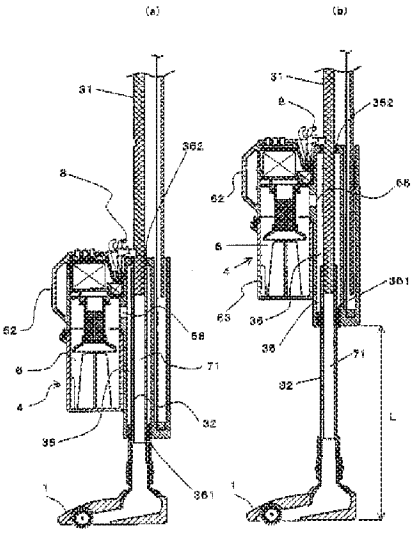


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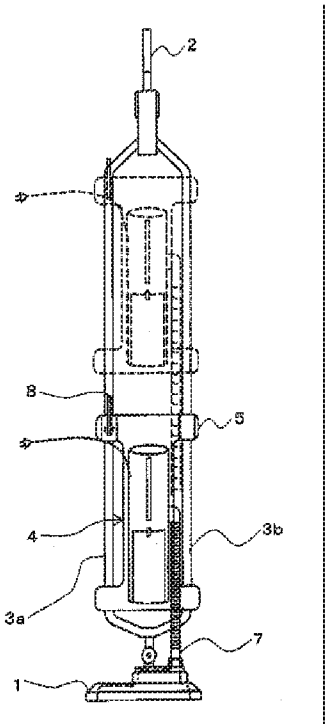
【図3】



【図4】



【図5】



Ｆターム(参考) 3B061 AA05 AA18 AA26 AA42 AA43
3B062 AH02

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Portable cleaner with no rope

Page bookmark CN1726857 (A) - Portable cleaner with no rope

Inventor(s): JOHNY BAORUINATO [CN] ±

Applicant(s): BAOSHIDE ELECTRIC TOOLS CO LTD [CN] ±

Classification: - international: ***A47L5/00; A47L9/16***

- cooperative:

Application number: CN2005173666 20050519

Priority number(s): CN2005173666 20050519

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Abstract of CN1726857 (A)

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A portable cleaner without power cord is composed of an elongated casing consisting of front casing and back casing, a battery unit, a motor, a blower, a cyclone separator for separating air from dust, a dust collecting cavity, and an air exhausting outlet.

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DESCRIPTION CN1726857

Portable cordless vacuum cleaner

Those of skill

The present invention relates to a relatively small draw or attract dust tool, especially a hand-held portable cordless vacuum cleaner.

Background technique

Vacuum cleaner can be used, such as cleaning cars. And, it also constitutes a domestic appliance, for example, which may be used Clean tablecloth meal bread crumbs left. Typically, the vacuum cleaner is vertically hung on the wall, for example, on the kitchen wall. Therefore, the vacuum cleaner must be lightweight, easy to grip and not only for electricity consumption, and for which it issued the air Cleanliness is concerned it must be effective.

Existing cordless cleaner comprises a primary or rear housing and provided with a filter bag made of paper front housing. After cleaning or changing the filter bag, the housing can be connected to the front and rear housing lock for operation. This includes paper filter One drawback to the design of the package, from the dust, such as bread crumbs or workpiece lessons sanding dust after cleaning emissions Air may not completely clean the air. Another disadvantage is that this paper filter bag from time to time update or require cleaning. Therefore, desirable to provide a more efficient and require less maintenance of the filter means.

in U.S. Patent No. 4,373,228, in particular in Figures 1 and 2, which discloses a portable power for home Movable vacuum apparatus. The vacuum cleaner includes a main housing with a handle, and the motor is located below the main housing and a removable Connected to the fan housing on the main housing. Having to draw a clear dust on its lower end, the motor and fan housing Clean the head. Parallel to each other and to the main housing of the cyclone has two series, and two dust containment cavity. In part through After the impeller, which left the cyclone dust-free air into the fan housing and discharged therefrom. More preferably, the clean air Air from the fan housing to discharge through the ejection outlet, the ejection outlet is located adjacent to or between the suction opening of the appliance.

It must be emphasized that this is not a cordless vacuum cleaner, and is a vertical type. Its relatively heavier, and for sucking Family of large amounts of gas or dust, for example from the carpet. For a table or draw on the dirt car seat it will be too large.

British Patent No. 2,372,435 cites a multi-cyclone vacuum cleaner. Similarly, the vacuum cleaner body Volume huge, heavy and does not apply to cordless.

SUMMARY

In order to overcome existing shortcomings, one of the technical problems to be solved by the present invention is to provide a portable no longer Rope vacuum cleaner provided with an efficient air filtration apparatus and substantially without increasing its weight and / or size.

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The present invention solves the technical problem of the second is to provide an air filtering device a portable cordless vacuum Device, the air filtering device requires only a few repair and maintenance.

Three invention solves the technical problem of providing an air filtering device a portable cordless vacuum is, at the time of the need to remove accumulated dust, the air filter unit can be convenient operation.

Four invention solves the technical problem of providing an air filtering device a small portable cordless suck Dust, the air filtering device comprises at least one cyclone.

The present invention solves the technical problem of the technology used in the program are: a portable cordless vacuum cleaner, comprising:

a) elongated housing, having

a1) has a connecting wall and the front housing includes a front chamber, wherein said connecting wall is provided with openings, and

a2) has a connecting wall and the rear housing comprising rear chamber,

b) means for detachably connecting the front housing to the rear housing of the apparatus,

c) forming a handle on the rear housing,

d) a motor accommodated in said rear cavity,

e) connected to the motor and is housed in the chamber after the fan through the shaft,

f) for energy to the motor, and the same in the battery accommodating chamber after

g) for supplying electrical energy from the battery to the switch on the motor,

h) is provided on the rear case and for distributing a clean air exhaust port,

i) provided in the connecting wall and seals the connection between the walls,

j) extending from said connecting wall to the front chamber and through at least one opening of said cyclone, the cyclone apparatus Have

j1) an inlet for receiving air and dust,

j2) a first outlet for discharging the air cleaner, wherein the first outlet is provided in the rear chamber, and

j3) a second outlet for discharging dust, wherein the second outlet is disposed in the front chamber, and

k) channel, which has a front for sucking air and dust from the object to be cleaned on the opening, and for the After the opening of air and dust into the inside of the cyclone inlet.

The beneficial effects of the present invention, corresponding to the present invention, at least one cyclone and the cleaner air and dust inhalation Mouth linked. This cyclone represents a very efficient dust filters, and even its size should be no smaller than existing portable Size vacuum cleaner cord. In particular, it sets the mounting cyclone inside the enclosure provides a compact set.

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According to the gas stream to be cleaned and the size of particles in the air, to note that, you can also use 2, 3 or even More cyclones. Their small size can be close to 2.5 cm. Typically, if you use only one cyclone with a diameter it may be less than half the diameter of the rear housing. Other parts of the housing can be used as the front dust accumulation space.

In the present embodiment, the air and dust to pass at least a portion of the channel disposed at the bottom of the front of the housing.

The channel may be a dust pipe or tube. It may include a second and a second portion. The first portion can be the front of the housing relative Linking; can even be integrated therewith. The second portion of the channel may be provided in the cavity and curve. Even the current housing Connected to the connecting walls of the rear housing wall is connected through a sealing ring, in which said two parts of the opening in a straight line.

The cyclone made of a thin and hard plastic material, in order to subtract weight.

Other embodiments as defined by the appended claims.

The following reference to the accompanying drawings of the preferred embodiments of the present invention will be described.

BRIEF DESCRIPTION

Figure 1 is a side view of a housing having a cordless cleaner, a front and a rear of the housing, wherein the front and rear cases separated from each other, The front housing and the separated side view display, then the display case in a sectional view.

Figure 2 is a rear view of the front housing 3 along the Z-Z direction.

Figure 3 is a view of the front of the housing along the P-P 2 to the side view

Figure 4 is a perspective external view of the vacuum cleaner, wherein the front and rear cases are separated. as well as

Figure 5 is a perspective external view of the vacuum cleaner, which shows one of the internal structure.

The same or similar elements are provided the same reference numbers in the figures.

[30]

Figure: 2. 4 cordless vacuum cleaner. 6 chassis. The front housing 8. After the housing 10. Front chamber 12. Connecting wall 14. Opening 16. After the chamber 18. Connecting wall 20. Ring 22. Arrow 24. Locking device 26. Handle 28. switch 30. Motor 32. Fan 34. Shaft 36. Battery 38. The exhaust port 40. Front opening 42. Cyclone 44. Wall 46. inlet 48. The first outlet 50. Second dust outlet 52. Channel 52a. The front portion 52b of the channel. After the channel 54. Dust heap a. Air d. Dust m. The cyclone diameter

detailed description

According to Figures 1 to 5, a portable vacuum cleaner housing 2 includes an elongated front and the rear housing 6 has a housing 8. The top of the front housing 6 toward its front end is rounded, and the rear housing 8 having a substantially rectangular shape. The housing 6 comprises a front A front chamber 10 which is provided with an end wall and the connecting wall 12, the connecting wall 12 is provided with a central hole of the ring 14. The connecting wall 12 Literally having substantially D-shaped (inclined by 90 °), as shown in Figures 2 and 5. Most of the front chamber 10 for receiving the dust d. After the demolition, the dust can be discharged d.

The rear housing 8 comprises a rear cavity 16, and has a flat end walls and the connecting wall 18. The top wall 18 is also Rounding. Walls 12 and 18 with respect to the housing extension shaft 4 is arranged vertically.

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[5]

A nearly D-shaped seal 20, which is made of rubber, is disposed between the connecting wall 12 and the wall 18 is connected. In the present Ming, the seal ring 20 located in a recess 18 connected to the outer surface of the wall. Once the front housing 6 by the arrow 22 (see FIG. 4 and FIG. 5)And against the direction of movement in the rear housing 8, the ring 20 will seal the frame-shaped connecting wall 12. Shaped seal State, the seal device or can be connected to the locking means 24a, 24b lock.

As shown in Figure 1, the upper portion of the rear housing 8 forming a handle 26. In the following handle 28 is provided with an electrical switch. After the chamber 16 containing Motor 30, connected to the fan motor 30 through the shaft 34. In the rear chamber 16 is mounted battery 36. The battery 36 is used to suck Users dust 2 through the switch 28 and the starter motor 30 when there is a demand.

The top wall of the rear housing 8 comprises a clean air exhaust port for releasing a 38. The exhaust fan 32 is disposed close to the port 38 Home.

It said air cleaner 2 for the front lower portion of the front housing 6 of the suction opening 40 of the dust separation d. This kind Separated by a wall in the rear housing 16 connected to the cyclone 44 42 implementation. The cyclone 42 is made of plastic. The cyclone Conical portion 42 from the upper portion of the connecting wall 18 extends longitudinally along the interior of the housing 10 to the front, and through the opening 14. That The cyclone has a front for sucking dust d from the opening 40 and the air inlet 46 a, for releasing a Clean Air 48 and a first outlet for discharging dust d inside the front housing 10 removable second outlet 50. The first Outlet 18 is located inside the rear cavity 16, especially near the air outlet 38. The second outlet 50 is located in the middle part of the front chamber 10.

[52]

To dust from the air and a clean d on the object and from the opening 40 into the inlet 46 of the cyclone 42, provided There are channels or channel 52a, 52b. The channel 52a, 52b of the tubular may be used, or, may be incorporated into the bottom side. The channel 52a, 52b comprises a flat bottom front of the housing 6 along the inner bottom wall extending a first or front longitudinal section 52a, and a 8 provided in the rear of the housing or a second curved rear portion 52b. The inlet channel 52a, 52b for absorbing air and a dust of d The front opening 40, and the inlet 46 at its outlet 42 of the cyclone. The ladder in a dust-laden air tangentially into the cyclone 42. Said channels 52a, 52b having a rectilinear cross-section.

Figures 1, 4 and seen from above the cyclone diameter m 42 is less than half the diameter of the rear housing 8. This may be an example m diameter For example, 6 cm.

Air and dust d from a channel 52a, 52b into the channel 42 inside the cyclone, where he separated from each other. The Clean off A distributing air from the exhaust port 38 to the surroundings, and the accumulation of dust d 10 within the first chamber.

It may be provided with a plurality of extending parallel to each other and to the intermediate portion of the front of the housing 6 instead of a single cyclone to the cyclone 42. Entry for each of the cyclone will be connected to 52a, 52b after the opening of the channel. This design can be separated with a very fine D accumulation of dust and piles of advantages. In this embodiment, each cyclone may have, such as a 2.5 cm diameter.

Vacuum cleaner described in Figures 1-5 of 2 relatively inexpensive to manufacture, easy to grip and operate effectively, and requires less Maintenance and repair.

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CLAIMS CN1726857

[1]

1. A portable cordless vacuum cleaner (2), comprising:

a) an elongated housing (4), having

a1) with a connection wall (12) and the front housing (6) includes a front chamber (10), wherein said link Connecting walls (12) with an opening (14), and

a2) has a connecting wall (18) and includes a rear cavity (16) of the rear housing (8),

Connecting means (24) b) for detachable front housing (6) connected to the housing (8),

c) formed in the rear housing (handle 8) (26),

d) receiving the motor (30) in said rear cavity (16) inside,

e) connected to the motor (30) via a shaft (34) and accommodated in the rear air chamber (16) within the Fan (32),

f) for powering said motor (30) to energy, and also housed in said rear cavity (16) The battery (36),

[28]

g) for switching the electric energy supplied from said battery (36) to the motor (30) (26),

h) provided in the rear housing (8) and for distributing the air cleaner (a) an exhaust port (38),

i) provided on the connecting ring wall (18) and said connecting walls (12) between (20),

j) extending from said connecting wall (18) into said front chamber (10) and through said opening (14) At least one cyclone (42), the cyclone (42) having

j1) for receiving air (a) and dust (d) an inlet (46),

j2) for discharging the air cleaner (a) a first outlet (48), wherein said first outlet (48) Disposed in the rear chamber (16), and

j3) for discharging dust (d) a second outlet (50), wherein the second outlet (50) Disposed in said front chamber (10), and

k) channel (52a, 52b), which is provided for sucking air from the object to be cleaned (a) and ash Before dust (d) an opening (40), and means for the air (a) and dust (d) into the After the opening of said cyclone (42) an inlet (46) inside.

[2]

2. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said sealing ring (20) is substantially Having a D-shape.

[3]

3. 1 or 2, wherein the vacuum cleaner as claimed in claim (2), characterized in that: said sealing ring (20) Made of rubber.

[4]

4. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said cyclone (42) Half the diameter (m) is smaller than the rear shell (8) diameter.

[5]

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5. Vacuum cleaner as claimed in claim 4 (2), characterized in that: said cyclone (42) Diameter (m) is substantially 2.5 cm.

[6]

6. Vacuum cleaner as claimed in claim 1 (2), characterized in that: the plurality of cyclones to extend Later front chamber (10) in the inlet of each cyclone (46) connected to said channel (52a, 52b) of An opening (46).

[7]

7. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said channel (52a, 52b) At least a first portion disposed on the bottom of the front housing (10).

[8]

8. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said channel (52a, 52b) At least a second portion (52b) is curved and disposed in the rear chamber (16).

[9]

9. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said channel (52a, 52b) Having a linear cross section.

[10]

10. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said switch (28) is provided Disposed in the handle (26).

[11]

11. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said exhaust port (38) Disposed adjacent said fan (32) at more suitably provided in the rear housing (8) of the top wall.

[18]

12. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said cyclone (42) Connected to the inner surface of the rear housing (8) of the wall (44), wherein said wall comprises said connecting wall (18).

[13]

13. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said cyclone (42) The upper portion of the second outlet (50) from said connecting wall (18) extending through said front chamber (10).

[14]

14. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said front housing (6) towards The front end is rounded, and wherein said rear housing (8) having a substantially rectangular shape.

[15]

15. Vacuum cleaner as claimed in claim 1 (2), characterized in that: said cyclone (42) Made of plastic.

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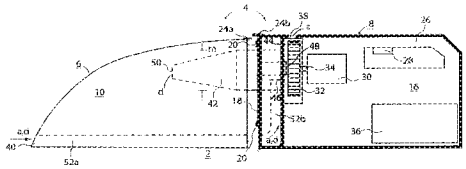
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便携式无绳吸尘器

[57] 摘要

一种便携式无绳吸尘器(2)包括加长机壳(4)，其具有设有前腔(10)的前壳体(6)和设有后腔(16)的后壳体(8)。电池(36)，电机(30)以及风扇(32)均设置在后腔(16)内。两个壳体(6，8)在操作过程中彼此相连。在操作中，旋风器(42)自后壳体(8)延伸至前腔(10)内。该旋风器接受来自前开口(40)的空气(a)和灰尘(d)以便分离。这种传递通过槽道(52a，52b)。被分离的干净空气(a)从设在后壳体(8)上的排气口(38)处排出。并且，被分离的灰尘(d)从旋风器的灰尘出口(50)排放至前腔(10)的中间部位以便聚积并卸出。



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1. 一种便携式无绳吸尘器（2），包括：

a) 一个加长的机壳（4），具有

a1)设有连接壁（12）和包含前腔（10）的前壳体（6），其中所述连接壁（12）设有开口（14），以及

a2)设有连接壁（18）并包含后腔（16）的后壳体（8），

b) 用于可拆卸的将前壳体（6）连接到后壳体（8）上的连接装置（24），

c) 形成于所述后壳体（8）上的手柄（26），

d) 收容在所述后腔（16）内的电机（30），

e) 通过轴（34）连接到电机（30）并收容在所述后腔（16）内的风扇（32），

f) 用于给所述电机（30）以能量，并同样收容在所述后腔（16）内的电池（36），

g) 用于将电能量从所述电池（36）供给到所述电机（30）上的开关（28），

h) 设置在所述后壳体（8）上并用于散发干净空气（a）的排气口（38），

i) 设置在所述连接壁（18）和所述连接壁（12）之间的密封圈（20），

j) 从所述连接壁（18）延伸进所述前腔（10）内并经过所述开口（14）的至少一个旋风器（42），所述旋风器（42）具有

j1)用于接受空气(a)和灰尘（d）的入口（46），

j2)用于排出干净空气(a)的第一出口（48），其中所述第一出口（48）设置在所述后腔（16）内，以及

j3)用于排出灰尘（d）的第二出口（50），其中所述第二出口（50）设置在所述前腔（10）内，以及

k)槽道（52a,52b），其设有用于吸取来自待清洁物体上的空气(a)和灰尘(d)的前开口（40），以及用于将所述空气(a)和灰尘(d)导入到所述旋风器（42）的入口（46）内的后开口。

2. 如权利要求 1 所述的吸尘器（2），其特征在于：所述密封圈（20）大致具有 D 形。

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3. 如权利要求 1 或 2 所述的吸尘器（2），其特征在于：所述密封圈（20）由橡胶制成。

4. 如权利要求 1 所述的吸尘器（2），其特征在于：所述旋风器（42）的直径（m）小于所述后壳体（8）的直径的一半。

5. 如权利要求 4 所述的吸尘器（2），其特征在于：所述旋风器（42）的直径（m）大致为 2.5 厘米。

6. 如权利要求 1 所述的吸尘器（2），其特征在于：多个旋风器延伸至所述前腔（10）内，每个旋风器的入口（46）连接到所述槽道（52a,52b）的后开口（46）上。

7. 如权利要求 1 所述的吸尘器（2），其特征在于：所述槽道（52a,52b）的至少一个第一部分设置在所述前壳体（10）的底部。

8. 如权利要求 1 所述的吸尘器（2），其特征在于：所述槽道（52a,52b）的至少一个第二部分（52b）是弯曲的，并设置在所述后腔（16）内。

9. 如权利要求 1 所述的吸尘器（2），其特征在于：所述槽道（52a,52b）具有直线性剖面。

10. 如权利要求 1 所述的吸尘器（2），其特征在于：所述开关（28）设置在所述手柄（26）上。

11. 如权利要求 1 所述的吸尘器（2），其特征在于：所述排气口（38）设置在临近所述风扇（32）处，更适宜设置在所述后壳体（8）的顶壁上。

12. 如权利要求 1 所述的吸尘器（2），其特征在于：所述旋风器（42）连接到所述后壳体（8）的壁（44）的内表面上，其中所述壁包括所述连接壁（18）。

13. 如权利要求 1 所述的吸尘器（2），其特征在于：所述旋风器（42）的第二出口（50）自所述连接壁（18）的上部延伸至所述前腔（10）内。

14. 如权利要求 1 所述的吸尘器（2），其特征在于：所述前壳体（6）朝着其前端被修圆，并且其中所述后壳体（8）大致具有矩形的形状。

15. 如权利要求 1 所述的吸尘器（2），其特征在于：所述旋风器（42）由塑料制成。

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便携式无绳吸尘器

所属技术领域

本发明涉及一种相对小的灰尘吸取或吸引工具，尤其是一种手持便携式无绳吸尘器。

背景技术

吸尘器可以用来，例如清洁汽车。并且，它也构成一种家用器具，例如，其可以用来清洁餐后桌布上留下的面包屑。通常，吸尘器被竖直的挂在墙壁上，例如，厨房的墙壁上。所以，吸尘器必须重量轻，便于握持以及，不但对于电消耗量，而且对于其所发出空气的清洁度来讲其必须有效的。

现有的无绳吸尘器包括一个主要或后壳体以及一个设有由纸制成的过滤包的前壳体。在清洁或更新过滤包之后，前壳体可以连接至后壳体并锁紧以便操作。这种包括纸质过滤包的设计的一个缺点是，从灰尘，如面包屑或工件上所吸取的砂磨灰尘，清洁后所排放的空气可能不是彻底的无尘空气。另外一个缺点是，这种纸质过滤包需要不时的更新或清洁。因此，需要提供一种更有效并需要较少维护的过滤装置。

在美国专利第4373228号中，尤其在图1和图2中，其揭示了一个用于家用的便携式电动真空器具。该吸尘器包括一个设有手柄的主壳体、电机以及位于主壳体下方并可拆卸的连接到主壳体上的风扇壳体。在其下端部，电机和风扇壳体上具有一个用来吸取灰尘的清洁头部。该主壳体具有两个串连的并互相平行的旋风，以及两个灰尘收容腔。在穿过部件的叶轮之后，该离开了旋风的无尘空气进入风扇壳体并从其上排出。更佳的是，该无尘空气从风扇壳体经过喷射出口而排出，该喷射出口紧邻于或位于该器具的吸入开孔之间。

必须强调的是，这种吸尘器不是无绳的，并且是竖直型的。其相对重些，并用于吸取家庭里的多量的气体或灰尘，例如来自地毯上的。其用于吸取桌子或汽车坐位上的灰尘将会太庞大。

英国专利第2372435号例举了一个多旋风式的真空吸尘器。同样，这种真空吸尘器体积庞大，比较重并且不适用于无绳方式。

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发明内容

为了克服现有的不足，本发明所要解决的技术问题之一是，提供一个加长的便携式无绳吸尘器，其设有有效的空气过滤装置而大体上没有增加其重量和/或尺寸。

本发明所要解决的技术问题之二是，提供一个设有空气过滤装置的便携式无绳吸尘器，该空气过滤装置只需要少量的维修和维护。

本发明所要解决的技术问题之三是，提供一个设有空气过滤装置的便携式无绳吸尘器，在所聚积的灰尘需要取出时，该空气过滤装置可以被方便的操作。

本发明所要解决的技术问题之四是，提供一个设有空气过滤装置的小型便携式无绳吸尘器，该空气过滤装置包括至少一个旋风器。

本发明解决其技术问题所采用的技术方案是：一种便携式无绳吸尘器，包括：

a) 加长机壳，具有

a1)设有连接壁和包含前腔的前壳体，其中所述连接壁设有开口，以及

a2)设有连接壁和包含后腔的后壳体，

b)用于可拆卸的将前壳体连接到后壳体上的连接装置，

c)形成在所述后壳体上的手柄，

d)收容在所述后腔内的电机，

e)通过轴连接到电机并收容在所述后腔内的风扇，

f)用于给所述电机以能量，并同样收容在所述后腔内的电池，

g)用于将电能量从所述电池供给到所述电机上的开关，

h)设置在所述后壳体上并用于散发干净空气的排气口，

i)设置在所述连接壁和所述连接壁之间的密封圈，

j)从所述连接壁延伸至所述前腔内并经过所述开口的至少一个旋风器，所述旋风器具有

j1)用于接受空气和灰尘的入口，

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j2)用于排出干净空气的第一出口，其中所述第一出口设置在所述后腔内，以及

j3)用于排出灰尘的第二出口，其中所述第二出口设置在所述前腔内，以及

k)槽道,其设有用于吸取来自待清洁物体上的空气和灰尘的前开口，以及用于将所述空气和灰尘导入到所述旋风器的入口内的后开口。

本发明的有益效果是，对应于本发明，至少一个旋风器与该吸尘器的空气和灰尘吸入口相联系。这种旋风器代表了一种非常有效的滤尘器，甚至其尺寸要小于现有的便携式无绳吸尘器的尺寸。上述安装在机壳内部的旋风器的特别设置提供了紧凑的设置。

根据所要清洁的气流和空气中的颗粒大小，需要注意的是，可以同时使用2，3或甚至更多旋风器。它们的尺寸可以小到接近2.5厘米。通常，如果只使用一个旋风器，其直径可以小于后壳体的直径的一半。该前壳体的其他部分可以用作聚积灰尘的空间。

在本实施例中，空气和灰尘传递槽道的至少一部分设置在该前壳体的底部。

该槽道可以是灰尘管或筒。它可以包括第二和第二部分。该第一部分可以与前壳体相联；甚至可以与其成为一体。该槽道的第二部分可以为曲线并设在后腔内。当前壳体的连接壁通过密封圈连接到该后壳体的连接壁上时，上述两部分在其开口处成一直线。

该旋风器由一种薄的，且坚硬的塑胶材料制成，以便减去重量。

其他的实施例由附属权项所限定。

以下将参照附图对本发明的最佳实施例进行描述。

附图说明

图1是具有前壳体和后壳体的无绳吸尘器的侧视图，其中前壳体和后壳体彼此分离，并且所分离的前壳体以侧视图显示，而后壳体以剖视图显示。

图2是沿着图3中Z—Z向的前壳体的后视图。

图3是沿着图2中P—P向的前壳体的侧视图。

图4是所述吸尘器的立体外形图，其中所述前壳体和后壳体相互分离。以及

图5是所述吸尘器的立体外形图，其显示了其中的内部结构。

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在图中相同或相似的元件被提供相同的参考号。

图中：2.无绳吸尘器 4.机壳 6.前壳体 8.后壳体 10.前腔 12.连接壁 14.开口 16.后腔 18.连接壁 20.密封圈 22.箭头 24.锁紧装置 26.手柄 28.开关 30.电机 32.风扇 34.轴 36.电池 38.排气口 40.前开口 42.旋风器 44.壁 46.入口 48.第一出气口 50.第二灰尘出口 52.槽道 52a.槽道的前部 52b.槽道的后部 54.灰尘堆 a.空气 d.灰尘 m.旋风器直径

具体实施方式

根据图1至图5， 一个便携式吸尘器2包括一个具有前壳体6和后壳体8的加长机壳1。该前壳体6的顶部朝向其前端被修圆，并且该后壳体8大致具有呈矩形。该前壳体6包括一个前腔10，其设有一个端壁和连接壁12，该连接壁12为设有中心孔14的环状。该连接壁12大致具有字面D形 （倾斜90° 后），如图2和图5所示。该前腔10的大部分用于收容灰尘d。在拆卸后，灰尘d可被卸出。

该后壳体8包括一个后腔16，并设有一个扁平的端壁和连接壁18。该壁18的顶部也被修圆。壁12和18相对于机壳4的加长轴是垂直设置。

一个接近D形的密封圈20，其由橡胶制成，设置在连接壁12和连接壁18之间。在本发明中，该密封圈20设在连接壁18外表面的一个凹槽内。一旦前壳体6以箭头22（见图4和图5）的方向移动并抵靠于后壳体8上，该密封圈20就会密封该框架形的连接壁12。在密封状态，该密封圈可以被连接装置或者锁紧装置24a, 24b锁紧。

如图1所示，在后壳体8的上部形成手柄26。在手柄的下面设有电开关28。后腔16包含电机30，通过轴34连接到电机30上的风扇。在后腔16内安装有电池36。该电池36用于在吸尘器2的用户有需求时通过开关28而启动电机30。

该后壳体8的顶壁上包含用于释放干净空气a的排气口38。该排气口38紧靠风扇32设置。

上述吸尘器2用于将从前壳体6的下部前开口40所吸入的空气中的灰尘d相分离。这种

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分离通过连接在后壳体16内的墙壁44上的旋风器42实现。该旋风器42由塑料制成。该旋风器42的圆锥部从连接壁18的上部沿着纵向延伸至前壳体10的内部，并经过上述开口14。该旋风器具有一个用于吸取来自前开口40的灰尘d和空气a入口46，一个用于释放干净空气a的第一出口48和一个用于将灰尘d排放在可拆卸的前壳体10的内部的第二出口50。该第一出口18位于后腔16内部，尤其紧邻空气出口38。该第二出口50位于前腔10的中间部分。

为了将来自物体上的空气a与灰尘d进行清洁并从开口40进入到旋风器42的入口46，设有通道、或槽道52a，52b。该槽道52a，52b可以采用管状，或者，可以并入底侧。该槽道52a，52b包括一个沿着前壳体6底扁平底壁的内部延伸的第一或者纵向前部52a，以及一个设在后壳体8内的第二或者弯曲后部52b。该槽道52a，52b的用于吸收空气a和灰尘d的入口时前开口40，并且其出口时旋风器42的入口46。该梯状灰尘的空气a以切线方式进入旋风器42。上述槽道52a，52b具有直线性的剖面。

从图1，4和可见，上述旋风器42的直径m小于后壳体8直径的一半。该直径m可以为，例如，6厘米。

空气a和灰尘d从槽道52a，52b进入道旋风器42里面，并在那里彼此分离。该干净过的空气a从排气口38散发到周围，而灰尘d聚积在前腔10内。

可以设有多个彼此平行并延伸至前壳体6的中间部位的旋风器来代替单个旋风器42。每个旋风器的入口将会连接到槽道52a，52b的后开口上。这种设计具有能分离非常细微的灰尘d并聚积成堆的优点。在该例中，每个旋风器可以具有，如2.5厘米的直径。

描述在图1－5中的吸尘器2相对制造便宜，操作有效并且便于握持，并且需要较少的维护和维修。

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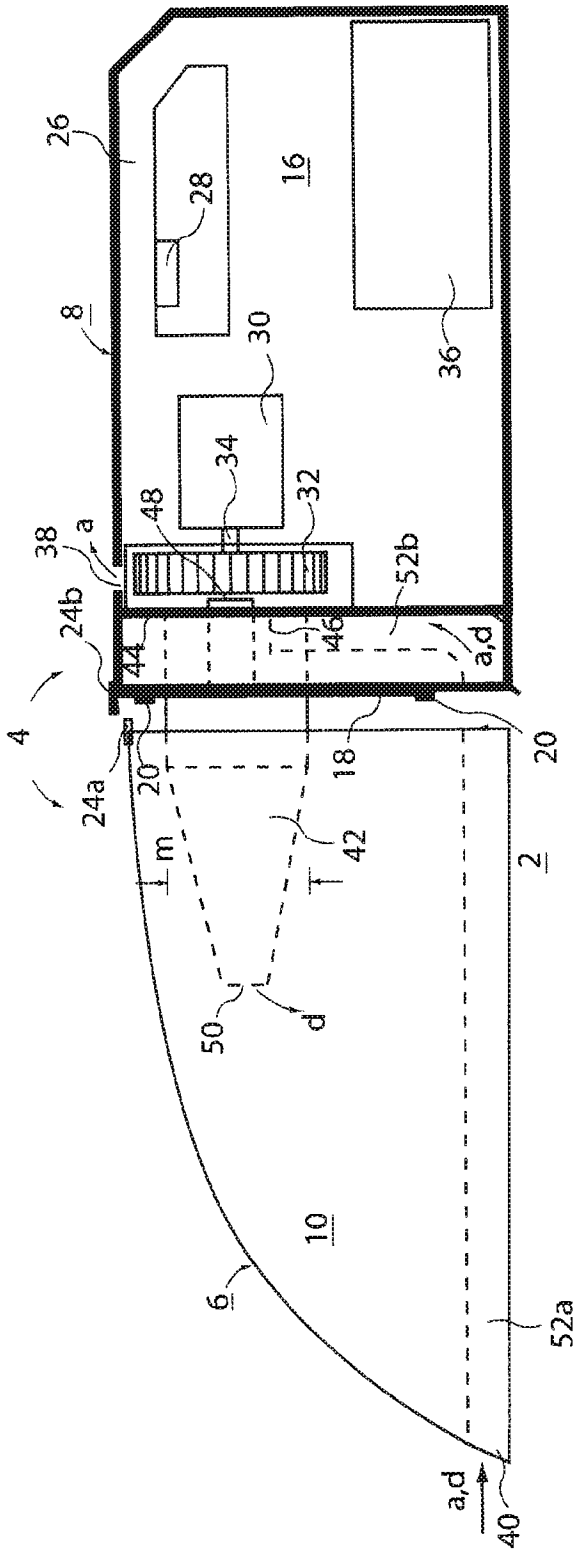


图 1

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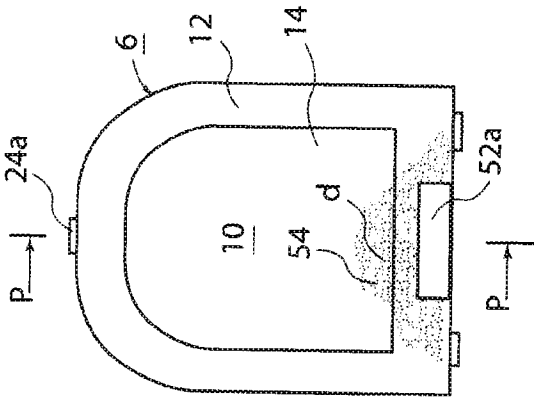


图 2

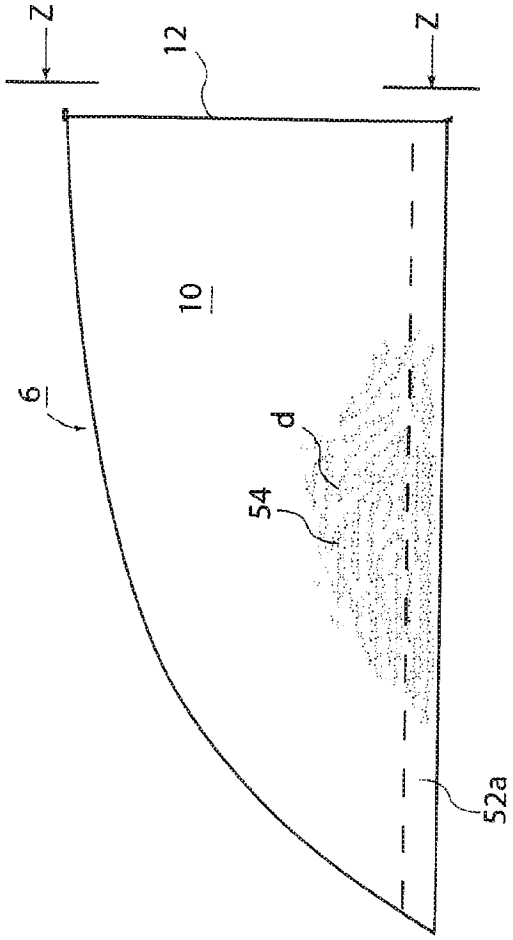


图 3

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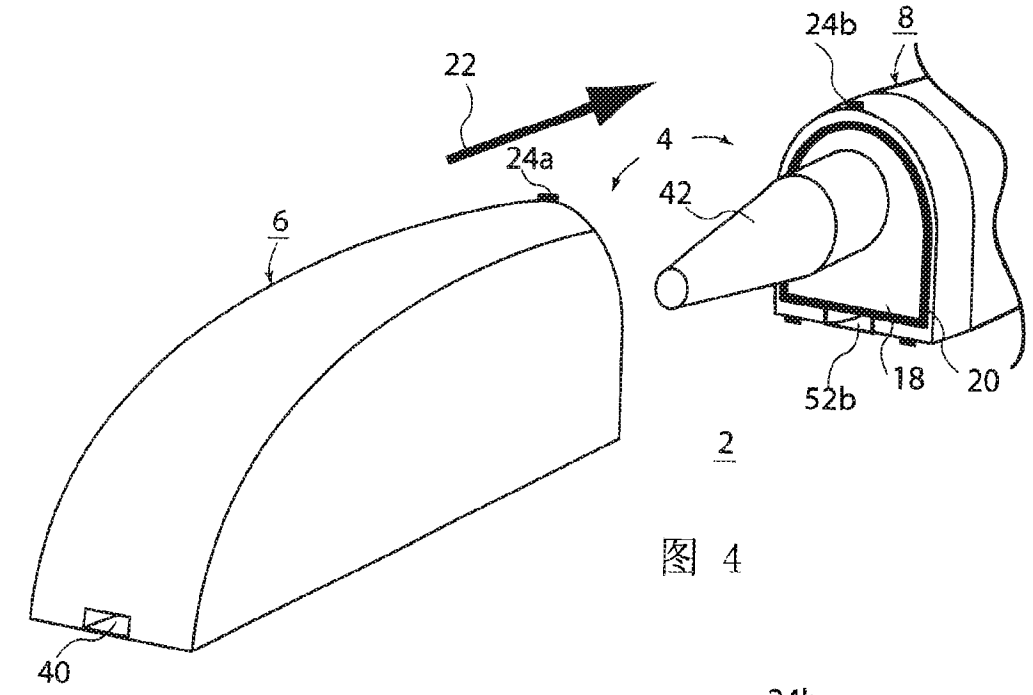


图 4

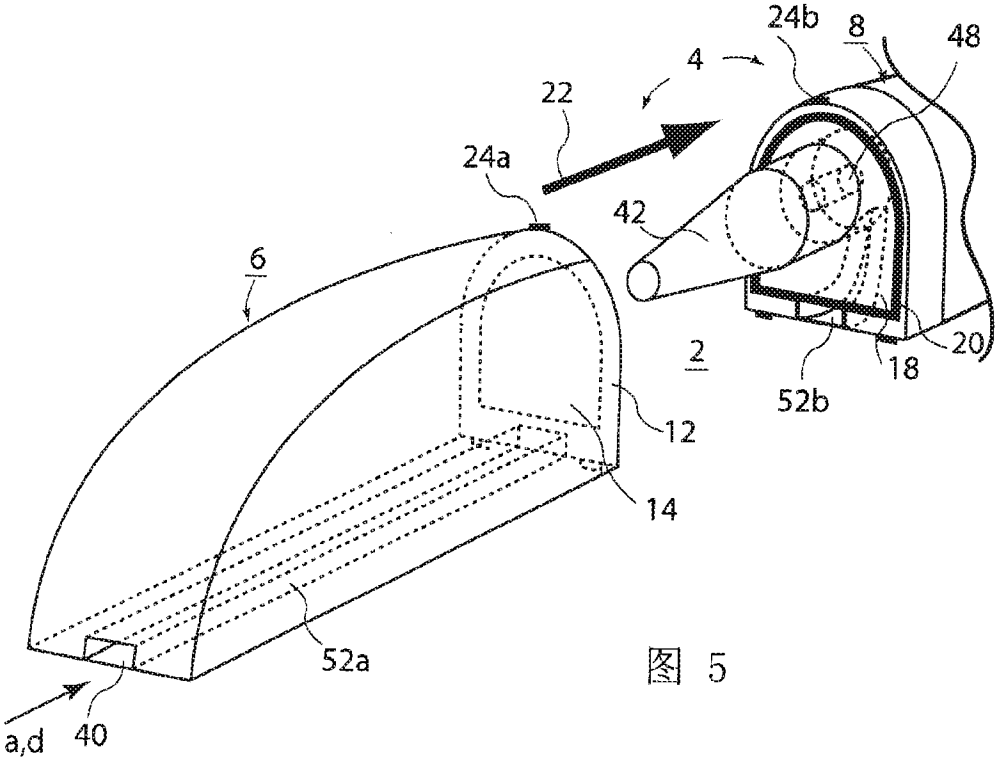


图 5

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JP2005270312 (A)
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Description
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VERTICAL VACUUM CLEANER

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Inventor(s):	TOMOOKA HIROSHI ±
Applicant(s):	SHARP KK ±
Classification:	- international: ***A47L5/28; A47L9/10; A47L9/16;*** (IPC1-7): A47L5/28; A47L9/10; A47L9/16
	- cooperative:
Application number:	JP20040087246 20040324
Priority number(s):	JP20040087246 20040324

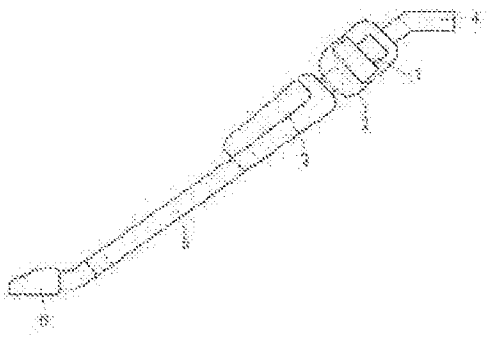
Abstract of JP2005270312 (A)

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PROBLEM TO BE SOLVED: To provide a vertical vacuum cleaner adopting a structure of separating a body part incorporating an electric blower from a dust collecting part and improving the operability in cleaning work. ;SOLUTION: This vertical vacuum cleaner is provided with a suction port 6 in a tip side and a grip part 4 in a rear end side. The suction port 6 is detachably fitted with an extension tube 5, and the extension tube 5 is detachably fitted with the dust collecting part 3 separating sucked dust from air and collecting. The extension tube 5 and the dust collecting part 3 constitute a tubular member. The dust collecting part 3 is detachably fitted with the body part 2 incorporating the electric blower 1 generating a suction force of the vertical vacuum cleaner. The rear end side of the body part 2 is detachably fitted with the grip part 4. ;COPYRIGHT: (C)2006,JPO&NCIPI



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DESCRIPTION JP2005270312

[Problem] with to adopt a structure that separates the electric blower built-in of the main unit and the dust collecting part, to enable the improvement of the operability at the time of cleaning work, to provide a vertical-type vacuum cleaner. A on the tip end side has a suction port 6, and a grip portion 4 to the rear end. The suction port 6, the extension pipe 5 is fitted detachably, also the extension pipe 5, the dust collection unit 3 for collecting dust by separating dust sucked air is fitted detachably there. This extension tube 5 and the dust collection unit 3, constitute the tube member. Further, the dust collecting part 3, the main body part 2 with a built-in electric blower 1 for generating a suction force of the vertical electric vacuum cleaner is fitted detachably. Further, the rear end of the main body 2, the grip portion 4 is fitted detachably. .FIELD 1

Vertical electric vacuum cleaner

[0001]

The present invention relates to a vertical electric vacuum cleaner, comprising a selectable configuration the combination of the components to suit the intended use, to a vertical electric vacuum cleaner.

[0002]

16 and 17 shows a schematic configuration of a conventional vertical vacuum cleaner. Vertical vacuum cleaner shown in FIG. 16, provided with a dust collecting portion 42 in front of the main body portion 41 having a built-in electric blower 1 includes an extension tube 5 in front of the dust collecting unit 42, collecting dust to its destination and a suction port 6 to be used for dust. In the vertical electric vacuum cleaner having the above structure, during operation, so that the cleaning hold the handle 43 of the main body portion 41. At that time, the load of the main body 41 will be applied to the proximal side.

[0003]

Next, the vertical-type vacuum cleaner shown in FIG. 17, provided with a dust collecting portion 45 in front of the main body 44 with a built-in electric blower 1, in front of the dust collecting unit 45, suction port 6 is provided . The distribution after the main body portion 44, the operation pipe 47 provided with a handle 46 to the rearmost end portion is attached. In the vertical electric vacuum cleaner having the above structure, during operation, so that the cleaning grasping the handle 43. At that time, the load of the main body 44 will be applied to the suction port 6 side.

[0004]

Moreover, in the vertical electric vacuum disclosed in Patent Document 1 described below, the main body portion is slidably disposed between the suction port and the handle operation portions in the vertical direction, shown in FIGS. 16 and 17, the vertical in type vacuum cleaner is one that makes it possible to dispose the body portion at any position. JP-A-07-116086 JP

[0005]

In the vertical type vacuum cleaner shown in FIG. 16, that the load of the main body portion is concentrated in the proximal side, you may feel the weight for the operator. Moreover, in the vertical electric vacuum cleaner shown in FIG. 17, since the load of the main body to the suction port 6 side is concentrated, it may not be possible to move the suction port 6 lightly.

[0006]

Furthermore, in the vertical electric vacuum cleaner disclosed in Patent Document 1, by the sliding operation of the body portion position, able to change the position of the main body portion. However,

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struts and the sliding mechanism for sliding the main body portion, and further, because it requires a locking mechanism for positional fixing on the main body, the apparatus configuration becomes complicated.

[0007]

Further, in each of the above vertical-type vacuum cleaner, since the dust collecting unit is provided in a part of the electric blower internal body section and the same housing, making the replacement of the dust bag in the dust collecting unit although possible, in the case where the fine dust that has leaked from the dust collecting part is attached in the vicinity of the dust collecting part, by washing or other means, there is also a problem that it is not possible to completely clean the dust collecting part.

[0008]

Accordingly, the present invention has been made to solve the above problems, while adopting a structure for separating the main body and the dust collecting portion of the electric blower built, enabling improvement in operability at the time of cleaning operation to, is to provide a vertical-type vacuum cleaner.

[0009]

Based on the present invention, in a vertical electric vacuum cleaner having a suction port for sucking dust floor other surface to be cleaned on the distal end side, a vertical vacuum cleaner having a grip portion on the rear end there are, by interposing a tubular member with respect to the suction port, a main body with a built-in electric blower for generating a suction force at the suction port, and constitutes a part of said tubular member, said body portion and said while being disposed between the suction port is provided detachably with respect to the main body, and a dust collecting unit for collecting dust dust sucked separately from the air.

[0010]

In the above vertical type vacuum cleaner, detachable structure between the dust collecting portion and the body portion fitting structure that allows the attachment and detachment of the dust collecting part only to the suction port side of the main body portion is employed that.

[0011]

In the above vertical type vacuum cleaner, between the suction port and the dust collecting unit, and in between the main body portion and the handle portion, also in between at least one mutually fitting detachable Goka structure is adopted.

[0012]

In the above vertical type vacuum cleaner, said dust collecting unit is provided with a vertically long shape of pivoting the dust separation system (cyclone method) structure.

[0013]

Based on the present invention, according to the vertical type vacuum cleaner, the dust collecting unit has a structure that is detachably attached to the main body. As a result, even in the case where the fine dust that has leaked from the dust collecting part is attached to the dust collecting part, by washing or other means, and to separate the dust collecting part from the main body, only the dust collection unit to be fully cleaned it becomes possible. Further, it is possible to arrange apart the main body portion and the dust collecting unit, since the distribution of the load to avoid concentration of the load is achieved, it is possible to improve the operability of the vertical electric vacuum cleaner .

[0014]

Further, by fitting structure that allows only collecting dust portion detachably attached to the suction port side of the main body is adopted, it is possible to prevent the fitting error. Furthermore, since between the suction port and the dust collecting unit, and also in between the body portion and the handle portion, in case of adopting the mutually detachable engageable structure, the various engagement patterns occur, the fitting error in such a case can be reliably prevented. Further, the results can be adopted various engagement patterns, grip-side position the center position of the load, the suction port side position, and, with both intermediate position, be appropriately changed to suit the preference of the operator possible to become.

[0015]

Further, to the dust collecting part, by employing a pivoting dust separation system (cyclone method) Structure of Vertical shape, it is substituted for a portion of the tubular member between the suction port and the body portion as a dust collecting unit since it makes it possible to simplify the apparatus structure.

[0016]

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(Overall configuration of the vertical-type vacuum cleaner) Hereinafter, the embodiments in accordance with the present invention will be described with reference to FIG.

[0017]

First, with reference to FIGS. 1-5, the configuration of the vertical electric vacuum cleaner of this embodiment. Incidentally, FIG 1 is an overall configuration side view showing a first engagement pattern of vertical electric vacuum cleaner of this embodiment, the second engagement pattern of vertical electric vacuum cleaner in the form of FIG. 2 is present an overall construction side view showing, Fig. 3 is an overall configuration side view showing a third engagement pattern of the vertical electric vacuum cleaner of this embodiment. Further, FIG. 4, in the case of an example of the third engagement pattern shown in FIG 3, is a separation view schematically showing the outer diameter relationship of the connecting fitting portion of the fitting region. Further, FIG. 5 is a partially enlarged cross-sectional view of a region surrounded by the V in FIG.

[0018]

First, referring to FIG. 1, a vertical electric vacuum cleaner in the present embodiment has a suction port 6 for sucking the dust of the floor surface other surface to be cleaned on the distal end side, the grip portion to the rear end it has four. The suction port 6, the extension pipe 5 is fitted detachably, also the extension pipe 5, the dust collection unit 3 for collecting dust by separating dust sucked air is fitted detachably there This extension tube 5 and the dust collection unit 3, constitute the tube member. Further, the dust collecting part 3, the main body part 2 with a built-in electric blower 1 for generating a suction force of the vertical electric vacuum cleaner is fitted detachably. Further, the rear end of the main body 2, the grip portion 4 is fitted detachably.

[0019]

Thus, the main body 2, the dust collecting part 3, handle unit 4, the extension tube 5, and the suction port 6, by the connecting structure according removable fitting structure, only the fitting state shown in FIG. 1 not, as shown in FIG. 2, fitting the dust collecting part 3 to the suction port 6, and fitted the extension tube 5 to the dust collection unit 3, and fitting the main body part 2 in the extension tube 5, the handle to the main body part 2 adoption and of connecting structure to fit the part 4, as shown in FIG. 3, and fitting the dust collecting part 3 to the suction port 6, and fitting the main body part 2 in the dust collection unit 3, extension tube 5 to the main body part 2 was fitted, adoption of the connection structure for fitting the handle portion 4 also enables the extension tube 5. Furthermore, it is also possible employ a connection structure using no extension tube 5.

[0020]

Here, as shown in FIG. 4, the main body 2, the dust collecting part 3, handle unit 4, the extension pipe 5, and, in the fitting area of the suction port 6, each tubular coupling fitting portion 2A, 2B , 3A, 3B, 4B, 5A, 5B, although 6A are respectively provided, connecting fitting portions 2A, 3A, 5A, 6A outer diameter of the connecting fitting portion 2B, 3B, 4B, the interior of the 5B in that you set to a dimension that can be fitted into in (see FIG. 5), it is possible to easily realize the connection structure shown in FIGS. 1-3.

[0021]

(Details of the consolidated structure) Here, in the coupling of the dust collecting portion 3 in the vertical electric vacuum cleaner, it is necessary to couple the suction port 6 side of the particulate collection portion 3 always body portion 2. Therefore, the coupling engaging portion 3A of the particulate collection portion 3, the fitting main body portion 2 to allow the fitting of the extension tube 5 (FIG. 1, the state of FIG. 3) (the state of FIG. 2), others fit so as not to be case, it is necessary to impose a predetermined limit. The following describes this configuration.

[0022]

First, the structure that allows the coupling state of the coupling fitting portion between the body portion 2 and the dust collecting section 3, will be described with reference to FIGS. 6-9. 6 is a diagram showing a state of being connected to the dust collecting part 3 to the suction port 6 side of the main body 2 corresponds to the case shown in FIG. 7 is a diagram showing a separated state of FIG. Further, FIG. 8 is a partially enlarged view of the region enclosed in FIG. 7 VIII, FIG. 9 is a partially enlarged view of the region enclosed in FIG. 7 IX.

[0023]

As described above, the outer diameter of the connecting fitting portion 3A of the particulate collection portion 3 is dimensioned capable fitted into the interior of the coupling fitting portion 2B of the main body part 2, further ccupling fitting portion 3A the outer surface, the protrusion 9 is provided on the connecting fitting portion 2B, the receiving hole 10 for receiving the protrusion 9 is provided. By fitted into the connecting fitting portion 3A of the particulate collection portion 3 inside the connecting fitting portion 2B of the main body portion 2, the protrusion 9 is fitted into the receiving hole 10, the connection between the main body portion 2 and the dust collecting part 3 state is allowed.

[0024]

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Similarly, a configuration which allows the coupling state of the coupling fitting portion between the extension pipe 5 and the dust collecting section 3, will be described with reference to FIG 13. FIG 10. Figure 10 is a diagram showing a state of being connected to the dust collecting part 3 to the suction port 6 side of the extension pipe 5 corresponds to the case shown in FIG. 11 is a diagram showing a separated state of Figure 10. Further, FIG. 12 is a partially enlarged view of a region enclosed by 11 in XII, FIG. 13 is a partial enlarged view of the region enclosed in FIG XIII.

[0025]

Outer diameter of the connecting fitting portion 3A of the particulate collection portion 3 is dimensioned capable fitted into the interior of the coupling fitting portion 5B of the extension tube 5, further on the outer surface of the connecting fitting section 3A , the projections 9 are provided on the connecting fitting portion 5B, the receiving hole 12 for receiving the protrusion 9 is provided. By fitted into the connecting fitting portion 3A of the particulate collection portion 3 inside the connecting fitting portion 5B of the extension pipe 5, the connected state of the projection 9 is fitted into the receiving hole 12, a main body 2 and the extension pipe 5 There would be tolerated.

[0026]

Here, even try to put fitting the coupling engaging portion 3A of the particulate collection portion 3 to the connecting fitting portion 4B of the handle portion 4, the projection 9 becomes an obstacle, thereby connecting the grip portion 4 directly dust collecting part 3 can not. In this way, allowing for connecting the fitting portion 3A of the particulate collection portion 3, the fitting main body part 2 fitting of the extension tube 5 (FIG. 1, the state of FIG. 3) and (state of FIG. 2), Others have it possible to prevent mating.

[0027]

Above, the dust collecting part 3 are the detachable from the main body portion 2, even when the micro dust leaking from the dust collecting part 3 is attached to the dust collecting section 3, to separate the dust collection unit 3 alone on, it is possible to completely clean the only dust collecting part 3 by washing or the like. Further, the concentration of load to handle portion 4 side shown in FIG. 1, the dispersion of load to the handle portion 4 side shown in FIG. 2 and the suction port 6 side, the concentration of load to the suction port 6 side shown in FIG. 3 the third aspect makes it possible to easily select, it is made possible to select an appropriate fitting pattern in accordance with the preference of the operator.

[0028]

Moreover, while enabling the various engagement patterns, inevitably, since the dust collecting part 3 adopts the configuration that is connected to the suction port 6 side of the body portion 2, reliably preventing the fitting error is it possible to.

[0029]

(Specific structure of the particulate collection portion 3) Next, the specific configuration of the dust collecting part 3, will be described with reference to FIGS. 14 and 15. incidentally, FIG. 14 is a diagram showing a state where the main body part 2 in the dust collecting section 3 is connected directly corresponds to the fitting pattern of FIG. 1 and FIG. Further, FIG. 15 is a partially enlarged cross-sectional view of a region enclosed by the figure 14 XV.

[0030]

The dust collecting section 3 in the present embodiment, vertically elongated shape of pivoting the dust separation system (cyclone method) structure is adopted, incoming air (including dust) from the extension pipe 5, the turning acceleration unit 13 and the dust separator by 14, dust is centrifuged from the air, flowing through the electric blower 1 side only air flows into the upper portion of the inner cylinder 15. The separated dust 16 is stored in the bottom of the cup 17.

[0031]

Thus, by employing the swivel dust separation system structure of elongated shape dust collecting section 3, it is possible to substitute part of the tubular member between the intake port 6 and the main body portion 2 as a dust collecting section 3 it can. Accordingly, and shorten the extension tube 5, adoption of a configuration that does not use the extension tube 5 is possible, it becomes possible to simplify the apparatus configuration. Further, the dust 16 separated from it to be accumulated in the bottom of the cup 17, can be easily carried out the disposal of the dust 16. Furthermore, its structure, the amount of dust 16, since it does not affect the air flow, it is possible to obtain a stable suction force.

[0032]

Incidentally, a case has been described where the present embodiment adopts the swivel dust separation system structure dust collecting section 3, not limited to the pivotally dust separation system structure, employing a filter-type dust collecting structure it is also possible.

[0033]

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Therefore, the above embodiments disclosed this time are illustrative in all points and not underlying the restrictive interpretation. Accordingly, the technical scope of the present invention is not to be interpreted only by the above-described embodiment is defined based on the claims. Also included are all of the modifications within the meaning and range equivalent to the scope of the claims.

[0034]

It is an overall configuration side view showing a first engagement pattern of vertical electric vacuum cleaner of this embodiment. It is an overall configuration side view showing a second engagement pattern of vertical electric vacuum cleaner of this embodiment. It is an overall configuration side view showing a third engagement pattern of the vertical electric vacuum cleaner of this embodiment. When made into an example of the third engagement pattern shown in FIG 3, it is a separation view schematically showing the outer diameter relationship of the connecting fitting portion of the fitting region. It is a partially enlarged cross-sectional view of a region surrounded by the V in FIG. The suction port side of the main body portion of the vertical electric vacuum cleaner of this embodiment is a diagram showing a state of being connected to the dust collecting unit. It is a diagram showing a separated state of FIG. It is a partially enlarged view of a region surrounded by FIG during VIII. It is a partially enlarged view of a region surrounded by FIG during IX. The suction port side of the extension pipe of the vertical electric vacuum cleaner of this embodiment is a diagram showing a state of being connected to the dust collecting unit. It is a diagram showing a separated state of Figure 10. It is a partially enlarged view of a region enclosed by 11 in XII. it is a partially enlarged view of a region enclosed by 11 in XIII. The dust collecting portion of the vertical electric vacuum cleaner of this embodiment is a diagram showing a state where the main body portion are connected directly. it is a partially enlarged cross-sectional view of a region enclosed by the figure 14 XV. It is a first side view showing an overall configuration of a conventional vertical vacuum cleaner. It is a second side view showing an overall configuration of a conventional vertical vacuum cleaner.

Description of the code

[0035]

1 electric blower, second body part, 2A, 2B, 3A, 3B, 4B, 5A, 5B, 6A connection fitting portion, 3 dust collecting part, 4 grip portion, 5 extension tube, 6 suction port, 9 projection, 10, 12 receiving hole, 13 turning accelerating unit, 14 dust separator, 15 inner cylinder, 16 dust, 17 cup.

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CLAIMS JP2005270312

1.

Having a suction port for sucking dust floor other surface to be cleaned on the distal end side, a vertical type vacuum cleaner having a grip portion on the rear end side, And wherein the tubular member is interposed against the suction port, the main body having a built-in electric blower for generating a suction force at the suction port, Forms a part of the tubular member, while being disposed between the main portion and the suction port is provided detachably with respect to said main body portion, collecting dust sucked by separating air dust and a dust collection unit that, Equipped with a, vertical electric vacuum cleaner.

2.

Detaching structure of the main body portion and the dust collecting unit, fitting structure that allows the attachment and detachment of the dust collection unit only in the suction port side of the main body portion is employed, the vertical according to claim 1 vacuum cleaner.

3.

Between the suction port and the dust collecting unit, and in between the main body portion and the handle portion, also in between at least one, mutually mating detachable structure is employed, claims vertical electric cleaner according to 1 or 2.

4.

The dust collection unit is provided with pivoting dust separation system structure of elongated shape, vertical electric vacuum cleaner according to any one of claims 1 to 3.

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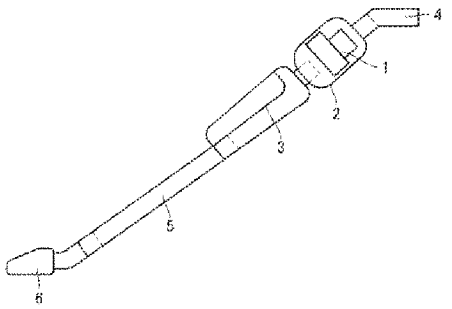
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(54)【発明の名称】縦型電気掃除機

(57)【要約】
【課題】　電動送風機内蔵の本体部と集塵部とを分離する構造を採用するとともに、清掃作業時における操作性の向上を可能とする、縦型電気掃除機を提供する。
【解決手段】　先端部側に吸引口６を有し、後端部側に把手部４を有している。吸引口６には、延長管５が着脱可能に嵌合され、また、この延長管５には、吸込んだ塵埃を空気と分離して集塵する集塵部３が着脱可能に嵌合されている。この延長管５および集塵部３は、管部材を構成する。さらに、集塵部３には、縦型電気掃除機の吸引力を発生させる電動送風機１を内蔵した本体部２が着脱可能に嵌合されている。また、本体部２の後端部側には、把手部４が着脱可能に嵌合されている。
【選択図】　図１



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【特許請求の範囲】
【請求項1】
先端部側に床面その他の被掃除面の塵埃を吸込む吸引口を有し、後端部側に把手部を有する縦型電気掃除機であって、
前記吸引口に対して管部材を介在させ、前記吸引口において吸引力を発生させるための電動送風機を内蔵した本体部と、
前記管部材の一部を構成し、前記本体部と前記吸引口との間に配設されるとともに、前記本体部に対して着脱可能に設けられ、吸込んだ塵埃を空気と分離して集塵する集塵部と、
を備える、縦型電気掃除機。
【請求項2】
前記集塵部と前記本体部との着脱構造は、前記本体部の前記吸引口側にのみ前記集塵部の着脱を可能とする嵌合構造が採用される、請求項１に記載の縦型電気掃除機。
【請求項3】
前記吸込口と前記集塵部との間、および、前記本体部と前記把手部との間において、少なくともいずれかの間においても、相互に着脱可能な嵌合可能構造が採用される、請求項１または２に記載の縦型電気掃除機。
【請求項4】
前記集塵部は、縦長形状の旋回式塵埃分離方式構造を備える、請求項１から３のいずれかに記載の縦型電気掃除機。

【発明の詳細な説明】
【技術分野】
【0001】
この発明は、縦型電気掃除機に関し、使用目的に合わせた各部品の組合せを選択可能な構成を備える、縦型電気掃除機に関する。
【背景技術】
【0002】
図１６および図１７に、従来の縦型電気掃除機の概略構成を示す。図１６に示す縦型電気掃除機は、電動送風機１を内蔵した本体部４１の前方に集塵部４２を備え、この集塵部４２の前方に延長管５を備え、その先に塵埃を集塵する際に使用する吸込口６を備えている。上記構成からなる縦型電気掃除機において、操作時には、本体部４１の把手４３を握って掃除することとなる。その際、本体部４１の荷重は、手元側に加わることになる。
【0003】
次に、図１７に示す縦型電気掃除機は、電動送風機１を内蔵した本体部４４の前方に集塵部４５を備え、この集塵部４５の前方に、吸込口６が備えられている。本体部４４の後報には、最後端部に把手４６を備えた操作管４７が取付けられている。上記構成からなる縦型電気掃除機において、操作時においては、把手４３を握って掃除することとなる。その際、本体部４４の荷重は、吸込口６側に加わることになる。
【0004】
また、下記の特許文献１に開示される縦型電気掃除においては、本体部が吸込口と把手操作部との間を上下方向に摺動可能に設けられ、図１６および図１７に示す、縦型電気掃除機において、任意の位置に本体部を配設させることを可能とするものである。
【特許文献1】特開平０７－１１６０８６号公報
【発明の開示】
【発明が解決しようとする課題】
【0005】
図１６に示す縦型電気掃除機においては、本体部の荷重が手元側に集中することで、操作者にとっては重さを感じる場合ある。また、図１７に示す縦型電気掃除機においては、吸込口６側に本体部の荷重が集中するため、吸込口６を軽快に動かすことができない場合がある。

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【0006】
さらに、上記特許文献１に開示される縦型電気掃除機においては、本体部位置の摺動動作により、本体部の位置を変更することはできる。しかし、本体部を摺動させるための支柱部や摺動機構、さらに、本体部に位置固定のためのロック機構が必要となるため、装置構成が複雑となる。
【0007】
また、上記各縦型電気掃除機においては、電動送風機内蔵の本体部と同一の筐体の一部に集塵部が設けられていることから、集塵部内の集塵袋の交換をすることはできるものの、集塵部から漏れた微細塵が集塵部近傍に付着した場合に、水洗いやその他の手段で、集塵部を完全に清掃することができないという課題も存在する。
【0008】
したがって、この発明は、上記課題を解決するためになされたものであり、電動送風機内蔵の本体部と集塵部とを分離する構造を採用するとともに、清掃作業時における操作性の向上を可能とする、縦型電気掃除機を提供することにある。
【課題を解決するための手段】
【0009】
この発明に基づいた、縦型電気掃除機においては、先端部側に床面その他の被掃除面の塵埃を吸込む吸引口を有し、後端部側に把手部を有する縦型電気掃除機であって、上記吸引口に対して管部材を介在させ、上記吸引口において吸引力を発生させるための電動送風機を内蔵した本体部と、上記管部材の一部を構成し、上記本体部と上記吸引口との間に配設されるとともに、上記本体部に対して着脱可能に設けられ、吸込んだ塵埃を空気と分離して集塵する集塵部とを備える。
【0010】
また、上記縦型電気掃除機において、上記集塵部と上記本体部との着脱構造は、上記本体部の上記吸引口側にのみ上記集塵部の着脱を可能とする嵌合構造が採用される。
【0011】
また、上記縦型電気掃除機において、上記吸込口と上記集塵部との間、および、上記本体部と上記把手部との間において、少なくともいずれかの間においても、相互に着脱可能な嵌合可構造が採用される。
【0012】
また、上記縦型電気掃除機において、上記集塵部は、縦長形状の旋回式塵埃分離方式（サイクロン方式）構造を備える。
【発明の効果】
【0013】
この発明に基づいた、縦型電気掃除機によれば、集塵部は、本体部に対して着脱可能に設けられる構成を備えている。これにより、集塵部から漏れた微細塵が集塵部に付着した場合にも、水洗いやその他の手段で、本体部から集塵部を分離させて、集塵部のみを完全に清掃することが可能になる。また、本体部と集塵部とを離して配置することができるため、荷重の集中を回避し荷重の分散が図られるため、縦型電気掃除機の操作性の向上を図ることが可能になる。
【0014】
また、本体部の上記吸引口側にのみ集塵部の着脱を可能とする嵌合構造が採用することにより、嵌合誤りを防止することが可能になる。さらに、吸込口と集塵部との間、および、本体部と把手部との間においても、相互に着脱可能な嵌合可能構造を採用した場合には、様々な嵌合パターンが生じるため、このような場合の嵌合誤りを確実に防止することが可能となる。また、様々な嵌合パターンを採用することができる結果、荷重の中心位置を把手部側位置、吸込口側位置、および、両者の中間位置と、操作者の好みに合わせて適宜変更することが可能になる。
【0015】
また、上記集塵部に、縦長形状の旋回式塵埃分離方式（サイクロン方式）構造を採用す

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ることにより、吸込口と本体部との間の管状部材の一部を集塵部として代用することができるため、装置構成を簡略化を図ることが可能になる。

【発明を実施するための最良の形態】

【0016】

（縦型電気掃除機の全体構成）

以下、本発明に基づいた実施の形態について、図を参照しながら説明する。

【0017】

まず、図１から図５を参照して、本実施の形態における縦型電気掃除機の構成について説明する。なお、図１は本実施の形態における縦型電気掃除機の第１嵌合パターンを示す全体構成側面図であり、図２は本実施の形態における縦型電気掃除機の第２嵌合パターンを示す全体構成側面図であり、図３は本実施の形態における縦型電気掃除機の第３嵌合パターンを示す全体構成側面図である。また、図４は、図３に示す第３嵌合パターンを一例にした場合の、嵌合領域の連結嵌合部の外径関係を模式的に示す分離図である。また、図５は、図４中のＶで囲まれる領域の部分拡大断面図である。

【0018】

まず、図１を参照して、本実施の形態における縦型電気掃除機は、先端部側に床面その他の被掃除面の塵埃を吸込む吸引口６を有し、後端部側に把手部４を有している。吸引口６には、延長管５が着脱可能に嵌合され、また、この延長管５には、吸込んだ塵埃を空気と分離して集塵する集塵部３が着脱可能に嵌合されている。この延長管５および集塵部３は、管部材を構成する。さらに、集塵部３には、縦型電気掃除機の吸引力を発生させる電動送風機１を内蔵した本体部２が着脱可能に嵌合されている。また、本体部２の後端部側には、把手部４が着脱可能に嵌合されている。

【0019】

このように、本体部２、集塵部３、把手部４、延長管５、および、吸引口６を、着脱可能な嵌合構造による連結構造にすることで、図１に示す嵌合状態だけでなく、図２に示すような、吸引口６に集塵部３を勘合し、集塵部３に延長管５を勘合し、延長管５に本体部２を勘合し、本体部２に把手部４を嵌合させる連結構造の採用や、図３に示すような、吸引口６に集塵部３を勘合し、集塵部３に本体部２を勘合し、本体部２に延長管５を勘合し、延長管５に把手部４を嵌合させる連結構造の採用も可能となる。さらに、延長管５を用いない連結構造の採用も可能である。

【0020】

ここで、図４に示すように、本体部２、集塵部３、把手部４、延長管５、および、吸引口６の嵌合領域には、それぞれ筒状の連結嵌合部２Ａ，２Ｂ，３Ａ，３Ｂ，４Ｂ，５Ａ，５Ｂ，６Ａがそれぞれ設けられているが、連結嵌合部２Ａ，３Ａ，５Ａ，６Ａの外径寸法を、連結嵌合部２Ｂ，３Ｂ，４Ｂ，５Ｂの内部に嵌め入れることができる寸法に設定しておくことで（図５参照）、図１から図３に示す連結構造を容易に実現させることが可能となる。

【0021】

（連結構造の詳細）

ここで、縦型電気掃除機における集塵部３の連結においては、集塵部３を必ず本体部２の吸引口６側に連結する必要がある。そこで、集塵部３の連結嵌合部３Ａには、本体部２の嵌合（図１、図３の状態）と延長管５の勘合（図２の状態）とを許容し、その他は嵌合できないように、所定の制限を課す必要がある。以下に、この構成について説明する。

【0022】

まず、本体部２と集塵部３との連結嵌合部の連結状態を許容する構成について、図６から図９を参照して説明する。図６は、本体部２の吸引口６側に集塵部３を連結させた状態を示す図であり、図１に示す場合に相当する。また、図７は、図６の分離状態を示す図である。さらに、図８は、図７中ＶＩＩＩで囲まれた領域の部分拡大図であり、図９は、図７中ＩＸで囲まれた領域の部分拡大図である。

【0023】

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