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SURFACE CLEANING APPARATUS

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CROSS REFERENCES TO RELATED APPLICATIONS

[0001] This application claims priority from United States patent application no. 11/953,292 which was filed on December 10, 2007, which is allowed, and which claimed priority from United States Provisional applications 60/894,005 (filed on March 9th, 2007), 60/893,990 (filed on March 9th, 2007), and 60/869,586 (filed on December 12th, 2006), all of which are incorporated herein by reference in their entirety.

FIELD OF THE INVENTION

[0002] The invention relates to surface cleaning apparatuses such as vacuum cleaners, wet/dry vacuum cleaner and carpet extractors. More particularly, the invention relates to surface cleaning apparatuses, which have a dirt bin having an off-centre inlet.

BACKGROUND

[0003] Surface cleaning apparatus have been developed which include one or more cyclonic cleaning stages. Each cleaning stage may include a single cyclone, or a plurality of cyclones positioned in parallel. Typically, in cleaning stages comprising a single cyclone, a dirt bin is positioned below the cyclone. The cyclone has an outlet, which is in fluid communication with an inlet of the dirt bin. Typically, the dirt bin and the cyclone are coaxial. The inlet to the dirt bin comprises an opening centrally positioned in an upper surface of the dirt bin.

[0004] For example, United States Patent Application Publication 2006/0130448 to Han et al. discloses a cyclone having a cubic dirt bin. The dirt bin is centrally positioned below the cyclone, such that the dirt bin and the cyclone are coaxial. A dirt inlet is positioned at the centre of the upper square surface of the dirt bin, aligned with a dirt outlet of the cyclone.

[0005] United States Patent Application Publication 2006/0123590 to Fester et al. discloses a surface cleaning apparatus having a first cleaning stage including a single cyclone, and a second cleaning stage including a plurality of cyclones in parallel. The cyclones of the second cleaning stage are arranged annularly around the cyclone of the first cleaning stage. The dirt bin of the first cleaning stage is coaxial with the cyclone of the first cleaning stage, and extends outwardly such that a portion is positioned underneath the cyclones of the second cleaning stage. The dirt inlet to the dirt bin is annular, and is centered about the longitudinal axis of the dirt bin.

SUMMARY

[0006] In one broad aspect, a surface cleaning apparatus is provided which has a collection chamber having an inlet that is off-centre from the centre of the collection chamber.

[0007] For example, the surface cleaning apparatus may comprise a fluid flow path extending from a dirt inlet to a clean fluid outlet, and a fluid flow motor positioned in the fluid flow path. A cyclonic cleaning stage is provided in the fluid flow path and comprises at least one, and preferably one, cyclone chamber. At least one dirt chamber is in fluid communication with the cyclone chamber and is positioned below the cyclone chamber. The dirt chamber has an upper portion proximate the cyclone chamber, a lower portion, a central axis extending vertically between the upper portion and the lower portion, and a dirt chamber inlet spaced from the central axis. The inlet is preferably provided in the top of the dirt chamber.

[0008] Embodiments in accordance with this broad aspect may be advantageous because the dirt chamber may have a larger cross sectional area than the cross sectional area of the cyclone chamber. Accordingly, the amount of dirt and/or water that may be collected in the dirt collection bin is increased. Further, the frequency with which the dirt chamber requires emptying is decreased. Further, by positioning the inlet off centre, the part of the dirt

chamber distal to the inlet is more isolated from any fluid flow effects at the dirt inlet, thereby enhancing dirt retention in the dirt chamber.

[0009] In some embodiments, the upper portion of the dirt chamber has a width, and the dirt chamber inlet is spaced from the central axis by distance of at least 10% of the width. In further embodiments, the dirt chamber inlet is spaced from the central axis by distance of at least 15% of the width. In yet further embodiments, the dirt chamber inlet is spaced from the central axis by distance of at least 25% of the width.

[00010] In some embodiments, the cyclonic cleaning stage comprises a single cyclone having a dirt outlet positioned at the dirt chamber inlet, which is defined in an upper surface of the dirt chamber.

[00011] In some embodiments the surface cleaning apparatus comprises a generally transversely extending plate positioned adjacent the dirt chamber inlet. In further embodiments, the plate is positioned in the dirt chamber below the dirt chamber inlet.

[00012] In some embodiments, the upper portion has a perimeter, and the dirt chamber inlet is proximate the perimeter.

[00013] In some embodiments, the cyclone chamber has a longitudinal axis, and the central axis of the dirt chamber is spaced from the longitudinal axis.

[00014] In some embodiments, the dirt chamber is cylindrical.

[00015] In some embodiments, the dirt chamber comprises at least two sidewalls that meet at an angle. Such embodiments may be advantageous because the configuration of the sidewalls may prevent cyclonic motion in the dirt chamber. Accordingly, the amount of dirt in the dirt chamber, which becomes re-entrained in air may be reduced.

[00016] In some embodiments, the cyclonic cleaning stage has a maximum cross sectional area in a plane transverse to the a longitudinal axis of the cyclonic cleaning stage and the dirt chamber has a maximum cross sectional

area in a plane transverse to the central axis that is larger than the maximum cross sectional area of the cyclonic cleaning stage.

[00017] In some embodiments, the maximum cross sectional area of the dirt chamber is at least 50% larger than the maximum cross sectional area of the cyclonic cleaning stage.

[00018] In another broad aspect, a surface cleaning apparatus is provided. The surface cleaning apparatus comprises a fluid flow path extending from a dirt inlet to a clean fluid outlet, and a fluid flow motor positioned in the fluid flow path. The surface cleaning apparatus further comprises a first cyclonic cleaning stage comprising a cyclone chamber. A dirt chamber is in fluid communication with the cyclone chamber and positioned below the cyclone chamber. The dirt chamber has a dirt chamber inlet that is off-centre.

[00019] In some embodiments, the dirt chamber has an upper portion proximate the cyclone chamber, a lower portion, and a central axis extending vertically between the upper portion and the lower portion, and the dirt chamber inlet is spaced from the central axis.

[00020] In some embodiments, the dirt chamber has a width, and the dirt chamber inlet is off-centre by a distance of at least 10% of the width. In further embodiments, the dirt chamber inlet is off-centre by a distance of at least 15% of the width. In yet further embodiments, the dirt chamber inlet is off-centre by a distance of at least 25% of the width.

[00021] In some embodiments, the surface cleaning apparatus further comprises a generally transversely extending plate positioned adjacent the dirt chamber inlet.

[00022] In some embodiments, a plate is provided in a flow path from the cyclone chamber to the dirt chamber. In further embodiments, the plate is provided in the dirt chamber.

[00023] In some embodiments, the dirt chamber inlet comprises a dirt outlet of the cyclone chamber.

[00024] In some embodiments, the upper portion defines a perimeter, and the dirt chamber inlet is proximate the perimeter.

[00025] In some embodiments, the surface cleaning apparatus further comprises a second cyclonic cleaning stage downstream from the cyclone. In some such embodiments, the second cyclonic cleaning stage comprises a plurality of cyclone in parallel. In some further embodiments, the first cyclonic cleaning stage comprises a single cyclone.

BRIEF DESCRIPTION OF THE DRAWINGS

[00026] These and other advantages of the present invention will be more fully and particularly understood in connection with the following description of the preferred embodiments of the invention in which:

[00027] Figure 1A is a perspective illustration of an embodiment of a surface cleaning apparatus of the present invention;

[00028] Figure 1B is a perspective illustration of another embodiment of a surface cleaning apparatus of the present invention;

[00029] Figure 1C is a perspective illustration of another embodiment of a surface cleaning apparatus of the present invention;

[00030] Figure 1D is a perspective illustration of another embodiment of a surface cleaning apparatus of the present invention;

[00031] Figure 2A is a cross-sectional view of the embodiment of Figure 1A, taken along line 2A-2A;

[00032] Figure 2B is a cross sectional view of the embodiment of Figure 1B, taken along line 2B-2B;

[00033] Figure 2C is a cross sectional view of the embodiment of Figure 1C, taken along line 2C-2C;

[00034] Figure 2D is an exploded view of the embodiment of Figure 1D;

[00035] Figures 3A to 5A are top views of various embodiments of a dirt chamber of the present invention;

[00036] Figures 3B to 5B are side views of the embodiments of Figures 3A to 5A;

[00037] Figures 3C-5C are perspective views of the embodiments of Figures 3A to 5A;

[00038] Figure 6 is a perspective view of the surface cleaning apparatus of Figure 1A, showing a panel in an opened position; and,

[00039] Figure 7 is a perspective view of the surface cleaning apparatus of Figure 2A, showing a panel in an opened position.

DETAILED DESCRIPTION OF THE INVENTION

[00040] Embodiments of a surface cleaning apparatus 110 of the present invention are shown in Figures 1A-1D. As shown in Figure 1A and 1C, the surface cleaning apparatus 110 may be a hand vacuum cleaner, which may be converted to a shoulder strap vacuum cleaner by the addition of a shoulder strap (not shown). Alternatively, as shown in Figure 1B and 1D, the surface cleaning apparatus 110 may be a shop-vac or wet/dry type vacuum cleaner. In other embodiments, the surface cleaning apparatus 110 may be another type of surface cleaning apparatus, for example an upright vacuum cleaner, a canister type vacuum cleaner, a stick vacuum cleaner, a back pack vacuum cleaner, a carpet extractor or the like.

[00041] The surface cleaning apparatus 110 comprises a dirty fluid inlet 112, a clean fluid outlet 114, and a fluid flow path extending therebetween. At least one cyclonic cleaning stage 116 is provided in the fluid flow path. A fluid flow motor 118 is positioned in the fluid flow path for drawing a fluid (e.g. air or water) from the dirty fluid inlet 112 to the clean fluid outlet 114. The surface cleaning apparatus may draw in water and/or air that may have entrained therein dirt through inlet 112 and discharge air through outlet 114. The water and/or dirt will accumulate in dirt chamber 144.

[00042] Referring to Figures 2A to 2D, dirty fluid entering dirty fluid inlet 112 is directed to cyclonic cleaning stage 116. As is known in the art, a hose or wand having a distal inlet that may be mounted on a surface cleaning head may be attached to inlet 112. In the embodiments shown, cyclonic cleaning stage 116 comprises a single cyclone chamber 120 extending longitudinally along a first longitudinal axis 122. In other embodiments, cyclonic cleaning stage 116 may comprise a plurality of cyclones. Cyclone chamber 120 comprises a clean air outlet 124, and a dirt and/or water outlet 126. A dirt chamber 144, as will be described further hereinbelow, is positioned below dirt outlet 126. It will be appreciated that other cleaning or treatment stages may be provided upstream of the cyclone inlet.

[00043] In some embodiments, air exiting cyclone chamber 120 may be directed past motor 118, and out of clean fluid outlet 114. Alternatively, air exiting cyclone chamber 120 may be directed to one or more additional cleaning stages, such as another component, for example housing a filter prior to flowing to motor 118. The second cleaning 128 stage comprises a plurality of second cyclones 130 in parallel.

[00044] The second cleaning stage 128 has, in the examples illustrated, a generally cylindrical configuration with a second longitudinal axis 132. In the embodiments of Figures 2A, 2B, and 2D, the second axis 132 is parallel to, and laterally offset from, first axis 122. In the embodiment of Figure 2C, the second axis 132 is parallel to and aligned with first axis 122. In the embodiments shown in Figures 2A and 2B, each of the second cyclones 130 in the assembly receives air from the clean air outlet 124 of the first cyclone, and discharges air through outlets 134 into a manifold 136. Air is evacuated from the manifold 136 through a conduit 138 disposed centrally of the assembly. From the conduit 138 the air is drawn towards the motor 118, and expelled from the apparatus 110 through the exhaust 114. In the embodiment of Figure 2C, each of the second cyclones 130 receives air from the clean air outlet 124 of the first cyclone via a conduit 137, and discharges air via outlets 134 into a manifold 139. From manifold 139, the air is drawn through a filter 141, and past motor 118. In the embodiment of

Figure 2D, each of the second cyclones 130 receives air from the clean air outlet 124 of the first cyclone via a conduits 127, and discharges air via outlets 134 into a motor housing 142. Alternately or in addition, in some embodiments the additional cleaning stage 128 may include a filter element, such as a pre-motor foam membrane, disposed in the fluid stream between the cleaning stage 128 and the motor 118.

[00045] In the embodiments shown in Figures 2A-2C, motor 118 is disposed laterally adjacent the additional cleaning stage 128, in a motor housing 142. In the embodiment of Figure 2D, motor 118 is disposed laterally adjacent the first cleaning stage above the additional cleaning stage, namely filters 141 and second cyclonic cleaning stage 128. In the embodiment of Figure 2A, motor 118 extends transverse to first longitudinal axis 122. In the embodiment of Figures 2B-2D, motor 118 extends parallel to first longitudinal axis 122. The motor 118 is, in the examples illustrated, offset from the second cleaning stage 128, having a portion that abuts or is adjacent at least a portion of the dirt chamber. It will also be appreciated that motor housing may be adjacent both the first and second housings and, thereby defining a generally triangular configuration in top plan view. Motor 118 may alternately be positioned at any other location known in the surface cleaning arts, such as above or below the cyclonic cleaning stage.

[00046] As previously mentioned, cyclone chamber 120 is in fluid communication with a dirt chamber 144, which is positioned below the dirt outlet 126. Dirt chamber 144 serves to collect dirt that is removed, e.g., from the air passing through cyclone chamber 120 or water drawn in through inlet 112. Dirt chamber 144 may be of any configuration known in the art provided the dirt chamber inlet 150 is off centre. As exemplified, dirt chamber 144 comprises an upper portion 146, which is proximate cyclone chamber 120, and a lower portion 148. Dirt chamber 144 is bounded by at least one wall. In the embodiments shown, dirt chamber 144 is bounded by a top wall 152 a bottom wall 154, and at least one sidewall 156.

[00047] Dirt chamber 144 further comprises a dirt chamber inlet 150, which is preferably defined in upper portion 146, and more preferably defined in top wall 152. Dirt chamber inlet 150 is in fluid communication with dirt outlet 126 of cyclone chamber 120. In some embodiments, as shown, dirt chamber inlet 150 and dirt outlet 126 may coincide. In other embodiments, dirt chamber inlet 150 and dirt outlet 126 may be separate, and may have a channel or passage providing fluid communication therebetween (not shown).

[00048] Dirt chamber inlet 150 may be of a variety of shapes and sizes. In the preferred embodiment, dirt chamber inlet 150 has a circular outer perimeter 162. In further embodiments, wherein surface cleaning apparatus 110 comprises a divider plate, as will be described further hereinbelow, dirt chamber inlet 150 may be substantially annular.

[00049] Dirt chamber 144 may be of a variety of shapes and sizes. For example, in the embodiment of Figures 1A, 2A, and 5A-5C, dirt chamber 144 comprises two substantially rounded lobes having curved sidewalls 156. In the embodiment of Figures 1B, 2B, 1C and 2C, dirt chamber 144 comprises two lobes which comprise substantially straight sidewalls 156. In the embodiment of Figures 1D, 2D, and 3A-3C, dirt chamber 144 comprises a single rectangular chamber. In the embodiment of Figures 4A-4C, dirt chamber 144 comprises a single trapezoidal chamber.

[00050] In some embodiments shown, dirt chamber 144 comprises at least two sidewalls which meet at an angle. For example, in the embodiment of Figures 2B-2D, sidewalls 156a and 156b meet at a corner 157. Such embodiments may be advantageous because cyclonic action in the dirt chamber may be minimized or reduced by providing the dirt chamber with sidewalls, which meet at an angle. Accordingly, dirt in the dirt chamber may be prevented from being re-entrained the circulating air. In other embodiments, dirt chamber 144 may be of another shape. For example dirt chamber 144 may be cylindrical.

[00051] In the embodiments shown, dirt chamber 144 extends laterally beyond the cyclone chamber 120. That is, if cyclonic cleaning stage 116 has a

maximum cross sectional area in a plane transverse to axis 122 (e.g. parallel to bottom wall 154), and dirt chamber 144 has a maximum cross sectional area in a plane transverse to axis 122 (e.g. parallel to bottom wall 154), the maximum cross sectional area of dirt chamber 144 is greater than the maximum cross sectional area of cyclonic cleaning stage 116. In some particular embodiments, the maximum cross sectional area of dirt chamber 144 is at least 25% larger, more preferably at least 50% larger and most preferably at least 75% larger than the maximum cross sectional area of cyclonic cleaning stage 116. Such embodiments may be advantageous because the overall volume of the dirt chamber may be increased without increasing the footprint of surface cleaning apparatus 110. In the embodiment of Figure 1A, 1C and 1D, dirt chamber 128 extends laterally such that a portion thereof is positioned beneath second cleaning stage 128. In the embodiment of Figure 2A, dirt chamber 128 extends laterally such that a portion thereof is positioned beneath second cleaning stage 128, and motor 118.

[00052] It will be appreciated that in an alternate embodiment, dirt chamber 144 may have a cross sectional area in a plane transverse to axis 122 that is essentially the same as the cross sectional area of the cyclone 116 in a plane transverse to axis 122. This may be achieved by placing inlet 150 below inlet 126 but at adjacent sidewall 156. Thus the inlet 150 is off centre and dirt chamber 144 may be underneath only a portion of cyclone 116.

[00053] Referring to Figures 3A – 3C, in some embodiments, dirt chamber 128 comprises a central axis 158 extending between upper portion 146, and lower portion 148. When surface cleaning apparatus 110 is positioned such that axis 122 extends vertically, central axis 158 may extend vertically between top wall 152 and bottom wall 154. Central axis 158 is positioned such that it extends through a centroid 160 of top wall 152. As used herein, the centroid of top wall 152 is defined as the point located centrally in the area A defined by dirt chamber 144 when viewed from above. For example, in the embodiment of Figures 3A-3C dirt chamber 144 is rectangular. When viewed from above, dirt chamber 130 has a Length L_1 and a width W_1, and centroid 160 is positioned at a point

corresponding to ½ L_1 and ½ W_1. In another example, as shown in Figures 4A – 4C, dirt chamber is substantially trapezoidal when viewed from the front. Accordingly, top wall 152 of dirt chamber 144 has a length L_2, bottom wall 154 of dirt chamber 144 has a length L_3, and dirt chamber 144 has a width W_2. When viewed from above, area A is defined by L_3 and W_2. Therefore, in this embodiment, centroid 160 is positioned at a point corresponding to ½ L_3 and ½ W_2. In another example, as shown in Figures 5A-5C, dirt chamber has two elongate and rounded lobes. When viewed from above, dirt chamber 144 has an overall width W_3, and an overall length L_4. The centroid 160 is positioned at a point corresponding to ½ W_3 and ½ L_4.

[00054] Dirt chamber inlet 150 is off centre with respect to dirt chamber 144. That is, dirt chamber inlet 150 is spaced from central axis. In further embodiments, central axis 158 is spaced from longitudinal axis 122. Such embodiments may allow for the volume of dirt chamber 144 to be increased, without substantially increasing the footprint of surface cleaning apparatus 110.

[00055] Referring to Figures 3A – 5C, dirt chamber inlet 150 may be spaced from central axis 158 by a distance X, which is defined as the shortest distance between a perimeter 162 of dirt inlet 150, and central axis 158. Distance X may vary depending on a variety of factors. Dirt chamber inlet 150 may be spaced from the central axis by a distance of at least 10% of the maximum length, L_{max}. In a preferred embodiment, dirt chamber inlet 150 is spaced from central axis 158 by a distance of at least 15% of L_{max}. In a more preferred embodiment, dirt chamber inlet 150 is spaced from central axis 158 by a distance of at least 25% of L_{max}.

[00056] In some particular embodiments, as shown in Figures 5A – 5C, the upper portion 146 of dirt chamber 144 has a perimeter 164, and dirt chamber inlet 150 is adjacent the perimeter.

[00057] Referring to Figures 6 and 7, the dirt chamber 144 preferably has an openable panel 166 to facilitate emptying debris collected therein. In the embodiment of Figure 6, panel 166 comprises bottom wall 15, which is movable

between open and closed positions. The bottom wall is preferably pivotally mounted to at least one sidewall 156. In the embodiment of Figure 7, panel 166 comprises top wall 152 of dirt chamber 132. In this embodiment, when panel 166 is opened, cyclonic cleaning stage 116, motor 118, and second cleaning stage 128 pivot together with panel 166. In other embodiments, dirt collection chamber 144 may be emptyable by any means known in the vacuum cleaner art. For example, dirt collection chamber 144 may be removably mounted to the surface cleaning apparatus or otherwise openable.

[00058] The apparatus 110 may also include a divider plate 168 positioned adjacent the dirt outlet 126 of the first cyclone chamber 120. In the example illustrated in Figures 2A-2C, the divider plate 168 is positioned within the dirt chamber 144, adjacent to but spaced below the dirt outlet 126. In other embodiments, divider palate 168 may be positioned within dirt outlet 126. In such an embodiment, dirt chamber inlet 150 may be defined between top wall 152 and divider plate 168, and may be substantially annular. The divider plate 168 may generally comprises a disc 170 that, when positioned below the dirt outlet 126, has a diameter slightly greater than the diameter of the dirt outlet 126, and disposed in facing relation to the dirt outlet 126. The disc 170 is, in the example illustrated, supported by a pedestal 172. In the embodiment of Figures 2A and 2C, pedestal 172 extends upwardly from bottom wall 154 of the dirt chamber 144. In the embodiment of Figure 2B pedestal 172 extends downwardly from top wall 152 of dirt chamber 144. Alternately, plate 168 may be mounted to a sidewall 156 of the dirt collection chamber 144.

[00059] In the embodiment of Figures 1A and 1C, the surface cleaning apparatus may be carried by a strap (not shown) or by using handle 174. In the embodiments of Figures 1B and 1D, the surface cleaning apparatus comprises one or more wheels 176, glides, or the like, for moving surface cleaning apparatus 110 along a surface.

[00060] In some embodiments, dirt chamber 144 preferably forms a portion of a casing member 177 for the apparatus 110 that is of a unitary, integral

construction. For example, casing member 177 may comprise dirt chamber 144, the outer wall of cyclone chamber 120, a housing for the second cleaning stage 128, motor housing 142, and handle 174.

[00061] In some embodiments, dirt chamber 144 may comprise one or more liner bags 180, for example as shown in Figure 2B, for lining dirt chamber 144 and aiding in emptying dirt chamber 144.

[00062] It will be appreciated that certain features of the invention, which are, for clarity, described in the context of separate embodiments or separate aspects, may also be provided in combination in a single embodiment. Conversely, various features of the invention, which are, for brevity, described in the context of a single embodiment or aspect, may also be provided separately or in any suitable sub-combination.

[00063] Although the invention has been described in conjunction with specific embodiments thereof, if is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Accordingly, it is intended to embrace all such alternatives, modifications and variations that fall within the spirit and broad scope of the appended claims. In addition, citation or identification of any reference in this application shall not be construed as an admission that such reference is available as prior art to the present invention.

I claim:

1. A hand vacuum cleaner comprising:

a) a main body comprising a fluid flow motor;

b) a first cyclonic cleaning stage having first and second spaced apart ends and comprising a cyclone chamber, the cyclone chamber having first and second spaced apart ends, a dirty fluid inlet, a clean fluid outlet and a first longitudinal axis, the dirty fluid inlet defines a passage extending along a passage axis that intersects the first longitudinal axis;

c) a handle; and,

d) a wand mounted to the dirty fluid inlet, the wand having a distal inlet that is mounted on a surface cleaning head

wherein the fluid flow motor is displaced from the passage axis in a direction parallel to the longitudinal axis.

2. The hand vacuum cleaner of claim 1 wherein an end of the handle is mounted to the hand vacuum cleaner at a position adjacent an upper end of the first cyclonic cleaning stage.

3. The hand vacuum cleaner of claim 1 wherein the dirty fluid inlet defines a passage extending along a passage axis, wherein the passage axis intersects the handle.

4. The hand vacuum cleaner of claim 2 wherein the hand vacuum cleaner has a lower dirt collection region, the cyclone chamber of the first cyclonic cleaning stage extends above the dirt collection region and the end of the handle is an upper end of the handle.

5. The hand vacuum cleaner of claim 1 wherein the first cyclonic cleaning stage comprises a dirt collection region that has a pivotally openable bottom.

6. The hand vacuum cleaner of claim 5 wherein the bottom is openable when the dirt collection region is attached to the main body.

7. The hand vacuum cleaner of claim 1 wherein the first end of the cyclone chamber is positioned above the second end of the cyclone chamber when the hand vacuum cleaner is positioned on a horizontal surface, the dirty fluid inlet and the clean fluid outlet are located at the first end of the cyclone chamber, the first cyclonic cleaning stage comprises a dirt collection region, and the dirt collection region is located at the second end of the first cyclonic cleaning stage.

8. The hand vacuum cleaner of claim 7 wherein the dirty fluid inlet defines a passage extending along a passage axis, wherein the passage axis intersects the handle.

9. The hand vacuum cleaner of claim 8 wherein the dirt collection region has a pivotally openable bottom.

10. The hand vacuum cleaner of claim 1 wherein the handle comprises a portion extending upwardly when the hand vacuum cleaner is positioned on a horizontal surface, and the portion extends away from a fluid flow motor housing of the main body.

11. The hand vacuum cleaner of claim 1 wherein the handle comprises a portion that extends upwardly when the hand vacuum cleaner is positioned on a horizontal surface and the dirty fluid inlet defines a passage extending along a passage axis, and the passage axis intersects the portion of the handle that extends upwardly.

12. The hand vacuum cleaner of claim 1 wherein the cyclone chamber extends longitudinally along a first longitudinal axis, the dirty fluid inlet defines a passage extending along a passage axis that intersects the first longitudinal axis, and the fluid flow motor is displaced from the passage axis in a direction parallel to the longitudinal axis.

13. The hand vacuum cleaner of claim 12 wherein the fluid flow motor has a fluid flow motor axis that is parallel to the passage axis.

14. The hand vacuum cleaner of claim 13 wherein the fluid flow motor axis is displaced from the passage axis in a direction parallel to the longitudinal axis.

15. The hand vacuum cleaner of claim 1 wherein the cyclone chamber extends longitudinally along a first longitudinal axis, the dirty fluid inlet defines a passage extending along a passage axis and the fluid flow motor extends transverse to the first longitudinal axis, is parallel to the passage axis and is displaced from the passage axis in a direction parallel to the longitudinal axis.

16. The hand vacuum cleaner of claim 14 wherein the dirty fluid inlet of the cyclone chamber is located at a front end of the hand vacuum cleaner and the fluid flow motor is positioned rearward of the first cyclonic cleaning stage.

17. The hand vacuum cleaner of claim 1 wherein the dirty fluid inlet of the cyclone chamber is located at a front end of the hand vacuum cleaner and the fluid flow motor is positioned rearward of the first cyclonic cleaning stage.

18. The hand vacuum cleaner of claim 1 wherein the first cyclonic cleaning stage comprises a dirt collection region and the dirt collection region is positioned below the wand when the hand vacuum cleaner is positioned on a horizontal surface.

19. The hand vacuum cleaner of claim 1 further comprising a second cyclonic cleaning stage comprising plurality of cyclones, each cyclone of the plurality of cyclones has an fluid inlet and the fluid inlets of the plurality of cyclones are provided at the first end of the second cyclonic cleaning stage wherein, when the hand vacuum cleaner is positioned on a horizontal surface, the first end of the second cyclonic cleaning stage is positioned above the first end of the first cyclonic cleaning stage and above the wand.

20. The hand vacuum cleaner of claim 1 wherein, when the hand vacuum cleaner is positioned on a horizontal surface, the first end of the cyclone chamber is positioned above the second end of the cyclone chamber, a first end of a second cyclonic cleaning stage is positioned above a second end of the second cyclonic cleaning stage and the first end of the second cyclonic cleaning stage is positioned above the first end of the cyclone chamber.

21. The hand vacuum cleaner of claim 1 further comprising a dirt collection region which is removably mounted to the hand vacuum cleaner.

22. The hand vacuum cleaner of claim 1 wherein the fluid flow motor has a fluid flow motor axis, the dirty fluid inlet defines a passage extending along a passage axis and a flow path from a pre-motor filter to the fluid flow motor comprises a portion that is parallel to the fluid flow motor axis and is spaced from the passage axis.

23. The hand vacuum cleaner of claim 1 wherein the clean fluid outlet comprises a conduit that extends into the cyclone chamber and the dirty fluid inlet defines a passage extending along a passage axis, wherein the passage axis intersects the conduit.

24. The hand vacuum cleaner of claim 1 wherein the first end of the cyclone chamber is positioned above the second end of the cyclone chamber when the hand vacuum cleaner is positioned on a horizontal surface, and the fluid flow motor is positioned above the first end of the cyclone chamber when the hand vacuum cleaner is positioned on the horizontal surface.

25. The hand vacuum cleaner of claim 1 further comprising a second cyclonic cleaning stage comprising a plurality of cyclones wherein each of the first and second cyclonic cleaning stages has a longitudinal axis and the axis are parallel.

26. The hand vacuum cleaner of claim 1 further comprising a second cyclonic cleaning stage comprising a plurality of cyclones wherein each of the first and

second cyclonic cleaning stages has a central longitudinal axis and the fluid flow motor and the handle are positioned rearward of the central axis.

27. The hand vacuum cleaner of claim 26 wherein the first cyclonic cleaning stage comprises a dirt collection region, the dirt collection region has a pivotally openable bottom and the fluid flow motor and the handle are positioned rearward of the pivotally openable bottom.

ABSTRACT

A hand vacuum cleaner is provided with a wand mounted to the dirty fluid inlet of the hand vacuum cleaner and the wand has a distal inlet that is mounted on a surface cleaning head. The hand vacuum cleaner has a cyclonic cleaning stage. The dirty fluid inlet has a passage with a passage axis and the cyclonic cleaning stage has a longitudinal axis. The fluid flow motor is displaced from the passage axis in a direction parallel to the longitudinal axis.

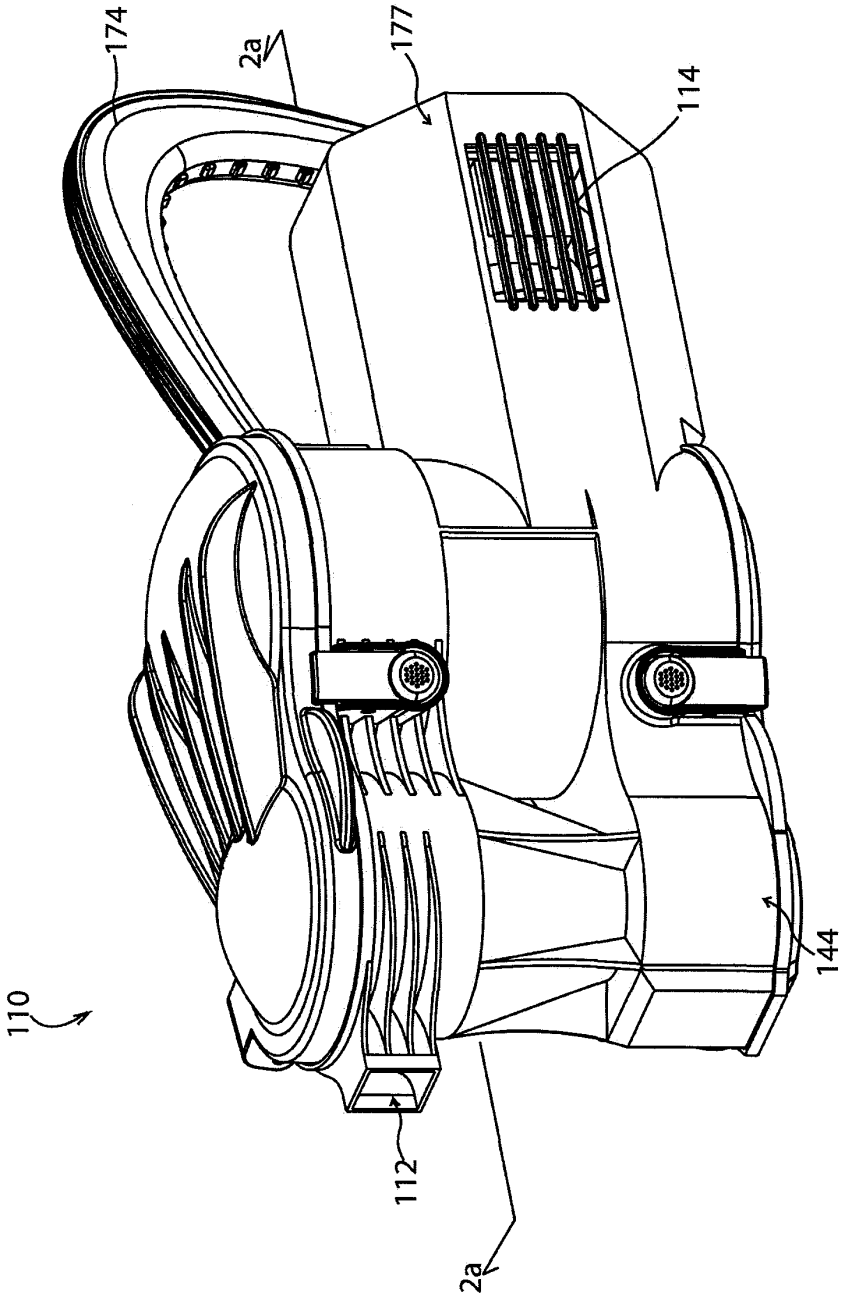


Fig. 1a

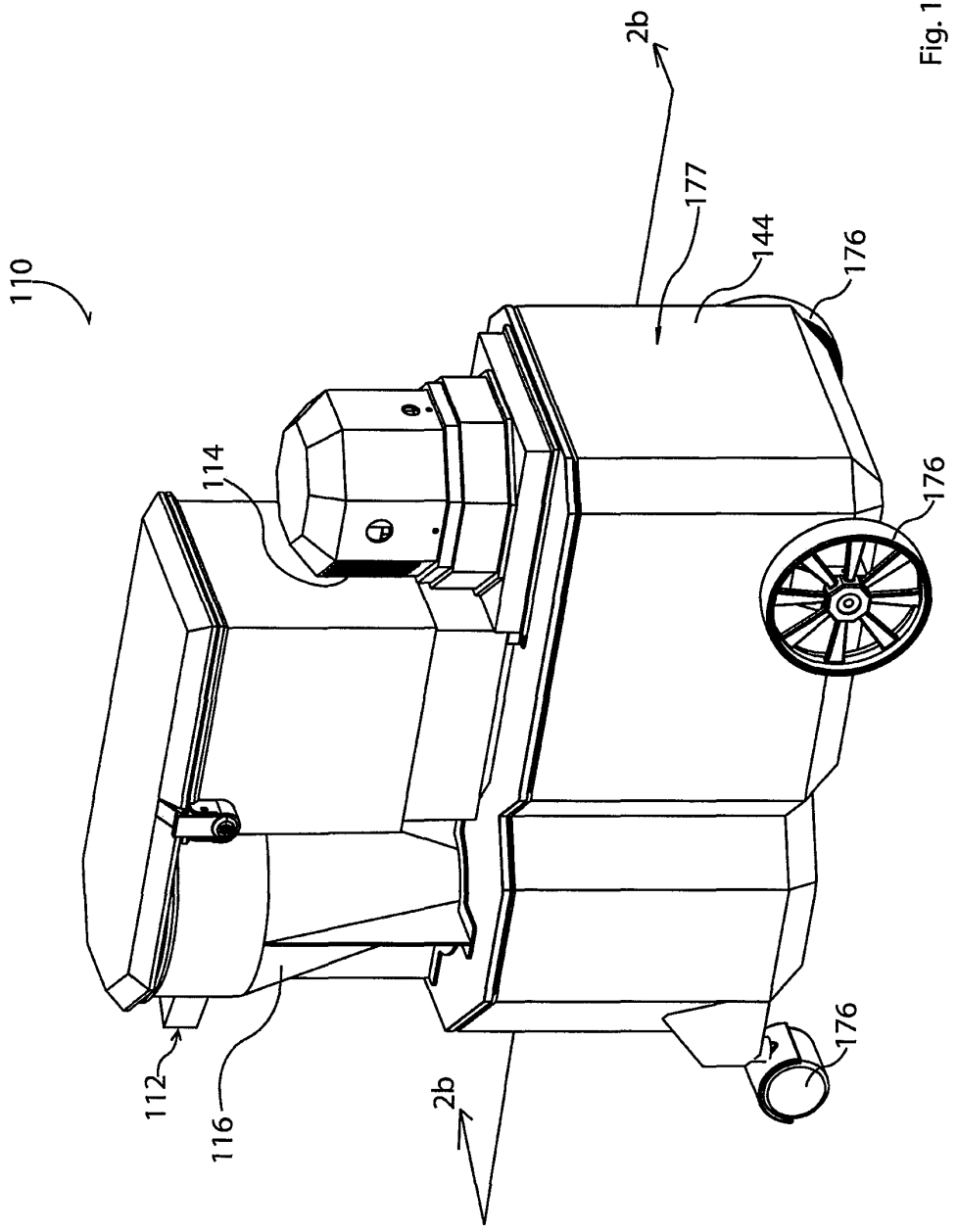


Fig. 1b

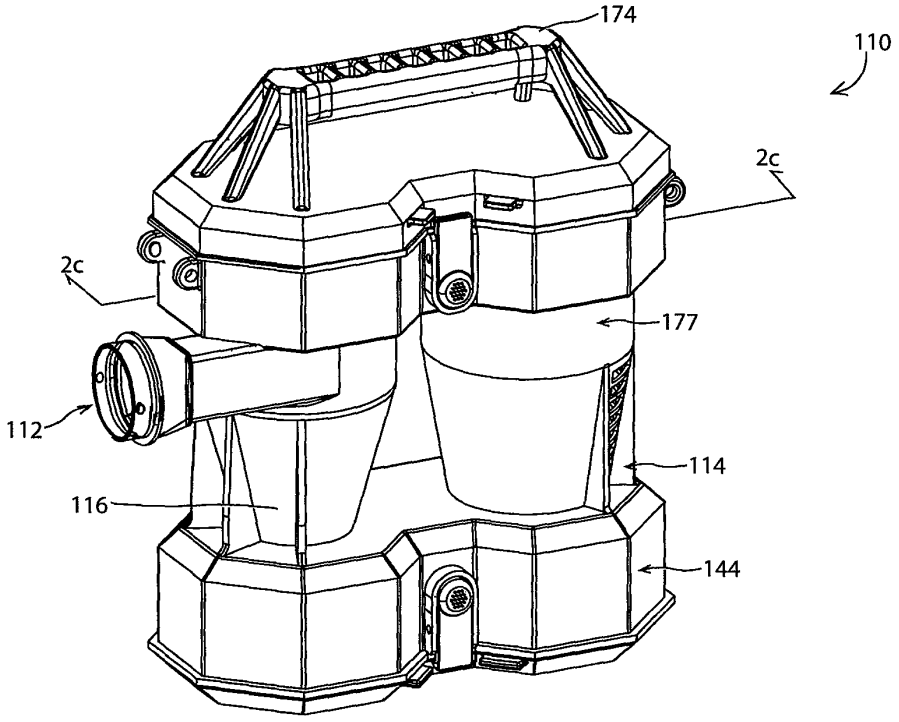


Fig. 1c

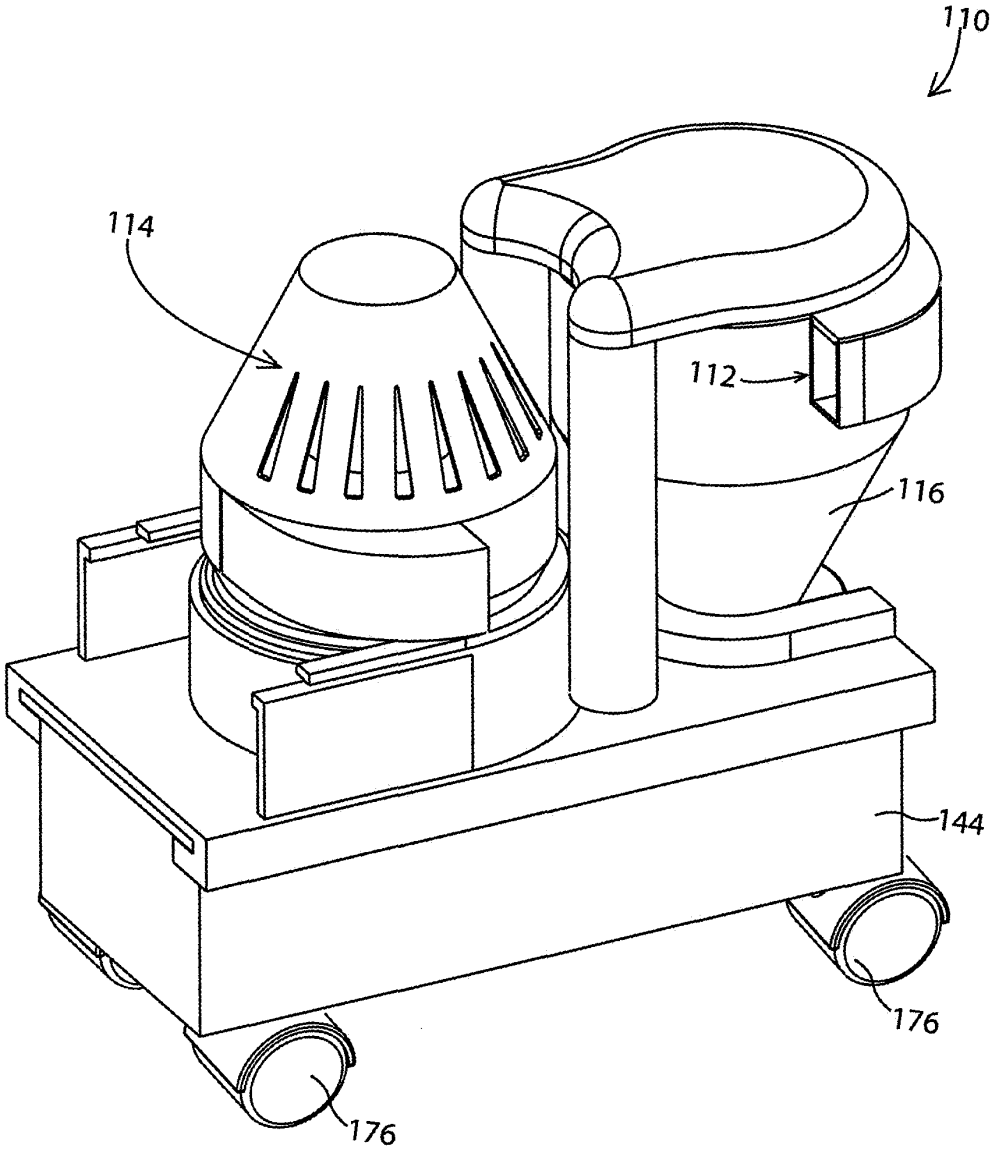


Fig. 1d

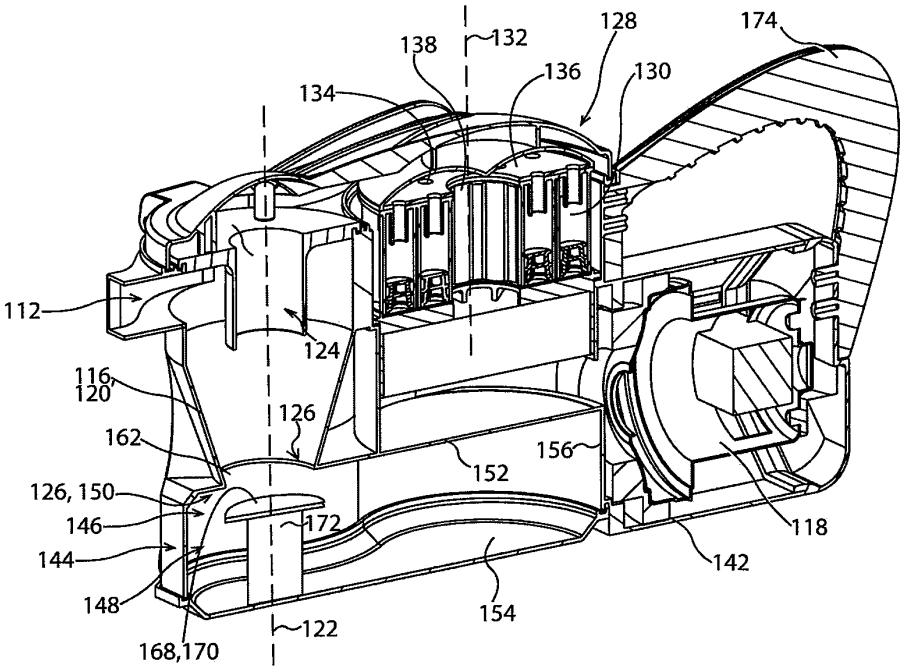

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Fig. 2a

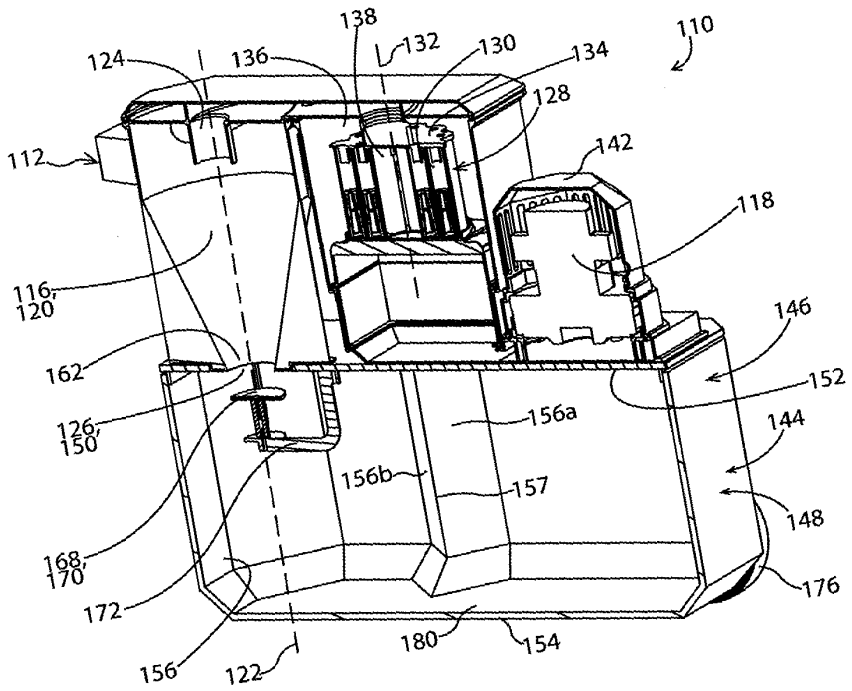

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Fig. 2b

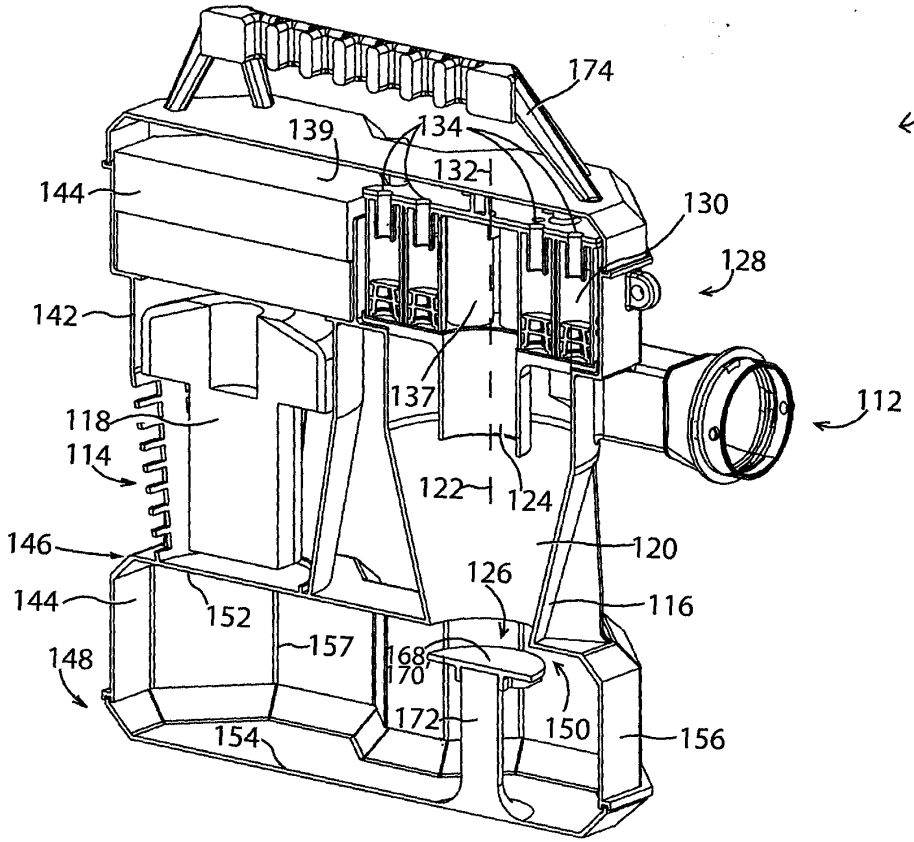

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Fig. 2c

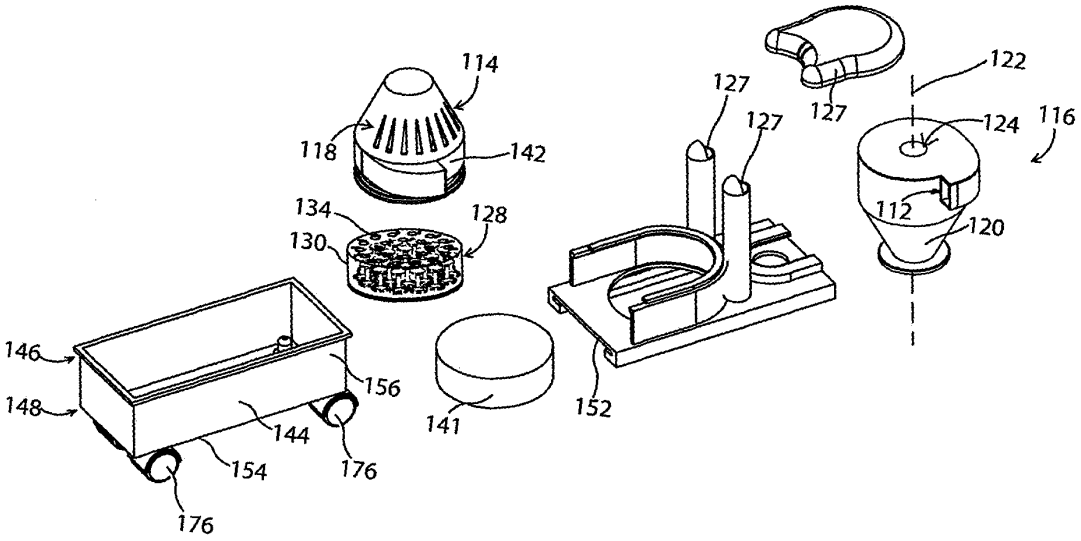

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Fig. 2d

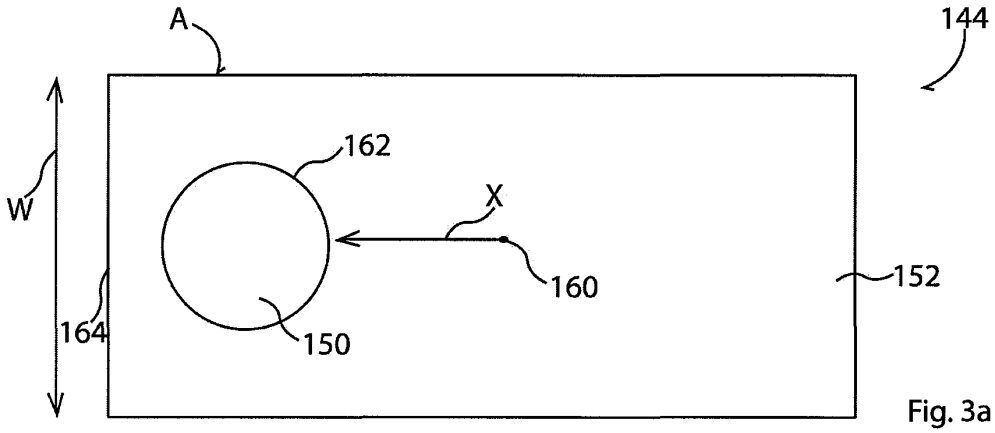


Fig. 3a

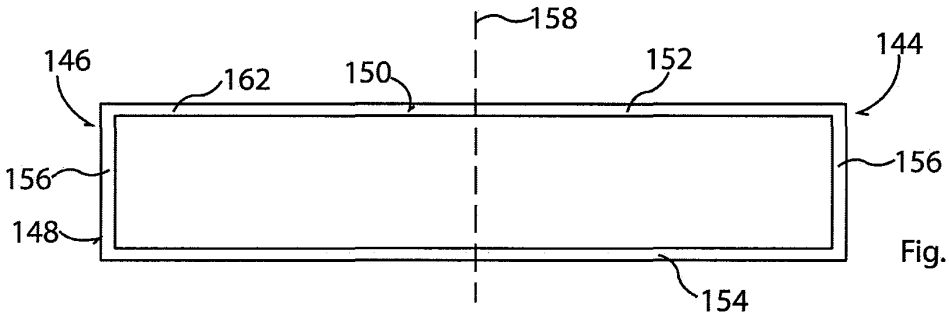


Fig. 3b

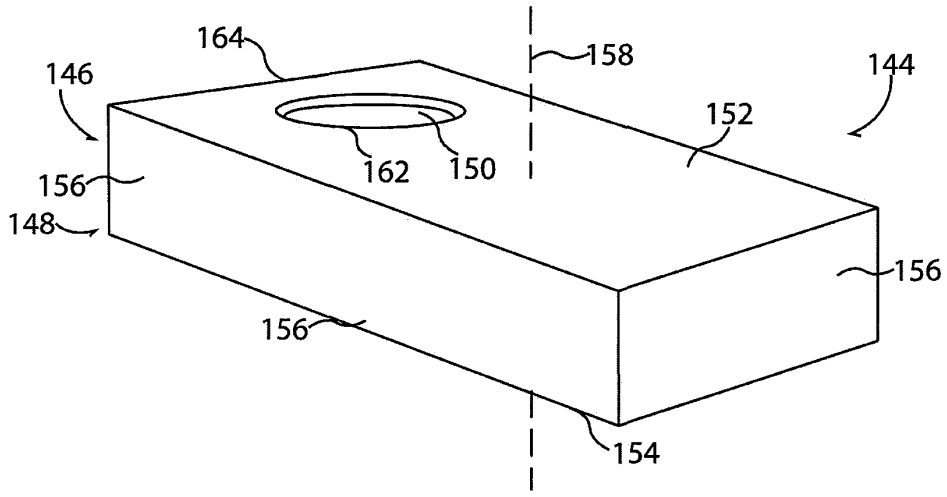


Fig. 3c

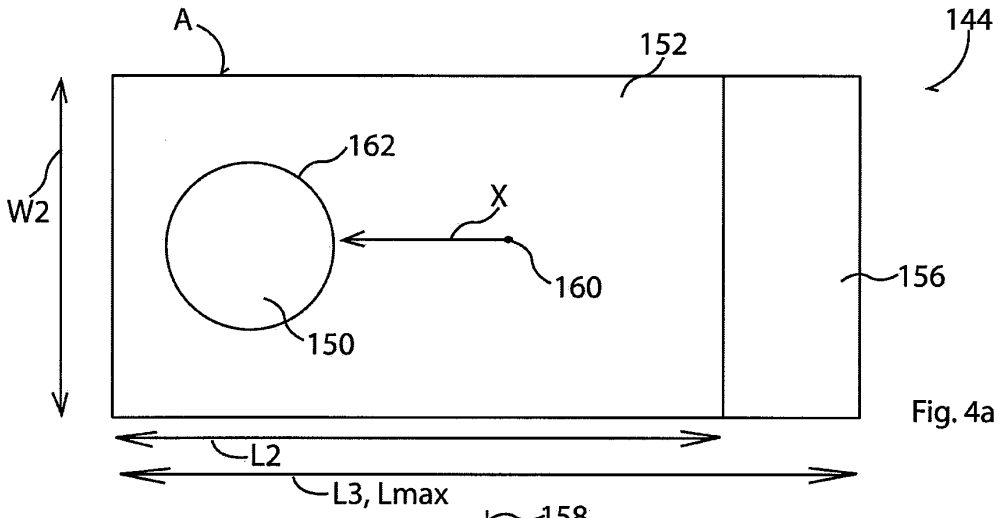


Fig. 4a

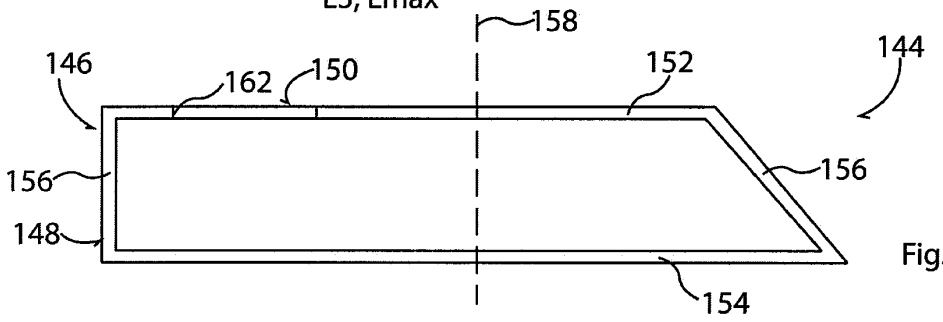


Fig. 4b

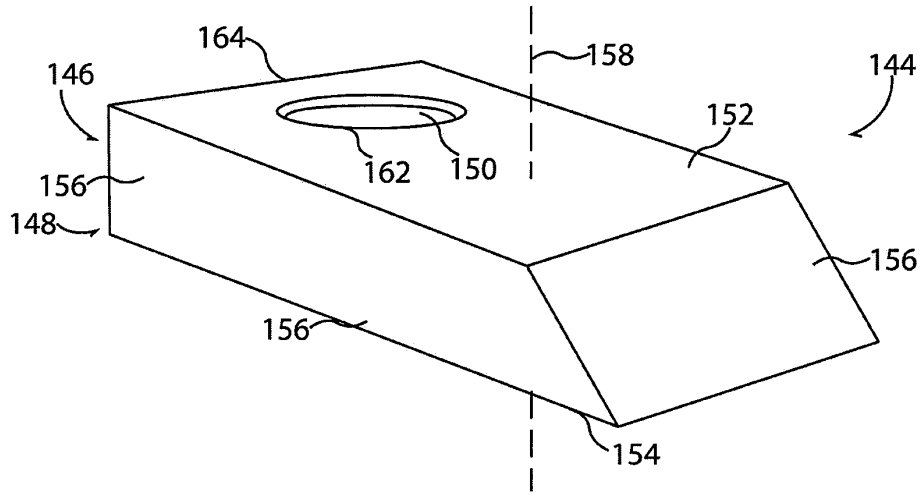


Fig. 4c

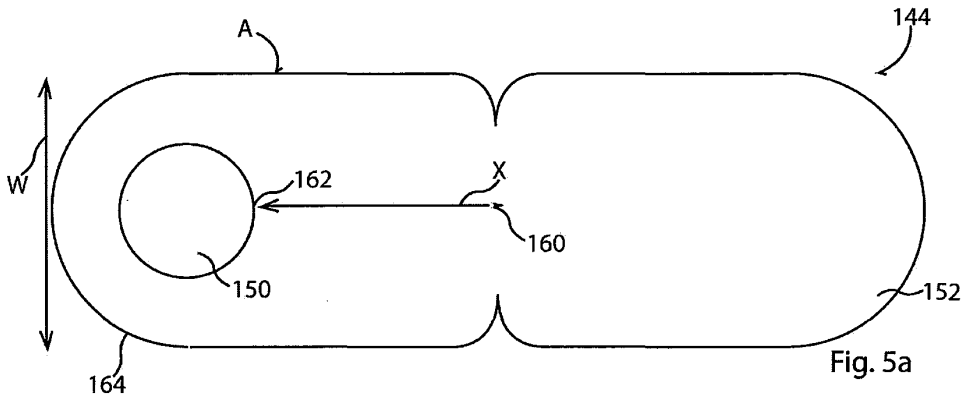


Fig. 5a

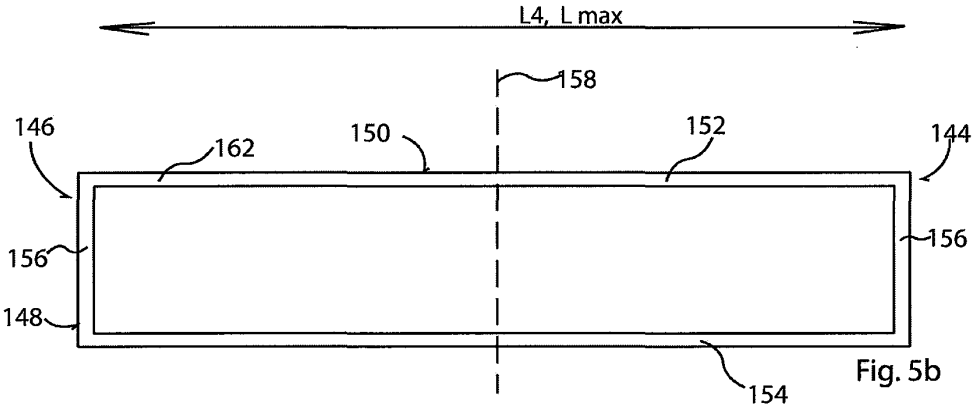


Fig. 5b

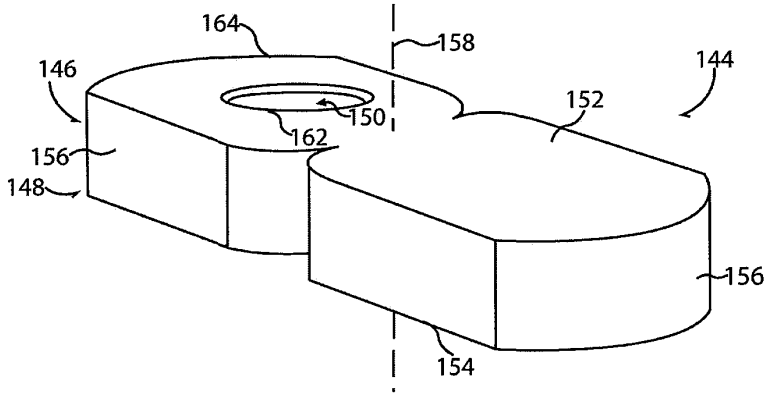


Fig. 5c

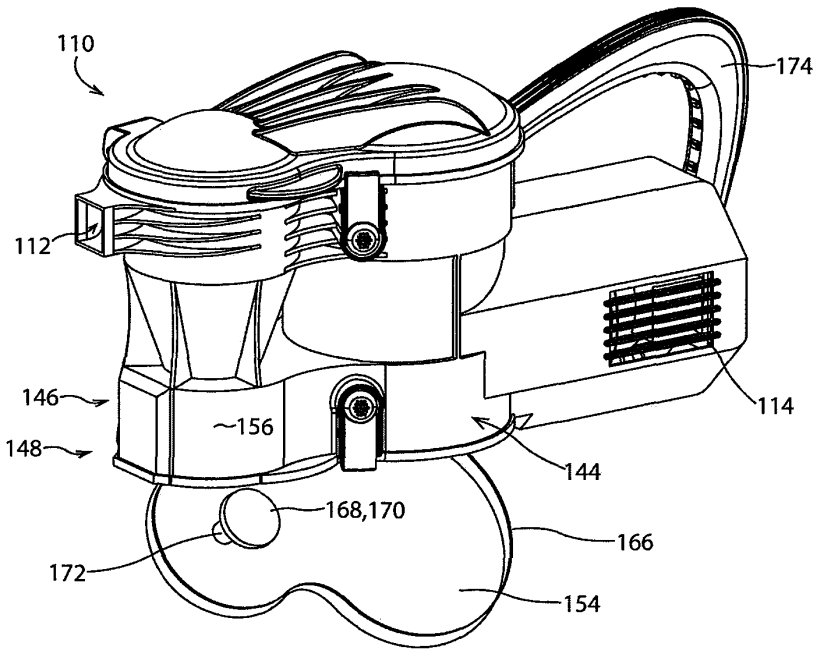


Fig. 6

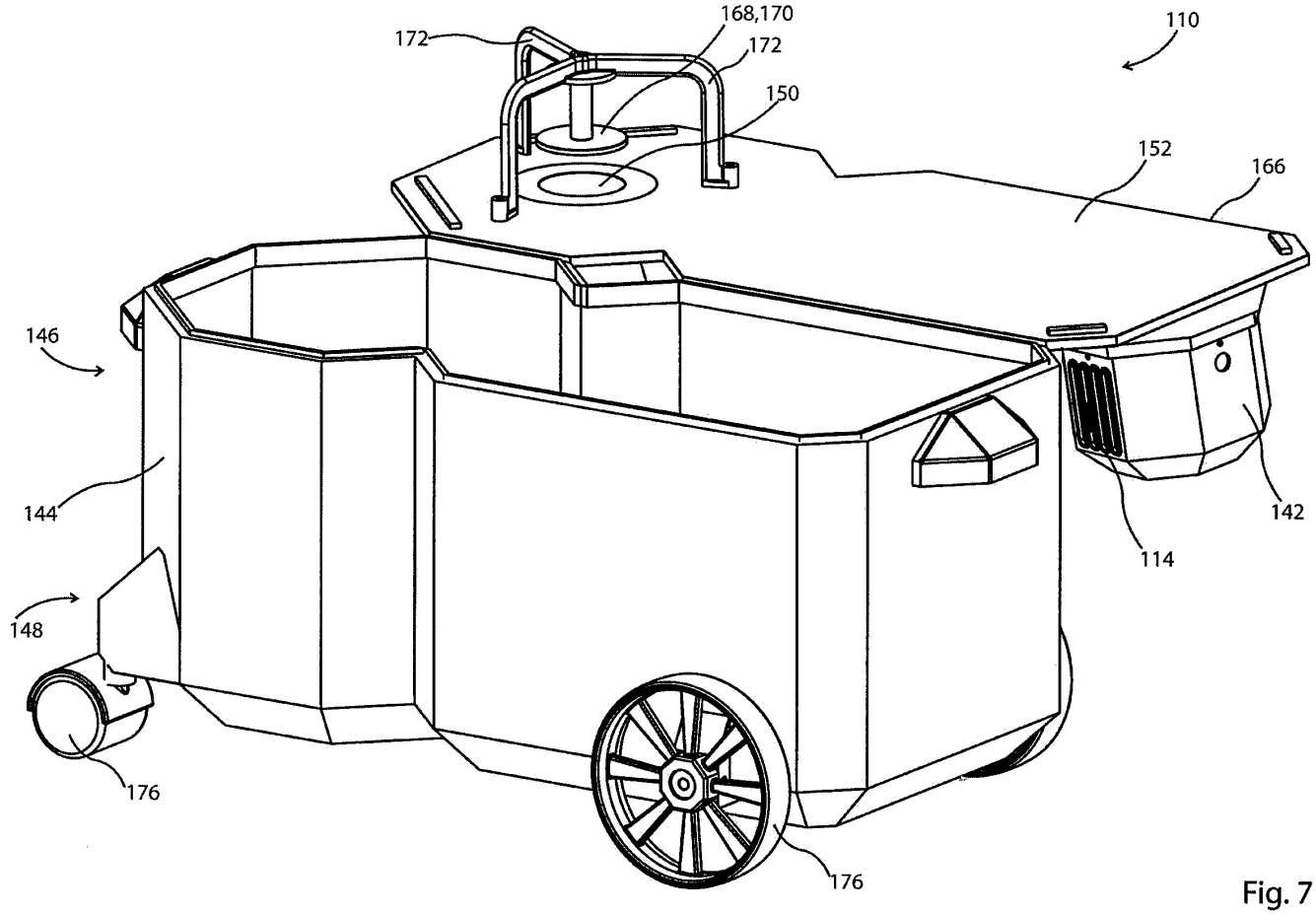


Fig. 7

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DECLARATION (37 CFR 1.63) FOR UTILITY OR DESIGN APPLICATION USING AN APPLICATION DATA SHEET (37 CFR 1.76)

Title of Invention	SURFACE CLEANING APPARATUS

As the below named inventor, I hereby declare that:

This declaration is directed to:

- [■] The attached application, or
- [ ] United States application or PCT international application number _____ filed on _____.

The above-identified application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.

WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

LEGAL NAME OF INVENTOR

Inventor: Wayne Ernest Conrad Date (Optional): September 10, 2014

Signature: Wayne Conrad

Note: An application data sheet (PTO/SB/14 or equivalent), including naming the entire inventive entity, must accompany this form or must have been previously filed. Use an additional PTO/AIA/01 form for each additional inventor.

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 1 minute to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2

Electronic Patent Application Fee Transmittal

Application Number:	
Filing Date:	
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Filer:	Leslie J. Paperner/Jamie Becton
Attorney Docket Number:	P46540

Filed as Large Entity

Utility under 35 USC 111(a) Filing Fees

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Claims in Excess of 20	1202	7	80	560
Miscellaneous-Filing:				
Petition:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD($)
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
		Total in USD ($)		**2160**

Electronic Acknowledgement Receipt

EFS ID:	20154146
Application Number:	14489646
International Application Number:	
Confirmation Number:	6255
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Customer Number:	7055
Filer:	Leslie J. Paperner/Jamie Becton
Filer Authorized By:	Leslie J. Paperner
Attorney Docket Number:	P46540
Receipt Date:	18-SEP-2014
Filing Date:	
Time Stamp:	11:37:39
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	$2160
RAM confirmation Number	8525
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)

1	Application Data Sheet	P46540_ADS.PDF	1611191 17c916617a596318401abbe6fb29710d1cb5e9bf	no	7
Warnings:					
Information:					
2		P46540_App.pdf	1631644 1ea4cb80514da377b498fefaf8678fd803f1f1a3	yes	34

Multipart Description/PDF files in .zip description

Document Description	Start	End
Miscellaneous Incoming Letter	1	1
Specification	2	14
Claims	15	19
Abstract	20	20
Drawings-only black and white line drawings	21	33
Oath or Declaration filed	34	34

Warnings:					
Information:					
3	Fee Worksheet (SB06)	fee-info.pdf	36484 6a79d48f3fea3e158d478e05118f40340fcb31c2	no	2
Warnings:					
Information:					
			Total Files Size (in bytes):	3279319	

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	P46540
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76.
This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.

Secrecy Order 37 CFR 5.2

☐ Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)

Inventor Information:

Inventor 1 Remove

Legal Name

Prefix	Given Name	Middle Name	Family Name	Suffix
	Wayne	Ernest	CONRAD	

Residence Information (Select One) ○ US Residency ◉ Non US Residency ○ Active US Military Service

City	Hampton	Country of Residence i	CA

Mailing Address of Inventor:

Address 1	9 King Lane		
Address 2			
City	Hampton	**State/Province**	ON
Postal Code	L0B 1J0	**Country** i	CA

All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the **Add** button. Add

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below.
For further information see 37 CFR 1.33(a).

☐ **An Address is being provided for the correspondence Information of this application.**

Customer Number	07055		
Email Address	gbpatent@gbpatent.com	Add Email	Remove Email

Application Information:

Title of the Invention	SURFACE CLEANING APPARATUS		
Attorney Docket Number	P46540	**Small Entity Status Claimed**	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	13	**Suggested Figure for Publication (if any)**	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	P46540
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

Filing By Reference :

Only compete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32).
Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	◉ Customer Number	○ US Patent Practitioner	○ Limited Recognition (37 CFR 11.9)
Customer Number	07055		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.
When referring to the current application, please leave the application number blank.

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	Continuation in part of	11/953292	2007-12-10
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11/953292	Claims benefit of provisional	60/893990	2007-03-09

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	P46540
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11/953292	Claims benefit of provisional	60/894005	2007-03-09
Prior Application Status	Pending		Remove
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11/953292	Claims benefit of provisional	60/869586	2006-12-12
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the **Add** button.			Add

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) [i] the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

			Remove
Application Number	Country [i]	Filing Date (YYYY-MM-DD)	Access Code [i] (if applicable)
Additional Foreign Priority Data may be generated within this form by selecting the **Add** button.			Add

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.
NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	P46540
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Applicant 1 Remove

If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.

Clear

(•) Assignee	( ) Legal Representative under 35 U.S.C. 117	( ) Joint Inventor
( ) Person to whom the inventor is obligated to assign.	( ) Person who shows sufficient proprietary interest	

If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:

Name of the Deceased or Legally Incapacitated Inventor :

If the Applicant is an Organization check here. [X]

Organization Name	G.B.D. CORP.

Mailing Address Information:

Address 1	Templeton Building, Lyford Cay		
Address 2	P.O. Box N-9204		
City	Nassau	**State/Province**	
Country [i]	BS	Postal Code	
Phone Number		Fax Number	

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	P46540
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

Email Address	

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Assignee Information including Non-Applicant Assignee Information:

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Assignee 1

Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication . An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.

Remove

If the Assignee or Non-Applicant Assignee is an Organization check here. ☐

Prefix	**Given Name**	Middle Name	**Family Name**	Suffix

Mailing Address Information For Assignee including Non-Applicant Assignee:

Address 1			
Address 2			
City		**State/Province**	
Country i		Postal Code	
Phone Number		Fax Number	
Email Address			

Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button. Add

Signature:

Remove

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications

Signature	/Leslie J. Paperner/			Date (YYYY-MM-DD)	2014-09-16
First Name	Leslie J.	Last Name	Paperner	Registration Number	33329

Additional Signature may be generated within this form by selecting the Add button. Add

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Application Data Sheet 37 CFR 1.76	Attorney Docket Number	P46540
	Application Number	
Title of Invention	SURFACE CLEANING APPARATUS	

This collection of information is required by 37 CFR 1.76. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 23 minutes to complete, including gathering, preparing, and submitting the completed application data sheet form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.

2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.

3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.

4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).

5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.

6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).

7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.

8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.

9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY.DOCKET.NO	TOT CLAIMS	IND CLAIMS
14/489,646	09/18/2014	1776	2160	P46540	27	1

CONFIRMATION NO. 6255

7055
GREENBLUM & BERNSTEIN, P.L.C.
1950 ROLAND CLARKE PLACE
RESTON, VA 20191

FILING RECEIPT

OC000000070933437

Date Mailed: 09/25/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

Wayne Ernest CONRAD, Hampton, CANADA;

Applicant(s)

G.B.D. CORP., Nassau, BAHAMAS

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CIP of 11/953,292 12/10/2007
which claims benefit of 60/893,990 03/09/2007
and claims benefit of 60/894,005 03/09/2007
and claims benefit of 60/869,586 12/12/2006

Foreign Applications for which priority is claimed (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see http://www.uspto.gov for more information.) - None.
Foreign application information must be provided in an Application Data Sheet in order to constitute a claim to foreign priority. See 37 CFR 1.55 and 1.76.

Permission to Access - A proper **Authorization to Permit Access to Application by Participating Offices** (PTO/SB/39 or its equivalent) has been received by the USPTO.

If Required, Foreign Filing License Granted: 09/23/2014
The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/489,646**
Projected Publication Date: 01/01/2015
Non-Publication Request: No

Early Publication Request: No
Title

SURFACE CLEANING APPARATUS

Preliminary Class

055

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

PROTECTING YOUR INVENTION OUTSIDE THE UNITED STATES

Since the rights granted by a U.S. patent extend only throughout the territory of the United States and have no effect in a foreign country, an inventor who wishes patent protection in another country must apply for a patent in a specific country or in regional patent offices. Applicants may wish to consider the filing of an international application under the Patent Cooperation Treaty (PCT). An international (PCT) application generally has the same effect as a regular national patent application in each PCT-member country. The PCT process **simplifies** the filing of patent applications on the same invention in member countries, but **does not result** in a grant of "an international patent" and does not eliminate the need of applicants to file additional documents and fees in countries where patent protection is desired.

Almost every country has its own patent law, and a person desiring a patent in a particular country must make an application for patent in that country in accordance with its particular laws. Since the laws of many countries differ in various respects from the patent law of the United States, applicants are advised to seek guidance from specific foreign countries to ensure that patent rights are not lost prematurely.

Applicants also are advised that in the case of inventions made in the United States, the Director of the USPTO must issue a license before applicants can apply for a patent in a foreign country. The filing of a U.S. patent application serves as a request for a foreign filing license. The application's filing receipt contains further information and guidance as to the status of applicant's license for foreign filing.

Applicants may wish to consult the USPTO booklet, "General Information Concerning Patents" (specifically, the section entitled "Treaties and Foreign Patents") for more information on timeframes and deadlines for filing foreign patent applications. The guide is available either by contacting the USPTO Contact Center at 800-786-9199, or it can be viewed on the USPTO website at http://www.uspto.gov/web/offices/pac/doc/general/index.html.

For information on preventing theft of your intellectual property (patents, trademarks and copyrights), you may wish to consult the U.S. Government website, http://www.stopfakes.gov. Part of a Department of Commerce initiative, this website includes self-help "toolkits" giving innovators guidance on how to protect intellectual property in specific countries such as China, Korea and Mexico. For questions regarding patent enforcement issues, applicants may call the U.S. Government hotline at 1-866-999-HALT (1-866-999-4258).

LICENSE FOR FOREIGN FILING UNDER

Title 35, United States Code, Section 184

Title 37, Code of Federal Regulations, 5.11 & 5.15

GRANTED

The applicant has been granted a license under 35 U.S.C. 184, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" followed by a date appears on this form. Such licenses are issued in all applications where the conditions for issuance of a license have been met, regardless of whether or not a license may be required as set forth in 37 CFR 5.15. The scope and limitations of this license are set forth in 37 CFR 5.15(a) unless an earlier license has been issued under 37 CFR 5.15(b). The license is subject to revocation upon written notification. The date indicated is the effective date of the license, unless an earlier license of similar scope has been granted under 37 CFR 5.13 or 5.14.

This license is to be retained by the licensee and may be used at any time on or after the effective date thereof unless it is revoked. This license is automatically transferred to any related applications(s) filed under 37 CFR 1.53(d). This license is not retroactive.

The grant of a license does not in any way lessen the responsibility of a licensee for the security of the subject matter as imposed by any Government contract or the provisions of existing laws relating to espionage and the national security or the export of technical data. Licensees should apprise themselves of current regulations especially with respect to certain countries, of other agencies, particularly the Office of Defense Trade Controls, Department of State (with respect to Arms, Munitions and Implements of War (22 CFR 121-128)); the Bureau of Industry and Security, Department of Commerce (15 CFR parts 730-774); the Office of Foreign AssetsControl, Department of Treasury (31 CFR Parts 500+) and the Department of Energy.

NOT GRANTED

No license under 35 U.S.C. 184 has been granted at this time, if the phrase "IF REQUIRED, FOREIGN FILING LICENSE GRANTED" DOES NOT appear on this form. Applicant may still petition for a license under 37 CFR 5.12, if a license is desired before the expiration of 6 months from the filing date of the application. If 6 months has lapsed from the filing date of this application and the licensee has not received any indication of a secrecy order under 35 U.S.C. 181, the licensee may foreign file the application pursuant to 37 CFR 5.15(b).

SelectUSA

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The U.S. offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to promote and facilitate business investment. SelectUSA provides information assistance to the international investor community; serves as an ombudsman for existing and potential investors; advocates on behalf of U.S. cities, states, and regions competing for global investment; and counsels U.S. economic development organizations on investment attraction best practices. To learn more about why the United States is the best country in the world to develop technology, manufacture products, deliver services, and grow your business, visit http://www.SelectUSA.gov or call +1-202-482-6800.

PATENT APPLICATION FEE DETERMINATION RECORD

Substitute for Form PTO-875

Application or Docket Number: 14/489,646

APPLICATION AS FILED - PART I

FOR	(Column 1) NUMBER FILED	(Column 2) NUMBER EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY FEE($)
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280
SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A			N/A	600
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720
TOTAL CLAIMS (37 CFR 1.16(i))	27 minus 20 =	* 7			OR	x 80 =	560
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1 minus 3 =	*				x 420 =	0.00
APPLICATION SIZE FEE (37 CFR 1.16(s))	If the specification and drawings exceed 100 sheets of paper, the application size fee due is $310 ($155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).						0.00
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))							0.00
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL			TOTAL	2160

APPLICATION AS AMENDED - PART II

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	SMALL ENTITY RATE($)	SMALL ENTITY ADDITIONAL FEE($)	OR	OTHER THAN SMALL ENTITY RATE($)	OTHER THAN SMALL ENTITY ADDITIONAL FEE($)
AMENDMENT A	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

		(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA	RATE($)	ADDITIONAL FEE($)	OR	RATE($)	ADDITIONAL FEE($)
AMENDMENT B	Total (37 CFR 1.16(i))	*	Minus	**	=	x =		OR	x =	
	Independent (37 CFR 1.16(h))	*	Minus	***	=	x =		OR	x =	
	Application Size Fee (37 CFR 1.16(s))									
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))							OR		
						TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".
*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".
The "Highest Number Previously Paid For" (Total or Independent) is the highest found in the appropriate box in column 1.

P46540

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s) :	Wayne Ernest CONRAD	Conf. No :	6255
Appl. No. :	14/489,646	Examiner :	Not Yet Assigned
Filed :	September 18, 2014	Group Art Unit :	Not Yet Assigned
For :	SURFACE CLEANING APPARATUS		

COVER LETTER REGARDING SUBMISSION OF APPLICATION DATA SHEET UNDER 37 C.F.R. 1.76(c)(2)

Commissioner for Patents
U.S. Patent and Trademark Office
Customer Service Window, Mail Stop _____
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

In accordance with 37 C.F.R. 1.76(c)(2), Applicant(s) submit(s) for the above-captioned application having a U.S. filing date after September 16, 2012, an Application Data Sheet (ADS) with information provided only in the section to be revised. In particular, the information being revised is in the following section(s):

- ☐ Application Information
- ☐ Inventor Information
- ☐ Correspondence Information
- ☐ Representative Information
- ☒ Domestic Benefit/National Stage Information
- ☐ Foreign Priority Information
- ☐ Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications
- ☐ Applicant Information
- ☐ Non-Applicant Assignee Information

Accordingly, Applicant(s) request(s) entry of the information provided in the attached Application Data Sheet.

Should there be any questions with regard to this submission, the Examiner is requested to contact the undersigned at the telephone number listed below.

Respectfully submitted,
Wayne Ernest CONRAD

Leslie J Paperner

Branko Pejic
Reg. No. 60,255

Leslie J. Paperner
Reg. #33329

October 21, 2014
GREENBLUM & BERNSTEIN, P.L.C.
1950 Roland Clarke Place
Reston, VA 20191
(703) 716-1191

Application Data Sheet

Application Information

Application Number::	14/489,646
Filing Date::	September 18, 2014
Application Type::	
Subject Matter::	
Suggested Classification::	
Suggested Group Art Unit::	
CD-ROM or CD-R?::	
Number of CD disks::	
Number of copies of CDs::	
Sequence submission?::	
Computer Readable Form (CRF)?::	
Number of copies of CRF::	
Title::	SURFACE CLEANING APPARATUS
Attorney Docket Number::	P46540
Request for Early Publication?::	
Request for Non-Publication?::	
Suggested Drawing Figure:	
Total Drawing Sheets::	
Small Entity?::	
Latin name::	
Variety denomination name::	
Petition included?::	
Petition Type::	
Licensed US Govt. Agency::	
Contract or Grant Numbers::	
Secrecy Order in Parent Appl.?::	

Inventor Information

Inventor 1::

Given Name::

Middle Name::

Family Name::

Name Suffix::

City of Residence::

State or Province of Residence::

Country of Residence::

Street of mailing address::

City of mailing address::

State or Province of mailing address::
Country of mailing address::

Postal or Zip Code of mailing address::

Correspondence Information

Correspondence Customer Number::

Name::

Street of mailing address::

City of mailing address::

State of Province of mailing address::

Country of mailing address::

Postal or Zip Code of mailing address::

Phone number::

Fax Number::

E-Mail address::

Representative Information

Representative Customer Number:	

-OR-

Representative Designation::	Registration Number::	Representative Name::

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

Prior Application Status	Pending		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
	~~Continuation in part of~~ **Continuation**	11/953292	2007-12-10
Prior Application Status	Pending		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11/953292	Claims benefit of provisional	60/893990	2007-03-09
Prior Application Status	Pending		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11/953292	Claims benefit of provisional	60/894005	2007-03-09
Prior Application Status	Pending		
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
11/953292	Claims benefit of provisional	60/869586	2006-12-12

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX) the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Application Number	Country	Parent Filing Date (YYYY-MM-DD)	Access code:: (if applicable)

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐	This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

Applicant Information

Applicant 1:: ☐ Assignee ☐ Legal Representative under 35 U.S.C 117

☐ Joint Inventor ☐ Person to whom the inventor is obligated to assign

☐ Person who shows sufficient proprietary interest

If applicant is the legal representative, the inventor is:: ☐ Deceased ☐ Legally incapacitated

Given Name::

Middle Name::

Family Name::

Name Suffix::

Applicant is an Organization::

Applicant Name::

Mailing address::

City of mailing address::

State or Province of mailing address::

Country of mailing address::

Postal or Zip Code of mailing address:

Non-Applicant Assignee Information:

Assignee 1:: ☐ Assignee is an Organization

Given Name::

Middle Name::

Family Name::

Name Suffix::

Applicant is an Organization::

Applicant Name::

Mailing address::

City of mailing address::

State or Province of mailing address::

Country of mailing address::

Postal or Zip Code of mailing address:

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certification					
Signature	Leslie J Paperner			Date (YYYY-MM-DD)	2014-10-21
First Name	Leslie J.	Last Name	Paperner	Registration Number	33,329

Electronic Acknowledgement Receipt

EFS ID:	20471870
Application Number:	14489646
International Application Number:	
Confirmation Number:	6255
Title of Invention:	SURFACE CLEANING APPARATUS
First Named Inventor/Applicant Name:	Wayne Ernest CONRAD
Customer Number:	7055
Filer:	Leslie J. Paperner/Jamie Becton
Filer Authorized By:	Leslie J. Paperner
Attorney Docket Number:	P46540
Receipt Date:	21-OCT-2014
Filing Date:	18-SEP-2014
Time Stamp:	13:37:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Application Data Sheet	P46540_SuppADS.pdf	235745 76ba0ac438f3a02b6ebbafa2b46b8b67839a9df3	no	7

Warnings:	
Information:	

This is not an USPTO supplied ADS fillable form	
Total Files Size (in bytes):	235745

This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.

New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

Attorney Docket No. P46540 Application No.14/489,646

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors	:	Wayne Ernest CONRAD	Conf. No.: 6255
Appl. No.	:	14/489,646	Examiner:
Filed	:	September 18, 2014	Group Art Unit:
For	:	SURFACE CLEANING APPARATUS	

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
U.S. Patent and Trademark Office
Customer Service Window, Mail Stop
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Sir:

In accordance with the duty of disclosure under 37 CFR § 1.56 and §§ 1.97 – 1.98, Applicant(s) wish to bring the following information to the attention of the Examiner.

Applicant(s) wish to make of record the documents listed on the attached form 1449. Copies of the listed documents are attached, where required, as are noted English translations, or partial translations of pertinent portions, and/or English language abstracts, of any non-English language references. The relevance of any document cited in any International/Foreign Search Report or Written Opinion is indicated in the Search Report or Written Opinion.

Applicant(s) note that the present application is a continuation of U.S. Appl. No. 11/953,292; thus copies of the documents cited in U.S. Appl. No. 11/953,292 are not required to be filed in the present application. Applicant(s) further note that U.S. Appl. Nos. 14/489,622, 14/489,636, 14/489,670, 14/489,657, 14/488,449, 14/488,430, and 14/488,464 are also continuations of U.S. Appl. No. 11/953,292.

CERTIFICATION

☐ Each item of information contained in this information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this statement. This certification does not apply to any document previously cited in the present application.

☐ Moreover, this communication was not received by any individual designated in §1.56 (c) more than thirty days prior to the filing of the Information Disclosure Statement.

FEES

☐ A payment in the amount required under 37 CFR §1.17(p) is provided herewith.

DEPOSIT ACCOUNT

In the event that any additional fees are due with respect to this paper, the Commissioner is hereby authorized to charge such fees to Deposit Account No. 19-0089 of the undersigned.

If there should be any questions, the Examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,
Wayne Ernest CONRAD

/Linda J. Hodge/
Reg. No. 47,348
Linda J. Hodge

_____
Branko Pejic
Reg. No. 60255

December 18, 2014
GREENBLUM & BERNSTEIN, P.L.C.
1950 Roland Clarke Place
Reston, VA 20191
(703) 716-1191

FORM 1449 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Use several sheets if necessary)	Atty. Docket No. P46537	Application No. 14/489,646
	Applicant G.B.D. CORP.	
	Filing Date September 18, 2014	Group

U.S. PATENT DOCUMENTS

EXAMINER INITIAL		DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	A	2007271724	11/29/2007	HAKAN et al.			
	B	5287591	02/22/1994	RENCH et al.			
	C	3320727	05/23/1967	FARLEY et al.			
	D	20120030896	02/09/2012	CROUCH et al.			
	E	5035024	07/30/1991	STEINER et al.			
	F	D353917	12/27/1994	HOEKSTRA et al.			
	G	D280033	08/06/1985	MIYAMOTO et al.			
	H	6883202	04/26/2005	STEFFEN et al.			
	I	20010023517	09/27/2001	YUJI ONISHI et al.			
	J	3543325	12/01/1970	HAMRICK et al.			
	K	6228260	05/08/2001	CONRAD et al.			
	L	D498027	11/02/2004	ALSRUH et al.			
	M	0303173	8/5/1884	MARK			
	N	D290894	07/14/1987	MIYAMOTO et al.			
	O	0280033	6/26/1883	HADLEY			
	P	D436699	01/23/2001	MAKIHARA et al.			
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*EXAMINER: Initial if citation considered, whether or not citation is in conformance with MPEP 609; draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.									

Japan Patent Office

Issued 21 May 1986

Design Gazette (S)

C3-410 D

679295 Design Application: 58-9911

Application date: 10 March 1983
Registered: 28 February 1986

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Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Attorney: NAKAO Toshio, Patent Attorney, and one other
Examiner: MAEKAWA Yukihiko

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details.

Plan view



Front view

Bottom view

Back view

679295 (2) C3-410 D

Left side view

Right side view

Perspective view

日本国特許庁

昭和61年(1986)5月21日発行　**意匠公報**　(S)

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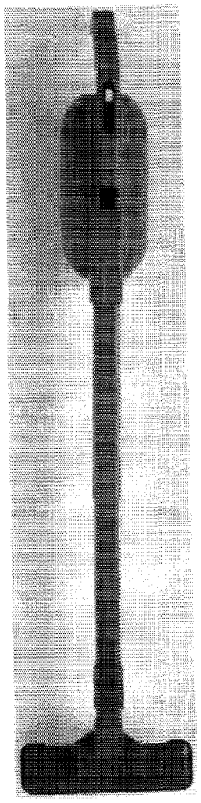
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意匠に係る物品　電気掃除機

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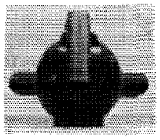
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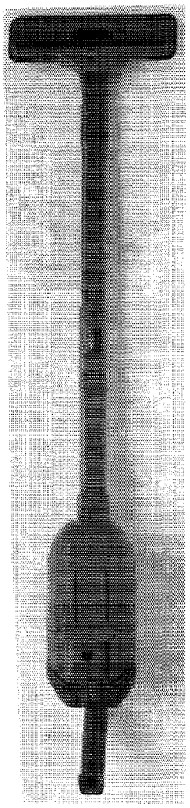
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背面図



底面図



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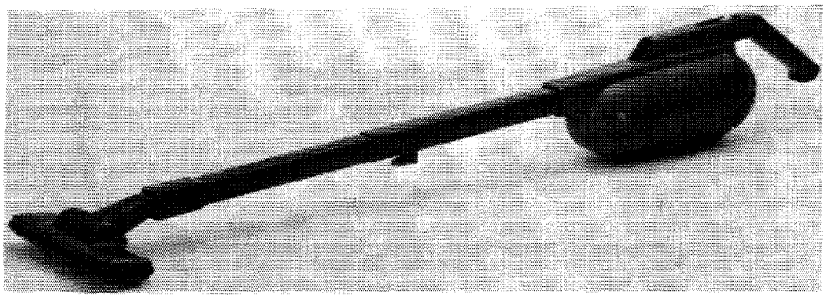
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右側面図



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Dyson Ex1004
Page 69

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(54) Title of the Invention: **Floor tool for a cleaning appliance**
Abstract Title: **Floor Tool for a Cleaning Applicance**

(57) A floor tool (1) for a cleaning appliance comprising a cleaner head (2) rotatably attached to a conduit (14) carried by a pair of wheels (15, 16) that converge beneath the conduit (14).

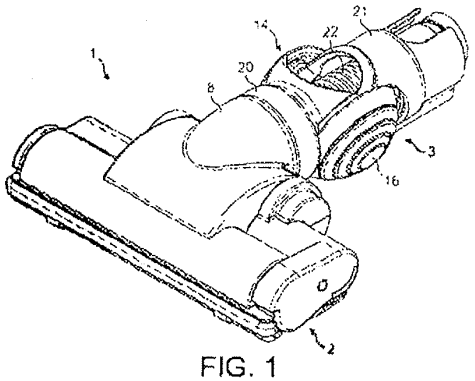


FIG. 1

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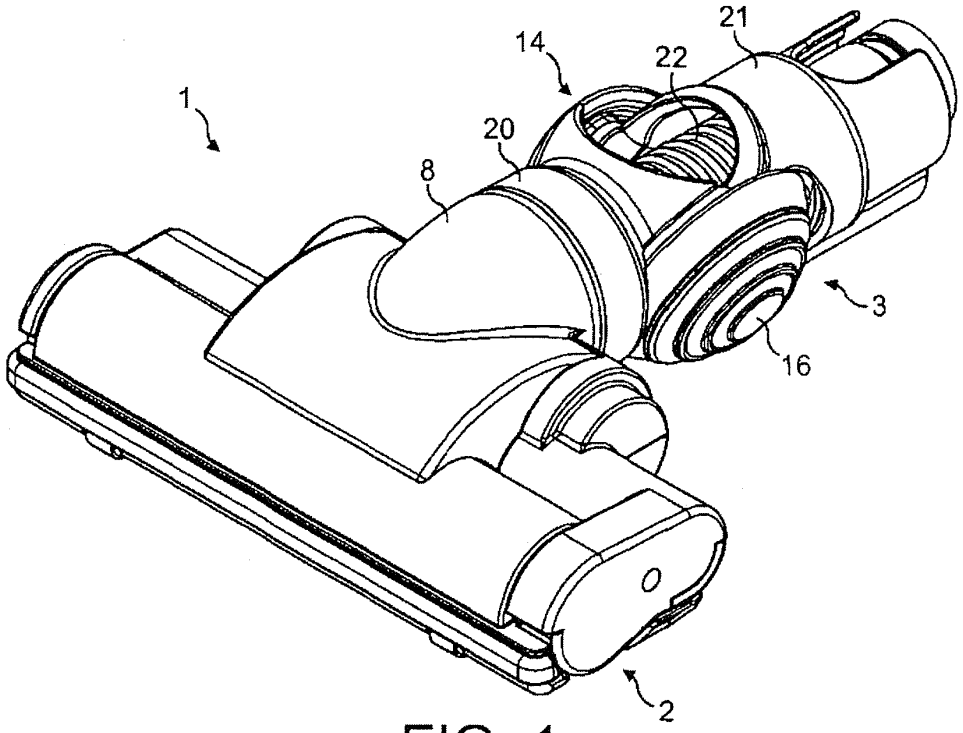


FIG. 1

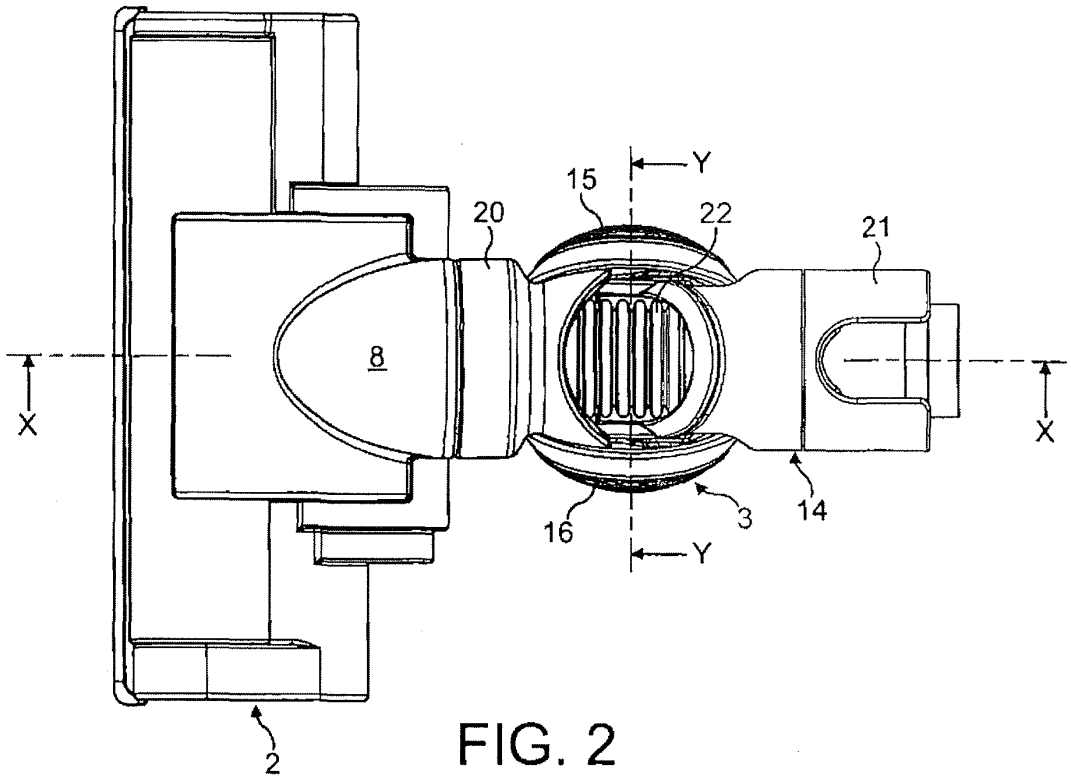


FIG. 2

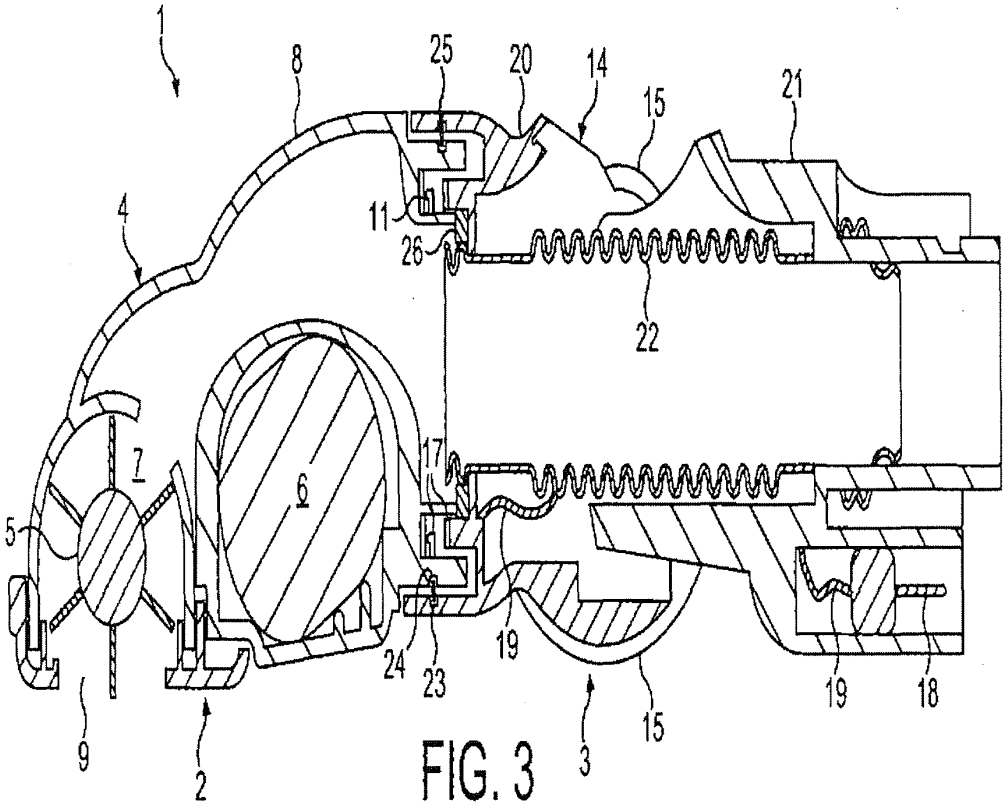


FIG. 3

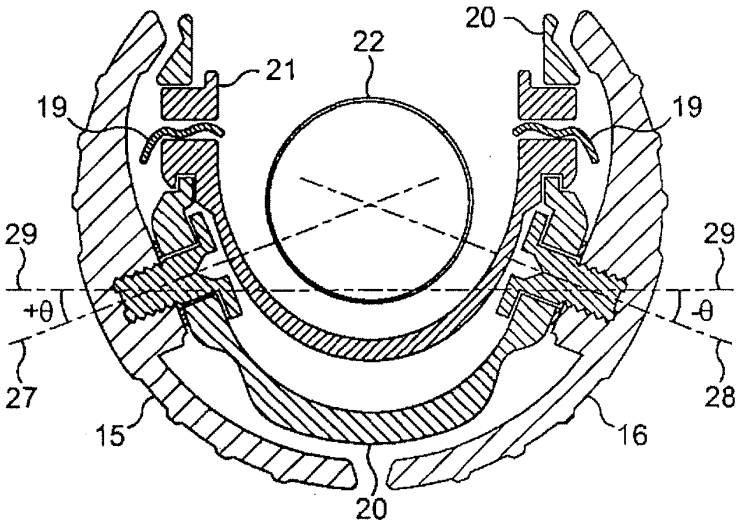


FIG. 4

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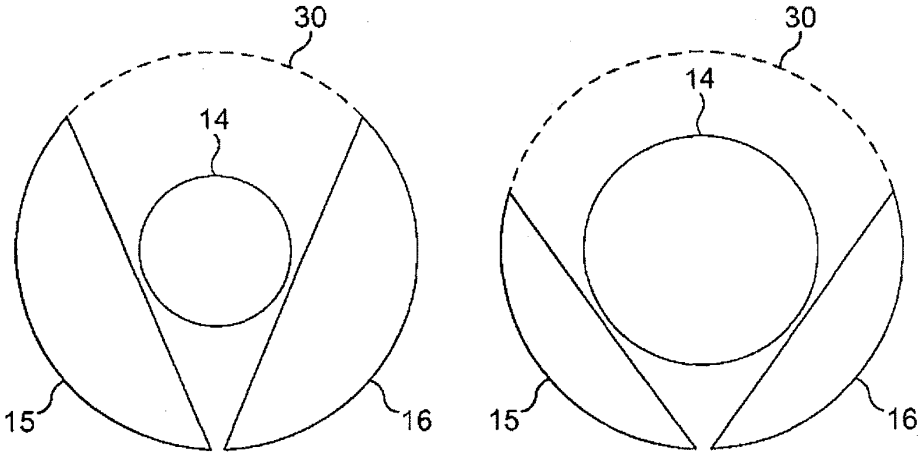


FIG. 5

Floor Tool for a Cleaning Appliance

The present invention relates to a floor tool for a cleaning appliance.

Cleaning appliances, such as vacuum cleaners, floor polishers and shampoo machines, may include a hose-and-wand assembly to which different accessories may be attached. One such accessory is a floor tool which a user manoeuvres back and forth over a surface to be cleaned. The floor tool may include wheels which aid the user in manoeuvring the floor tool. However, there is often difficultly in manoeuvring the floor tool in directions beyond that of a straight line.

In a first aspect, the present invention provides a floor tool for a cleaning appliance comprising a cleaner head rotatably attached to a conduit carried by a pair of wheels that converge beneath the conduit.

The conduit fluidly couples the cleaner head to the cleaning appliance such that fluid may be carried between the cleaning appliance and a surface to be cleaned. The free end of the conduit may be adapted for releasable attachment to a wand, hose or like duct of the cleaning appliance. Alternatively, the conduit may form an integral part of the cleaning appliance.

In converging beneath the conduit, the wheels rotate about axes of rotation that are oriented such that the separation between the wheels is smallest beneath the conduit. In providing convergent wheels, a space is defined between the two wheels through which the conduit can pass. Accordingly, the floor tool is supported by wheels that do not unduly increase the size, and in particular the height, of the floor tool.

By including a bend in the conduit, movement of the floor tool beyond that of a straight line is made possible by rotating the free end of the conduit. To facilitate steering of the floor tool, the conduit preferably comprises a forward portion that is pivotally attached to a rearward portion. The wheels are then rotatably attached to the forward portion,

which is in turn rotatably attached to the cleaner head. This arrangement additionally helps to prevent the cleaner head being inadvertently lifted as the floor tool is manoeuvred over the cleaning surface. Advantageously, the rearward portion is attached to the forward portion at points above those at which the wheels are attached to the forward portion. Consequently, the length of the conduit may be kept to a minimum, resulting in a more compact floor tool.

The wheels are preferably dome-shaped. Accordingly, as the conduit rotates relative to the cleaner head, the wheels continue to provide a rolling support. Moreover, the wheels advantageously provide a substantially continuous arcuate support in the plane normal to the longitudinal axis of the conduit. Consequently, as the floor tool is steered in different directions, a smooth transition occurs as support moves from one wheel to the next. Indeed, in order that, from the point of the user, the transition between wheels feels continuous, the gap between the wheels preferably subtends an angle at the centre of the conduit of no more than 20 degrees. That is to say that, in the plane normal to the longitudinal axis of the conduit, the gap subtends an angle of no more than 20 degrees at the longitudinal axis of the conduit.

The surfaces of the wheels are preferably coincident with a common sphere. Moreover, the centre of the common sphere is ideally coincident with the longitudinal axis of the conduit. Consequently, as the conduit rotates relative to the cleaner head, the conduit maintains the same height above the cleaning surface. This then helps prevent lifting of the cleaner head as the floor tool is steered in different directions.

In a further aspect, the present invention provides a floor tool for a cleaning appliance comprising a cleaner head rotatably attached to a conduit carried by a pair of dome-shaped wheels, the wheels having axes of rotation that are oriented such that the wheels converge beneath the conduit.

In a still further aspect, the present invention provides a coupling comprising a conduit carried by a pair of wheels, wherein the conduit has a first end for rotatable attachment

to a cleaner head and a second end for attachment to a duct of a cleaning appliance, and the wheels converge beneath the conduit.

In order that the present invention may be more readily understood, embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 illustrates a floor tool in accordance with the present invention;

Figure 2 is a plan view of the floor tool;

Figure 3 is a sectional view of the floor tool taken along the line X-X as illustrated in Figure 2;

Figure 4 is a sectional view of the floor taken along the line Y-Y as illustrated in Figure 2; and

Figure 5 illustrates simplified sectional views of floor tools having (a) a small diameter conduit, and (b) a large diameter conduit.

The floor tool 1 of Figures 1 to 4 comprises a cleaner head 2 rotatably attached to a coupling 3. The free end of the coupling 3 is attachable to a wand, hose or other such duct of a cleaning appliance (not shown).

The cleaner head 2 comprises a housing 4, a brushbar 5 and a motor 6. The housing 4 defines a chamber 7 within which the brushbar 5 is rotatably mounted, and an outlet duct 8 that extends from the chamber 7 to the rear of the cleaner head 2. An opening 9 formed on the underside of the housing 2 provides an inlet to the chamber 7. The brushbar 5 is driven by the motor 6, which is located to the rear of the cleaner head 2 beneath the outlet duct 8. The motor 6 is coupled to an electrical terminal 11 provided

at an end of the outlet duct 8, through which electrical power may be delivered to the motor 6.

The coupling 3 comprises a conduit 14 carried by a pair of wheels 15,16, an electrical terminal 17,18 provided at each end of the conduit 14, and an electrical cable 19 that extends between the electrical terminals 17,18.

The conduit 14 comprises a forward portion 20, a rearward portion 21, and a flexible hose 22.

The forward portion 20 is pivotally attached at one end to the rearward portion 21. The other end of the forward portion 20 is shaped as a cylindrical collar that receives the end of the outlet duct 8. An annular groove 23,24 is formed around each of the forward portion 20 and the outlet duct 8 into which a snap ring 25 is seated. The snap ring 25 extends between the two grooves 23,24 such that relative rotation of the forward portion 20 and outlet duct 8 is possible whilst relative separation is not. A gasket 26 made of resilient material (e.g. rubber or foam) is provided within the forward portion 20. The outlet duct 8, when received within the forward portion 20, abuts and compresses the gasket 26 to form a seal between the cleaner head 2 and the coupling 3. The surface of the gasket 26 is coated with a low friction material (e.g. PTFE or HDPE) such that relative rotation of the outlet duct 8 and forward portion 20 does not result in adverse wearing of the gasket 26.

One end of the rearward portion 21 is pivotally attached to the forward portion 20, whilst the other end is shaped for attachment to a wand, hose or other such duct of a cleaning appliance.

The hose 22 is held within and extends between the forward and the rearward portions 20,21. The hose 22 is ribbed such that the length of the hose 22 can be made to expand and contract. Consequently, as the rearward portion 21 pivots relative to the forward portion 20, the length of the hose 20 varies to accommodate the change.

Each wheel 15,16 is domed-shaped and is rotatably attached to the forward portion 20. One wheel 15 rotates about a first axis of rotation 27 and the other wheel 16 rotates about a second axis of rotation 28. The axes of rotation 27,28 are non-parallel and lie in a common plane normal to the longitudinal axis of the forward portion 20. More specifically, the first axis 27 is tiled by $+\theta$ and the second axis is tilted by $-\theta$ relative to a line 29 passing through the wheel centres, the tilt occurring in the common plane. Consequently, the two axes of rotation 27,28 intersect one another at a point that is spaced above the line 29 passing through the wheel centres. Owing to the tilt in the axes of rotation 27,28, the wheels 15,16 converge beneath the conduit 14, i.e. the separation between the wheels 15,16 is smallest beneath the conduit 14.

The curvature of each dome-shaped wheel 15,16 is spherical. Furthermore, the two wheels 15,16 are arranged (i.e. spaced from one another and tilted) such that the surfaces of the wheels 15,16 are coincident with a common sphere 30. The surfaces of the two wheels 15,16 may thus be regarded as defined by an imaginary sphere 30 from which a v-shaped wedge has been removed (this is perhaps best visualised in Figure 5). The centre of this common sphere 30 is coincident with the longitudinal axis of the forward portion 20, the advantage of which is outlined below.

The electrical terminals 17,18 of the coupling 3 are located at the ends of the forward and rearward portions 20,21. The terminals 11,17 of the outlet duct 8 and the forward portion 20 forms a slip ring arrangement so as to permit relative rotation. The electrical cable 19 extends between and connects the terminals 17,18 of the forward and rearward portions 20,21. From the terminal 17 provided on the forward portion 20, the cable 19 extends between the forward portion 20 and the hose 22, divides in two with each half passing through a pivot formed between the forward and rearward portions 20,21, and extends between rearward portion 21 and the hose 22.

The floor tool 1 is intended to be used with a cleaning appliance that carries fluid to and/or from a surface, e.g. wet/dry vacuum cleaners, polishing/waxing machines and

carpet shampoo machines. The floor tool 1 is manoeuvred over the surface to be cleaned by means of a duct of the cleaning appliance. The duct includes an electrical terminal that mates with the electrical terminal 18 provided on the rearward portion 21. Electrical power is thus delivered by the cleaning appliance to the motor 6 of the cleaner head 2, which in turn drives the brushbar 5 to agitate the cleaning surface and/or massage a fluid into the surface.

As the floor tool 1 is manoeuvred forwards and backwards, the forward portion 20 of the coupling 3 pivots relative to the rearward portion 21 such that the cleaner head 2 maintains a flat profile with the cleaning surface. Steering of the floor tool 1 is achieved by rotating the duct of the cleaning appliance, which in turn causes the rearward portion 21 of the coupling 3 to rotate about its longitudinal axis. When manoeuvring the floor tool 1, the rearward portion 21 is normally angled relative to the forward portion 20. Consequently, as the rearward portion 21 rotates about its longitudinal axis, the forward portion 20 is caused to precess about the longitudinal axis of the rearward portion 21. Owing to the weight of the cleaner head 2, as well as the pivot formed between the forward and rearward portions 20,21, rather than precessing in a cone-like manner, the forward portion 20 precesses in a plane parallel to the cleaning surface. The net result is that the cleaner head 2 moves to the right or left in response to clockwise or anticlockwise rotation of the duct of the cleaning appliance. As the cleaner head 2 moves to the right or left, the outlet duct 8 rotates relative to the forward portion 20 such that the cleaner head 2 maintains a flat profile with the cleaning surface.

As the floor tool 1 is manoeuvred forwards and backwards, the wheels 15,16 of the coupling 3 rotate to provide a rolling support for the conduit 14. In response to steering the floor tool 1, the forward portion 20 rotates about its longitudinal axis. As the forward portion 20 rotates, one of the two wheels 15,16 maintains contact with the cleaning surface and thus continues to provide rolling support for the conduit 14. The surfaces of the wheels 15,16 are coincident with a common sphere 30, the centre of which is coincident with the longitudinal axis of the forward portion 20. Consequently,

as the forward portion 20 rotates about its longitudinal axis, the wheels 15,16 continue to support the forward portion 20 at the same height above the cleaning surface. No lifting of the cleaner head 2 therefore occurs and a flat profile with the cleaning surface is maintained.

The rolling support provided by the wheels 15,16 describes an arc in the plane normal to the longitudinal axis of the forward portion 20. This arcuate rolling support includes a small discontinuity at the gap between the two wheels 15,16. The discontinuity, however, is sufficiently small that, from the point of view of a user, the rolling support feels continuous.

Since the floor tool 1 is moved predominantly in a forward and backward direction, ease of movement would be greatest if both wheels 15,16 were to rotate about a single horizontal axis. However, if the wheels 15,16 were to rotate about a single horizontal axis, hemispherical wheels would be required in order to provide a continuous rolling support. Such an arrangement would leave no space for the conduit 14 to pass between the wheels 15,16. The angle by which the rotational axes 27,28 are tilted is therefore ideally as small as possible whilst permitting sufficient space for the conduit 14 to pass between the wheels 15,16. The angle of tilt will thus depend upon the diameter of the conduit 14 as well as the diameter of the common sphere 30 coincident with the wheel surfaces. By way of example, Figure 7 illustrates two arrangements in which (a) a small diameter conduit 14 and (b) a large diameter conduit 14 are employed; in both arrangements, the diameter of the common sphere 30 of the wheels 15,16 is the same.

As can be seen in Figure 4, the rearward portion 21 is pivotally attached to the forward portion 20 at points directly above those points at which the wheels 15,16 are attached to the forward portion 20. Consequently, the overall length of the conduit 14 may be kept to a minimum, resulting in a more compact floor tool 1. Nevertheless, the points at which the rearward portion 21 attaches to the forward portion 20 may be located elsewhere.

In the embodiment described above, the cleaner head 2 includes a brushbar 5 that is driven by a motor 6. However, the cleaner head 2 may include alternative means for agitating or otherwise working a surface to be cleaned. By way of example, the brushbar 5 may be driven by an air turbine rather than a motor. Alternatively, the brushbar 5 and motor 6 may be omitted altogether from the cleaner head 2. There are therefore applications for which the electrical terminals 17,18 and cable 19 may be omitted from the coupling 3.

Wheels 15,16 having surfaces that are coincident with a common sphere 30 have the advantage that the forward portion 20 maintains the same height above the cleaning surface as the forward portion 20 rotates. Nevertheless, there may be applications for which it is advantageous to have a forward portion 20 that increases or decreases in height with rotation. Accordingly, it is not essential that the surfaces of the wheels 15,16 have spherical curvature or that the surfaces are coincident with a common sphere. Moreover, the dome-shaped wheels need not be continuously curved but may include a flat section at the wheel axes.

In the embodiment described above, the conduit 14 comprises a forward portion 20 pivotally attached to a rearward portion 21. The provision of a pivot has the advantage of ensuring that the cleaner head 2 maintains a flat profile with the cleaning surface as the floor tool 1 is manoeuvred back and forth. Nevertheless, there may be applications for which a pivot within the conduit 14 may not be necessary. By way of example, the outlet duct 8 of the cleaner head 2 may be pivotally attached to the remainder of the cleaner head 2. In this instance, the conduit 14 may be formed as a unitary element having an elbow or bend such that rotation of the conduit 14 continues to bring about steering of the cleaner head 2.

Whilst the cleaner head 2 and the coupling 3 are attached in a manner that is intended to prevent their separation, the two may be adapted for separable attachment. The coupling 3 may then be used with different cleaner heads to form a floor tool 1. Moreover, whilst the coupling 3 is intended to be releasably attached to a duct of a

cleaning appliance, the coupling 3 may alternatively form an integral part of the cleaning appliance. The cleaning appliance may then be used with different, interchangeable cleaner heads.

Conventional floor tools often include wheels that aid in manoeuvring the floor tool. However, movement of the floor tool is typically constrained to that along a straight line. In contrast, the floor tool 1 of the present invention can be manoeuvred in directions beyond that of a straight line.

Floor tools capable of movement beyond a straight line are known. In one example, a pair of wheels is arranged on opposite sides of a conduit attached to a cleaner head. The wheels rotate about a common horizontal axis such that, when steering the floor tool, one of the wheels lifts off the cleaning surface. Additionally, the conduit rocks to one side causing the height of the conduit above the cleaning surface to increase. This in turn causes the rear of the cleaner head to lift off the cleaning surface resulting in loss of performance. Furthermore, the lifting of the cleaner head places a strain on the arm of the user and thus repeated steering of the floor tool can become tiring. In a further example, a cleaner head is attached to a conduit carried by three wheels. A barrel-shaped wheel sits below the conduit and two larger wheels are located on opposite sides of the conduit. This arrangement has the advantage that, as the floor tool is steered left or right, the height of the conduit above the cleaning surface is unchanged and thus the cleaner head maintains a flat profile with the surface. Nevertheless, the floor tool is relatively bulky owing to the presence of three wheels. In particular, since the conduit sits on top of the barrel-shaped wheel, the height of the floor tool is relatively high. Additionally, the provision of three wheels increases the weight and cost of the floor tool.

With the floor tool of the present invention, a substantially continuous rolling support is provided by two wheels only. Accordingly, the floor tool is both lighter and cheaper than the aforementioned floor tool having three wheels. Moreover, the conduit of the floor tool passes between, rather than over, the wheels and thus the floor tool is more

compact. In particular, the floor tool is of lower height, making it well-suited at cleaning beneath structures of particularly low profile. As the floor tool is steered to the left or right, the conduit (or at least that portion of the conduit attached to the cleaner head) maintains the same height above the cleaning surface. Consequently, the cleaner head maintains a flat profile with the cleaning surface and no loss of performance occurs. Additionally, in comparison to the aforementioned floor tool having two wheels, less effort is required on the part of the user to steer the floor tool. Furthermore, the floor tool is capable of tighter turns.

CLAIMS

1. A floor tool for a cleaning appliance comprising a cleaner head rotatably attached to a conduit carried by a pair of wheels that converge beneath the conduit.

2. A floor tool as claimed in claim 1, wherein the wheels have non-parallel axes of rotation that intersect above a line passing through the wheel centres.

3. A floor tool as claimed in claim 1 or 2, wherein the wheels are dome-shaped.

4. A floor tool as claimed in any one of the preceding claims, wherein the wheels provide a substantially continuous arcuate support in a plane normal to a longitudinal axis of the conduit.

5. A floor tool as claimed in any one of the preceding claims, wherein the wheels are separated beneath the conduit by a gap that subtends an angle at a centre of the conduit by no more than 20 degrees.

6. A floor tool as claimed in any one of the preceding claims, wherein the wheels have surfaces of spherical curvature.

7. A floor tool as claimed in any one of the preceding claims, wherein the wheels have surfaces coincident with a common sphere.

8. A floor tool as claimed in claim 7, wherein the conduit has a longitudinal axis that is coincident with the centre of the common sphere.

9. A floor tool as claimed in any one of the preceding claims, wherein the conduit comprises a forward portion pivotally attached to a rearward portion, and the wheels are rotatably attached to the forward portion.

10. A floor tool as claimed in claim 9, wherein the conduit comprises a flexible hose that extends between the forward portion and the rearward portion.

11. A floor tool as claimed in claim 9 or 10, wherein the wheels are attached to the forward portion at a first set of points, and the rearward portion is attached to the forward portion at a second set of points located above the first set of points.

12. A floor tool for a cleaning appliance comprising a cleaner head rotatably attached to a conduit carried by a pair of dome-shaped wheels, the wheels having axes of rotation that are oriented such that the wheels converge beneath the conduit.

13. A coupling comprising a conduit carried by a pair of wheels that converge beneath the conduit, the conduit having a first end for rotatable attachment to a cleaner head and a second end for attachment to a duct of a cleaning appliance.

14. A floor tool substantially as hereinbefore described with reference to and illustrated in the accompanying drawings.

15. A coupling substantially as hereinbefore described with reference to and illustrated in the accompanying drawings.

Application No: GB0823191.2 **Examiner:** Mr Henrik Mensing

Claims searched: 1-15 **Date of search:** 19 March 2009

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, 12, 13	GB 2441301 A (DYSON TECHNOLOGY LTD), see for instance page 2, lines 8-19; page 9, line 7 to page 10, line 19; page 11, lines 13-30 and figure 9-12.

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

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Worldwide search of patent documents classified in the following areas of the IPC

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The following online and other databases have been used in the preparation of this search report

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(54) Vacuum cleaner.

(57) A vacuum cleaner comprising a housing (1) with two filter systems (2, 3) arranged in series, means (4) for generating an air flow through the filter systems, the second filter system (3) as seen in the direction of flow being a cyclone filter system, which vacuum cleaner is provided with one reservoir (5) for collecting dust from both filter systems (2, 3), which reservoir can be closed off with a lid (14), is suitable for accommodating a disposable dust bag (6), and is furthermore divided into two compartments (5a, 5b) by a wall (13), each reservoir compartment serving to collect separated dust from the accompanying filter system, while the wall (13) is fastened in the reservoir (5) in such a way that it can be taken out. Preferably, the removable wall (13) is fastened to the lid (14).

As a result, the user can remove all the dust from the vacuum cleaner in one operation.

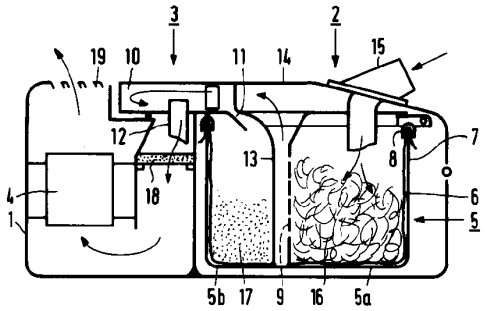


FIG.1

EP 0 489 468 A1

The invention relates to a vacuum cleaner comprising a housing with two filter systems connected in series and means for generating an air flow through the filter systems, the second filter system as seen in the direction of flow being a cyclone filter system.

Such a vacuum cleaner is known from EP-A-0121511.

It is known that dust can be effectively removed from an air flow by a cyclone filter system. A cyclone filter system, however, has the disadvantage that the material separated by the cyclone in the collector reservoir is subjected to small forces, so that little densification takes place there in the case of fluffy material. As a result, the filling of the reservoir, also when the latter is full, consists mainly of air.

A normal paper dust bag of a comparable volume can contain a much greater mass of dust. This is because the material collected is continuously pressed home by the air sucked through it, so that the material is densified. A further advantage of a paper dust bag is that it can be easily and hygienically removed and disposed with. A disadvantage of a paper dust bag, however, is that fine dust quickly chokes up the bag, so that the flow resistance increases markedly and the air flow is strongly reduced. In addition, it is not ideal always to be dependent on a comparatively expensive paper dust bag which has to be re-purchased every time.

In EP-A-0121511 cited above the advantages of both filter systems are combined. For a cyclone this is the property that the flow resistance is independent of the quantity of dust already separated, and for the filter system the property that the separated dust is densified.

The vacuum cleaner described in EP-A-0121511 is a street vacuum cleaning machine. This machine comprises a separate collector reservoir for the dust from each of the filter systems. Both reservoirs are to be emptied from time to time. In view of the kind of refuse which is sucked up, the use of two reservoirs would seem to be necessary. If such a dual filter system should be used in a household vacuum cleaner, however, two collector reservoirs are inconvenient to use.

The invention has for its object to improve a vacuum cleaner as described in the opening paragraph in such a manner that the user can remove all the dust from the vacuum cleaner in one operation.

The vacuum cleaner according to the invention is for this purpose characterized in that the vacuum cleaner is provided with one reservoir for collecting dust from both filter systems, which reservoir can be closed off by a lid, is suitable for accommodating a disposable dust bag, and is furthermore divided into two compartments by a wall, each reservoir compartment serving to collect dust separated by the accompanying filter system, while the said wall is fastened in the reservoir in such a way that it can be taken out.

An advantage of the vacuum cleaner according to the invention is that after the removal of the partition wall all the dust can be taken from the vacuum cleaner housing by means of the disposable dust bag in one operation and put in a refuse container. The vacuum cleaner is ready for use again after the provision of a new disposable dust bag and the return of the partition wall.

A preferred embodiment of the vacuum cleaner is characterized in that the removable wall is fastened to the lid. This means that the removable wall is automatically taken from the reservoir when the lid is taken off.

A further preferred embodiment of the vacuum cleaner is characterized in that the cyclone filter system is fastened to the lid. If it is necessary for the cyclone filter system to be removed in order to render the reservoir accessible, it is favourable when the cyclone filter system is fastened to the lid. A further embodiment is characterized in that a window frame is present for clamping an upper edge of the disposable dust bag on an upper rim of the reservoir. This prevents the disposable dust bag detaching itself from the upper rim of the reservoir during closing of the lid or during operation of the vacuum cleaner.

A preferred embodiment of the vacuum cleaner is characterized in that the first filter system as seen in the direction of flow is formed by a plate provided with holes. The plate provided with holes is also to be removed before emptying of the reservoir. It was found that, when a plate provided with holes is used as a coarse filter, no dust such as hairs and the like adhere to this filter plate when it is removed. During operation of the vacuum cleaner, a turbulent air flow is generated in the reservoir portion in front of the first filter system, so that the coarse dust taken in is continuously rotated. The hairs and fluffs present especially in the coarse dust do not enter the openings of the filter plate, but are as it were wound into a ball. Only the fine dust continues to the cyclone filter. After some time the entire filter plate is covered and the intake material more or less settles.

The filter plate provided with holes is preferably fastened to the lid, as is the partition wall. Thus the partition wall as well as the filter plate is automatically removed from the reservoir when the lid is taken off, so that the disposable dust bag can be taken out.

A cyclone filter system could also be used as the first filter system, in such a way that both cyclone filter systems are arranged next to one

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another.

The invention will now be explained in more detail with reference to an embodiment shown in a drawing, in which:

Fig. 1 diagrammatically depicts a vacuum cleaner with a dual filter system according to the invention,

Fig. 2 diagrammatically shows the vacuum cleaner of Fig. 1 with the lid raised,

Fig. 3 is a perspective view of a model of the dual filter system of Fig. 1,

Fig. 4 is another diagrammatic model of a dual filter system comprising two cyclones, and

Fig. 5 is a plan view of the model shown in Fig. 4.

The vacuum cleaner is built up from a housing 1 with two filter systems 2, 3 arranged in series and a motor unit 4 for generating an air flow through the filter systems. The vacuum cleaner is provided with one reservoir 5 for collecting dust from both filter systems. The reservoir is suitable for accommodating a disposable dust bag 6. To this end, the edge of the bag is folded around the upper rim 7 of the reservoir and clamped on this upper rim by means of a window frame 8. The disposable dust bag may even be a simple, preferably environment-friendly plastic bag.

The first filter system 2 as seen in the direction of flow is formed by a filter plate 9 provided with holes. The second filter system 3 as seen in the direction of flow is a cyclone filter system with a flat box-shaped cyclone chamber 10, a discharge slot 11 for admitting dust to the reservoir 5, and a central outlet opening 12 for the air. The reservoir 5 is provided with a wall 13 which divides the reservoir into two compart-ments 5a, 5b, each for collecting separated dust from the accompanying filter system 2, 3, respectively. The reservoir 5 can be closed off with a lid 14 which is hinged to the housing 1 of the vacuum cleaner. The filter plate 9, the partition wall 13, and the cyclone chamber 10 are fastened to the inside of the lid 14.

The operation of the vacuum cleaner is as follows: air which contains dust is sucked into the reservoir compartment 5a through an inlet opening 15 of the lid 14, passes the filter plate 9 provided with holes, whereby large dust particles 16, such as hairs, fluffs and the like, are stopped by the filter plate 9, upon which the air containing only small dust particles 17 is sucked into the cyclone chamber 10 and the small dust particles end up in the reservoir compartment 5b through the discharge slot 11. This is clarified in Fig. 3 by means of a perspective view of a test model. The vacuum cleaner housing containing the motor and other parts have been left out here. The substantially clean air then passes a motor filter 18 for protecting the motor unit 4 and leaves the vacuum cleaner through a grille 19. The large dust particles 16 are united into a ball-shaped package lying against the filter plate by the initially turbulent air flow in the reservoir compartment 5a, the small dust particles 17 accumulate upwards starting from the bottom of the reservoir compartment 5b. When the reservoir compartment 5a is full, which may be displayed by means of a pressure indicator, the disposable dust bag must be replaced. To this end, the lid 14 of the vacuum cleaner is hinged upwards, by which both the filter plate 9 and the partition wall 13 are also moved away (Fig. 2). After removal of the window frame 8, the full bag 6 may be taken from the reservoir 5 and thrown into a waste bin, upon which a new bag can be put in the reservoir again.

The vacuum cleaner may also be built up from two cyclone filter systems connected in series. The two systems are situated next to one another in Figs. 4 and 5. Air containing dust is sucked into the cyclone chamber 20 of the first cyclone filter system 2 through an inlet opening 15. The large dust particles 16 are separated in the cyclone chamber 20 and enter the reservoir compartment 5a through the discharge slot 21. The air containing the smaller dust particles 17 leaves the first cyclone through an outlet opening 22 and reaches the cyclone chamber 10 of the second cyclone filter system 3 through a connection channel 23. In this latter system, the smaller dust particles 17 are separated and enter the reservoir compartment 5b through opening 11. The clean air leaves the second cyclone through the outlet opening 12. Both cyclone filter systems 2 and 3 are fastened to the lid 14 of the reservoir 5. When the reservoir is to be emptied, the lid 14 is removed (for example, swivelled up), owing to which the partition wall 13 leaves the reservoir 5. The disposable dust bag 6 can now be readily removed.

Claims

1. A vacuum cleaner comprising a housing (1) with two filter systems (2, 3) connected in series and means for generating an air flow through the filter systems, the second filter system (3) as seen in the direction of flow being a cyclone filter system, characterized in that the vacuum cleaner is provided with one reservoir (5) for collecting dust from both filter systems (2, 3), which reservoir can be closed off by a lid (14), is suitable for accommodating a disposable dust bag (6), and is furthermore divided into two compartments (5a, 5b) by a wall (13), each reservoir compartment serving to collect dust separated by the accompanying filter system, while the said wall (13) is fastened in the reservoir (5) in such a way that it can be taken out.

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2. A vacuum cleaner as claimed in Claim 1, characterized in that the removable wall (13) is fastened to the lid (14).

3. A vacuum cleaner as claimed in Claim 2, characterized in that the cyclone filter system (3) is fastened to the lid (14).

4. A vacuum cleaner as claimed in Claim 3 or 4, characterized in that the lid (14) is hinged to the housing (1) of the vacuum cleaner.

5. A vacuum cleaner as claimed in any one of the preceding Claims, characterized in that a window frame (8) is present for clamping an edge of the disposable dust bag (6) on an upper rim (7) of the reservoir (5).

6. A vacuum cleaner as claimed in any one of the preceding Claims, characterized in that the first filter system (2) as seen in the direction of flow is formed by a plate (9) provided with holes.

7. A vacuum cleaner as claimed in Claim 6, characterized in that the holes said are not more than 2 mm large.

8. A vacuum cleaner as claimed in Claim 6, characterized in that the lid (14) is provided with an inlet opening (15) for the first filter system (2).

9. A vacuum cleaner as claimed in any one of the Claims 1 to 5, characterized in that the first filter system (2) as seen in the direction of flow is also a cyclone filter system and in that both cyclone filter systems (2, 3) are arranged next to one another.

10. A vacuum cleaner as claimed in Claim 9, characterized in that both cyclone filter systems (2, 3) are fastened to the lid (14) and are each provided with a flat, box-shaped cyclone chamber (20, 10) whose bottom comprises a discharge slot (21, 11) which provides access to the accompanying reservoir (5a, 5b).

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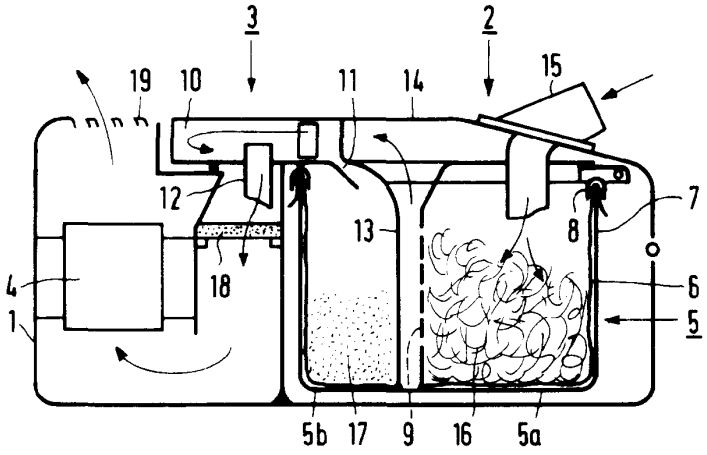


FIG.1

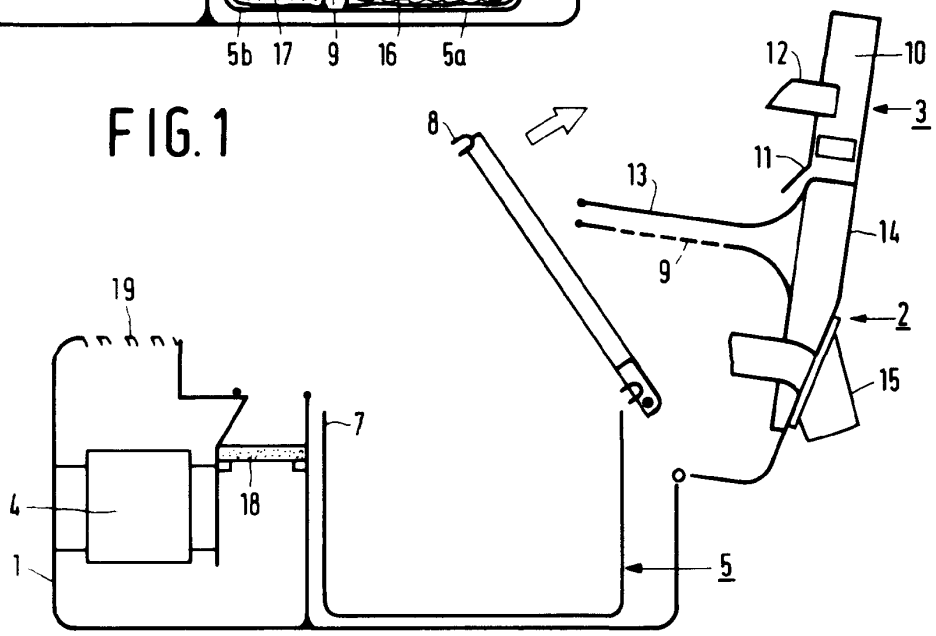


FIG.2

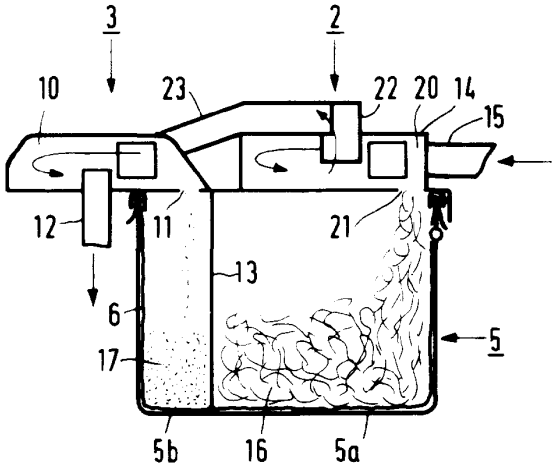


FIG.4

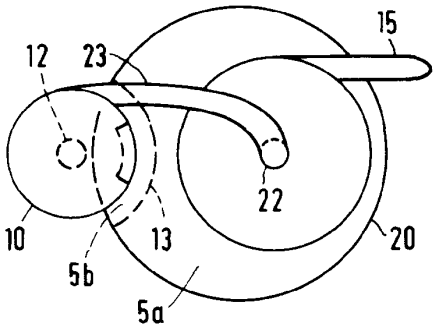


FIG.5

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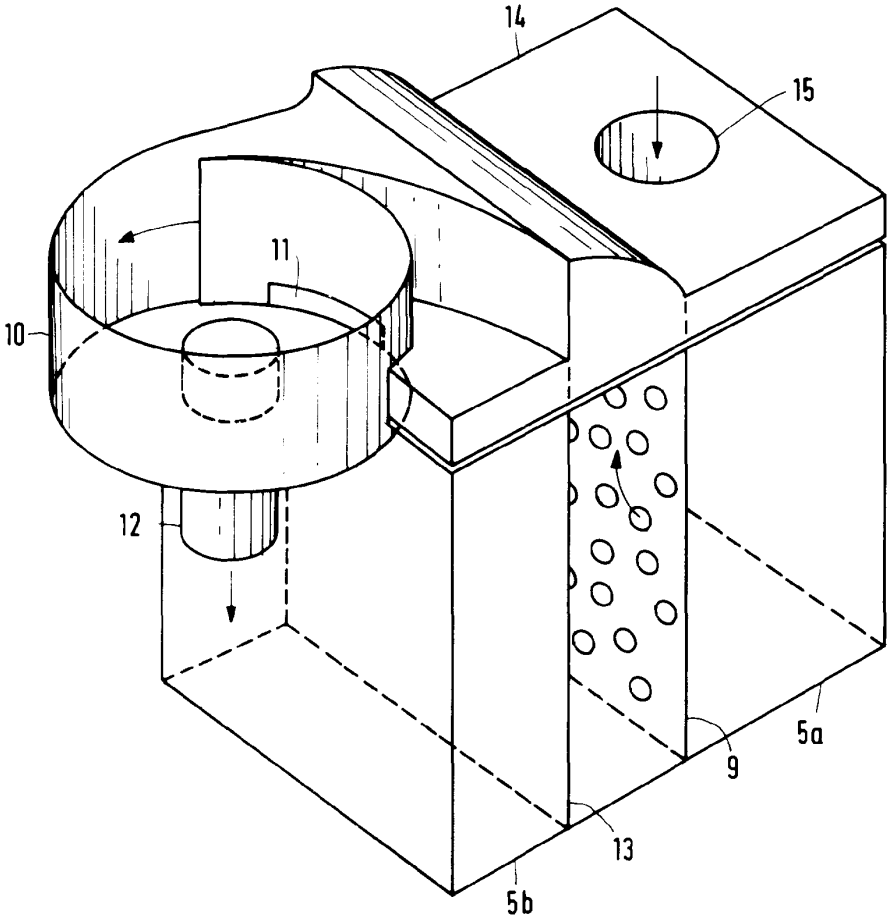


FIG.3

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European Patent Office

EUROPEAN SEARCH REPORT

Application Number

EP 91 20 3133

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
D,A	EP-A-0 121 511 (D. NOLTE)		A47L9/16
A	US-A-3 320 727 (F.F. FARLEY & AL)		
A	US-A-4 853 008 (J. DYSON)		
A	US-A-1 461 173 (A.C. BENNET)		

TECHNICAL FIELDS SEARCHED (Int. Cl.5)

A47L
E01H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	26 FEBRUARY 1992	M. VANMOL

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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& : member of the same patent family, corresponding document

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(12) UK Patent (19) GB (11) 2 035 787 B

SCIENCE REFERENCE LIBRARY

(54) Title of invention

Suction cleaning device

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GB 1489478
GB 1452435
GB 1391373
GB 1331064
GB 1319454
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GB 767232
GB 508152

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F4X

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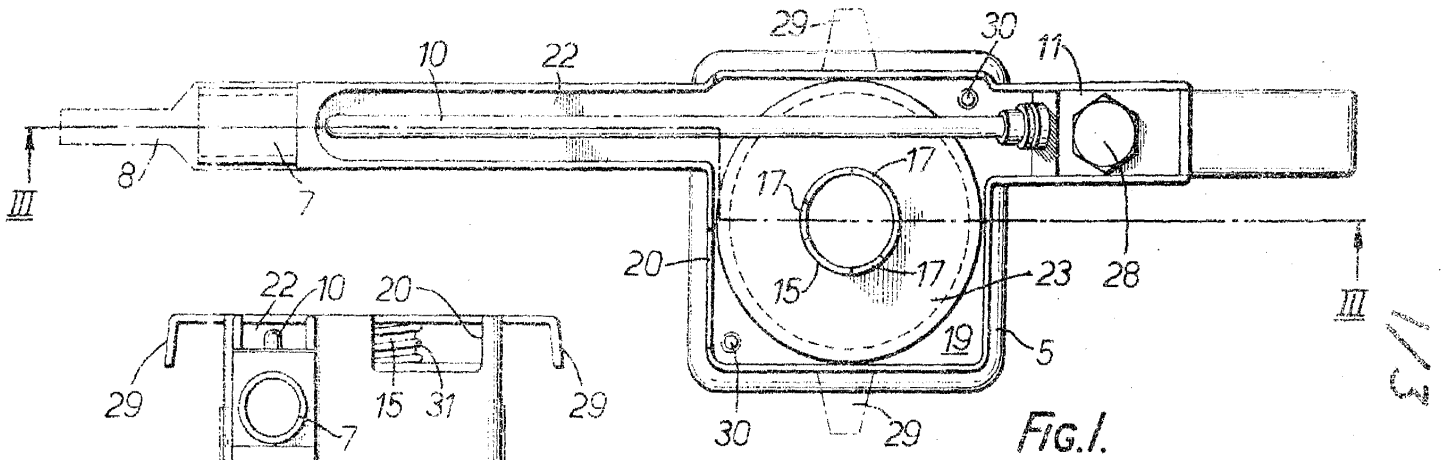


FIG.1.

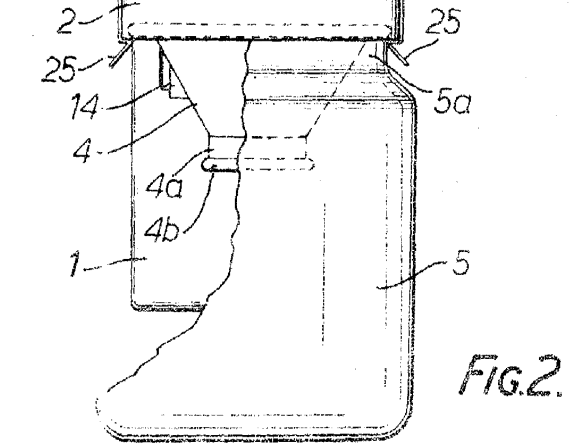


FIG.2.

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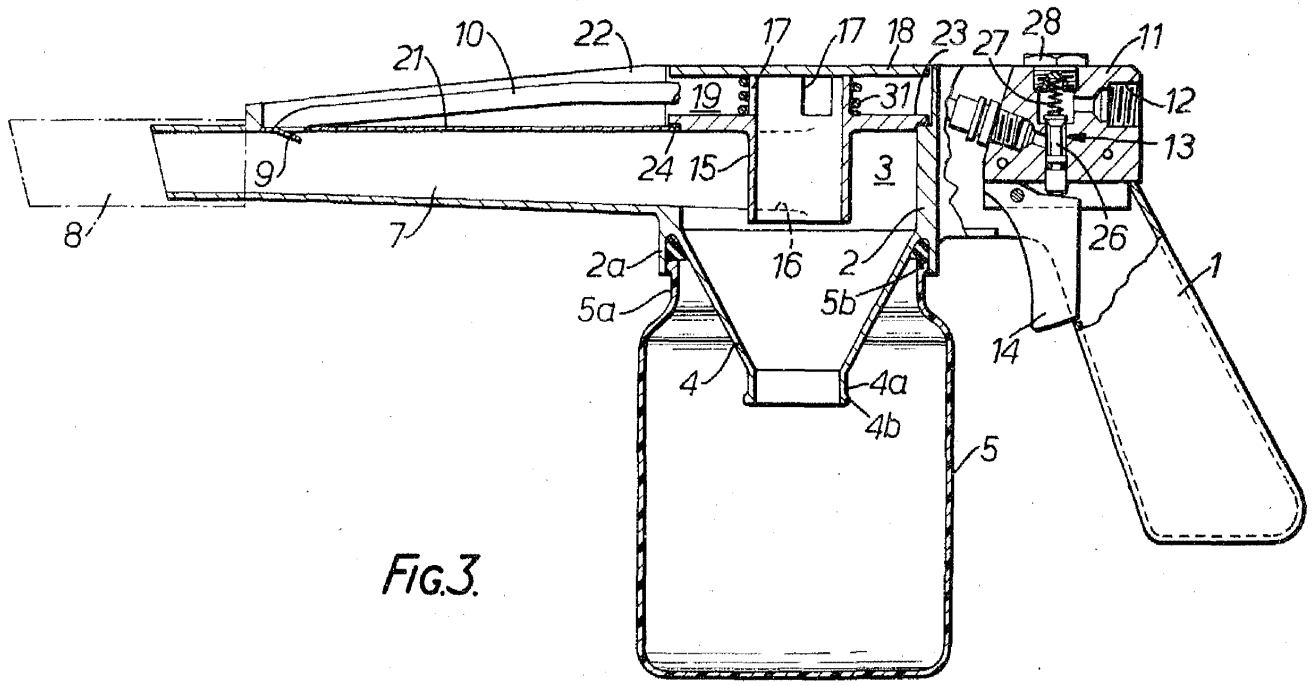


FIG.3.

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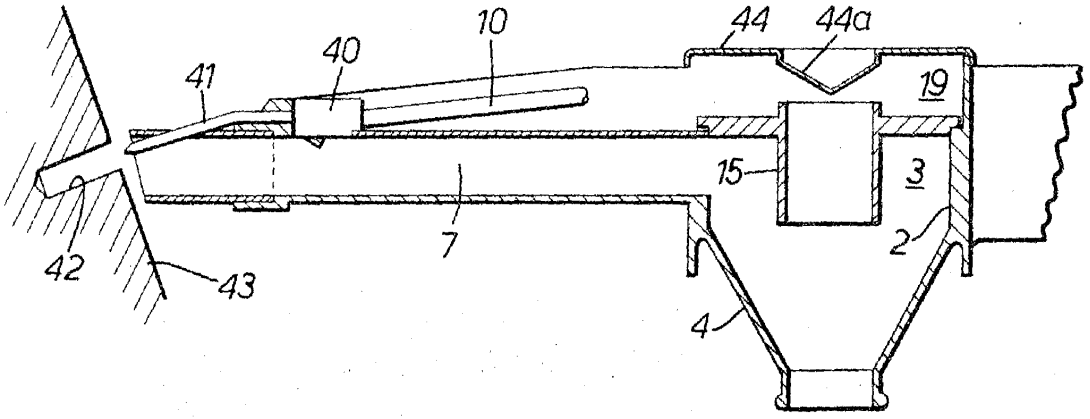


FIG.4.

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SPECIFICATION

Suction cleaning device

This invention relates to cleaning devices of the type which employ suction to pick up solid matter which is transported in an air flow to a bag or container in which it collects for disposal.

Devices of this type are not, generally speaking, suitable for workshop use as they do not satisfactorily handle oily metal such as the swarf produced by machine tools. The cleaning out of oily swarf from the T-slots of lathes, milling machines and the like is a common workshop problem. This swarf normally has to be dislodged and brushed out by hand.

The object of the invention is to provide a portable hand-held suction cleaning device which is particularly suitable for workshop use, for example to clear out the T-slots of machine tool slides and tables.

According to the invention a hand-held suction cleaning device has a suction pipe leading to a cyclone separator which exhausts to atmosphere and is disposed above a container for solids which are in use picked up at an inlet end of the pipe and separated out in the separator, and an air inlet connection for coupling to a compressed-air line and which supplies an air jet which discharges into the suction pipe to produce an air flow therealong to the separator with resultant suction at the inlet of the pipe.

Preferably a detachable nozzle at the end of the suction pipe provides the suction inlet, and this nozzle may be one of a range of interchangeable nozzles which are differently shaped to suit a variety of applications. A device in accordance with the invention has in practice proved extremely useful for clearing out machine tool T-slots, and for this purpose an elongated rectangular cross-section nozzle is most suitable.

The device preferably has a pistol-grip handle with an ON/OFF air valve controlling the air jet and operated by a conveniently situated trigger control member. A pre-settable needle valve may also be provided for adjustable throttling of the air flow to the jet, whereby to provide optimum performance for picking up different solid materials. The separator may exhaust at the top and to the side away from the operator, and the container is preferably readily detachable from the separator for emptying when full.

A discharge funnel may be provided below the separator to discharge into the container, and this funnel may have an end section with a lip for attachment of a polythene bag by means of an elastic band in place of the container. This provides ready and safe disposal of contaminated material collected by the device.

An air blast nozzle may be provided which is operable to dislodge solid matter which is subsequently picked up by the suction of the device, for example to dislodge swarf from a blind hole or recess in a component. This air blast nozzle may be concentric with, or otherwise positioned with respect to, a detachable suction nozzle of the device and said ON/OFF air valve may simultaneously supply the air blast nozzle and the suction air jet. Alternatively, the air blast nozzle may have its own air supply controlled along with the suction air jet by a two-position trigger control valve operable to supply the air jet, and thus apply suction, first, and then to apply both an air blast and suction should this be necessary.

A general-purpose suction cleaning device designed with the problem of clearing out the T-slots of machine tools particularly in mind is illustrated, by way of example, together with a modification, in the accompanying drawings and will now be described with reference thereto. In the drawings:

Figure 1 is a plan view of the device;

Figure 2 is a suction-inlet end view, with a container of the device partly cut away;

Figure 3 is a sectional view on the line III–III in Fig. 1; and

Figure 4 is a fragmentary sectional view, on the same section line, showing the modification.

The hand-held device illustrated in Figs. 1 to 3 has a stock 1 (shown partly cut away in Fig. 3) which provides a pistol grip and to which is attached a cyclone separator chamber 3 disposed coaxially above a frusto-conical discharge funnel 4. A detachable circular blow-moulded polythene container 5 has a neck 5a which fits into a bottom skirt 2*a* of the separator 2, the funnel 4 projecting a short distance down into the container 5.

A suction pipe 7 enters the cyclone chamber 3 tangentially at one side of the device, and an interchangeable inlet nozzle 8 (shown in broken lines) is a push fit on the end of the pipe 7. The inlet nozzle shown is of elongated rectangular cross-section, which is particularly suitable for clearing swarf out of T-slots. An air jet nozzle 9, formed by semi-piercing the upper wall of the tube 7 adjacent the inlet end thereof, discharges into the separator 2 with the resultant production of a vacuum at the inlet nozzle 8.

The jet nozzle 9 is supplied by an air supply pipe 10 leading from a valve block 11 at the top of the stock 1. At the block 11 an inlet connection 12 enables the pipe 10 to be connected to a compressed-air line through an ON/OFF valve 13 housed in the block 11. The valve 13 is normally OFF and is actuated, to operate the device, by a trigger control member 14 mounted in the stock 1.

A tubular exhaust outlet pipe 15 mounted centrally of the separator 2 projects upwardly from and downwardly into the chamber 3 to a

level below the port of entry 16 of the tube 7 into the chamber 3. The exhaust pipe 15 has side outlets 17 at an upper level and is capped by a closure plate 18 which closes the top of the pipe 15 and surrounding exhaust chamber 19 which in turn discharges to atmosphere forwardly, and thus away from the operator holding the stock 1, through an air discharge aperture 20.

The stock 1, separator 2, funnel 4 and tube 7 are all provided by an integral die-casr body of aluminium or zinc based alloy. The casting is open at the top above the tube 7 and the separator chamber 3, the casting being closed to form the tube by a closure plate 21 providing said upper wall in which the jet nozzle 9 is formed. The supply pipe 10 to the nozzle 9 passes through the space 22 within the die-cast body above the plate 21 as well as through the chamber 19, and it is encapsulated within the space 22, for example with an epoxy resin. The exhaust pipe 15 is provided by a further die-cast moulding which fits into the body and has an intermediate annular flange 23 which seals against the body through a gasket 24 to form the top of the cyclone separating chamber 3.

The neck 5a of the container 5 has a top lip 5*b* engaged by two spring clips, which are respectively fixed to the sides of the body and act to retain the container. This provides a quick-release attachment for the container 5, and the rim of the container neck 5a seals against a foam rubber sealing ring housed in a recess between the skirt 2a and the funnel 4. The frusto-conical funnel 4 has a short cyclindrical extension at its lower end with a lip 4*b* to retain an elastic band which can be used to secure a disposable polythene bag to the funnel in lieu of the container 5. This simplifies the disposal of contaminated material which can be thrown away with the bag.

The valve 13 comprises a simple poppet valve member 26 which is directly displaceable off its seating in the block 11 (which is shown sectioned in Fig. 3) by the trigger member 14 which is pivoted to the block 11. The valve member 26 is urged to the closed position, as shown, by a valve spring 27 an abutment for which is provided by a closure plug 28 screwed into the block 11. This plug seals off an aperture through which the valve member 26 and the spring 27 are fitted.

To use the device the operator actuates the trigger member 14, thus starting the air flow along the tube 7 into the cyclone chamber 3. Swarf or other solid matter to be collected can then be picked up by the suction at the nozzle 8, and transported by the air stream along the tube 7 to the chamber 3. In that chamber a normal centrifugal cyclone separation occurs, the solid matter which is separated out falling down the funnel 4 into the container 5 which can be detached and emptied when full, or into a disposable polythene bag fixed to the extension 4a when preferred. The air discharges to atmosphere from the chamber 3 through the pipe 15 and chamber 19.

As shown the pistol grip is offset to said one side of the central section line II–II and line with the tube 7 to improve balance, and as a modification (not shown) the air jet 9 may be positioned on the vertical centre line of the tube 7. As a further modification (aga not shown) the air jet may be provided by a drilling, which may be divergent, in a connecting piece mounted at the end of the tub 7 and on to which the interchangeable nozz such as 8 fit.

At the sides of the device the closure plat 18 has projecting angled lugs 29 (see Fig. 2 These enable the device to be hung up out the way when not in use. The closure plate 18 is shown in ghost broken outline in Fig. to show how the pipe 10 passes through th chamber 19 to the valve block 11. The plat 18 is held in place by two screws at 30, an it retains a spring 31 which holds the flange 23 in sealing engagement with the gasket 2 The bottom end inlet of the exhaust pipe 15 is positioned at the bottom of the cyclone separator chamber 3, and the exhaust discharge path through the exhaust chamber 1 prevents any possibility of non-separated so ids being exhausted to atmosphere. Any sol which may enter the pipe 15 will collect in the chamber 19. Removal of the plate 18 enables the chamber 19 to be cleaned out, and also the moulding 15, 23 to be remove for cleaning of the device as a whole and should the chamber 3 become clogged with swarf.

In the modification of Fig. 4 the air suppl pipe 10 supplies an air distribution block 4 which in turn supplies a forwardly directed blast nozzle 41 as well as the suction air jet nozzle 9. The interchangeable inlet suction nozzle 8 is cut away to allow the nozzle 41 project within the cross-sectional area of th suction nozzle 8. Fig. 4 illustrates how the modified device is used to remove swarf fr a blind hole 42 in a component 43. The device is positioned so that when the trigge operated ON/OFF valve is actuated the air blast from the nozzle 41 dislodges the swa in the bore 42, the dislodged swarf then being picked up by the suction nozzle 8 an transported along the suction pipe 7 to the cyclone chamber 3.

The device as modified in Fig. 4 also ha top cover 44 which replaces the closure pl 18 of Figs. 1 to 3 and is in the form of a l pressing. This pressing has an indentation 44a to assist the air flow and for location the spring 31. The exhaust pipe 15 projec only a short distance upwardly into the exhaust chamber 19, terminating well below top cover 44 so that slotting of the pipe 1 not now necessary.

CLAIMS

1. A hand-held suction cleaning device having a suction pipe leading to a cyclone separator which exhausts to atmosphere and is disposed above a container for solids which are in use picked up at an inlet end of the pipe and separated out in the separator, and an air inlet connection for coupling to a compressed air line and which supplies an air jet which discharges into the suction pipe to produce an air flow therealong to the separator with resultant suction at the inlet end of the pipe.

2. A device according to claim 1, wherein a detachable nozzle at the inlet end of the pipe provides the suction inlet.

3. A device according to claim 2, wherein said nozzle is one of a range of interchangeable nozzles differently shaped to suit a variety of applications.

4. A device according to claim 2 or 3, wherein said nozzle, or one of said range thereof, is of elongated rectangular cross-section as suited to clearing out the T-slots of a slide or table of a machine tool.

5. A device according to any one of the preceding claims, wherein a discharge funnel below the separator discharges into the container.

6. A device according to claim 5, wherein said funnel has an end section with a lip to retain an elastic band by means of which a disposable polythene bag can be secured to the funnel in place of the container.

7. A device according to any one of the preceding claims, wherein the device has a pistol-grip handle, an ON/OFF air valve to control the air jet and a trigger control member for operation of the air valve.

8. A device according to any one of the preceding claims, wherein a pre-settable needle valve is provided for adjustable throttling of the air flow to said air jet.

9. A device according to any one of the preceding claims, wherein said separator has an annular chamber into which the suction pipe feeds tangentially and which exhausts to atmosphere through an exhaust pipe positioned centrally of the chamber, said exhaust pipe having an inlet at the bottom of the separator chamber and an outlet above the chamber.

10. A device according to claim 9, wherein said exhaust pipe outlet discharges into an exhaust chamber disposed above the separator chamber and which in turn discharges to atmosphere away from an operator when holding the device.

11. A device according to claim 9 or 10, wherein the separator chamber is formed within a main body moulding to which the container is detachably secured, and the exhaust pipe is provided by a removable moulding which includes an intermediate flange which forms the top wall of the separator chamber.

12. A device according to claim 11, wherein the removable moulding is held in position within the body moulding by a top closure plate which provides the top of said exhaust chamber and is detachable for cleaning the exhaust chamber and removal of the exhaust pipe moulding.

13. A device according to any one of the preceding claims, wherein said air jet issues from a nozzle in the wall of the suction pipe adjacent the inlet end thereof.

14. A device according to any one of the preceding claims, wherein an air blast nozzle of the device is positioned to produce an air blast operative to dislodge material to be picked up at the inlet end of the suction pipe.

15. A device according to claims 7 and 14, wherein said ON/OFF valve supplies both the suction air jet and the air blast nozzle.

16. A hand-held suction cleaning device constructed and arranged substantially as herein particularly described with reference to and as illustrated in Figs. 1 to 3 of the accompanying drawings, or modified as shown in Fig. 4 of the accompanying drawings.

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706192 Design Application: 59-39927

Application date: 26 September 1984
Registered: 27 February 1987

Designer: HIRANO Yukio, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

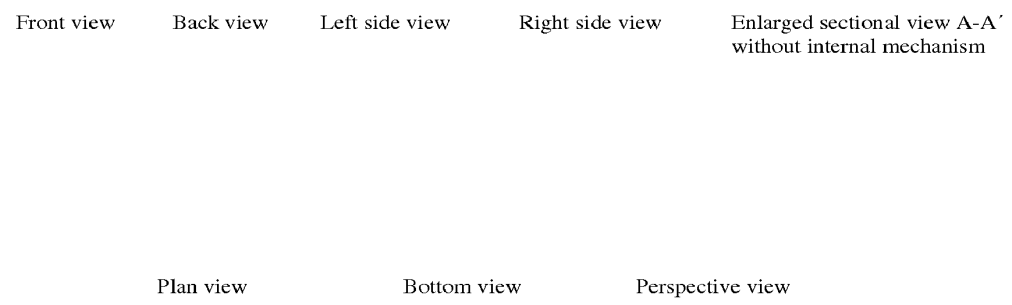
Designer: NAKANO Fumiyasu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Attorney: NAKAO Toshio, Patent Attorney, , and one other

Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner



日本国特許庁

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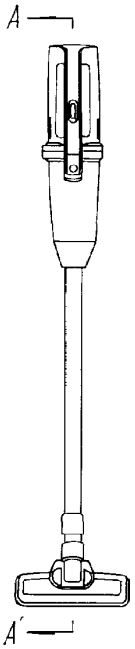
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706192　　意願 昭59－39927　　出願 昭59(1984)9月26日
登録 昭62(1987)2月27日

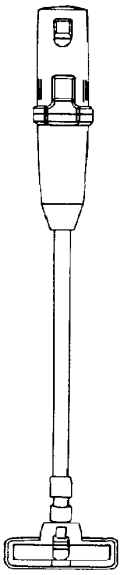
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創作者　中野二三康　門真市大字門真1006番地　松下電器産業株式会社内
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審査官　鍋田和宣

意匠に係る物品　電気掃除機

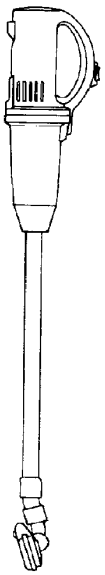
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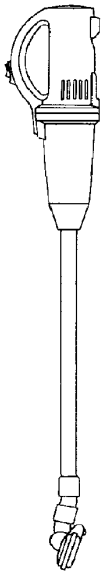
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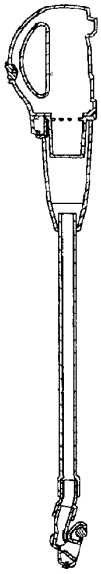
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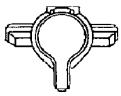
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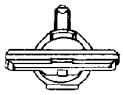
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A－A'断面図



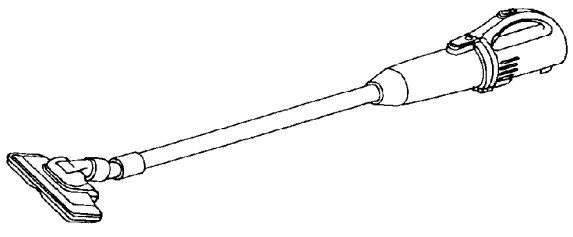
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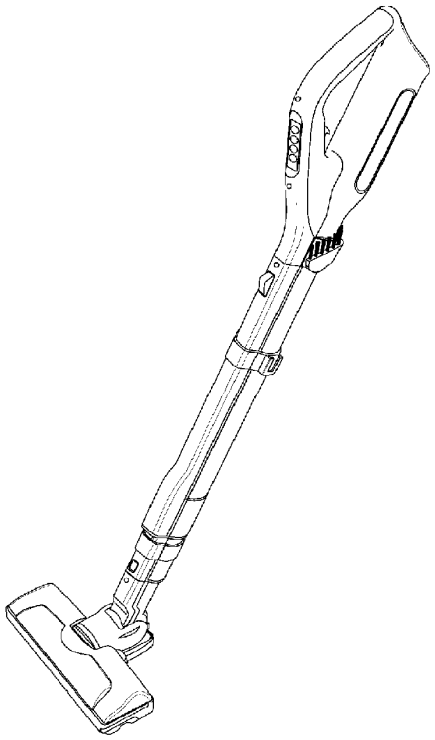
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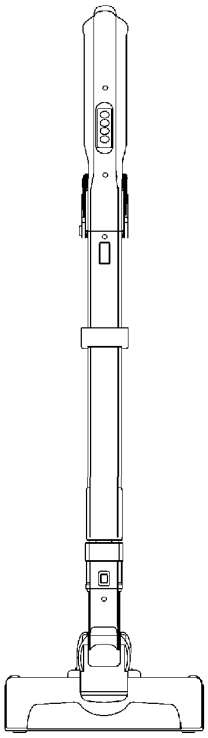
Dyson Ex1004
Page 103

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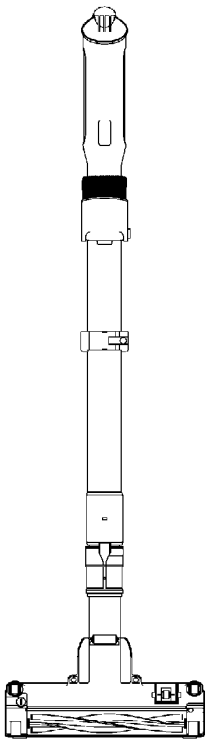
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（５２）【意匠分類】Ｃ３－４１００
（５１）【国際意匠分類（参考）】１５－０５
（２１）【出願番号】意願２００６－３２９２３（Ｄ２００６－３２９２３）
（２２）【出願日】平成１８年１１月３０日（２００６．１１．３０）
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【氏名又は名称原語表記】ＳＨＡＲＰ　ＫＡＢＵＳＨＩＫＩ　ＫＡＩＳＨＡ
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（７４）【代理人】
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【氏名又は名称】小池　隆彌
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【氏名又は名称】田畑　昌男
【審査官】上島　靖範
【図面】
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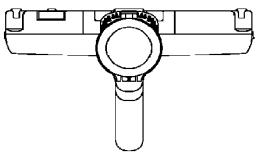
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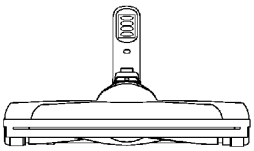
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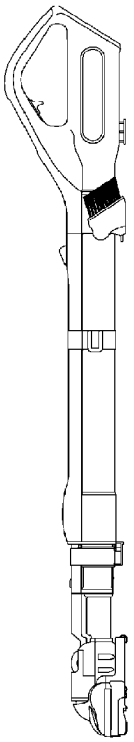
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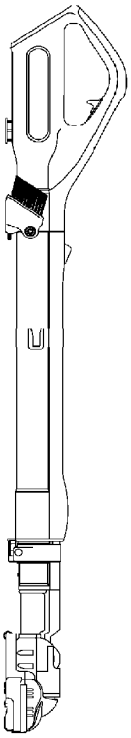
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【右側面図】



【左側面図】



Japan Patent Office

Issued 28 May 1987

Design Gazette (S)

C3-410 E

706193 Design Application: 59-39928

Application date: 26 September 1984
Registered: 27 February 1987

Designer: HIRANO Yukio, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: NAKANO Fumiysu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Attorney: NAKAO Toshio, Patent Attorney, and one other

Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner

Front view

Back view



Left side view



Right side view

Enlarged sectional view A-A′ without internal mechanism



Plan view

Bottom view

Perspective view

日本国特許庁

昭和62年(1987)5月28日発行　**意匠公報**　(S)　C3-410 E

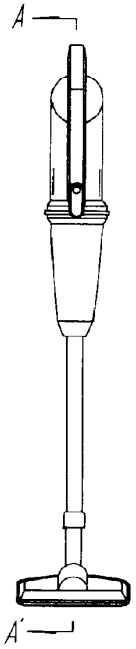
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登録 昭62(1987)2月27日

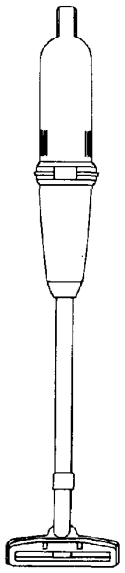
創作者　平野幸雄　門真市大字門真1006番地　松下電器産業株式会社内
創作者　中野二三康　門真市大字門真1006番地　松下電器産業株式会社内
意匠権者　松下電器産業株式会社　門真市大字門真1006番地
代理人　弁理士 中尾敏男　外1名
審査官　鍋田和宣

意匠に係る物品　電気掃除機

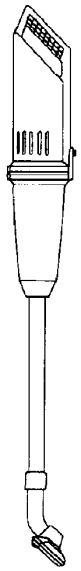
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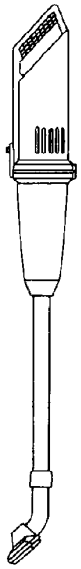
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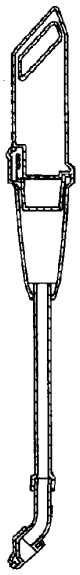
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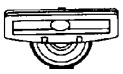
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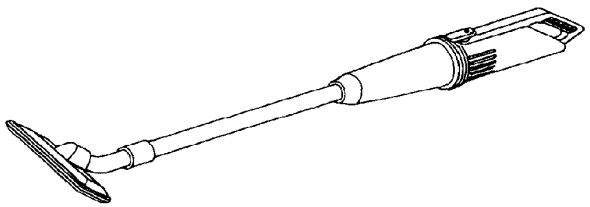
平面図



底面図



斜視図



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A47L 9/28 (2006.01) *H02J 7/02* (2006.01)

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EP 0100438 A US 4573234 A

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UK CL (Edition X) A4B, A4F
INT CL A47G, A47L, H02J
Other: WPI, EPODOC

(54) Abstract Title: **A support device**

(57) A support device or wall mounting bracket 100 for a handheld cleaning appliance (10, fig 1) comprises a body 102 having a plurality of walls (104, 106, 108, 110, 112, fig 2). A portion of the body 102 defines a receiving portion (116, fig 2) for receiving at least a part of the handheld cleaning appliance (10, fig 1). At least two of the walls (106, 108, fig 2) are capable of connection to a support surface 150 so that the support device 100 can be retained in at least two different orientations with respect to the support surface 150. By providing such an arrangement, a user can choose from at least two orientations of the support device 100 and therefore the handheld cleaning appliance (10, fig 1) when located in the support device 100 with respect to the support surface (150). This allows a user to select an orientation which fits most conveniently into a living space. The support device 100 may include a connector 122 which is fastened to the 150 so that the support device 100 can be slidably fitted into the connector 122.

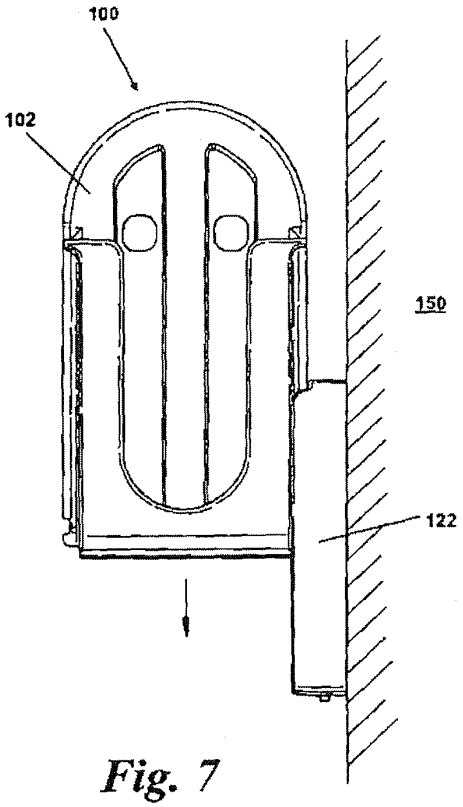


Fig. 7

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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GB 2 441 962 A

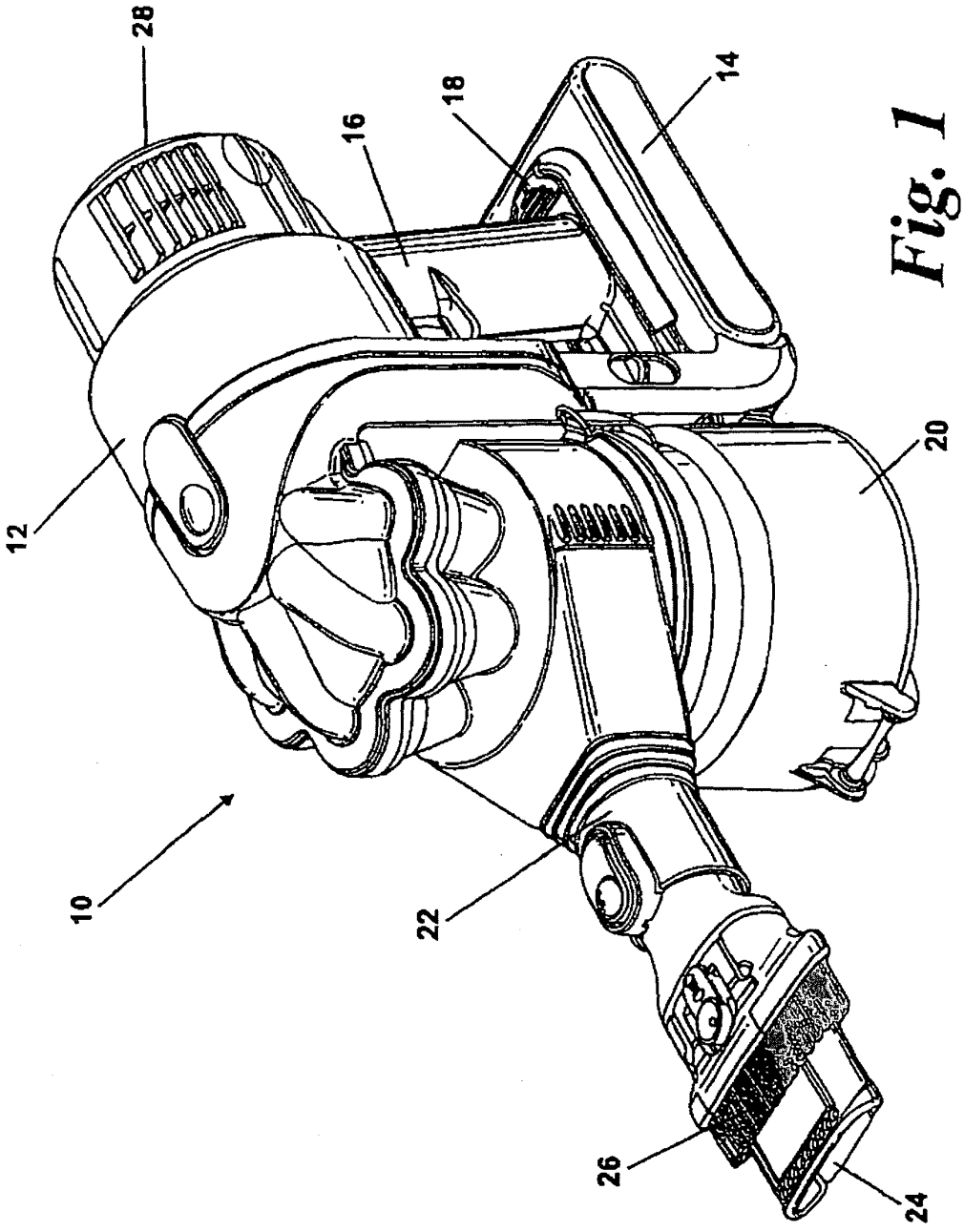


Fig. 1

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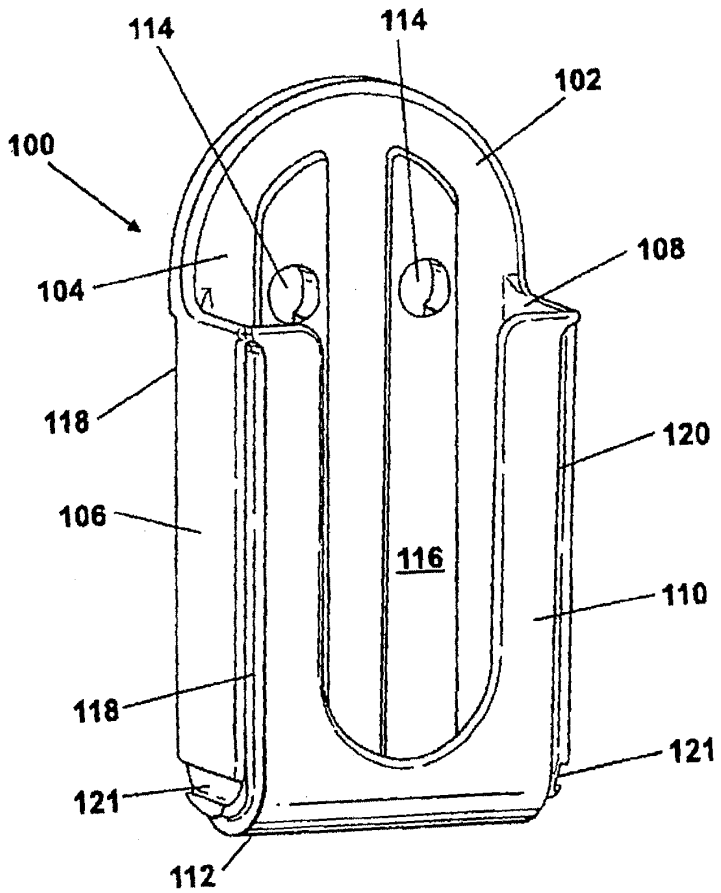

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Fig. 2

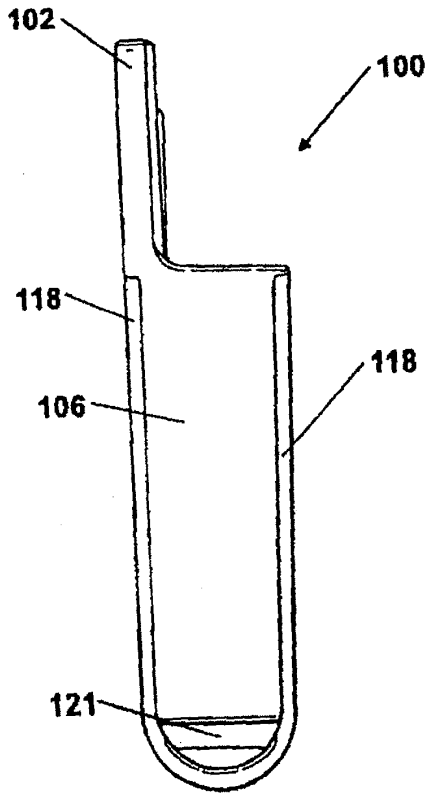

102
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Fig. 3

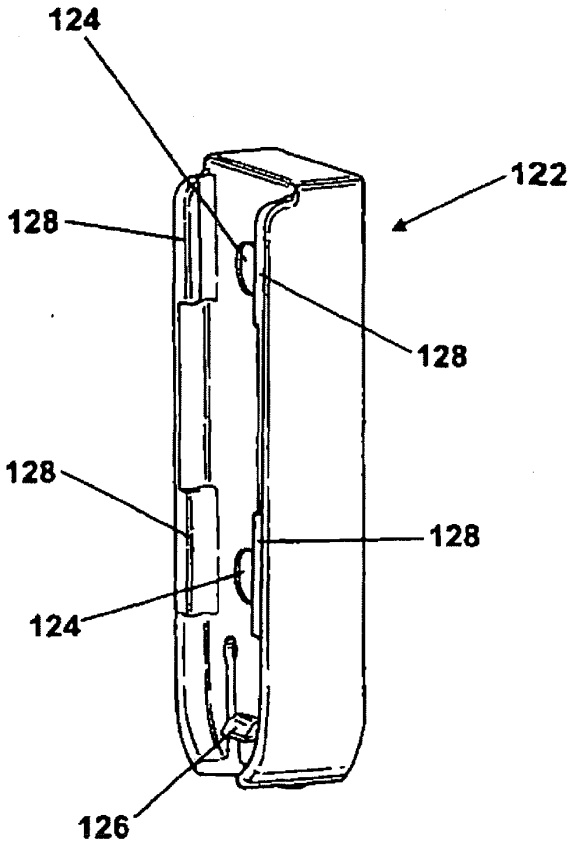


Fig. 4

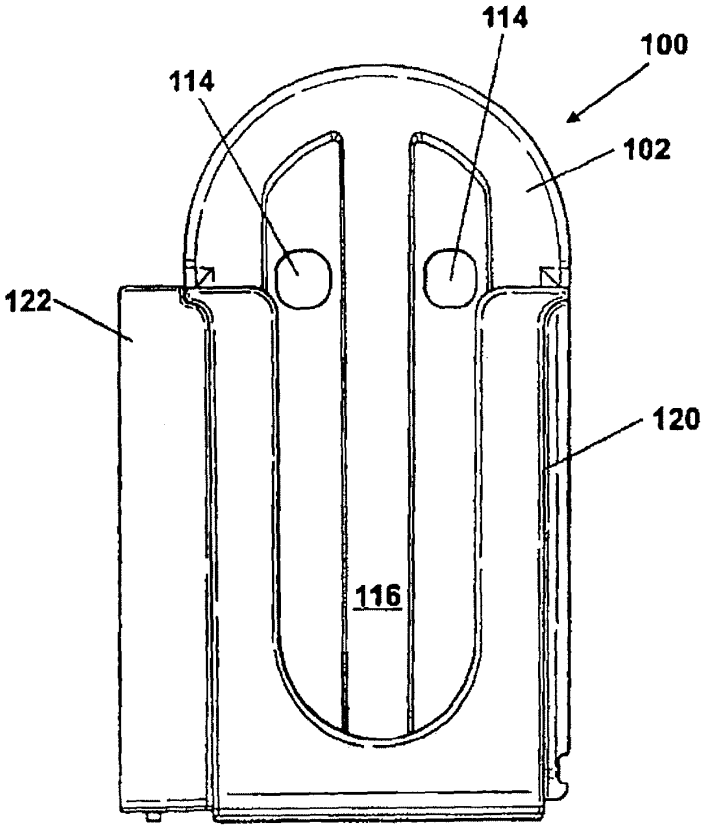


Fig. 5

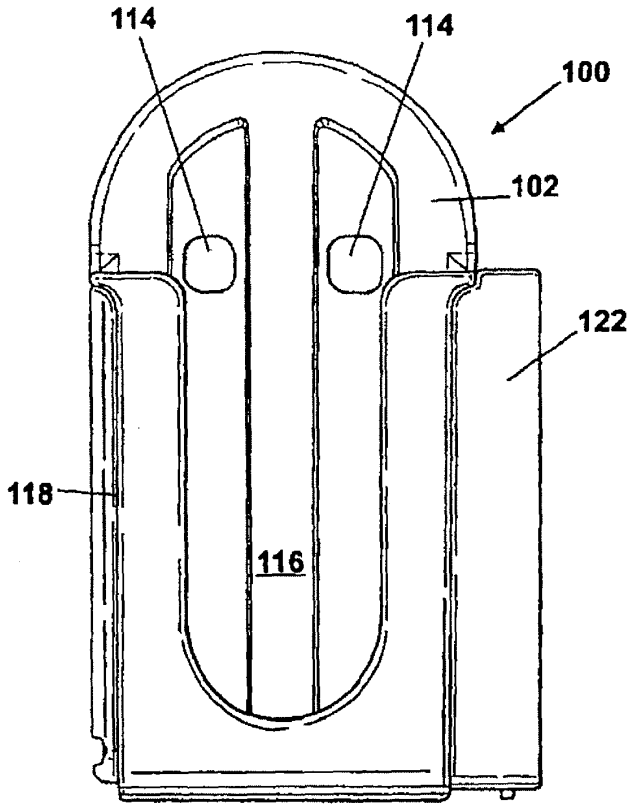


Fig. 6

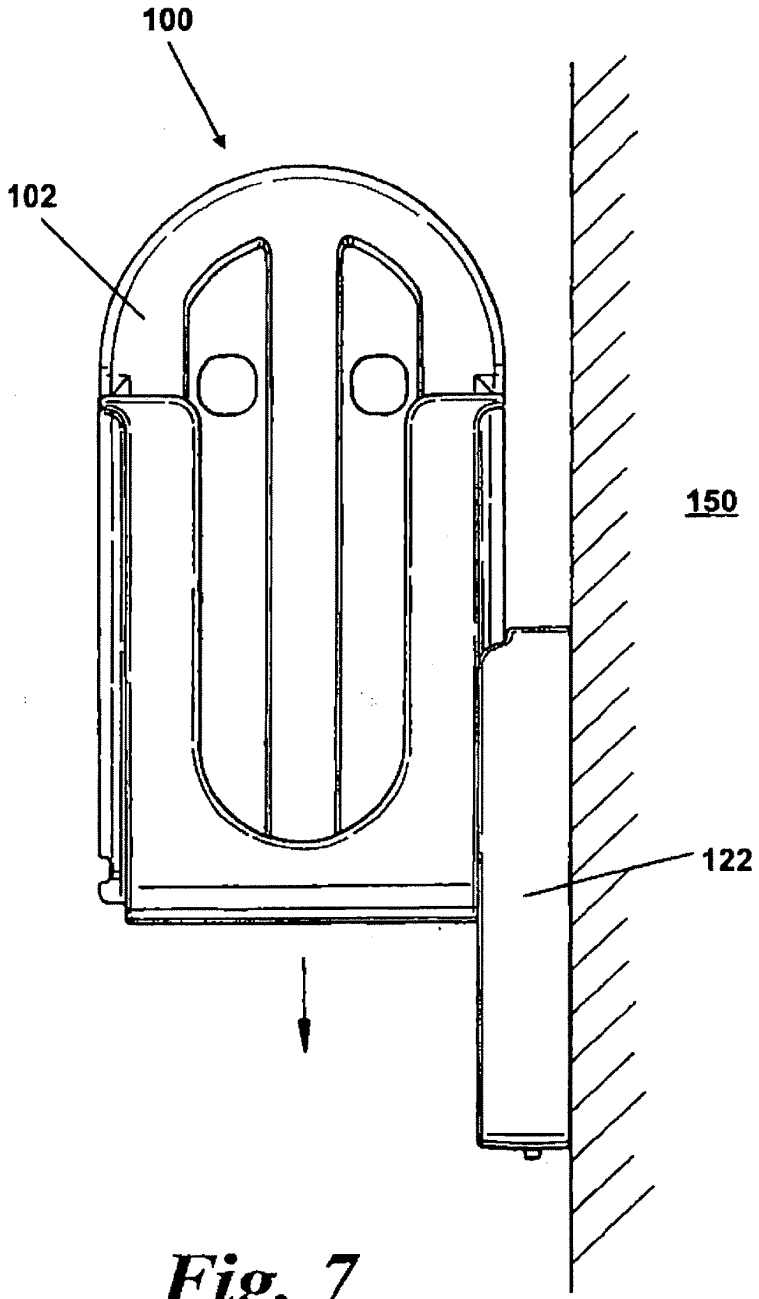


Fig. 7

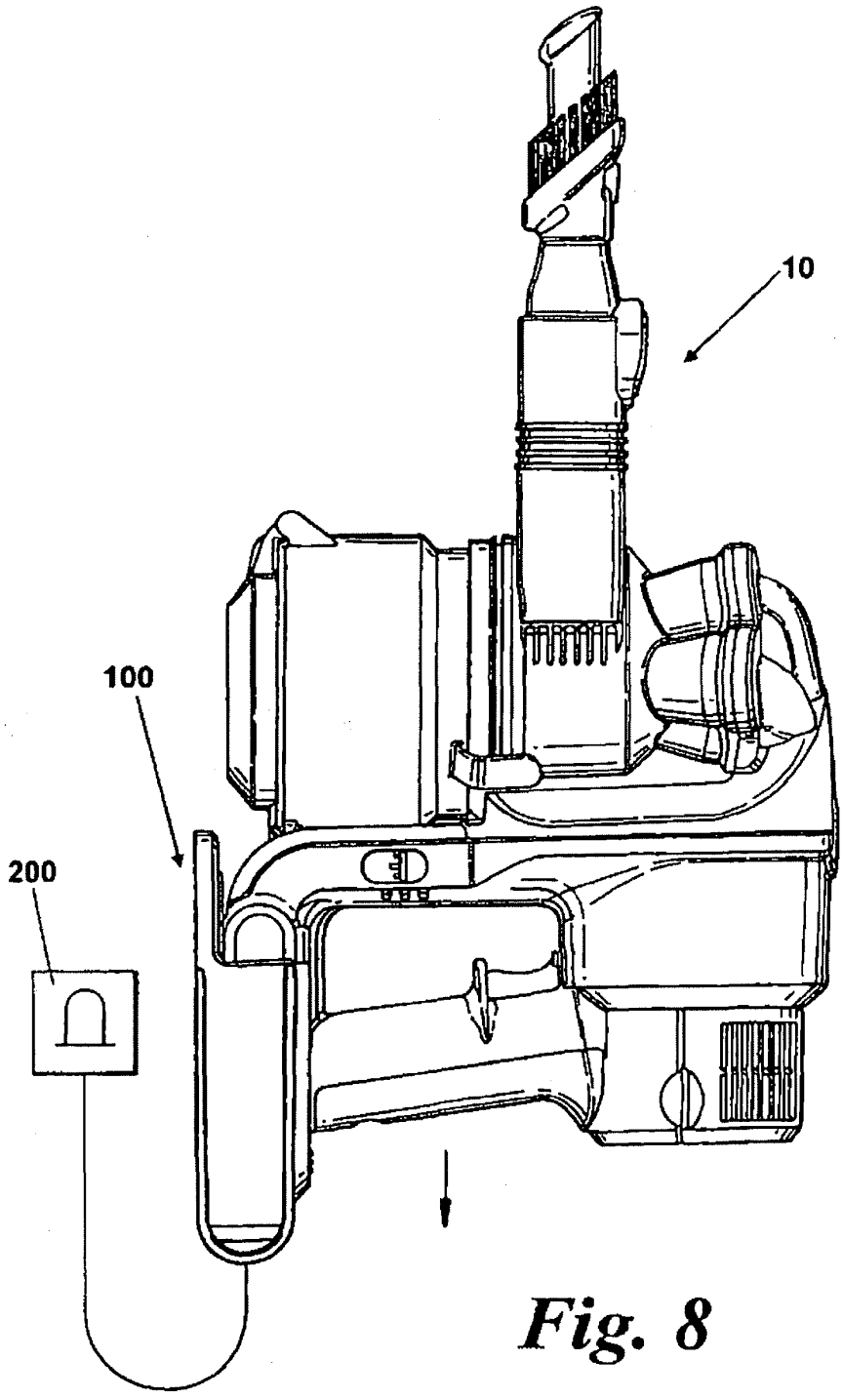


Fig. 8

A Support Device

The invention relates to a support device for a handheld cleaning appliance. Particularly, but not exclusively, the invention relates to a support device for a handheld vacuum cleaner.

Handheld vacuum cleaners are well known and have been manufactured and sold for several years. Typically, a handheld vacuum cleaner comprises a body which houses a motor and a fan unit for generating an airflow. The airflow enters the vacuum cleaner via an inlet. A separator such as a filter, bag or cyclonic separator is located downstream of the inlet to separate dirt and dust from the airflow. Further, it is common for a handheld vacuum cleaner to be battery powered. In many cases, a rechargable battery is provided. An example of this type of vacuum cleaner is shown in GB 1 207 278.

Handheld vacuum cleaners are often of a relatively small size when compared to upright or cylinder vacuum cleaners. Further, they are often required to be easily accessible for spot cleaning or other such cleaning tasks. Therefore, it is useful and practical to store a handheld vacuum cleaner on a support surface such as an internal wall where it can easily be reached. It is known to provide a support device for a handheld vacuum cleaner in order to achieve this. Further, it is known to provide a charger for a rechargeable battery within the support device. An example of such a support device is shown in US 4,225,814. The support device is used for storage and recharging of the handheld vacuum cleaner. The support device has a plurality of screw holes so that the support device can be secured to a support surface such as a wall.

However, a disadvantage of the type of support device disclosed in US 4,225,814 is that only one wall of the support device can be secured to a support surface. This is due in part to the shape of the support device which is elongate and flat, and in part to the provision of screw holes in only one wall of the support device. Therefore, this arrangement provides a limited number of orientations in which the support device can

be secured to a support surface and may not allow the handheld vacuum cleaner to be stored in the most convenient orientation in a home.

It is therefore an object of the invention to provide a support device for a handheld vacuum cleaner which allows the support device to be mounted on a support surface in at least two different orientations. It is a further object of the invention to provide a support surface having at least two walls which are capable of connection to a support surface so that the support device can be retained in at least two different orientations with respect to the support surface. This gives a user improved flexibility regarding storage of the handheld vacuum cleaner on a support surface.

The invention provides a support device for a handheld cleaning appliance comprising a body having a plurality of walls, a portion of the body defining a receiving portion for receiving at least a part of the handheld cleaning appliance, wherein at least two of the walls are capable of connection to a support surface so that the support device can be retained in at least two different orientations with respect to the support surface. By providing such an arrangement, a user can choose from at least two orientations of the support device (and therefore the handheld cleaning appliance when it is located in the support device) with respect to a support surface. This allows a user to select an orientation which fits most conveniently into a room or space.

The invention further provides a connector capable of being fixedly secured to the support surface. Preferably, the connector is arranged removably to receive one of the at least two walls in order to retain the support device on the support surface. By providing such an arrangement, a connector can be fixed to a support surface and the remainder of the support device can be attached thereto. This allows different orientations of the support device to be selected without the need to remove securing components such as screws or nails from the support surface.

Preferably, the connector is arranged slidably to receive one of the at least two walls. By providing a slidable engagement between the connector and the remainder of the

support device, the remainder of the support device can easily and quickly be removed from the connector without undue burden.

Preferably, the receiving portion is arranged such that, when the support device is retained on the support surface and a handheld cleaning appliance is located in the receiving portion, the handheld cleaning appliance lies alongside the support surface. By providing such an arrangement, the largest dimensions of a handheld cleaning appliance can be held parallel to the support surface. This minimises the intrusion of the handheld cleaning appliance into a room or area in which the support surface is located.

An embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is an isometric view showing a handheld vacuum cleaner;

Figure 2 is an isometric view showing a body forming part of a support device according to the invention;

Figure 3 is a side view showing the body of Figure 2;

Figure 4 is an isometric view showing a connector forming part of the support device according to the invention;

Figure 5 is a front view showing the connector of Figure 4 attached to the body of Figure 2 in a first configuration;

Figure 6 is a front view showing the connector of Figure 4 attached to the body of Figure 2 in a second configuration;

Figure 7 is a front view showing the body of Figure 2 during attachment to the connector of Figure 4 in the second configuration; and

Figure 8 is a side view showing a support device according to the invention when supporting the handheld vacuum cleaner of Figure 1.

Figure 1 shows a handheld vacuum cleaner 10. The hand-held vacuum cleaner 10 has a main body 12 which houses a motor and fan unit (not shown). The main body 12 also includes a battery pack 14. A handle 16 is provided on the main body 12 for manipulating the hand-held vacuum cleaner 10 in use. At the base of the handle 16 is located a mounting portion 18. The mounting portion 18 is arranged to connect the battery pack 14 to the remainder of the handheld cleaning appliance 10. Cyclonic separating apparatus 20 is attached to the main body 12. An inlet pipe 22 extends from a portion of the cyclonic separating apparatus 20 remote from the main body 12. A dirty air inlet 24 is formed at the distal end of the inlet pipe 22. A brush tool 26 is slidably mounted on the distal end of the inlet pipe 22. A set of exhaust vents 28 are provided on the main body 12 for exhausting air from the hand-held vacuum cleaner 10.

In use, the motor and fan unit draws a flow of dirt- and dust-laden air into the dirty air inlet 24, through the inlet pipe 22 and into the cyclonic separating apparatus 20. The cyclonic separating apparatus 20 separates dirt and dust from the airflow. The cleaned airflow then passes through the motor and fan unit and out of the exhaust vents 28.

Figures 2 and 3 show a part of the support device 100 according to the invention. The support device 100 is suitable for use with the handheld vacuum cleaner 10 of Figure 1. The support device 100 comprises a body 102 having a rear wall 104, two side walls 106, 108, a front wall 110 and a base wall 112. A pair of holes 114 is formed in the rear wall 104. The holes 114 are arranged to include metallic contacts (not shown) arranged to supply power to the battery pack 14 when the handheld cleaning appliance 10 is located in the support device 100.

A part of the body 102 defines a receiving portion 116. The receiving portion 116 takes the form of a cavity defined by the front, rear, side and base walls 104, 106, 108, 110,

112. The receiving portion 116 is dimensioned to receive the battery pack 14 and mounting portion 18 of the handheld vacuum cleaner 10. The front wall 110 is shaped to abut the mounting portion 18 of the handheld vacuum cleaner 10 when the handheld vacuum cleaner 10 is inserted into the receiving portion 116.

Two channels 118 are formed on the side wall 106. One channel 118 is formed adjacent the rear wall 104 and the other channel 118 is formed adjacent the front wall 110. Two further channels 120 are formed on the opposing side wall 108. One channel 120 is formed adjacent the rear wall 104 and the other channel 120 is formed adjacent the front wall 110. Only one of the channels 120 can be seen in Figure 2. Each channel 118, 120 extends parallel to the respective side wall 106, 108. Additionally, the lower ends of each side wall 106, 108 include a notch 121.The purpose of the channels 118, 120 and the notches 121 will be described later.

It is desirable to connect the body 102 of the support device 10 shown in Figures 2 and 3 to a support surface such as a wall or cabinet. In order to connect the support device 10 to a support surface, the support device 10 further comprises a connector 122. The connector 122 is shown in Figure 4. The connector 122 includes two through-holes 124. The through-holes 124 are dimensioned to receive attachment devices such as screws or nails (not shown) so that the connector 122 can be retained on a support surface (not shown) such as a wall. The connector 122 also includes a catch 126. The catch 126 is arranged to engage with the notch 121 formed on each of the side walls 106, 108 of the support device 100.

The connector 122 further includes four lugs 128. The lugs 128 are dimensioned and arranged slidably to engage with either the two channels 116 located on the side wall 106 or the two channels 118 located on the opposing side wall 108. This is in order to attach the connector 122 to the body 102 of the support device 100 in one of two possible positions. The connector 122 is held in position on the body 102 of the support device 100 by engagement of the catch 126 with one of the notches 121.

The two possible locations of the connector 122 on the body 102 of the support device 100 are shown in Figures 5 and 6. In Figure 5, the connector 122 is shown attached to the side wall 106 in a first configuration of the support device 100. In Figure 6, the connector 122 is shown attached to the opposing side wall 108 in a second configuration of the support device 100.

In use, a user attaches the connector 122 to the support surface 150 using suitable attachment means such as screws or nails. The screws or nails are inserted through the through-holes 124 formed in the connector 122. The connector 122 is shown attached to a support surface 150 in Figure 7.

A user can choose from two configurations of the body 102 with respect to the connector 122. The choice of the configuration will determine the orientation of the support device 100 with respect to the support surface 150. Figure 7 shows the process necessary to select the second configuration of the support device 100. In use, the user slides the lugs 128 into the channels 120. The lugs 128 cooperatively engage with the channels 120 so that the body 102 of the support device 100 can be pushed down onto the connector 122 until the connector 122 and body 102 are in the relationship shown in Figure 6. At this point, the catch 126 engages with the notch 121 and the body 102 and connector 122 of the support device 100 are held in a fixed relationship. The support device 100 is now in the second configuration.

In this configuration, the support device 100 extends away from the support surface 150 into a room or area (not shown) in which the support surface 150 is located. The support device 100 is now securely attached to the support surface 150 and is ready to receive the handheld vacuum cleaner 10.

Figure 8 shows the handheld vacuum cleaner 10 of Figure 1 located in the support device 100 and being supported thereby. In order to locate the handheld vacuum cleaner 10 in the support device 100, the user holds the handheld vacuum cleaner 10 so that the

dirty air inlet 22 is pointing upwards. The user then inserts the handheld vacuum cleaner 10 into the receiving portion 116 so that the battery pack 14 is partly surrounded by the walls 104, 106, 108, 110, 112 of the body 102 of the support device 100. When correctly located, the battery pack 14 abuts the base wall 112 of the body 102 and the mounting portion 18 abuts the front wall 110 of the body 102.

When located in the support device 100, the handheld vacuum cleaner 10 lies alongside the support surface 150 (not shown in Figure 8). This is because the body 102 of the support device 100 extends perpendicularly away from the support surface 150 (Figure 7). This arrangement allows the handheld vacuum cleaner 10 to be supported by the support device 100 with minimal intrusion into the room or area in which the support surface 150 is located. Additionally, the battery pack 14 may be charged by a power source 200 which is connected to the support device 100. Arrangements for charging a battery pack are known in the art and will not be described further here.

The invention is not limited to the precise details of the embodiment described above. For example, the support device need not include a connector. Through-holes for the introduction of screws, nails or other attachment devices may be provided in at least two of the walls of the body of the support device. This allows the support device to be directly connected to the support surface.

Additionally, more than two alternative configurations of the support device may be possible. Any number of configurations may be used, for example, the rear wall of the body of the support device could be capable of connection to the support surface.

Alternatively, more than one connector may be provided. This may be necessary if, for example, the handheld vacuum cleaner is very heavy or the weight of the handheld vacuum cleaner needs to be spread out over a greater area. This may occur when attempting to fix the support device to an internal partition wall or other relatively weak structure.

The invention is applicable to all types of handheld cleaning appliance, for example, floor polishers, floor sweepers and wet/dry machines. What is important is that the support device has at least two walls which are capable of connection to a support surface so that the support device can be retained in at least two different orientations with respect to the support surface.



CLAIMS

1. A support device for a handheld cleaning appliance comprising a body having a plurality of walls, a portion of the body defining a receiving portion for receiving at least a part of the handheld cleaning appliance, wherein at least two of the walls are capable of connection to a support surface so that the support device can be retained in at least two different orientations with respect to the support surface.

2. A support device as claimed in claim 1, wherein the at least two walls can each be fixedly secured to the support surface.

3. A support device as claimed in claim 1, further comprising a connector capable of being fixedly secured to the support surface, wherein the connector is arranged removably to receive one of the at least two walls in order to retain the support device on the support surface.

4. A support device as claimed in claim 3, wherein the connector is arranged slidably to receive one of the at least two walls.

5. A support device as claimed in any one of the preceding claims, wherein the receiving portion is arranged such that, when the support device is retained on the support surface and a handheld cleaning appliance is located in the receiving portion, the handheld cleaning appliance lies alongside the support surface.

6. A support device as claimed in any one of the preceding claims, wherein the receiving portion is arranged such that, when the support device is retained on the support surface, the support device extends away from the support surface.

7. A support device as claimed in any one of the preceding claims, wherein the receiving portion takes the form of a cavity arranged to surround at least a part of the handheld cleaning appliance.

8. A support device as claimed in any one of the preceding claims, further comprising a power source for supplying power to charge a battery forming part of the handheld cleaning appliance.

9. A support device as claimed in any one of the preceding claims, wherein the handheld cleaning appliance is a handheld vacuum cleaner.

10. A support device substantially as hereinbefore described with reference to the accompanying drawings.

Patent Office

For Innovation

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Application No:	GB0618495.6	**Examiner:**	Rhodri Evans
Claims searched:	1-10	**Date of search:**	6 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
A	-	EP0100438 A (Euras)
A	-	US 4573234 A (Kochte)

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^{X} :

A4B; A4F

Worldwide search of patent documents classified in the following areas of the IPC

A47G; A47L; H02J

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

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(12) the Chairman of the Gazette (S)

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(51) international classification 15-05

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73) registration No. lol Kim Kyu-Han, Juan5 hope Villa, 16-71, # 101
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74) the delegate Yu-Gi-Hyun
54) the vacuum cleaner

Stereoscopic, Chairman of the drafting
Subject of article
Vacuum cleaner
Chairman's description
1. the material is PVC and metal materials, rubber tenure.
2. Chairman of the vacuum cleaner is double-suction tube, depending on the user's choice in the bottom of the floor clean of brush to clean intake, intake, intake, nook
Easy and convenient to use, combined with the personal as well as vacuum motor is seated in the console with integrated intake combined with double-suction
An outer tube of the tube base length adjustment button and sliding the inner tube at the same time pull the distal end of the double-suction pipe to draw
This can be adjusted according to the user's choice.
3. this speaker built into the main vacuum motor is driven by the suction caused by the combined inlet, and double-suction tube, through the
Filter and inhale the dirt into the spout side panelling of the ratings, and, again, the filter sieve and suction of the motor fan through the contaminants have been removed
The air is vented to the outside but did not pass the filter sieve contaminated water suction dirt bins inside the flea, and ends up cleaning
If suction dirt bins to separately remove the filter the dirt without the exchange of structured, reusable over and over again.
4. Chairman of the Board for work power wires and plugs were omitted.
5. sections are omitted.
6. the note also the console and double-suction tube (1) with the exception of the filter and the filter sieve, suction of rated panelling, dirt bins, floor cleaning inlet, configuration, administration
Cattle intake, brush one side of their isolated State representation of the intake.
The gist of the contents of the Chairman of the Board of creative
"The vacuum cleaner", Chairman of the creative content, a combination of geometry and shape of the point.

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(12) 등록의장공보(S)

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담당심사관 김기호

(54) 진공청소기

입체의장 도면

의장의 대상이 되는 물품

진공청소기

의장의 설명

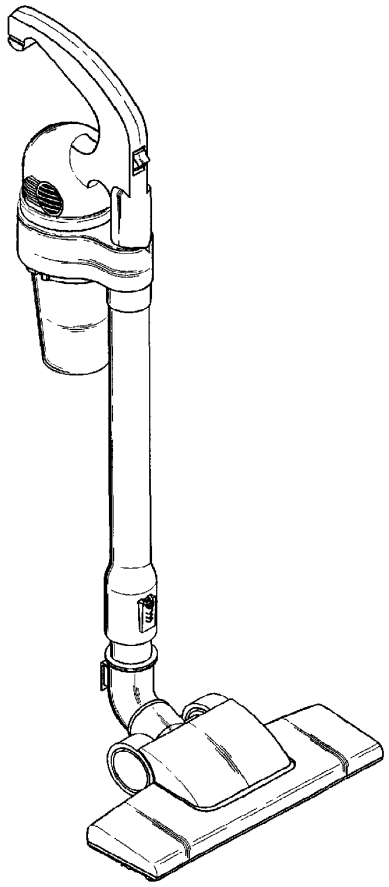
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2. 본 의장 진공 청소기는 사용자의 선택에 따라 이중흡입관 하단에 바닥청소흡입구, 구석청소흡입구, 브러쉬흡입구 등을 쉽고 편리하게 교체 결합하여 사용이 가능함은 물론 진공모터가 내장된 본체 흡입구에 끼워져 결합된 이중흡입관의 외측관 하단부에 구비된 길이조정버튼을 슬라이딩함과 동시에 내측관 선단부를 당겨 인출하여 이중흡입관의 길이를 사용자의 선택에 따라 조절 사용할 수 있는 것임.
3. 본 의장 본체에 내장된 진공모터의 구동으로 발생된 흡입력에 의해 선택 결합된 흡입구 및 이중흡입관을 통하여 필터고정격벽판의 일측 배출구로 흡입오물이 유입되고, 다시 필터거름망 및 모터의 흡입팬을 통해 오염물이 제거된 공기만 외부로 배출되므로 필터거름망을 통과하지 못한 오염물은 흡입오물수거통 내부에 잔류하게되고, 청소가 끝나면 흡입오물수거통을 분리하여 수거오물을 제거 필터의 교환 없이 반복적 재사용이 가능한 구조임.
4. 본 의장 작동을 위한 전원 공급용 전선 및 플러그를 생략하였음.
5. 단면도는 생략하였음.
6. 참고도 1은 본체 및 이중흡입관을 제외한 필터고정격벽판, 필터거름망, 흡입오물수거통, 바닥청소흡입구, 구성청소흡입구, 브러쉬흡입구들이 분리된 상태를 나타낸 측면도임.

의장 창작 내용의 요점

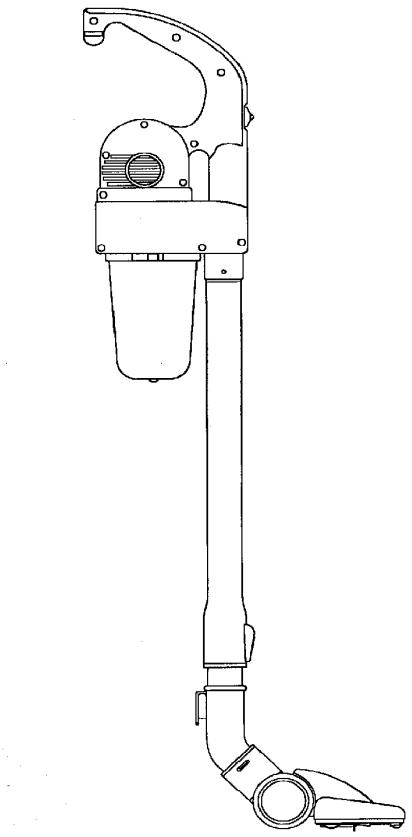
"진공청소기"의 형상과 모양의 결합을 의장창작 내용의 요점으로 함.

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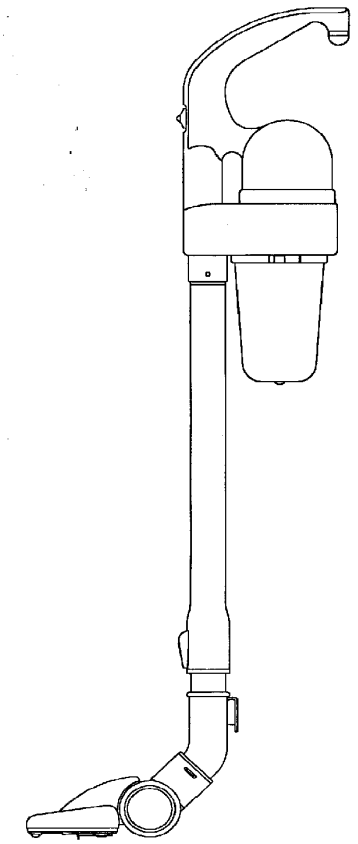
사시도



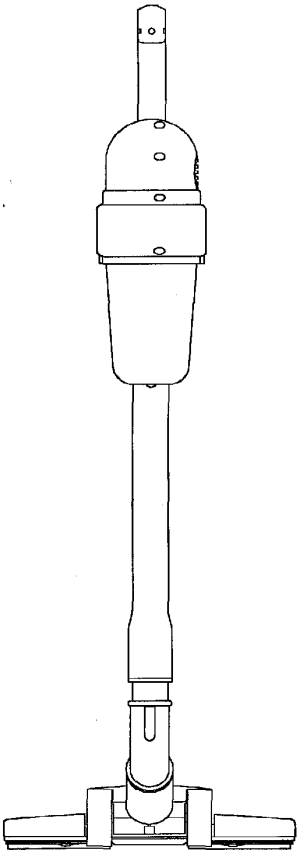
정면도



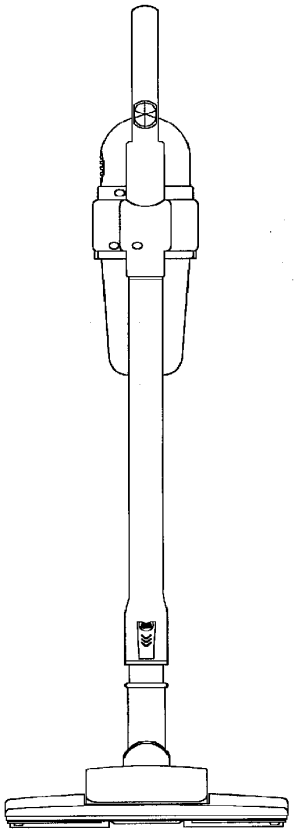
배면도



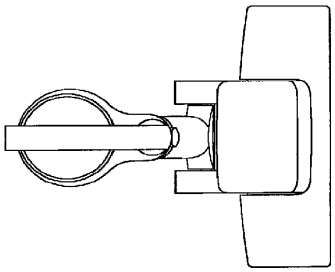
좌측면도



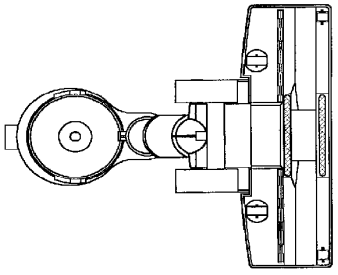
우측면도



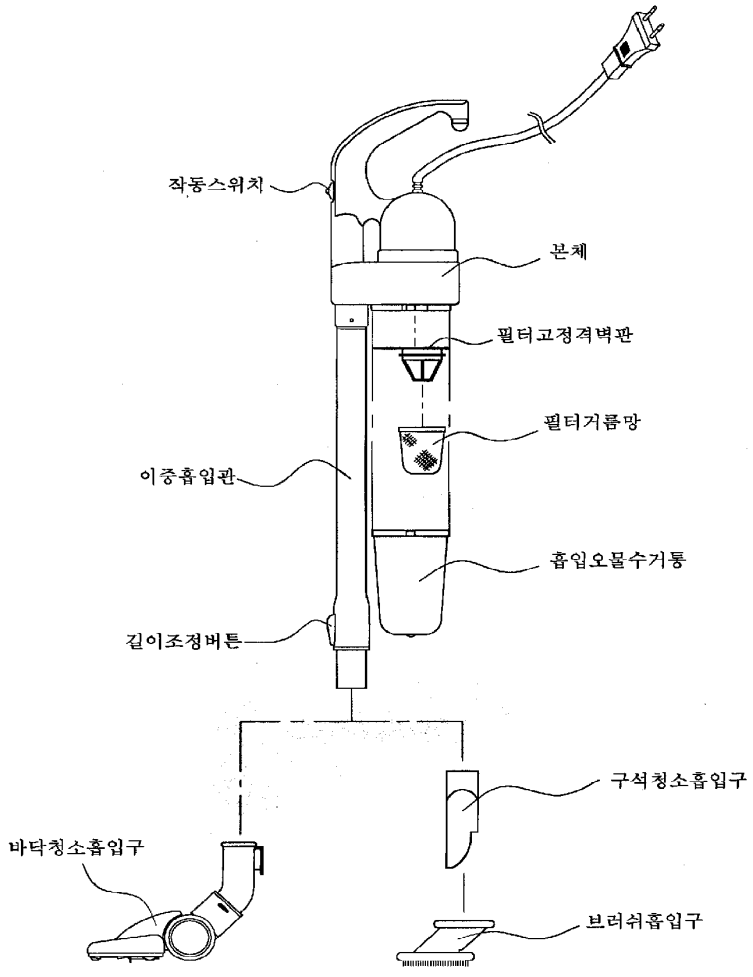
평면도



저면도



참고도 1


작동스위치
본체
필터고정격벽판
필터거름망
이중흡입관
흡입오물수거통
길이조정버튼
구석청소흡입구
바닥청소흡입구
브러쉬흡입구

Japan Patent Office

Issued 22 May 1986

Design Gazette (S)

C3-410 D

679390 Design Application: 58-42478

Application date: 29 September 1983
Registered: 28 February 1986

Designer: SAKAMOTO Masaharu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: MORIYAMA Toshiya, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: NAGAMATSU Yasuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: MIYAMOTO Isshin, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Attorney: NAKAO Toshio, Patent Attorney, and one other
Examiner: MAEKAWA Yukihiko

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details.

Left side view | Front view | Back view | Right side view

Plan view Bottom view

Perspective view showing use with middle hose removed

Perspective view when extended

日本国特許庁

昭和61年(1986)5月22日発行　**意匠公報**　(S)

C3-410 D

679390

意願 昭58－42478

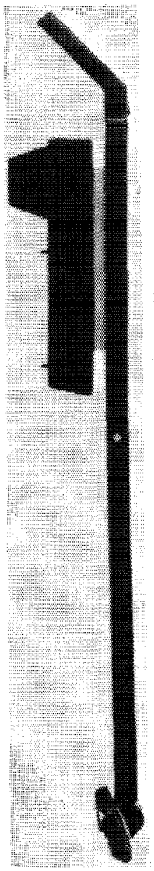
出願 昭58(1983)9月29日
登録 昭61(1986)2月28日

創作者　坂本雅春　門真市大字門真1006番地　松下電器産業株式会社内
創作者　森山俊哉　門真市大字門真1006番地　松下電器産業株式会社内
創作者　長松康男　門真市大字門真1006番地　松下電器産業株式会社内
創作者　宮本一伸　門真市大字門真1006番地　松下電器産業株式会社内
意匠権者　松下電器産業株式会社　門真市大字門真1006番地
代理人　弁理士　中尾敏男　外1名
審査官　前川幸彦

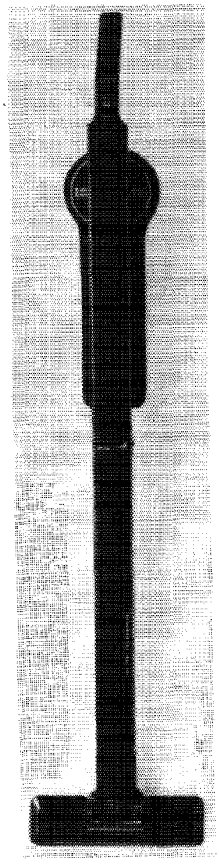
意匠に係る物品　電気掃除機

この意匠は図面代用写真によって表わされたものであるから細部については原本を参照されたい

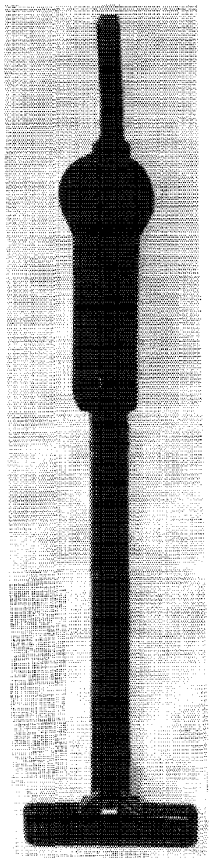
左側面図



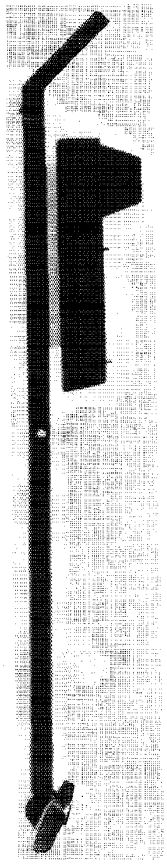
正面図



背面図

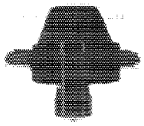


右側面図



Dyson Ex1004
Page 139

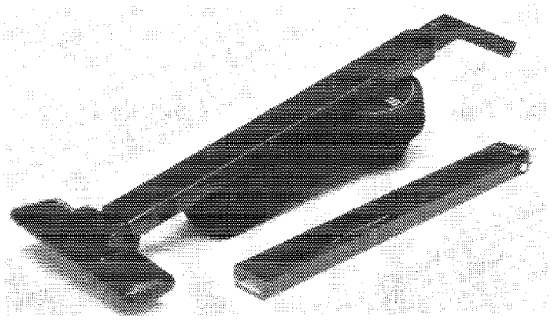
平面図



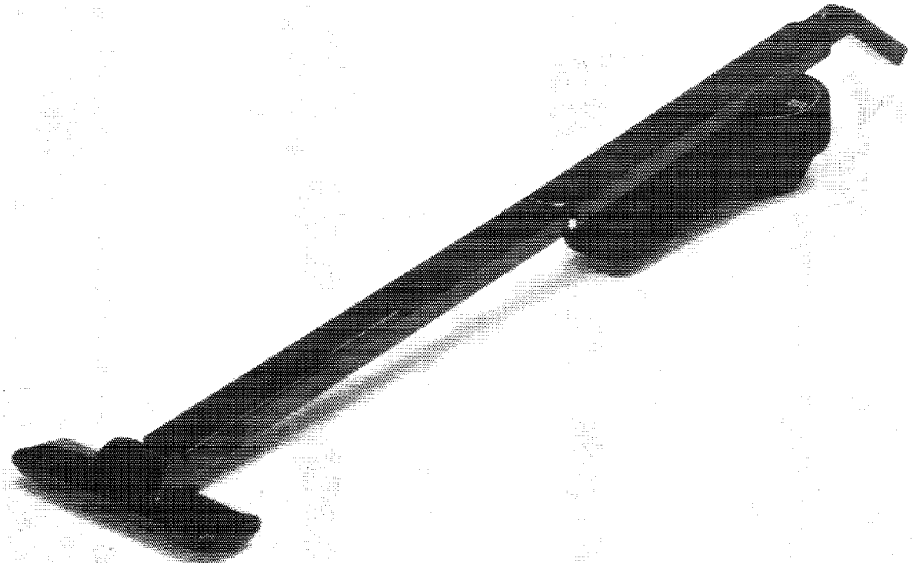
底面図



中間パイプ継手を取外した
使用状態を示す斜視図



拡大斜視図



Dyson Ex1004
Page 140

Japan Patent Office

Issued 23 May 1990

Design Gazette (S)

C3-410 D

788427 Design Application: S63-35265

Application date: 7 September 1988
Registered: 28 February 1990

Designer: NAGAMATSU Yasuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: ISHIDA Kazuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: TANAKA Yasuhiko, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: HIDAKA Masataka, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: SAKAMOTO Hideaki, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: KAKU Hiroyuki, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka
Attorney: KURINO Shigetaka, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details

Left side view | Front view | Back view | Right side view

788427 (2) C3-410 D

Plan view

Perspective view

Bottom view

日本国特許庁

平成2年(1990)5月23日発行　**意匠公報**（S）

C3-410 D

788427　　意願 昭63－35265　　出願 昭63(1988) 9月7日

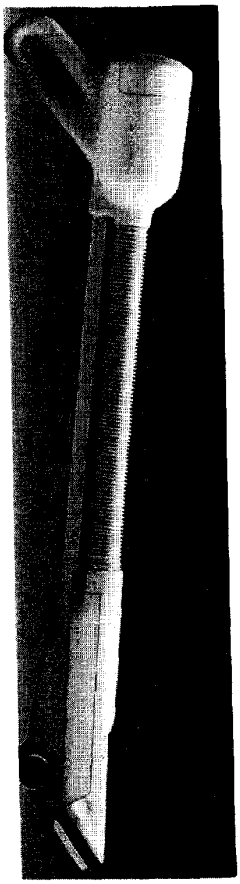
登録 平2(1990) 2月28日

創作者	長松康男	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	石田和男	大阪府門真市大字門真1006番地　松下電器産業株式会社内
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創作者	日高正隆	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	坂本英明	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	角裕之	大阪府門真市大字門真1006番地　松下電器産業株式会社内
意匠権者	松下電器産業株式会社	大阪府門真市大字門真1006番地
代理人	弁理士 粟野重孝	外1名
審査官	鍋田和宣	

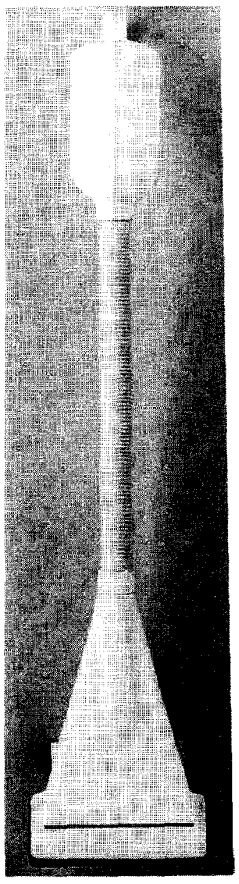
意匠に係る物品　電気掃除機

この意匠は図面代用写真によつて表わされたものであるから細部については原本を参照されたい

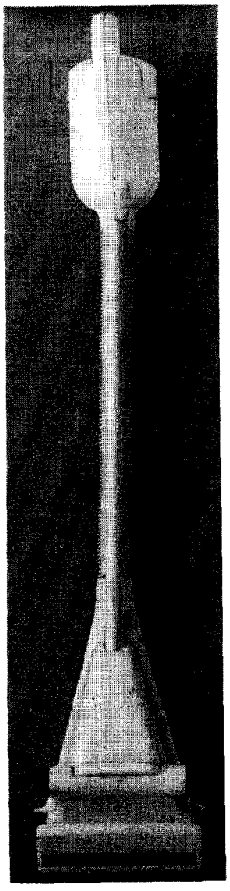
左側面図



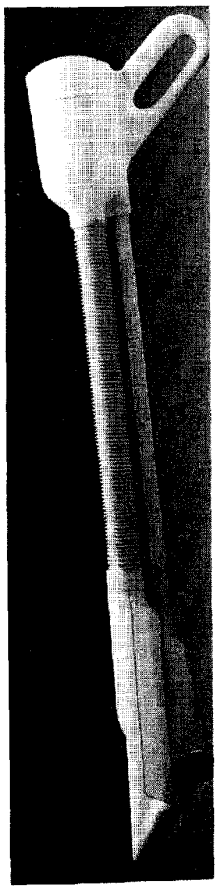
正面図



背面図



右側面図

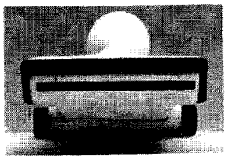


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Page 143

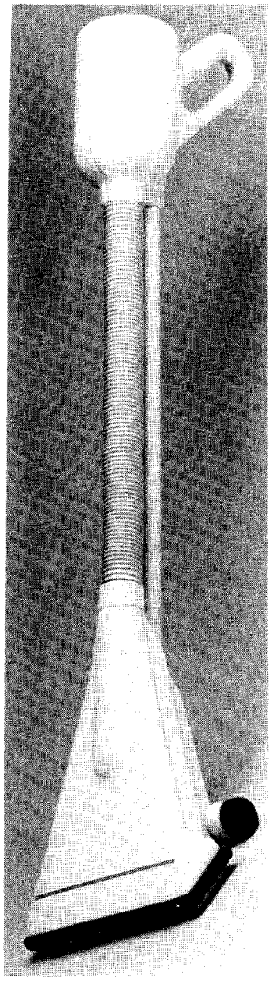
平面図



底面図



斜視図



Dyson Ex1004
Page 144

Intellectual Property Office

Designs Full Details

REGISTER ENTRY FOR DESIGN NUMBER 3017095

Date of Application. 27th April 2004

Priority date claimed 8th December 2003

Date as of which design registered 27th April 2004

View image(s)

Certificate of registration granted 19th May 2004

Design Expired 27th April 2009

Product in respect of which design registered:
'Vacuum cleaner '

Edition	Pri. Class'n	First Duplicate	Second Duplicate	Third Duplicate
07 At Issue	15-05 01B			

Name(s) and Address(es) of Proprietor(s):
ADP NUMBER: 00046919002

Rowenta France
Chemin Du Virolet
27200 Vernon
FRANCE

Address for Service
ADP NUMBER: 00000016002

Dehns
St. Bride's House
10 Salisbury Square
London
EC4Y 8JD

20th May 2005
Classification amended

27th April 2009
Period of Protection Expired.

** END OF REGISTER DETAILS **

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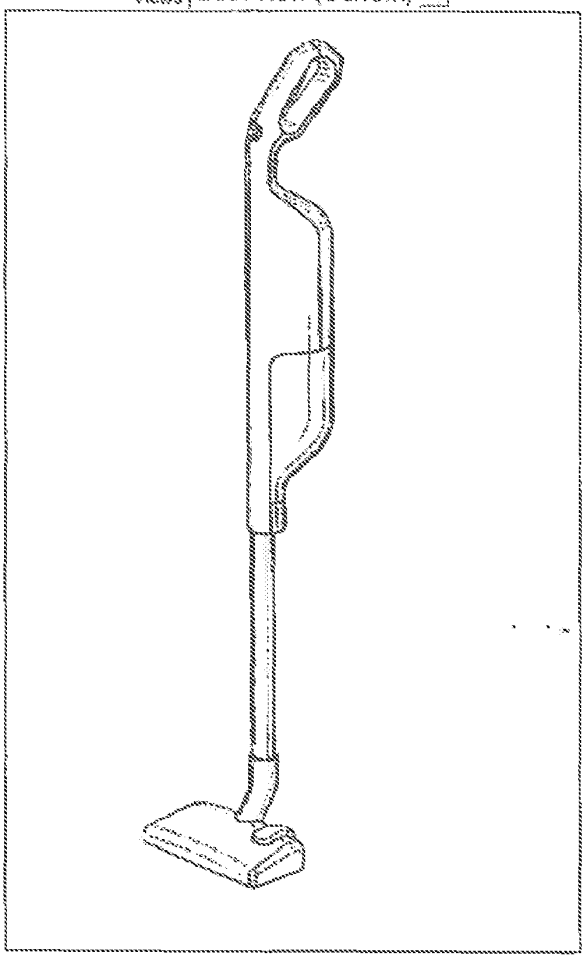
Intellectual Property Office is an operating name of the Patent Office

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Design # 3017095

Hint: Press Ctrl-P to Print

Views Best View (Current)

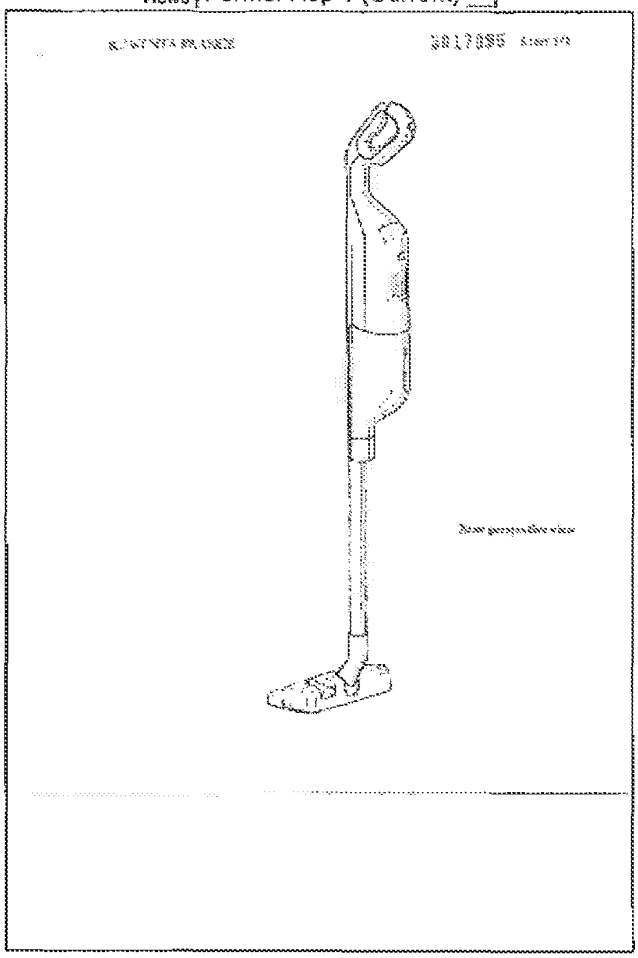


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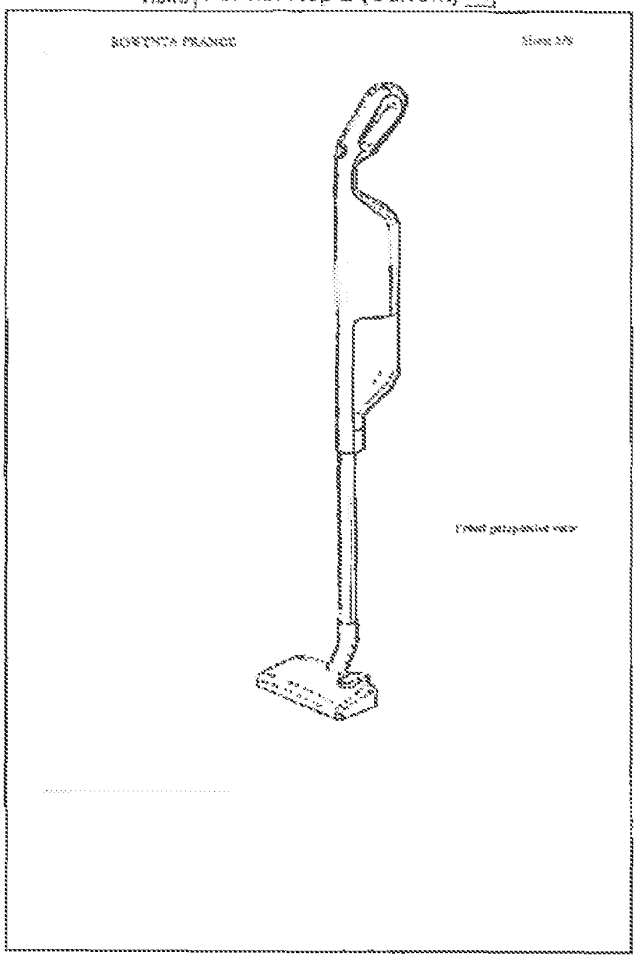


close

Design # 3017095

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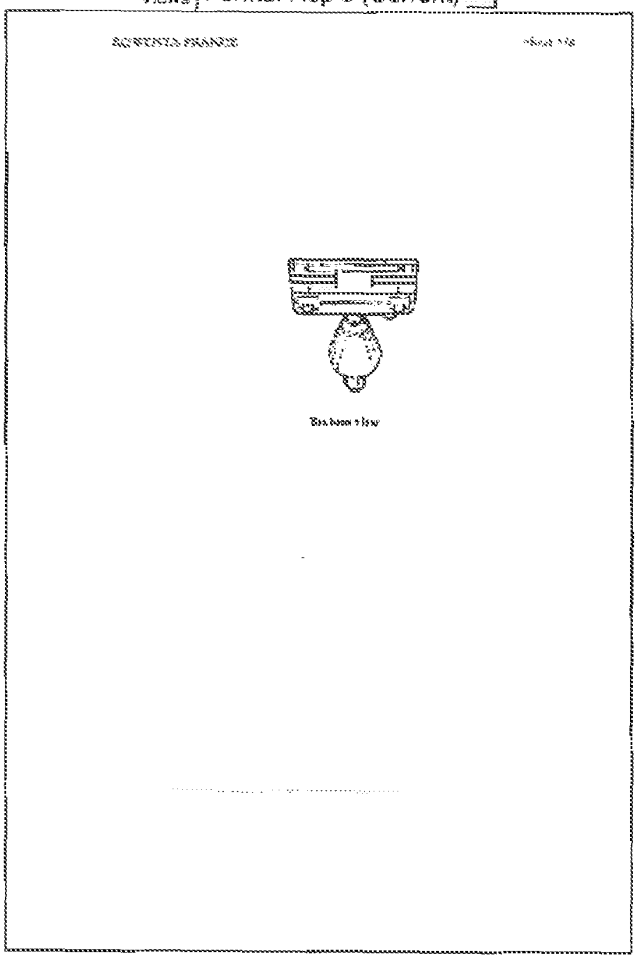


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Design # 3017095

Hint: Press Ctrl-P to Print

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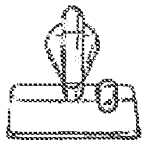


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Design # 3017095

Hint: Press Ctrl-P to Print

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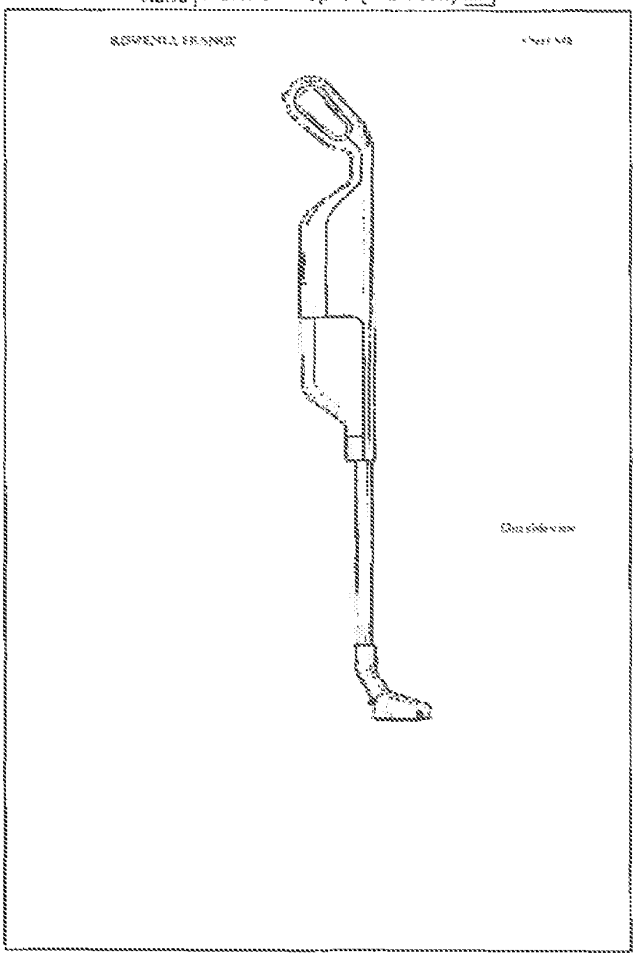


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Design # 3017095

Hint: Press Ctrl-P to Print

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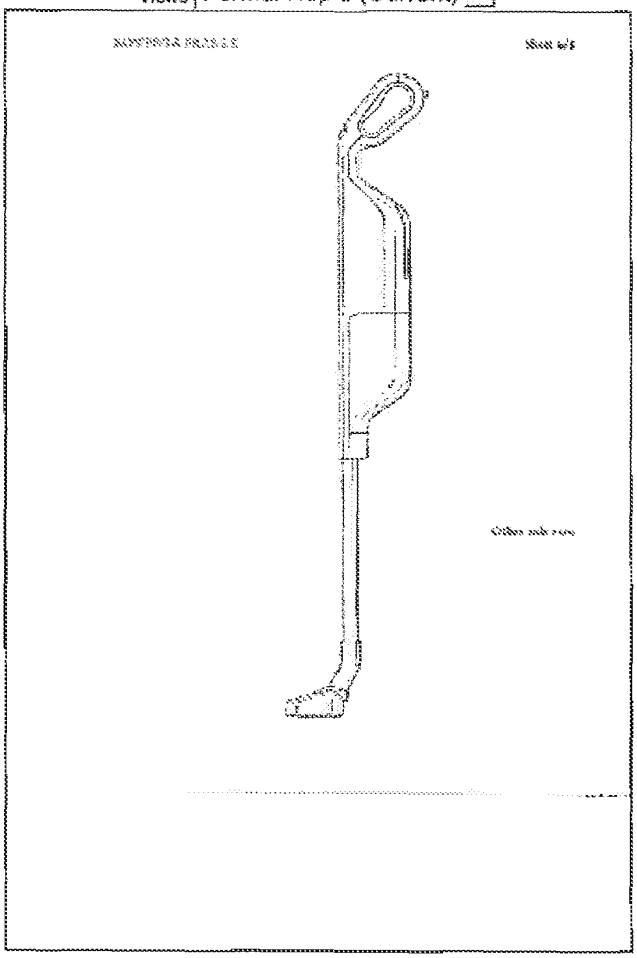


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Design # 3017095

Hint: Press Ctrl-P to Print

Views Formal Rep 6 (Current)

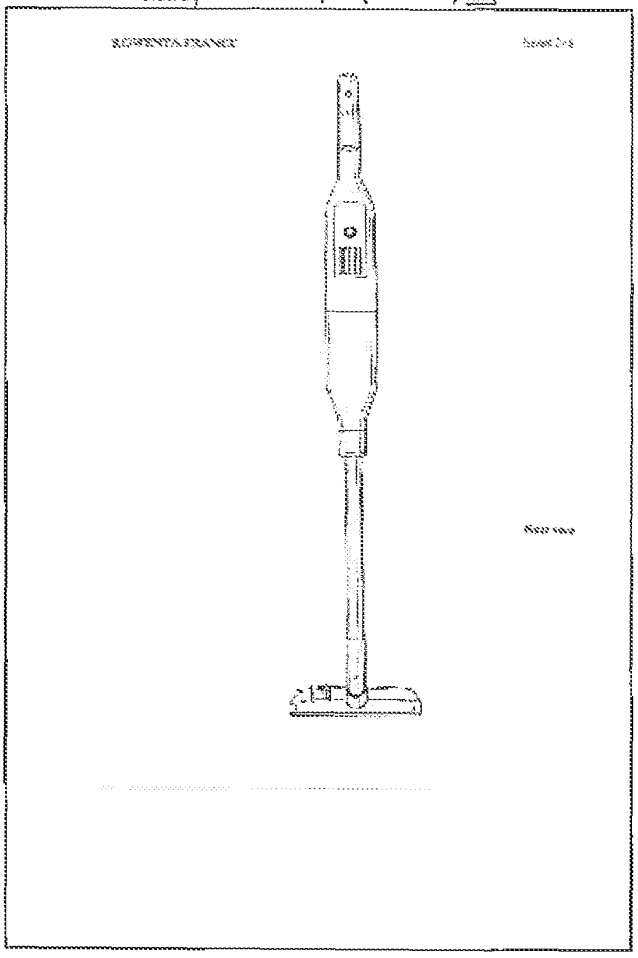


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Design # 3017095

Hint: Press Ctrl-P to Print

Views Formal Rep 7 (Current)

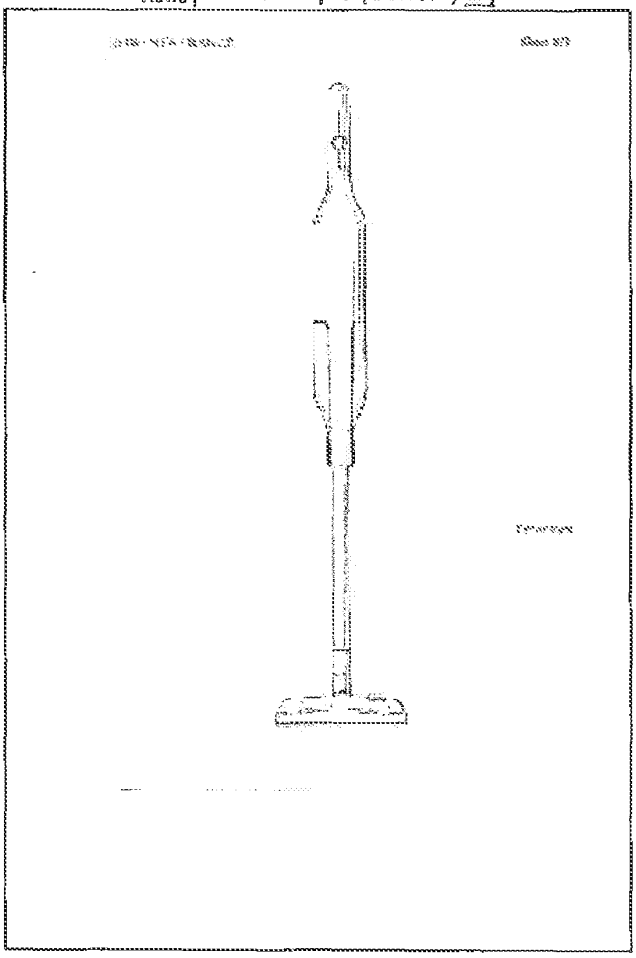


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Design # 3017095

Hint: Press Ctrl-P to Print

Views Formal Rep 8 (Current)



English Abstract of D1: JP-A-64-15020

Patent

Public Laid-open Disclosure No.: 64-15020

Public Laid-open Disclosure Date: January 19, 1989

Application No.: 62-171022

Filing Date: July 10, 1987

Title of Invention: VACUUM CLEANER

Applicant: HITACHI LTD

The present invention relates to a vacuum cleaner which can perform cleanup with the extension pipe and a suction inlet connected to a vacuum cleaner body. The present invention is to provide a vacuum cleaner which can prevent the wall or pillar from damaging by a plug of a power supply cord.

A vacuum cleaner according to the present invention comprises a body case 1, a dust collection lid 2, an extension pipe 3, a paper filter 5 in the dust collector, a motor-driven fan 6, a cord reel 7, and a handle 9.

⑲日本国特許庁（JP）　⑪特許出願公開

⑫公開特許公報（A）　昭64－15020

⑤1Int.Cl.⁴	識別記号	庁内整理番号	④3公開　昭和64年(1989)1月19日
A 47 L 5/24		Z－8206－3B	

審査請求　未請求　発明の数 1　（全3頁）

⑤4発明の名称　電気掃除機

⑳特　願　昭62－171022
㉒出　願　昭62(1987)7月10日

⑦2発明者　桜井　英俊　茨城県日立市東多賀町1丁目1番1号　株式会社日立製作所多賀工場内
⑦1出願人　株式会社日立製作所　東京都千代田区神田駿河台4丁目6番地
⑦4代理人　弁理士　小川　勝男　外2名

明　細　書

1．発明の名称

電気掃除機

2．特許請求の範囲

1．一端より集じん部，電気送風機，コードリールを略直列に内蔵する本体ケースと，該本体ケースのコードリール側後端部より一体的に略U字状のハンドルを設けたものにおいて，前記本体ケースの略中央下部に受部を設け，前記ハンドル下端部に壁かけ用の係止穴を設けるとともに，前記ハンドルの下端部を本体ケース下面よりも突出させたことを特徴とする電気掃除機．

3．発明の詳細な説明

〔従来の技術〕

本発明は電気掃除機に係り，取扱性，安全性にすぐれた，ほうき形掃除機に関する．

〔従来の技術〕

従来，掃除機本体に延長管，吸口を接続した状態で掃除が可能な，ほうき形掃除機においては，収納時，壁や柱などにフックを設け，これに引掛けることができ，場所をとらず便利である．しかしながら，その際に電源コードの処理が問題であり，特開昭61－76119 などに見られるように，電源コードを本体に設けた引掛け部に巻きつけたり，あるいは，コードリール式として電源コードを収納する方法がある．

〔発明が解決しようとする問題点〕

上記従来技術のうち，前者は，電源コードを本体に巻き付けた際，プラグの刃先が露出しており収納時に，壁や柱の表面を傷付けることがある．

一方，コードリール式の場合は，掃除の際の操作性の関係で掃除機本体の後下部にコード口を設けているが，コードの引出しのためには，ある程度プラグを露出させておかなければならないため，前者と同様に傷付きの問題があった．

本発明の目的は，上記問題点を解決し，取扱性，安全性にすぐれた電気掃除機を提供することにある．

〔問題点を解決するための手段〕

上記目的は，一端より集じん部，電動送風機，

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コードリールを略直列に内蔵する本体ケースと、該本体ケースのコードリール側後端部より一体的に略U字状のハンドルを設けたものにおいて、本体ケースの略中央部に受部を設け、前記ハンドル下部に壁掛け用の係止部を設けるとともに、前記ハンドルの下端部を本体ケース下面より突出させることにより達成される。

〔作用〕

本体ケースのコードリール側後端部より一体的に設けた略U字状のハンドルの下端部が本体ケース下面よりも突出しており、さらにこの部分に係止部があるため、壁に本体を引掛けた際、本体ケース略中央部の受部と、ハンドルの下端部とが壁面に接触し、本体ケースのコードリール部を、壁面より離した位置に保持されるので、万一プラグが本体ケースより飛び出していても、プラグの刃先が壁に当接せず、傷付きが無い。

〔実施例〕

以下、本発明の一実施例を図面を用いて説明すると、第１図において、１は本体ケースであり、左右二分割されたケース１ａおよび１ｂとを合せネジにて構成されている。２は、集じん部蓋体であり、蓋体２の一端には、延長管３との接続部４があり、集じん部内の袋状の紙フイルター５の内部と連通させている。６は電動送風機、７はコードリールであり、前記三者が直列に配置されている。本体ケース１のほぼ中央には、ケースと一体に、平面状の突出した受部８がある。一方、本体ケース１の後端部にはU字状のハンドル９が一体的に設けてあり、さらに本体ケース１の中心軸よりも傾斜させ、ハンドル９の下端部が、本体ケース１の下面よりも外側に出るようにしている。１０はコードリール操作ボタン、１１は本体スイッチ、１２は排気口、１３は集じん部蓋体２の蓋閉閉クランプ、１５はフック、１４は引掛け部穴で、フック１５は壁面１６に固定されている。

第２図は、第１図におけるＡＡ′断面（コードリール７の断面）において、１７はプラグ、１８はプラグ刃、１９はコード線、２０は、コード出入口、２１はプラグ１７を、本体ケース１内に収納する収納ガイドである。さらに第３図において、２７は床用の吸口である。

以上の構成において、動作を説明すると、掃除を始める際は、コードを引出して、ハンドル９を持ち、プラグ１７を持ち引出し、コンセントに入れた後、掃除に使用する。掃除終了後は、コードリール操作ボタン１０を押し、巻き込む。保管する場合は、ハンドル９の引掛け部穴１４に、フック１５を引掛けて収納するが、その際に、受部８と、ハンドル９の先端部間の本体ケース１は壁面より離させられるので、コード出入口２０より、プラグ１７が多少飛び出していても、直接傷付けることがない。

ゆえに、本実施例によれば、安全性が高く、取扱性が良い。

また、壁に引掛けて保管する際に、受部とハンドルにより、延長管３および床用吸口を壁面に近づけることができるので、保管状態において、床用吸口や延長管に、手足が引掛りつまづく恐れがない。等、主として安全性を特に高めることが可能である。

〔発明の効果〕

したがつて本発明によれば、収納時に、壁面などへの傷付きを防止し、取扱性，安全性にすぐれた電気掃除機を提供することができる。

４．図面の簡単な説明

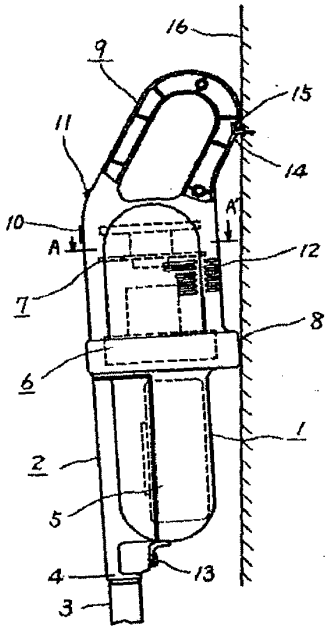
第１図は、本発明の一実施例の掃除機の保管状態を示す側面図、第２図は、第１図のＡ－Ａ′断面図、第３図は全体斜視図である。

１…本体ケース、７…コードリール、９…ハンドル、８…受部、１４…係止部。

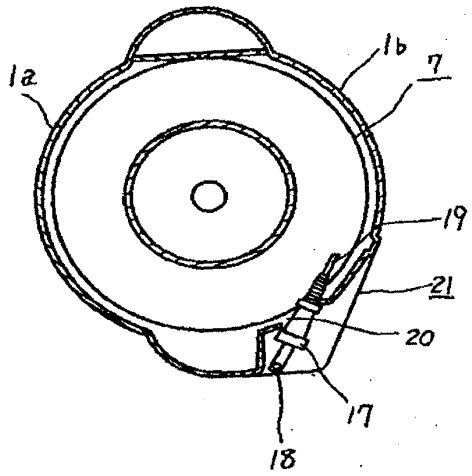
代理人　弁理士　小川勝男

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Page 157

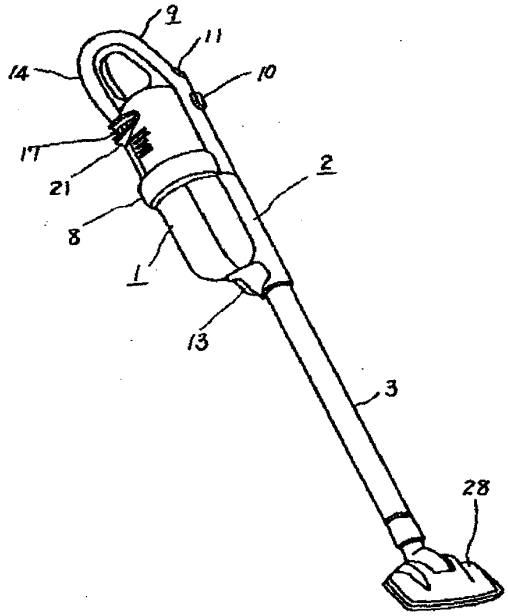
第 1 図


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第 2 図


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1b
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第 3 図


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Japan Patent Office (11) Design registration number

(45) Issued 1 November 1988 (12) Design Gazette (S) 943287

(52) C3-419

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(21) Design Application: H6-5019 (22) Application date: 28 February 1994
(24) Registered: 25 October 1995

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(73) Design right holder: Toshiba Corporation, 72 Horikawa-cho, Saiwa-ku, Kawasaki, Kanagawa

(73) Design right holder: Tec Co. Ltd., 570 Ohito, Ohito-machi, Tagata-gun, Shizuoka

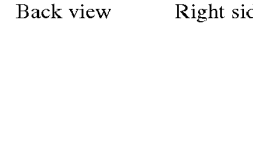
(74) Attorney: TSUCHIYA Yutaka, Patent Attorney, and one other
Examiner: IKIGAME Terue

(54) Designed product: Floor brush with dust container for vacuum cleaner

(55) Description: The left side view is symmetrical with the right side view

Perspective view

Front view



Back view

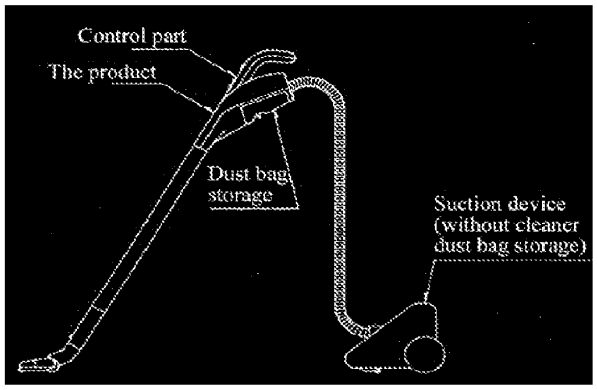
Right side view

Plan view

Bottom view

Enlarged sectional view A-A′
without internal mechanism

View during use, for reference



(19)日本国特許庁　　(11)登録意匠番号

(45)平成8年(1996)1月11日発行　　(12)意匠公報(S)　　943287

(52)C3-419

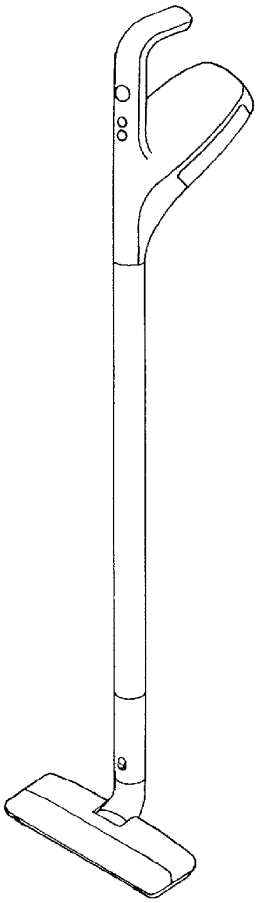
(21)意願 平6−5019　　(22)出願 平6(1994)2月28日
(24)登録 平7(1995)10月25日

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(74)代理人　弁理士　土屋　豊
審査官　生亀　照恵

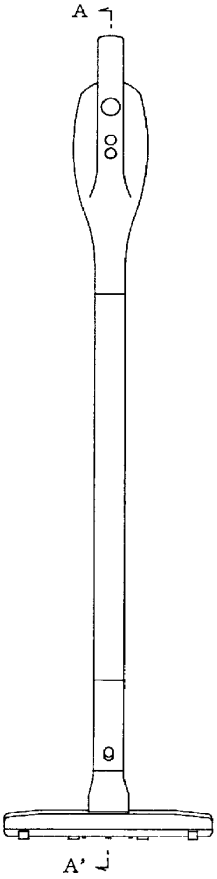
(54)意匠に係る物品　電気掃除機用ごみ収納器付床ブラシ

(55)説明　左側面図は右側面図と対称にあらわれる。

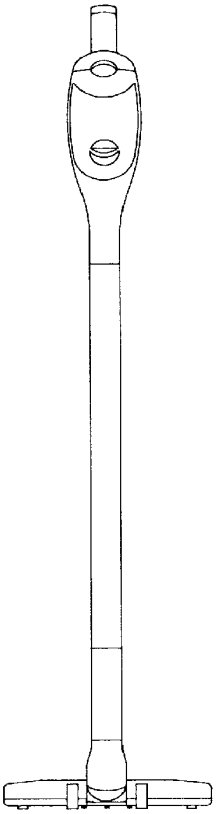
斜視図



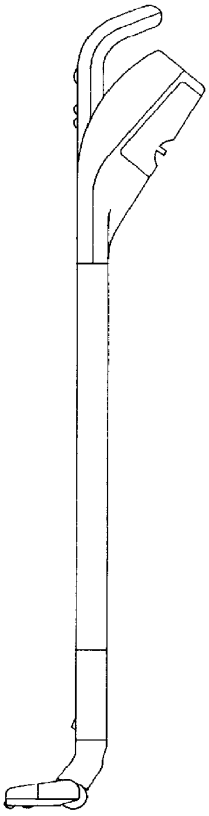
正面図



背面図

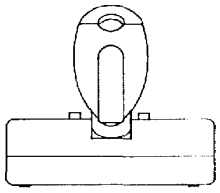


右側面図

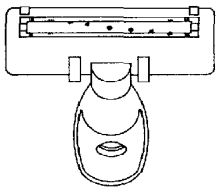


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Page 161

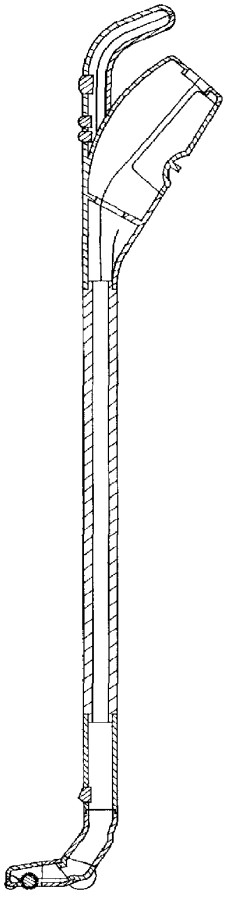
平 面 図



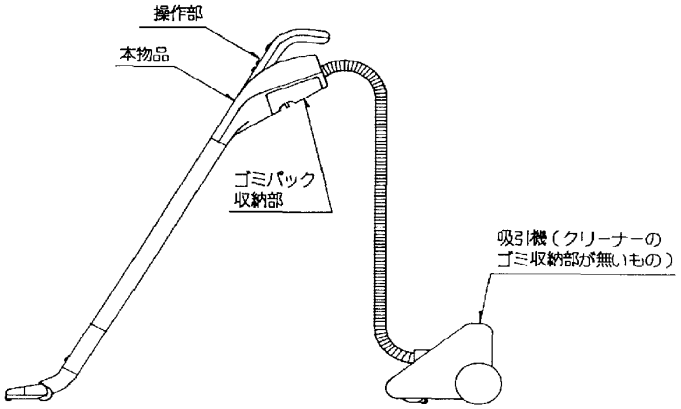
底 面 図



内部機構を省略した
Ａ－Ａ’拡大断面図



使用状態を示す参考図



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Page 162

(12) UK Patent Application (19) GB (11) 2 377 880 (13) A

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(51) INT CL[7]
A47L 5/26 5/00

(52) UK CL (Edition V)
A4F FSCW FSSB

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US 4766638 A
WPI Abstract Accession No. 1998-514005 & JP10225403
www.ewbank.co.uk/latest_news : Daily Mail reviews Ewbank"123" 31/05/2001

(58) Field of Search
UK CL (Edition S) A4F
INT CL[7] A47L 5/00 5/24 5/26 9/00
Other: Online:WPI, EPODOC, PAJ

(54) Abstract Title
Multi-operational battery powered vacuum cleaner

(57) A battery powered vacuum cleaner 1 comprising a hand held vacuum cleaner 1 releasably mounted within a caddy 15 which has a detachable handle 51 and a floor engaging head 19 may be used in three different modes. The hand held unit 1 may be released from the caddy to be used in a first hand held operation, it may alternatively be mounted within the caddy with the handle attached for use as an upright vacuum cleaner, whilst in a third mode the handle 51 may be removed from the caddy while the hand held unit remains mounted in the caddy to provide a compact vacuum cleaner system with a floor engaging head 19. The cleaner further comprises a first spring biased latch member 27 mounted within the caddy 15 to releasably restrain the hand held unit therein, together with a second latch member (53) mounted within the handle 57 for releasably connecting the handle to the caddy 15. The second latch member (53) is released by sliding button 55.

The floor engaging head 19 is pivotally connected to the support caddy 15 and comprises a rotatable brush powered by the battery of the hand held unit 1. Attachment tools may be stored in a tool holding assembly (81) in the upper handle portion 51.

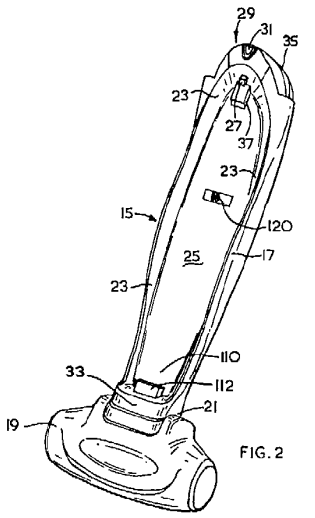


FIG. 2

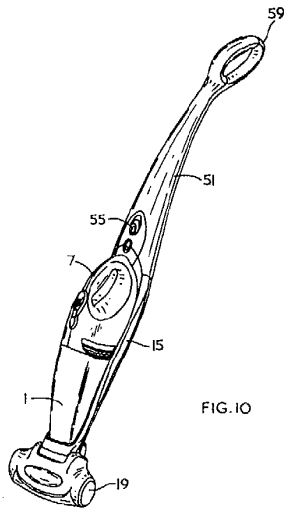


FIG. 10

GB 2 377 880 A

At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

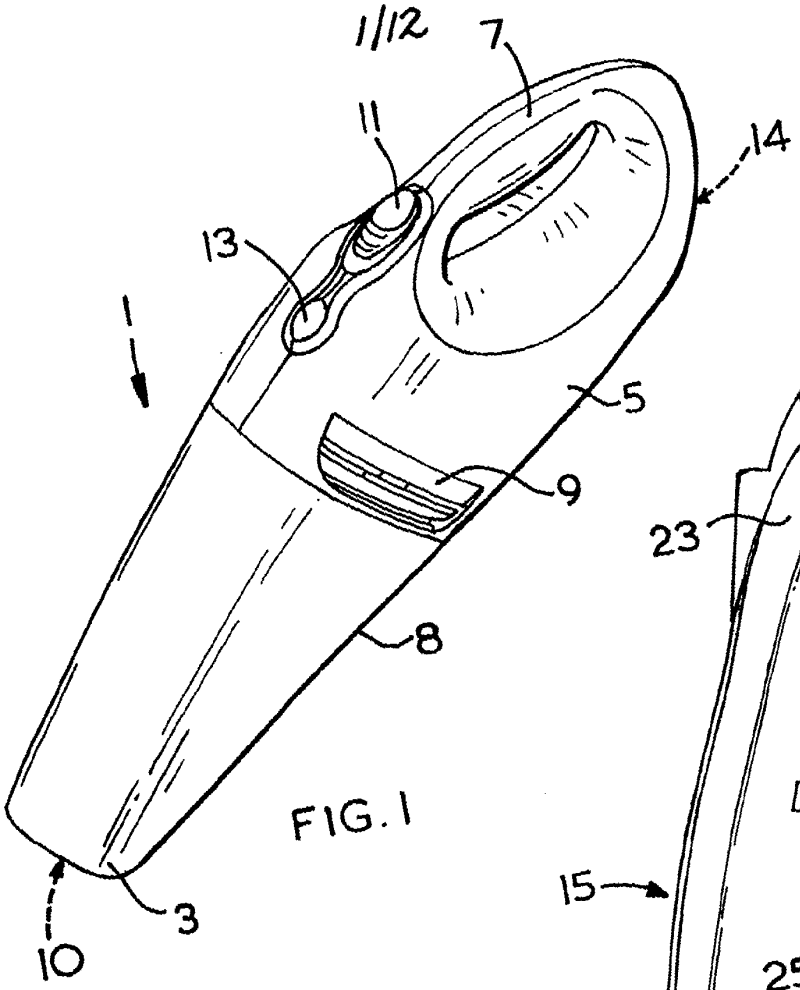

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FIG. 1

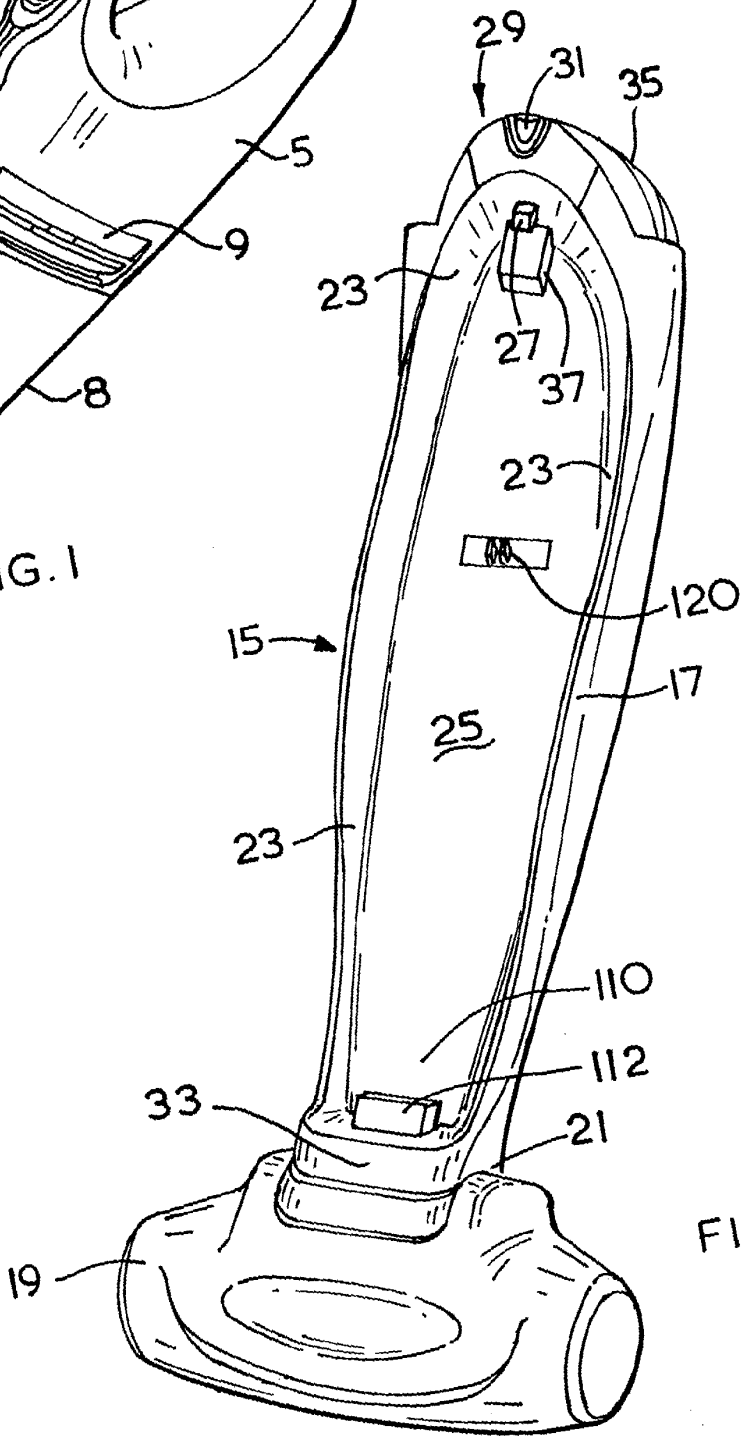

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FIG. 2

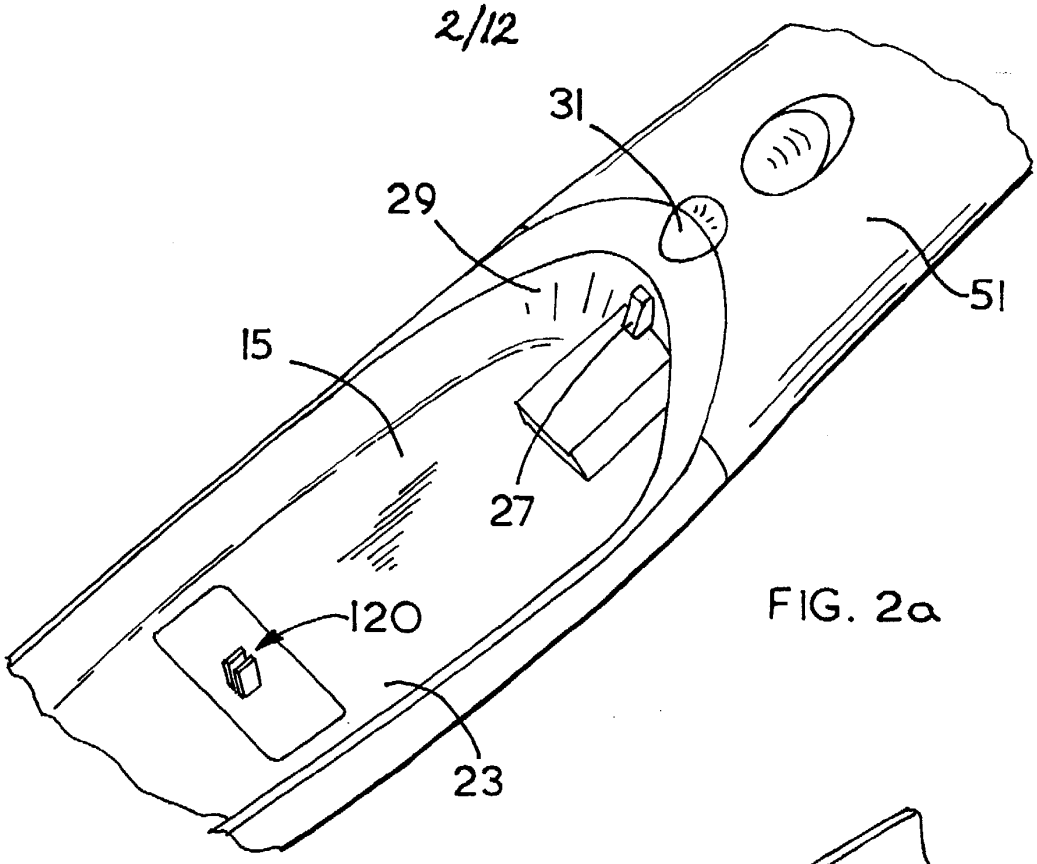


FIG. 2a

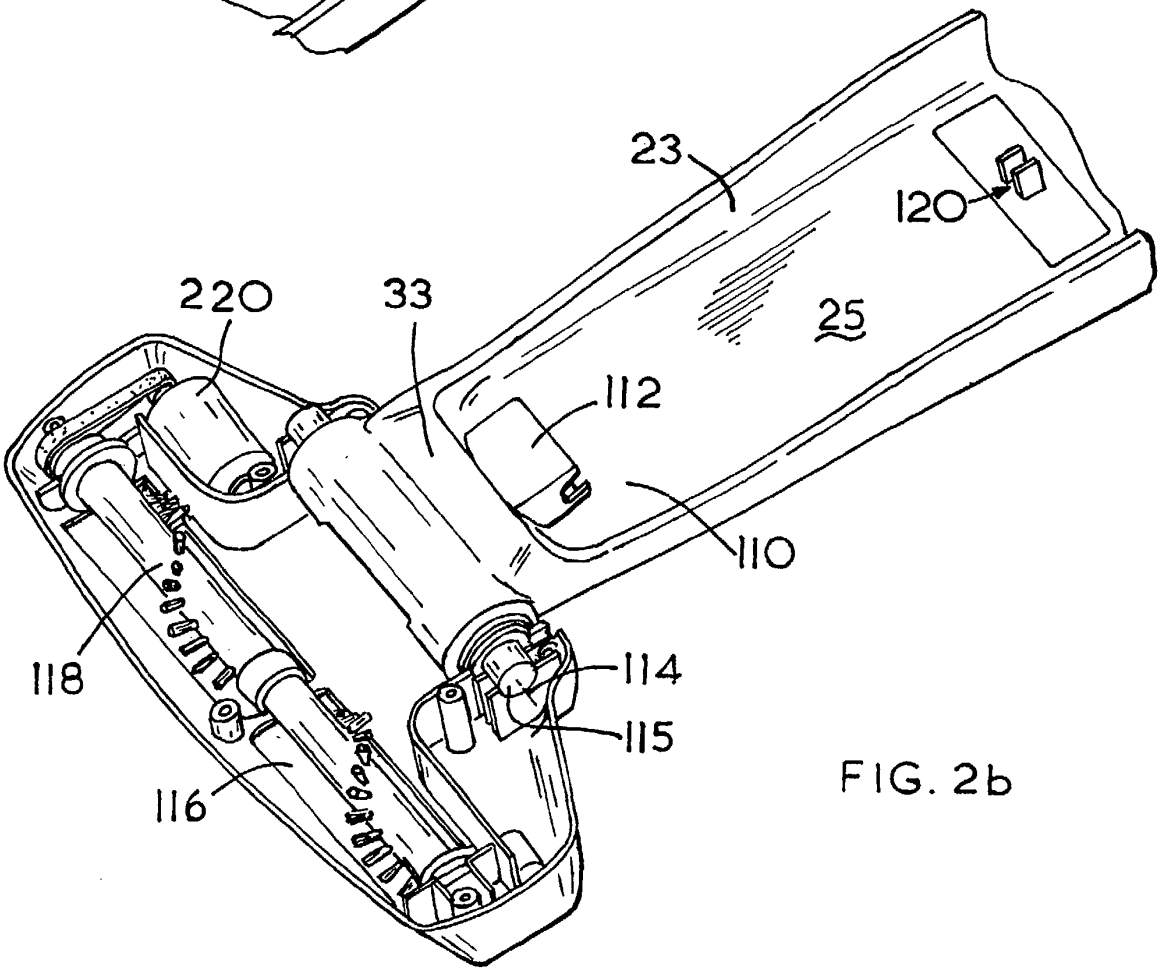


FIG. 2b

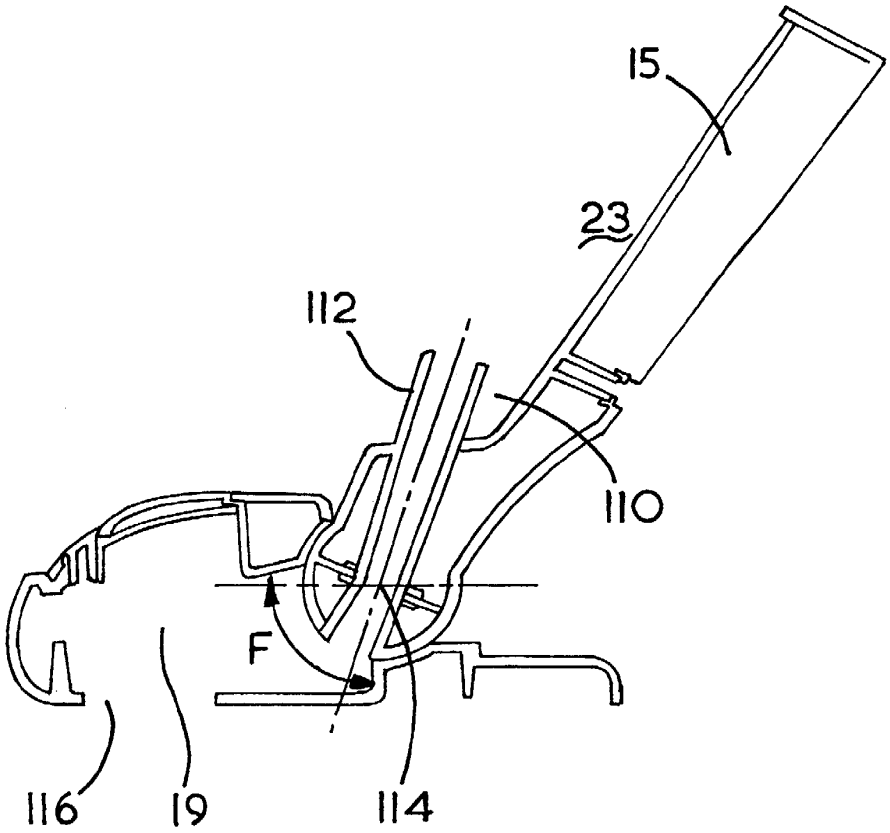


FIG. 2c

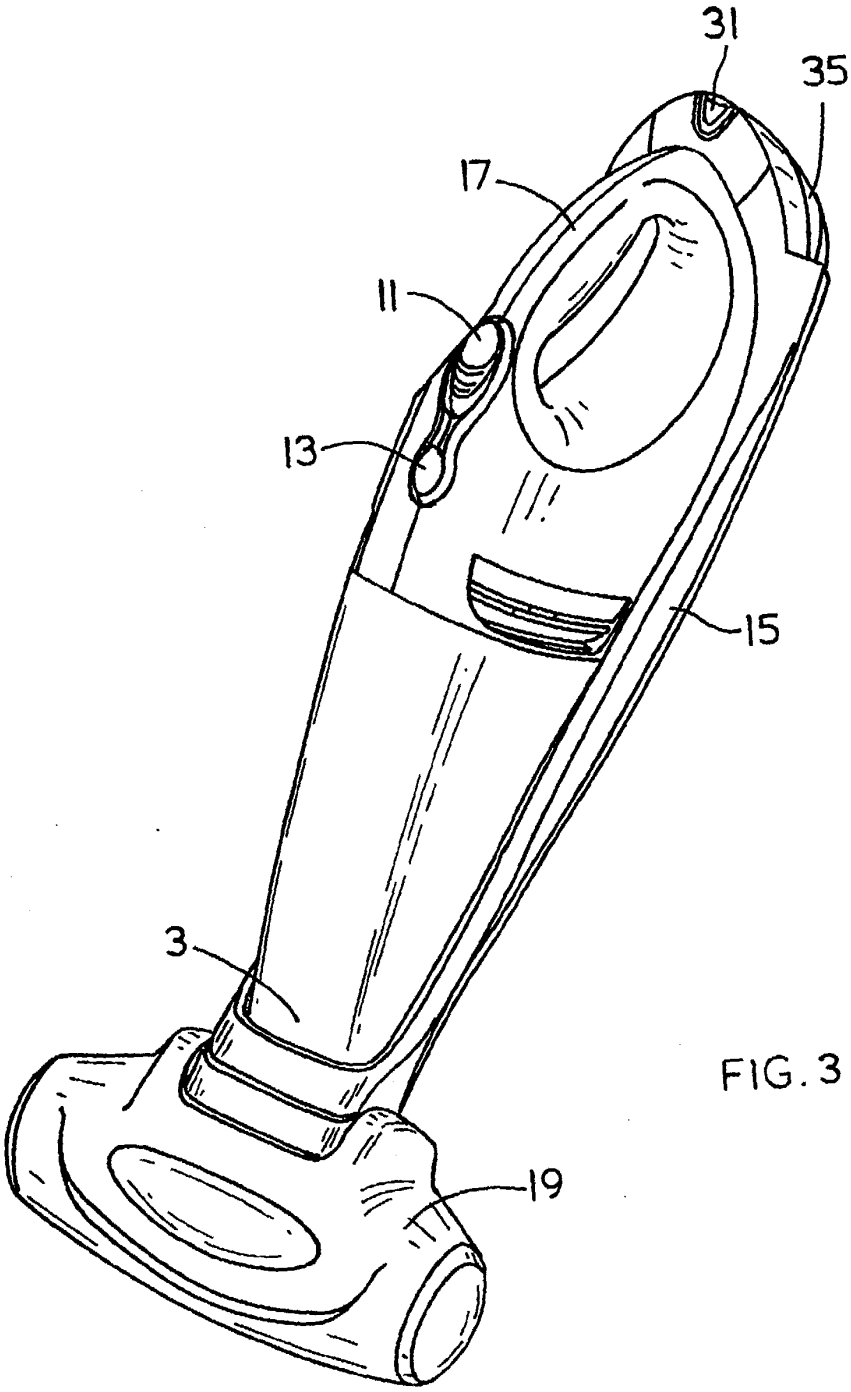


FIG. 3

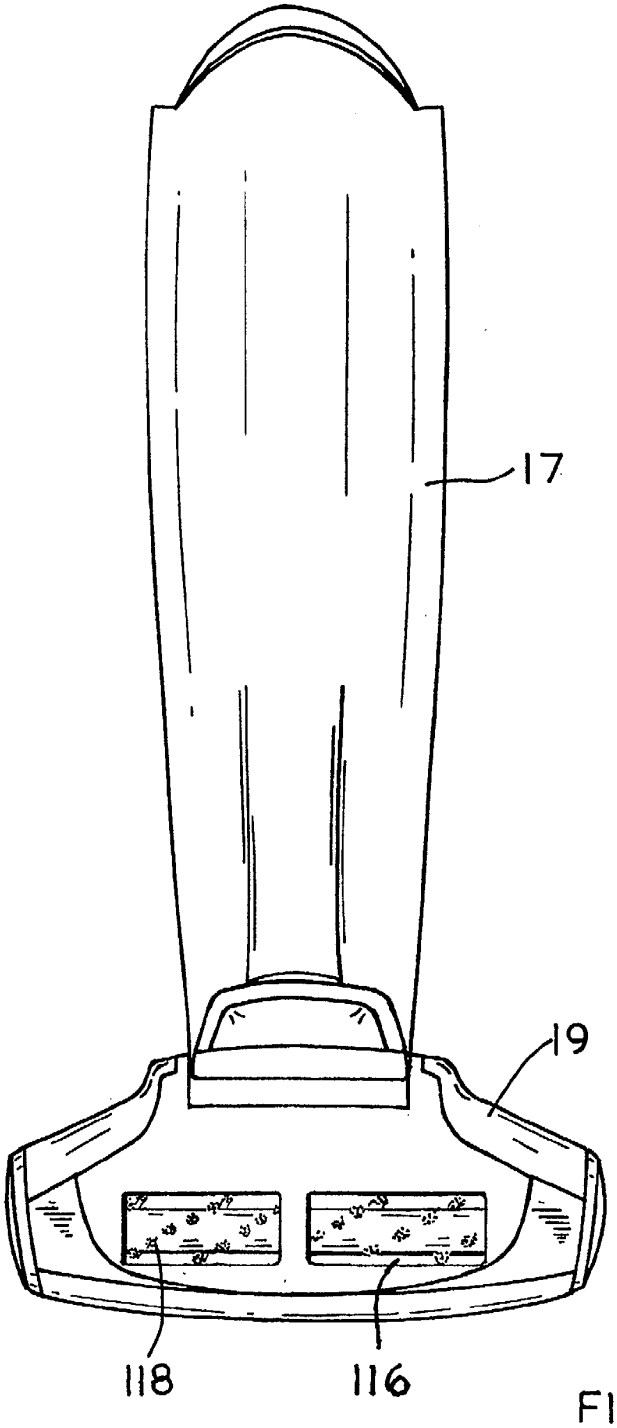


FIG. 4

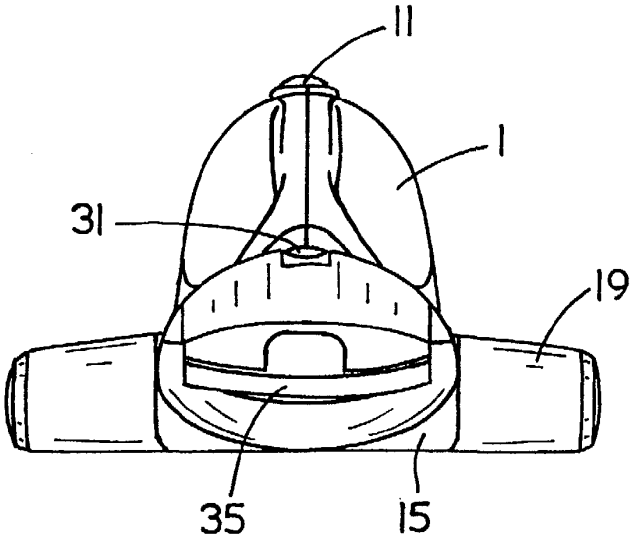


FIG. 5

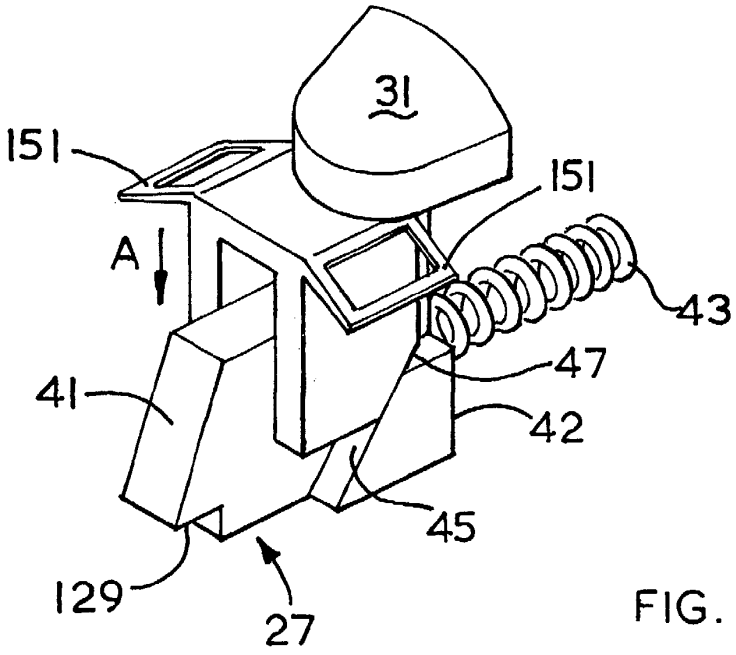


FIG. 6

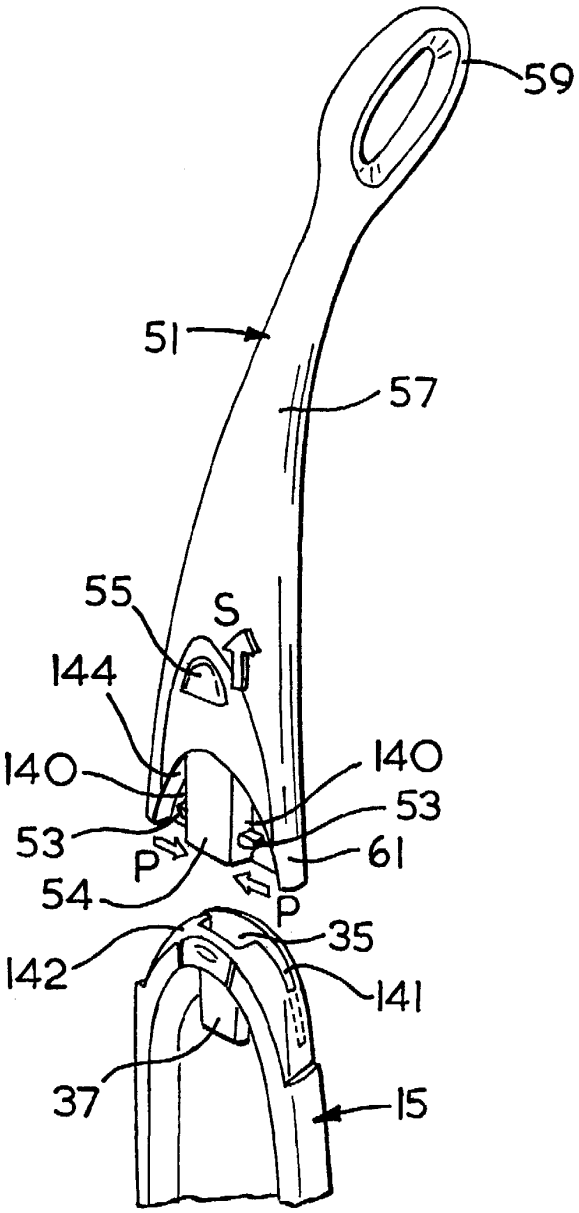

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FIG.7

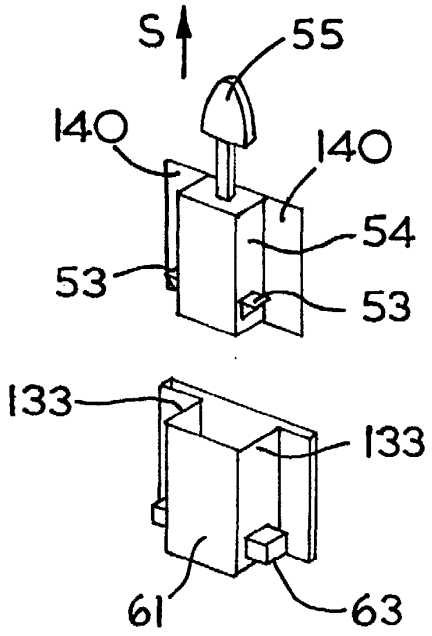

S
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FIG.8

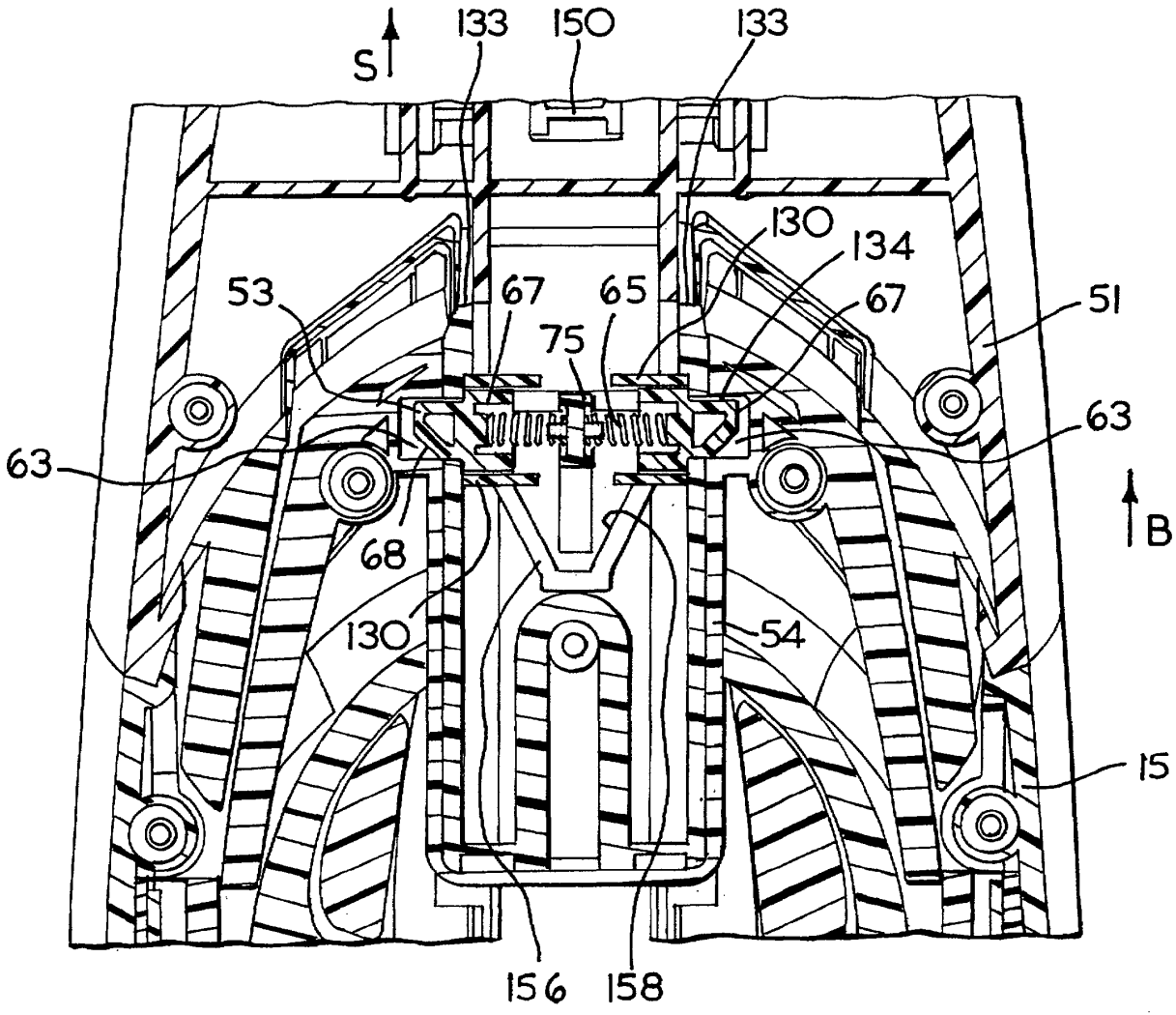
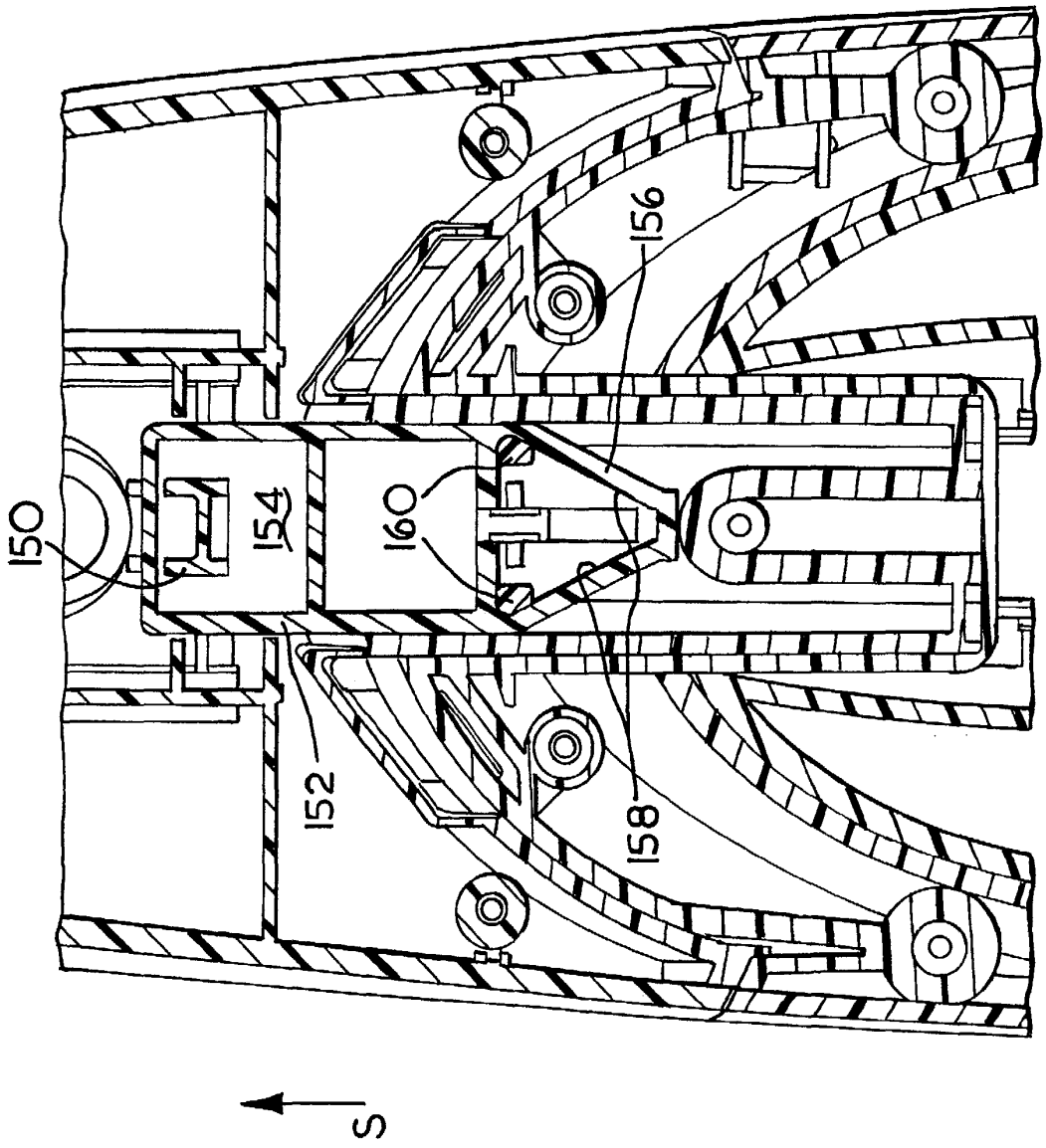


FIG. 9

8/12

FIG. 9a



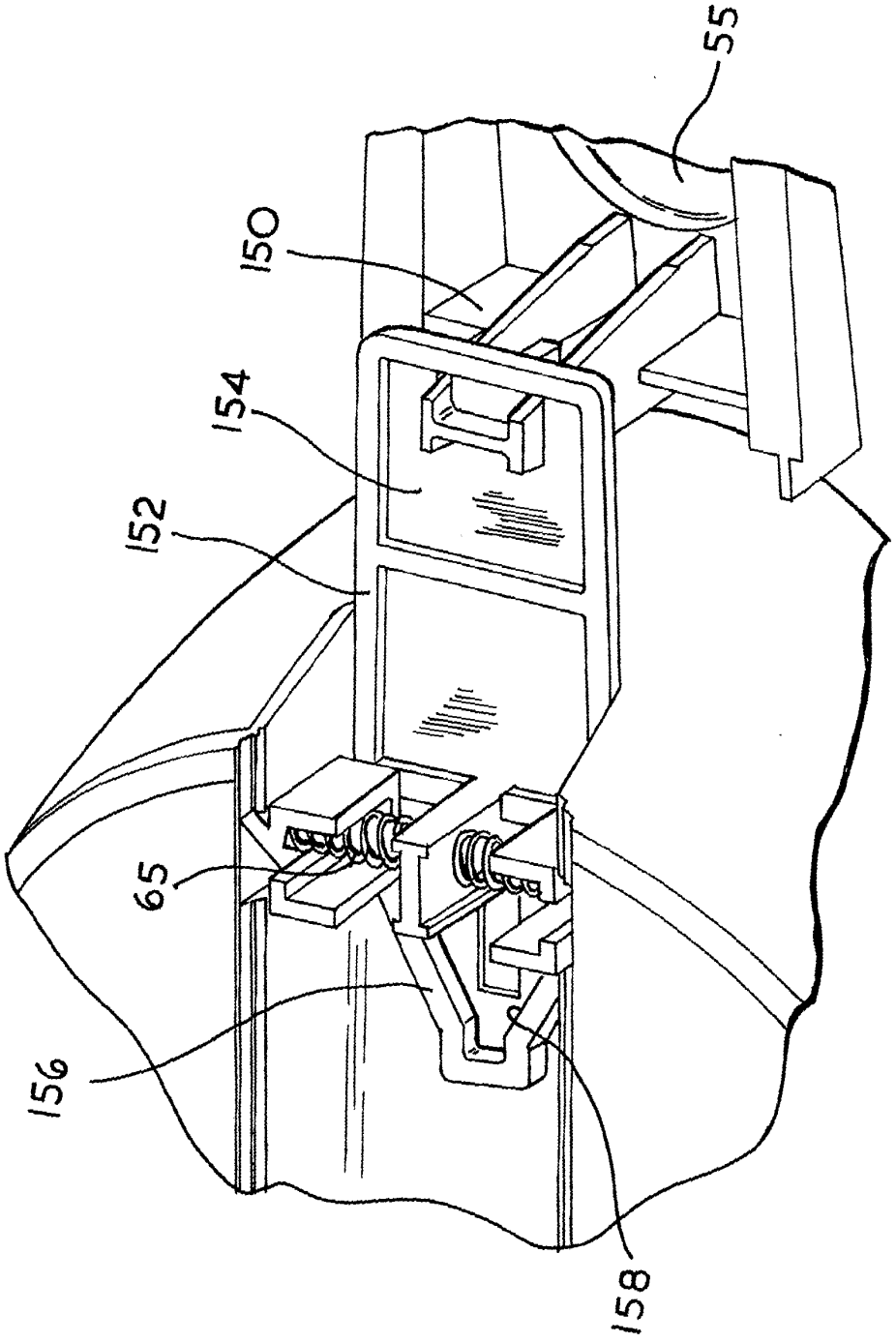


FIG. 9b

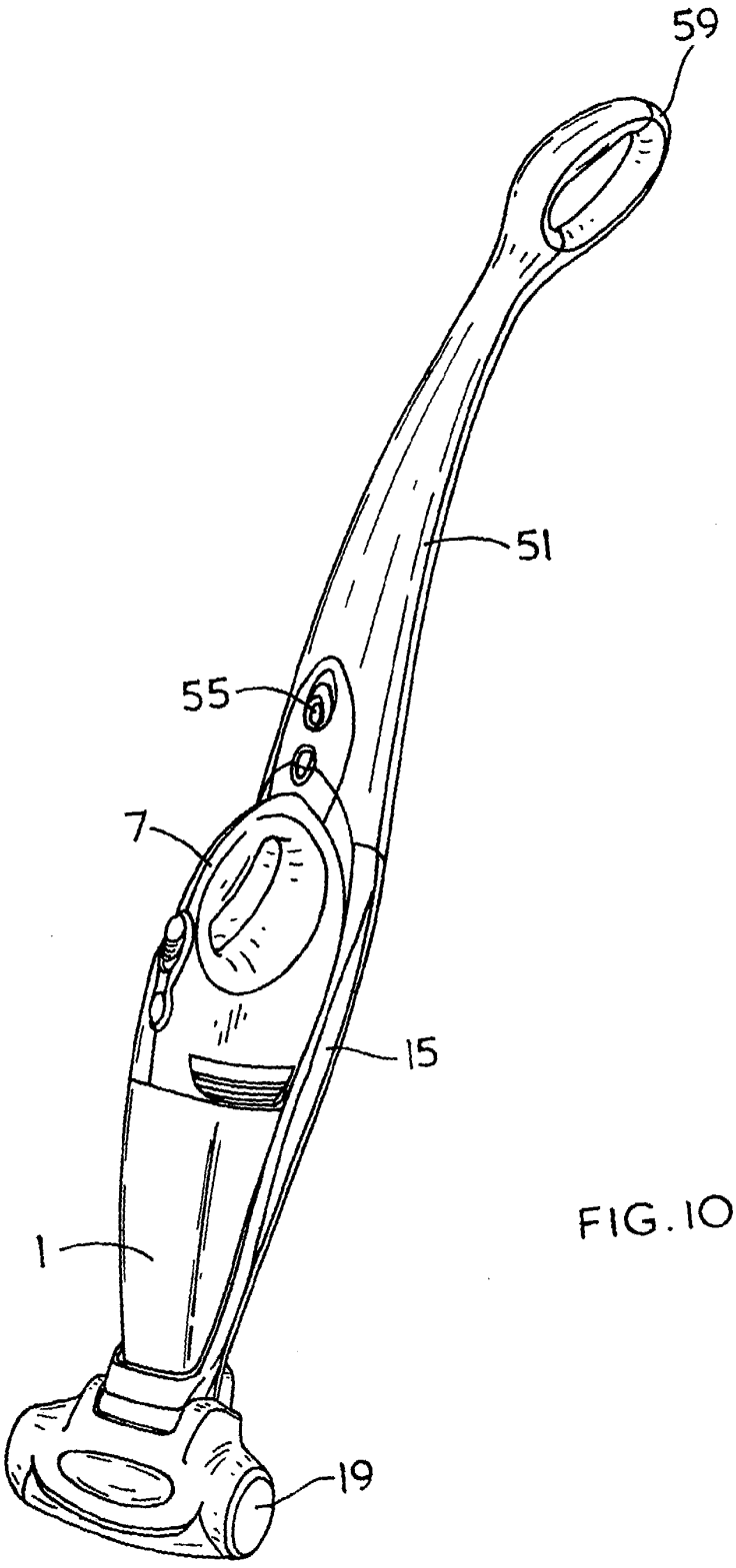


FIG. 10

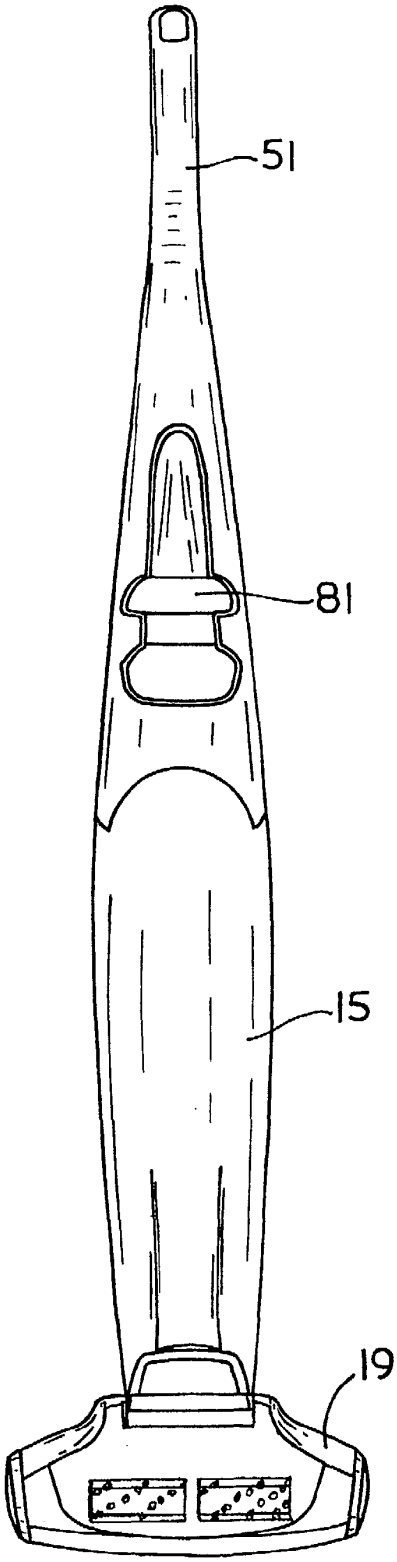


FIG. 11

MULTI-OPERATIONAL BATTERY POWERED VACUUM CLEANER

This invention relates to a battery powered hand-held vacuum cleaner, and in particular to such a vacuum cleaner used in combination with other component parts to provide a multi-operational vacuum cleaner.

A typical known battery powered hand-held vacuum cleaner is described in EP-A-1070478. It comprises a generally conical nosepiece containing the air flow inlet at its tip and the dust collection module, a main housing portion behind the nosepiece containing the fan, motor and rechargeable battery pack, and an integrally moulded handle on its upper surface. The vacuum cleaner is typically wall mounted when not in use on a recharging mount so that the cleaner is perpetually in a state of high battery charge. The cleaner is hand-held and relatively small, and is typically used for collecting small amounts of dust or debris. Its small size and hand-held nature mean it is particularly useful for collecting dust or debris from raised or difficult to access locations. For normal floor use the operator must bend to place the cleaner in contact with the floor, and for floor cleaning use of an upright vacuum cleaner may be a more suitable choice.

Typically upright vacuum cleaners comprise a floor travelling head comprising an air inlet and a rotating brush which dislodges dust or debris, the brush usually being positioned in or close to the air inlet. In upright vacuum cleaners the functional components such as the motor, fan and dust collection modules are typically contained either in the floor travelling head, or in an upwardly extending main housing portion. Upright cleaners generally also comprise a handle connected to the floor travelling head or the main housing portion if present, the length of the handle being chosen to allow the operator to move the floor travelling head using the handle from a standing position.

US Patent No. 4,766,638 (BISSEL) discloses A conversion mechanism for a hand-held vacuum cleaner by plugging in a floor engaging head directly into the nozzle of the hand-held cleaner and further attaching an elongate stick handle directly to the handle of such hand-held vacuum cleaner to create an upright vacuum cleaner. However, in such a situation the elongate handle mounted in the cleaner directly creates a high concentration of stress within the handle of the vacuum cleaner, together with the high degree of stress between engagement of the vacuum cleaner

with the floor engaging head. Thus a vacuum cleaner according to this prior art could be subject to damage if undue force is applied to the handle. Attempts to overcome the deficiency of the Bissel invention have been addressed by the Applicant's own product range by the launch of its System 3™ combined hand-held vacuum cleaner and caddy system during the mid 1990s. Such a system involved the use of a caddy with a pivotable floor engaging head for receiving the hand-held vacuum cleaner to convert the hand-held vacuum cleaner into a cleaner with a floor engaging head, and which caddy further accommodated an elongate cylindrical handle mounted within the caddy and which could be extended therefrom. However, the drawbacks of this system involved the necessity of a rather bulky caddy to accommodate the elongate handle when its fitted in a stored position, whereby even in the stored position a portion of the elongate handle remained projecting externally of the caddy thereby increasing the length of the unit which could result in the restriction of where such a unit could be used since the additional length of the projecting handle, even in the stored position, increased the overall length of the caddy mounted hand-held unit making it more bulky and difficult to use in restricted areas. The present invention now seeks to overcome the problems associated with these earlier vacuum cleaner systems.

We have designed a new vacuum cleaner which uses a hand-held vacuum cleaner that is essentially the same in design as known hand-held vacuum cleaners, but which can be used in combination with other component parts so as make the hand-held vacuum cleaner optionally convertible by the user into a different vacuum cleaner for different applications. In particular we have designed a new vacuum cleaner which comprises a hand-held vacuum cleaner and other component parts making it possible to make three different vacuum cleaners from different combinations of the component parts.

The present invention provides a multi-operational battery powered vacuum cleaner comprising:

(a) a hand held vacuum cleaner comprising a nose cone containing an air flow inlet, and a handle;

(b) a support caddy comprising a support member to which the hand held vacuum cleaner can be detachably secured, and a floor cleaning head attached to the support member; and

(c) an upper handle portion that can be detachably secured to the support caddy;

wherein the vacuum cleaner can operate: (i) in a first mode as a hand-held vacuum cleaner alone; (ii) in a second mode with the hand-held vacuum cleaner secured to the support caddy; or (iii) in a third mode as (ii) additionally with the upper handle portion secured.

As mentioned briefly above the present invention therefore advantageously allows the operator to choose which component parts to put together so that three vacuum cleaners can be made, the selection depending on the application. The present invention therefore provides three vacuum cleaners in one. First the operator can choose to use the vacuum cleaner as a hand held vacuum cleaner alone. This would be suitable for example for picking up small amounts of dust or debris or in awkward to reach locations. Secondly the operator can choose to use the vacuum cleaner as a short handled vacuum cleaner with a traditional floor cleaning head, with the hand held vacuum cleaner attached to the caddy. The arrangement is preferably such that air flow passes through the floor cleaning head and into nose cone of hand held vacuum cleaner. Selection of this mode of operation may be useful, for example, for removal of larger amounts of dust or debris on raised surfaces, or on stairs or the like. Thirdly the operator may choose to secure the upper handle portion thereby effectively creating an upright vacuum cleaner, with a floor cleaning head, which can be used by the operator in a standing position. All three modes of operation of vacuum cleaner are advantageously powered by the hand-held vacuum cleaner component, and the dust or debris is collected within the dust collection module of the hand-held vacuum cleaner component.

Preferably for ease of operation the floor cleaning head is pivotally connected to the support member of the support caddy. The support member is preferably substantially elongate, and preferably substantially flat for receipt of the hand-held vacuum cleaner, which is similarly preferably substantially flat based.

Preferably the floor cleaning head comprises a rotatable brush. This may be rotated mechanically by movement of the floor cleaning head over the floor, or may be powered by the battery of the hand-held vacuum cleaner, appropriate electrical connections being provided in the respective parts.

In one embodiment attachment tools are preferably provided, stored in a tool holding assembly in the upper handle portion.

The hand-held vacuum cleaner may itself comprise a handle. This may act as the handle of the vacuum cleaner when the hand-held vacuum cleaner is used alone, and also when it is used in the second mode in combination with the support caddy

Preferably latch members are provided to releasably secure the hand-held vacuum cleaner to the support caddy, and the support caddy to the upper handle portion, so that the operator can readily change the vacuum cleaner between its different modes of operation.

In one embodiment the hand-held vacuum cleaner is detachably secured to the support caddy by a first spring-biased latch member, the spring of the first spring-biased latch member being movable from an uncompressed to a compressed state. While a spring biased latch member is preferred, other resilient member latch members may also be used, and where reference is made to spring-biased latch members the reader will appreciate that another resilient member could replace the spring.. Preferably the first spring-biased latch member is located in the support caddy, and the hand held vacuum cleaner comprises a recess shaped to receive the first spring-biased latch member when the spring is in its uncompressed state. Preferably the spring of the first spring-biased latch member can be compressed to allow the first spring-biased latch member to be released from the latch-receiving-recess of the hand-held vacuum cleaner so that the hand-held vacuum cleaner can be detached from the support caddy.

In order to compress the spring of the first spring-biased latch member of the support caddy, the latch member preferably comprises a first cam surface, and a first release member comprising a co-operating second cam surface is also provided on the support caddy, whereby the release member can be moved relative to the first spring-biased latch member so that the first and second cam surfaces slide relative to each other to cause the spring of the first spring-biased latch member to move from its uncompressed to its compressed state. Preferably the release member is a depressible button that can be depressed by an operator, depression of the button causing the first and second cam surfaces to move relative to each other.

In one embodiment where the hand-held vacuum cleaner comprises a latch receiving recess, this is contained in the rear end of the hand-held vacuum cleaner, remote from its nose cone. Preferably the support caddy has a lower end and an upper

end, and the lower end of the support caddy comprises a nose engaging projection for engaging the nose cone of the hand-held vacuum cleaner.

Preferably in order to install the hand-held vacuum cleaner in the support caddy the nose cone of the vacuum cleaner is first mounted on the nose engaging projection at the lower end of the support caddy, then the spring of the first spring-biased-latch member is compressed and positioned in line with the latch-receiving recess of the hand-held vacuum cleaner, and then the spring is released so that the latch engages the said recess; and to release the retained hand-held vacuum cleaner the spring of the first spring-biased latch member is compressed so that the latch disengages the latch-receiving-recess of the hand-held vacuum cleaner.

Preferably the spring compression required to insert the hand-held vacuum cleaner is effected simply by the hand-held vacuum cleaner pushing against the projecting first latch member, and preferably spring compression required to remove the installed hand-held vacuum cleaner is effected by action of the separate release member, preferably the depressible release button as described above.

While the preferred embodiments described so far have a latch in the support caddy and a recess in the hand-held vacuum cleaner, reverse designs in which the latch is in the hand-held vacuum cleaner and a co-operating recess is in the support caddy are also envisaged.

As mentioned above, the upper handle portion is preferably also detachably secured to the support caddy by a second spring-biased latch member. The design of this second latch member is preferably as a central spring and at least one, but preferably two, end caddy-engaging portions on either side of the spring. Preferably the second spring-biased latch member is located in the upper handle portion and the support caddy comprises at least one, but preferably two, recesses adapted to receive the caddy-engaging portions of the second spring-biased latch member. Reversed designs in which the second spring biased latch member is located in the support caddy and the recesses in the upper handle portion are also envisaged. In an especially preferred design, the support caddy comprises an upper end and the upper handle portion comprises a lower end containing the second spring-biased latch member, and the upper end of the support caddy comprises a slot adapted to receive part of the lower end of the upper handle portion containing the second spring-biased

latch member. The vacuum cleaner preferably also comprises a second release member which can be moved relative to the second spring biased latch member to cause the spring of the second spring-biased latch member to move from its uncompressed to its compressed state. This movement can be effected by co-operating cam surfaces. Preferably the second spring biased latch member comprises a third cam surface which slides relative to a fourth cam surface on the second release member to cause the spring of the second spring-biased latch member to move from its uncompressed to its compressed state. Preferably the second spring-biased latch member comprises a central spring and two end caddy-engaging portions and two third cam surfaces are provided on the second spring-biased latch member, one on each of the two end caddy-engaging portions of the second spring-biased latch member. In one design two fourth cam surfaces are provided on the second release member to co-operate with respective ones of the two third cam surfaces on the second spring-biased latch member. The or each fourth cam surface is preferably provided as a projecting surface on a back plate which can be moved relative to the second spring-biased latch member. In one embodiment, the second spring-biased latch member additionally comprises a slideable button that can be slid by an operator, and movement of the co-operating third and fourth cam surfaces is effected by sliding the button.

Preferably the second latch member spring compression required to insert the upper handle portion in the support caddy is effected simply by part of the support caddy pushing against the latch member that is contained in the upper handle portion; and preferably spring compression required to remove the upper handle portion is effected by action of the separate release member, preferably the slidable release button as described above.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings wherein:

Figure 1 is a perspective view showing a hand-held vacuum cleaner which is part of a multi-operational vacuum cleaner according to the present invention;

Figure 2 is a perspective view of a support caddy which is another component of a multi-operational vacuum cleaner according to the present invention, and can be used in conjunction with the hand-held vacuum cleaner of Figure 1;

Figure 2a is a magnified perspective view of the end region of the support caddy of Figure 2 when connected to a handle;

Figure 2b is a magnified perspective view of the lower end of the support caddy of Figure 2, with the upper clamshell of the floor cleaning head removed;

Figure 2c is a schematic cross-section through the lower caddy and floor travelling head of Figure 2;

Figures 3, 4 and 5 are perspective view of the upper side, underneath side, and rear end respectively of the hand-held vacuum cleaner of Figure 1 installed in the support caddy of Figure 2;

Figure 6 is a perspective view of a first spring-biased latch member used to detachably secure the hand-held vacuum cleaner of Figure 1 in the support caddy of Figure 2;

Figure 7 is a schematic perspective view of part of the support caddy of Figure 2 in combination with an upper handle portion, which is another component of a multi-operational vacuum cleaner according to the present invention, and can be used in conjunction with the hand-held vacuum cleaner and support caddy combination of Figures 3 to 5, the Figure showing schematically the second latch mechanism that detachably secures the upper handle portion to the support caddy;

Figure 8 is a schematic perspective view showing the internal portion of the support caddy that forms part of the second latch mechanism of Figure 7;

Figure 9 is a sectional view showing in more detail the second latch mechanism of Figures 7 and 8;

Figure 9a is a second sectional view of the second latch mechanism of Figure 9 through a section disposed between the sectional view of Figure 9 and the upper surface of the handle and caddy;

Figure 9b is a perspective schematic view of the second latch mechanism of Figure 9 from below;

Figures 10 and 11 are perspective views of upper side and underneath side respectively of the hand-held vacuum cleaner and support caddy combination of Figures 3 to 5 with the additional upper handle portion of Figure 7 secured to the support caddy.

Referring now to the drawings, Figure 1 shows a hand-held vacuum cleaner 1 comprising a nose cone 3, a main housing portion 5 and a handle 7. The base 8 of the hand-held vacuum cleaner 1 is substantially flat. The air flow inlet into the vacuum cleaner (not visible in Figure 1 but indicated by the dotted reference arrow 10) is at

the end of the nose cone 3, and the nose cone 3 also acts as a dust collection module. The main housing portion 5 contains the functional components of the vacuum cleaner including a motor, a fan, and rechargeable batteries to power the motor. Air flow outlets 9 are provided on the sides of the main housing portion 5. These surround the fan (not visible). On/off switch 11 is provided on the upper surface of the main housing portion 5 and a depressible button 13 is provided to releasably secure the nose cone portion 3 to the main housing portion 5, so that the nose cone can be removed for emptying the dust collection module. The hand-held vacuum cleaner 1 also contains a recess (not visible, but indicated by the hashed arrow 14) at its rear end. This is for securement to the support caddy component of the vacuum cleaner as described in more detail below.

The hand-held vacuum cleaner of Figure 1 may be exactly as described in EP-A-1070478 or as described in co-pending GB Patent Application Number 0113385.9, filed 1st June 2001 by common applicant, the entire disclosure of which is incorporated herein by reference.

The hand-held vacuum cleaner 1 of Figure 1 is one of the components of the multi-operational vacuum cleaner of the invention. As shown and used in Figure 1 it represents the first mode of operation of the multi-operational vacuum cleaner.

Figure 2 shows a support caddy 15, which is a second component of vacuum cleaner according to the invention. Since this unit 15 has no power source, it can not be used alone, but can be used in combination with the hand-held vacuum cleaner of Figure 1 to provide the vacuum cleaner of the present invention operating in its second mode. This is described in more detail later with reference to Figures 3 to 5.

Looking in more detail at Figures 2, 2a and 2b, the support caddy 15 comprises a substantially elongate and substantially planar support member 17 and a floor cleaning head 19 attached pivotally at one end 21 of the support member 17. The support member 17 of the support caddy 15 is generally recessed around its edges 23 and provides a substantially flat backed central portion 25 for complementary receipt of the substantially flat base 8 of the hand-held vacuum cleaner 1 of Figure 1. A retractable first latch member 27 is contained in the recessed region 23 towards the upper or rear end 29 of the support caddy 15. This first latch member 27 can be retracted into the support caddy by depression of button 31 at the rear end 29 of the

support caddy 15. If button 31 is not depressed, or latch member 27 is not pushed against, then the latch member 27 projects out of the surface of the support caddy 15. The purpose of the first latch member 27 is to latch into the recess 14 of the hand-held vacuum cleaner 1 of Figure 1.

Referring to Figure 2b, the lower end portion 110 of the caddy 15 further comprises a male projection 112 extending into the recess region 23 from a front support bar 33. This projection 112 (as best seen in Figure 2c – which is a schematic cross-section through the floor travelling head 19 and caddy 15) is substantially hollow having a substantially rectangular cross-section, providing a fluid communication channel from the recessed region 23 into the interior of the floor travelling head 19. Again as seen in Figure 2c, the upper portion of the caddy 15 is pivotally mounted to the floor travelling head along an axis 114 by conventional use of two pivot members 150 (Figure 26) the caddy member 15 being accommodated within circular trunions formed integrally with the internal clamshell of the floor travelling head 19. This arrangement allows the head to pivot relative to the caddy and as can be seen in Figure 2c, the fluid communication of the projection 112 is thus permitted to travel through an angular range defined as F and remain in fluid communication with the interior of the floor travelling head. The interior of the floor travelling head is substantially hollow to provide further fluid communication from the projection 112 with a suction inlet 116 on the under surface of such head 19. Thus fluid communication is achieved between suction inlet 116 and the recessed region 23 of the caddy 15. Furthermore, as can be seen from Figure 2b, the floor travelling head comprises a conventional beater bar 118 mounted within the suction inlet 116 so as to agitate dirt from any surface being vacuumed and which beater bar 118 is driven by a motor 120 which is in electrical contact, by means of wires extending through the axles 115, with electrical contact 120 within the central portion 25.

When the hand-held vacuum cleaner 1 of Figure 1 is inserted to engage with the caddy 15 the nosecone 3 is manoeuvred towards the lower end 110 of the caddy 15 so as to bring the airflow inlet 10 into contact with the projection 112 for the projection 112 and the caddy 15 to be received in a complementary and friction fit within the inlet 10 of the cleaner 1. Not only does this provide fluid communication between the suctions of the vacuum cleaner and the floor travelling head but also serves to orientate the cleaner 1 in a correct insertion position with the caddy 15 which can then be pushed into the recessed region 23 of the support caddy 15 (Figure 2), serving the

rear end of the cleaner 1 to automatically engage with the latch 27 which is automatically pushed back against its natural biasing (i.e. retracted). Further insertion of the cleaner into the caddy 15 will then bring a complementary aperture on the cleaner 1 into orientation with the projection 27 for such projection to snap engage therewith as will be described later. When it is desired to withdraw the hand-held vacuum cleaner, button 31 is depressed which acts to retract the latch 27 out of engagement with the recess in the cleaner 1 allowing removal of the hand-held vacuum cleaner. Retraction of the latch member 27 by such depression of button 31 will be described in more detail below with reference to Figure 6.

In this manner, it will be appreciated that the projection 112 and latch member 27 serve to restrain the cleaner 1 in the caddy 15 whereby the additional side walls 17 also serve to orientate and retain the cleaner within the caddy 15.

The support caddy 15 has a raised rear end 29 extending substantially perpendicular to the elongate central portion 25, which further comprises from its inner surface a rear end inlet 35 and in its outer surface a substantially rectangular elongate member 37 extending within the central portion 25 of the caddy 15 from this rear end 29. A corresponding rebate is formed on the underside of the rear of the cleaner 1 for complementary engagement with this projection 37 when the cleaner is mounted in the caddy 15. The projection 37 and the inlet 35 are features required for retention of a removable handle portion 51 of the multi-operational vacuum cleaner of the present invention and will be described in more detail later with reference to Figures 7 to 9b.

Furthermore, it will be appreciated that a hand-held vacuum cleaner 1 employs rechargeable batteries to drive its internal motor whilst the power for this combined vacuum cleaner system is derived from such rechargeable batteries. To this end, the caddy 15 comprises an electrical connection portion 120 which is received by co-operating electrical connecting portion (not shown) in the vacuum cleaner in a manner which is conventional for providing electrical connection between a storage caddy and a hand-held vacuum cleaner (and as such will not be described in detail further). However, as is conventional within the art, the electrical connector 120 can serve to both connect the hand-held vacuum cleaner to an external power source (via an external connecting lead which can be connected to the caddy) for recharging purposes, whilst it can also serve to provide electrical connection between the hand-

held cleaner and the motor within the floor cleaning head 19 to provide a power source to the beater bar. Such an arrangement is standard within the field of hand-held vacuum cleaners and portable caddy systems.

Figures 3 to 5 show the hand-held vacuum cleaner of Figure 1 installed in the support caddy of Figure 2. Figure 4, which is an underside view shows the brush 118 housed within the suction inlet 116. Brush 118 can rotate. Rotation may simply be mechanical, by movement of the floor travelling head across a surface or, as in this particular case, be powered indirectly by the hand-held vacuum cleaner via motor 120. Appropriate electrical connections (not shown) may be present in the floor travelling head and hand-held vacuum cleaner for such indirect powering. Figure 5, which is a rear end view shows in more detail the inlet 35 which is used for securement of the upper handle portion of the multi-operational vacuum cleaner of the invention as described in more detail below, especially with reference to Figures 7 to 9b.

In the form shown in Figures 3 to 5 with the hand-held vacuum cleaner secured to the support caddy 15, the multi-operational vacuum cleaner is operating in its second mode. It can be seen, especially with reference to Figure 3, that in this mode the handle 7 of the hand-held vacuum cleaner 1 acts as the handle for the vacuum cleaner operating in its second mode. The floor travelling head 9 and brush 39 make it more suitable than the hand-held vacuum cleaner alone for picking up larger amounts of dust and debris, or for covering larger surfaces, but the short height of the cleaner in its second mode makes it especially suitable for cleaning raised surfaces or stairs or the like. Other advantageous applications of the cleaner in its second mode would be apparent to the man skilled in the art.

Figure 6 is a schematic perspective view showing the first latch member 27 that is used detachably to secure the hand-held vacuum cleaner 1 in the support caddy 15, as briefly described in Figure 2. The latch member 27 comprises a tapered front surface 41, and a generally flat back surface 42. The latch 27 is resiliently biased by a spring 43 acting on the back surface 42. The other end of the spring 43 is secured within the body of the rear end 29 of the support caddy 15 (see Figure 2) so as to bias the surface 41 to project into the central portion 25 of the caddy, but this securement is not illustrated. The tapered front surface 41 of the latch 27 means that when the hand-held vacuum cleaner 1 is inserted into the support caddy 15 it engages and acts

on the tapered surface 41 (downward force indicated by arrow "A" in Figure 6) gradually to push it backwards against the bias of the spring 43, so that the latch 27 no longer projects from the surface of the support caddy 15 and the hand-held vacuum cleaner 1 is further displaced into the caddy 15. Continued insertion of the cleaner 1 causes the latch 27 to become aligned with the recess 14 in the back of the hand held vacuum cleaner 1 (see Figure 1) and the spring 43 urges the latch member 27 to snap engage into the recess 14 so that the hand-held vacuum cleaner is securely held in place in the support caddy 15 by a shoulder 129 of the latch 27.

Towards its back face 42 the latch member 27 is provided with a first cam surface 45. Release button 31 (see also Figure 2) is also provided with a reciprocal cam surface 47 (referred to as the second cam surface in this specification). The button 31 is restrained, by the caddy clamshell, from longitudinal displacement relative to the latch member 27, and conversely the latch member is restrained from vertical displacement relative to the button 31. Subsequently, when button 31 is depressed (as shown in Figure 6) the cam surface 47 moves over the cam surface 45 of the latch member 27 causing the latch member to move to the right and the spring 43 to compress. This therefore achieves retraction of the latch 27 to allow removal of the hand-held vacuum cleaner 1. When button 31 is released the spring 43 assumes its uncompressed state causing the latch member 27 to move to the left again. The subsequent reciprocal interaction of cam surfaces45 and 47 thus serve to return button 31 to its unactuated position, and will retain this position until the hand-held vacuum cleaner 1 is re-inserted. Resiliently moulded integral wing portions 151 also serve to exert a biasing force on the button 31 urging it to return to an unactuated position.

Figure 7 shows the upper end of the support caddy 15 and an upper handle portion 51, which is a third component of the multi-operational vacuum cleaner of the present invention. The upper handle portion 51 can not be used alone, but can be used in combination with the hand-held vacuum cleaner and support caddy combination of Figures 3 to 5 to provide the vacuum cleaner of the present invention operating in its third mode.

The upper handle portion 51 comprises a long stem 57 and a stem handle 59 at its upper end. The lower end 61 of the stem 57 of the upper handle portion 51 is provided with a latch member 53 (referred to elsewhere in the specification as the second latch member) which can be retracted, as indicated by arrows P, into a latch

containing block 54. The latch member 53 comprises two end sections and a central spring member (not visible in Figure 7). The retraction of the latch member 53 can occur automatically when the upper handle portion 51 is pushed into the inlet slot 35 of the support caddy 15, or may be effected by sliding button 55 in the direction indicated by arrow S. When the upper handle portion 51 is pushed into the inlet slot 35 of the support caddy 15, the latch-containing block 54 of the upper handle portion 51 is contained within the raised section 37 in the flat surface 25 of the support caddy 15 (see also Figure 2).

Figure 8 shows (schematically) that contained inside raised section 37 of the support caddy 15 there is a housing shell 61 integral with the caddy clamshell for receiving the latch-containing block 54 of the upper handle portion 51. The housing shell 61 comprises two hollow projecting portions 63 which act as recesses to each receive and retain a latch member 53.

Figure 9, which shows a cross-sectional view through the handle 51 when engaged with the caddy 15, shows the basic operation of the latch member 53. The latch 52 comprises two opposed end portions 67 which are displaceable laterally (right to left in Figure 9) relative to the elongate handle and are resiliently biased into an outward position as shown in Figure 9 by a spring member 65. In this particular embodiment, each end portion 67 has an individual spring member 65 biased against a central pillar 75 but it will be appreciated that a single spring member could also be employed. Rib members 1 to 30 retain the end portions 67 from any longitudinal displacement. In this manner it will be appreciated that the end portion 67 can be pushed inwardly of their extreme outer positions against the resilient biasing of the spring 65. To help facilitate such displacement each end portion has an inclined cam surface 68 from which, it will be appreciated, any longitudinal engaging force in the direction B shown in Figure 9 applied to such cam surfaces 68 will affect cam displacement of the end portion 67 against the resilient biasing of spring 65 into a compressed position and when such force is removed the natural biasing of the spring will again force the end portion 67 into their outermost positions shown in Figure 9. Thus, referring now to Figures 8 in combination with Figure 9,the shell portion 61 of the caddy 15 comprises two hollow projecting portions 63 for each accommodating an end portion 67 of the latch. Again as can be seen from Figure 8 the handle 51 has a latch containing block 54 which is received in a complementary fit within the shell 61 of the caddy. It will be appreciated from the schematic view shown in Figure 8 that as

the handle 51 is brought into engagement with the caddy the latch containing block 54 is receivcd in a complementary fit within the shell 61 of the caddy. Continued displacement will bring the inclined cam surfaces 68 of the end portion 67 into abutment with a remote edge 133 of the shell whereby continued displacement of the handle towards the caddy will result in such end surfaces 133 applying a force in direction B shown in Figure 9 against such cam surfaces 68 causing the cam deflection inwardly Figure 9 so as to compress the spring member 65. Continued displacement then causes the shell 61 to pass over the compressed latch member 53 until the end portion 67 encounter the recesses 63 formed in the shell member 61 thereby, under the resilient biasing of the spring member 65, the end portion 67 are displaced outwardly of their compressed position so as to enter and engage with these recesses 63 so as to prevent the handle 51 from being withdrawn out of the caddy 15 by engagement of a flat shoulder 134 on the rear face of the end portion 67 with a corresponding shoulder formed in the recess 63. This engagement serves to lock the handle into a restrained position within the caddy 15. As illustrated in Figure 10 it will be appreciated that engagement betwcen the latch containing block 54 in complementary fit with the shell 61 provides a sturdy engagement between the handle and the caddy 15 and provides distribution for any stress created by engagement of the handle with the caddy when a leverage is applied to the handle portion 59 to be dissipated over a relatively large surface area between the handle and the caddy. Whereas the use of a rectangular shape of the latch containing block 54 in corresponding rebate 35, as opposed to a circular cross-section, restrains the handle from twisting relative to the caddy 15 when engaged. This feature is further emphasised by the side plates 140 (Figure 7) disposed either side of the block 54 for slot engagement with corresponding slots 141 associated with the opening 35 in the caddy 15. Again engagement between these plates 140 and the slots 141 helps to distribute stress between the handle and the caddy over a larger surface area and restrains the handle from twisting relative to the caddy. As can also be seen from Figures 7 and 9 the rear surface 142 of the caddy then abuts against a corresponding shoulder 140 from the block 54. As can be seen from Figure 7 this is substantially hemispherical and forms a complementary fit between the face 142 and shoulder 144. Such a hemispherical interface again serves to prevent rotation of the handle relative to the caddy 15.

In order to release this second latch member 53, the handle has mounted thereon a longitudinally displaceable sliding button 55 which is displaceable in the direction

shown generally as S in Figures 7 and 8. Slidable button 55 has an elongate member extending transversely with respect to the longitudinal direction of the handle which cannot be seen in Figures 7 and 8 but is shown schematically by the reference numeral 150 in Figures 9a and 9b. In this manner this member 150 can be displaced longitudinally by associated displacement of the switch 55. This member 150 then engages with a solid cam deflector member 152 which comprises a substantially rectangular plate 154 having at its end remote from that to which the member 150 is connected, a tapered cam member 156 having two inner tapered cam surfaces 158. Both of the end portions 67 have mounted on an upper surface thereof two pin members 160 shown in 9a, which pins are received between the tapered cam surfaces 158 of the cam member 156. Figures 9, 9a and 9b show this cam member 156 in an unactuated position whereby the spring 65 has displaced the end portions 67 to their outermost position. These end portions 67 are restrained, as mentioned, from any longitudinal displacement by the clamshell ribs 130.

To unlatch the handle portion from the caddy 15 the slideable button 55 is displaced in the direction S as shown in Figures 7, 8 and 9b by such longitudinal displacement as transmitted by the member 150 to the cam member 152 and hence the cam surfaces 158. Displacements of the cam surfaces 158 in the direction S as seen in Figure 9a causes engagement with the pins 160 mounted on each of the end portions 67 which are subsequently deflected towards one another, which causes displacement of the end member 67 against the resilient biasing of the spring 65 until such end portion 67 are no longer received within the projecting portions 63 of the housing shell 61 which thus allows the handle to be slideably removed from the caddy 15.

When the displacement force S is removed from the switch member 55 the biasing of the spring 65 then forces the end portion 67 outwardly of their compressed position and subsequently moves the pin members 160 against the tapering cam surfaces 158 so as to force the cam member 152 in a direction opposed to direction S as shown in Figure 9a to return the slideable switch 55 to its original position.

Figures 10 and 11 show the upper handle portion 51 secured to the support caddy 15 and hand-held vacuum cleaner combination. In Figure 10 it can be seen that in this mode of operation the handle 59 of the upper handle portion 51 is the one that is used, not the handle 7 of the hand-held vacuum cleaner. Also from the rear view orientation of Figure 11, a tool attachment storage 81 in the upper handle portion 51 is

illustrated. The third mode of operation of the multi-operational vacuum cleaner of the invention, as illustrated in Figures 10 and 11 is traditional upright mode. It is useful for ease of cleaning from a standing position for regular floor cleaning. As with the other two modes of operation power for the operation is from the hand-held vacuum cleaner, and dust collection is also in the hand-held vacuum cleaner.

As illustrated by simple selection and combination of the three component parts (hand-held vacuum cleaner, support caddy, and upper handle portion) an operator can use the vacuum cleaner illustrated in three different modes depending on the application. It is therefore a three in one vacuum cleaner.

CLAIMS

1. A multi-operational battery powered vacuum cleaner comprising:

(a) a hand held vacuum cleaner comprising a nose cone air flow inlet and a handle;

(b) a support caddy comprising a support member to which the hand held vacuum cleaner can be detachably secured, and a floor cleaning head attached to the support member; and

(c) an upper handle portion that can be detachably secured to the support caddy;

wherein the vacuum cleaner can operate: (i) in a first mode as a hand-held vacuum cleaner alone; (ii) in a second mode with the hand-held vacuum cleaner secured to the support caddy; or (iii) in a third mode as (ii) additionally with the upper handle portion secured.

2. A vacuum cleaner according to claim 1, wherein the floor cleaning head is pivotally connected to the support caddy.

3. A vacuum cleaner according to claim 1 or 2, wherein the floor cleaning head comprises a rotatable brush.

4. A vacuum cleaner according to claim 3, wherein the brush is powered by the battery of the hand-held vacuum cleaner.

5. A vacuum cleaner according to any preceding claim, comprising attachment tools stored in a tool holding assembly in the upper handle portion.

6. A vacuum cleaner according to any preceding claim wherein the hand-held vacuum cleaner has a handle.

7. A vacuum cleaner according to claim 6, wherein the hand-held vacuum cleaner is attached to the support caddy and, and wherein the handle of the hand-held vacuum cleaner acts as the handle when the vacuum cleaner is operating in the second mode.

8. A vacuum cleaner according to any preceding claim, wherein the hand-held vacuum cleaner is detachably secured to the support caddy by a first spring-biased

latch member, the spring of the first spring-biased latch member being movable from an uncompressed to a compressed state.

9. A vacuum cleaner according to claim 8, wherein the first spring-biased latch member is located in the support caddy, and the hand held vacuum cleaner comprises a recess shaped to receive the first spring-biased latch member when the spring is in its uncompressed state.

10. A vacuum cleaner according to claim 9, wherein the spring of the first spring-biased latch member can be compressed to allow the first spring-biased latch member to be released from the latch-receiving-recess of the hand-held vacuum cleaner so that the hand-held vacuum cleaner can be detached from the support caddy.

11. A vacuum cleaner according to claim 11, wherein the first spring-biased latch member of the support caddy comprises a first cam surface, and a first release member comprising a co-operating second cam surface is also provided on the support caddy, whereby the release member can be moved relative to the first spring-biased latch member so that the first and second cam surfaces slide relative to each other to cause the spring of the first spring-biased latch member to move from its uncompressed to its compressed state.

12. A vacuum cleaner according to claim 11, wherein the release member is a depressible button that can be depressed by an operator, depression of the button causing the first and second cam surfaces to move relative to each other.

13. A vacuum cleaner according to any of claims 9 to 12, wherein the hand held vacuum cleaner has a rear end remote from its nose cone and the latch-receiving-recess of the hand-held vacuum cleaner is at the said rear end, and the support caddy has a lower end and an upper end, the lower end comprising a nose engaging projection.

14. A vacuum cleaner according to claim 13 which is arranged so that to install the hand-held vacuum cleaner in the support caddy the nose cone of the vacuum cleaner is first mounted on the nose engaging projection at the lower end of the support caddy, then the spring of the first spring-biased-latch member is compressed and positioned in line with the latch-receiving recess of the hand-held vacuum cleaner, and then the spring is released so that the latch engages the said recess; and so that to release the retained hand-held vacuum cleaner the spring of the first spring-

biased latch member is compressed so that the latch disengages the latch-receiving-recess of the hand-held vacuum cleaner.

15. A vacuum cleaner according to any preceding claim, wherein the upper handle portion is detachably secured to the support caddy by a second spring-biased latch member.

16. A vacuum cleaner according to claim 15, wherein the second spring-biased latch member comprises a central spring and at least one end caddy-engaging portions.

17. A vacuum cleaner according to claim 16, wherein the second spring-biased latch member is located in the upper handle portion and the support caddy comprises at least one recess adapted to receive the at least one caddy-engaging portions of the second spring-biased latch member.

18. A vacuum cleaner as claimed in claim 16 or claim 17 wherein the second latch member comprises two end caddy-engaging portions.

19. A vacuum cleaner according to any one of claims 16 to 18, wherein the support caddy comprises an upper end and the upper handle portion comprises a lower end containing the second spring-biased latch member, and wherein the upper end of the support caddy comprises a slot adapted to receive part of the lower end of the upper handle portion containing the second spring-biased latch member.

20. A vacuum cleaner according to any of claims 16 to 19, additionally comprising a second release member which can be moved relative to the second spring biased latch member to cause the spring of the second spring-biased latch member to move from its uncompressed to its compressed state.

21. A vacuum cleaner according to claim 20 wherein the second spring biased latch member comprises a third cam surface which slides relative to a fourth cam surface on the second release member to cause spring of the second spring-biased latch member to move from its uncompressed to its compressed state.

22. A vacuum cleaner according to claim 21, wherein the second spring-biased latch member comprises a central spring and two end caddy-engaging portions and wherein two third cam surfaces are provided on the second spring-biased latch

member, one on each of the two end caddy-engaging portions of the second spring-biased latch member.

23. A vacuum cleaner according to claim 22 wherein two fourth cam surfaces are provided on the second release member to co-operate with respective ones of the two third cam surfaces on the second spring-biased latch member.

24. A vacuum cleaner according to any of claims 20 to 23, wherein the or each fourth cam surface is provided as a projecting surface on a back plate which can be moved relative to the second spring-biased latch member.

25. A vacuum cleaner according to any of claims 15 to 24, wherein the second spring-biased latch member additionally comprises a slideable button that can be slid by an operator, and movement of the co-operating third and fourth cam surfaces is effected by sliding the button.

26. A vacuum cleaner substantially as hereinbefore described with reference to the accompanying drawings.

INVESTOR IN PEOPLE

Application No: GB 0118141.1 **Examiner:** Kathryn Orme
Claims searched: 1-26 **Date of search:** 28 September 2001

Patents Act 1977
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Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): A4F

Int Cl (Ed.7): A47L 5/00, 5/24, 5/26, 9/00

Other: Online: WPI, EPODOC, PAJ

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
Y	GB 2291790	(AIRLUX) see whole document	1-4 and 6-7 at least
Y	WO 86/01703	(PROGRESS-ELEKTOGERATE) see abstract and figures 1 and 2	1 at least
Y	US 5819364	(SHAM) see whole document	1,3,6,8
Y	US 4766638	(MCDOWELL)	1 at least
Y	US 4635315	(KOZAK) see whole document	1,3,6,8
Y	www.ewbank.co.uk/latest_news : Daily Mail reviews Ewbank '123' 31/05/2001		1-4 and 6-7 at least
Y	WPI Abstract Accession No. 1998-514005 & JP 10225403 (Mitsubishi DKK) 01/11/1999 (see abstract)		1 at least

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&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

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(54) **Vacuum-cleaner suction tool and vacuum cleaner using the same**

Saugdüse für einen Staubsauger und Staubsauger mit solcher Saugdüse

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Description

FIELD OF THE INVENTION

[0001] The present invention relates generally to an overall structure of an electric vacuum cleaner, and more particularly to an improvement in usability of a suction tool used in the vacuum cleaner.

BACKGROUND OF THE INVENTION

[0002] A structure of conventional suction tool 1 will be described with reference to FIG. 14A and FIG. 14B. As disclosed in Japanese Patent Unexamined Publication No. 2002-102125, by operating handle 16 to apply turning forces thereto in leftward and rightward directions, suction tool 1 attached to the front end of handle 16 is turned around and brought from the state as shown in FIG. 14A into the state longitudinally oriented as shown in FIG. 14B, when viewed from the position of the user doing cleaning with handle 16 held in hand. Therefore, it becomes possible to advance suction tool 1 into a narrow space or to make cleaning at a portion close to a side wall.

[0003] At a position somewhat rearward from sucking portion 4, there is provided supporting portion 7 formed of a roller and the like for keeping sucking portion 4 horizontal to the surface to be cleaned while suction tool 1 is moved back and forth.

[0004] In the described conventional configuration, however, because the turning center of sucking portion 4 is greatly deviated from the center of sucking portion 4 and also because supporting portion 7 described above is needed to be provided at the rear of sucking portion 4, the width of suction tool 1 becomes great when it is oriented in the longitudinal direction and, hence, it has been only the front portion of suction tool 1 that is then reachable into a narrow space.

[0005] DE 100 17 705 A1 describes a vacuum-cleaner suction tool in which the joint portion for the handle and the sucking portion are connected to each other by a gimbal or universal joint. This connection allows independent rotations or inclinations between handle and sucking portion such that the sucking portion may be used in two different positions turned against each other by 90° to either sweep over a carpet as shown in Fig. 1 or enter into a narrow space between two furniture pieces as shown in Fig. 2. Cleaning a narrow space as for example, under a bed will not be easy or even impossible, since the handle always has a considerable inclination against the sucking portion.

[0006] It is an object of the invention to improve cleaning efficiency. This object is solved by the independent claims, referring to the suction tool and a vacuum cleaner having such a suction tool. Improvements are referred to in sub claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007]

FIG. 1 is a side view of a vacuum-cleaner suction tool showing embodiment 1 of the present invention.

FIG. 2 is a top view of the vacuum-cleaner suction tool.

FIG. 3 is a front view of the vacuum-cleaner suction tool.

FIG. 4 is an internal structural drawing of the vacuum-cleaner suction tool.

FIG. 5 is another side view of the vacuum-cleaner suction tool.

FIG. 6 is another top view of the vacuum-cleaner suction tool.

FIG. 7 is an internal structural drawing of the vacuum-cleaner suction tool viewed from its bottom side.

FIG. 8 is another internal structural drawing of the vacuum-cleaner suction tool viewed from its bottom side.

FIG. 9 is a side view of a vacuum-cleaner suction tool showing embodiment 2 of the present invention.

FIG. 10 is another side view showing the vacuum-cleaner suction tool.

FIG. 11 is a detailed drawing of a sucking portion of the vacuum-cleaner suction tool.

FIG. 12 is a general drawing of a vacuum cleaner showing embodiment 3 of the present invention.

FIG. 13 is another general drawing of the vacuum cleaner.

FIG. 14A is a general drawing of a conventional vacuum-cleaner suction tool.

FIG. 14B is another general drawing of the conventional vacuum-cleaner suction tool.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0008] Embodiment 1 of the present invention will be described below with reference to the accompanying drawings. Embodiments 2 and 3 are not part of the invention.

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(Embodiment 1)

[0009] Embodiment 1 will be described with reference to FIG. 1 to FIG. 8. FIG. 1 is a side view of a vacuum-cleaner suction tool.

[0010] Sucking portion 4 is provided, on its under side, with opening 12 for sucking up dust. To the upper side of sucking portion 4, one end of joint portion 5 is attached turnably in the direction substantially horizontal to surface to be cleaned 23. To joint portion 5, supporting portion 7 is attached. Supporting portion 7 is provided with roller 17, which has its surface formed of a soft material such as Elastomer, flexible resin such as polypropylene and vinyl chloride, or raised blanket and supports joint portion 5 by rolling over surface to be cleaned 23 by being placed in contact with the surface. Joint portion 5 has connection pipe 6 attached to the other end thereof. Incidentally, supporting portion 7 may be attached to connection pipe 6. There is formed channel portion 8 through which dust sucked up at opening 12 is transported to joint portion 5 and further to connection pipe 6.

[0011] FIG. 2, FIG. 3, and FIG. 4 are a top view, a front view, and an internal structural drawing of the vacuum-cleaner suction tool.

[0012] In the portion projecting upwardly from sucking portion 4, there is incorporated electric motor 13. By power of the motor, agitator 14 is rotatively driven via belt 24 so that dust attached to the surface to be cleaned such as a carpet can be forcedly scraped off the surface to be cleaned, and thereby sucking up of dust is performed. Since electric motor 13 is disposed above agitator 14, the width of sucking portion 4, i.e., the size from its front side to rear side, is made small. Further, longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 are adapted to be arranged substantially perpendicular to each other.

[0013] FIG. 5 and FIG. 6 are a side view and a top view of the vacuum-cleaner suction tool when the joint portion 5 has turned, relative to the sucking portion 4, in a direction substantially horizontal to the surface to be cleaned such that the longitudinal central axis 4a of the sucking portion 4 and the longitudinal central axis 6a of the connection pipe 6 become substantially parallel to each other.

[0014] Joint portion 5 is attached to sucking portion 4 turnably, relative to the sucking portion, in a direction substantially horizontal to surface to be cleaned 23 to such an extent that longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 become parallel to each other (become coincident with each other, in the case of embodiment 1). Accordingly, by applying a turning force to joint portion 5 relative to sucking portion 4, it becomes possible to use suction tool 1 in its longitudical direction (in the direction of longitudinal central axis 4a of sucking portion 4). At this time, the outside shape of joint portion 5 and connection pipe 6 falls within the range of the width of sucking portion 4.

[0015] Further, when joint portion 5 has turned, relative to sucking portion 4, in the direction substantially horizontal to surface to be cleaned 23 such that longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 have become substantially parallel to each other (become concurrent, in the case of embodiment 1), supporting portion 7 is then positioned at the rear of sucking portion 4 (in the state where longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 are substantially parallel to each other). Since, in addition, connection pipe 6 can be rotated, relative to joint portion 5, from a position in which longitudinal central axis 6a of connection pipe 6 is substantially vertical to surface to be cleaned 23 to a position in which longitudinal central axis 6a of connection pipe 6 is substantially parallel to surface to be cleaned 23, suction tool 1 is enabled to reach even into a space being low and narrow. Thus, a vacuum- cleaner suction tool enhanced in usability and excellent in dust collecting performance in any cleaning attitude can be provided.

[0016] Since the rotation at this time is made in a direction away from the side where heavy electric motor 13 is incorporated, sucking portion 4 is allowed to stably keep its position even if the rotating force is applied to joint portion 5 relative to sucking portion 4. Further, since electric motor 13 is disposed above agitator 14, the width of sucking portion 4 measured across its longitudinal central axis 4a, in the described condition, can be kept small.

[0017] FIG. 7 and FIG. 8 are internal structural drawings of the vacuum-cleaner suction tool viewed from its bottom side.

[0018] In two positions, an angular distance of 90° apart from each other, of the portion where joint portion 5 is connected to sucking portion 4, there are provided grooves 19. Further, there is provided retaining member 15 formed of a metallic or plastic plate spring which is adapted to be fitted into one or the other of grooves 19 for suppressing the turning of joint portion 5.

[0019] When joint portion 5 is turned, relative to sucking portion 4, in the direction substantially horizontal to surface to be cleaned 23 and, thereby, longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 are caused to be substantially parallel to each other (to be concurrent with each other, in the case of the present embodiment), or longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 are caused to be substantially perpendicular to each other, retaining member 15 is, then, put into one or the other of grooves 19, so that sucking portion 4 can maintain its present position even when it is subjected to an external force in some degree by collision with furniture or the like while the vacuum cleaner is being used.

[0020] Since supporting portion 7 is attached to joint portion 5, sucking portion 4 is prevented from lifting from the floor in the normal cleaning condition in which longitudinal central axis 4a of sucking portion 4 and longitudinal central axis 6a of connection pipe 6 are substantially

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perpendicular to each other, so that high usability is obtained. Further, since supporting portion 7 is configured to be positioned on the rear side of sucking portion 4 when joint portion 5 connected with connection pipe 6 is turned, relative to sucking portion 4, in a direction substantially horizontal to surface to be cleaned 23, it is made possible to bring the forward end of sucking portion 4, from left to right, into close contact with wall surfaces. Hence, dust liable to collect at corners can be fully sucked up. Thus, vacuum-cleaner suction tool providing high usability and excellent dust collecting performance in any cleaning attitude can be provided.

(Embodiment 2)

[0021] Embodiment 2 will now be described with reference to FIG. 9, FIG. 10, and FIG. 11. Components like those used in the above described embodiment 1 will be given like names and reference numerals and description thereof will be omitted.

[0022] Although supporting portion 7 is fixedly attached to one end of joint portion 5 in embodiment 1, supporting portion 7, in embodiment 2, is rotatably attached to one end of joint portion 5 by way of first rotation center 9 as shown in FIG. 9. Supporting portion 7 is further attached to connection pipe 6 by way of second rotation center 10 located at a position closer to sucking portion 4 than first rotation center 9. Incidentally, supporting portion 7 may be attached to connection pipe 6 the same as in embodiment 1. Since roller 17 is positioned closer to the side of sucking portion 4 than first rotation center 9, even if a force is applied to connection pipe 6 to push it down, the front portion of sucking portion 4 is prevented from lifting from the floor due to a rotational movement of supporting portion 7 carried on first rotation center 9.

[0023] In the above described configuration, when joint portion 5 has turned, relative to sucking portion 4, in a direction substantially horizontal to surface to be cleaned 23 and, thereby, longitudinal central axis 4a of sucking portion 4 has become substantially parallel to (concurrent with, in the present embodiment) longitudinal central axis 6a of connection pipe 6, supporting portion 7 turns in an upward direction from surface to be cleaned 23 so as to be positioned higher than sucking portion 4. In addition, since connection pipe 6 can be turned, relative to joint portion 5, from its state where longitudinal central axis 6a of connection pipe 6 is substantially vertical to surface to be cleaned 23 to its state where longitudinal central axis 6a of connection pipe 6 is substantially horizontal to surface to be cleaned 23, it becomes possible to insert suction tool 1 into a space being low and narrow. Thus, vacuum-cleaner suction tool providing high usability and excellent dust collecting performance in any cleaning attitude can be provided.

[0024] FIG. 11 shows internal structure of the first rotation center to which supporting portion 7 is connected.

[0025] There is further provided urging member 21 formed of spring or the like between supporting portion 7 and joint portion 5. Hence, supporting portion 7 is urged in the direction of sucking portion 4, while it is turnable in an upward direction from surface to be cleaned 23. Therefore, sucking portion 4 is prevented from lifting from the floor, as described above, due to turn of supporting portion 7 in the normal cleaning condition in which longitudinal central axis 4a of sucking portion 4 is substantially perpendicular to longitudinal central axis 6a of connection pipe 6, whereby usability of vacuum-cleaner suction tool 1 is enhanced. In addition, when joint portion 5 with connection pipe 6 attached thereto is turned, relative to sucking portion 4, in a direction substantially horizontal to surface to be cleaned 23, supporting portion 7 ensures sucking portion 4 to be secured in position, so that the front end of suction tool 1, from left to right, can be brought into close contact with wall faces, and hence dust liable to collect at corners can be fully sucked up. Thus, vacuum-cleaner suction tool providing high usability and high dust collecting performance in any cleaning attitude can be provided.

(Embodiment 3)

[0026] Embodiment 3 will be described with reference to FIG. 12 and FIG. 13. Components like those used in embodiments 1 and 2 will be denoted by like reference numerals and description thereof will be omitted.

[0027] Embodiment 3 is a vacuum cleaner having the vacuum-cleaner suction tool described in embodiments 1 and 2 connected thereto.

[0028] FIG. 12 and FIG. 13 show general drawings of a vacuum cleaner. The vacuum cleaner has dust collecting chamber 2 for collecting dust, channel portion 8 through which sucked-up dust is transported to dust collecting chamber 2, handle portion 16, power supplying battery 20, and electric fan 22 for generating a suction air flow. Electric fan 22 is communicating with suction tool 1 through channel portion 8.

[0029] In the state where longitudinal central axis 6a of connection pipe 6 is substantially parallel to surface to be cleaned 23, suction tool 1 can be advanced even into a space under a bed or a table as shown in FIG. 12. Hence, it is made possible to fully suck up dust on the surface to be cleaned. When longitudinal central axis 6a of connection pipe 6 is turned to a position in which it is substantially vertical to surface to be cleaned 23 as shown in FIG. 11, the cleaner in a non-cleaning condition can be conveniently placed or stored, for example, in a small space.

[0030] Though the vacuum cleaner of embodiment 3 has been described as a broom-type rechargeable vacuum cleaner, the described configuration is applicable to general vacuum cleaners irrespective of the types of the cleaner or systems of the power source.

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Claims

1. A vacuum-cleaner suction tool comprising:

   a sucking portion (4) having an opening (12) for sucking up dust on a surface to be cleaned (23);
   a joint portion (5) having one end thereof connected with said sucking portion (4) at an upper portion thereof and the other end provided with a connection pipe (6);
   an agitator (14) disposed within said sucking portion (4) for scraping up dust, and
   a channel portion (8) provided in said opening (12), said joint portion (5), and said connection pipe (6) for transporting sucked-up dust therethrough, wherein
   said joint portion (5) is turnable, relative to said sucking portion (4), in a direction horizontal to the surface to be cleaned (23) pivoted on an axis of substantially vertical line to the surface to be cleaned (23), and said connection pipe (6) is turnable relative to said joint portion (5) pivoted on an axis of parallel line to the surface to be cleaned (23) to such an extent that a longitudinal central axis (4a) of said sucking portion (4) and a longitudinal central axis (6a) of said connection pipe (6) become parallel to each other, and said joint portion (5) and connection pipe (6) are within the width of said sucking portion (4);
   characterised in that said vacuum-cleaner suction tool further comprises
   a retaining member (15) including a plate spring and a groove (19),
   said retaining member (15) disallowing said joint portion (5) to turn relative to said sucking portion (4) when a turning force applied to said joint portion (5) is not greater than a predetermined value and allowing said joint portion (5) to turn relative to said sucking portion (4) when the turning force applied to said joint portion (5) is greater than the predetermined value.

2. The vacuum-cleaner suction tool according to claim 1, further comprising an electric motor (13) within said sucking portion (4) for driving said agitator (14), wherein
   said electric motor is disposed above said agitator.

3. The vacuum-cleaner suction tool according to claim 2, wherein,
   said electric motor (13) is disposed at one end in the longitudinal direction of said sucking portion (4) and said joint portion (5) comes to be positioned higher than said sucking portion (4) on a side where said electric motor is not disposed when said joint portion has turned, relative to said sucking portion, in a direction horizontal to the surface to be cleaned and the longitudinal central axis of said sucking portion and the longitudinal central axis of said joint portion have become substantially parallel to each other.

4. The vacuum-cleaner suction tool according to claim 1 or 2, further comprising a supporting portion (7) attached to one of said joint portion (5) and said connection pipe (6) for supporting one of said joint portion and said connection pipe by being placed in contact with the surface to be cleaned, wherein
   said supporting portion (7) is adapted to be positioned on a rear side of said sucking portion (4) when said joint portion (15) has turned, relative to said sucking portion, in a direction substantially horizontal to the surface to be cleaned to such an extent that the longitudinal central axis of said sucking portion and the longitudinal central axis of said connection pipe become substantially parallel to each other.

5. The vacuum-cleaner suction tool according to claim 1 or 2, wherein
   said connection pipe (6) is configured to be turnable, relative to said joint portion (5), from a position in which the longitudinal central axis thereof is substantially parallel to the surface to be cleaned to a position in which the axis is substantially vertical to the surface to be cleaned.

6. The vacuum-cleaner suction tool according to claim 4, wherein
   said supporting portion (7) has its periphery covered with a soft material.

7. A vacuum cleaner using a vacuum-cleaner suction tool as defined in any of claims 1 to 6.

Patentansprüche

1. Staubsaugersaugwerkzeug, umfassend:

   einen Saugabschnitt (4), der eine Öffnung (12) zum Aufsaugen von Staub an einer zu reinigenden Oberfläche (23) aufweist;
   einen Übergangsabschnitt (5), dessen eines Ende mit dem Saugabschnitt (4) an einem oberen Abschnitt hiervon verbunden und dessen anderes Ende mit einem Verbindungsrohr (6) versehen ist;
   einen Aufwirbler (14), der innerhalb des Saugabschnittes (4) zum Aufschaben von Staub angeordnet ist, und
   einen Kanalabschnitt (8), der in der Öffnung (12), dem Übergangsabschnitt (5) und dem Verbindungsrohr (6) zum Durchtransportieren von aufgesaugtem Staub vorgesehen ist, wobei
   der Übergangsabschnitt (5) relativ zu dem Saugabschnitt (4) in einer Richtung horizontal zu der zu reinigenden Oberfläche (23) bei Ver-

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schwenkung an einer Achse einer im Wesentlichen vertikalen Linie zu der zu reinigenden Oberfläche (23) drehbar ist und das Verbindungsrohr (6) relativ zu dem Übergangsabschnitt (5) bei Verschwenkung an einer Achse einer parallelen Linie zu der zu reinigenden Oberfläche (23) in einem Ausmaß drehbar ist, dass eine Längsmittelachse (4a) des Saugabschnittes (4) und eine Längsmittelachse (6a) des Verbindungsrohres (6) parallel zueinander werden und der Übergangsabschnitt (5) und das Verbindungsrohr (6) innerhalb der Breite des Saugabschnittes (4) sind;
dadurch gekennzeichnet, dass das Staubsaugersaugwerkzeug des Weiteren umfasst:

ein Rückhalteelement (15), das eine Plattenfeder und eine Nut (19) beinhaltet,
wobei das Rückhalteelement (15) nicht zulässt, dass sich der Übergangsabschnitt (5) relativ zu dem Saugabschnitt (4) dreht, wenn eine auf den Übergangsabschnitt (5) einwirkende Drehkraft nicht größer als ein vorbestimmter Wert ist, und zulässt, dass sich der Übergangsabschnitt (5) relativ zu dem Saugabschnitt (4) dreht, wenn die auf den Übergangsabschnitt (5) einwirkende Drehkraft größer als der vorbestimmte Wert ist.

2. Staubsaugersaugwerkzeug nach Anspruch 1, des Weiteren umfassend einen Elektromotor (13) innerhalb des Saugabschnittes (4) zum Antreiben des Aufwirblers (14), wobei
der Elektromotor über dem Aufwirbler angeordnet ist.

3. Staubsaugersaugwerkzeug nach Anspruch 2, wobei:

der Elektromotor (13) an einem Ende in der Längsrichtung des Saugabschnittes (4) angeordnet ist und
der Übergangsabschnitt (5) höher als der Saugabschnitt (4) auf einer Seite, auf der der Elektromotor nicht angeordnet ist, wenn sich der Übergangsabschnitt gedreht hat, relativ zu dem Saugabschnitt in einer Richtung horizontal zu der zu reinigenden Oberfläche positioniert wird und die Längsmittelachse des Saugabschnittes und die Längsmittelachse des Übergangsabschnittes im Wesentlichen parallel zueinander geworden sind.

4. Staubsaugersaugwerkzeug nach Anspruch 1 oder 2, des Weiteren umfassend einen Stützabschnitt (7), der an einem von dem Übergangsabschnitt (5) und dem Verbindungsrohr (6) angebracht ist, um eines von dem Übergangsabschnitt und dem Verbindungsrohr **dadurch** zu stützen, dass er in Kontakt mit der zu reinigenden Oberfläche platziert wird, wobei
der Stützabschnitt (7) dafür ausgelegt ist, auf einer Rückseite des Saugabschnittes (4), wenn sich der Übergangsabschnitt (15) gedreht hat, relativ zu dem Saugabschnitt in einer Richtung im Wesentlichen horizontal zu der zu reinigenden Oberfläche in einem Ausmaß positioniert zu werden, dass die Längsmittelachse des Saugabschnittes und die Längsmittelachse des Verbindungsrohres im Wesentlichen parallel zueinander werden.

5. Staubsaugersaugwerkzeug nach Anspruch 1 oder 2, wobei:

das Verbindungsrohr (6) dafür ausgelegt ist, relativ zu dem Übergangsabschnitt (5) aus einer Position, in der die Längsmittelachse hiervon im Wesentlichen parallel zu der zu reinigenden Oberfläche ist, zu einer Position, in der die Achse im Wesentlichen vertikal zu der zu reinigenden Oberfläche ist, drehbar zu sein.

6. Staubsaugersaugwerkzeug nach Anspruch 4, wobei der Stützabschnitt (7) einen mit einem weichen Material bedeckten Umfang aufweist.

7. Staubsauger, bei dem ein Staubsaugersaugwerkzeug nach einem der Ansprüche 1 bis 6 verwendet wird.

Revendications

1. Ustensile d'aspiration pour aspirateur comprenant :

une partie d'aspiration (4) comportant une ouverture (12) pour aspirer de la poussière sur une surface à nettoyer (23) ;
une partie de jonction (5) dont une extrémité est raccordée à ladite partie d'aspiration (4) dans une partie supérieure de celle-ci et l'autre extrémité est munie d'un tuyau de raccordement (6) ;
un agitateur (14) disposé à l'intérieur de ladite partie d'aspiration (4) pour évacuer la poussière, et
une partie de canal (8) prévue dans ladite ouverture (12), ladite partie de jonction (5) et ledit tuyau de raccordement (6) pour transporter à travers celle-ci la poussière aspirée, dans lequel on peut faire tourner ladite partie de jonction (5) par rapport à ladite partie d'aspiration (4) dans une direction horizontale par rapport à la surface à nettoyer (23) ayant pivoté sur un axe d'une ligne sensiblement verticale par rapport à la surface à nettoyer (23), et on peut faire tourner ledit

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tuyau de raccordement (6) par rapport à ladite partie de jonction (5) ayant pivoté sur un axe d'une ligne parallèle à la surface à nettoyer (23) dans une mesure telle que l'axe central longitudinal (4a) de ladite partie d'aspiration (4) et l'axe central longitudinal (6a) dudit tuyau de raccordement (6) deviennent parallèles entre eux et ladite partie de jonction (5) et le tuyau de raccordement (6) sont compris dans la largeur de ladite partie d'aspiration (4) ;
caractérisé en ce que ledit ustensile d'aspiration pour aspirateur comprend en outre
un élément de maintien (15) incluant un ressort plat et une gorge (19),
ledit élément de maintien (15) interdisant à ladite partie de jonction (5) de tourner par rapport à ladite partie d'aspiration (4) lorsque la force de rotation appliquée à ladite partie de jonction (5) est inférieure ou égale à une valeur prédéterminée et permettant à ladite partie de jonction (5) de tourner par rapport à ladite partie d'aspiration (4) lorsque la force de rotation appliquée à ladite partie de jonction (5) est supérieure à la valeur prédéterminée.

2. Ustensile d'aspiration pour aspirateur selon la revendication 1, comprenant en outre un moteur électrique (13) situé dans ladite partie d'aspiration (4) pour entraîner ledit agitateur (14), dans lequel
ledit moteur électrique est disposé au-dessus dudit agitateur.

3. Ustensile d'aspiration pour aspirateur selon la revendication 2, dans lequel,
ledit moteur électrique (13) est disposé à une extrémité dans la direction longitudinale de ladite partie d'aspiration (4) et
ladite partie de jonction (5) vient se positionner plus haut que ladite partie d'aspiration (4) sur une face où n'est pas disposé ledit moteur électrique lorsque ladite partie de jonction a tourné, par rapport à ladite partie d'aspiration, dans une direction horizontale par rapport à la surface à nettoyer et l'axe central longitudinal de ladite partie d'aspiration et l'axe central longitudinal de ladite partie de jonction sont devenus sensiblement parallèles entre eux.

4. Ustensile d'aspiration pour aspirateur selon la revendication 1 ou 2, comprenant en outre une partie de support (7) fixée à un élément parmi ladite partie de jonction (5) et ledit tuyau de raccordement (6) pour soutenir un élément parmi ladite partie de jonction et ledit tuyau de raccordement en étant placé en contact avec la surface à nettoyer, dans lequel
ladite partie de support (7) est adaptée à être positionnée sur la face arrière de ladite partie d'aspiration (4) lorsque ladite partie de jonction (15) a tourné, par rapport à ladite partie d'aspiration, dans une direction sensiblement horizontale par rapport à la surface à nettoyer dans une mesure telle que l'axe central longitudinal de ladite partie d'aspiration et l'axe central longitudinal dudit tuyau de raccordement deviennent sensiblement parallèle entre eux.

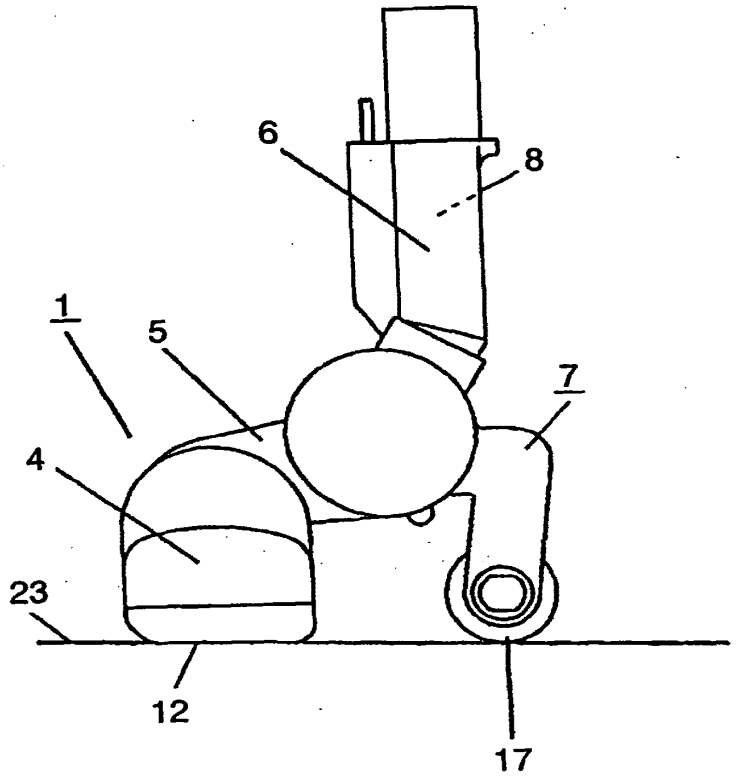
5. Ustensile d'aspiration pour aspirateur selon la revendication 1 ou 2, dans lequel
ledit tuyau de raccordement (6) est configuré pour pouvoir être tourné, par rapport à ladite partie de jonction (5) depuis une position dans laquelle son axe central longitudinal est sensiblement parallèle à la surface à nettoyer jusqu'à une position dans laquelle l'axe est sensiblement vertical par rapport à la surface à nettoyer.

6. Ustensile d'aspiration pour aspirateur selon la revendication 4, dans lequel
la périphérie de ladite partie de support (7) est recouverte d'un matériau doux.

7. Aspirateur utilisant un ustensile d'aspiration pour aspirateur selon l'une quelconque des revendications 1 à 6.

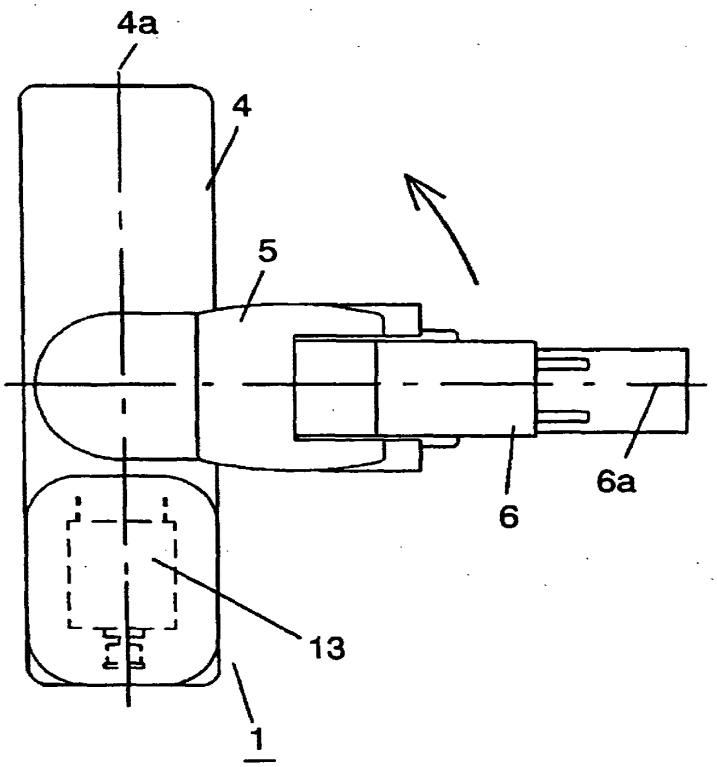
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FIG. 1



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FIG. 2



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FIG. 3

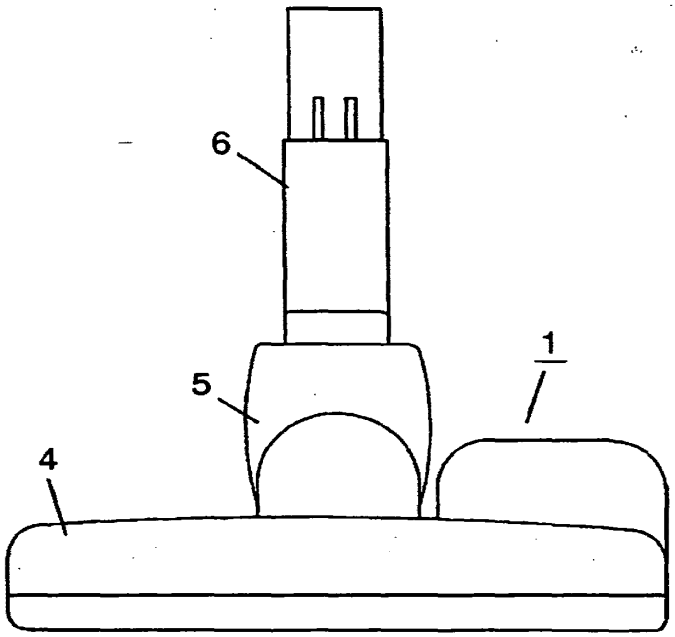
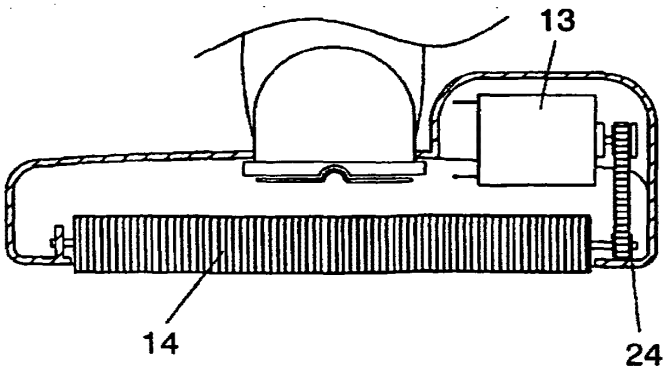
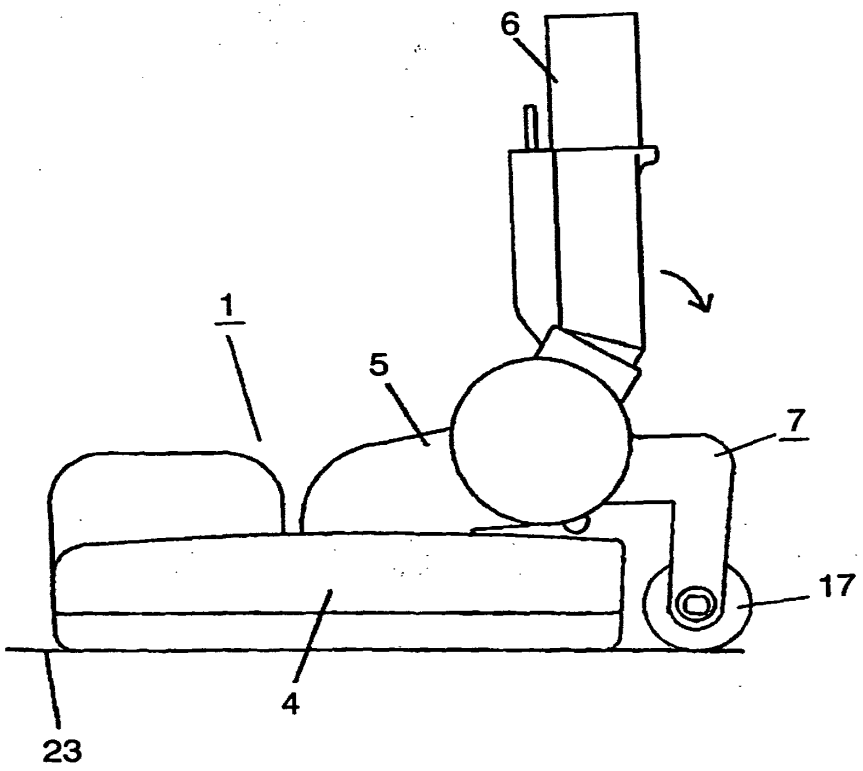


FIG. 4



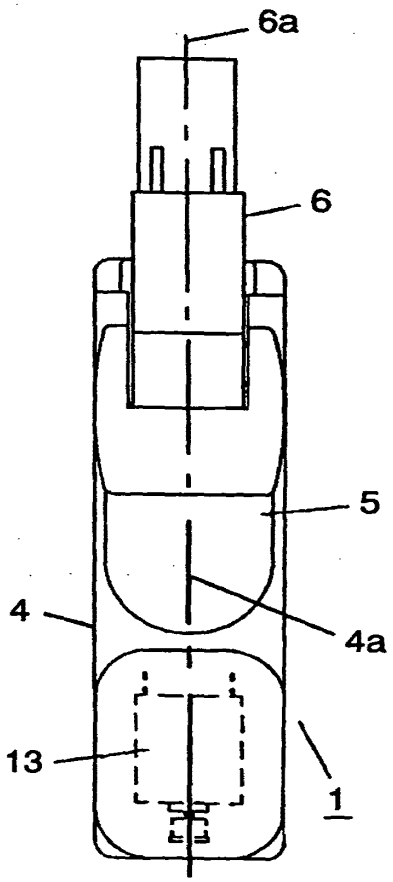
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FIG. 5



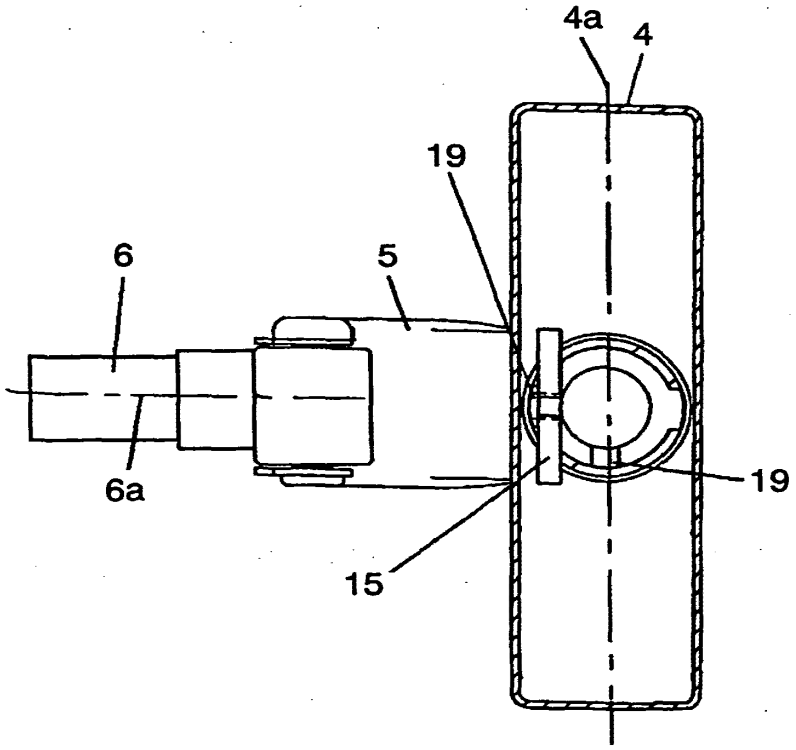
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FIG. 6



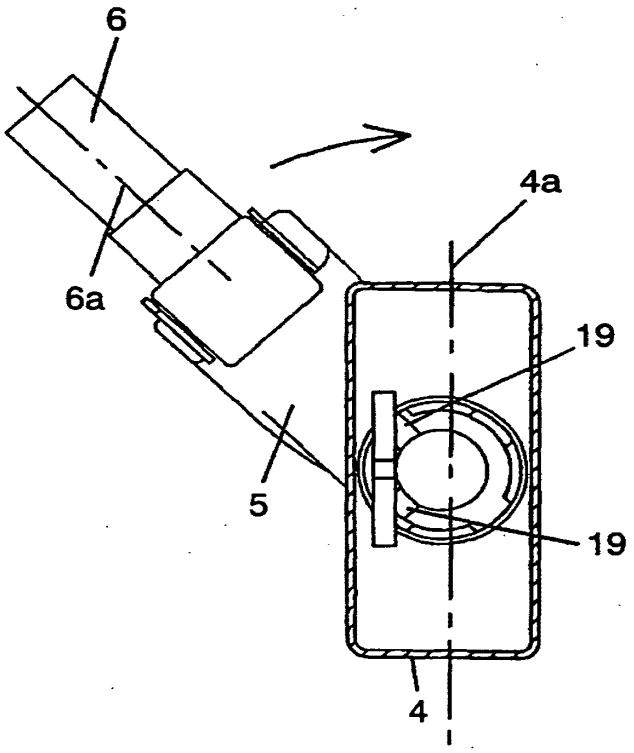
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FIG. 7



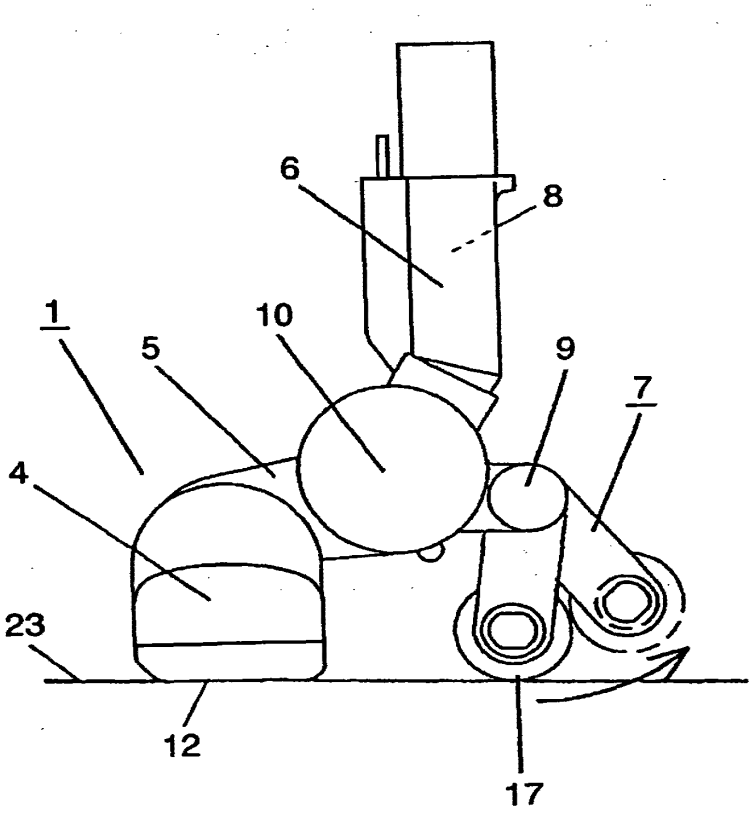
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FIG. 8



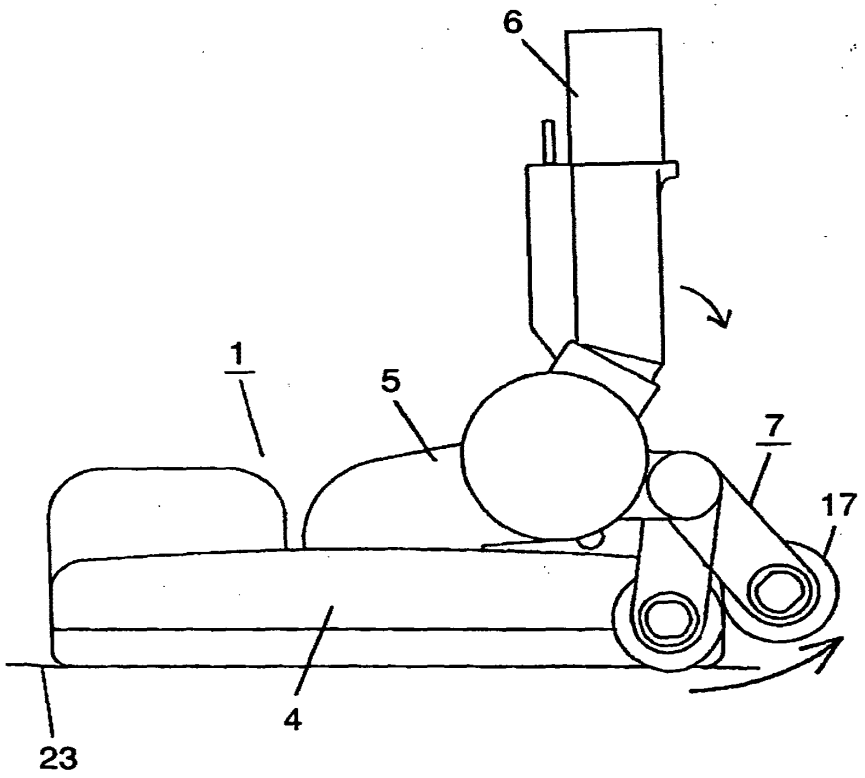
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FIG. 9



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FIG. 10



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FIG. 11

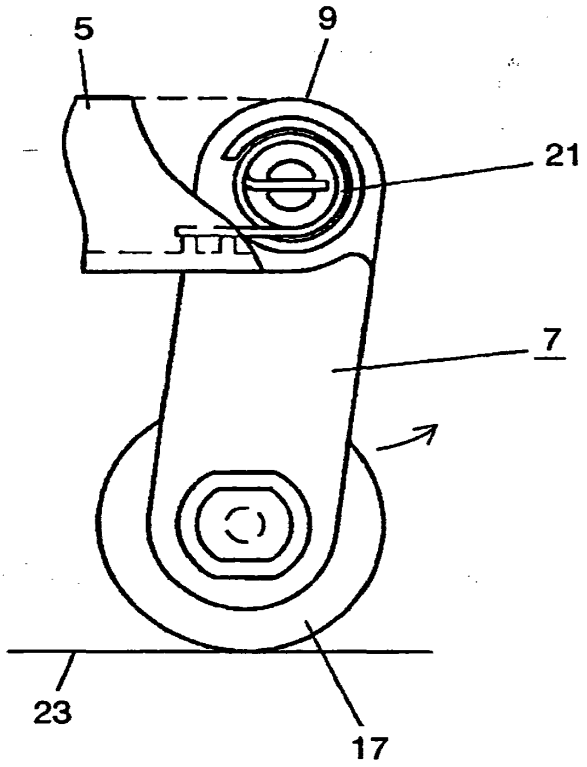


FIG. 12

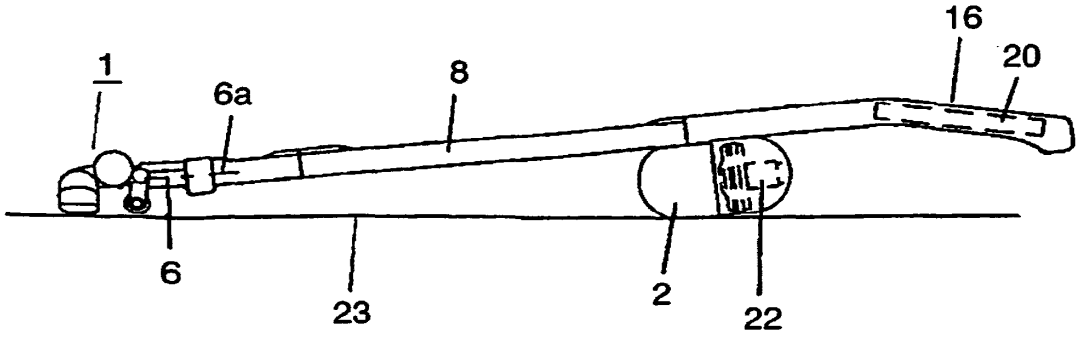
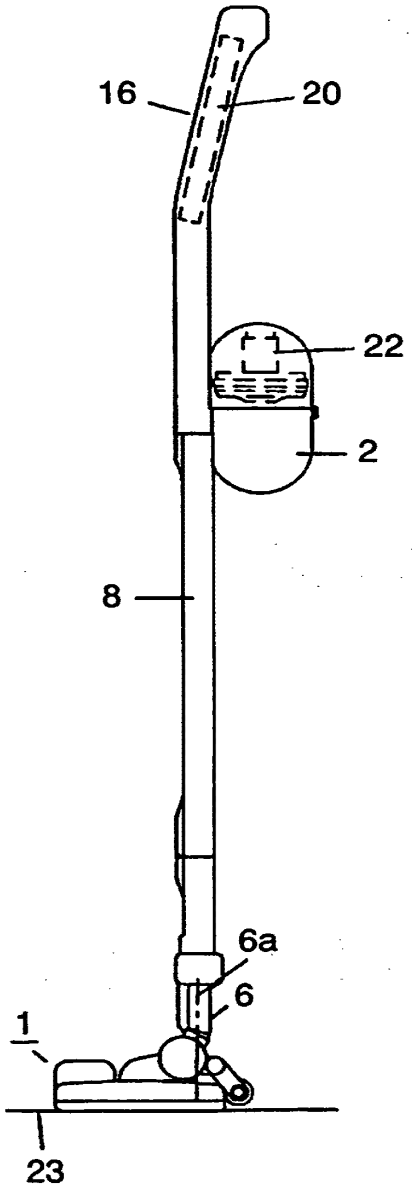


FIG. 13



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FIG. 14A

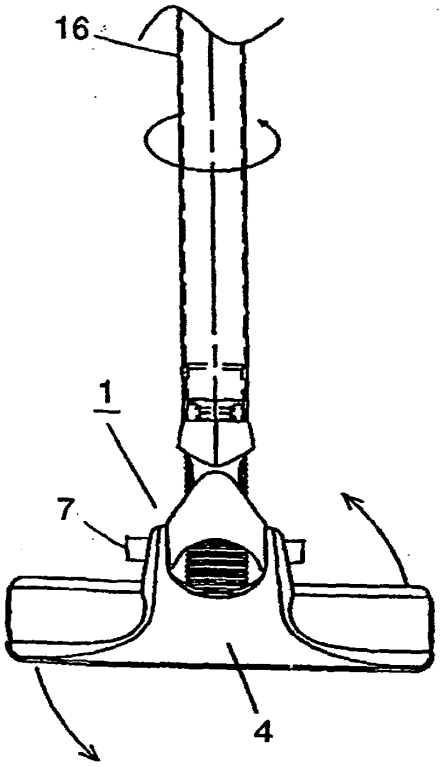
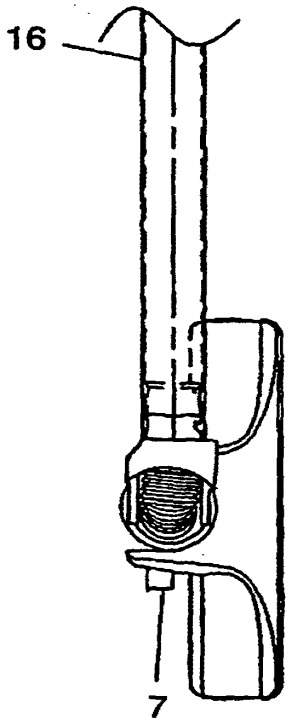


FIG. 14B



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REFERENCES CITED IN THE DESCRIPTION

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- JP 2002102125 A **[0002]**
- DE 10017705 A1 **[0005]**

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Page 216

Japan Patent Office

Issued 5 October 1983

Design Gazette (S)

C3-410 E

745201 Design Application: S61-41073 Application date: 16 October 1986
Registered: 13 July 1988

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Designer: ICHIHARA Fumioki, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: TOKUE Yasuhiko, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

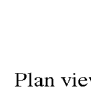
Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Attorney: NAKAO Toshio, Patent Attorney, and one other

Examiner: NABEDA Kazunori

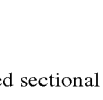
Designed product: Vacuum cleaner

Left side view

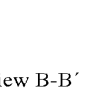


Front view

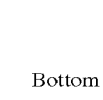
Sectional view A-A′ without internal mechanism



Back view



Right side view



Plan view

Enlarged sectional view B-B′

Bottom view

Perspective view
with hose stowed



Perspective view



日本国特許庁

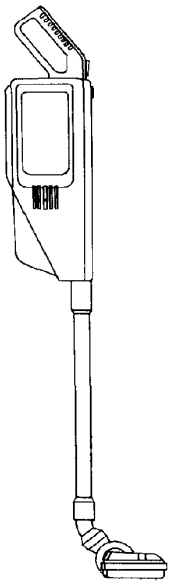
昭和63年(1988)10月5日発行　**意匠公報**（S）　C 3-410 E

745201　意願 昭61－41073　出願 昭61(1986)10月16日
登録 昭63(1988)7月13日

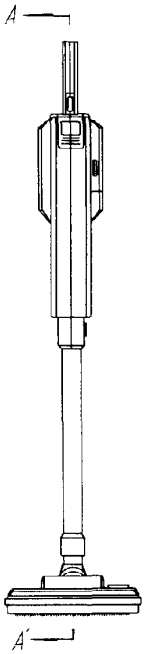
創作者　小路　隆　大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者　市原文興　大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者　徳江康彦　大阪府門真市大字門真1006番地　松下電器産業株式会社内
意匠権者　松下電器産業株式会社　大阪府門真市大字門真1006番地
代理人　弁理士 中尾敏男　外1名
審査官　鍋田和宣

意匠に係る物品　電気掃除機

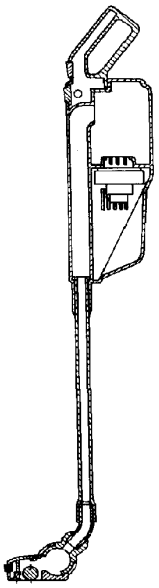
左側面図



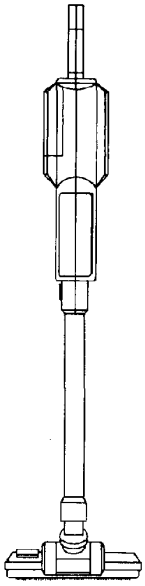
正面図



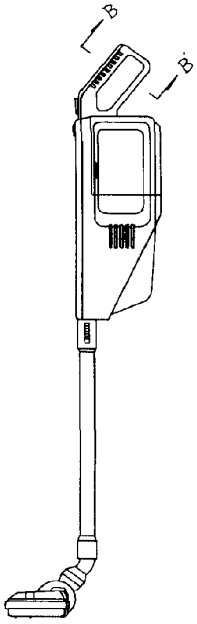
内部機構を省略した
A－A'断面図



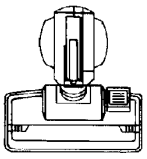
背面図



右側面図



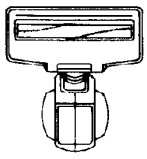
平面図



B－B'拡大断面図

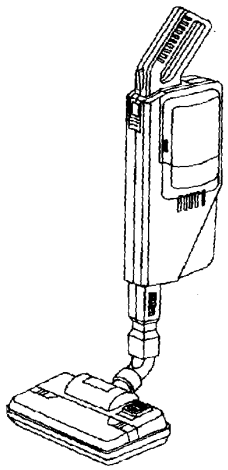


底面図

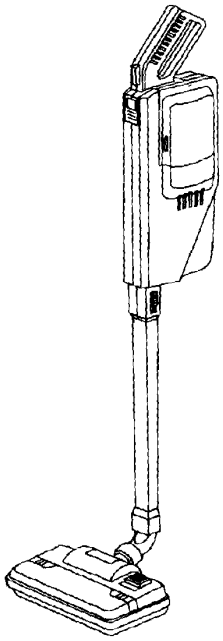


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パイプ収納状態の
斜　視　図



斜 視 図



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mechanical translation of D2

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1.This document has been translated by computer. So the translation may not reflect the original precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention]The present invention relates to the vacuum cleaner provided with the mouthpiece object which can operate the angle of a mouthpiece object arbitrarily easily because a user operates a hand handle.
[0002]
[Description of the Prior Art]It is connected to a hand handle via extension wands, and the mouthpiece object currently used for the conventional vacuum cleaner is attached somewhat pivotable by the joint structure which is rotating the longitudinal direction of extension wands as the axis of rotation, and provided this hand handle on the mouthpiece object.
[0003]The structure comprises a first joint attached to a vertical direction rockable by setting the axis of rotation as the both sides of the longitudinal direction of a mouthpiece body, and a second joint which are provided with the form of the shape of a refracted pipe, attach the one end to the axial direction of the above-mentioned first joint pivotable, fixes the other end to extension wands and is attached.
[0004]And according to this mouthpiece object, the angle and general target in which the second joint was refracted can be made to rotate a mouthpiece object about 45 degree by rotating a hand handle. For example, such structures are disclosed in JP,H5-245073,A.
[0005]
[Problem to be solved by the invention]The mouthpiece object of the aforementioned conventional vacuum cleaner is formed considering an oblong mouthpiece as the keynote, in order to make it move in forward/rearward direction via a hand handle and to clean a mouthpiece object, and he is trying to clean a floor line efficiently. And up-and-down motion of a hand handle and rotation of the mouthpiece object itself are enabled by having two joints described above in order to improve the bottom of a table, and the cleanability of a gap, sticking a mouthpiece object to a floor line by operation of a hand handle.
[0006]However, since the conventional mouthpiece object had restrictions in the working range of the mouthpiece object itself of what can make structure of the mouthpiece object itself strong, it had left problem to the operativity in the hand handle.
[0007]For example, when cleaning the wall time, it is efficient to make the longitudinal direction of a mouthpiece object parallel at a wall surface, and to make it move over a wall surface. However, in the structure of the aforementioned conventional mouthpiece object, since angle of rotation of a joint rotated only about 45 degree even if it rotates a hand handle 90 degree, the aforementioned work had to be done with the impossible attitude, and both hands had to perform it.
[0008]In cleaning of the low gaps under a sofa etc., cleaning efficiency which the joint bent [aforementioned] catches for which and considers was not able to be attained.
[0009]The object of this invention reduces noise and a dust jam, and there is cleanability which can rotate a mouthpiece body broadly to a floor line in twist operation of a hand handle in providing a good vacuum cleaner.
[0010]

[Means for solving problem]In order to attain the aforementioned purpose, the vacuum cleaner concerning the present invention, The main part of a vacuum cleaner provided with the air blower for absorbing dust to a settling chamber, and a suction hose with the flexibility which an end is attached by the aforementioned main part of a vacuum cleaner, and communicates the aforementioned air blower, The hand handle which is attached with the other end of the aforementioned suction hose, and communicates the aforementioned air blower, In the communication trunk which is attached to the aforementioned hand handle and communicates the aforementioned suction hose, the mouthpiece object which is attached to the aforementioned communication trunk and communicates this communication trunk, ** and others, the aforementioned mouthpiece object, The mouthpiece body provided with the suction opening for absorbing dust in which right and left directions are longer than a depth direction, Connect the aforementioned mouthpiece body with the aforementioned communication trunk pivotable, have a dust passage of a mouthpiece body, and a free connecting part which communicates the aforementioned communication trunk, and the above-mentioned free connecting part, Comprise a tubular first arm and a second arm and the above-mentioned first arm, It is attached to the Y-direction which serves as an elevation angle to the aforementioned mouthpiece body via a first rotating part by the end pivotable, and the above-mentioned second arm, The one end is attached to the X-direction which makes a cleaning face and parallel rotate the aforementioned mouthpiece body to the other end of the above-mentioned first arm via a second rotating part pivotable, it is formed in the upper center of the right and left directions of the aforementioned mouthpiece body by the concave part, and the above-mentioned first rotating part, The first axis-of-rotation receiving part formed in the upper part of the both sides of the right and left directions of the aforementioned concave part, It is ** constituted with the first shaft projection of the upper both sides of the opening which constitutes the dust collection passage formed in the end of the above-mentioned first arm, and in the lower part of ******** with pivotable picking, and the aforementioned opening, the first shaft projection is provided by the above-mentioned first axis-of-rotation receiving part so that frequent appearance to the aforementioned concave part is possible.

[0011]

[Mode for carrying out the invention]Hereafter, one form of enforcement of the present invention is described with reference to Fig.24 from Fig.1.

[0012](First embodiment) Fig.1 to Fig.17 is a first embodiment concerning the present invention,In the parts constitution figure of a free connecting part, and Fig.10, Fig.11 to the explanatory view of a mouthpiece object of operation and Fig.16 are [Fig.2 to the appearance perspective view and the Fig.6 whose Fig.1 is a vacuum cleaner / the outline view of a mouthpiece object, Fig.7, and Fig.8 / the cross sectional view of a mouthpiece object, and Fig.9 / the explanatory view of a hand handle and Fig.17] the busy condition figures of a mouthpiece object.

[0013]First, the vacuum cleaner concerning this embodiment is described with reference to Fig.1. The mechanism 100 which it is a vacuum cleaner which the code 1 shows in the gross, and is not illustrated for absorbing dust to a settling chamber, for example, the main part of a vacuum cleaner provided with the air blower, The suction hose 200 with the flexibility which an end is attached to the aforementioned main part 100 of a vacuum cleaner, and communicates the aforementioned air blower, The hand handle 300 which is attached to the other end of the aforementioned suction hose 200, and communicates the aforementioned air blower, It is attached to the siphon 400 which is attached to the aforementioned hand handle 300 and communicates the aforementioned suction hose 200, and the aforementioned siphon 400, and comprises the mouthpiece object 500 which communicates this siphon 400.

[0014]The aforementioned main part 100 of a vacuum cleaner is provided with the settling chamber which equipped the inside with the disposable dust bag, is with the pair of giant swing 101 and the one free wheel 102, and can be made to move it via the aforementioned suction hose 200. The operation control of the aforementioned main part 100 of a vacuum cleaner is the infrared light-receiving part 103 in the operation display part provided on the upper surface of this main part 100 of a vacuum cleaner, and is operated in response to the operation signal sent

from the hand handle 300.
[0015]Along with the suction hose 200, an electric electric conduction line may be provided from the hand handle 300, the signal for controlling operation of a vacuum cleaner via this electric conduction line, for example, the signal which controls the revolving speed of the motor currently provided by the air blower, may be transmitted, and operation of the vacuum cleaner 1 may be controlled.
[0016]The aforementioned suction hose 200 is provided with the function as a carrying passage for conveying dust on the aforementioned main part 100 of a vacuum cleaner, and the function as a move hauling means for moving the main part 100 of a vacuum cleaner. The supple bellows-like hose is adopted in this embodiment.
[0017]The hand handle 300 is provided with the function which the aforementioned suction hose 200 and the aforementioned communication trunk 400 are made to communicate, the function to which the operation control of the aforementioned main part 100 of a vacuum cleaner and the main part 100 of a vacuum cleaner are moved, and the function to operate a motion of the aforementioned mouthpiece object 500 further. It is removably connected with the aforementioned suction hose 200, and this hand handle 300 is that the aforementioned communication trunk 400 is attached further, enabling free attachment and detachment, makes the aforementioned suction hose 200 and the aforementioned communication trunk 400 communicate, and forms the conveying path of dust.
[0018]further -- this hand handle 300 -- the longitudinal direction of the aforementioned communication trunk 400 -- that is, To the upper end on the extension wire of medial-axis B-2 of the aforementioned communication trunk 400, aforementioned medial-axis B-2 and 90 degree [160 / or less] or more, It had an angle (alpha in a figure) around 120 degree from 100 degree preferably, and the longitudinal direction B4 equips the suction hose 200, the connecting direction of the aforementioned communication trunk 400, and the position that abbreviated-corresponds with the handle 301. By this handle 301, the aforementioned main part 100 of a vacuum cleaner can be moved via the aforementioned suction hose 200, and a motion of the mouthpiece object 500 can be operated further.
[0019]In particular, according to this handle part 301, twist operation P1, i.e., rotation centering on medial-axis B-2, can be performed easily. And since it is attached pivotable in this twist operation so that the aforementioned suction hose 200 may always be placed under the aforementioned handle part 301 with gravity to the aforementioned hand handle 300, Since the suction hose 200 is not pulled up in twist operation of the handle part 301, the burden concerning a wrist is mitigable. Under the present circumstances, since the handle part 301 is provided in the upper part, the suction hose 200 provided caudad does not interfere with the aforementioned twist operation. Thereby, the mouthpiece object 500 can be rotated 90 degree or more on a floor line (cleaning face) like the after-mentioned (P2 in a figure). The form of the handle part 301 mentioned above can perform rotatably operating of the mouthpiece object 500 comparatively easily. This Reason is giving an angle (alpha in a figure) to the handle part 301, and is for the angular moment to arise, when the handle part 301 is twisted.
[0020]Since the handle cover 307 which a user holds is provided by the aforementioned handle part 301 pivotable, Since change of the angle accompanying twist operation of the aforementioned handle part 301 is absorbable because the aforementioned handle cover 307 rotates the handle part 301, the burden concerning a wrist is mitigable.
[0021]Near the aforementioned handle part 301, the operating part 302 which operates operation of the aforementioned main part 100 of a vacuum cleaner is provided. An operation signal can be sent to the infrared light-receiving part 103 which the infrared dispatch part 303 is provided by this operating part 302, and was provided on the aforementioned main part 100 of a vacuum cleaner from this infrared dispatch part 303, and ON of the power supply of the aforementioned main part 100 of a vacuum cleaner, and OFF and various kinds of control can be performed. Since the hand handle 300 is equipped with power supply sections, such as a cell which is not illustrated, it is unnecessary to perform electric wiring to the aforementioned suction hose 200. Since the infrared dispatch part 303 is provided to two places and an operation signal can be reliably transmited to the main part 100 of a vacuum cleaner using a reflection of a ceiling, a wall

surface, etc., malfunction is mitigable.
[0022]The aforementioned communication trunk 400 is making the aforementioned hand handle 300 and the aforementioned mouthpiece object 500 communicate, and fixing this hand handle 300 and this mouthpiece object 500 by a position further, It has the function transmited so that a motion (movement and rotation) of this hand handle 300 may be considered as a motion (movement and rotation) of this mouthpiece object 500. It constitutes elastically so that the aforementioned communication trunk 400 can be fixed by predetermined length, and he is trying to attach the aforementioned hand handle 300 to another side for the aforementioned mouthpiece object 500 in this embodiment at one side by combining the two shells 401 and 402 which differ in a size, enabling free attachment and detachment.
[0023]The mouthpiece body 1000 which equipped the bottom surface with the mouthpiece 1004 (refer to Fig.6) for the aforementioned mouthpiece object 500 to absorb dust, While operating so that a floor line may always be touched in the bottom surface of the mouthpiece body 1000 to a motion of the hand handle 300 which connects the aforementioned mouthpiece body 1000 with the aforementioned communication trunk 400, and is transmited via the aforementioned communication trunk 400, It comprises the free connecting part 1500 which communicates so that the airstream containing the dust absorbed from the aforementioned mouthpiece body 1000 may be led to the aforementioned communication trunk 400.
[0024]The aforementioned mouthpiece body 1000 is provided with flat approximately rectangular form, and the above-mentioned free connecting part 1500 is attached in the center of the upper surface pivotable. The above-mentioned free connecting part 1500 is provided with the mechanism which transmits the rotation P1 of twist operation of the hand handle 300 to the rotation P2 of the mouthpiece body 1000 as it is while connecting it with the direction Y of height and the right and left directions X of the hand handle 300 pivotable centering on this mouthpiece object 500.
[0025]The tubular first arm 1501 that can attach the free connecting part 1500 to the aforementioned mouthpiece body 1000 pivotable, and enables rotation of the direction Y of height in this embodiment, It comprises the tubular second arm 1502 which one end is attached by the aforementioned siphon 400, and is attached in the other end so that rotation of the other end of the above-mentioned first arm 1501 and the right and left directions X may be enabled. And the above-mentioned first arm 1501 constitutes the first rotating part 1503 attached to the Y-direction from which the end serves as an elevation angle to the aforementioned mouthpiece body 1000 pivotable, The one end is attached to the other end of the above-mentioned first arm 1501, and the above-mentioned second arm 1502 is performing operation which leans the aforementioned hand handle 300 to right and left, and constitutes the pivotable second rotating part 1504 in the X-direction which makes a cleaning face and parallel rotate the mouthpiece body 500 as a result.
[0026]The above-mentioned second rotating part 1504 is in the state which made the minimum the angle of the direction Y of height of the above-mentioned free connecting part 1500, the surface of revolution -- the surface of revolution which only the angle Z makes it incline ahead, has provided it from the floor line, and carried out [aforementioned] the inclination of the F -- the end of the above-mentioned first arm 1501 is attached to the upper part side of F (Fig.7, eight references), and the end of the above-mentioned second arm 1502 is attached to the lower part side of the aforementioned surface of revolution F.
[0027]According to [although a postscript is carried out for details] the vacuum cleaner 1 of this embodiment, by this embodiment, operation of the rotation P1 of the aforementioned hand handle 300 turns into operation which shakes the both wings of the mouthpiece object 500 here, but, Since the bottom surface of the aforementioned mouthpiece object 500 is supported by the cleaning face in a busy condition, the motion is restricted. However, since the surface of revolution F of the second rotating part 1504 of the free connecting part 1500 inclines to a cleaning face, the rotation P1 of twist operation of the hand handle 300, It converts to rotation of the second rotating part 1504, if the right and left directions X 300, i.e., a hand handle, are twisted clockwise, this second rotating part will be moved in the direction of right-hand side in the left lateral at half:00, if it is the direction of the total (motion shaken so that it may escape),

and it operates as like.
[0028]Under the present circumstances, in this embodiment, since it had the first rotating part 1503 that operates in the direction Y of height, while this first rotating part 1503 has stuck the bottom surface of the mouthpiece object 500 to the cleaning face, it follows in footsteps of operation of the above-mentioned second rotating part 1504, and rotates. And the motion of the right and left directions X of the above-mentioned second rotating part 1504 operates so that the back of the mouthpiece object 500 may be shaken via the first arm 1501 connected with this, and it is converted to the rotation P2 of the mouthpiece object 500. Thereby, in this embodiment, the rotation P1 of twist operation of the aforementioned hand handle 300 can be transmited as the rotation P2 of the mouthpiece body 1000.
[0029]Especially the place by which it is characterized [of this embodiment / big], Since the surface of revolution F of the above-mentioned second rotating part 1504 is set up in parallel with the medial axis B of the communication trunk 400 and the attitude always inclined to the cleaning face is taken in the working range of the first rotating part 1503, In the working range of the first rotating part 1503, the rotation P2 of the mouthpiece object 500 is controllable by the rotation P1 of twist operation of the hand handle 300.
[0030]It can carry out rightward and rotation of the aforementioned X-direction of the aforementioned mouthpiece body 1000 can be performed leftward in the range of 90 degree, i.e., 180 degree, 90 degree at least at this embodiment in the state of V2 which carried out the right opposite of the mouthpiece object 500, and made the hand handle 300 be placed at the center and which is made to go straight on. Rotation of the aforementioned Y-direction makes the aforementioned communication trunk 400 pivotable in the range to the position which stands straight from a horizontally near position.
[0031]In this embodiment, although the angle of gradient Z of the aforementioned surface of revolution F is set as 20 degree, the same operation is expectable in the range up to 10 degree - 30 degree. However, if the angle Z is large, the motion control of the mouthpiece object 500 in the state where the angle of the direction Y of height is small can rotate the mouthpiece body 1000 90 degree in the working range where it is good and the direction Y of height is small, but it becomes difficult to level the communication trunk 400 arranged in parallel with the aforementioned surface of revolution F. If the angle Z is small to this reverse, the aforementioned angle Z will be in a state contrary to the case where it is large. For this reason, the size of the preferable angle Z is good to determine suitably in consideration of a busy condition.
[0032]The aforementioned mouthpiece object 500 is providing the bumper part 1100 formed with the material which is easy to slide on the circumference of the mouthpiece body 1000, and it is providing the wheel 1200 which makes smooth a motion of the longitudinal direction of the mouthpiece object 1000 on the bottom surface while improving the cleanability in the wall case. Henceforth, the moving direction which was along the transverse direction of the mouthpiece object 1000 in the right and left directions V1, these right and left directions, and a right-angled direction about the moving direction in alignment with the longitudinal direction of the mouthpiece object 1000 is described as V2 on account of a description.
[0033]Thus, since the operation signal is transmited via an infrared signal according to the vacuum cleaner 1 concerning this embodiment, and it is not necessary to wire the suction hose 200, the weight saving of the suction hose 200 is attained. For this reason, the burden of the hand handle 300 which a user has in a hand is eased, and a leading-about run of the main part 100 of a vacuum cleaner and operation of the mouthpiece object 500 can be improved.
[0034]Especially the place by which it is characterized [of this embodiment / big], Rotation P1 of operation of the mouthpiece object 500 through the hand handle 300, for example, twist operation of the aforementioned hand handle 300, can be considered as the rotation P2 of the mouthpiece object 500 as it is, It is on the point that operation which a user performs by the hand handle 300 can be smoothly performed as a motion of the mouthpiece object 500.
[0035]It is the operation to which rotation (rotation P2) of the mouthpiece object 500 is carried out 90 degree as shown in the dotted line of Fig.1, and usual carries out back and forth movement of the hand handle 300 further specifically, for example by twisting the hand handle

300 90 degree (rotation P1), Floor line cleaning in the wall case can be performed carrying out back and forth movement of the mouthpiece body 1000 in the direction of the right and left directions V1 over a wall surface. Under the present circumstances, while being able to move the mouthpiece object 500 smoothly by the bumper part 1100 and the wheel 1200, it is mitigable to give a crack to a wall surface.
[0036]Since the suction hose 200 connected with the hand handle 300 rotates in this case so that it may always be placed caudad even if the aforementioned hand handle 300 is twisted 90 degree, the suction hose part 200 does not impair the operativity accompanying the aforementioned twist operation.
[0037]In this embodiment, in the working range of the direction Y of height, since the rotation P2 of the mouthpiece object 500 is controllable by the hand handle 300, right and left blur of the mouthpiece object 500 which worsens tracking is mitigable. And sudden BATATSUKI of the hand handle 300 whose one side of the longitudinal direction of the mouthpiece object 500 floats since the conformity of the mouthpiece object 500 improves even if it switches and carries out and performs the change of operation, for example, sudden right and left twist operation, is reduced by the inclining surface of revolution F.
[0038]While according to the free connecting part 1500 concerning this embodiment maintaining the height from a cleaning face to the first rotating part 1503 and securing the circulation route of dust, Where the free connecting part 1500 is substantially leveled using the dead space used as the downward position of this first rotating part 1503, since the second arm 1502 is made to be placed under the first arm 1501, the height of the whole mouthpiece object 500 can be made low. having stuck the bottom surface of the mouthpiece body 1000 to the cleaning face as by this -- space where the height under a bed etc. is low, for example -- the mouthpiece object 500 -- ********** -- things are made. And the mouthpiece object 500 excels [**********] in tracking under the bed, without blurring right and left.
[0039]Hereafter, the mouthpiece object 500 which is one of the big characteristics of the vacuum cleaner concerning this embodiment is described in detail.
[0040]First, with reference to Fig.6, it describes about the appearance structure of the aforementioned mouthpiece object 500 from Fig.3 based on Fig.2.As for a side view and Fig.4, Fig.2 is [the back perspective view of a mouthpiece object, and Fig.3 / a front view and the Fig.6 of a plan view and Fig.5] bottom views.
[0041]As it described above in Fig.5 from Fig.2, the mouthpiece object 500 comprises the mouthpiece body 1000 and the free connecting part 1500 arranged in the center behind this mouthpiece body 1000.
[0042]While making the appearance into the thin type form which makes four corners big R shape seen from a top, the aforementioned mouthpiece body 1000, While improving cleanability by considering it as the form which made the subject R shape made into the arc shape which uses a central part as the maximum crowning seen from a side surface, it considers by making each corner into R shape so that a crack may not be attached to furniture etc.
[0043]The lower case 1001 into which the mouthpiece body 1000 was molded with the resin material which accomplishes the skeleton of the mouthpiece body 1000, A settling chamber consists of the arm top covers 1002 molded with the resin material which covers the upper part of the mouthpiece body 1000. The front arm top cover 1001 and the discharge ring 1002 are set by the circumference side of the mouthpiece body 1000, and the convex bumper 1100 is formed in the doubling part. The aforementioned bumper 1100 is formed with soft materials, such as the material of a separate body, for example, rubber etc., or an elastic resin material, it is assembling so that this may be put from the upper and lower sides with the arm top cover 1001 and the discharge ring 1002, and he is trying to stop with a screw in this embodiment, as shown in Fig.7.
[0044]It assembles, and the aforementioned bumper 1100 is formed integrally with the front arm top cover 1001, and it may be made shine and to attach with the screw which is not illustrated so that the discharge ring 1002 may fit into this bumper 1100.
[0045]As described above, on the other hand, the above-mentioned free connecting part 1500, Two the tubular first arms 1501 and the second arms 1502 are connected by the second rotating part 1504, It is considered as the connection part 1505 for attaching the other end of the first

arm 1501 to the mounting part 1003 of the aforementioned mouthpiece body 1000 pivotable in the direction Y of height via the first rotating part 1503, and attaching the other end of the above-mentioned second arm 1502 to the aforementioned communication trunk 400.
[0046]The aforementioned mounting part 1003 is formed behind [central] the longitudinal direction of the aforementioned arm top cover 1001 here at a concave, The axis of rotation Q1 of the above-mentioned first rotating part 1503 is provided by the maximum crowning of the aforementioned circular face used as the concave front part, and the above-mentioned first arm 1501 is inserted in the aforementioned concave mounting part 1003, and is attached pivotable with the aforementioned axis of rotation Q1.
[0047]The above-mentioned free connecting part 1500 is in the state which made the attitude parallel substantially in the cleaning face, While carrying out the lap of Ryobe's end, providing so that the second arm 1502 may be placed under the first arm 1501, and providing the second rotating part 1504 into this portion that carried out the lap, It is made to incline ahead to the longitudinal direction R1 of the first arm 1501, and the second longitudinal direction R2 (the same direction as aforementioned medial-axis B-2) is providing the surface of revolution F of the above-mentioned second rotating part 1504 in parallel. Fig.7 describes this detailed structure.
[0048]In Fig.6, the mouthpiece 1004 of the oblong rectangular shape for absorbing dust is formed in the center of a bottom surface of the mouthpiece body 1000, Two or more convex guide projections 1006 in which the convex brush 1005 which has flexibility before and after this mouthpiece 1004 is arranged to be located in a line by the single tier, guides the airstream which contained dust in the outside of that brush 1005 further at the aforementioned mouthpiece, and rectifies the flow of an air current are provided. And the wheel 1200 which floats the aforementioned mouthpiece 1004 appropriately from a cleaning face, and secures the running function of the mouthpiece object 500 is provided before and after the both sides of the mouthpiece body 1000. By this, the mouthpiece object 500 can be smoothly moved to the forward/rearward direction V2, a cleaning face can be brushed with the aforementioned brush 1005 in this case, and the dust which soared by this can be absorbed efficiently.
[0049]Since the aforementioned wheel 1200 is formed with the slide resin material with appropriate hardness, while also being able to rotate the rotating operation of the mouthpiece object 500 smoothly, it can be made to move to the right and left directions V1 smoothly. If the aforementioned wheel 1200 is made into the shape of a drum shape in which the center swelled or the brush and carpet cloth are stuck on a wheel traveling surface, it can act as Kougami of the rotationability much more.
[0050]In this embodiment, a part of longitudinal direction of the bumper 1100 formed in the aforementioned convex one is cut, and two or more concave parts 1101 are formed. Thereby, when pressing the point (front part of the bumper 1100) of the mouthpiece object 500 to the wall, air can be inhaled from the concave part 1101 formed in the aforementioned bumper 1100. This air inhaled can be sprayed in spot, since that flow rate moreover becomes early by two or more aforementioned guide projections 1006, it can lick the portion of the cleaning face which the brush does not reach, for example, the cleaning face in the wall case, according to a quick spot air current, and it can absorb dust efficiently. It is rectified by the aforementioned guide projection 1006 and the air furthermore inhaled is sucked by the mouthpiece 1004.
[0051]Thus, since according to the mouthpiece body 1000 concerning this embodiment the operativity of the mouthpiece body 1000 can be improved by the wheel 1200 consisting of a slider and the guide projection 1006 and the brush 1005 are provided further, the cleaning efficiency of a floor line (cleaning face) can be improved. Since the wheel 1200 is formed with the slider when rotating the mouthpiece body 1000 concerning this embodiment, the operativity of the mouthpiece body 1000 is not deteriorated.
[0052]At this embodiment, where the mouthpiece object 500 is rotated 90 degree, since the free connecting part 1500 is settled in the project area of the mouthpiece body 1000, the mouthpiece object 500 can be inserted also in the gap between Haba of the transverse direction of the mouthpiece body 1000. In addition, where the aforementioned mouthpiece object 500 is rotated 90 degree, since both the longitudinal directions of the mouthpiece body 1000 can be attached to a wall surface, even if it carries out the RRC of the mouthpiece object 500, and it carries out

a RLC, same cleaning work can be performed.
[0053]Next, in Fig.9, the internal structure of the mouthpiece object 500 is described from Fig.7.The cross sectional view of the mouthpiece object in the state where Fig.7 made the angle of the direction Y of height small, the cross sectional view of the mouthpiece object in the state where Fig.8 carried out the angle of the direction Y of height largely, and Fig.9 are the material explosion figures of a free connecting part.In Fig.7 and 8, the mouthpiece object 500 concerning this embodiment, It has the axis of rotation Q1 and Q2, rotation of the X-direction of the mouthpiece body 1000 is performed in accordance with the axis of rotation Q1 which constitutes the second rotating part 1504, and rotation of the angle (elevation angle) Y of the direction of height is performed in accordance with the axis of rotation Q2 which constitutes the first rotating part 1503.
[0054]The above-mentioned first arm 1501 and the second arm 1502 are attached pivotable so that it may always communicate with the opening of other components with which the opening which is formed tubular and formed in both both ends is connected.
[0055]As shown in Fig.9, the first shaft part 1506 that the first arm 1501 is provided by convex at the both sides of the upper end of the opening 1501a formed in the one end, and constitutes the axis of rotation Q1 is provided, This first shaft part 1506 is attached to the first axis-of-rotation receiving part 1007 provided by the upper part of the mouthpiece body 1000 using resin elasticity, and constitutes the first rotating part 1503. According to the structure of the above-mentioned first rotating part 1503, the first arm 1501 can be rotated from a horizontally near position to a vertical position centering on the upper part of the opening 1501 provided at the end of the first arm 1501, making the opening 1501 incline.
[0056]Here, it returns to Fig.7 and 8, and in this embodiment, in order to improve the miniaturization of the mouthpiece object 500, and the handling property at the time of V1 run, the mouthpiece 1004 is provided under the first rotating part 1503. For this reason, without the airstream absorbed from this mouthpiece 1004 winding largely, And in order to make it communicate with the above-mentioned first arm 1501 so that the free connecting part 1500 may have a big effective area product in a vertical position from the settling chamber 1008 of the mouthpiece body 1000 from a horizontally near position to ** and there may moreover be no air leak, The shutter mechanism is adopted as the first rotating part 1503 in this embodiment.
[0057]Specifically, by this embodiment, since the lower part of the opening 1501a rotates around the center of the upper end of the opening 1501a, The lower part of the end of the first arm 1501 provided with the aforementioned opening 1501a is made into the convex arc shape part 1507 centering on the aforementioned axis of rotation Q1, and this arc shape part 1507 makes the lower part of the mounting part 1003 stored the same concave arc shape part 1009. And the shutter plate 1508 formed with the same circular arc arranged by sticking so that there may be no air leak between the arc shape part 1507 of the above-mentioned first arm 1501 and the arc shape part 1009 of the aforementioned mounting part 1003 is provided. Furthermore, around the center of the aforementioned axis of rotation Q1, along with this circumferential direction, the aforementioned shutter plate 1508 is provided so that operation is possible.
[0058]And as the aforementioned shutter plate 1508 is shown in Fig.7, the first arm 1501 laps with the arc shape part 1007 of the above-mentioned first arm 1501 in a substantially level position, and is stored by the mounting part 1003, In the state where the first arm 1501 shown in Fig.8 is vertical, while the both ends of the shutter plate 1508 connect with the aforementioned mounting part 1003 and the first arm 1501, it is pulled out.
[0059]Since according to this structure the mouthpiece body 1000 is a central part of that upper surface and is connected with the first arm 1501 in the maximum crowning, Since the mouthpiece body 1000 is hung near [the] the center position when raised via the communication trunk 400, it is raised as it is with the attitude of the mouthpiece body 1000, and the attitude which made the bottom surface parallel in the cleaning face. Since the whole bottom surface can be landed on a cleaning face even if the balance of an air attitude becomes good by this and it is again put on a cleaning face, handling is easy. In this embodiment, since the axis of rotation Q1 is set as one side of the opening 1501a, and what is necessary is just to provide the shutter plate 1508 to one side of the opening 1501a, structure can be simplified.

[0060]In this embodiment, since the aforementioned arc shape part 1507 is stored in the mounting part 1003 of the mouthpiece body 1000 and the first arm 1501 can make the height of the mouthpiece object 500 whole low at the time of a horizontally near attitude (lateral attitude), the cleanability of a gap with low height can be improved.
[0061]Next, the other end of the first arm 1501 is arranged so that as mutual a peripheral flank as the other end of the second arm 1502 may lap, and the second rotating part 1504 is provided by the overlapping portion. The tubular concave axis-of-rotation receiving part 1509 which is formed below one end of the above-mentioned first arm 1501 in the second rotating part 1504, and constitutes the opening 1501b by the side of the other end of this 1st arm 1501 from this embodiment specifically, It is formed above the end of the above-mentioned second arm 1502, and constitutes from the shaft part 1510 which constitutes the opening 1502a by the side of the end of the second arm 1502 and which was projected tubular, It is attached pivotable so that the checking and verifying of the shaft part 1510 may be carried out to the aforementioned axis-of-rotation receiving part 1509 and there may be no air leak centering on the axis of rotation Q2.
[0062]While in other words making circular the openings 1501b and 1502a in which the annular ventilation flue was made bent so that the end of the first arm 1501 and the second arm 1502 may be made with an L type in this embodiment, and the both-arms part was bent, The axis-of-rotation receiving part 1509 is formed in the opening 1501b of the first arm 1501, and the shaft part 1510 is formed in the opening 1502a of the second arm 1502. And the checking and verifying of the aforementioned axis-of-rotation receiving part 1509 and the shaft part 1510 are carried out, and it attaches pivotable centering on the axis of rotation Q2 which is the circular center of the aforementioned double door regio oralis 1501b and 1502a. The aforementioned axis-of-rotation receiving part 1509 and the shaft part 1510 are fixed by the fixing member 1511 provided ranging over the slot of the ring shape provided to the mutual annular sliding surface.
[0063]According to the structure of this free connecting part 1500, in the state of a lateral attitude, the longitudinal direction R1 of the first arm 1501 and the longitudinal direction R2 of the second arm 1502 are arranged for this free connecting part 1500 up and down, and the surface of revolution F of the second rotating part 1504 is provided in the meantime. The longitudinal direction R2 of the second arm 1502, i.e., medial-axis B-2 of the communication trunk 400, and parallel provide, and the longitudinal direction R1 of the first arm 1501 is provided with the angle of gradient Z, and the aforementioned surface of revolution F inclines ahead, and is provided.
[0064]Thus, since it has the two rotating parts Q1 to which a rotating part goes direct, Q2 [1503], i.e., the first rotating part of the direction Y of height, and the second rotating part 1504 of right and left directions according to the free connecting part 1500 concerning this embodiment, The rotation P1 of twist operation of the hand handle 300 can be converted to the rotation P2 of the turning operation of the mouthpiece object 500 as it is. And since the two aforementioned rotational structures and the especially second rotating part 1504 are made into the simple rotational structure according to this free connecting part 1500, Since an exterior can also be made simple without unevenness while manufacture is also easy, while being able to improve a design, safety measures and cleanability, such as pinching a finger, can be improved.
[0065]Next, based on Fig.10, a motion of the free connecting part accompanying operation of the hand handle 300 is described further. In Fig.10, the outline perspective view which saw from back the mouthpiece object 500 which requires the (a) figure for this embodiment, and the (b) figure show the mouthpiece object 500a which reversed the fitting location of a first arm and second arm up and down.
[0066]In the state which shows in the (a) and (b) figure now, the state where the hand handle 300 was twisted to the clockwise rotation and the opposite side is shown. For example, in the embodiment of the (a) figure, the rotation P1 of the hand handle 300 is transmited to the free connecting part 1500 by the communication trunk 400, and caudad, it operates the left-hand side of the longitudinal direction of the mouthpiece body 1000 so that right-hand side may be shaken up. However, since the bottom surface of the aforementioned mouthpiece body 1000 is supported by the cleaning face in a busy condition, operation which shakes the aforementioned wings is prevented.

[0067]However, since the surface of revolution F of the second rotating part 1504 inclines to a cleaning face in this embodiment, The second rotating part 1504 rotates, the first arm 1501 and the second arm 1502 are bent by the second rotating part 1504, and the rotation P1 of medial-axis B-2 transmited to the above-mentioned second arm 1502 operates this 2nd rotating part 1504 so that it may escape to **** (U1 direction). Under the present circumstances, sticking the bottom surface of the mouthpiece body 1000 to a cleaning face, the first rotating part 1503 operates to U 2-way, is interlocked with operation of the above-mentioned second rotating part 1504, and operates so that the angle of the direction Y of height may be carried out largely. By operation which escapes horizontally in this 1504Urotating part 1 second direction, it operates so that the back of the mouthpiece object 500 may shake the hips in the U1 direction, and rotation P2 of the mouthpiece object 500 is performed.
[0068]The operation which escapes horizontally in the 1504Urotating part 1 above-mentioned second direction here according to experimental verification operates circularly so that it may go up up, as it goes to a transverse direction.
[0069]The size of the aforementioned circular arc is made small without being largely accompanied by motion of the U1 aforementioned direction if the angle of gradient Z is 90 degree so that the angle of gradient Z of the aforementioned surface of revolution F is small, and the rotation P1 of the communication trunk 400 links it with the rotation P2 of the mouthpiece object 400 directly. The mouthpiece object 500 concerning this embodiment furthermore shown in the (a) figure can perform rotation P2 by the rotation P1 less than the mouthpiece object 500a shown in the (b) figure.
[0070]This operation can be described in operating so that the second rotating part 1504 may draw a circular arc centering on that upper center of rotation S.
[0071]If it carries out from this, in this embodiment shown in the (a) figure, To the center of rotation S, since the outside Z2 of the second rotating part 1504, i.e., the length of the aforementioned center of rotation S and the second arm 1502, is longer than the length Z1 of the center of rotation S and the second rotating part 1504, the second arm 1502 can rotate the mouthpiece object 500 by small power (P2).
[0072]On the other hand, according to the mouthpiece object 500a shown in the (b) figure, the second arm 1502 to the center of rotation S The inside of the second rotating part 1504, That is, since it is [the length Z3 of the aforementioned center of rotation S and the second arm 1502] shorter than the length Z1 of the center of rotation S and the second rotating part 1504, in order to rotate the mouthpiece object 500 (P2), large force is needed from the mouthpiece object 500 shown with the (a) figure.
[0073]That is, this embodiment shown with the (a) figure can rotate the mouthpiece object 500 compared with the embodiment shown with the (b) figure by the power in which the rotation P1 of twist operation of the hand handle 300 is small (P2).
[0074]In the embodiment shown in the (a) figure, from the cleaning face of the second arm 1502, since the height J2 is smaller than the height J1 from the cleaning face of the second rotating part 1504, Since the second arm 1502 which is an operating agency is close to the rotation P2 of the mouthpiece body 1000 which is going to rotate a cleaning face, are efficient in the rotation P1 of twist operation of the hand handle 300, And while being able to consider it as rotation (P2) of the mouthpiece object 500 smoothly, the rotation (P2) stable at the low center of gravity is obtained.
[0075]On the other hand, by the embodiment shown in the (b) figure, from the cleaning face of the second arm 1502, since the height J3 is larger than the height J1 from the cleaning face of the second rotating part 1504, Since the second arm 1502 which is an operating agency becomes far from the rotation P2 of the mouthpiece body 1000 which is going to rotate a cleaning face, the efficiency which considers rotation P1 of twist operation of the hand handle 300 as the rotation P2 of the mouthpiece object 500 is deteriorated from the embodiment of the (a) figure. Since it becomes a position with the second high arm 1502 which is an operating agency, rotation (P2) of the mouthpiece object 500 becomes more unstable than the embodiment of the (a) figure.
[0076]Next, it describes by Fig.7 and 8 about the airstream containing dust flowing. In this

embodiment, the above-mentioned free connecting part 1500 shown in Fig.7 in the state of a lateral attitude, The airstream absorbed from the mouthpiece 1004 is led to the guide 1010 of the settling chamber 1008, goes into the first arm 1501 from the opening 1501a, and is led to the communication trunk 400 from the second arm 1502 through the crank form second rotating part 1504.

[0077]The above-mentioned free connecting part 1500 shown in Fig.8 in the state of a vertical attitude, The airstream absorbed from the mouthpiece 1004 is guided at the guide 1010 and the shutter plate 1508 of the settling chamber 1008, goes into the first arm 1501 from the opening 1501a, and is led to the communication trunk 400 from the second arm 1502 through the crank form second rotating part 1504. In the state of the aforementioned Fig.7 or Fig.8, after the second arm 1502 has bent by the second rotating part 1504, airstream will refract and flow by the second rotating part 1504.

[0078]Thus, in this embodiment, it is connected with the effective area product where the settling chamber 1008 and the free connecting part 1500 of the mouthpiece body 1000 were stabilized regardless of the operation position of the free connecting part 1500. Since the surface of revolution F is ahead inclined and provided to the first arm 1501 in this embodiment, The angle at which the portion 1512 of a ventilation flue straight to the L type which follows the second rotating part 1504 from the first arm 1501 bends, That is, noise can be made small while making air resistance small, since the longitudinal direction R1 of the axis of rotation Q1 and the first arm 1501 can be made into 90 degree or more.

[0079]Next, the hand handle which starts this embodiment with reference to Fig.11 - Fig.16 is described in detail.As for the cross sectional view of a hand handle, and Fig.14, the appearance perspective view of a hand handle and Fig.12 are [Fig.11 / the exploded view of a second interconnecting-tube part and Fig.13 / the explanatory view of a handle cover and the Fig.16 of the busy condition figure of a vacuum cleaner and Fig.15] the explanatory views of a hand handle of operation.

[0080]In Fig.11 and Fig.12, the hand handle 300 comprises the handle body 308 which constitutes the handle part 301 and the first interconnecting-tube part 305, and the second interconnecting-tube part 306.

[0081]The aforementioned handle body 308 is provided with the appearance shape of the approximately triangular shape provided with the through hole 316 of approximately triangular shape in the center, One side of the upper part of this triangular shape is made into the operation switch placement part 308a, one side of other upper parts is made into the grip placement part 308b which the handle part 301 comprises, and the base of triangular shape is made into the interconnecting-tube placement part 408c provided with the first interconnecting-tube part 305. And he is trying to attach the longitudinal direction of the aforementioned operation switch placement part 308a to the aforementioned communication trunk part 400 via the corner 408d of the aforementioned operation switch placement part 308a and the interconnecting-tube placement part 408c so that it may be made to correspond with medial-axis B-2 of the aforementioned communication trunk 400.

[0082]In this embodiment, the operation switch placement part 308a, the grip placement part 308b, and the interconnecting-tube placement part 408c are substantially formed in linear shape. In the operation switch placement part 308a, attachment of the plate-like operation substrate 302a (it illustrates by Fig.13) is improved by this, Attachment of the handle cover 307 which rotates in the grip placement part 308b was improved, and rotation space of the second interconnecting-tube part 306 is secured in the interconnecting-tube placement part 350c.

[0083]While making it possible to connect the first interconnecting-tube part 304 with the communication trunk 400 at the gentle angle which noise does not generate easily according to this structure, The grip grip (handle part 301) which is easy to hold in the upper part of this interconnecting-tube part 304 for a user is made to be placed at the angle which is easy to grasp on medial-axis B-2 of the aforementioned communication trunk 400. The operating part 302 can be arranged in the good position of operativity using space (operation switch placement part 308a) accompanying arrangement of the aforementioned handle part 301. Thereby, it is the compact form excellent in internal mounting efficiency, and moreover, it is strong also in strength

and the hand handle 300 excellent in operativity can be realized.
[0084]In particular, in this embodiment, since the first interconnecting-tube part 305 and the second interconnecting-tube part 306 turning around the circumference of this first communication tube part 305 are communicated, it is necessary to provide the big opening 317 to the peripheral flank of the interconnecting-tube placement part 408c provided with the first communication tube part 305. The insufficient strength of the aforementioned interconnecting-tube placement part 408c accompanying installation of this big opening 317 is solvable by connecting this interconnecting-tube placement part 408c and the grip placement part 308b.
[0085]The operation switch placement part 308a and the grip placement part 308b were substantially formed in linear shape, in this embodiment, it has joined together so that triangular shape may be accomplished, but it may form in gentle arch shape continuous from the aforementioned communication trunk 400. Since it can be considered as the handle part which turns at the arch shape aforementioned portion gently by this, since the user can hold the portion of arbitrary angles, he can improve holdout.
[0086]The aforementioned handle body 308 comprises the body covers 309a and 309b resin-molded symmetrically, the operation switch cover 310, the handle cover 307 attached to the handle part 301 pivotable, etc. The operation switch cover 310 is inserted, it is combined by the parting line 311, and the aforementioned body covers 309a and 309b are attached with the screw which is not illustrated.
[0087]On the other hand, the above-mentioned second interconnecting-tube part 306 comprises the main part 312 of the 2nd interconnecting tube, and the 2nd interconnecting-tube covering 313, between this main part 312 of the 2nd interconnecting tube, and the 2nd interconnecting-tube covering 313, puts the above-mentioned first interconnecting-tube part 305 of the aforementioned handle body 308, and is attached. In this attachment, the attachment rib 314a provided to the above-mentioned 2nd interconnecting-tube covering 313 is attached to the rib mounting part 314b provided inside the main part 312 of the 2nd interconnecting tube, and it is made to attach via a screw from the method of outside. By making dismountable this second interconnecting-tube part 306, the dust got blocked in the interconnecting tube 304 is easily removable.
[0088]The hose connecting part 315 is provided by the above-mentioned main part 312 of the 2nd interconnecting tube, and the end of the suction hose part 200 is removably attached to it. The protruding part 201a provided to the connecting part 201 of the suction hose 200 makes this attachment-and-detachment structure the structure connected with the connection hole 315a of the aforementioned hose connecting part 315 by carrying out checking and verifying. When removing, it can remove, if the aforementioned protruding part 201a which carried out checking and verifying is stuffed into the aforementioned connection hole 315a with a driver etc. and checking and verifying are removed.
[0089]The connecting part 201 of the aforementioned suction hose 200 is attached pivotable in the suction hose 200 and its axial direction B3, and torsion of the suction hose 200 is kept from influencing the hand handle 300.
[0090]The battery cover for attachment and detachment of the cell by which 318 was built in the hand handle 300, and 303 are infrared dispatch parts provided behind the hand handle 300 with the operating part 302.
[0091]Next, with reference to Fig.13, it describes focusing on the internal structure of the hand handle 300.
[0092]In the figure, this hand handle 300 is first designed in consideration of medial-axis B-2 of the aforementioned communication trunk 400, the tube axial direction B1 of an interconnecting-tube part, the tube axial direction B3 of the suction hose part 200, and longitudinal direction B4 of the handle part 301. This is described based on the busy condition of Fig.14.
[0093]In Fig.14, first, by standing and holding the hand handle 300 with an attitude, the user can operate the mouthpiece object 500 via the communication trunk 400, and can clean a floor line with the vacuum cleaner 1 concerning this embodiment. Under the present circumstances, since the main part 100 of a vacuum cleaner connected with the hand handle 300 via the suction hose part 200 is equipped with the pair of giant swing 101 and the one free wheel 102, it can clean,

moving.
[0094]Generally, although the average height of Japanese women is 157 cm, When this user tries to clean up by making the mouthpiece object 500 get mixed up via the communication trunk 400 where it has the hand handle 300 automatically, it can clean up, without applying a burden to a hand or an arm, if the distance of the vertical direction of the hand handle 300 and a floor line is 78 cm or less. The angle is set as the working range where the user who considers it as 45 degree perpendicularly is operated most, and if it is 45 degree or more, it will apply a burden to a hand or an arm conversely.
[0095]In Fig.12 and Fig.13, by this embodiment, the length of the communication trunk 400 is set up so that medial-axis B-2 of the aforementioned communication trunk 400 may be 45 degree about a floor line and the angle theta 4 to accomplish.And since longitudinal direction B4 of the handle part 301 of the hand handle 300 has set the angle theta 3 to accomplish to aforementioned medial-axis B-2 90 degree - in 150, the user who grips this handle part 301 can relieve a motion of forward/rearward direction in the state where the angle of the aforementioned communication trunk 400 is 45 degree.
[0096]The carrying passage of the dust lifted to the maximum crowning of the hand handle 300 by the aforementioned communication trunk 400 is made to continue gently in this embodiment to the lowest position of the main part 100 of a vacuum cleaner installed in a floor line. And in order that the suction hose part 200 connected to the aforementioned hand handle 300 may make possible the motion [like] which shakes focusing on the aforementioned hand handle 300 (forward/rearward direction shown with Drawings), The tube axial direction B1 of the interconnecting-tube part 304, aforementioned medial-axis B-2, and the angle theta 1 to accomplish are set as the range of 110 to 150 degree to become a horizontal position substantially parallel to a floor line, The angle theta 2 of the tube axial direction B3 of the suction hose part 200 and the tube axial direction B1 of the interconnecting-tube part 304 to accomplish is set as the range of 110 to 150 degree.
[0097]In order to realize the hand handle 300 in consideration of the aforementioned use actual condition by this embodiment in Fig.13, First, the communication trunk mounting part 318 to which the first communication trunk part 305 is attached on medial-axis B-2 of the aforementioned communication trunk 400, The above-mentioned second interconnecting-tube part 306 is attached, and it constitutes from the hinge tube part 319 formed to medial-axis B-2 of the aforementioned communication trunk 400 by being bent with the aforementioned communication trunk mounting part 318 at an angle of [theta 1] an obtuse angle.
[0098]In the aforementioned suction hose part 200, the above-mentioned second interconnecting-tube part 306 is attached pivotable so that the angle of the obtuse angle theta 2 may be taken to the tube axial direction B1 of the aforementioned hinge tube part 319. And while making connection between the aforementioned communication trunk mounting part 318 and the hinge tube part 319 gently continuous inner surface shape, he makes the rear part of the aforementioned hinge tube part 319 follow the opening 317 with big R shape, and is trying to follow the second interconnecting-tube part 306.
[0099]By this the dust absorbed from the aforementioned mouthpiece object 500, Maintaining the rotating operation in which the suction hose part 200 in the aforementioned hand handle 300 shakes. Since it is conveyed by the main part 100 of a vacuum cleaner via the gentle dust conveying path of the mountain shape which comprises the communication trunk 400, the first interconnecting-tube part 305, the second communication trunk part 306, and the suction hose part 200, A jam of the noise generated from the aforementioned hand handle 300 or other conveying paths or dust is mitigable.
[0100]In this embodiment, the switch placement part 308a was provided on medial-axis B-2 of the aforementioned communication trunk 400, and the cell part 320 which supplies a power supply to this inside at the aforementioned operation substrate 302a and this operation substrate 317 is stored. And the angle theta 3 of longitudinal direction B4 of the handle part 301 is determined by providing the grip placement part 308b which connects the upper end of the aforementioned switch placement part 308a, and the rear part of the interconnecting-tube placement part 408c provided with the aforementioned hinge tube part 319.

[0101]The pivotable handle cover 307 is provided to the grip placement part 308b, and the handle part 301 consists of these embodiments. This handle cover 307 is further described by Fig.15. In Fig.15, the (a) figure is a development view of the handle cover 307, and the (b) figure is a cross sectional view of the handle part 301. In a figure, the handle cover 307 constitutes a cylindrical form from the semi-cylindrical cover pieces 307a and 307b, and is attached to the mounting part 321 of the grip placement part 308b. It is attached to the aforementioned mounting part 321 by carrying out the checking and verifying of the attachment rib 322a provided to one cover piece 307a to the rib receiving part 322b provided to the cover piece 307b of another side in attachment.
[0102]By returning to Fig.13, according to the handle cover 307 with the aforementioned structure, twisting medial-axis B-2 of the aforementioned communication trunk 400 like an arrow for example, and rotating, Since the handle cover 307 held at the user's hand can rotate aforementioned medial-axis B-2 to an arrow and a counter direction, a motion of the wrist accompanying twist operation is absorbable reasonable. This reverse twist operation is also the same. Thereby, twist operation can be performed reasonable in accordance with human being's system.
[0103]Next, the operating state of the hand handle concerning this embodiment is further described with reference to Fig.16. The hand handle of this embodiment in the state where Fig.16 is the reference drawing of a busy condition which saw the hand handle 300 from back, and the (a) figure made the mouthpiece object straight. (b) Figures are the constitutional diagram made to rotate a handle part and a busy condition figure of the hand handle of the former [figure / (c)].
[0104]First, in the (a) and (b) figure, the suction hose part 200 is placed under the hand handle 300 in the state where the hand handle 300 of this embodiment does not twist the hand handle 300 as shown in the (a) figure. On the other hand, as shown in the dotted line of the (b) figure, even if it twists the hand handle 300 90 degree right and left, since the second interconnecting-tube part 306 rotates the circumference of the hinge tube part 319 of the first connecting part 305, the aforementioned suction hose part 200 is always placed caudad with the weight. Since the suction hose part 200 is held in the always same state by this by the operation which twists the hand handle 300, the burden placed on a wrist is mitigable.
[0105]And in this embodiment, since the handle cover 307 which rotates to the aforementioned handle part 301 is provided, the burden further placed on a wrist is mitigable.
[0106]Since the aforementioned mouthpiece object 500 is made pivotable 90 degree in this embodiment, While setting up the rotating operation range of the second interconnecting-tube part 306 pivotable focusing on a lower position the right and left of 90 degree, and in a total of 180 degree so that the suction hose part 200 may be placed caudad even if it twists the hand handle 300 90 degree, The opening 317 is formed so that the first interconnecting-tube part 305 and the above-mentioned second interconnecting-tube part 305 may communicate in the aforementioned range.
[0107]On the other hand, since the conventional example shown in the (c) figure will pull up the suction hose part 200 up by twisting the hand handle 300 90 degree right and left, the power which tries to pull back the suction hose part 200 to the hand of holding the handle part 301a, caudad commits it to an arrow direction. This will force an unnecessary burden the hand of the user holding the hand handle 300.
[0108]In the case where the long suction hose part 200 is adopted especially in recent years, the above-mentioned power it tries to pull back is big. When there is between the suction hose part 200 and the main parts 100 of a vacuum cleaner, the main part 100 of a vacuum cleaner will also be pulled in the aforementioned twist operation, and the burden placed on a hand becomes largely. According to the hand handle 300 of this point and this embodiment, the problem of the aforementioned conventional example is solved.
[0109]Next, with reference to Fig.17, it describes about the operativity in a position with the low hand handle 300 which is the big characteristics of this embodiment. In Fig.17, by this embodiment, as described above, since the surface of revolution F of the second rotating part 1504 inclines ahead also in the state of a horizontally near lateral attitude, the above-mentioned

free connecting part 1500 can perform the roll control of the mouthpiece object 500 by the hand handle 300.
[0110](a) shows among a figure the state where this low operating condition was seen from the upper part, and the (b) figure shows the state where it saw from the side. According to this embodiment, the height under a bed and furniture etc. is excellent in the cleanability of the floor line which has depth low. for example, according to this embodiment, making the hand handle 300 low and changing the communication trunk 400 into a near level state so that clearly from a figure -- the bottom of a bed, etc. -- ********** -- things are made. and -- since the height of the mouthpiece object 500 is made low in this embodiment -- a gap with lower height -- ********** -- things are made.
[0111]Since the rotation P1 of twist operation of the hand handle 300 and the rotation P2 of the mouthpiece object 500 are interlocking in the aforementioned state especially according to this embodiment, In the cleaning operation which gets mixed up in V 2-way, while being able to press down the right and left blur of the mouthpiece object 500 by the hand handle 300, The mouthpiece object 500 is rotated by the rotation P2 of twist operation of the hand handle 300, and since the cleaning operation of V1 direction is possible, the cleanability of the slit of the bed back can be improved.
[0112]According to this embodiment, in the state which shows in the aforementioned Fig.17, since the surface of revolution F of the second rotating part 1504 inclines, the communication trunk 400 formed in this and parallel also inclines. Therefore, since the hand handle 300 will be in the state where it floated a little from the cleaning face, the working range of the handle part 301 attached to medial-axis B-2 by inclining is secured. And in this embodiment, since the suction hose 200 is always hung by the lower part of the hand handle 300, it is mitigable that this hung suction hose 200 contacts a cleaning face.
[0113]Fig.24 shows the mouthpiece object 550 concerning the second embodiment concerning the present invention from (a second embodiment), next Fig.18.Here, in this second embodiment, since structures other than mouthpiece object 550 are common in the above-mentioned first embodiment, they are omitting the description. As for a plan view and Fig.21, the back perspective view of the mouthpiece object which requires Fig.18 for a second embodiment, and Fig.19 are [a right side view and Fig.20 / a bottom view, Fig.23, and the Fig.24 of a front view and Fig.22] cross sectional views.
[0114]It realizes the whole miniaturization, the rotary brush 1050 (Fig.23, 24 references) being used for the mouthpiece object 550 concerning this second embodiment in the mouthpiece body 1000. The mouthpiece object 550 applied to this second embodiment in Fig.21 from Fig.18 comprises the mouthpiece body 1000 and the free connecting part 1500 arranged in the center behind this mouthpiece body 1000.
[0115]The mouthpiece object 550 of this embodiment is made into the plane shape of "abbreviation T type" which projected the front part of the mouthpiece body 1000 over both sides while using the appearance as the thin type, and projected back the mounting part 1054 of the above-mentioned free connecting part 1500 arranged in the center of rear. And by making each corner into R shape, while improving cleanability by making the whole upper surface into the form which made R shape the subject, it considers so that a crack may not be attached to furniture etc.
[0116]The lower case 1051 into which the mouthpiece body 1000 was molded with the resin material which accomplishes the skeleton of the mouthpiece body 1000, It comprises the front arm top cover 1052 molded with the resin material which covers the front of the mouthpiece body 1000, and the rear arm top cover 1053 molded with the resin material which covers the back of the mouthpiece body 1000. The rib which is not illustrated to that inside is formed, and the aforementioned lower case 1051 puts the end of the first arm 1501 of the free connecting part 1500 with this rib and rear arm top cover 1053, and constitutes the first rotating part 1504.
[0117]And when the free connecting part 1500 is a lateral attitude, the concave mounting part 1054 which stores the end of the first arm 1501 is formed in the above-mentioned rear arm top cover 1053, and the above-mentioned first rotating part 1504 is provided at the front upper end of the aforementioned mounting part 1054. The settling chamber 1055 (Fig.23, 24) is constituted

from the aforementioned lower case 1051 and the front arm top cover 1052, and the rotary brush 1050 is built in in this settling chamber 1055. The above-mentioned front arm top cover 1052 forms the air-intake 1056 for rotating the rotary brush 1050 behind [both-sides] a longitudinal direction.
[0118]The above-mentioned front arm top cover 1052 and the discharge ring 1051 are set by the circumference side of the mouthpiece body 1000, and the convex bumper 1100 is formed in the doubling part. In this embodiment, since the mouthpiece body 1000 is used as "abbreviation T type", the concave part 1101 is formed in the front part of the bumper 1100.
[0119]On the other hand, the above-mentioned free connecting part 1500 connects two the tubular first arms 1501 and the second arms 1502 by the second rotating part 1504, It is considered as the connection part 1505 for attaching the other end of the first arm 1501 to the mounting part 1054 of the aforementioned mouthpiece body 1000 pivotable in the direction Y of height, and attaching the other end of the above-mentioned second arm 1502 to the aforementioned communication trunk 400. He is trying for the aforementioned mounting part 1054 to put the above-mentioned first arm 1501 from both sides with the two back overhanging base materials 1054a and 1054b here. Since the structure of the free connecting part 1500 is the same as that of the above-mentioned first embodiment, a description is omitted.
[0120]In Fig.22, the mouthpiece 1004 of the oblong rectangular shape for absorbing dust is formed in the center of a bottom surface of the mouthpiece body 1000, Two or more convex guide projections 1006 in which the convex brush 1005 which is supple ahead of this mouthpiece 1004 is arranged to be located in a line by the single tier, guides the airstream which contained dust in the aforementioned mouthpiece 1004 ahead [that] further, and rectifies the flow of an air current are provided. The convex keeper 1057 for rebounding the dust which did not suck up and break by this mouthpiece 1004 behind the aforementioned mouthpiece 1004, and on the other hand, returning to it to the mouthpiece 1004 is provided.
[0121]And while floating the aforementioned mouthpiece 1004 appropriately from a cleaning face and receiving the aforementioned convex brush 1005 and the keeper's 1057 efficiency, the wheel 1200 which secures the running function of the mouthpiece object 500 is provided. The dolly ring 1210 arranged in the aforementioned wheel 1200 in this embodiment at the both sides of the front part of the mouthpiece body 1000, It constitutes from the giant swing 1211 supported and provided with the two base materials 1054a and 1054b back projected over the rear end part of the aforementioned mounting part 1054, i.e., the backmost part of the mouthpiece body 1000 used as the lower position of the free connecting part 1500. Processing which slides on the wheel 1200 horizontally like a first embodiment also in this embodiment has been performed.
[0122]Since the load transmited via the hand handle 300 and the communication trunk 400 can be supported by the giant swing 1211 which is placed under the above-mentioned free connecting part 1500 according to this embodiment, performance traverse and turnability can be improved.
[0123]In Fig.23 and 24, the mouthpiece object 550 concerning this embodiment, Since it has the free connecting part 1500 which adopted the same shutter mechanism as the above-mentioned first embodiment, While the free connecting part 1500 can make a vertical position communicate from the settling chamber 1008 of the mouthpiece body 1000 from a horizontally near position with a big effective area product to **, without the airstream absorbed from the mouthpiece 1004 winding largely, The rotation P1 of twist operation of the hand handle 300 can perform rotation P2 of the mouthpiece object 550.
[0124]There is especially a place by which it is characterized [of this embodiment / big] in having made the height of the mouthpiece object 550 low by having arranged the free connecting part 1500 behind the mouthpiece body 1000 provided with the rotary brush 1050, taking the same structure as the above-mentioned first embodiment. And in this embodiment, since the axis of rotation Q1 of the first rotating part is provided in the maximum crowning of the mouthpiece object 550 and rotating operation of the free connecting part 1500 can be performed in a low position, stably moreover, rotation P2 of the mouthpiece object 550 can be performed smoothly.
[0125]The detailed structure description of this embodiment omits a description by attaching the

same code as a first embodiment.
[0126]As mentioned above, although the axis of rotation Q1 was described in the 1st and a second embodiment by providing in the upper end part of the opening 1501a of the first arm 1501, the axis of rotation Q1 may be provided on both sides of the center of the aforementioned opening 1501b, and the shutter plate 1508 may be provided up and down.
[0127]Although the suction hose 200 is attached to right and left directions rockable in this aforementioned embodiment at the hand handle 300, the suction hose 200 may be fixed and provided. Although the aforementioned hand handle 300 is providing the handle part 301 independently, the thing of the structure which made the upper end part of the communication trunk 400 bent, and carried out direct continuation of the suction hose 200 to this end made bent may be used. In this case, the same effect as the aforementioned handle part 301 can be acquired by making into a handle part the tube part bent [aforementioned], and supporting it by hand.
[0128]
[Effect of the Invention]Since according to the present invention a mouthpiece body can be rotated by twist operation of a hand handle while noise and a dust jam are mitigable, It can clean up with an attitude with an easy user of a vacuum cleaner, and ** can improve the cleanability of a low gap, and the operativity of a vacuum cleaner can be improved.

[Translation done.]

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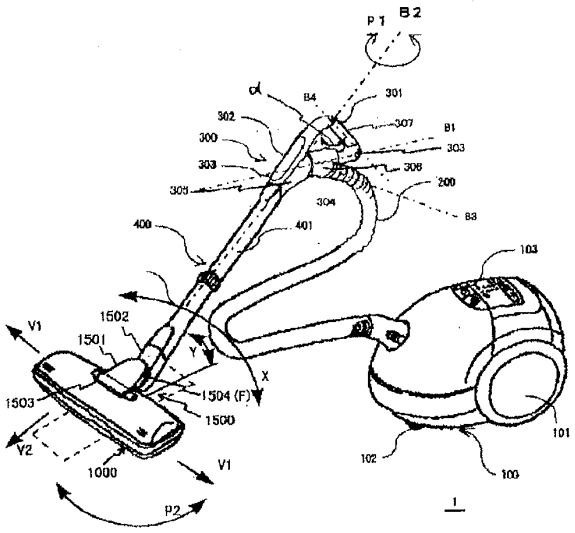
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(54)【発明の名称】　電気掃除機

(57)【要約】
【課題】　騒音や塵埃つまりを軽減して、手元ハンドルのひねり動作で吸口本体を床面に対して広範囲に回転させることのできる清掃性が良好な電気掃除機を提供する。
【解決手段】　電気掃除機の吸口体５００を、吸口本体１０００と、管状の２つの腕部からなる自在連結部１５００とから構成し、第１の腕部１５０１を吸口本体１０００に第１の回転部１５０３で仰角Ｙ方向に回転可能に取付け、第２の腕部１５０２を第１の腕部１５０２の他端に第２の回転部１５０４で左右Ｘ方向に回転可能に取付け、前記吸口体１０００の上部に凹部を形成し、この凹部の上部両側に第１の回転軸受部を設け、前記第１の腕部の一端に形成した開口部の上部両側に第１の回転軸突起を形成し、この第１の回転軸突起を第１の回転軸受部に回転可能取り付けて、前記開口部の下部を前記凹部に出没可能にする。

図1



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【特許請求の範囲】
【請求項１】　塵埃を集塵室に吸い込むための送風機を備えた電気掃除機本体と、一端を前記電気掃除機本体に取付けられて前記送風機に連通する柔軟性のある吸引ホースと、前記吸引ホースの他端と取付けられて前記送風機に連通する手元ハンドルと、前記手元ハンドルに取付けられて前記吸引ホースに連通する接続管と、前記接続管に取付けられて該接続管に連通する吸口体と、からなり、
前記吸口体は、塵埃を吸い込むための吸引口を備え、奥行方向より左右方向が長い吸口本体と、前記吸口本体を前記接続管に回転可能に連結し、吸口本体の塵埃通路と前記接続管を連通する自在連結部と、を備え、
前記自在連結部は、管状の第１の腕部と第２の腕部とから構成され、
前記第１の腕部は、その一端が第１の回転部を介して前記吸口本体に対して仰角となるＹ方向に回転可能に取付けられ、
前記第２の腕部は、その一端が第２の回転部を介して前記第１の腕部の他端に前記吸口本体を清掃面と平行に回転させるＸ方向に回転可能に取り付けられ、
前記吸口本体の左右方向の上部中央には凹部が形成され、
前記第１の回転部は、前記凹部の左右方向の両側の上部に形成される第１の回転軸受部と、前記第１の腕部の一端に形成される集塵通路を構成する開口部の上部両側の第１の回転軸突起と、から構成され、
第１の回転軸突起は前記第１の回転軸受部に回転可能取り付けられて、前記開口部の下部を前記凹部に出没可能に設けられていることを特徴とする電気掃除機。
【発明の詳細な説明】
【０００１】
【発明の属する技術分野】本発明は、使用者が手元ハンドルを操作することで簡単に吸口体の角度を任意に操作することのできる吸口体を備えた電気掃除機に関するものである。
【０００２】
【従来の技術】従来の電気掃除機に使用されている吸口体は、手元ハンドルに延長管を介して接続され、該手元ハンドルを延長管の長手方向を回転軸として回転させることで、吸口体に設けた継手構造によりある程度回転可能に取付けられている。
【０００３】その構造は、吸口本体の長手方向の両側を回転軸として上下方向に揺動可能に取付けられる第１の継手と、屈折した管状の形態を備え、その一端を前記第１の継手の軸方向に回転可能に取付け、他端を延長管に固定して取付けられる第２の継手から構成されている。
【０００４】そして、この吸口体によれば、手元ハンドルを回転させることにより、吸口体を第２の継手が屈折した角度、一般的には４５度程度回転させることができる。例えば、これらの構造は特開平５－２４５０７３号に開示されている。

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【０００５】
【発明が解決しようとする課題】前記従来の電気掃除機の吸口体は、吸口体を手元ハンドルを介して前後方向に移動させて掃除するために横長の吸口を基調として形成され、床面を効率良く清掃するようにしている。そして、テーブルの下や隙間の清掃性を向上するために前記した２つの継手を備えることで、手元ハンドルの操作で吸口体を床面に密着させたまま手元ハンドルの上下動や吸口体自体の回転を可能にしている。
【０００６】しかし、従来の吸口体は、吸口体自体の構造を堅牢にすることができるものの、吸口体自体の動作範囲に制約があるため手元ハンドルでの操作性に課題を残していた。
【０００７】例えば、壁際を清掃する場合は、吸口体の長手方向を壁面に平行にして壁面に沿って移動させるのが効率的である。しかし、前記従来の吸口体の構造では、手元ハンドルを９０度回転させても継手の回転角度が４５度程度しか回転できないために、前記作業を無理な姿勢で行ったり、両手で行わなくてはならなかった。
【０００８】また、ソファーの下などの低い隙間の清掃では、前記屈曲した継手が引っかかって思うような清掃効率を達成できなかった。
【０００９】本発明の目的は、騒音や塵埃つまりを軽減して、手元ハンドルのひねり動作で吸口本体を床面に対して広範囲に回転させることのできる清掃性が良好な電気掃除機を提供することにある。
【００１０】
【課題を解決するための手段】前記目的を達成するために、本発明に係る電気掃除機は、塵埃を集塵室に吸い込むための送風機を備えた電気掃除機本体と、一端を前記電気掃除機本体に取付けられて前記送風機に連通する柔軟性のある吸引ホースと、前記吸引ホースの他端と取付けられて前記送風機に連通する手元ハンドルと、前記手元ハンドルに取付けられて前記吸引ホースに連通する接続管と、前記接続管に取付けられて該接続管に連通する吸口体と、からなり、前記吸口体は、塵埃を吸い込むための吸引口を備え、奥行方向より左右方向が長い吸口本体と、前記吸口本体を前記接続管に回転可能に連結し、吸口本体の塵埃通路と前記接続管を連通する自在連結部と、を備え、前記自在連結部は、管状の第１の腕部と第２の腕部とから構成され、前記第１の腕部は、その一端が第１の回転部を介して前記吸口本体に対して仰角となるＹ方向に回転可能に取付けられ、前記第２の腕部は、その一端が第２の回転部を介して前記第１の腕部の他端に前記吸口本体を清掃面と平行に回転させるＸ方向に回転可能に取り付けられ、前記吸口本体の左右方向の上部中央には凹部が形成され、前記第１の回転部は、前記凹部の左右方向の両側の上部に形成される第１の回転軸受

部と、前記第１の腕部の一端に形成される集塵通路を構成する開口部の上部両側の第１の回転軸突起と、から構成され、第１の回転軸突起は前記第１の回転軸受部に回転可能取り付けられて、前記開口部の下部を前記凹部に出没可能に設けられているようにする。

【００１１】

【発明の実施の形態】以下、本発明の実施の一形態を図１から図２４を参照して説明する。

【００１２】（第１の実施形態）図１から図１７は本発明に係る第１の実施形態であり、図１が電気掃除機の外観斜視図、図２から図６が吸口体の外観図、図７、図８が吸口体の断面図、図９が自在連結部の部品構成図、図１０が吸口体の動作説明図、図１１から図１６が手元ハンドルの説明図、図１７が吸口体の使用状態図である。

【００１３】先ず、図１を参照して、本実施形態に係る電気掃除機を説明する。符号１で総括的に示すのは電気掃除機であり、塵埃を集塵室に吸い込むための図示しない機構、例えば送風機を備えた電気掃除機本体１００と、一端が前記電気掃除機本体１００に取り付けられ、前記送風機に連通する柔軟性のある吸引ホース２００と、前記吸引ホース２００の他端に取り付けられて前記送風機に連通する手元ハンドル３００と、前記手元ハンドル３００に取り付けられて前記吸引ホース２００に連通する吸引管４００と、前記吸引管４００に取り付けられ、該吸引管４００に連通する吸口体５００とから構成される。

【００１４】前記電気掃除機本体１００は、内部に使い捨て塵埃袋を備えた集塵室を備え、一対の大車輪１０１と１個の自在車輪１０２とで、前記吸引ホース２００を介して移動させることができる。また、前記電気掃除機本体１００の運転制御は、該電気掃除機本体１００の上面に設けた運転表示部内の赤外線受光部１０３で、手元ハンドル３００から発信される操作信号を受けて操作される。

【００１５】また、手元ハンドル３００から吸引ホース２００に沿って電気的な導電線を設け、この導電線を介して電気掃除機の運転を制御するための信号、例えば送風機に設けられているモーターの回転速度を制御する信号を伝え、電気掃除機１の運転を制御しても良い。

【００１６】前記吸引ホース２００は、塵埃を前記電気掃除機本体１００に搬送するための搬送通路としての機能と、電気掃除機本体１００を移動させるための移動引っ張り手段としての機能を備えている。この実施形態ではじゃばら状の柔軟性のあるホースを採用している。

【００１７】手元ハンドル３００は、前記吸引ホース２００と前記接続管４００とを連通させる機能と、前記電気掃除機本体１００の運転制御および電気掃除機本体１００を移動させる機能、さらに前記吸口体５００の動きを操作する機能を備えている。該手元ハンドル３００は、前記吸引ホース２００と着脱可能に接続され、さらに前記接続管４００とも着脱自在に取り付けられることで、前記吸引ホース２００と前記接続管４００とを連通させて塵埃の搬送路を形成している。

【００１８】さらに該手元ハンドル３００は、前記接続管４００の長手方向、すなわち、前記接続管４００の中心軸Ｂ２の延長線上の上端に、前記中心軸Ｂ２と９０度以上１６０度以下、好ましくは１００度から１２０度前後の角度（図中のα）を持って、その長手方向Ｂ４が吸引ホース２００と前記接続管４００の接続方向と略一致する位置にハンドル３０１を備えている。このハンドル３０１により、前記吸引ホース２００を介して前記電気掃除機本体１００を移動させることができ、更に、吸口体５００の動きを操作することができる。

【００１９】特に、このハンドル部３０１によれば、ひねり動作、即ち中心軸Ｂ２を中心とした回転Ｐ１を容易に行うことができる。しかも、このひねり動作では、前記手元ハンドル３００に対して前記吸引ホース２００が重力により常に前記ハンドル部３０１の下方に位置するように回転可能に取付けられているので、ハンドル部３０１のひねり動作で吸引ホース２００を引き上げないので、手首に係る負担を軽減できる。この際、ハンドル部３０１を上部に設けているので、下方に設けた吸引ホース２００が前記ひねり動作を邪魔することがない。これにより、後述の如く吸口体５００を床面（清掃面）上で９０度以上回転させることができる（図中のＰ２）。また、上述したハンドル部３０１の形状により、吸口体５００の回転操作を比較的容易に行なうことができる。この理由は、ハンドル部３０１に角度（図中のα）をつけることで、ハンドル部３０１をひねった際に回転モーメントが生じるためである。

【００２０】また、前記ハンドル部３０１には、使用者が保持するハンドルカバー３０７が回転可能に設けられているので、前記ハンドル部３０１のひねり動作にともなう角度の変化を前記ハンドルカバー３０７がハンドル部３０１を回転することで吸収することができるので、手首に係る負担を軽減できる。

【００２１】さらに、前記ハンドル部３０１の近傍には前記電気掃除機本体１００の運転を操作する操作部３０２が設けられている。該操作部３０２には赤外線発信部３０３が設けられており、該赤外線発信部３０３から前記電気掃除機本体１００に設けた赤外線受光部１０３に操作信号を発信し、前記電気掃除機本体１００の電源のＯＮ、ＯＦＦや各種の制御を行なうことができる。なお、手元ハンドル３００には図示しない電池等の電源部が備えられているので、前記吸引ホース２００に電気配線を行なうことが不要である。また、赤外線発信部３０３を２ケ所に設けているため、天井や壁面等の反射を利用して操作信号を確実に電気掃除機本体１００に伝達できるので、誤動作を軽減することができる。

【００２２】前記接続管４００は、前記手元ハンドル３

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００と前記吸口体５００とを連通させ、さらに該手元ハンドル３００と該吸口体５００とを所定の位置で固定することで、該手元ハンドル３００の動き（移動や回転）を該吸口体５００の動き（移動や回転）とするように伝達する機能を備えている。この実施形態では、大きさの異なる２つの管体４０１と４０２とを組み合わせることにより、前記接続管４００を所定の長さで固定できるように伸縮自在に構成し、一方に前記手元ハンドル３００を、他方に前記吸口体５００を着脱自在に取り付けるようにしている。

【００２３】前記吸口体５００は、塵埃を吸い込むための吸口１００４（図６参照）を底面に備えた吸口本体１０００と、前記吸口本体１０００を前記接続管４００に連結し、前記接続管４００を介して伝達される手元ハンドル３００の動きに対して常に吸口本体１０００の底面を床面に接するように動作するとともに、前記吸口本体１０００から吸込んだ塵埃を含んだ空気流が前記接続管４００に導かれるように連通する自在連結部１５００とで構成される。

【００２４】前記吸口本体１０００は、偏平な略長方形状を備えて、その上面中央に前記自在連結部１５００が回転可能に取付けられる。前記自在連結部１５００は、該吸口体５００を中心にして、手元ハンドル３００の高低方向Ｙと、左右方向Ｘに回転可能に連結するとともに、手元ハンドル３００のひねり動作の回転Ｐ１をそのまま吸口本体１０００の回転Ｐ２に伝達する機構を備えている。

【００２５】この実施形態では、自在連結部１５００を、前記吸口本体１０００に回転可能に取付けられ、高低方向Ｙの回転を可能にする管状の第１の腕部１５０１と、一端を前記吸引管４００に取付けられ、他端を前記第１の腕部１５０１の他端と左右方向Ｘの回転を可能にするように取付けられる管状の第２の腕部１５０２とから構成される。そして、前記第１の腕部１５０１は、その一端が前記吸口本体１０００に対して仰角となるＹ方向に回転可能に取付けられる第１の回転部１５０３を構成し、前記第２の腕部１５０２は、その一端が前記第１の腕部１５０１の他端に取り付けられて、前記手元ハンドル３００を左右に傾ける動作を行うことで、結果として吸口本体５００を清掃面と平行に回転させるＸ方向に回転可能な第２の回転部１５０４を構成する。

【００２６】また、前記第２の回転部１５０４は、前記自在連結部１５００の高低方向Ｙの角度を最低にした状態で、その回転面Ｆを床面から角度Ｚだけ前方に傾斜させて設けてあり、前記傾斜した回転面Ｆ（図７、８参照）の上方側に前記第１の腕部１５０１の一端が取り付けられ、前記回転面Ｆの下方側に前記第２の腕部１５０２の一端が取り付けられている。

【００２７】ここで、本実施形態では、詳細については後記するが、本実施形態の電気掃除機１によれば、前記

手元ハンドル３００の回転Ｐ１の動作は吸口体５００の両翼を振るような動作となるが、使用状態では前記吸口体５００の底面が清掃面により支持されるので、その動きが制限される。しかし、自在連結部１５００の第２の回転部１５０４の回転面Ｆは清掃面に対して傾斜しているので、手元ハンドル３００のひねり動作の回転Ｐ１は、第２の回転部１５０４の回転に変換され、この第２の回転部を左右方向Ｘ、即ち手元ハンドル３００を時計方向にひねれば左側方向に、半時計方向であれば右側方向に移動（逃げるように振られる動き）させようと動作する。

【００２８】この際、この実施形態では、高低方向Ｙに動作する第１の回転部１５０３を備えているので、この第１の回転部１５０３が吸口体５００の底面を清掃面に密着させたまま、前記第２の回転部１５０４の動作に追随して回転する。そして、前記第２の回転部１５０４の左右方向Ｘの動きは、これに連結する第１の腕部１５０１を介して吸口体５００の後方を振るように動作して吸口体５００の回転Ｐ２に変換される。これにより、本実施形態では前記手元ハンドル３００のひねり動作の回転Ｐ１を、吸口本体１０００の回転Ｐ２として伝達することができる。

【００２９】特に、この実施形態の大きな特徴とするところは、前記第２の回転部１５０４の回転面Ｆは、接続管４００の中心軸Ｂと平行に設定され、第１の回転部１５０３の動作範囲において、常に清掃面に対して傾斜した姿勢をとるので、第１の回転部１５０３の動作範囲において吸口体５００の回転Ｐ２を手元ハンドル３００のひねり動作の回転Ｐ１で制御することができる。

【００３０】なお、本実施形態では、前記吸口本体１０００の前記Ｘ方向の回転は、吸口体５００を正対させて手元ハンドル３００をその中心に位置させた直進させるＶ２の状態において、少なくとも右方向へ９０度、左方向へ９０度、すなわち１８０度の範囲で行なうことができる。また、前記Ｙ方向の回転は、前記接続管４００を水平に近い位置から直立する位置までの範囲で回転可能にしている。

【００３１】また、この実施形態では、前記回転面Ｆの傾斜角度Ｚを２０度に設定しているが１０度～３０度までの範囲で同様な動作が期待できる。しかし、角度Ｚが大きいと高低方向Ｙの角度が小さい状態での吸口体５００の動作制御が良好であり、高低方向Ｙの小さな動作範囲で吸口本体１０００を９０度回転させることができるが、前記回転面Ｆに平行に配置される接続管４００を水平にすることが難しくなる。この逆に角度Ｚが小さいと前記角度Ｚが大きい場合と逆の状態となる。このため、好適な角度Ｚの大きさは使用状態を考慮して適宜決定するとよい。

【００３２】また、前記吸口体５００は、吸口本体１０００の周囲に滑りやすい材料で形成されるバンパー部１

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１００を設けることで、壁際の清掃性を向上するとともに、底面に吸口体１０００の長手方向の動きをスムーズにする車輪１２００を設けている。以後、説明の都合上、吸口体１０００の長手方向に沿った移動方向を左右方向Ｖ１、該左右方向と直角の方向で吸口体１０００の短手方向に沿った移動方向をＶ２として説明する。

【００３３】このように、本実施形態に係る電気掃除機１によれば、操作信号を赤外線信号を介して伝達しているので、吸引ホース２００に配線する必要がないので吸引ホース２００の軽量化が図られる。このため、使用者が手に持つ手元ハンドル３００の負担が軽減され、電気掃除機本体１００の引き回し走行や、吸口体５００の操作を向上することができる。

【００３４】特に、この実施形態の大きな特徴とするところは、手元ハンドル３００を介しての吸口体５００の動作、例えば前記手元ハンドル３００のひねり動作の回転Ｐ１をそのまま吸口体５００の回転Ｐ２とすることができる等、使用者が手元ハンドル３００で行う動作を吸口体５００の動きとしてスムーズに行うことができる点にある。

【００３５】具体的には、例えば、手元ハンドル３００を９０度（回転Ｐ１）ひねることにより、吸口体５００を図１の点線に示すように９０度回転（回転Ｐ２）させ、更に、手元ハンドル３００を通常の前後移動させる動作で、壁面に沿って吸口本体１０００を左右方向Ｖ１の方向に前後移動させながら壁際の床面清掃を行うことができる。この際、バンパー部１１００と車輪１２００により吸口体５００をスムーズに動かすことができるとともに、壁面に傷をつけることを軽減することができる。

【００３６】また、この際、手元ハンドル３００に連結する吸引ホース２００は、前記手元ハンドル３００が９０度ひねられても常に下方に位置するように回転するので、吸引ホース部２００が前記ひねり動作にともなう操作性を損なうことがない。

【００３７】また、この実施形態では、高低方向Ｙの動作範囲において、手元ハンドル３００で吸口体５００の回転Ｐ２を制御できるので、直進性を悪くする吸口体５００の左右のぶれを軽減することができる。しかも、傾斜する回転面Ｆにより、手元ハンドル３００の急な切り替えし操作、例えば、急な左右のひねり動作の切り替えを行っても、吸口体５００の追随性が向上されるので吸口体５００の長手方向の片側が浮いてしまうバタツキが軽減される。

【００３８】また、この実施形態に係る自在連結部１５００によれば、清掃面から第１の回転部１５０３までの高さを維持して塵埃の流通路を確保するとともに、この第１の回転部１５０３の下方位置となるデッドスペースを利用して自在連結部１５００をほぼ水平にした状態で、第２の腕部１５０２を第１の腕部１５０１の下方に

位置するようにしているので、吸口体５００の全体の高さを低くすることができる。これにより、吸口本体１０００の底面を清掃面に密着させたままで、例えばベッドの下などの高さの低い空間に吸口体５００をむぐる込ませることができる。しかも、ベッドの下にむぐり込ませても吸口体５００は左右にぶれることなく直進性に優れている。

【００３９】以下、本実施形態に係る電気掃除機の大きな特徴の１つである吸口体５００を詳細に説明する。

【００４０】先ず、図２を基に図３から図６を参照して、前記吸口体５００の外観構造について説明する。図２は吸口体の後方斜視図、図３は側面図、図４は平面図、図５は正面図、図６は底面図である。

【００４１】図２から図５において、前記したように、吸口体５００は、吸口本体１０００と、この吸口本体１０００の後方の中央に配置された自在連結部１５００とから構成されている。

【００４２】前記吸口本体１０００は、その外観を上からみて４隅を大きなアール形状とする薄形の形状とするとともに、側面からみて中央部を最頂部とする円弧形状とするアール形状を主体とした形状とすることで清掃性を向上するとともに、各角部をアール形状とすることで、家具等へ傷を付けないように配慮している。

【００４３】また、吸口本体１０００は、吸口本体１０００の骨格を成す樹脂材料で成形された下ケース１００１と、吸口本体１０００の上部をカバーする樹脂材料で成形された上カバー１００２とで集塵室を構成する　前部上カバー１００１と下カバー１００２は吸口本体１０００の周側で合わされ、その合わせ部に凸状のバンパー１１００が形成されている。この実施形態では、図７に示すように、前記バンパー１１００を別体の材料、例えば、ゴムなどの軟質材、あるいは弾力性のある樹脂材料で形成し、これを上カバー１００１と下カバー１００２とで上下から挟み込むように組み立ててネジで止めるようにしている。

【００４４】なお、前記バンパー１１００を前部上カバー１００１と一体成形し、このバンパー１１００に下カバー１００２が嵌まり込むように組み立てられて、図示しないネジで取付けるようにしてもよい。

【００４５】一方、前記したように、前記自在連結部１５００は、管状の２つの第１の腕部１５０１と第２の腕部１５０２とを第２の回転部１５０４で連結し、第１の腕部１５０１の他端を前記吸口本体１０００の取付部１００３に第１の回転部１５０３を介して高低方向Ｙに回転可能に取り付け、前記第２の腕部１５０２の他端を前記接続管４００に取り付けるための接続部１５０５としている。

【００４６】ここで、前記取付部１００３は前記上カバー１００１の長手方向の中央後方に凹状に形成され、その凹状の前部となる前記円弧面の最頂部に前記第１の回

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転部１５０３の回転軸Ｑ１が設けられ、前記第１の腕部１５０１が前記凹状の取付部１００３に挿入されて前記回転軸Ｑ１で回転可能に取付けられる。

【００４７】また、前記自在連結部１５００は、その姿勢を清掃面にほぼ平行にした状態で、第２の腕部１５０２が第１の腕部１５０１の下方に位置するように両部の一端をラップさせて設けられ、このラップした部分に第２の回転部１５０４を設けるとともに、前記第２の回転部１５０４の回転面Ｆを第１の腕部１５０１の長手方向Ｒ１に対して前方に傾斜させ、第２の長手方向Ｒ２（前記中心軸Ｂ２と同じ方向）とは平行に設けている。この詳細な構造については図７で述べる。

【００４８】図６において、吸口本体１０００の底面中央には塵埃を吸い込むための横長矩形状の吸口１００４が形成され、この吸口１００４の前後に柔軟性のある凸状の刷毛１００５が一列に並んで配置され、さらに、その刷毛１００５の外側に前記吸口に塵埃を含んだ空気流をガイドして気流の流れを整流する複数の凸状のガイド突起１００６が設けられている。そして、前記吸口１００４を清掃面から適度に浮かせて吸口体５００の走行機能を確保する車輪１２００を、吸口本体１０００の両側の前後に設けている。これにより、吸口体５００を前後方向Ｖ２にスムーズに移動させることができ、この際前記刷毛１００５で清掃面をブラッシングして、これにより舞い上がった塵埃を効率よく吸い込むことができる。

【００４９】また、前記車輪１２００は適度な硬さがある滑り樹脂材料で形成されているので、吸口体５００の回転動作にもスムーズに回転させることができるとともに、左右方向Ｖ１にスムーズに移動させることができる。なお、前記車輪１２００を中央が膨らんだ太鼓形状としたり、車輪走行面に刷毛や絨毯生地を貼り付けるなどすると、回転性能を一段と向上することができる。

【００５０】また、この実施形態では、前記凸状に形成したバンパー１１００の長手方向の一部を切り欠いて複数の凹部１１０１を形成している。これにより、吸口体５００の先端部（バンパー１１００の前部）を壁に押し付けてた場合、前記バンパー１１００に形成した凹部１１０１から空気を吸い込むことができる。この吸い込まれる空気はスポット的に吹き付けられ、しかも前記複数のガイド突起１００６によりその流速が早くなるので刷毛が届かない清掃面の部分、例えば壁際の清掃面を速いスポット的な気流により舐めて、塵埃を効率よく吸い込むことができる。さらに吸い込まれた空気は前記ガイド突起１００６により整流されて吸口１００４に吸引される。

【００５１】このように、本実施形態に係る吸口本体１０００によれば、滑り部材からなる車輪１２００により吸口本体１０００の操作性を向上することができ、さらに、ガイド突起１００６、刷毛１００５を設けているので、床面（清掃面）の清掃効率を向上させることができる。また、本実施形態に係る吸口本体１０００を回転させた場合においても、車輪１２００が滑り部材により形成されているので、吸口本体１０００の操作性が低下することがない。

【００５２】さらに、この実施形態では、吸口体５００を９０度回転させた状態では、吸口本体１０００の投影面積内に自在連結部１５００が収まるので、吸口本体１０００の短手方向の幅の隙間にも吸口体５００を挿入することができる。加えて、前記吸口体５００を９０度回転させた状態では、吸口本体１０００の両長手方向とも壁面に付けることができるので、吸口体５００を右回転させても、左回転させても同様な清掃作業を行うことができる。

【００５３】次に、図７から図９において吸口体５００の内部構造を説明する。図７は高低方向Ｙの角度を小さくした状態の吸口体の断面図、図８は高低方向Ｙの角度を大きくした状態の吸口体の断面図、図９は自在連結部の部品展開図である。図７、８において、この実施形態に係る吸口体５００は、回転軸Ｑ１、Ｑ２を備えており、吸口本体１０００のＸ方向の回転が第２の回転部１５０４を構成する回転軸Ｑ１に沿って行われ、高低方向の角度（仰角）Ｙの回転が第１の回転部１５０３を構成する回転軸Ｑ２に沿って行なわれる。

【００５４】前記第１の腕部１５０１および第２の腕部１５０２は、管状に形成され、ともに両端部に形成される開口部を連結される他の部材の開口部と常に連通するように回転可能に取り付けられる。

【００５５】図９に示すように、第１の腕部１５０１は、その１端に形成される開口部１５０１ａの上端の両側に凸状に設けられて回転軸Ｑ１を構成する第１の回転軸部１５０６が設けられ、この第１の回転軸部１５０６が吸口本体１０００の上部に設けられる第１の回転軸受部１００７に樹脂弾性を利用して取り付けられて第１の回転部１５０３を構成する。前記第１の回転部１５０３の構造によれば、第１の腕部１５０１の一端に設けた開口部１５０１の上部を中心に、開口部１５０１を傾斜させながら第１の腕部１５０１を水平に近い位置から垂直位置まで回転させることができる。

【００５６】ここで、図７、８に戻り、この実施形態では、吸口体５００の小型化とＶ１走行時の取り扱い性を向上させるために、第１の回転部１５０３の下方に吸口１００４を設けている。このため、この吸口１００４から吸い込んだ空気流が大きく蛇行することなく、かつ自在連結部１５００が水平に近い位置から垂直位置に至まで吸口本体１０００の集塵室１００８から大きな開口面積を持って、しかも空気漏れがないように前記第１の腕部１５０１と連通させるために、本実施形態では第１の回転部１５０３にシャッタ機構を採用している。

【００５７】具体的には、本実施形態では、開口部１５０１ａの上端を中心として開口部１５０１ａの下部が回

転するので、前記開口部１５０１ａを備えた第１の腕部１５０１の一端の下部を前記回転軸Ｑ１を中心とする凸状の円弧形状部１５０７とし、該円弧形状部１５０７が収納される取付部１００３の下部を同様な凹状の円弧形状部１００９とする。そして、前記第１の腕部１５０１の円弧形状部１５０７と前記取付部１００３の円弧形状部１００９との間に空気漏れがないように密着して配置される同様な円弧で形成されたシャッタ板１５０８を設けるようにする。さらに前記シャッタ板１５０８は、前記回転軸Ｑ１を中心として、この円周方向に沿って動作可能に設けられる。

【００５８】そして、前記シャッタ板１５０８は、図７に示すように、第１の腕部１５０１がほぼ水平の位置では前記第１の腕部１５０１の円弧形状部１００７と重なって取付部１００３に収納され、図８に示す第１の腕部１５０１が垂直の状態では、シャッタ板１５０８の両端が前記取付部１００３と第１の腕部１５０１と連結しながら引き出される。

【００５９】この構造によれば、吸口本体１０００は、その上面の中央部でかつ最頂部で第１の腕部１５０１に連結しているので、接続管４００を介して持ちあげられた際に、吸口本体１０００がその中心位置近傍で吊り下げられるから、吸口本体１０００の姿勢、清掃面に底面を平行にした姿勢でそのまま持ちあげられる。これにより、空中姿勢のバランスが良好となり、また清掃面に再度置かれても底面全体を清掃面に着地できるので、取り扱いが容易である。また、この実施形態では、開口部１５０１ａの一方を回転軸Ｑ１としているので、シャッタ板１５０８を開口部１５０１ａの一方に設ければよいので構造を簡単にすることができる。

【００６０】さらに、この実施形態では、第１の腕部１５０１が水平に近い姿勢（横姿勢）の時に、前記円弧形状部１５０７が吸口本体１０００の取付部１００３内に収納されるので吸口体５００全体の高さを低くすることができるので、高さが低い隙間の清掃性を向上することができる。

【００６１】次に、第１の腕部１５０１の他端は第２の腕部１５０２の他端と互いの周側面が重なるように配置され、その重なった部分に第２の回転部１５０４が設けられる。具体的には、本実施形態では、第２の回転部１５０４を、前記第１の腕部１５０１の一端の下側に形成され、該第１の腕部１５０１の他端側の開口部１５０１ｂを構成する管状で凹状の回転軸受部１５０９と、前記第２の腕部１５０２の一端の上側に形成され、第２の腕部１５０２の一端側の開口部１５０２ａを構成する管状に突出した回転軸部１５１０とで構成し、前記回転軸受部１５０９に回転軸部１５１０が勘合されて回転軸Ｑ２を中心に空気漏れのないように回転可能に取付けられる。

【００６２】いいかえれば、本実施形態では第１の腕部

１５０１と第２の腕部１５０２の一端をＬ型となすようにその環状の通風路を屈曲させ、両腕部の屈曲した開口部１５０１ｂ、１５０２ａを円形にするとともに、第１の腕部１５０１の開口部１５０１ｂに回転軸受部１５０９を形成し、第２の腕部１５０２の開口部１５０２ａに回転軸部１５１０を形成する。そして、前記回転軸受部１５０９と回転軸部１５１０を勘合して、前記両開口部１５０１ｂ、１５０２ａの円形の中心である回転軸Ｑ２を中心に回転可能に取付ける。なお、前記回転軸受部１５０９と回転軸部１５１０は、互いの環状の摺動面に設けたリング状の溝にまたがって設けられる固定部材１５１１によって固定される。

【００６３】この自在連結部１５００の構造によれば、この自在連結部１５００が横姿勢の状態において、第１の腕部１５０１の長手方向Ｒ１と、第２の腕部１５０２の長手方向Ｒ２とが上下に配置され、その間に第２の回転部１５０４の回転面Ｆが設けられる。前記回転面Ｆは、第２の腕部１５０２の長手方向Ｒ２、すなわち接続管４００の中心軸Ｂ２と平行に設けられ、第１の腕部１５０１の長手方向Ｒ１とは傾斜角度Ｚを備えて前方に傾斜して設けられる。

【００６４】このように、本実施形態に係る自在連結部１５００によれば、回転部が直行する２つの回転部Ｑ１、Ｑ２、即ち、高低方向Ｙの第１の回転部１５０３と、左右方向の第２の回転部１５０４とを備えているので、手元ハンドル３００のひねり動作の回転Ｐ１をそのまま吸口体５００の旋回動作の回転Ｐ２に変換することができる。しかも、この自在連結部１５００によれば、前記２つの回転構造、特に第２の回転部１５０４をシンプルな回転構造としているので、製造も容易であるとともに、外観上も凹凸なくシンプルにできるから、意匠性を向上できるとともに、指を挟む等の安全対策や清掃性を向上することができる。

【００６５】次に、図１０に基づいて、手元ハンドル３００の動作にともなう自在連結部の動きをさらに説明する。図１０において、（ａ）図は、本実施形態にかかる吸口体５００を後方からみた概略斜視図、（ｂ）図は、第１の腕部と第２の腕部の取付け位置を上下に反転させた吸口体５００ａを示している。

【００６６】今（ａ）（ｂ）図に示す状態では、手元ハンドル３００を時計方向と反対側にひねった状態を示している。例えば（ａ）図の実施形態では、手元ハンドル３００の回転Ｐ１は接続管４００により、自在連結部１５００に伝達され、吸口本体１０００の長手方向の左側を下方に、右側を上方に振るように動作させる。しかし、使用状態においては前記吸口本体１０００の底面は清掃面により支持されるので、前記翼を振るような動作は阻止される。

【００６７】しかし、この実施形態では第２の回転部１５０４の回転面Ｆが清掃面に対して傾斜しているので、

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前記第２の腕部１５０２に伝達される中心軸Ｂ２の回転Ｐ１は第２の回転部１５０４が回転して、第１の腕部１５０１と第２の腕部１５０２が第２の回転部１５０４で屈曲して、該第２の回転部１５０４をに横（Ｕ１方向）に逃げるように動作させる。この際、第１の回転部１５０３は吸口本体１０００の底面を清掃面に密着しながら高低方向Ｙの角度を大きくするようにＵ２方向に動作して前記第２の回転部１５０４の動作に連動して動作する。この第２の回転部１５０４がＵ１方向に横に逃げる動作により、吸口体５００の後方がＵ１方向にお尻を振るように動作して吸口体５００の回転Ｐ２が行われる。

【００６８】ここで、実験的検証によれば、前記第２の回転部１５０４のＵ１方向に横に逃げる動作は、横方向に行くにしたがって上方に上がるように円弧状に動作する。

【００６９】また、前記円弧の大きさは前記回転面Ｆの傾斜角度Ｚが小さいほど大きく、傾斜角度Ｚが９０度であれば前記Ｕ１方向の動きをともなわないであるいは小さくして接続管４００の回転Ｐ１が吸口体４００の回転Ｐ２に直結する。さらに（ａ）図に示す本実施形態に係る吸口体５００は（ｂ）図に示す吸口体５００ａより少ない回転Ｐ１で回転Ｐ２を行うことができる。

【００７０】この動作は例えば第２の回転部１５０４がその上方の回転中心Ｓを中心に円弧を描くように動作することで説明できる。

【００７１】このことからすれば、（ａ）図に示す本実施形態では、第２の腕部１５０２が回転中心Ｓに対して第２の回転部１５０４の外側、すなわち前記回転中心Ｓと第２の腕部１５０２の長さＺ２が、回転中心Ｓと第２の回転部１５０４の長さＺ１より長いので小さな力で吸口体５００を回転（Ｐ２）させることができる。

【００７２】一方、（ｂ）図に示す吸口体５００ａによれば、第２の腕部１５０２が回転中心Ｓに対して第２の回転部１５０４の内側、すなわち前記回転中心Ｓと第２の腕部１５０２の長さＺ３が、回転中心Ｓと第２の回転部１５０４の長さＺ１より短いので吸口体５００を回転（Ｐ２）させるためには（ａ）図で示す吸口体５００より大きな力が必要となる。

【００７３】つまり、（ａ）図で示す本実施形態は（ｂ）図で示す実施形態に比べて手元ハンドル３００のひねり動作の回転Ｐ１が小さな力で吸口体５００を回転（Ｐ２）させることができる。

【００７４】また、（ａ）図に示す実施形態では、第２の腕部１５０２の清掃面から高さＪ２が第２の回転部１５０４の清掃面からの高さＪ１より小さいので、動作元である第２の腕部１５０２が清掃面を回転しようとする吸口本体１０００の回転Ｐ２に近いので手元ハンドル３００のひねり動作の回転Ｐ１を効率よく、かつスムーズに吸口体５００の回転（Ｐ２）とすることができるとともに、低重心で安定した回転（Ｐ２）が得られる。

【００７５】一方、（ｂ）図に示す実施形態では、第２の腕部１５０２の清掃面から高さＪ３が第２の回転部１５０４の清掃面からの高さＪ１より大きいので、動作元である第２の腕部１５０２が清掃面を回転しようとする吸口本体１０００の回転Ｐ２から遠くなるから、（ａ）図の実施形態より、手元ハンドル３００のひねり動作の回転Ｐ１を吸口体５００の回転Ｐ２とする効率が低下する。また、動作元である第２の腕部１５０２が高い位置となるので吸口体５００の回転（Ｐ２）が（ａ）図の実施形態より不安定となる。

【００７６】次に、図７、８により、塵埃を含んだ空気流の流れについて説明する。この実施形態では、図７に示す前記自在連結部１５００が横姿勢の状態では、吸口１００４から吸い込まれた空気流は集塵室１００８のガイド１０１０に導かれて開口部１５０１ａから第１の腕部１５０１に入り、クランク状の第２の回転部１５０４を経て第２の腕部１５０２から接続管４００へと導かれる。

【００７７】また、図８に示す前記自在連結部１５００が縦姿勢の状態では、吸口１００４から吸い込まれた空気流は集塵室１００８のガイド１０１０とシャッタ板１５０８に案内されて開口部１５０１ａから第１の腕部１５０１に入り、クランク状の第２の回転部１５０４を経て第２の腕部１５０２から接続管４００へと導かれる。なお、前記図７または図８の状態において、第２の腕部１５０２が第２の回転部１５０４で折れ曲がった状態では、空気流は第２の回転部１５０４で屈折して流れることとなる。

【００７８】このように、この実施形態では、自在連結部１５００の動作姿勢に関係なく吸口本体１０００の集塵室１００８と自在連結部１５００が安定した開口面積を持って連結される。また、この実施形態においては、回転面Ｆを第１の腕部１５０１に対して前方に傾斜して設けているので、第１の腕部１５０１から第２の回転部１５０４に連続するＬ型に折れ曲がる通風路の部分１５１２の折れ曲がる角度、つまり回転軸Ｑ１と第１の腕部１５０１の長手方向Ｒ１を９０度以上とすることができるから空気抵抗を小さくするとともに、騒音を小さくすることができる。

【００７９】次に、図１１～図１６を参照して本実施形態に係る手元ハンドルを詳細に説明する。図１１は手元ハンドルの外観斜視図、図１２は第２の連結管部の分解図、図１３は手元ハンドルの断面図、図１４は電気掃除機の使用状態図、図１５はハンドルカバーの説明図、図１６は手元ハンドルの動作説明図である。

【００８０】図１１、図１２において、手元ハンドル３００は、ハンドル部３０１と第１の連結管部３０５を構成するハンドル本体３０８と、第２の連結管部３０６とから構成される。

【００８１】前記ハンドル本体３０８は、中央に略三角

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形状の貫通穴３１６を備えた略三角形状の外観形状を備え、この三角形状の上部の１辺を操作スイッチ配置部３０８ａとし、他の上部の１辺をハンドル部３０１が構成されるグリップ配置部３０８ｂとし、三角形状の底辺を第１の連結管部３０５を備えた連結管配置部４０８ｃとしている。そして、前記操作スイッチ配置部３０８ａの長手方向を前記接続管４００の中心軸Ｂ２と一致させるように、前記操作スイッチ配置部３０８ａと連結管配置部４０８ｃの角部４０８ｄを介して前記接続管部４００に取付けるようにしている。

【００８２】また、この実施形態では、操作スイッチ配置部３０８ａとグリップ配置部３０８ｂと連結管配置部４０８ｃをほぼ直線状に形成している。これにより、操作スイッチ配置部３０８ａにおいては板状の操作基板３０２ａ（図１３で図示）の取付けを向上し、グリップ配置部３０８ｂにおいては回転するハンドルカバー３０７の取付けを向上し、連結管配置部３５０ｃにおいては第２の連結管部３０６の回転空間を確保している。

【００８３】この構造によれば、接続管４００と第１の連結管部３０４を騒音の発生し難い緩やかな角度で連結することを可能にするとともに、この連結管部３０４の上部に使用者にとって保持し易い握りグリップ（ハンドル部３０１）を前記接続管４００の中心軸Ｂ２上に握り易い角度で位置させ、更に、前記ハンドル部３０１の配置にともなう空間（操作スイッチ配置部３０８ａ）を利用して操作性のよい位置に操作部３０２を配置することができる。これにより、内部実装効率に優れたコンパクトな形態で、しかも、強度的にも強く、操作性に優れた手元ハンドル３００を実現することができる。

【００８４】特に、この実施形態では、第１の連結管部３０５と、この第１の連通管部３０５の周囲を回転する第２の連結管部３０６を連通するために、第１の連通管部３０５を備えた連結管配置部４０８ｃの周側面に大きな開口部３１７を設ける必要がある。この大きな開口部３１７の設置にともなう前記連結管配置部４０８ｃの強度不足を、この連結管配置部４０８ｃとグリップ配置部３０８ｂを連結することで解決することができる。

【００８５】なお、この実施形態では、操作スイッチ配置部３０８ａとグリップ配置部３０８ｂをほぼ直線状に形成して、三角形状を成すように結合しているが、前記接続管４００から連続する緩やかなアーチ状に形成してもよい。これにより、前記アーチ状の部分を緩やかに曲がるハンドル部とすることができるので、使用者は任意な角度の部分を保持することができるから保持性を向上することができる。

【００８６】また、前記ハンドル本体３０８は、左右対称に樹脂成形される本体カバー３０９ａ、３０９ｂと、操作スイッチカバー３１０と、ハンドル部３０１に回転可能に取付けられるハンドルカバー３０７等から構成される。前記本体カバー３０９ａ、３０９ｂは、操作スイッチカバー３１０をはさみ込んで分割線３１１で結合され、図示しないネジで取付けられる。

【００８７】一方、前記第２の連結管部３０６は、第２連結管本体３１２と、第２連結管カバー３１３とから構成され、この第２連結管本体３１２と第２連結管カバー３１３の間に、前記ハンドル本体３０８の前記第１の連結管部３０５を挟み込んで取付けられる。この取付けにあたっては、前記第２連結管カバー３１３に設けた取付けリブ３１４ａを第２連結管本体３１２の内側に設けたリブ取付部３１４ｂに取付け、外方よりネジを介して取付けるようにする。この第２の連結管部３０６を取り外し可能とすることにより、連結管３０４内につまった塵埃を簡単に除去することができる。

【００８８】また、前記第２連結管本体３１２には、ホース連結部３１５が設けられ、吸引ホース部２００の一端が着脱可能に取付けられる。この着脱構造は、吸引ホース２００の連結部２０１に設けた突起部２０１ａが前記ホース連結部３１５の連結穴３１５ａに勘合して連結される構造としている。取り外す場合は、前記連結穴３１５ａに勘合した前記突起部２０１ａをドライバー等で押し込んで勘合を外せば取り外すことができる。

【００８９】なお、前記吸引ホース２００の連結部２０１は、吸引ホース２００とその軸方向Ｂ３で回転可能に取付けられ、吸引ホース２００のねじれが手元ハンドル３００に影響しないようにしている。

【００９０】また、３１８は手元ハンドル３００に内蔵された電池の着脱用の電池カバー、３０３は操作部３０２とともに手元ハンドル３００の後方に設けられる赤外線発信部である。

【００９１】次に、図１３を参照して、手元ハンドル３００の内部構造を中心に説明する。

【００９２】図において、先ず、この手元ハンドル３００は、前記接続管４００の中心軸Ｂ２と、連結管部の管軸方向Ｂ１と、吸引ホース部２００の管軸方向Ｂ３と、ハンドル部３０１の長手方向Ｂ４とを考慮して設計されている。これを図１４の使用状態を基に説明する。

【００９３】図１４において、先ず、本実施形態に係る電気掃除機１では、使用者は立ち姿勢で手元ハンドル３００を保持することにより、接続管４００を介して吸口体５００を操作して床面の掃除を行うことができる。この際、吸引ホース部２００を介して手元ハンドル３００に連結される電気掃除機本体１００には一対の大車輪１０１と１個の自在車輪１０２が備えられているので、移動しながら清掃を行うことができる。

【００９４】一般に、日本女性の平均身長は１５７センチであるが、この使用者が自然に手元ハンドル３００を持った状態で、接続管４００を介し吸口体５００を前後させて掃除をしようとした場合には、手元ハンドル３００と床面との垂直方向の距離が７８センチ以下であれば手や腕に負担をかけることなく掃除をすることができ

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る。その角度は垂直方向に４５度とする使用者の最も操作される動作範囲に設定され、４５度以上であれば逆に手や腕に負担をかけることになる。

【００９５】図１２及び図１３において、本実施形態では、前記接続管４００の中心軸Ｂ２が床面と成す角度θ４を４５度となるように接続管４００の長さを設定している。そして、手元ハンドル３００のハンドル部３０１の長手方向Ｂ４が前記中心軸Ｂ２と成す角度θ３を９０度～１５０の範囲で設定しているので、該ハンドル部３０１を把持する使用者は前記接続管４００の角度が４５度の状態で前後方向の動きを楽にすることができる。

【００９６】また、本実施形態では、前記接続管４００により手元ハンドル３００の最頂部まで持ち上げられた塵埃の搬送通路を床面に設置される電気掃除機本体１００の最低位置まで緩やかに連続させ、かつ、前記手元ハンドル３００に接続される吸引ホース部２００が前記手元ハンドル３００を中心にして揺れる（図面で示す前後方向）ような動きを可能とするために、連結管部３０４の管軸方向Ｂ１と前記中心軸Ｂ２と成す角度θ１を床面とほぼ平行な水平位置となるように１１０度から１５０度の範囲に設定し、吸引ホース部２００の管軸方向Ｂ３と連結管部３０４の管軸方向Ｂ１との成す角θ２を１１０度から１５０度の範囲に設定している。

【００９７】図１３において、本実施形態では、前記使用実態を考慮した手元ハンドル３００を実現するために、先ず、第１の接続管部３０５を、前記接続管４００の中心軸Ｂ２上に取付けられる接続管取付部３１８と、前記第２の連結管部３０６が取付けられ、前記接続管４００の中心軸Ｂ２に対して鈍角の角度θ１で前記接続管取付部３１８と屈曲して形成されるヒンジ管部３１９とから構成する。

【００９８】更に、前記第２の連結管部３０６は、前記吸引ホース部２００を前記ヒンジ管部３１９の管軸方向Ｂ１に対して鈍角θ２の角度を取るように回転可能に取付けられる。そして、前記接続管取付部３１８とヒンジ管部３１９との接続を緩やかに連続する内面形状とするとともに、前記ヒンジ管部３１９の後部を大きなアール形状で開口部３１７に連続させて、第２の連結管部３０６に連続するようにしている。

【００９９】これにより、前記吸口体５００から吸い込まれた塵埃は、前記手元ハンドル３００での吸引ホース部２００の揺れる回転動作を維持しながら、接続管４００と第１の連結管部３０５と第２の接続管部３０６と吸引ホース部２００から構成される山形の緩やかな塵埃搬送路を介して電気掃除機本体１００に搬送されるので、前記手元ハンドル３００や他の搬送路から発生する騒音、あるいは塵埃のつまりを軽減することができる。

【０１００】また、本実施形態では、前記接続管４００の中心軸Ｂ２上にスイッチ配置部３０８ａを設け、この内部に前記操作基板３０２ａ及びこの操作基板３１７に電源を供給する電池部３２０を収納している。そして、前記スイッチ配置部３０８ａの上端と前記ヒンジ管部３１９を備えた連結管配置部４０８ｃの後部とを連結するグリップ配置部３０８ｂを設けることで、ハンドル部３０１の長手方向Ｂ４の角度θ３を決定している。

【０１０１】また、本実施形態では、グリップ配置部３０８ｂに回転可能なハンドルカバー３０７を設けてハンドル部３０１を構成する。このハンドルカバー３０７を図１５で更に説明する。図１５において、（ａ）図はハンドルカバー３０７の展開図、（ｂ）図はハンドル部３０１の断面図である。図において、ハンドルカバー３０７は半筒状のカバー片３０７ａと３０７ｂとで筒状の形態を構成し、グリップ配置部３０８ｂの取付部３２１に取付けられる。取付けにあたっては、一方のカバー片３０７ａに設けた取付リブ３２２ａを他方のカバー片３０７ｂに設けたリブ受部３２２ｂに勘合することで前記取付部３２１に取付けられる。

【０１０２】図１３に戻り、前記構造を持つハンドルカバー３０７によれば、例えば、前記接続管４００の中心軸Ｂ２を矢印のようにひねって回転することにより、使用者の手に保持されたハンドルカバー３０７は前記中心軸Ｂ２を矢印と反対方向に回転することができるので、ひねり動作にともなう手首の動きを無理なく吸収することができる。この逆のひねり動作も同様である。これにより、ひねり動作を人間の体系に合わせて無理なく行うことができる。

【０１０３】次に、本実施形態に係る手元ハンドルの動作状態を図１６を参照して更に説明する。図１６は手元ハンドル３００を後方よりみた使用状態の参考図であり、（ａ）図は吸口体をまっすぐにした状態の本実施形態の手元ハンドル。（ｂ）図はハンドル部を回転させた状態図、（ｃ）図は従来の手元ハンドルの使用状態図である。

【０１０４】先ず、（ａ）（ｂ）図において、本実施形態の手元ハンドル３００は（ａ）図のように手元ハンドル３００をひねらない状態では、吸引ホース部２００は手元ハンドル３００の下方に位置している。一方、（ｂ）図の点線に示すように、手元ハンドル３００を左右に９０度ひねっても前記吸引ホース部２００は、第２の連結管部３０６が第１の連結部３０５のヒンジ管部３１９の周囲を回転するのでその重さにより常に下方に位置する。これにより、手元ハンドル３００をひねる動作では吸引ホース部２００が常に同じ状態で保持されるので、手首にかかる負担を軽減することができる。

【０１０５】しかも、本実施形態では、前記ハンドル部３０１に回転するハンドルカバー３０７を設けているので、一層手首にかかる負担を軽減することができる。

【０１０６】なお、本実施形態では、前記吸口体５００を９０度回転可能としているために、手元ハンドル３００を９０度ひねっても吸引ホース部２００が下方に位置

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するように、第２の連結管部３０６の回転動作範囲を下方の位置を中心に左右９０度、合計１８０度の範囲で回転可能に設定するとともに、前記範囲で第１の連結管部３０５と前記第２の連結管部３０５が連通するように開口部３１７を形成している。

【０１０７】これに対し、（ｃ）図に示す従来例は、手元ハンドル３００を左右に９０度ひねることにより、吸引ホース部２００を上方に引き上げることになるので、ハンドル部３０１ａを保持する手に、吸引ホース部２００を下方に引き戻そうとする力が矢印方向に働く。これにより、手元ハンドル３００を保持する使用者の手に無用な負担を強いることになる。

【０１０８】特に、近年、長い吸引ホース部２００が採用されているケースでは、前記引き戻そうとする力は大きなものである。また、吸引ホース部２００と電気掃除機本体１００との間がある場合、前記ひねり動作で電気掃除機本体１００をも引っ張ってしまうこととなり、手にかかる負担は大きくなる。この点、本実施形態の手元ハンドル３００によれば、前記従来例の課題が解決される。

【０１０９】次に、図１７を参照して、この実施形態の大きな特徴である手元ハンドル３００が低い位置での操作性について説明する。図１７において、この実施形態では、前記したように、前記自在連結部１５００が水平に近い横姿勢の状態でも第２の回転部１５０４の回転面Ｆが前方に傾斜しているので手元ハンドル３００により吸口体５００の回転制御を行うことができる。

【０１１０】図中、（ａ）はこの低い操作状態を上方より見た状態を示し、（ｂ）図は側方より見た状態を示している。本実施形態によれば、ベッドの下や家具の下などの高さが低く奥行きのある床面の清掃性に優れている。例えば、本実施形態によれば、図から明らかなように、手元ハンドル３００を低くして接続管４００を水平近い状態にしてベッドの下などにむぐり込ませることができる。しかも、本実施形態では、吸口体５００の高さを低くしているので、より高さの低い隙間にむぐり込ませることができる。

【０１１１】特に、本実施形態によれば、前記状態では、手元ハンドル３００のひねり動作の回転Ｐ１と吸口体５００の回転Ｐ２が連動しているので、Ｖ２方向に前後する清掃動作において、吸口体５００の左右のブレを手元ハンドル３００で押さえることができるとともに、手元ハンドル３００のひねり動作の回転Ｐ２で吸口体５００を回転させてＶ１方向の清掃動作が可能なのでベッド奥の狭い隙間の清掃性を向上させることができる。

【０１１２】また、この実施形態によれば、前記図１７に示す状態では、第２の回転部１５０４の回転面Ｆが傾斜しているので、これと平行に形成される接続管４００も傾斜する。したがって、手元ハンドル３００は清掃面からやや浮いた状態となるので、中心軸Ｂ２に傾斜して

取付けられるハンドル部３０１の動作範囲が確保される。しかも、この実施形態では、手元ハンドル３００の下部に常に吸引ホース２００が吊り下げられるので、この吊り下げられた吸引ホース２００が清掃面と接触するのを軽減することができる。

【０１１３】（第２の実施形態）次に、図１８から図２４は、本発明に係る第２の実施形態に係る吸口体５５０を示すものである。ここで、この第２の実施形態では吸口体５５０以外の構造は前記第１の実施形態と共通するため説明を省略している。図１８は第２の実施形態に係る吸口体の後方斜視図、図１９は右側面図、図２０は平面図、図２１は正面図、図２２は底面図、図２３、図２４は断面図である。

【０１１４】この第２の実施形態に係る吸口体５５０は、吸口本体１０００内に回転ブラシ１０５０（図２３、２４参照）を採用しつつ全体の小型化を実現するものである。図１８から図２１において、この第２の実施形態に係る吸口体５５０は、吸口本体１０００と、この吸口本体１０００の後方の中央に配置された自在連結部１５００とから構成されている。

【０１１５】本実施形態の吸口体５５０は、その外観を薄形とするとともに吸口本体１０００の前部を両側に張り出し、後部中央に配置した前記自在連結部１５００の取付部１０５４を後方に張り出した「略Ｔ字形」の平面形状としている。そして、その上面全体をアール形状を主体とした形状とすることで清掃性を向上するとともに、各角部をアール形状とすることで、家具等へ傷を付けないように配慮している。

【０１１６】また、吸口本体１０００は、吸口本体１０００の骨格を成す樹脂材料で成形された下ケース１０５１と、吸口本体１０００の前方をカバーする樹脂材料で成形された前部上カバー１０５２と、吸口本体１０００の後方をカバーする樹脂材料で成形された後部上カバー１０５３とから構成される。前記下ケース１０５１は、その内部に図示しないリブが形成されていて、このリブと後部上カバー１０５３とで自在連結部１５００の第１の腕部１５０１の一端を挟み込んで第１の回転部１５０４を構成する。

【０１１７】そして、前記後部上カバー１０５３には、自在連結部１５００が横姿勢の時に、第１の腕部１５０１の端部を収納する凹状の取付部１０５４が形成され、前記第１の回転部１５０４は前記取付部１０５４の前部上端に設けられている。前記下ケース１０５１と前部上カバー１０５２とで集塵室１０５５（図２３、２４）を構成し、この集塵室１０５５内に回転ブラシ１０５０を内蔵している。また、前記前部上カバー１０５２は、回転ブラシ１０５０を回転させるための空気取入口１０５６を長手方向の両側後方に形成している。

【０１１８】前記前部上カバー１０５２と下カバー１０５１は吸口本体１０００の周側で合わされ、その合わせ

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部に凸状のバンパー１１００が形成されている。なお、この実施形態では、吸口本体１０００を「略Ｔ字形」としているので、バンパー１１００の前部に凹部１１０１を形成している。

【０１１９】一方、前記自在連結部１５００は、管状の２つの第１の腕部１５０１と第２の腕部１５０２とを第２の回転部１５０４で連結し、第１の腕部１５０１の他端を前記吸口本体１０００の取付部１０５４に高低方向Ｙに回転可能に取り付け、前記第２の腕部１５０２の他端を前記接続管４００に取り付けるための接続部１５０５としている。ここで、前記取付部１０５４は、後方に張り出した２本の支持体１０５４ａ、１０５４ｂで前記第１の腕部１５０１を両側から挟み込むようにしている。なお、自在連結部１５００の構造は前記第１の実施形態と同様なため説明を省略する。

【０１２０】図２２において、吸口本体１０００の底面中央には塵埃を吸い込むための横長矩形状の吸口１００４が形成され、この吸口１００４の前方に柔軟性のある凸状の刷毛１００５が一列に並んで配置され、さらに、その前方に前記吸口１００４に塵埃を含んだ空気流をガイドして気流の流れを整流する複数の凸状のガイド突起１００６が設けられている。一方、前記吸口１００４の後方には、この吸口１００４で吸い切れなかった塵埃をはね返して吸口１００４へ戻すための凸状のキーパー１０５７が設けられている。

【０１２１】そして、前記吸口１００４を清掃面から適度に浮かせて、前記凸状の刷毛１００５やキーパー１０５７の効率をよくするとともに、吸口体５００の走行機能を確保する車輪１２００を設けている。この実施形態では、前記車輪１２００を、吸口本体１０００の前部の両側に配置される小車輪１２１０と、前記取付部１０５４の後端部、すなわち自在連結部１５００の下方の位置となる吸口本体１０００の最後部に、後方に張り出した２本の支持体１０５４ａ、１０５４ｂで支持して設けられる大車輪１２１１とから構成している。この実施形態においても第１の実施形態と同様に車輪１２００を横にすべる処理を施している。

【０１２２】この実施形態によれば、手元ハンドル３００、接続管４００を介して伝達される負荷を前記自在連結部１５００の下方に位置する大車輪１２１１で支持することができるので、走行性や旋回性を向上することができる。

【０１２３】図２３、２４において、この実施形態に係る吸口体５５０は、前記第１の実施形態と同様なシャッタ機構を採用した自在連結部１５００を備えているので、吸口１００４から吸い込んだ空気流が大きく蛇行することなく、かつ自在連結部１５００が水平に近い位置から垂直位置に至まで吸口本体１０００の集塵室１００８から大きな開口面積を持って連通させることができるとともに、手元ハンドル３００のひねり動作の回転Ｐ１により吸口体５５０の回転Ｐ２を行うことができる。

【０１２４】特に、この実施形態の大きな特徴とするところは、前記第１の実施形態と同様な構造を取りながら、回転ブラシ１０５０を備えた吸口本体１０００の後方に自在連結部１５００を配置したことにより、吸口体５５０の高さを低くしたことにある。しかも、本実施形態では、第１の回転部の回転軸Ｑ１を吸口体５５０の最頂部に設けているので、自在連結部１５００の回転動作を低い位置で行うことができるので、吸口体５５０の回転Ｐ２を安定して、しかもスムーズに行うことができる。

【０１２５】なお、本実施形態の詳細な構造説明は第１の実施形態と同じ符号を付けることにより説明を省略する。

【０１２６】以上、第１及び第２の実施形態では、回転軸Ｑ１を第１の腕部１５０１の開口部１５０１ａの上端部に設けることで説明したが、前記開口部１５０１ｂの中央の両側に回転軸Ｑ１を設けてシャッタ板１５０８を上下に設けてもよい。

【０１２７】また、この前記実施形態では手元ハンドル３００に吸引ホース２００を左右方向に揺動可能に取付けているが、吸引ホース２００を固定して設けてもよい。さらに、前記手元ハンドル３００はハンドル部３０１を独立して設けているが、接続管４００の上端部を屈曲させて、この屈曲させた端部に吸引ホース２００を直接接続した構造のものでもよい。この場合、前記屈曲した管部をハンドル部として手で支持することで、前記ハンドル部３０１と同様な効果を得ることができる。

【０１２８】

【発明の効果】本発明によれば、騒音や塵埃つまりを軽減できるとともに、吸口本体を手元ハンドルのひねり動作により回転させることができるので、電気掃除機の使用者が楽な姿勢で掃除を行なうことができるとともに低い隙間の清掃性を向上させ、かつ電気掃除機の操作性を向上することができる。

【図面の簡単な説明】

【図１】本発明に係る電気掃除機の第１の実施形態を示す電気掃除機の外観斜視図である。

【図２】本発明に係る電気掃除機の第１の実施形態を示す吸口体の斜視図である。

【図３】本発明に係る電気掃除機の第１の実施形態を示す吸口体の側面図である。

【図４】本発明に係る電気掃除機の第１の実施形態を示す吸口体の平面図である。

【図５】本発明に係る電気掃除機の第１の実施形態を示す吸口体の正面図である。

【図６】本発明に係る電気掃除機の第１の実施形態を示す吸口体の底面図である。

【図７】本発明に係る電気掃除機の第１の実施形態を示す吸口体の断面図である。

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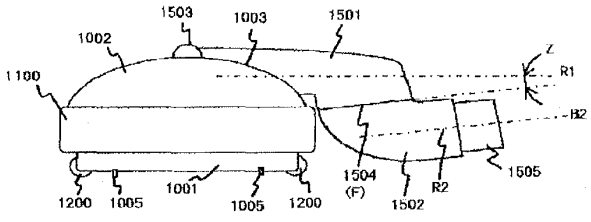
【図８】本発明に係る電気掃除機の第１の実施形態を示す吸口体の断面図である。
【図９】本発明に係る電気掃除機の第１の実施形態を示す吸口体の自在連結部の分解斜視図である。
【図１０】本発明に係る電気掃除機の第１の実施形態を示す吸口体の動作説明図である。
【図１１】本発明に係る電気掃除機の第１の実施形態を示す手元ハンドルの外観図である。
【図１２】本発明に係る電気掃除機の第１の実施形態を示す手元ハンドルの部分分解図である。
【図１３】本発明に係る電気掃除機の第１の実施形態を示す手元ハンドルの断面図である。
【図１４】本発明に係る電気掃除機の第１の実施形態の使用状態図である。
【図１５】本発明に係る電気掃除機の第１の実施形態を示すハンドルグリップ部の構造図である。
【図１６】本発明に係る電気掃除機の第１の実施形態を示す手元ハンドルの動作説明図である。
【図１７】本発明に係る電気掃除機の第１の実施形態の使用状態図である。
【図１８】本発明に係る電気掃除機の第２の実施形態を示す吸口体の斜視図である。
【図１９】本発明に係る電気掃除機の第２の実施形態を示す吸口体の側面図である。
【図２０】本発明に係る電気掃除機の第２の実施形態を示す吸口体の平面図である。
【図２１】本発明に係る電気掃除機の第２の実施形態を示す吸口体の正面図である。
【図２２】本発明に係る電気掃除機の第２の実施形態を示す吸口体の底面図である。
【図２３】本発明に係る電気掃除機の第２の実施形態を示す吸口体の断面図である。

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【図２４】本発明に係る電気掃除機の第２の実施形態を示す吸口体の断面図である。
【符号の説明】
１　電気掃除機
１００　電気掃除機本体
１０１　大車輪
１０２　自在車輪
１０３　赤外線受光部
２００　吸引ホース
３００　手元ハンドル
３０１　ハンドル部
３０２　操作部
３０３　赤外線発信部
４００　接続管
４０１，４０２　管体
５００　吸口体
１０００　吸口本体
１２００　車輪
１５００　自在連結部
１５０１　第１の腕部
１５０２　第２の腕部
１５０３　第１の回転部
１５０４　第２の回転部
Ｂ２　接続管の中心軸
Ｆ　第２の回転部の回転面
Ｐ１　手元ハンドルのひねり動作の回転
Ｐ２　吸口体の回転
Ｑ１，Ｑ２　回転軸
Ｘ　左右方向の回転
Ｙ　高低方向の回転
Ｚ　回転面の傾斜角度

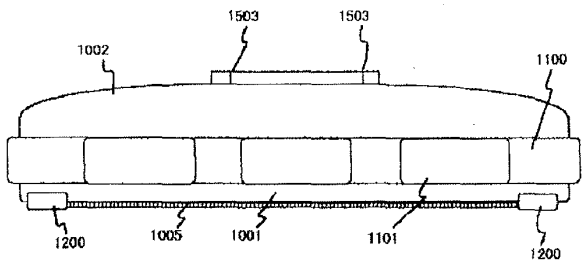
【図３】

図３



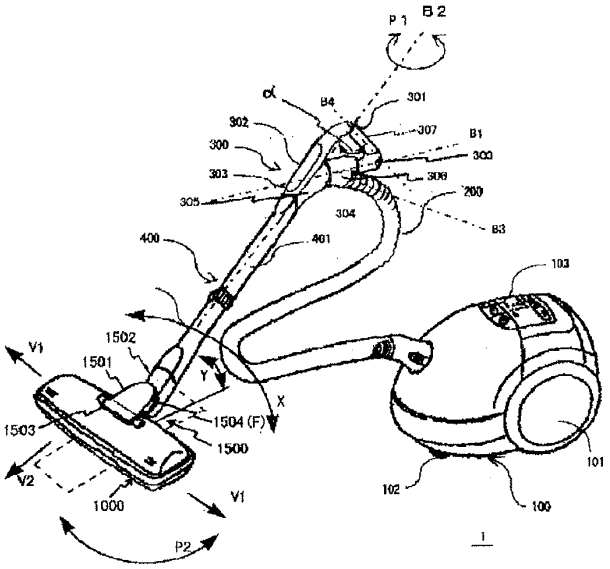
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図５



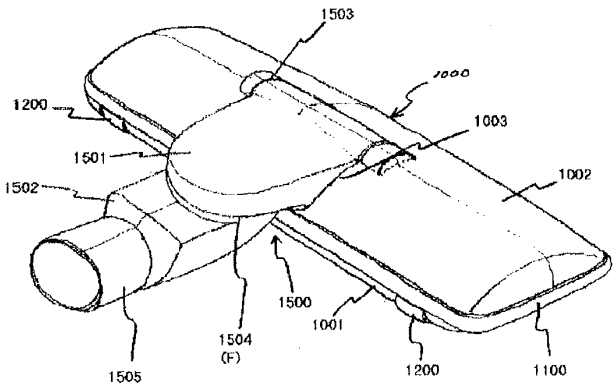
【図１】

図1



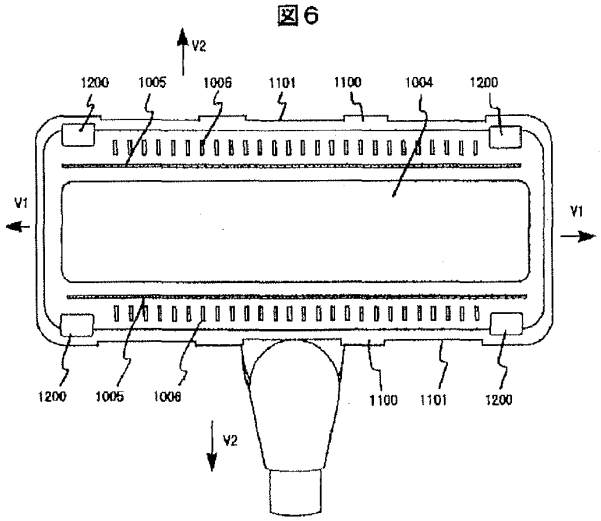
【図２】

図2



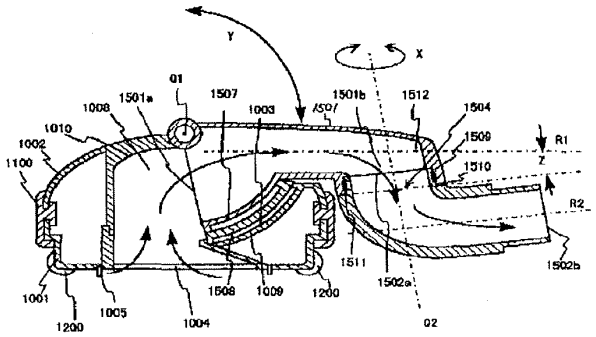
【図６】

図6



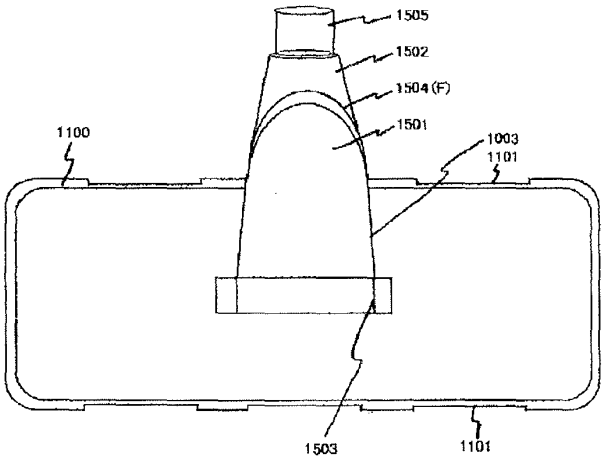
【図７】

図7



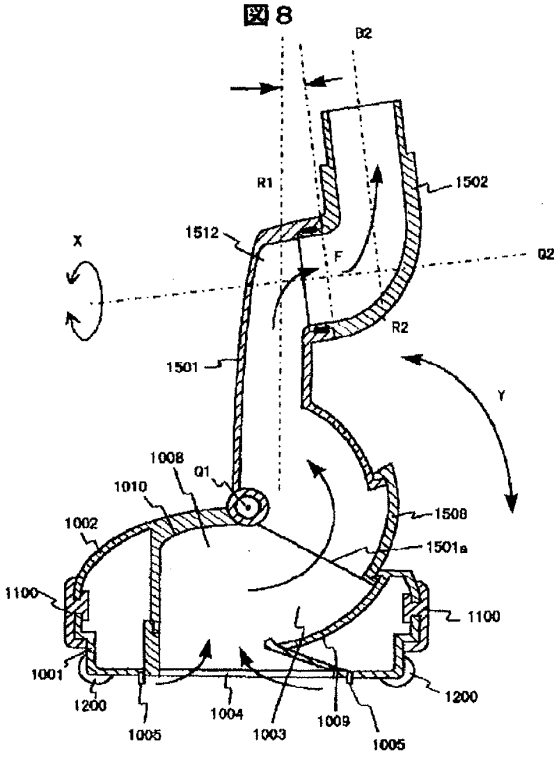
【図４】

図４



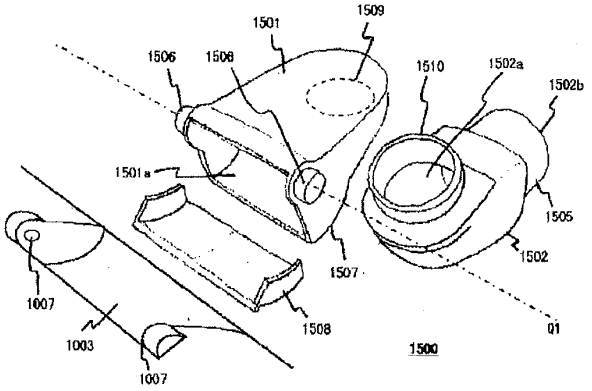
【図８】

図８



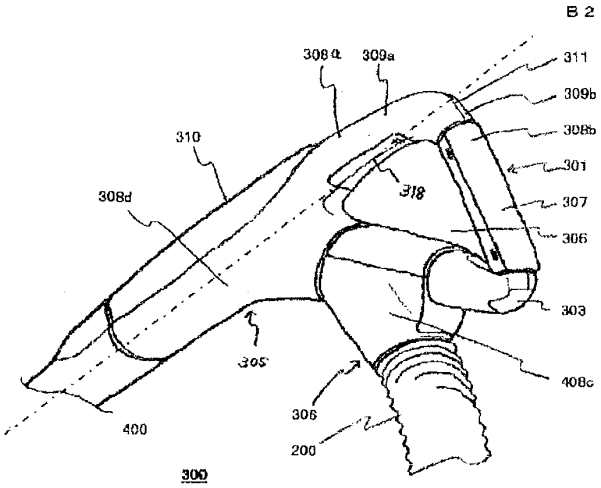
【図９】

図９



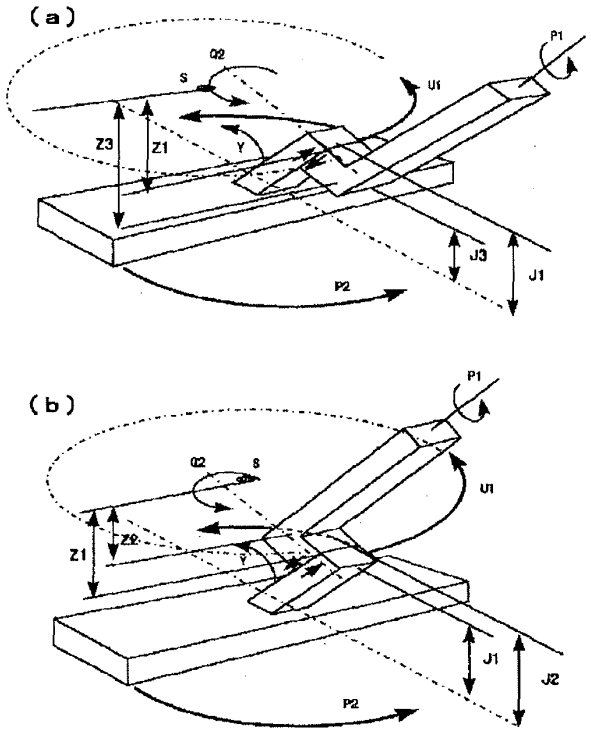
【図１１】

図１１



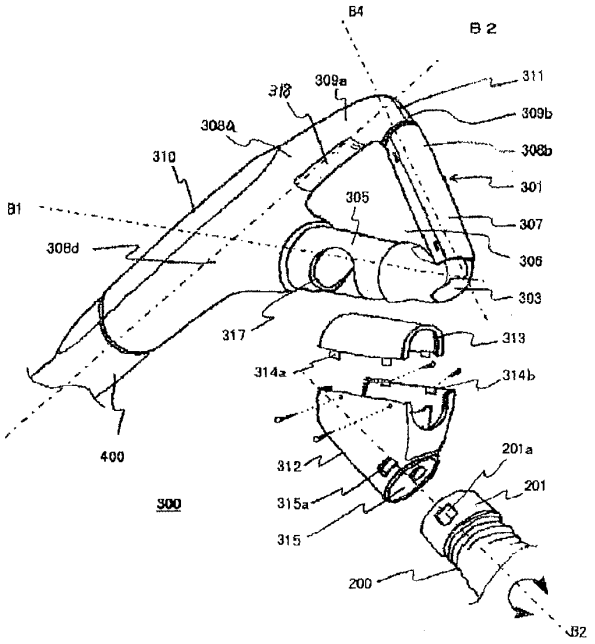
【図１０】

図１０



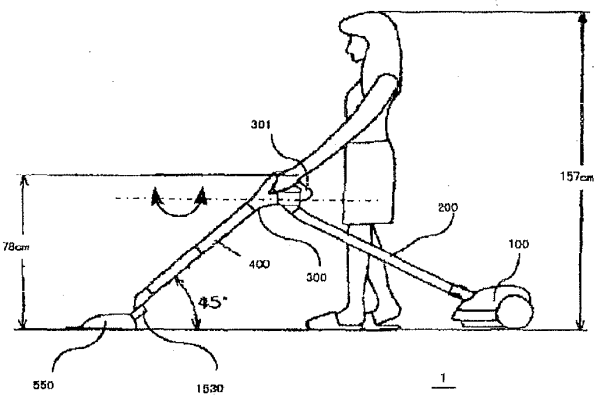
【図１２】

図１２



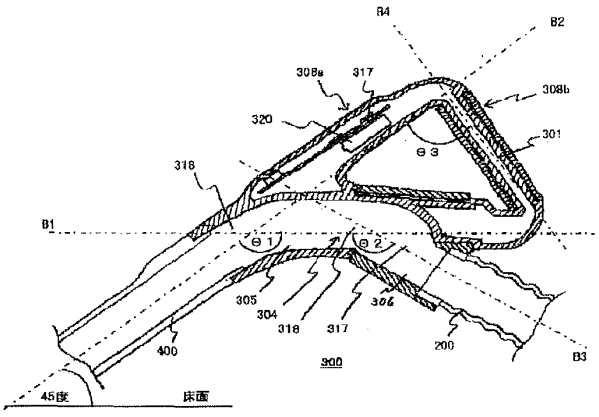
【図１４】

図１４



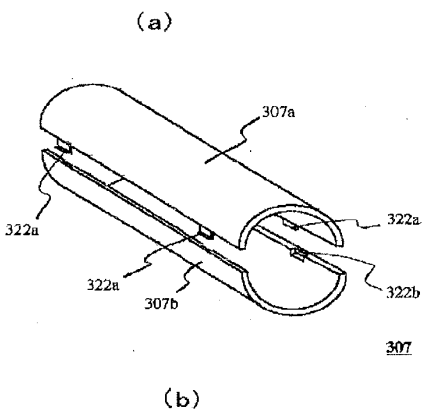
【図１３】

図１３



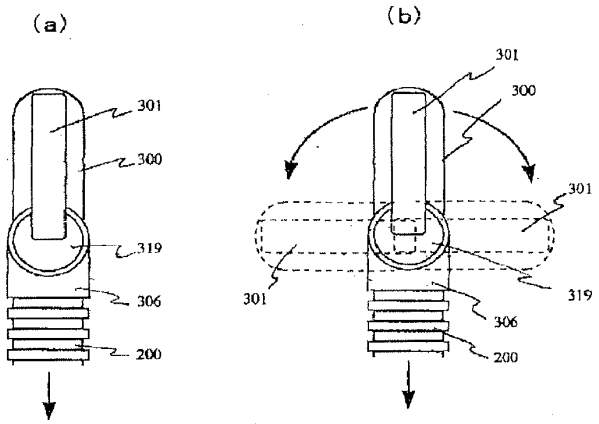
【図１５】

図１５



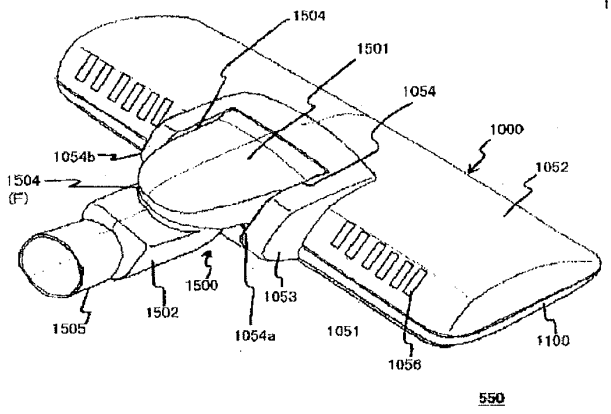
【図１６】

図１６



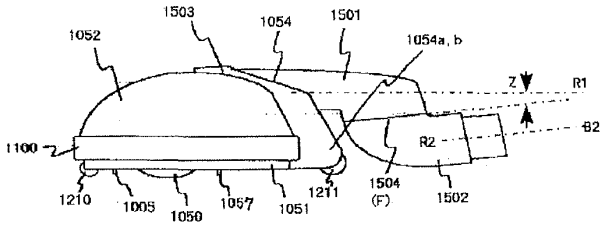
【図１８】

図18



【図１９】

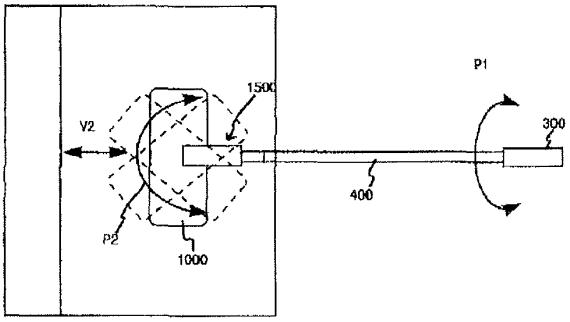
図１９



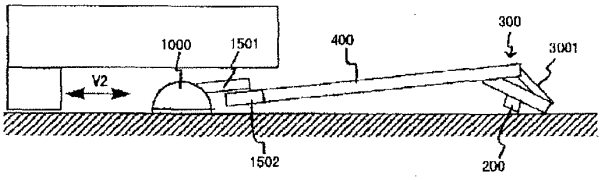
【図１７】

図１７

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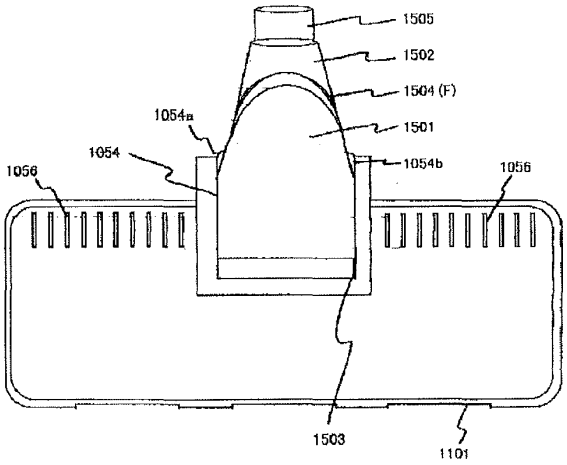


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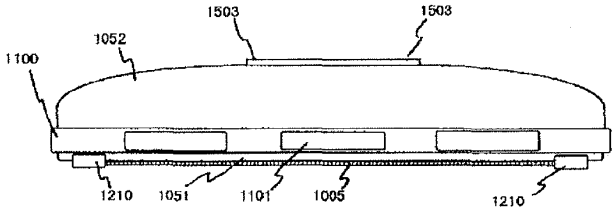
【図２０】

図２０



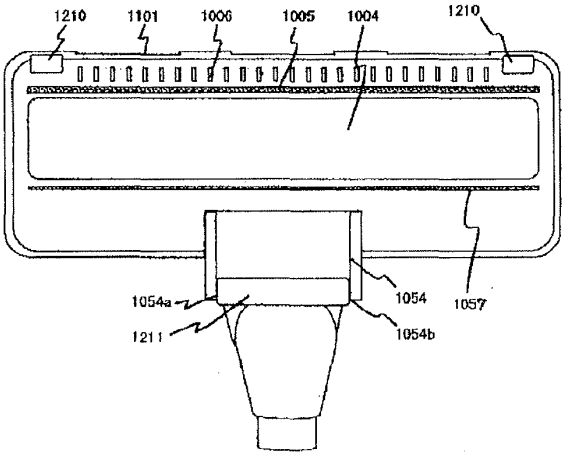
【図２１】

図２１



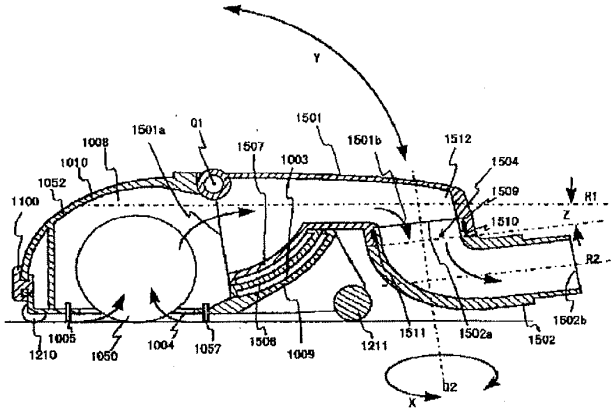
【図２２】

図２２



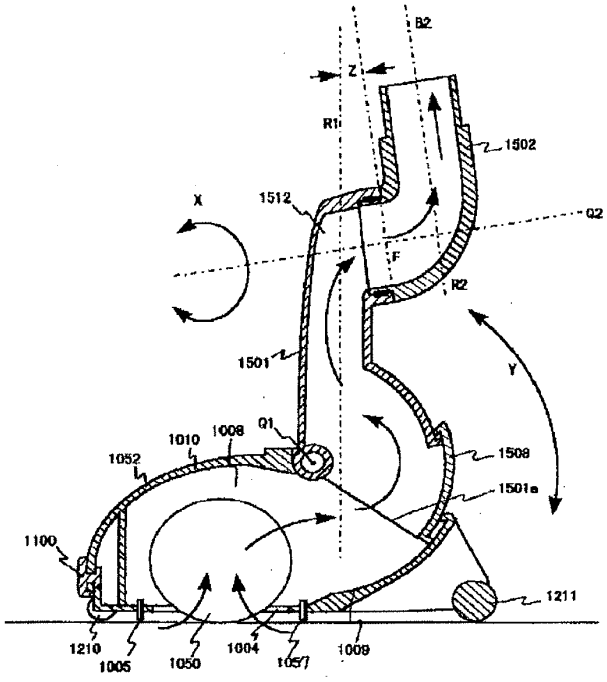
【図２３】

図２３



【図２４】

図２４



【公報種別】特許法第１７条の２の規定による補正の掲載
【部門区分】第１部門第２区分
【発行日】平成17年7月28日(2005.7.28)

【公開番号】特開2000-83879(P2000-83879A)
【公開日】平成12年3月28日(2000.3.28)
【出願番号】特願平11-301575
【国際特許分類第７版】
　Ａ４７Ｌ　9/24
　Ａ４７Ｌ　9/02
【ＦＩ】
　Ａ４７Ｌ　9/24　Ｚ
　Ａ４７Ｌ　9/02　Ｚ

【手続補正書】
【提出日】平成16年12月17日(2004.12.17)
【手続補正１】
【補正対象書類名】明細書
【補正対象項目名】特許請求の範囲
【補正方法】変更
【補正の内容】
【特許請求の範囲】
【請求項１】
塵埃を空気流と共に吸い込むための送風機を備えた電気掃除機本体と、下面に塵埃を吸い込むための吸口を備えた吸口体と、前記吸口及び前記電気掃除機本体と連通する通風路を形成する接続管とを備え、
前記吸口体は、奥行方向の長さより左右方向の長さが長い吸口本体と、前記吸口本体を前記接続管に接続する自在連結部とを備え、
前記吸口本体は、その左右方向の中央後方に形成された前記自在連結部の取付部を備え、
前記自在連結部は、管状に形成された第１の腕部と第２の腕部とを備え、
前記第１の腕部の一端は、前記吸口本体の左右方向と平行な第１の回転中心軸をもち、前記接続管を清掃面に対して高低方向に回転させる第１の回転部を介して前記取付部に接続され、
前記第１の腕部の他端と前記第２の腕部の一端は、前記第１の回転中心軸と直交する第２の回転中心軸をもち、前記接続管を吸口本体の左右方向に向けて回転させる第２の回転部を介して接続され、前記第２の腕部の他端は前記接続管に接続され、
前記第２の回転部には、前記第２の回転中心軸と直交する回転面が形成され、
前記接続管の高低方向の回転角度が最も小さい状態において、前記回転面は、前記吸口本体に向かう方向へ下るように清掃面に対して傾斜した状態をとり、かつ前記傾斜した回転面の上方側に前記第１の腕部の他端が位置し、前記傾斜した回転面の下方側に前記第２の腕部の一端が位置し、
前記接続管をひねることによって、前記自在連結部は、前記接続管のひねりに対応して前記吸口本体を清掃面上で回転させることを特徴とする電気掃除機。
【請求項２】
塵埃を空気流と共に吸い込むための送風機を備えた電気掃除機本体と、下面に塵埃を吸い込むための吸口を備えた吸口体と、前記吸口及び前記電気掃除機本体と連通する通風路を形成する接続管とを備え、
前記吸口体は、奥行方向の長さより左右方向の長さが長い吸口本体と、前記吸口本体を前記接続管に接続する自在連結部とを備え、

前記吸口本体は、その左右方向の中央後方に形成された前記自在連結部の取付部を備え、

前記自在連結部は、管状に形成された第１の腕部と第２の腕部とを備え、

前記第１の腕部の一端は、前記吸口本体の左右方向と平行な第１の回転中心軸をもち、前記接続管を清掃面に対して高低方向に回転させる第１の回転部を介して前記取付部に接続され、

前記第１の腕部の他端と前記第２の腕部の一端は、前記第１の回転中心軸と直交する第２の回転中心軸をもち、前記接続管を吸口本体の左右方向に向けて回転させる第２の回転部を介して接続され、前記第２の腕部の他端は前記接続管に接続され、

前記第２の回転部には、前記第２の回転中心軸と直交する回転面が形成され、

前記自在連結部の高低方向の回転角度が最も小さい状態において、前記回転面は、前記吸口本体に向かう方向へ下るように清掃面に対して傾斜した状態をとると共に、前記傾斜した回転面の上方側に前記第１の腕部の他端が位置し、前記傾斜した回転面の下方側に前記第２の腕部の一端が位置し、かつ前記接続管が清掃面から浮いた状態をとり、

前記接続管をひねることによって、前記自在連結部は、前記接続管のひねりに対応して前記吸口本体を清掃面上で回転させることを特徴とする電気掃除機。

【手続補正２】

【補正対象書類名】明細書

【補正対象項目名】００１０

【補正方法】変更

【補正の内容】

【００１０】

【課題を解決するための手段】

上記目的を達成するため、本願による電気掃除機の１つの発明では、

塵埃を空気流と共に吸い込むための送風機を備えた電気掃除機本体と、下面に塵埃を吸い込むための吸口を備えた吸口体と、前記吸口及び前記電気掃除機本体と連通する通風路を形成する接続管とを備え、

前記吸口体は、奥行方向の長さより左右方向の長さが長い吸口本体と、前記吸口本体を前記接続管に接続する自在連結部とを備え、

前記吸口本体は、その左右方向の中央後方に形成された前記自在連結部の取付部を備え、

前記自在連結部は、管状に形成された第１の腕部と第２の腕部とを備え、

前記第１の腕部の一端は、前記吸口本体の左右方向と平行な第１の回転中心軸をもち、前記接続管を清掃面に対して高低方向に回転させる第１の回転部を介して前記取付部に接続され、

前記第１の腕部の他端と前記第２の腕部の一端は、前記第１の回転中心軸と直交する第２の回転中心軸をもち、前記接続管を吸口本体の左右方向に向けて回転させる第２の回転部を介して接続され、前記第２の腕部の他端は前記接続管に接続され、

前記第２の回転部には、前記第２の回転中心軸と直交する回転面が形成され、

前記接続管の高低方向の回転角度が最も小さい状態において、前記回転面は、前記吸口本体に向かう方向へ下るように清掃面に対して傾斜した状態をとり、かつ前記傾斜した回転面の上方側に前記第１の腕部の他端が位置し、前記傾斜した回転面の下方側に前記第２の腕部の一端が位置し、

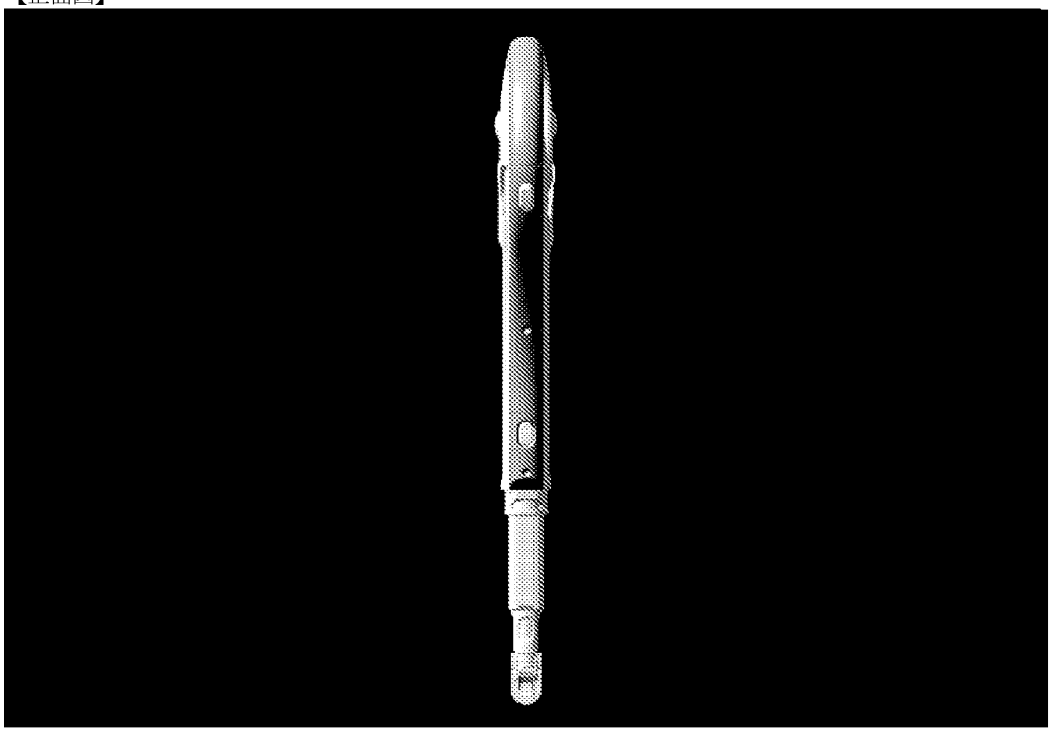
前記接続管をひねることによって、前記自在連結部は、前記接続管のひねりに対応して前記吸口本体を清掃面上で回転させるように、構成される。

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(54) [design article: electrical vacuum unit for suction mouth with handles
(52) [design classification] C3-4190 (51) [international design classification (help)] 15-05
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(72) [creator] [your name] Uehara Yang [resident] status in Osaka Prefecture Osaka City abeno-Ku, nagaike-Cho 22-22, Sharp Corporation
(73) [of a design right] [identification number] 000005049 [applicant name] sharp co., Ltd. [your name or the name full name: SHARP KABUSHIKI KAISHA [domicile or address: Osaka Prefecture Osaka City abeno-Ku, nagaike-Cho 22-22, [address or full name domicile] 22-22, Nagaike-Cho, Abeno-ku, Osaka-shi, Osaka 545-8522 JAPAN
(74) [representative] [identification number] 100088281 [attorneys] [applicant name] the filing of article 4, paragraph 2 design Masao fields display the exception of lack of novelty. [Examiner] kaminukushina, Hiroyasu
(56) [bibliography] thanked Noboru 1310011
(55) description of a design article this article is electric cleaning machines for suction mouth with handles, and attaching a hose to the upper rear side and connected electric vacuum cleaner that used as the inlet should be. In addition, storage and inlet to the electric vacuum cleaner, used as a vertical vacuum cleaner handle.
(55) Description of a design are expressed on the surface of each figure, to identify any three-dimensional surface shape in. Colors were represented in the periphery of each figure is in shape to clear background. [Drawing] [Perspective]

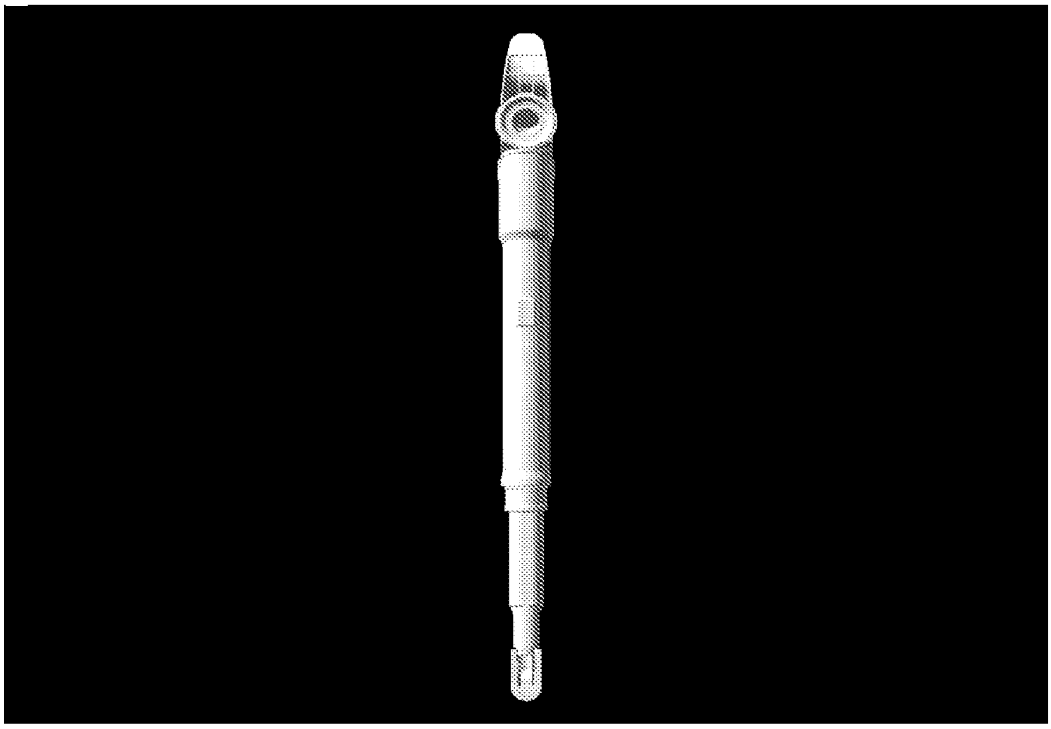
（１９）【発行国】日本国特許庁（ＪＰ）
（４５）【発行日】平成２１年１０月１３日（２００９．１０．１３）
（１２）【公報種別】意匠公報（Ｓ）
（１１）【登録番号】意匠登録第１３７０９１５号（Ｄ１３７０９１５）
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（５４）【意匠に係る物品】電気掃除機用吸込み口付き取っ手
（５２）【意匠分類】Ｃ３－４１９０
（５１）【国際意匠分類（参考）】１５－０５
（２１）【出願番号】意願２００９－９２３（Ｄ２００９－９２３）
（２２）【出願日】平成２１年１月２０日（２００９．１．２０）
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【氏名又は名称】シャープ株式会社
【氏名又は名称原語表記】ＳＨＡＲＰ　ＫＡＢＵＳＨＩＫＩ　ＫＡＩＳＨＡ
【住所又は居所】大阪府大阪市阿倍野区長池町２２番２２号
【住所又は居所原語表記】２２－２２，Ｎａｇａｉｋｅ－ｃｈｏ，Ａｂｅｎｏ－ｋｕ，Ｏｓａｋａ－ｓｈｉ，Ｏｓａｋａ　５４５－８５２２　ＪＡＰＡＮ
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【識別番号】１０００８８２８１
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【新規性喪失の例外の表示】意匠法第４条第２項の適用申請が有りました。
【審査官】温品　博康
（５６）【参考文献】意登１３１００１１
（５５）【意匠に係る物品の説明】本物品は、電気掃除機用吸込み口付き取っ手であり、上方背面側にホースを取り付け電気掃除機本体と接続し、吸込み口として使用することが可能である。また、電気掃除機本体に吸い込み口を収納し、縦型電気掃除機の取っ手として使用される。
（５５）【意匠の説明】各図の表面部に表された濃淡は、いずれも立体表面の形状を特定するためのものである。各図の周辺部に表された色彩は、形状を明確にするための背景である。
【図面】
【斜視図】



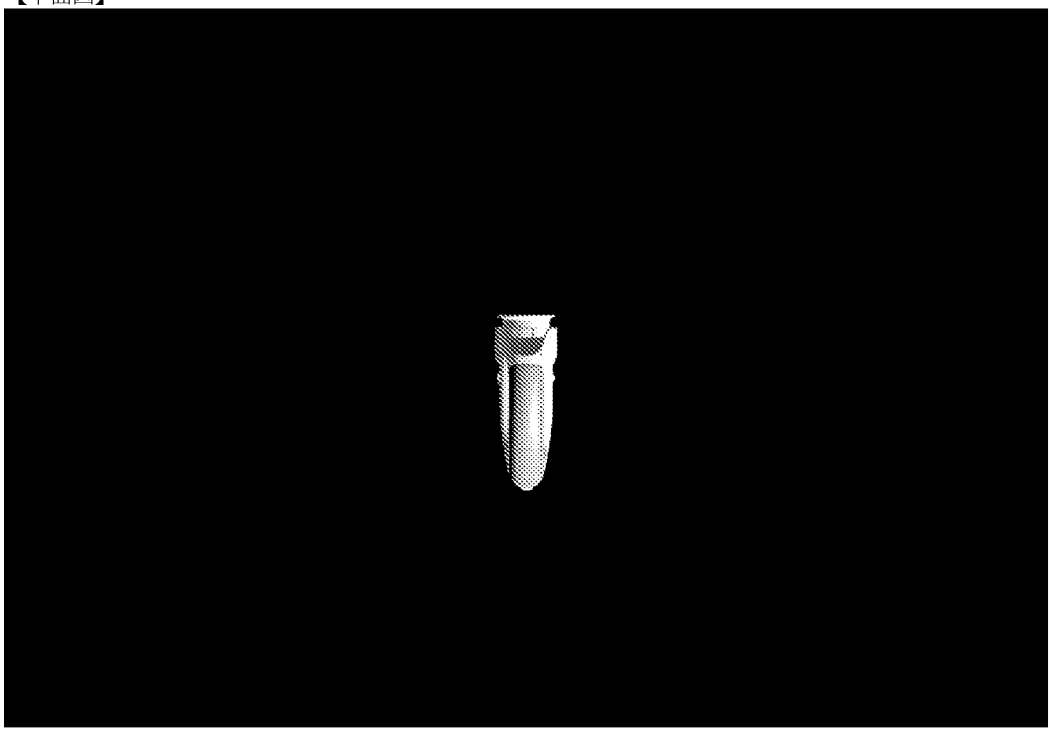
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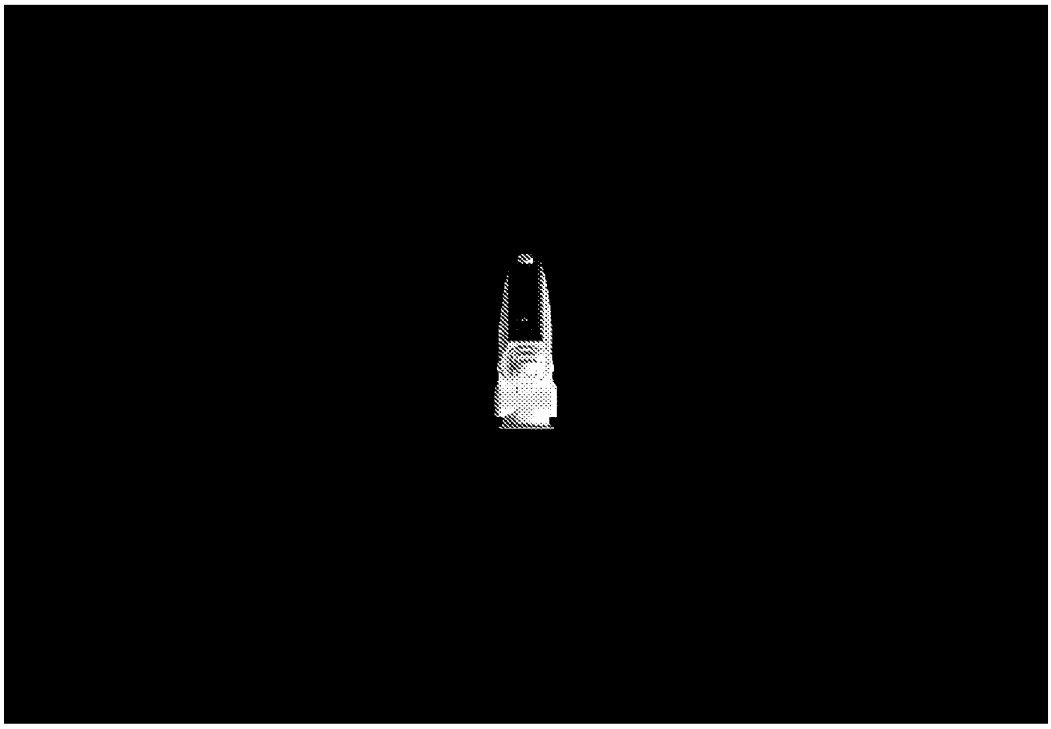
【背面図】



【平面図】



【底面図】



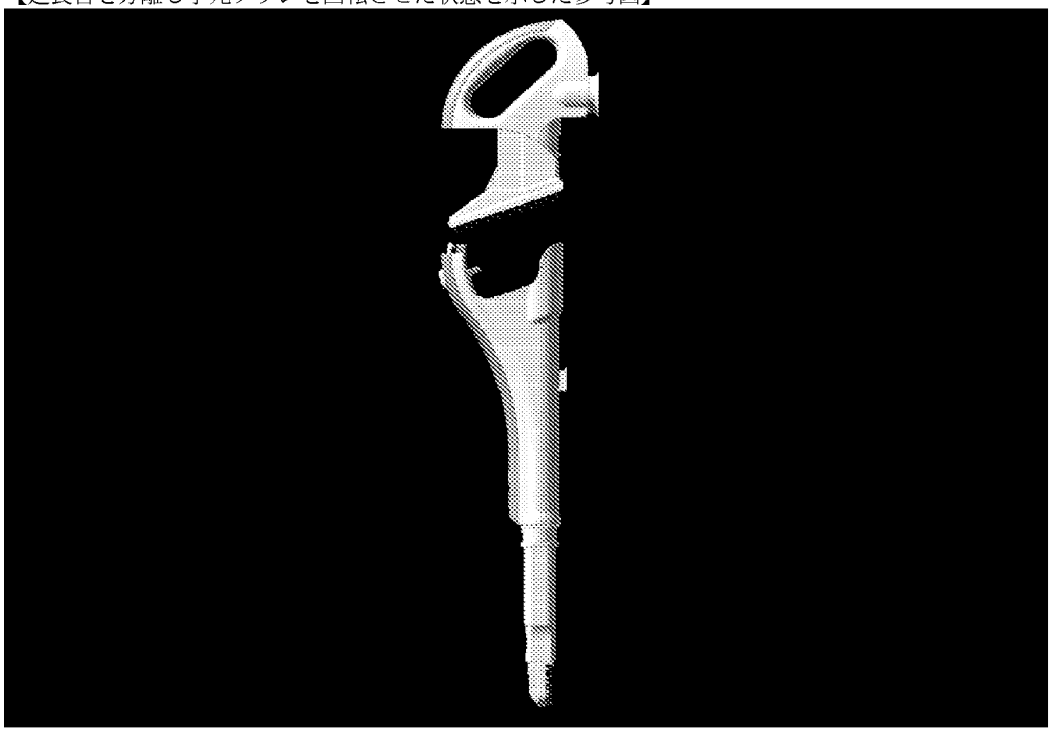
【右側面図】



【左側面図】



【延長管を分離し手元ブラシを回転させた状態を示した参考図】



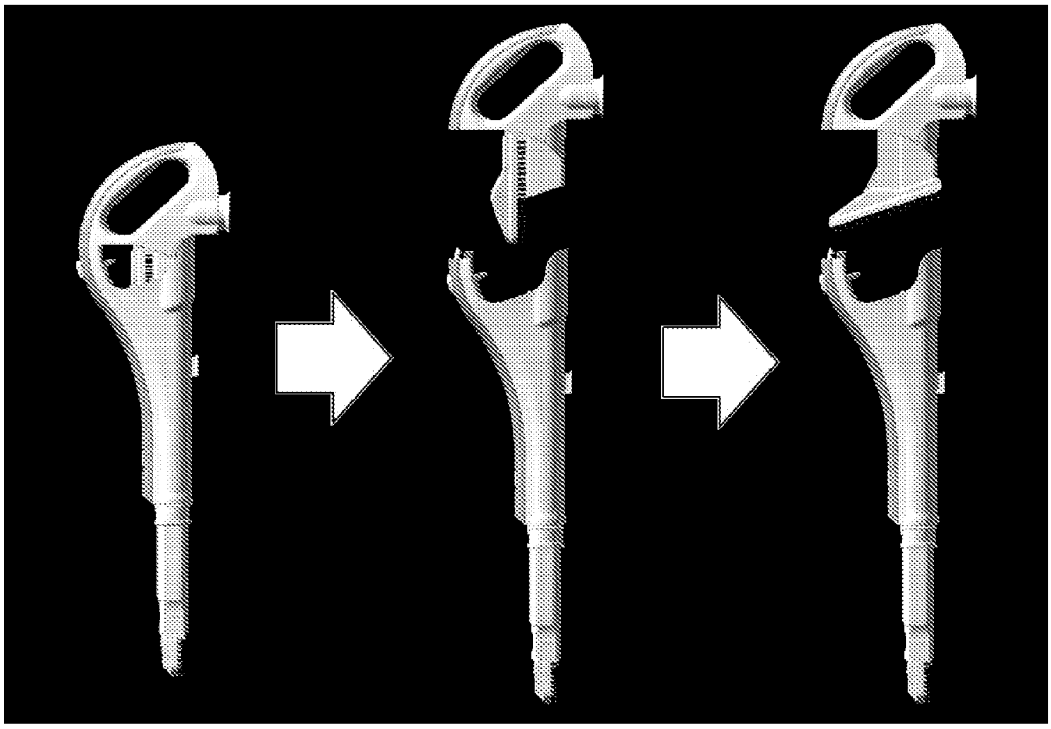
【延長管を延長し先端ブラシを回転させた状態を示した参考図】



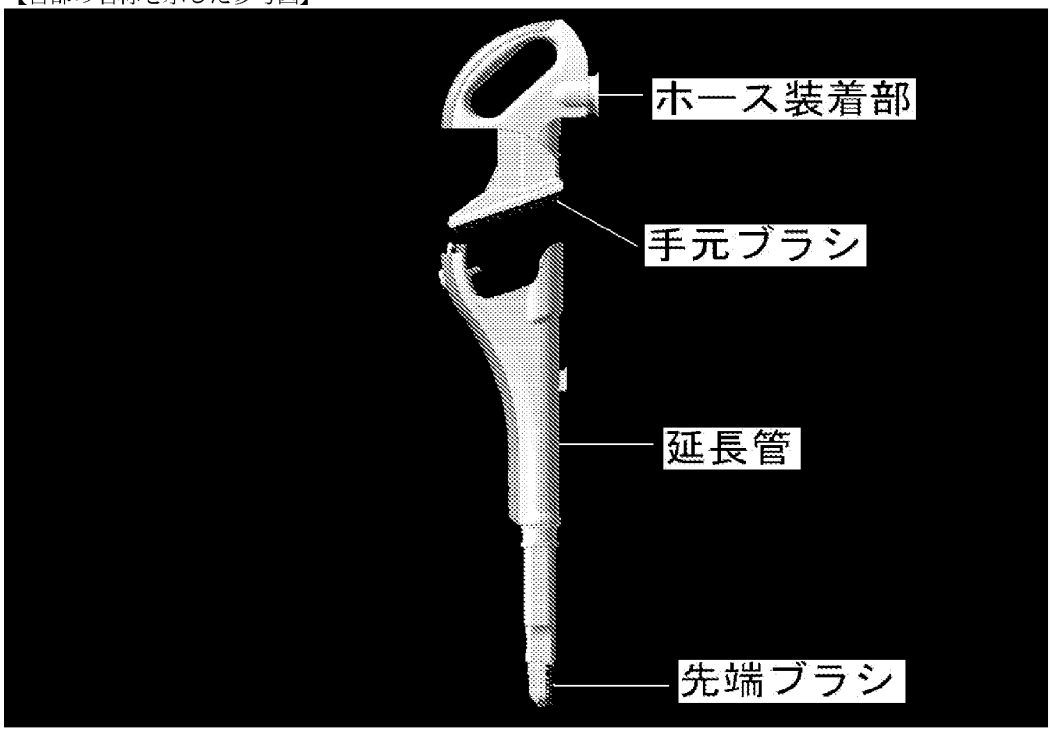
【電気掃除機本体に収納した状態を示した参考図】



【手元ブラシの可動状態を示した参考図】



【各部の名称を示した参考図】



1 of 1 DOCUMENT

CN201523596U 2010-07-14 **Can comb the dust collector of animal's fur** (en)

English Abstract:

The utility model refers to the field of 'rearing or breeding animal husbandry in general, especially cattle raising'. This utility model has disclosed a kind of dust collector that can comb animal's fur, this dust collector includes the host computer; This host computer includes air intake, supplying air channel, vacuum source electrical machinery, air-out channel and air outlet, enter airstream in the body to pass the stated air intake, supplying air channel, vacuum source electrical machinery, air-out channel sequentially, the gas is discharged through the stated air outlet finally; The stated dust collector also includes joint pipe and tooth are brushed, the stated tooth brushes the bottom there are comb dents and openings; Get off the windscreen in the stated place of air outlet, this goes out of and sets up the air-out nozzle on the windscreen; The stated joint pipe both ends can paste up one end and link with stated air-out nozzle and stated tooth separately, , while working, exitting stated air-out nozzle airstream blow out in order to person who make stated dust collector by stated opening that tooth brush after stated joint pipe. Have met the need of jockey one and can reach to the function which pet combs while drying after having a bath through a hand through this structure, easy to use, flexible.

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Inventors: Peng Zhongmei

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IPC[8]: A47L5/00 (2006-01-01; A, L, I, 2011-12-16; B, H, CN)
IPC[8]: A47L5/22 (2006-01-01; A, L, I, 2011-12-16; B, H, CN)
IPC[8]: A47L9/00 (2006-01-01; A, L, I, 2011-12-16; B, H, CN)
IPC[8]: A47L9/16 (2006-01-01; A, L, I, 2011-12-16; B, H, CN)

English Description:

TECHNICAL FIELD

Technical Field

The utility model relates to a vacuum cleaner, in particular to a vacuum cleaner can be carded animal fur, which belongs to the technical field of vacuum cleaner.

BACKGROUND ART

Background Art

PET to their loyalty, the cute characteristics of the masses, has become indispensable in people's life the "partners". However, pets are struck of families, the PET because of the seasonal variation of the lint, and ash the wool becomes sticky various knotting, and after bathing of PET are not timely wiping clean of cold and nourish caused many problems such as bacteria, are often will allow breeders, mood irritancies.

Currently, the market of specialized PET combing hair. Conventional vacuum cleaner with the dust collector not only the dust-collecting function, but also through the PET with the design of the brush head, the brush head and the cleaner is connected with the air inlet of the at. CN201067030Y number of the notice, the applicant is disclosed in the Patent literature of li Boliang the technology. The technology at present in PET hair combing process dropping and the flying flue meeting , pollution of the environment, endanger the health of the contact with the near distance this problem, has proposed a carding animal hair cleaner, the cleaner can be of animal hair carding at the same time, can make the animal under falls offmao Ji scrap suction, and stored in the cleaning device in on. However, the cleaner is only limited to the PET combing hair, absorb and convenience of the role of the hair, but unable to solve the problem of how to quickly and effectively for the PET to solve the problem of wiping clean after bathing.

In real life, the operator of the bath after the PET is used to dry, the blower to the one hand, with one hand and place the PET brush. The operator to comb the hair to the PET at the same time, the blower used for hair drying. However, the PET in the course of the drying, often tamper with. Therefore, the present drying equipment in the operator in the process of drying, have to be midway stallings, to pacify PET, drying work is very difficult to be carried out smoothly.

DISCLOSURE

Content of the utility model

The utility model the technical problem to be solved is:to the limitations of the prior art, provides a convenient operation of the air blowing cleaner carding animal fur.

In order to solve the above technical problem, the utility model provides the following technical scheme:

A vacuum cleaner can be carded animal fur, the cleaner includes a host; the host computer comprises an air inlet, and the air inlet passage, a source of vacuum motor, the air outlet of the air channel and, in turn the air flow enters into the main body through the air inlet, and the air inlet passage, a source of vacuum motor, the air channel, the gas finally discharged through the air outlet; the cleaner also comprises a connecting pipe and the tooth brushes , states the tooth to brush are arranged at the bottom of the comb and an opening; the indoor air outlet is provided with an outlet, a nozzle is arranged on the plate of the air outlet pipe; two ends of said connecting pipe with the water outlet pipe respectively of the nozzle and is connected with one end states the tooth to brush , in order to make the vacuum cleaner is in operation, air from the outlet air stream can be discharged from the nozzle through the connecting pipe by the states the tooth to brush after the opening of the blow hole.

In order to make the cleaner with absorbing hair, scrap and the function of the peculiar smell, the two ends of the connecting pipe can be connected with the air inlet and the is connected with one end states the tooth to brush.

To save cost and flexible and varied use, the detachable the comb brushesstates attracts the tooth to brush on the head of the; states the comb to brush can be the long teeth, tooth or dense teeth.

In order to use more flexible the tooth brushes , reasonable, states the tooth to brush suction head in the suction pipe is connected with the connection of the tubular end portion is a holding section of the operator, this tube around which is disposed the vertical plane of the axis of the suction head states the tooth to brush 360 degree rotary motion.

In order to avoid excessive suction, injury animal, preferred embodiment, the is connected with the connecting pipes states the tooth to brush the end of the holding section of the operator, in the tube part is provided an auxiliary air inlet, utilizes the in the auxiliary air inlet can be provided with a manual body of the

cover.

As a common dust collector in the cleaning work, in order to avoid the knocking of the inducting nozzle is provided with an obstacle such as furniture, with the outlet plate can be used by the ordinary vacuum cleaner of the locomotive.

In order to improve the gas-solid separation effect, for the vacuum cleaner cyclone dust collector; say further, the vacuum cleaner is a multi-stage cyclone dust collector.

The applicants experience of many years of research and development, the prior art improved further, the beneficial effects of the technical scheme lies in: the design with a PET-brush of the vacuum cleaner. The dust collector solves the problems that the PET after bathing blowing of, hair combing detangle and the like, and in the prior art of the hair and the scrap, at the same time absorbing smell, equipped with various kind of comb teeth through the PET the tooth brushes synchronous massage nursing, the relationship between the PET more chummy.

Description of drawings

Combined with the Figure below the utility model is used as the further description.

Figure 1 is a structure diagram of a host computer of the dust collector of the existing.

Figure 2 is a structure diagram of the whole of the vacuum cleaner of the present utility model.

Figure 3 is a structure diagram of the the tooth brushes of the present utility model.

Figure 4 is a schematic diagram of the connecting pipe of the vacuum cleaner with the wind deflector assembly of the present utility model.

Figure 5 is a schematic diagram of the connecting pipe of the vacuum cleaner with the tooth brushes assembly of the present utility model.

Figure 6 is a schematic diagram of the assembly at the bottom of the with the tooth brushesthe tooth brushes of the present utility model.

Figure 7-1 is of the embodiment of the utility model the tooth brushes with long teeth of a structure diagram.

Figure 7-2 embodiment of the utility model is the tooth brushes a structure diagram of the stub.

Figure 7-3 is of the embodiment of the utility model the the tooth brushes with dense teeth of a structure diagram.

Figure 8 is a structure diagram of the state of the dust vacuum cleaner of the present utility model.

Figure 9 is a structure diagram of the blowing state of the vacuum cleaner of the present utility model.

MODE FOR INVENTION

Mode of execution

This embodiment of a vacuum cleaner can be carded animal fur. As shown in Figure 2-Figure 9 shows, the vacuum cleaner comprises a host computer 1, the connecting pipe 3 and the tooth brushes 2. The host 1 includes air intake 4, air inlet passage, a source of vacuum motor, the air outlet of the air channel and, enter the main air flow passes through air inlet 4, air inlet passage, a source of vacuum motor, the air channel, the gas finally discharged through the air outlet. The air inlet 4 is located in the host computer 1 at the front lower part of the, air outlet is located in the host computer 1 at the rear part of, the air outlet is provided with air outlet HEAP assembly, the plate with the outside of assembly HEAP 5 to cover the same. The air outlet 5 is

provided with a outlet pipe the center of the nozzle 51. Connecting pipe 3 is provided with two end, one end of the same with the tooth brushes 2 is connected. Connecting pipe 3 and the tooth brushes 2 which is connected with the end 22 can be for an operator, the tooth brushes 2 bottom 21 is provided with comb teeth 26 and the opening 260, the openings 260 is located in the comb teeth 26 on the end face of the, can be of any shape. The comb teeth 26 is detachably installed in the the tooth brushes 2 is, after installation, an opening 260 through the tooth brushes 2 the bottom of the opening 21 and end 22 connected, form the tooth brushes 2 of the main air inlet. The end 22 is provided an auxiliary air inlet 23, in the auxiliary air inlet hole 23 utilizes the manual can be provided with a body of the cover 24. The comb teeth 26 with the tooth brushes the shape of the 2 bottom 21 and set up, the inner wall of the bottom of the edge with a plurality of holes 25, in the comb teeth 26 with the side wall surface is provided with a plurality of elastic ribs 261, through the convex ribs 261 is inserted into the hole 25 can be of the comb teeth 26 into the tooth brushes 2 the upper, or from the the tooth brushes 2 remove the comb teeth 26, thereby the the tooth brushes 2 of the comb teeth with different tooth 3. Connecting pipe 3 one end of the 31 and end 22 is inserted, the other end 32 and the air inlet 4 or of the air outlet 5 of the nozzle 51 is inserted.

Of the kind referred to above can include the shape of the comb teeth of the: tooth, tooth and dense teeth. The operator can in accordance with different work needs to be selected with a purpose.

When in operation, when the need to clean the fur of the animal fur, reference Figure 6 and 7-1 illustrated, the long teeth 262 the elastic rib [...] 261 is inserted into the hole of the suction head 25 in, so that the long teeth 262 the the tooth brushes[...] attached to the 2 upper. When the dust collector is in animal fur, when the, reference Figure 5 and Figure 8 shows, the connecting pipe 3 one end of the 31 and end 22 is inserted, the other end 32 with an air outlet 4 is inserted, open the dust collector power switch, the hairier animals can be comb fur, while absorbing animal fall off the hair and scrap. When air blowing as hairier animals, reference Figure 4, Figure 5 and Figure 9 shows, the connecting pipe 3 one end of the 31 and end 22 is inserted, the other end 32 and the plate 5 of the nozzle 51 is inserted, the power supply switch of the dust collector, the dust collector is in a working state, from the outlet pipe nozzle 51 of the gas stream discharged through the connecting pipe 3 after, the opening of the by the states the tooth to brush blown out. At this moment, the operator can simultaneously realized by a single hand for the hairier animal carding fur, one side of the drying of the coat of the animal.

When the need to clean the fur of the animal with a certain, reference Figure 6 and 7-2 illustrated, only the short teeth 262 the elastic rib [...] 261 is inserted into the hole of the suction head 25 in, so that the tooth 26 the the tooth brushes[...] attached to the 2 after on, the operation of the remaining suction or blowing with the hairier animals as the operation of the dust suction or blowing.

In animal Epilating more serious season, the dense teeth 262 the [...] 'onto the the tooth brushes , specific operating reference Figure 6 and 7-3 shown, the dense teeth 262 the [...] ' elastic ribs 261 is inserted into the hole of the the tooth brushes 25 in. Because the dense teeth 262 the [...] 'of the intensive the tooth is thin , can better the animal hair and carding out scrap from animal, thus dense teeth 262 the [...] ' combined dust-collecting function, better effects can be expected to use, even in the chorial can also absorb deep.

Preferably, in the connecting tube is connected with the states the tooth to brush the end of the holding section of the operator, the winding of which is disposed at the plane perpendicular to the shaft the the tooth brushes 360 degree rotation. In this way, when the animal mao Chu knotting, can be rotated end portion 22 of the carding direction in order to find appropriate, to avoid excessively large force due to the carding the torn fingernails animal tying the hair of the animal.

The states the tooth to brush is connected with the end of the tube is connected with a holding section of the operator is provided with an auxiliary air inlet 23. When the suction on the falling off of the coat of the animal, encounter excessive hair blocking the hole on the comb teeth 260 and the excessive suction of the internal the tooth brushes , reference Figure 3, may be opened manually the tooth brushes 2 auxiliary air inlet 23 of the body of the cover 24, so that the outside air can be from the auxiliary air inlet 23 into the suction head 2 of the cavity, the air intake is increased, reducing the negative pressure, thus avoiding excessive suction fingernails animal, or even damage to the animal.

Furthermore, when the user is home no PET, not many or the blowing function under the condition of use, the utility model has the two blowing of carding animal fur of the air cleaner 5 can be detachably replaced by the locomotive 6, use as an ordinary vacuum cleaner. Therefore, when the operator of the vacuum cleaner to the work surface during walking randomly, because there is no of the locomotive the rear end of the vacuum cleaner using the air in the rear end of the outlet pipe in a projecting shape of the nozzle, and avoids the situation of furniture, and the like of knocking.

The utility model, with the suction side is combed falls off the wool the function of the and convenience, the air outlet of the dust collector can be connected at the same time, the side of the PET after carding function of blowing side. And can be different according to the animal hair length, with the sucker the tooth brushes with different tooth profile, preferably a cleaning fur of the animal. Furthermore, since the end part is circular, therefore when the comb hair to the animal, but also the play the role of the massage nursing.

Furthermore, it is of the note: in this embodiment of the multi-stage cyclone cleaner of the vacuum cleaner, the vacuum cleaner through the centrifugal principle, the gas-solid separation effect is more obvious. Because in the prior art multi-cyclone dust collector, in this do not repeat.

In addition to the above implementation of the exception, the utility model can also be provided with other embodiments. Where the equivalent of replacement or equivalent transform forms a technical scheme, all fall in the scope of protection the utility model.

Number of Claims: 9

ENGLISH CLAIMS:

1. A vacuum cleaner can be carded animal fur, the cleaner includes a host; the host computer comprises an air inlet, and the air inlet passage, a source of vacuum motor, the air outlet of the air channel and, in turn the air flow enters into the main body through the air inlet, and the air inlet passage, a source of vacuum motor, the air channel, the gas finally discharged through the air outlet; characterized in that

The cleaner also comprises a connecting pipe and the tooth brushes , states the tooth to brush are arranged at the bottom of the comb and an opening; the indoor air outlet is provided with an outlet, a nozzle is arranged on the plate of the air outlet pipe; two ends of said connecting pipe with the water outlet pipe respectively of the nozzle and is connected with one end states the tooth to brush , in order to make the vacuum cleaner when the work, is discharged from the outlet pipe of the air flow through the connecting pipe by the states the tooth to brush blown out of the opening.

2. Cleaner according to Claim 1, characterized in that the two ends of the connecting pipe can be connected with the air inlet and the is connected with one end states the tooth to brush.

3. Cleaner according to Claim 1, characterized in that the comb teeth can be disassembled is arranged on the teeth.

4. Cleaner according to Claim 1, characterized in that the comb is long teeth, tooth or dense teeth.

5. Cleaner according to Claim 1, characterized in that the is connected with the connecting pipes states the tooth to brush the end of the holding section of the operator, the pipe part is arranged a vertical plane states the tooth to brush can rotate around the axis of the 360 degree rotary motion.

6. Cleaner according to Claim 1, characterized in that is connected with the connecting pipes states the tooth to brush the end of the holding section of the operator, in the tube part is provided an auxiliary air inlet, utilizes the in the auxiliary air inlet can be provided with a manual body of the cover.

7. Cleaner according to Claim 1, characterized in that the outlet plate can be replaced by the ordinary vacuum cleaner use on the locomotive.

8. Cleaner according to Claim 1, characterized in that in the vacuum cleaner cyclone dust collector.

9. Cleaner according to Claim 8, characterized in that the vacuum cleaner is a multi-stage cyclone dust collector.

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(12)实用新型专利

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A47L 9/16(2006.01)

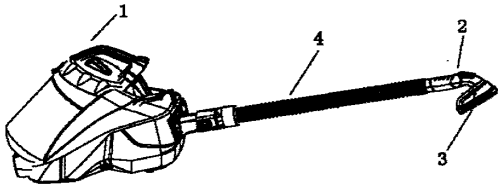
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(54)实用新型名称

可梳理动物皮毛的吸尘器

(57)摘要

本实用新型公开了一种可梳理动物皮毛的吸尘器，该吸尘器包括主机；该主机包括进风口、进风通道、真空源电机、出风通道和出风口，进入主体内的气流依次经过所述进风口、进风通道、真空源电机、出风通道，气体最终通过所述出风口排出；所述吸尘器还包括连接管和齿刷，所述齿刷底部设置有梳齿及开口；所述出风口处设有出风板，该出风板上设置出风管嘴；所述连接管两端分别可与所述出风管嘴和所述齿刷一端相连接，以使得所述吸尘器在工作时，从所述出风管嘴排出的气流经过所述连接管后由所述齿刷的开口吹出。通过该结构实现了操作者只需要通过一只手即可达到对洗澡后的宠物进行边吹风边梳理的功能，使用方便、灵活。



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1. 一种可梳理动物皮毛的吸尘器，该吸尘器包括主机；该主机包括进风口、进风通道、真空源电机、出风通道和出风口，进入主体内的气流依次经过所述进风口、进风通道、真空源电机、出风通道，气体最终通过所述出风口排出；其特征在于：

所述吸尘器还包括连接管和齿刷，所述齿刷底部设置有梳齿及开口；所述出风口处设有出风板，该出风板上设置出风管嘴；所述连接管两端分别可与所述出风管嘴和所述齿刷一端相连接，以使得所述吸尘器在工作时，从所述出风管嘴排出的气流经过所述连接管后由所述齿刷的开口吹出。

2. 根据权利要求 1 所述的吸尘器，其特征在于：所述连接管的两端可分别与所述进风口和所述齿刷一端相连接。

3. 根据权利要求 1 所述的吸尘器，其特征在于：所述梳齿可拆卸的设置在所述齿刷上。

4. 根据权利要求 1 所述的吸尘器，其特征在于：所述梳齿是长齿、短齿或者密齿。

5. 根据权利要求 1 所述的吸尘器，其特征在于：所述齿刷与所述连接管连接的端部有供操作者握持的管部，该管部设置成可绕与所述齿刷平面垂直的轴作 360 度旋转运动。

6. 根据权利要求 1 所述的吸尘器，其特征在于：所述齿刷与所述连接管连接的端部有供操作者握持的管部，在该管部上设置一辅助进气口，在该辅助进气口的外口部设置一个可手动的盖体。

7. 根据权利要求 1 所述的吸尘器，其特征在于：所述出风板可更换为普通吸尘器上所使用的出风栅。

8. 根据权利要求 1 所述的吸尘器，其特征在于：所述吸尘器为旋风吸尘器。

9. 根据权利要求 8 所述的吸尘器，其特征在于：所述吸尘器为多级旋风吸尘器。

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可梳理动物皮毛的吸尘器

技术领域

[0001] 本实用新型涉及一种吸尘器，尤其是一种可梳理动物皮毛的吸尘器，属于吸尘器技术领域。

背景技术

[0002] 宠物以其忠诚、可爱的特质博得了广大群众的喜爱，成为人们生活中不可缺少的“伙伴”。然而，饲养宠物的家庭都深有感触，对于宠物因季节变化出现的掉毛、毛发粘灰而出现各种打结、以及宠物洗澡后未及时擦拭干净而导致的感冒和滋养细菌等诸多问题，常常会让饲养者叫苦连天，心情烦闷。

[0003] 目前，市场上出现了专门宠物梳理毛发的吸尘器。该吸尘器不仅具备常规吸尘器的吸尘功能，而且通过配有的专为宠物设计的刷头，将该刷头与吸尘器进风口处相连接进行使用。公告号为 CN201067030Y，申请人为李博良的专利文献中公开了该技术。该技术针对宠物毛梳理过程中存在的脱落毛及毛屑会到处飞扬，污染环境，危害近距离接触者的健康这一问题，提出了一种梳理动物毛的清除器，利用该清除器可以在梳理动物毛的同时，可以使脱落下的动物毛及皮屑吸入，并集中储存在清除器中。然而，该清除器也仅局限于给宠物梳理毛发、吸除脱落的毛发和皮屑的作用，而无法解决如何快速有效地为宠物解决洗澡后擦拭干净的问题。

[0004] 现实生活中，操作者在给洗澡过后的宠物进行吹干工作时，需要一手拿着吹风机，一手拿着宠物刷。操作者在给宠物进行梳理毛发的同时，用吹风机将其毛发吹干。但是，宠物在被吹干的过程中，时常会乱动。因此，目前的吹干设备使得操作者在吹干过程中，不得不中途停顿，去安抚宠物，吹干工作很难顺利进行。

实用新型内容

[0005] 本实用新型要解决的技术问题是：针对以上现有技术存在的局限性，提出一种操作方便的可梳理动物皮毛的吹风吸尘器。

[0006] 为了解决以上技术问题，本实用新型提供以下技术方案：

[0007] 一种可梳理动物皮毛的吸尘器，该吸尘器包括主机；该主机包括进风口、进风通道、真空源电机、出风通道和出风口，进入主体内的气流依次经过所述进风口、进风通道、真空源电机、出风通道，气体最终通过所述出风口排出；所述吸尘器还包括连接管和齿刷，所述齿刷底部设置有梳齿及开口；所述出风口处设有出风板，该出风板上设置出风管嘴；所述连接管两端分别可与所述出风管嘴和所述齿刷一端相连接，以使得所述吸尘器在工作时，从所述出风管嘴排出的气流可经过所述连接管后由所述齿刷的开口孔吹出。

[0008] 为使得该吸尘器具备吸除毛发、皮屑和异味的功能，所述连接管的两端可分别与所述进风口和所述齿刷一端相连接。

[0009] 为节约成本和灵活多变使用，所述梳齿刷可拆卸的设置在所述吸齿刷头上；所述梳齿刷可以是长齿、短齿或者密齿。

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[0010] 为使用齿刷更为灵活、合理，所述齿刷吸头在与所述连接吸尘管连接通的所述管状端部有供操作者握持的管部，该管部设置成可绕与所述齿刷吸头平面垂直的轴作 360 度旋转运动。

[0011] 为避免吸力过大，伤害动物，优选方案中，所述齿刷与所述连接管连接的端部有供操作者握持的管部，在该管部上设置一辅助进气口，在该辅助进气口的外口部设置一个可手动的盖体。

[0012] 在作为普通吸尘器进行清洁工作时，为避免出风板处设有的管嘴磕碰家具等障碍物，所述出风板可更换为普通吸尘器上所使用的出风栅。

[0013] 为提高气固分离效果，所述吸尘器为旋风吸尘器；进一步地说，所述吸尘器为多级旋风吸尘器。

[0014] 本申请人结合多年的研发经验，对现有技术做了进一步的改良，本技术方案的有益效果在于：设计出一种带有宠物刷的吸尘器。该吸尘器解决了宠物洗澡后的吹风、毛发梳理解结等问题，并且保持现有技术中所起到的吸除脱落的毛发和皮屑，吸除异味的同时，通过配备各种梳齿的齿刷对宠物同步按摩护理，使宠物与人的关系更亲密。

附图说明

[0015] 下面结合附图对本实用新型作进一步的说明。

[0016] 图 1 是现有的普通吸尘器主机结构示意图。

[0017] 图 2 是本实用新型的吸尘器整机结构示意图。

[0018] 图 3 是本实用新型齿刷的结构示意图。

[0019] 图 4 是本实用新型吸尘器的连接管与出风板组装的示意图。

[0020] 图 5 是本实用新型吸尘器的连接管与齿刷组装的示意图。

[0021] 图 6 是本实用新型齿刷与齿刷底部组装的示意图。

[0022] 图 7-1 是本实用新型实施例的带有长齿的齿刷结构示意图。

[0023] 图 7-2 是本实用新型实施例的带有短齿的齿刷结构示意图。

[0024] 图 7-3 是本实用新型实施例的带有密齿的齿刷的结构示意图。

[0025] 图 8 是本实用新型吸尘器的吸尘状态的结构示意图。

[0026] 图 9 是本实用新型吸尘器的吹风状态的结构示意图。

具体实施方式

[0027] 本实施例的一种可梳理动物皮毛的吸尘器。如图 2- 图 9 所示，该吸尘器包括主机 1、连接管 3 和齿刷 2。主机 1 包括进风口 4、进风通道、真空源电机、出风通道和出风口，进入主体的气流依次经过进风口 4、进风通道、真空源电机、出风通道，气体最终通过出风口排出。所述进风口 4 位于主机 1 的前下部，出风口位于主机 1 的后部，出风口处设有出风 HEAP 组件，在 HEAP 组件外部有出风板 5 将其罩住。出风板 5 的中心开设一出风管嘴 51。连接管 3 设有两端，其一端可与齿刷 2 相连。连接管 3 与齿刷 2 相连接的端部 22 可供操作者握持，齿刷 2 底部 21 设有梳齿 26 和开口 260，该开口 260 位于梳齿 26 的端面上，可呈任意形状。梳齿 26 可拆卸地安装在齿刷 2 上，当安装后，开口 260 通过齿刷 2 开放的底部 21 与端部 22 连通，构成齿刷 2 的主进气口。在端部 22 上开设一辅助进气口 23，在该辅助进气孔 23 的外

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口部设置一个可手动的盖体 24。梳齿 26 的形状配合齿刷 2 底部 21 而设置，底部内壁边缘有多个孔 25，在梳齿 26 的侧壁面配合设置有多个弹性的凸肋 261，通过凸肋 261 插入孔 25 可将梳齿 26 装到齿刷 2 上，或者从齿刷 2 上拆下梳齿 26，从而可在齿刷 2 上更换不同齿形的梳齿 3。连接管 3 的一端 31 与端部 22 插接，另一端 32 与进风口 4 或者出风板 5 上的管嘴 51 插接。

[0028] 上文所提到的各种形状的梳齿可以包括：长齿、短齿和密齿。操作者可以按照不同的工作需要有目的加以选用。

[0029] 操作时，当需要为长毛动物清洁皮毛时，参考图 6 和 7-1 所示，将长齿 262' 的弹性凸肋 261 插入吸头的孔 25 中，从而将长齿 262' 装到了齿刷 2 上。当为长毛动物吸尘时，参考图 5 和图 8 所示，将连接管 3 的一端 31 与端部 22 插接，另一端 32 与进风口 4 插接，打开吸尘器电源开关，就可一边为长毛动物梳理皮毛，一边吸除动物脱落的毛和皮屑。当为长毛动物吹风时，参考图 4、图 5 和图 9 所示，将连接管 3 的一端 31 与端部 22 插接，另一端 32 与出风板 5 上的管嘴 51 插接，打开吸尘器电源开关，吸尘器处于工作状态，从所述出风管嘴 51 排出的气流经过所述连接管 3 后，由所述齿刷的开口吹出。此时，操作者可以通过一只手实现一边为长毛动物梳理皮毛，一边将动物的皮毛吹干了。

[0030] 当需要为短毛动物清洁皮毛时，参考图 6 和 7-2 所示，只需将短齿 262" 的弹性凸肋 261 插入吸头的孔 25 中，从而将短齿 26" 装到了齿刷 2 上后，其余吸尘或吹风的操作与为长毛动物吸尘或吹风的操作一样。

[0031] 在动物脱毛比较严重的季节，可以将密齿 262"' 装到齿刷上，具体操作参考图 6 和 7-3 所示，将密齿 262"' 的弹性凸肋 261 插入齿刷的孔 25 中。由于密齿 262"' 上的齿细而密集，可更好的将脱落的动物毛和皮屑从动物身上梳理带出，因而密齿 262"' 结合吸尘功能使用效果会更好，甚至连脱落在深处的绒毛也能吸除。

[0032] 优选地，在所述齿刷在与连接管连接的端部有供操作者握持的管部，该管部设置成可绕与齿刷平面垂直的轴 360 度旋转。这样，当梳理到打结的动物毛处，可以旋转端部 22 以找到合适的梳理方向，避免因梳理时用力过大扯断动物打结的毛而弄疼动物。

[0033] 所述齿刷在与连接管连接的端部有供操作者握持的管部上设有一辅助进气口 23。当吸除动物脱落的皮毛上，遇到过多的毛阻塞了梳齿上的孔 260 而使得齿刷内部的吸力过大时，参考图 3，可以手动打开齿刷 2 上的辅助进气口 23 上的盖体 24，使得外界的空气可以从辅助进气口 23 进入吸头 2 的腔内，增大了进气量，减小负压，从而避免吸力过大弄疼动物，甚至给动物造成损伤。

[0034] 另外，当使用者家里没有宠物，或者吹风功能使用不多的情况下，本实用新型所述的可梳理动物皮毛的吹吸两用吸尘器的出风板 5 可以拆卸地更换为出风栅 6，作为普通的吸尘器使用。由此，当操作者拖着吸尘器在待工作表面随意行走时，吸尘器后端的出风栅因为没有如出风板后端所带有的呈突出状的出风管嘴，而避免了磕碰家具等状况发生。

[0035] 本实用新型，具有边梳理边吸脱落毛和皮屑的功能，同时可以接吸尘器的出风，对洗澡后的宠物进行边吹风边梳理的功能。并且可根据动物毛长短不同，在吸头上配合装上不同齿形的齿刷，达到较佳地为动物清洁皮毛的功效。另外，由于梳齿端部呈圆型，因此在给动物梳理毛发时，也兼备了起到按摩护理的作用。

[0036] 另外，值得说明的是：本实施例中的吸尘器为多级旋风吸尘器，该吸尘器通过离心

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原理，使得气固分离效果更明显。由于多级旋风吸尘器为现有技术，在此不再赘述。

[0037] 除上述实施例外，本实用新型还可以有其他实施方式。凡采用等同替换或等效变换形成的技术方案，均落在本实用新型要求的保护范围。

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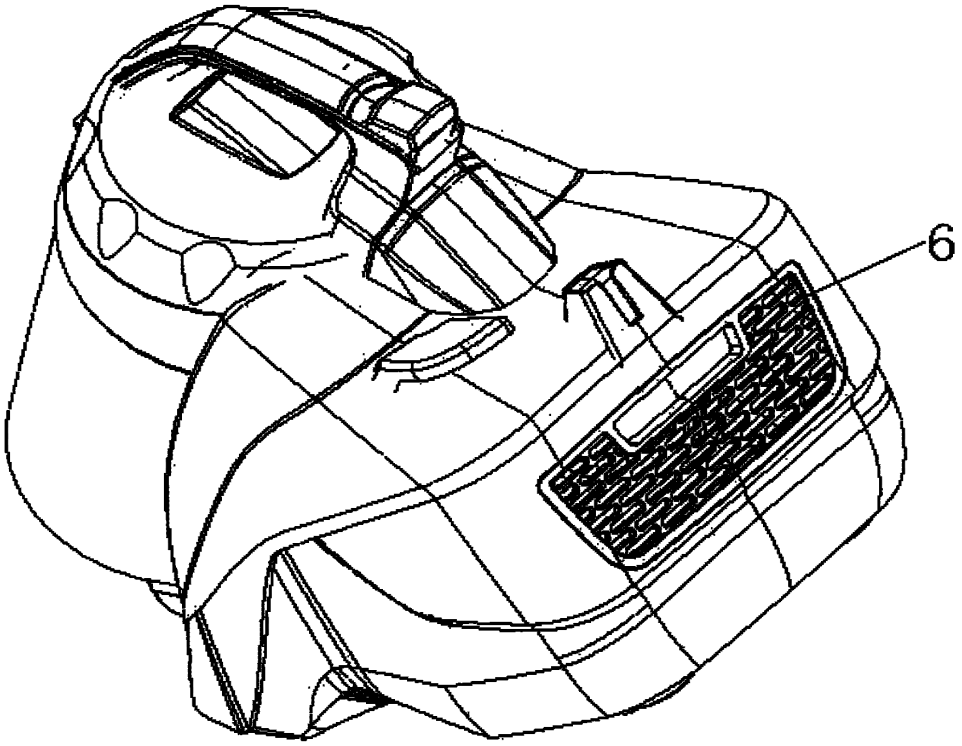


图 1

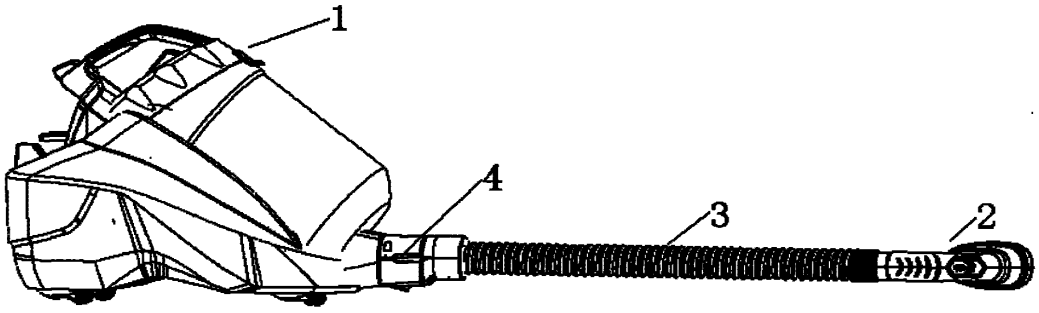


图 2

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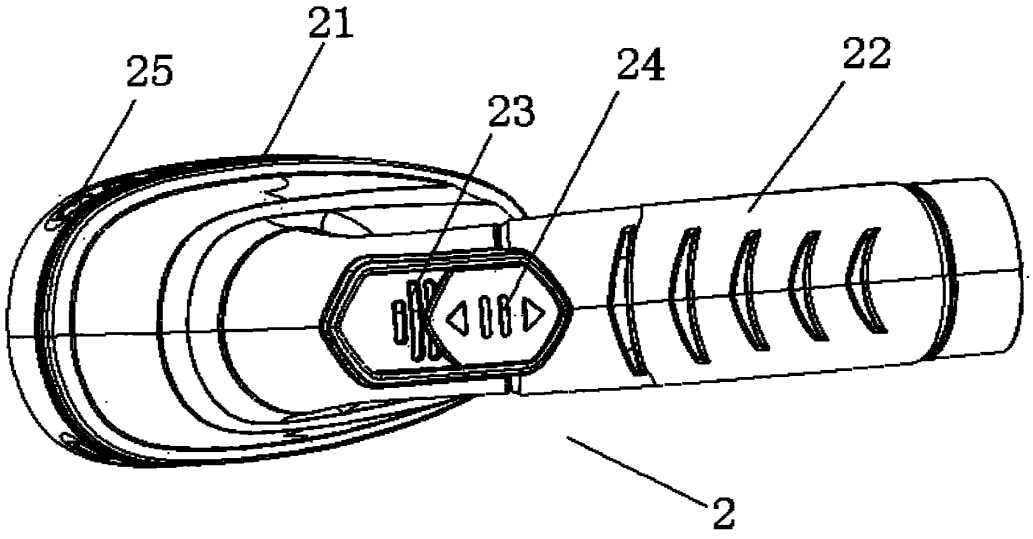


图 3

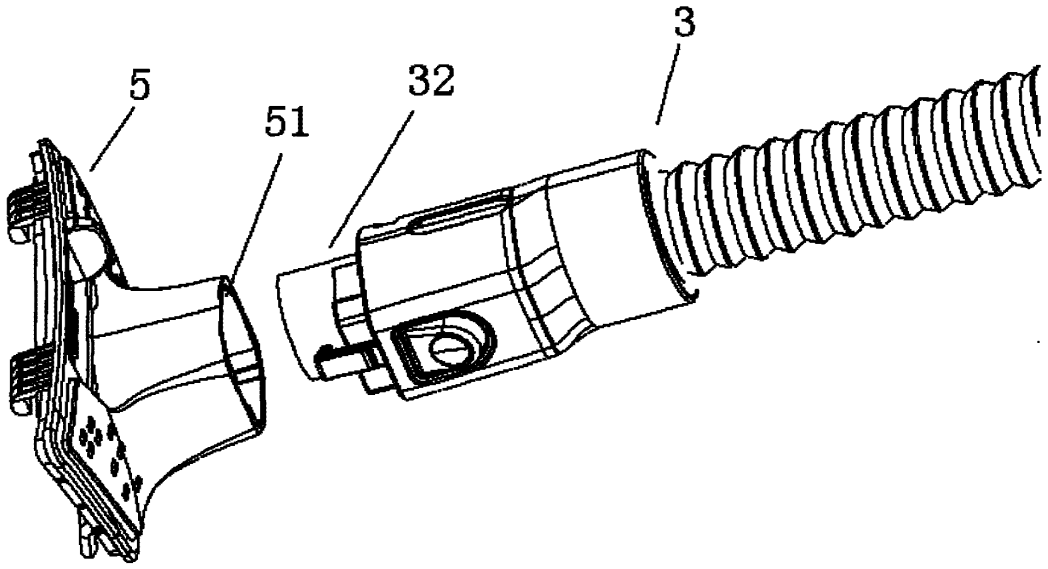


图 4

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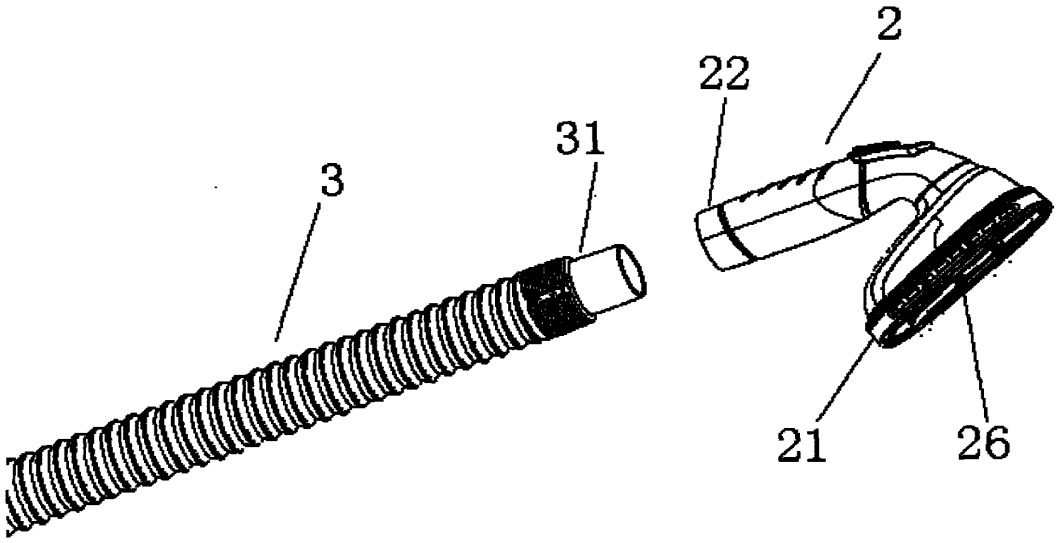


图 5

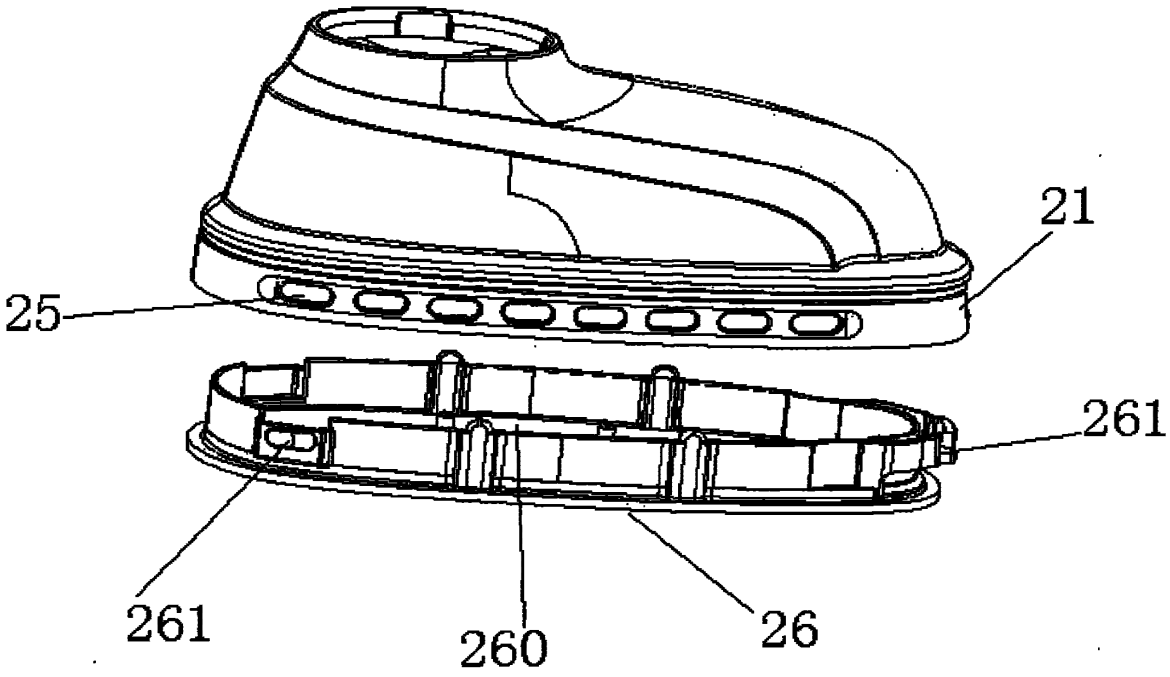


图 6

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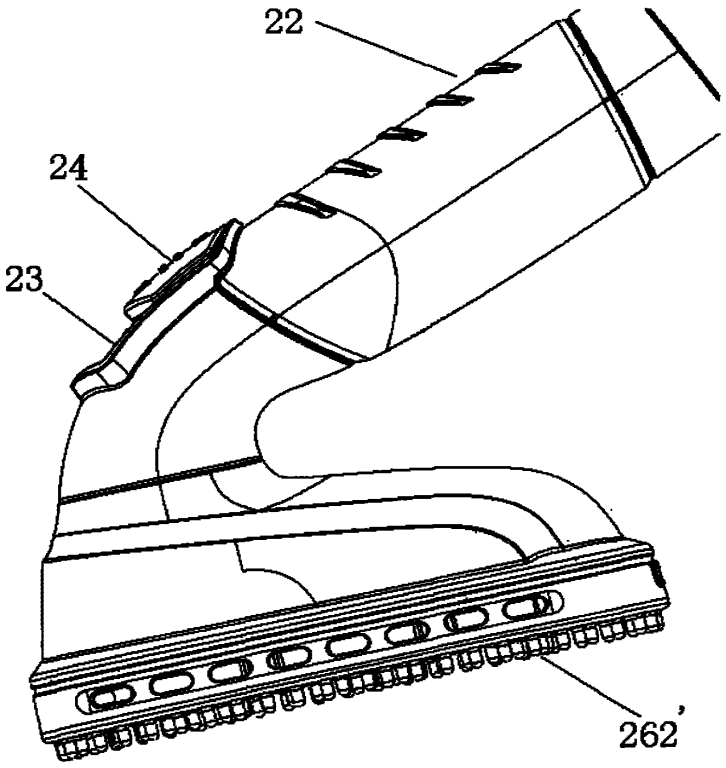


图 7-1

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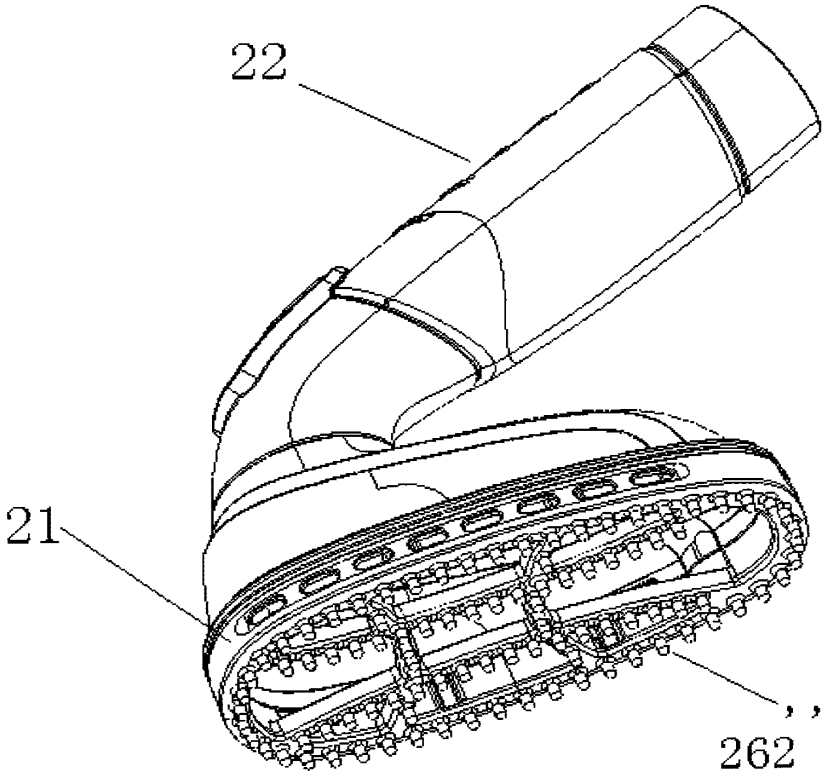


图 7-2

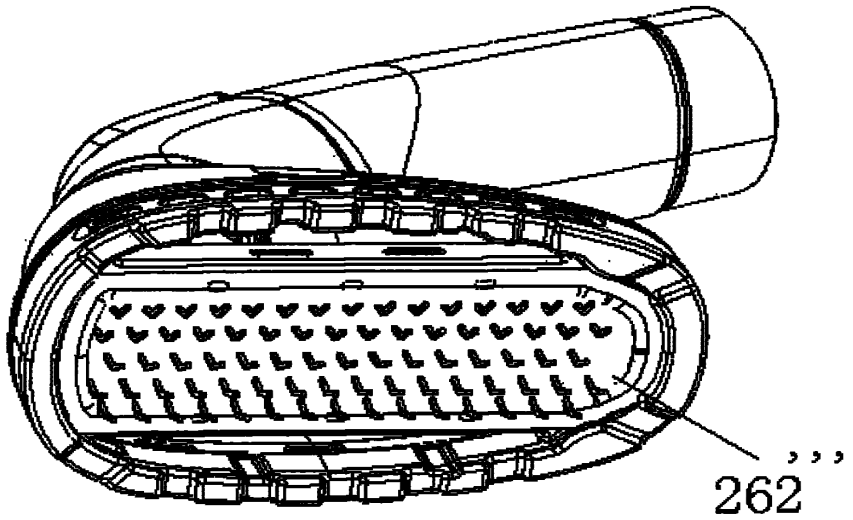


图 7-3

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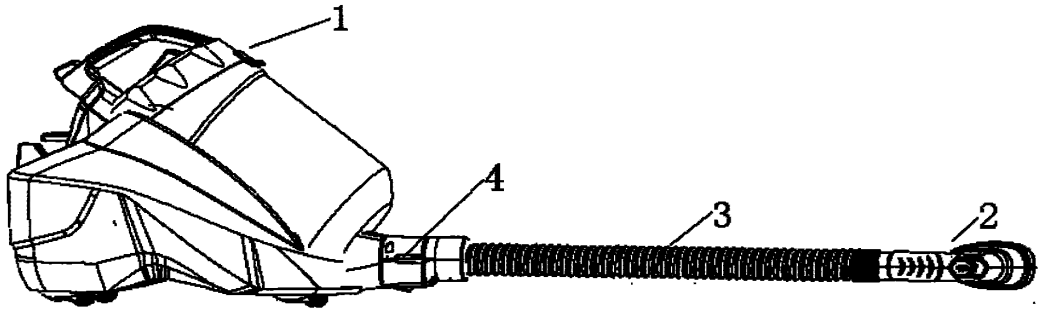


图 8

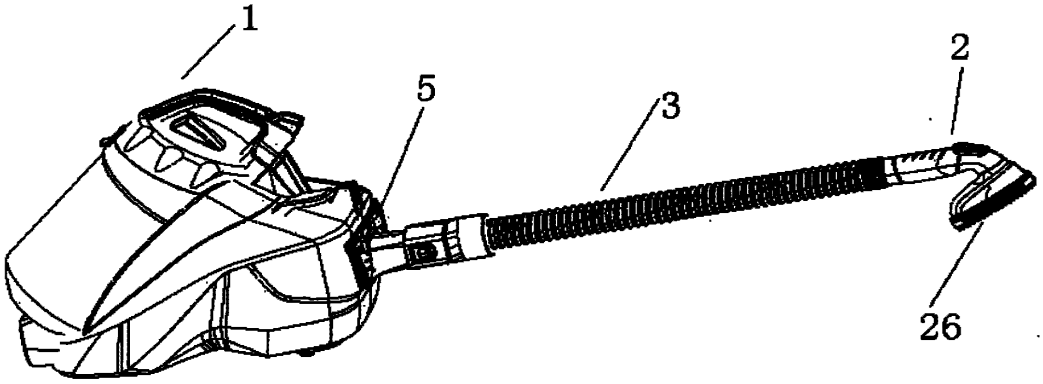
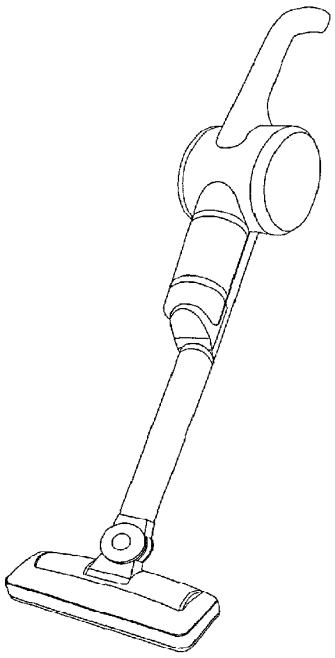


图 9

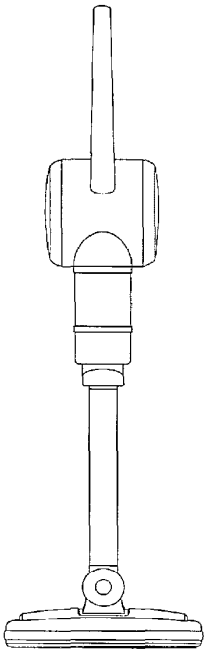
Dyson Ex1004
Page 284

(19) [Countries] Japan Patent Office (JP)
(45) [publication date] 7/16/2001 (2001.7.16)
(12) [publication type] design Bulletin (S)
(11) [registration No.] design registration 1115813 No. (D1115813)
(24) [registered date] 5/25/2001 (2001.5.25)
(54) [design article] electric cleaning machines
(52) [architectural classification] C3-410D
(51) [international design classification (help)] 15-05
(21) [filing number] will hopefully spur 11-32654
(22) [filing date] 11/25/1999 (1999.11.25)
(72) [Creator] [your name] makihara steep road [resident] status in Osaka Prefecture Osaka City abeno-Ku, nagaike-Cho 22-22, Sharp Corporation
(72) [creator] [your name] Fujii, y. [resident] status in Osaka Prefecture Osaka City abeno-Ku, nagaike-Cho 22-22, Sharp Corporation
(73) [of a design right] [identification number] 000005049 [applicant name] sharp co., Ltd. [domicile or address: Osaka Prefecture Osaka City abeno-Ku, nagaike-Cho 22-22,
(74) [representative] [identification number] 100103296 [Attorneys] [applicant name] Koike, Wataru
(74) [representative] [identification number] Masaharu Kinoshita 100073667 [attorneys] [applicant name] [examiner] Saito Takashi Megumi
(55) [description of design article: this article is on the vacuum cleaner body downward trash removably installed storage area, from trash can throw trash out storage area.
[Drawing] [Perspective]

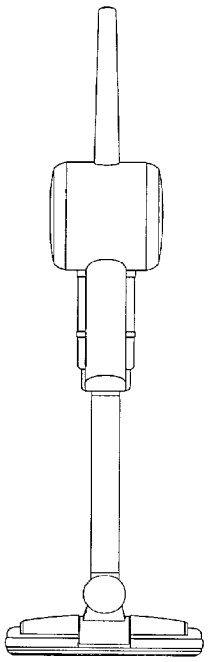
（１９）【発行国】日本国特許庁（ＪＰ）
（４５）【発行日】平成１３年7月１６日（２００１．７．１６）
（１２）【公報種別】意匠公報（Ｓ）
（１１）【登録番号】意匠登録第１１１５８１３号（Ｄ１１１５８１３）
（２４）【登録日】平成１３年5月２５日（２００１．５．２５）
（５４）【意匠に係る物品】電気掃除機
（５２）【意匠分類】Ｃ３－４１０Ｄ
（５１）【国際意匠分類（参考）】１５－０５
（２１）【出願番号】意願平１１－３２６５４
（２２）【出願日】平成１１年１１月２５日（１９９９．１１．２５）
（７２）【創作者】
【氏名】牧原　険道
【住所又は居所】大阪府大阪市阿倍野区長池町２２番２２号　シャープ株式会社内
（７２）【創作者】
【氏名】藤井　伸裕
【住所又は居所】大阪府大阪市阿倍野区長池町２２番２２号　シャープ株式会社内
（７３）【意匠権者】
【識別番号】０００００５０４９
【氏名又は名称】シャープ株式会社
【住所又は居所】大阪府大阪市阿倍野区長池町２２番２２号
（７４）【代理人】
【識別番号】１００１０３２９６
【弁理士】
【氏名又は名称】小池　隆彌
（７４）【代理人】
【識別番号】１０００７３６６７
【弁理士】
【氏名又は名称】木下　雅晴
【審査官】斉藤　孝恵
（５５）【意匠に係る物品の説明】本物品は、掃除機の本体下方部にゴミ収納部分を着脱自在に設け、本体からゴミ収納部分を取り出してゴミを捨てることができる。
【図面】
【斜視図】



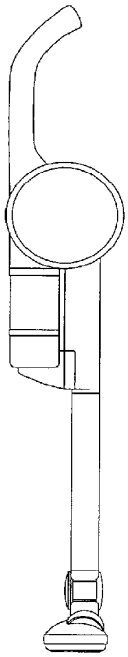
【正面図】



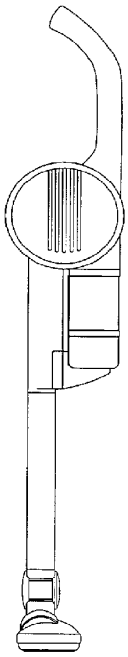
【背面図】



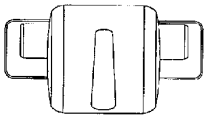
【右側面図】



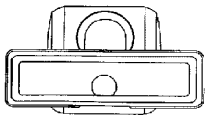
【左側面図】



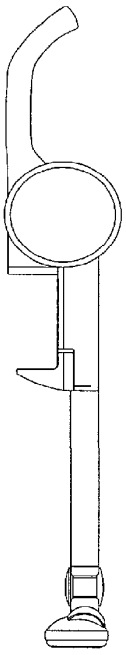
【平面図】



【底面図】



【カップ取り出し時右側面図】



Japan Patent Office

Issued 16 September 1988 Design Gazette (S) C3-410 E

743618 Design Application: S61-15495 Application date: 24 April 1986
Registered: 10 June 1988

Designer: MIYAMOTO Isshin, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: NAGAMATSU Yasuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: ISHIDA Kazuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: TANAKA Yasuhiko, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: SAKAMOTO Masaharu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka
Designer: HIDAKA Masataka, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka
Designer: SAKAMOTO Hideaki, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka
Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka
Attorney: NAKAO Toshio, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details

Front view Back view

743618 (2) C3-410 E

Left side view Plan view Bottom view Perspective view Right side view

日本国特許庁

昭和63年(1988)9月16日発行　**意匠公報**　(S)

C3-410 E

743618　　意願 昭61－15495　　出願 昭61(1986)4月24日

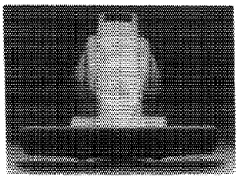
登録 昭63(1988)6月10日

創作者	宮本一伸	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	長松康男	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	石田和男	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	田中康彦	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	坂本雅春	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	日高正隆	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	坂本英明	大阪府門真市大字門真1006番地　松下電器産業株式会社内
意匠権者	松下電器産業株式会社	大阪府門真市大字門真1006番地
代理人	弁理士 中尾敏男	外1名
審査官	鍋田和宣	

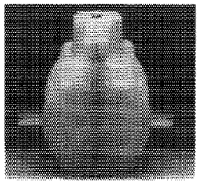
意匠に係る物品　電気掃除機

この意匠は図面代用写真によつて表わされたものであるから細部については原本を参照されたい

正面図

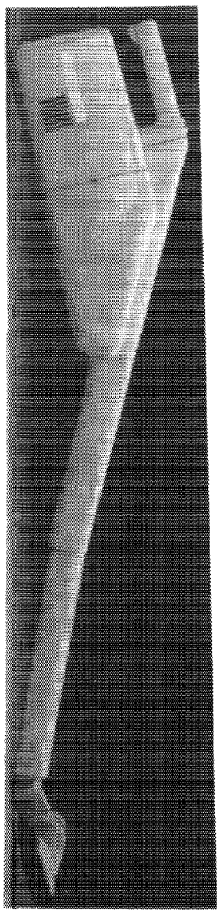


背面図

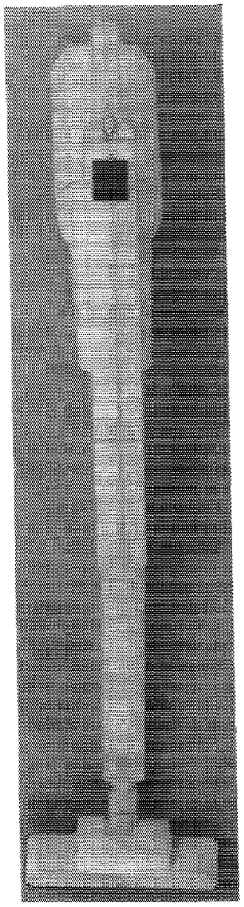


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Page 293

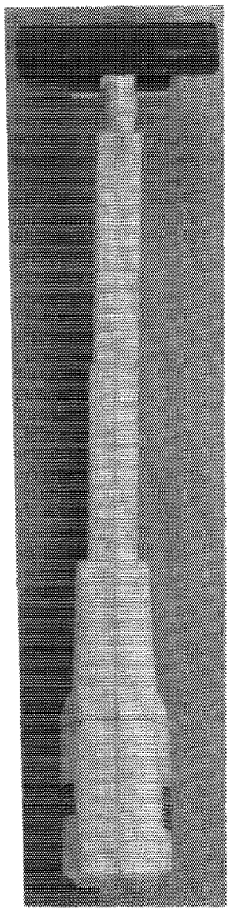
左側面図



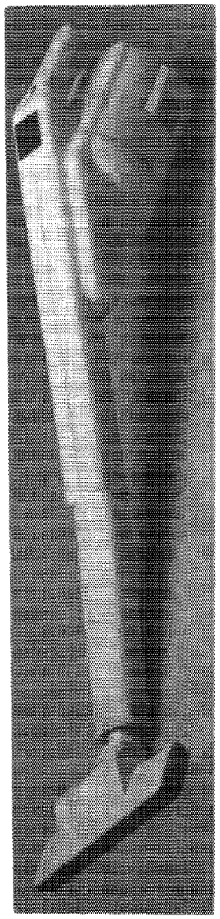
平面図



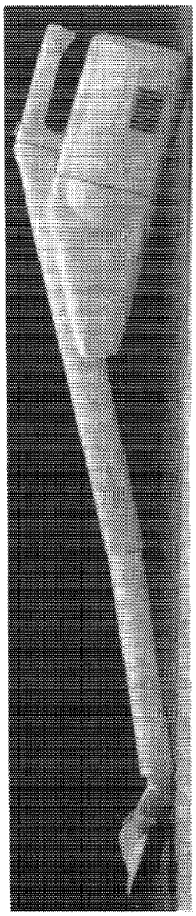
底面図



斜視図



右側面図



Dyson Ex1004
Page 294

Japan Patent Office

Issued 4 October 1988

Design Gazette (S)

C3-410 E

745200 Design Application: S61-41072 Application date: 16 October 1986
Registered: 24 June 1988

Designer: SHOJI Takashi, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: ICHIHARA Fumioki, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: TOKUE Yasuhiko, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Attorney: NAKAO Toshio, Patent Attorney, and one other

Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner

Left side view

Front view

Sectional view A-A´ without internal mechanism

Back view

Right side view

Plan view

Bottom view

Enlarged sectional view B-B´

Perspective view
with hose stowed



Perspective view



日本国特許庁

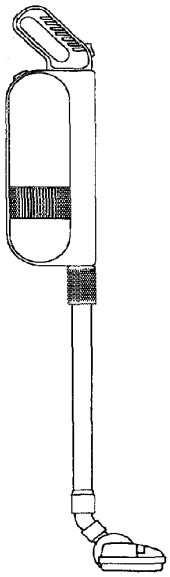
昭和63年(1988)10月4日発行　**意匠公報**（S）　C3-410 E

745200　意願 昭61－41072　出願 昭61(1986)10月16日
登録 昭63(1988)6月24日

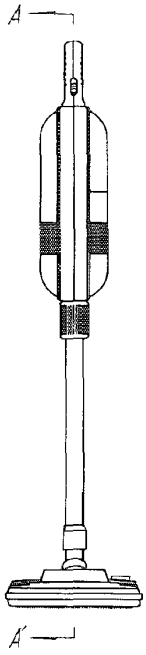
創作者　小路　隆　大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者　市原文興　大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者　徳江康彦　大阪府門真市大字門真1006番地　松下電器産業株式会社内
意匠権者　松下電器産業株式会社　大阪府門真市大字門真1006番地
代理人　弁理士　中尾敏男　外1名
審査官　鍋田和宣

意匠に係る物品　電気掃除機

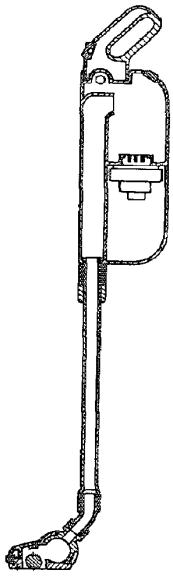
左側面図



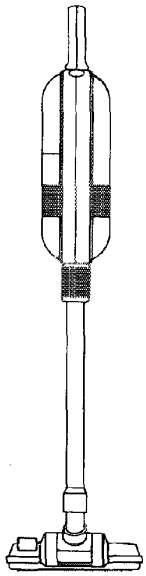
正面図



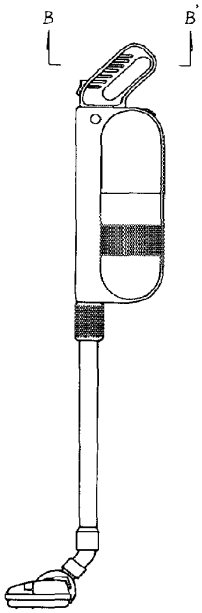
内部機構を省略した
A－A'断面図



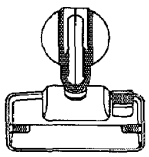
背面図



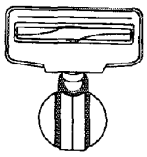
右側面図



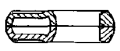
平面図



底面図



B－B'拡大断面図



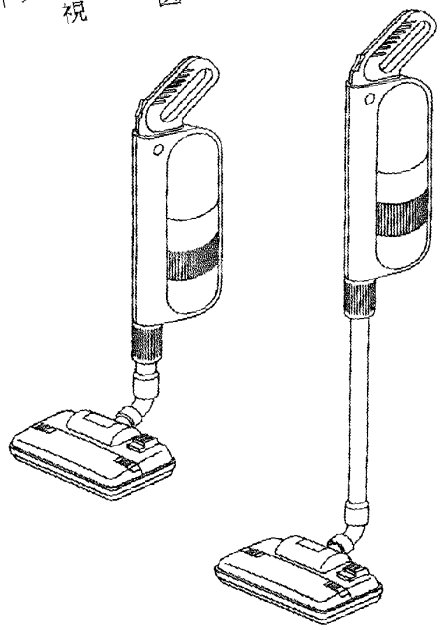
Dyson Ex1004
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(2)

745200

斜視図

パイプ収納状態の斜視図



Dyson Ex1004
Page 298

Japan Patent Office

Issued 22 September 1983 **Design Gazette (S)** (10-44)

C3-410 D

609203 Design Application: 56-5533 Application date: 13 February 1981
Registered: 30 June 1983

Designer: SHOJI Takashi, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: INOUE Yoshiaki, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Design rights holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Attorney: NAKAO Toshio, Patent Attorney, and one other

Designed product: Vacuum cleaner

Description: the left side view is symmetrical with the right side view

Front view



Back view

Right side view



Perspective view



Enlarged sectional view A-A′ without internal mechanism

Plan view

Bottom view

日本国特許庁

昭和58年(1983)9月22日発行　**意匠公報**(S)　(10-44) C3-410 D

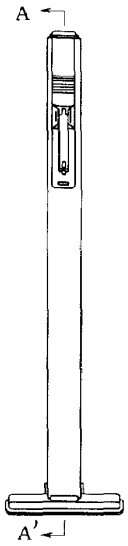
609203　意願 昭56-5533　出願 昭56(1981)2月13日
登録 昭58(1983)6月30日

創作者　小路　隆　門真市大字門真1006番地　松下電器産業株式会社内
創作者　井上義昭　門真市大字門真1006番地　松下電器産業株式会社内
意匠権者　松下電器産業株式会社　門真市大字門真1006番地
代理人　弁理士　中尾敏男　外1名

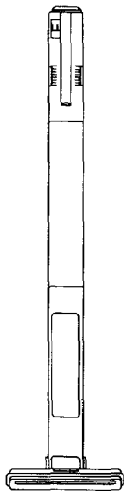
意匠に係る物品　電気掃除機

説明　左側面図は右側面図と対称にあらわれる。

正面図



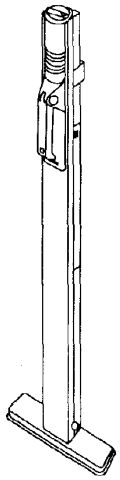
背面図



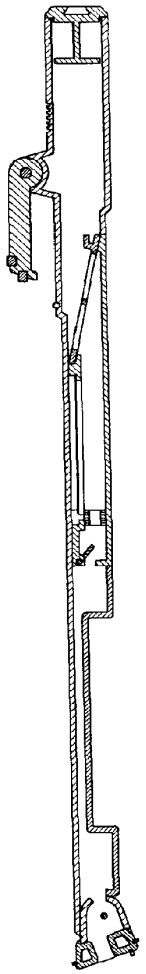
右側面図



斜視図



内部機構を省略した
A－A'拡大断面図



平面図



底面図



Dyson Ex1004
Page 300

Japan Patent Office

Issued 16 September 1988

Design Gazette (S)

C3-410 D

743603 Design Application: 60-34213 Application date: 9 August 1985
Registered: 10 June 1988

Designer: ONISHI Toru, Sanyo Electric Co. Ltd., 2-18 Hondori, Keihan, Moriguchi, Osaka

Designer: MORIMOTO Kazunori, Sanyo Electric Co. Ltd., 2-18 Hondori, Keihan, Moriguchi, Osaka

Design right holder: Sanyo Electric Co. Ltd, 2-18 Hondori, Keihan, Moriguchi, Osaka

Attorney: NISHINO Takuji, Patent Attorney, and one other

Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner
Description: The left side view is symmetrical with the right side view.

Front view



Back view



Bottom view

Sectional view A-A´ without internal mechanism

Right side view

Plan view

Bottom view

Perspective view

Perspective view showing it detached from the storage stand

日本国特許庁

昭和63年(1988)9月16日発行　**意匠公報**　(S)

C3-410 D

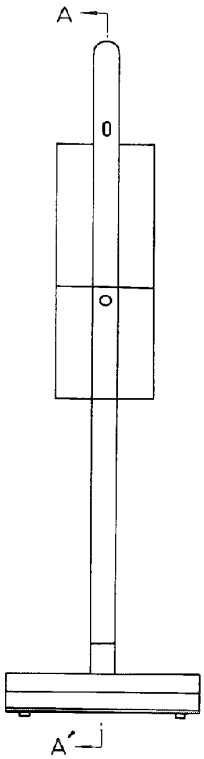
743603　　意願 昭60－34213　　出願 昭60(1985)8月9日
登録 昭63(1988)6月10日

創作者　大西　透　大阪府守口市京阪本通2丁目18番地　三洋電機株式会社内
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意匠権者　三洋電機株式会社　大阪府守口市京阪本通2丁目18番地
代理人　弁理士　西野　卓嗣　外1名
審査官　鍋田　和宣

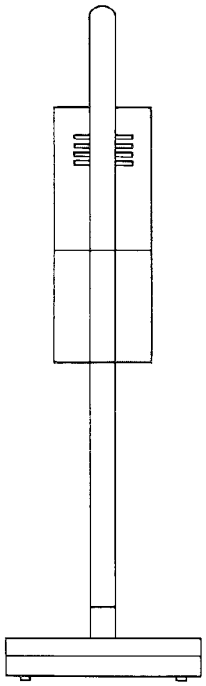
意匠に係る物品　電気掃除機

説明　左側面図は右側面図と対称にあらわれる。

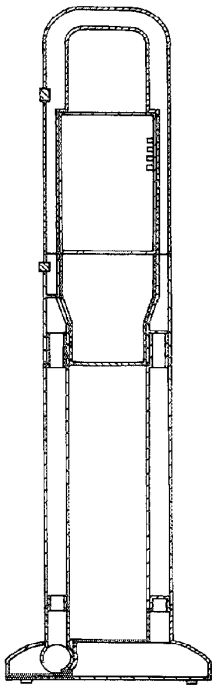
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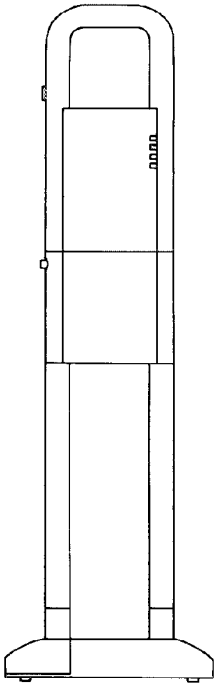
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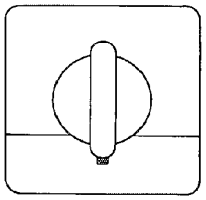
内部機構を省略した
A－A'断面図



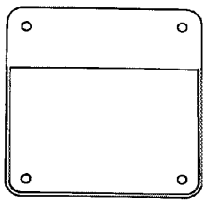
右側面図



平面図

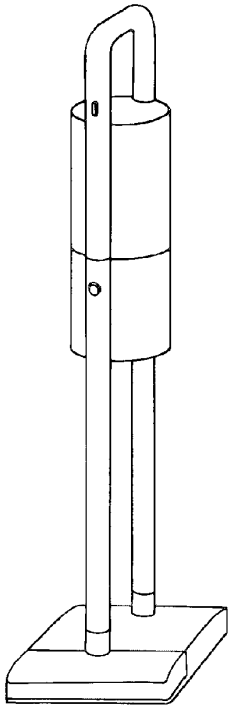


底面図

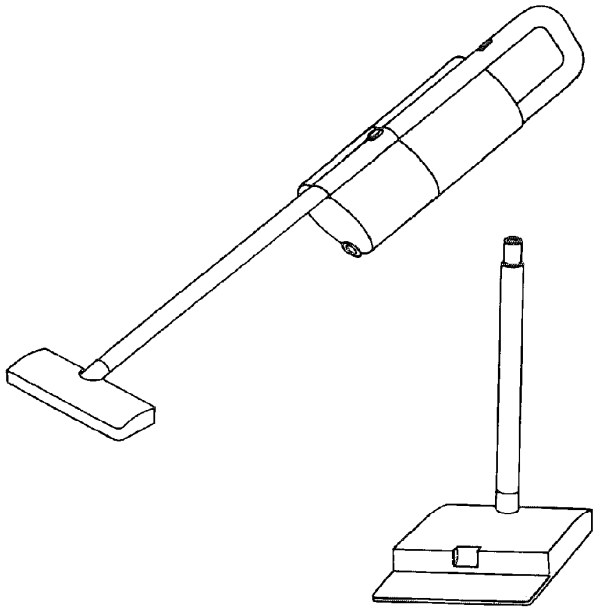


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斜 視 図



収納スタンドより分離した
状 態 を 示 す 斜 視 図



Dyson Ex1004
Page 304

Japan Patent Office

Issued 17 April 1985

Design Gazette (S)

C3-410 D

649078 Design Application: 57-52217

Application date: 18 November 1982
Registered: 22 January 1985

Designer: MIYAMOTO Isshin, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: NAGAMATSU Yasuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: MORIYAMA Toshiya, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: SAKAMOTO Masaharu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

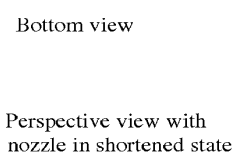
Attorney: NAKAO Toshio, Patent Attorney, and one other
Examiner: MAEKAWA Yukihiko

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details.

Left side view Front view Back view Right side view

649078 (2) C3-410-CD

Plan view



Bottom view

Perspective view

Perspective view with nozzle in shortened state

日本国特許庁

昭和60年(1985)4月17日発行　**意匠公報**（S）　C3-410 D

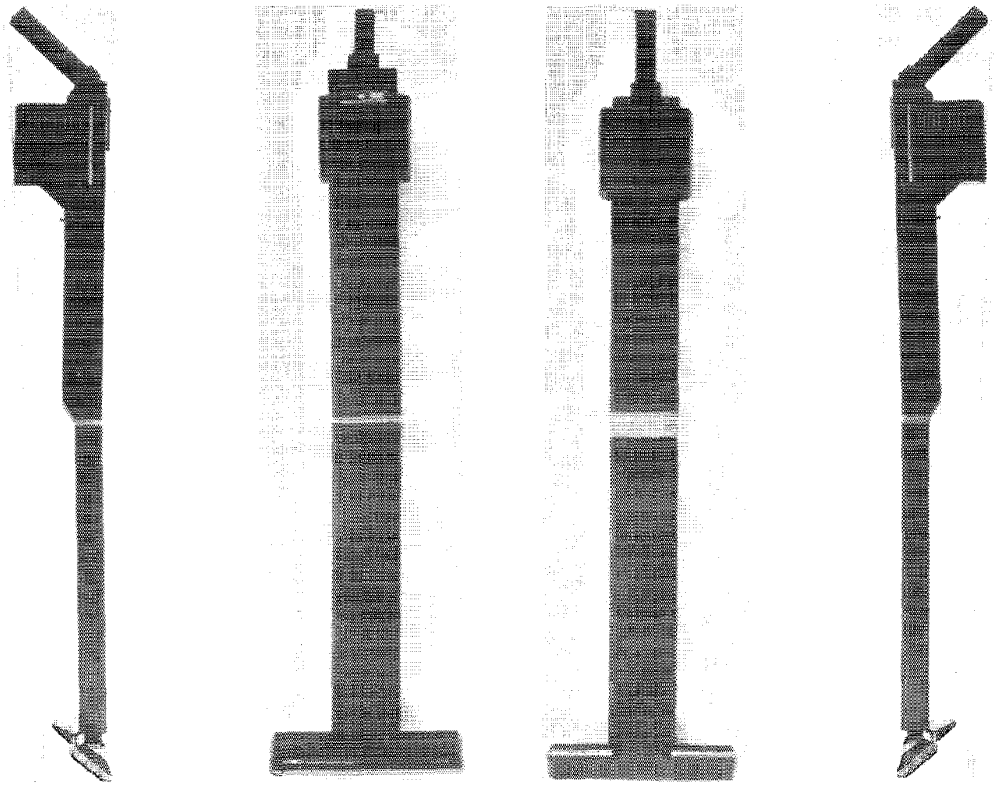
649078　意願 昭57-52217　出願 昭57(1982)11月18日
登録 昭60(1985)1月22日

創作者　宮本一伸　門真市大字門真1006番地　松下電器産業株式会社内
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意匠権者　松下電器産業株式会社　門真市大字門真1006番地
代理人　弁理士 中尾敏男　外1名
審査官　前川幸彦

意匠に係る物品　電気掃除機

この意匠は図面代用写真によつて表わされたものであるから細部については原本を参照されたい

左側面図　正面図　背面図　右側面図



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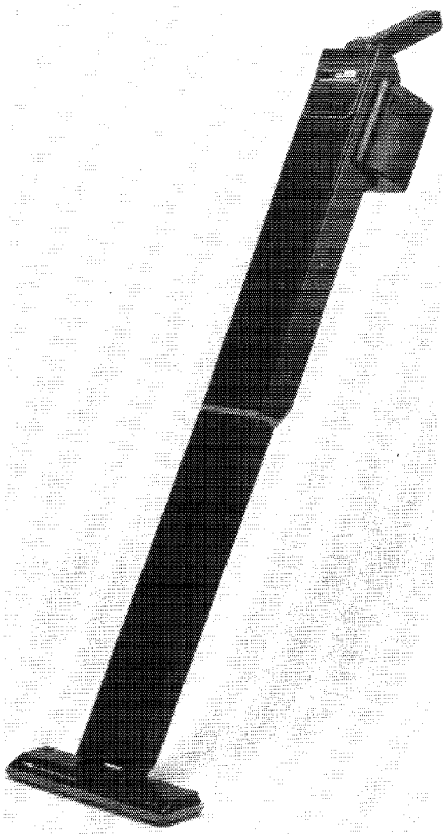
平面図



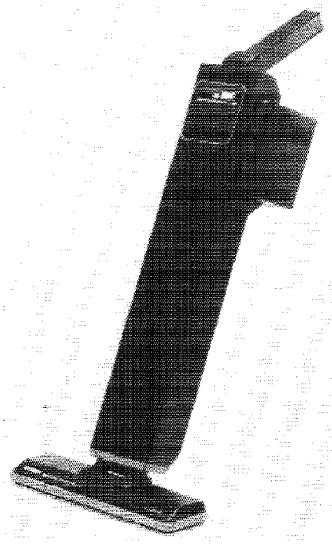
底面図



斜視図



ノズル部短縮状態の斜視図



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Page 308

Japan Patent Office

Issued 4 March 1988

Design Gazette (S)

C3-410 D

726318 Design Application: 60-3240 Application date: 1 February 1985
Registered: 17 November 1987

Designer: MIYATA Tomoyuki, Design Centre, Hitachi Ltd., 1-280 Higashi-koigakubo, Kokubunji-shi, Tokyo

Designer: HASEGAWA Koichi, Design Centre, Hitachi Ltd., 1-280 Higashi-koigakubo, Kokubunji-shi, Tokyo

Designer: OHIRA Yoshikuni, Design Centre, Hitachi Ltd., 1-280 Higashi-koigakubo, Kokubunji-shi, Tokyo

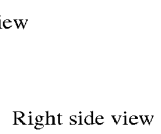
Designer: TSUKAMOTO Yasuhiro, Taga Plant, Hitachi Ltd., 1-1-1, Higashi Taga-cho, Hitachi-shi, Ibaraki

Design right holder: Hitachi Ltd, 4-6 Kanda Surugadai, Chiyoda-ku, Tokyo

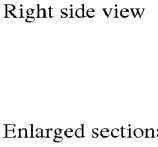
Attorney: OGAWA Katsuo, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner
Description: As shown in the figures, the product can have an adaptor suction inlet attached to the top of the front side and the power cable can be stored by raising a hook fitted at the bottom of the front surface and winding the cable around this and a hook at the bottom of the handle. The left side aspect is the mirror image of the right side.

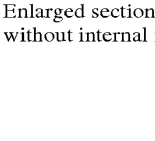
Front view



Back view



Right side view



Enlarged sectional view A-A´
without internal mechanism

726318 (2) C3-410 D

Plan view

Bottom view

Reference drawing showing operational state

Perspective view

日本国特許庁

昭和63年(1988)3月4日発行　意匠公報（S）

C3-410 D

726318　　意願 昭60－3240　　出願 昭60(1985)2月1日
登録 昭62(1987)11月17日

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意匠権者　株式会社日立製作所　東京都千代田区神田駿河台4丁目6番地

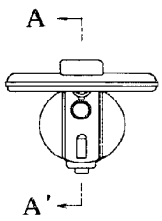
代理人　弁理士　小川勝男　外1名

審査官　鍋田和宣

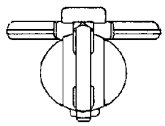
意匠に係る物品　電気掃除機

説明　本物品は、参考図に示すように、正面側の上部にアダプター吸口を取付けることができ、また、正面側下部のツメを起すことにより、ハンドル下部に設けたツメとで、電源コードを巻きつけて電源コードの収納を行なうようにできるものである。左側面図は右側面図と対称にあらわれる。

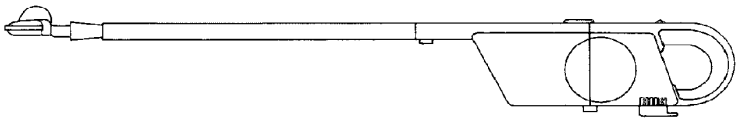
正面図



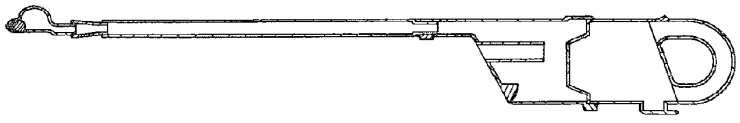
背面図



右側面図

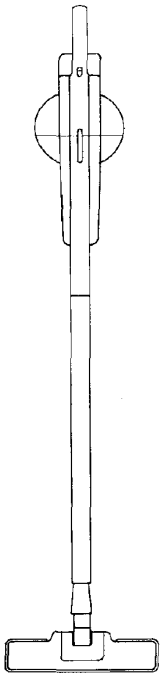


内部機構を省略した
A－A断面図

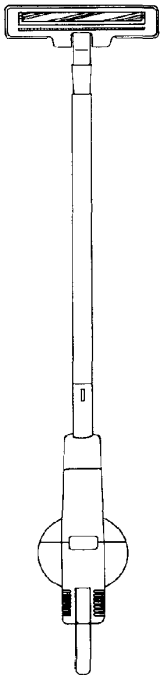


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Page 311

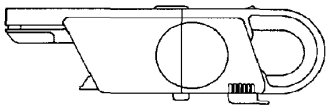
平 面 図



底 面 図



使用状態を示す参考図



斜 視 図



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Page 312

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(19) World Intellectual Property Organization
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0614235.0 18 July 2006 (18.07.2006) GB

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(72) Inventors; and
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(74) Agents: **SMITH, Gillian Ruth** et al.; Dyson Technology Limited, Intellectual Property Department, Tetbury Hill, Malmesbury Wiltshire SN16 0RP (GB).

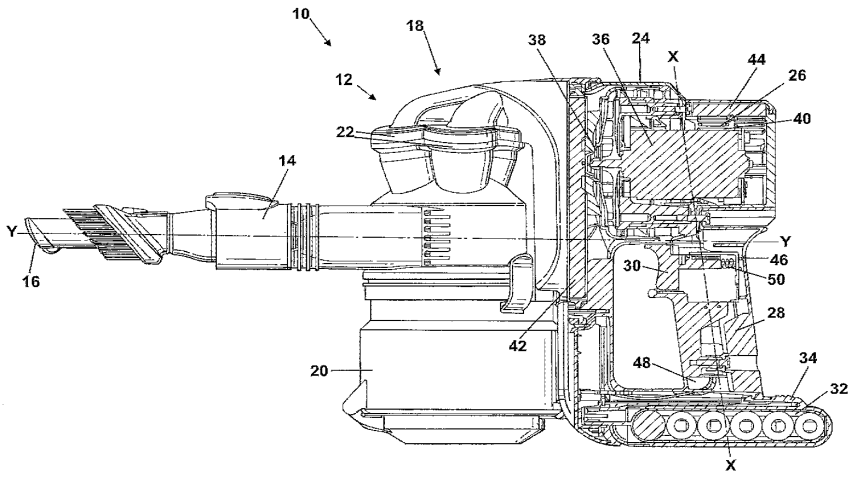
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) **Title:** A HAND-HELD CLEANING APPLIANCE



(57) **Abstract:** The invention provides a hand-held cleaning appliance (10) comprising a suction conduit (14) having a longitudinal axis (Y-Y), an airflow generator (36) for generating an airflow along the suction conduit (14), separating apparatus (18) arranged in communication with the suction conduit (14) for separating dirt and dust from the airflow, a power source (32) for supplying power to the airflow generator (36) and an elongate handle (28) disposed between the airflow generator (36) and the power source (32). The elongate handle (28) is dimensioned and arranged to be gripped by a user's hand and the elongate handle (28) lies transverse to the longitudinal axis (Y-Y) of the suction conduit. By providing a hand-held vacuum cleaner (10) with such an arrangement, the hand-held vacuum cleaner (10) is easier and more comfortable to manipulate in use.

WO 2008/009888 A1

A Cleaning Appliance

The invention relates to a hand-held cleaning appliance. More particularly, the invention relates to a hand-held vacuum cleaner.

Hand-held vacuum cleaners are known from, for example, GB 1 207 278. This document discloses a hand-held vacuum cleaner having an elongate main body with an air inlet, a suction conduit and a dust bag for separating dirt and dust from an airflow. A motor and fan assembly is provided in the main body together with a power source. A handgrip is located on the upper part of the hand-held vacuum cleaner. The handgrip extends parallel to the elongate main body at a shallow angle to the suction conduit, and both the airflow generator and the power source are located in the main body underneath the handgrip. JP 2004-041760 discloses a hand-held vacuum cleaner having a similar handgrip arrangement. However, in this case, the motor and fan assembly and the power source of the hand-held vacuum cleaner are arranged so that the centre of gravity of the machine is located at the centre of the handgrip.

An alternative arrangement of handgrip is shown in US 1,871,624. This document discloses a hand-held vacuum cleaner having a cylindrical main body and a handgrip arranged at one end. A curved suction conduit is located at an end opposite to the handgrip. The handgrip is arranged transversely to the longitudinal axis of the cylindrical main body and approximately parallel to the suction conduit. This arrangement may give the user a stronger wrist position in use than the handgrip arrangements disclosed in GB 1 207 278 and JP 2004-041760. However, the heavy components of the vacuum cleaner (for example, the motor and fan assembly) are located forwardly of the handgrip relative to a user's hand when the vacuum cleaner is in use. Therefore, the centre of mass of the respective hand-held vacuum cleaner will be located forwardly of the handgrip. This may result in the hand-held vacuum cleaner described above being tiring and uncomfortable to use because the user will have to

exert additional effort in order to maintain the hand-held vacuum cleaner in a fixed orientation.

It is an object of the present invention to provide a hand-held vacuum cleaner which is easier to manipulate in use than known arrangements. It is a further object of the present invention to provide a hand-held vacuum cleaner in which the arrangement of the handgrip, the motor and fan assembly and the power source allow the hand-held vacuum cleaner to be manipulated easily and comfortably.

The invention provides a hand-held cleaning appliance comprising a suction conduit having a longitudinal axis, an airflow generator for generating an airflow along the suction conduit, separating apparatus arranged in communication with the suction conduit for separating dirt and dust from the airflow, a power source for supplying power to the airflow generator and an elongate handle disposed between the airflow generator and the power source and dimensioned and arranged to be gripped by a user's hand, wherein the elongate handle lies transverse to the longitudinal axis of the suction conduit. By providing a hand-held cleaning appliance with such an arrangement, a user is able to maintain a comfortable wrist position and movement of the hand-held vacuum cleaner feels comfortable.

Preferably, the elongate handle lies at an angle to the longitudinal axis in the range of 80 to 90°. More preferably, the elongate handle lies at an angle to the longitudinal axis which is close to a right angle.

Preferably, the separating apparatus is located between the suction conduit and the elongate handle. This arrangement improves the weight balance of the hand-held vacuum cleaner.

Preferably, the suction conduit has a suction opening and the longitudinal axis passes through the suction opening. This arrangement feels natural for a user and is easy to use.

An embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is an isometric view of a hand-held vacuum cleaner according to the invention;

Figure 2 is a partially cut-away side view of the hand-held vacuum cleaner of Figure 1; and

Figure 3 is a plan view of the hand-held vacuum cleaner of Figure 1.

Figure 1 shows a hand-held vacuum cleaner 10. The hand-held vacuum cleaner 10 comprises a main body 12. The main body 12 includes a suction conduit 14 having a suction opening 16. The main body 12 also includes cyclonic separating apparatus 18 for separating dirt and dust from an airflow drawn in through the suction opening 16. The cyclonic separating apparatus 18 is in communication with the suction conduit 14 and the suction opening 16. The cyclonic separating apparatus 18 comprises an upstream cyclone 20 and a plurality of downstream cyclones 22 but further detail is not material to the invention and therefore will not be described.

The main body 12 further includes a motor housing 24 having a plurality of exhaust vents 26 formed therein. A flowpath extends from the suction opening 16, through the suction conduit 14, the cyclonic separating apparatus 18 and the motor housing 24 to the exhaust vents 26. A handgrip 28 is located below the motor housing 24 for manipulating the hand-held vacuum cleaner 10 when in use. The handgrip 28 is arranged so that the cyclonic separating apparatus 18 is located between the handgrip 28 and the suction opening 16. The handgrip 28 includes a trigger switch 30 which is positioned on the side of the handgrip 28 closest to the suction opening 16 such that the trigger switch 30 can be manipulated by a user's index finger. A power source 32 is connected to the handgrip 28 through a mounting portion 34.

Figure 2 shows the hand-held vacuum cleaner 10 in more detail. An airflow generator 36 is located in the motor housing 24. In this embodiment, the airflow generator 36 takes the form of a motor and fan assembly. The airflow generator 36 has an inlet 38 and an outlet 40. A pre-motor filter 42 is located upstream of the inlet 38 for filtering fine particulates from the airflow. A post-motor filter 44 is located downstream of the outlet 40. The pre-motor filter 42 and the post-motor filter 44 are located in the flowpath.

The handgrip 28 takes the form of an elongate handle and has a first end 46, a second end 48 and an axis X-X. The first end 46 of the handgrip 28 is connected to the motor housing 24. The airflow generator 36 is located adjacent the first end 46 of the handgrip 28. In this embodiment, the handgrip 28 and the airflow generator 36 are arranged such that the axis X-X of the handgrip 28 passes through at least a part of the airflow generator 36.

The mounting portion 34 removably receives the power source 32. When fitted to the hand-held vacuum cleaner 10, the power source 32 is located directly adjacent the second end 48 of the handgrip 28. In this embodiment, the power source 32 and the handgrip 28 are arranged so that the axis X-X passes through at least a part of the power source 32.

In other words, the handgrip 28 is arranged to lie between the airflow generator 36 and the power source 32. In this embodiment, the axis X-X passes through at least a part of each of the airflow generator 36 and the power source 32. Further, the axis X-X of the handgrip 28 lies transverse to a longitudinal axis Y-Y of the suction conduit 12. The longitudinal axis Y-Y passes through the suction opening 16. In this embodiment, the axis X-X is arranged at an angle to the longitudinal axis Y-Y which is close to 90°. This arrangement feels comfortable for a user.

The trigger switch 30 is located towards the first end 46 of the handgrip 28. The trigger switch 30 is located between the power source 32 and the airflow generator 36 and is

capable of switching the airflow generator 36 on or off. The trigger switch has on and off positions. The trigger switch moves from left to right as seen in Figure 2. The off position is located to the left, and the on position to the right. In the off position the trigger switch 30 is in an open state and the airflow generator 36 will be switched off. In the on position the trigger switch 30 will be closed and the airflow generator 36 will be switched on. The trigger switch 30 includes a spring 50 which biases the trigger switch 30 towards a normally open state. This arrangement allows the trigger switch 30 to be operated easily by a user's index finger. This in turn allows the hand-held vacuum cleaner 10 to be operated with one hand.

In use, a user grips the handgrip 28 to manipulate the hand-held vacuum cleaner 10 in use. When the user squeezes the trigger switch 30, the airflow generator 36 operates. The user must maintain pressure on the trigger switch 30 in order to keep the airflow generator 36 operating. This means that the user is likely to release the trigger switch 30 when he or she does not require a cleaning action, e.g. when moving from one room to another. If the user releases the trigger switch 30, the spring 50 will bias the trigger switch 30 to the off position and operation of the airflow generator 36 will cease. This reduces unnecessary use of the airflow generator 36 and results in a saving of battery life and motor life.

When operating, the airflow generator 36 draws a flow of dirt- and dust-laden air into the suction opening 16, through the suction conduit 14 and into the cyclonic separating apparatus 18. Dirt- and dust-laden air enters the upstream cyclone 20 and larger dirt and dust particles are separated by cyclonic motion. These particles are then collected in the upstream cyclone 20.

The partially-cleaned airflow then enters the plurality of downstream cyclones 22. The downstream cyclones 22 are able to separate smaller particles of dirt and dust from the partially-cleaned airflow than the upstream cyclone 20. The cleaned air exits the cyclonic separating apparatus 16 and passes sequentially through the pre-motor filter 42,

the airflow generator 36 and the post-motor filter 44 before being exhausted from the hand-held vacuum cleaner 10 through the exhaust vents 26.

In use, a user may wish to clean a variety of surfaces which may be orientated at different angles. Therefore, a user will need to lift and move the hand-held vacuum cleaner 10 into a variety of positions and orientations in order to clean effectively. The location of the handgrip 28 between the airflow generator 36 and the power source 32 allows the hand-held vacuum cleaner 10 to be manipulated easily in use. This is because the user's hand will be located between the two heaviest components of the hand-held vacuum cleaner 10. This results in a "dumbbell-like" configuration in which the weight of the hand-held vacuum cleaner 10 is distributed on both sides of the user's hand.

The transverse arrangement of the longitudinal axis Y-Y of the suction conduit 14 with respect to the axis X-X of the handgrip 28 results in the suction conduit 12 forming a substantially straight extension of the user's forearm when the user's wrist is essentially straight. This arrangement feels comfortable for the user, especially when the hand held vacuum cleaner 10 is used for a period of time. Further, the location of the longitudinal axis Y-Y of the suction conduit 14 close to the centre of the hand-held vacuum cleaner 10 means that the longitudinal axis Y-Y of the suction conduit 14 will be coincident, or close to, the longitudinal axis of rotation of the user's forearm. This results in little or no axial displacement of the suction opening 14 when the hand-held vacuum cleaner 10 is rotated.

The invention is not limited to the features of the specific embodiment described above. Variations will be apparent to the person skilled in the art. For example, the specific locations of the airflow generator or power source may be varied. The airflow generator may lie directly adjacent the first end of the handgrip. The airflow generator may lie above or below the handgrip. Additionally, the power source may lie directly adjacent the second end of the handgrip. The power source may lie above or below the handgrip. What is important is that the airflow generator lies adjacent a first end of the handgrip and the power source lies adjacent a second end of the handgrip.

The angular relationship between the longitudinal axis of the suction conduit and the axis of the handgrip can be varied. It is preferred that the angle between the longitudinal axis of the suction conduit and the axis of the handgrip is in the range of 80 to 90°. However, what is important is that these axes are transverse to one another such that the manipulation of the hand-held vacuum cleaner by a user feels comfortable.

A cyclonic separating unit need not be used. Other separating apparatus such as a bag-type filter could be used. Further, the hand-held vacuum cleaner need not be fitted with a rechargeable power source. Standard batteries or a power lead could be used. Further, the invention is not limited to hand-held vacuum cleaners. Other types of hand-held cleaning appliances could be used, for example, carpet shampooers, wet and dry machines or blower vacuum devices.

CLAIMS

1. A hand-held cleaning appliance comprising a suction conduit having a longitudinal axis, an airflow generator for generating an airflow along the suction conduit, separating apparatus arranged in communication with the suction conduit for separating dirt and dust from the airflow, a power source for supplying power to the airflow generator and an elongate handle disposed between the airflow generator and the power source and dimensioned and arranged to be gripped by a user's hand, wherein the elongate handle lies transverse to the longitudinal axis of the suction conduit.

2. A hand-held cleaning appliance according to claim 1, wherein the elongate handle lies at an angle to the longitudinal axis in the range of 80 to 90°.

3. A hand-held cleaning appliance according to claim 1 or 2, wherein the elongate handle lies at an angle to the longitudinal axis which is close to a right angle.

4. A hand-held cleaning appliance according to claim any one of claims 1 to 3, wherein the separating apparatus is located between the suction conduit and the elongate handle.

5. A hand-held cleaning appliance according to any one of the preceding claims, wherein the suction conduit has a suction opening and the longitudinal axis passes through the suction opening.

6. A hand-held cleaning appliance according to claim 5, wherein the suction opening is remote from the elongate handle.

7. A hand-held cleaning appliance according to any one of the preceding claims, wherein a trigger switch is located on the elongate handle for switching the airflow generator on or off.

8. A hand-held cleaning appliance according to claim 6 and 7, wherein the trigger switch is located on the side of the elongate handle which is closest to the suction opening.

9. A hand-held cleaning appliance according to claim 7 and 8, wherein the trigger switch includes resilient means for biasing the trigger switch into an off position.

10. A hand-held cleaning appliance according to any one of the preceding claims, wherein the separating apparatus comprises a cyclonic separator.

11. A hand-held cleaning appliance according to any one of the preceding claims, wherein the hand-held cleaning appliance is a hand-held vacuum cleaner.

12. A hand-held cleaning appliance substantially as hereinbefore described with reference to the accompanying drawings.

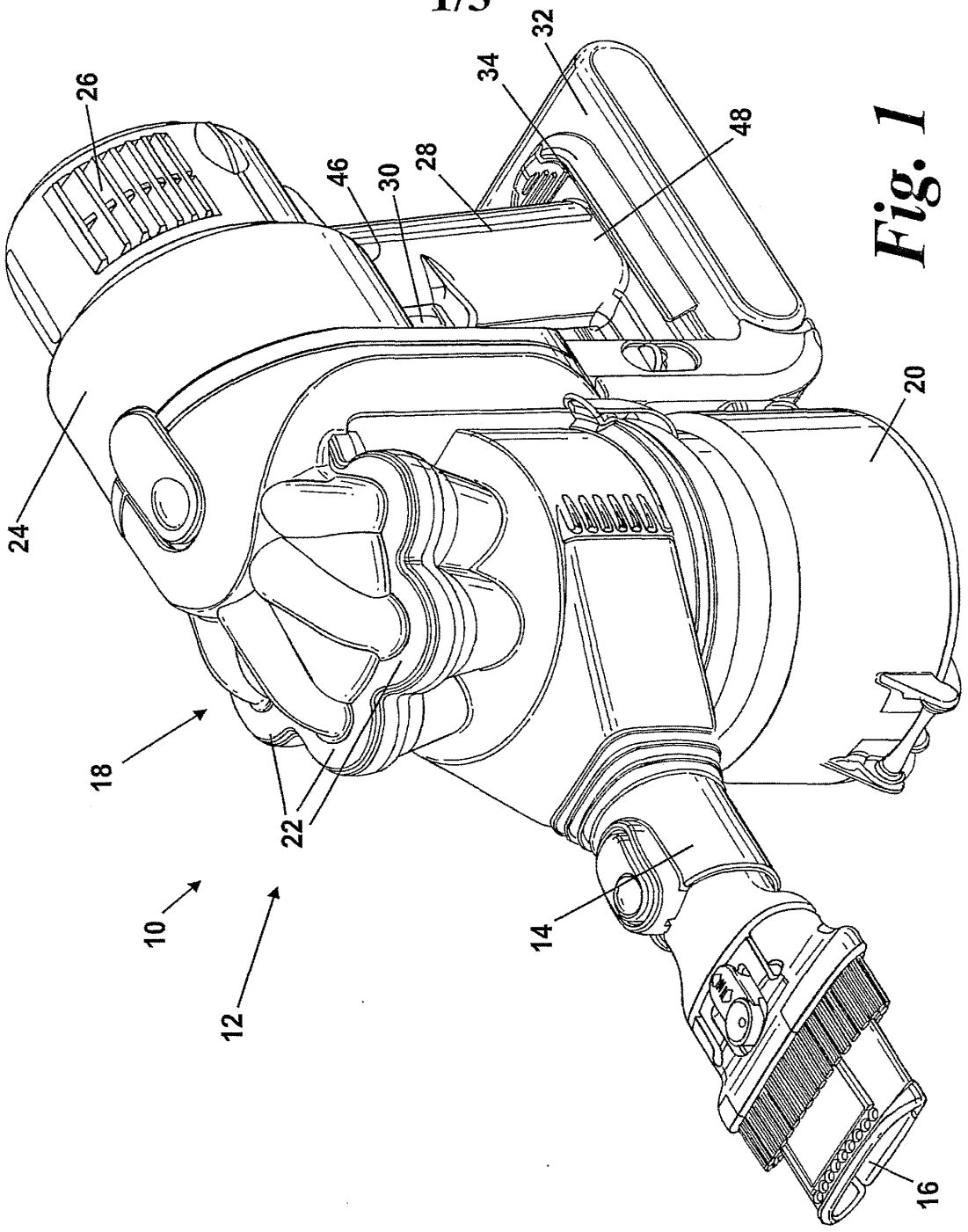


Fig. 1

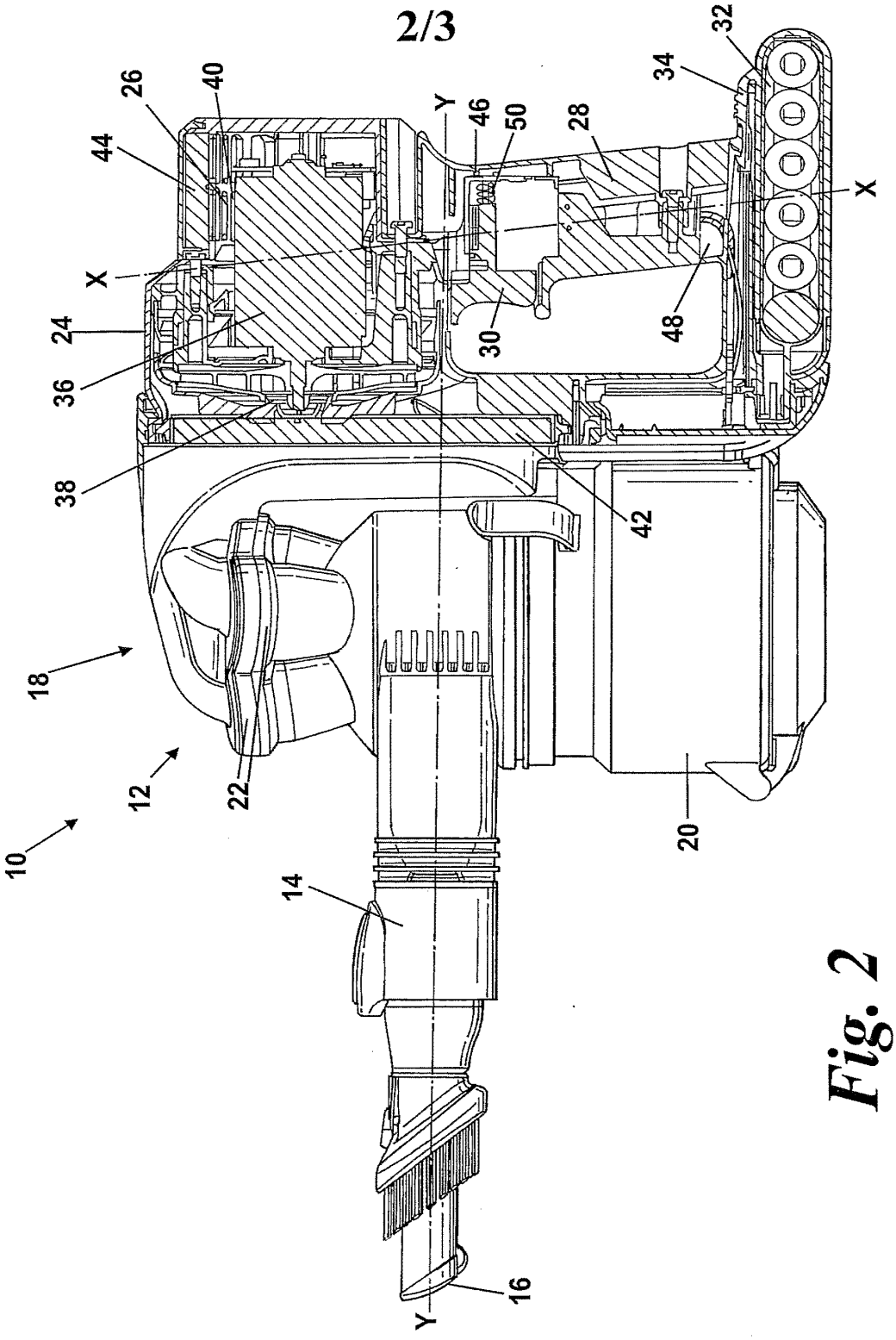


Fig. 2

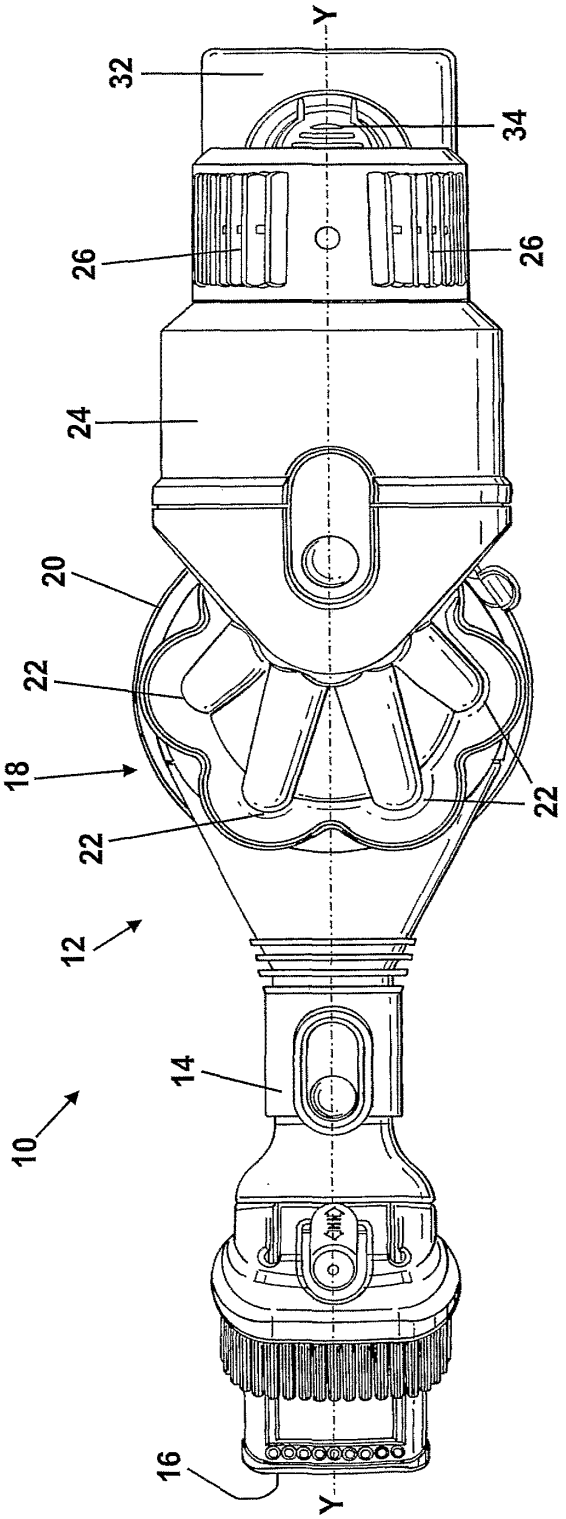


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2007/002536

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L5/24

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)
A47L B60S B25F

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 practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 914 820 A (HANKEL ROBERT WILLIAM) 28 October 1975 (1975-10-28) figures 1,3,5	1-7,11, 12
Y		9
X	FR 1 508 452 A (MOBES NACHF W) 5 January 1968 (1968-01-05) the whole document	1-3,5-8, 11,12
X	JP 2004 041760 A (MATSUSHITA ELECTRIC IND CO LTD) 12 February 2004 (2004-02-12) cited in the application abstract; figure 1	1,4,11, 12
Y		10

-/--

[X] Further documents are listed in the continuation of Box C.

[X] 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 document 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
6 September 2007	19/09/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	PAPADIMITRIOU, S

Form PCT/ISA/210 (second sheet) (April 2005)

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2007/002536

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	GB 1 207 278 A (NEMEJANSKI ARIANE SABINE [FR]) 30 September 1970 (1970-09-30) cited in the application page 1, lines 32-45 page 2, lines 63-111; figures	9
Y	US 2002/189048 A1 (MARUYAMA KANAME [JP] ET AL) 19 December 2002 (2002-12-19) paragraph [0014]	10
A	DE 202 02 595 U1 (FRITZSCHE HELMUT [DE]) 25 July 2002 (2002-07-25) figures	
A	US 5 074 006 A (EREMITA NUNZIO [US]) 24 December 1991 (1991-12-24) column 1, lines 28,29 column 1, line 58 - column 2, line 28; figures 1,2	
A	JP 50 147166 A (-) 26 November 1975 (1975-11-26) figure 2	
A	US 2004/144070 A1 (GAMMACK PETER DAVID [GB] ET AL) 29 July 2004 (2004-07-29) figures 3-5	
A	US 5 089 738 A (BERGQVIST HAKAN [SE] ET AL) 18 February 1992 (1992-02-18) abstract; figures 1,3	

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/GB2007/002536

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		SE 9000080 A	11-07-1991

Japan Patent Office

Issued 17 April 1985

Design Gazette (S)

C3-410 E

6049084 Design Application: 57-52223 Application date: 18 November 1982
Registered: 22 January 1985

Designer: MIYAMOTO Isshin, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: NAGAMATSU Yasuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: MORIYAMA Toshiya, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: SAKAMOTO Masaharu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Attorney: NAKAO Toshio, Patent Attorney, and one other
Examiner: MAEKAWA Yukihiko

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details.

Front view

Back view

Plan view



Left side view



Bottom view



Right side view



Perspective view

日本国特許庁

昭和60年(1985)4月17日発行　**意匠公報**（S）　C3-410 E

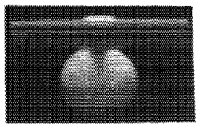
649084　意願 昭57 52223　出願 昭57(1982)11月18日
登録 昭60(1985)1月22日

創作者　宮本一伸　門真市大字門真１００６番地　松下電器産業株式会社内
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代理人　弁理士 中尾敏男　外１名
審査官　前川幸彦

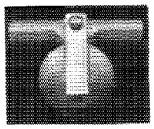
意匠に係る物品　電気掃除機

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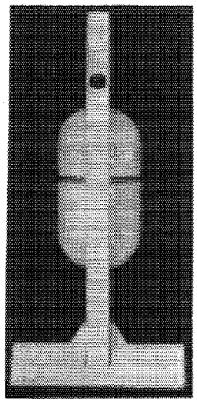
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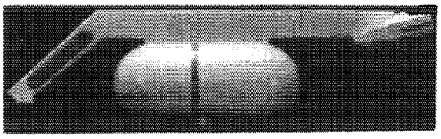
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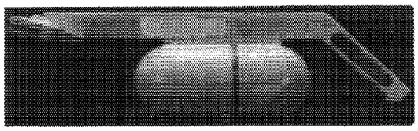
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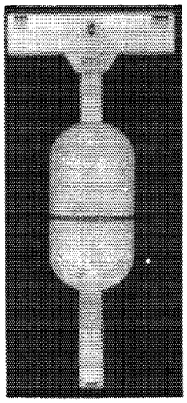
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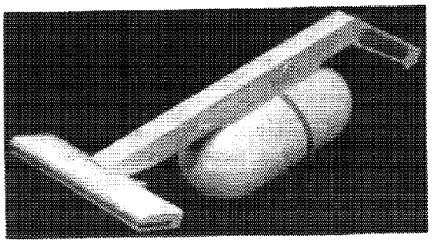
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底面図



斜視図



Dyson Ex1004
Page 330

Japan Patent Office

Issued 22 May 1986

Design Gazette (S)

C3-410 D

679426 Design Application: 59-5131

Application date: 15 February 1984
Registered: 28 February 1986

Designer: MIYAMOTO Isshin, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: NAGAMATSU Yasuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Designer: MORIYAMA Toshiya, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

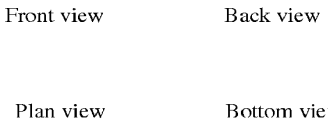
Designer: SAKAMOTO Masaharu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi

Attorney: NAKAO Toshio, Patent Attorney, and one other
Examiner: MAEKAWA Yukihiko

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details.

Front view



Back view

Plan view

Bottom view

Left side view

Right side view

Perspective view

日本国特許庁

昭和61年(1986)5月22日発行　**意匠公報**　(S)

C3-410 D

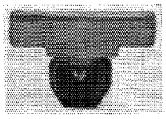
679426　　意願 昭59－5131　　出願 昭59(1984)2月15日
登録 昭61(1986)2月28日

創作者　宮本一伸　門真市大字門真1006番地　松下電器産業株式会社内
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創作者　森山俊哉　門真市大字門真1006番地　松下電器産業株式会社内
創作者　坂本雅春　門真市大字門真1006番地　松下電器産業株式会社内
意匠権者　松下電器産業株式会社　門真市大字門真1006番地
代理人　弁理士 中尾敏男　外1名
審査官　前川幸彦

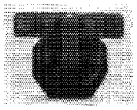
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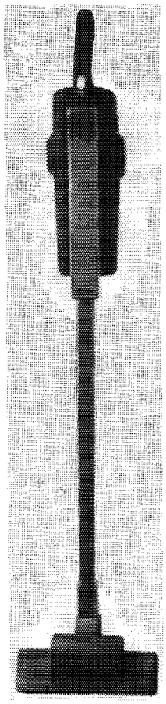
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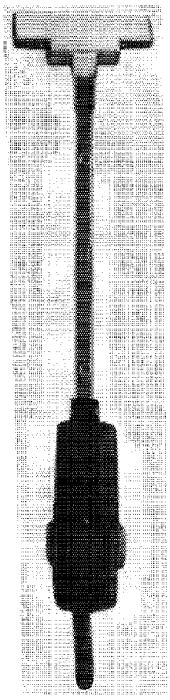
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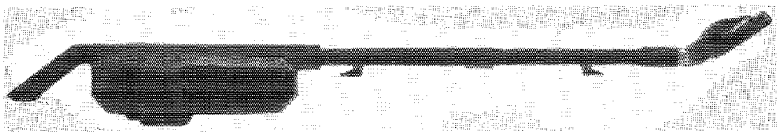


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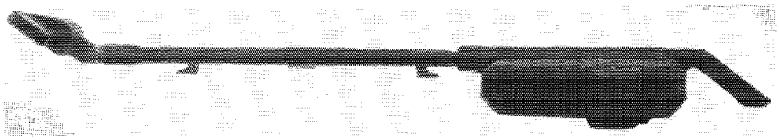


Dyson Ex1004
Page 333

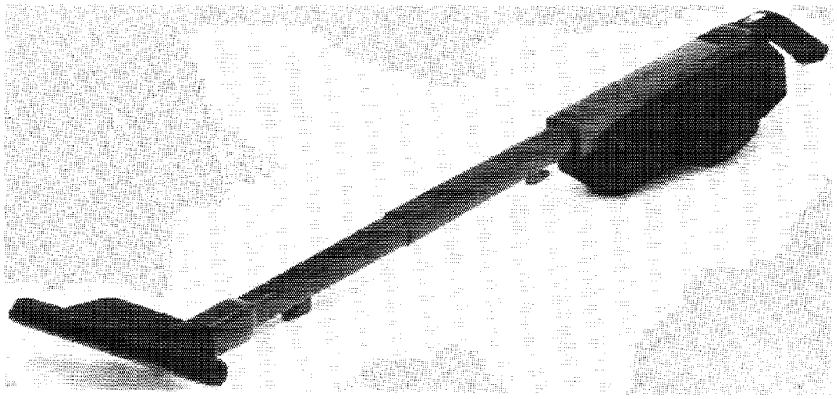
左側面図



右側面図



斜 視 図



Dyson Ex1004
Page 334

(12) UK Patent (19) GB (11) 2484146 (13) B

(45) Date of B Publication 13.02.2013

(54) Title of the Invention: A vacuum cleaner

(51) INT CL: ***A47L 5/24*** (2006.01)

(21) Application No: **1016563.7**

(22) Date of Filing: **01.10.2010**

(43) Date of A Publication **04.04.2012**

(56) Documents Cited:
GB 2466290 A **GB 2441962 A**
GB 2409404 A
USD298875

(58) Field of Search:
As for published application 2484146 A viz:
INT CL **A47L**
Other: **WPI, EPODOC**
updated as appropriate

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GB 2484146 B

01 12 11

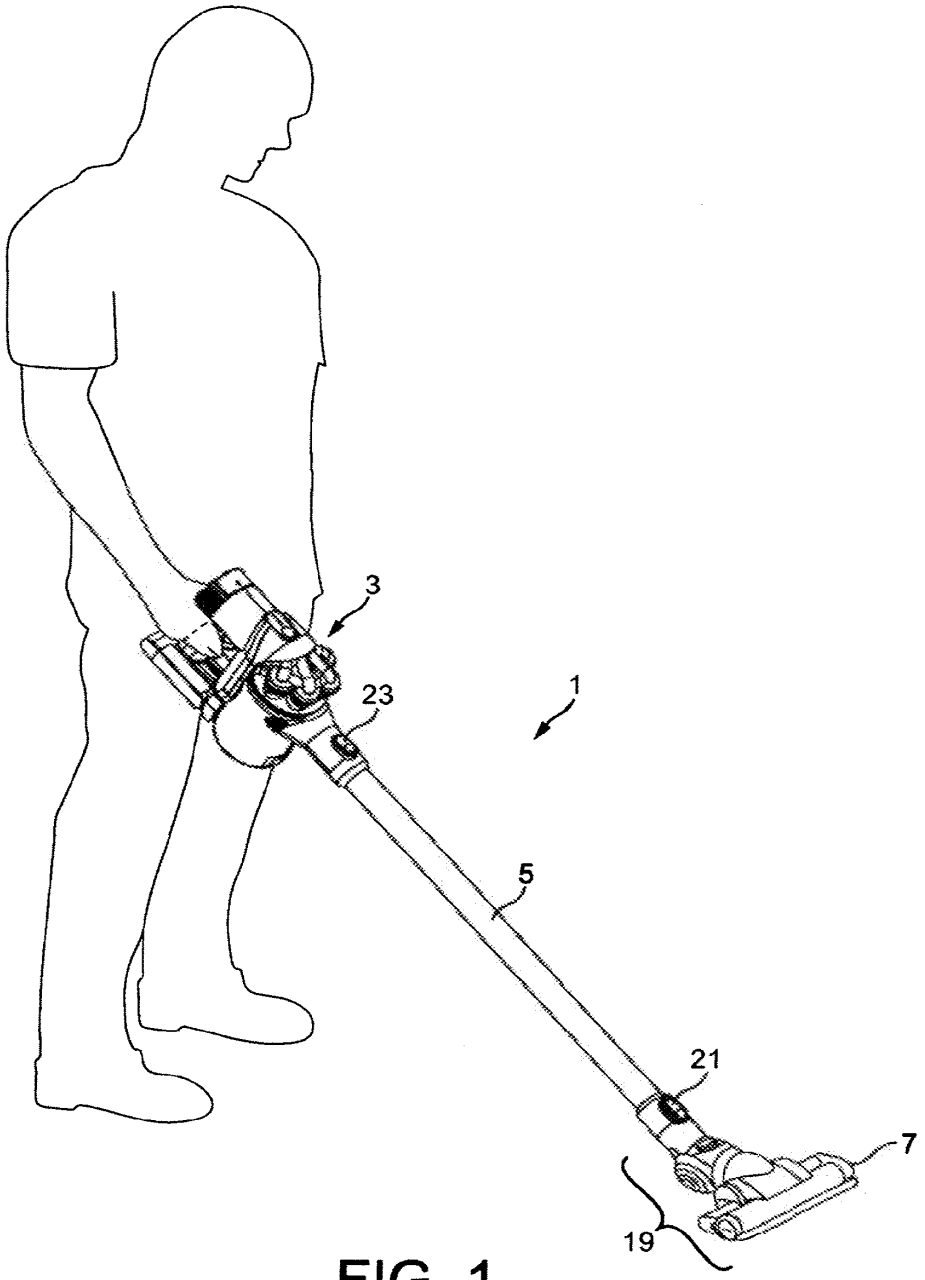


FIG. 1

01 12 11

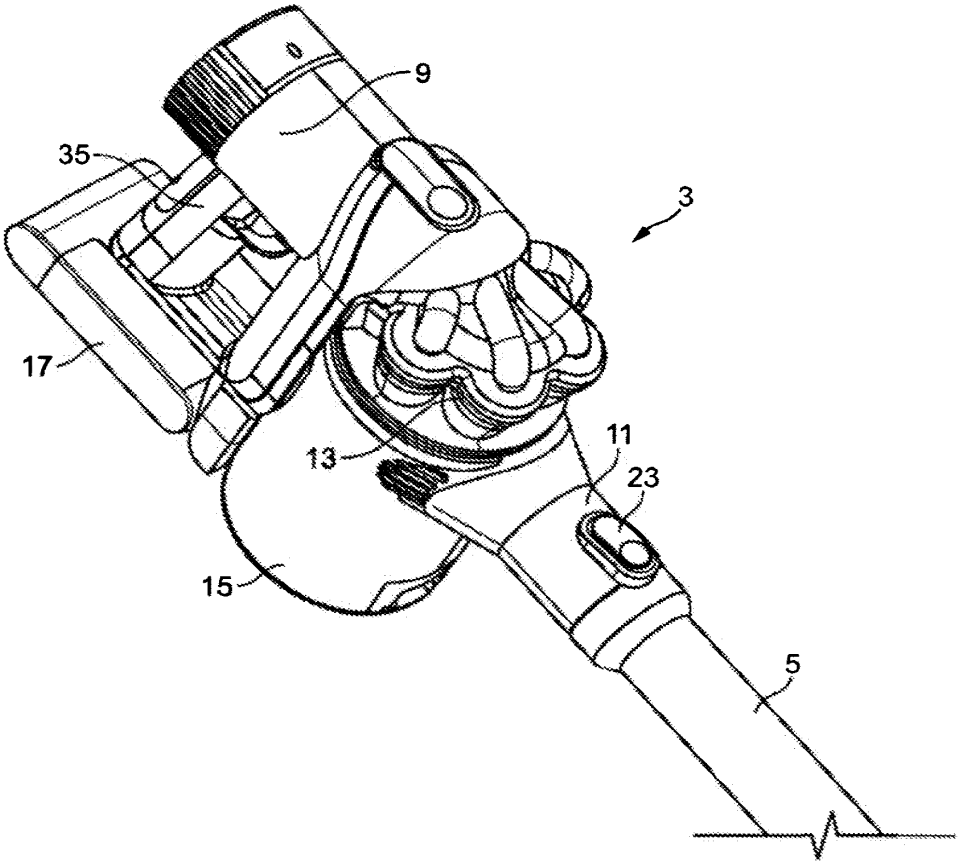


FIG. 2

01 12 11

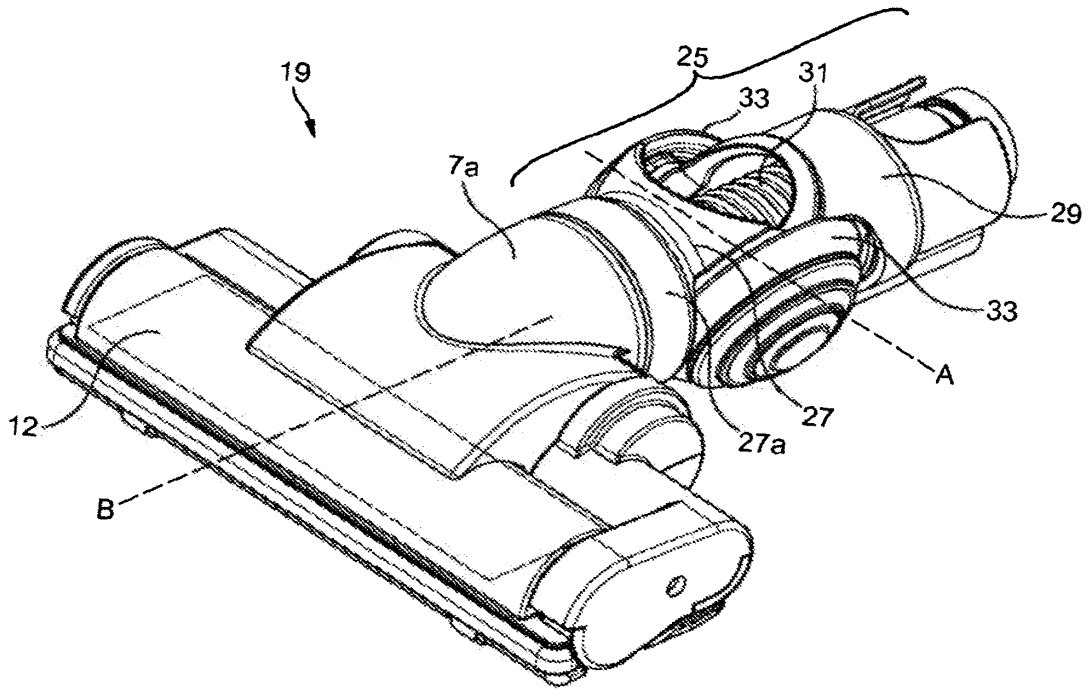


FIG. 3

01 12 11

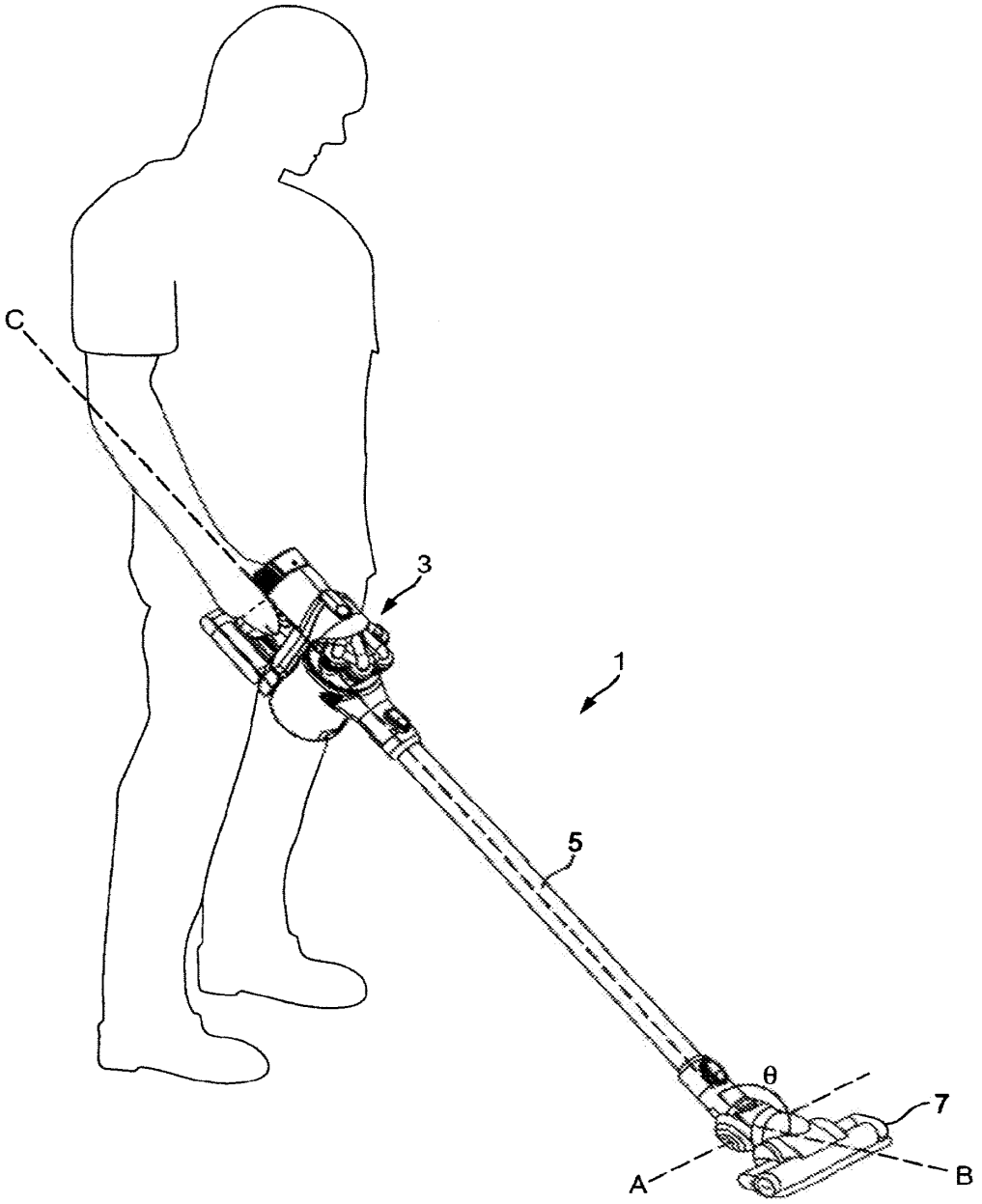


FIG. 4

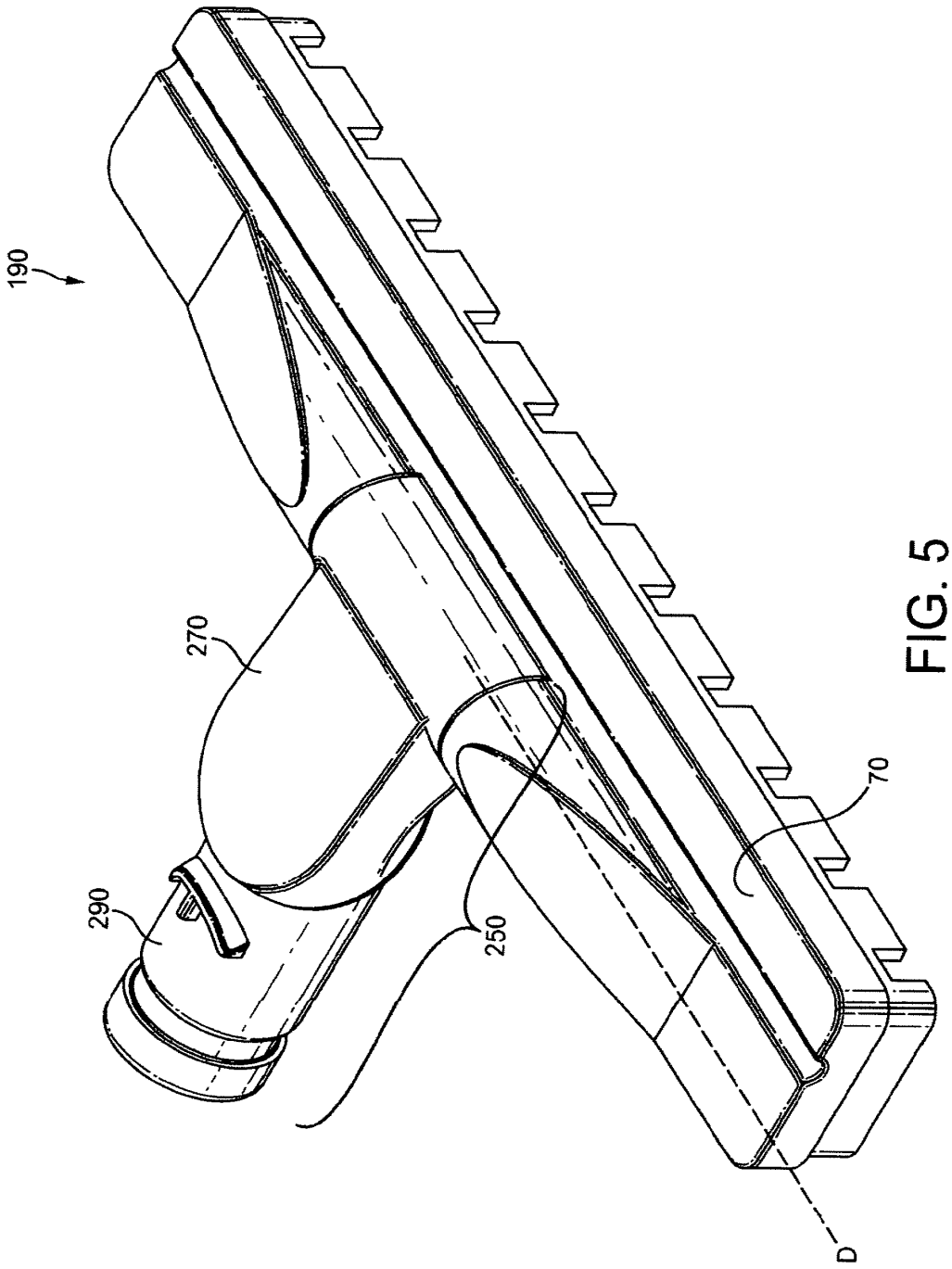


FIG. 5

01 12 11

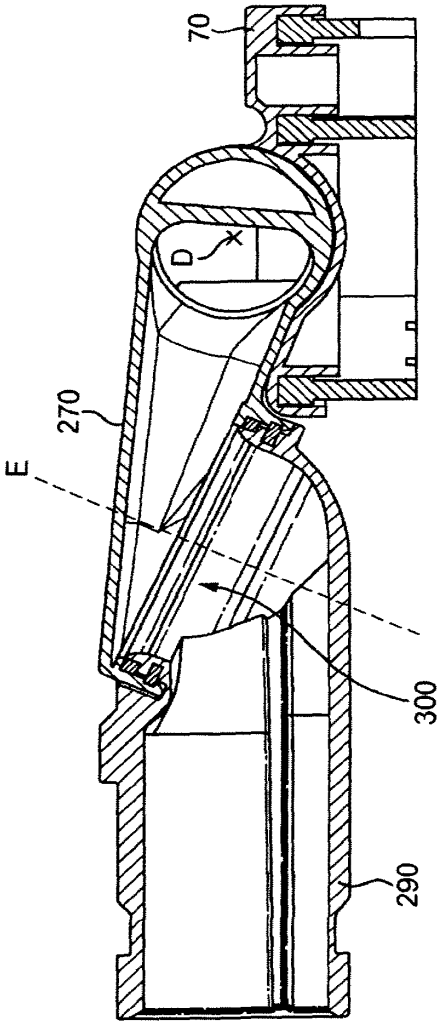


FIG. 6

01 12 11

A Vacuum Cleaner

The present invention relates to the field of vacuum cleaners, and more specifically to "stick-vac" type vacuum cleaners of the general type comprising a handheld vacuum cleaner which is attached to an elongate, rigid wand and which is fluidly connected to a cleaner head provided at the end of the wand.

Broadly speaking, there are four types of vacuum cleaner: "upright" vacuum cleaners, "cylinder" cleaners (also referred to as "canister" cleaners), "handheld" vacuum cleaners and "stick" vacuum cleaners, the latter being popularly referred to as "stick-vac" cleaners, or simply "stick-vacs".

Upright cleaners and cylinder cleaners are well known. They tend to be mains-operated and are used for relatively heavy-duty cleaning applications.

Handheld vacuum cleaners are relatively small, highly portable vacuum cleaners, best suited to relatively low duty applications such as spot cleaning floors and upholstery in the home, interior cleaning of cars and boats etc. Unlike upright cleaners and cylinder cleaners, they are designed to be carried in the hand during use, and tend to be battery-operated.

Stick-vac cleaners essentially offer a lightweight, functional alternative to upright cleaners for relatively low duty floor-cleaning applications, such as cleaning up floor spills.

Broadly speaking, there are two distinct types of stick-vac. The first type is, in a sense, an ultra slim-line upright cleaner, though usually "cordless" rather than mains-operated. An example of this type of stick-vac cleaner is shown in UK Patent Application No.

GB2377880A1, in this case additionally incorporating a removable, handheld vacuum-cleaner.

The second type of stick-vac cleaner is a spin-off from the handheld vacuum cleaner, and comprises a handheld vacuum cleaner in combination with a rigid, elongate suction wand which effectively reaches down to the floor so that the user may remain standing while cleaning a floor surface. A floor tool is typically fixedly attached to the end of the rigid, elongate suction wand, or alternatively may be integrated with the bottom end of the wand. Designs of this type of stick-vac cleaner are shown in USD298875, USD303173 and USD280033. In each case, the handheld suction unit incorporates the motor, the fan and some sort of separating apparatus, which may be a bag or a cyclonic separation system.

The present invention relates to stick vac cleaners of the second type. In the case of these stick vac cleaners, the wand and floor tool are typically conceived and marketed as low-cost accessories for a handheld vacuum cleaner, and as such the functionality of the cleaner in stick vac mode tends to be relatively poor compared to dedicated stick vac cleaners of the first type.

It is an object of the present invention to seek to provide an improved stick vac cleaner of the second general type described above.

According to the present invention there is provided a stick-vac cleaner comprising a handheld vacuum cleaner which is attached to an elongate, rigid wand and which is fluidly connected to a cleaner head provided at the end of the wand, wherein the cleaner head is connected to the wand via a mechanical steering couple for directionally steering the cleaner head in plane parallel contact with the floor as the wand is rotated about its axis.

By providing a mechanical steering couple between the wand and cleaner head according to the present invention, the manoeuvrability of the stick-vac cleaner is

greatly improved compared to conventional stick-vac cleaners of the second general type..

Any suitable mechanical steering couple may be used. In particular, the mechanical steering couple may be configured to constrain the wand and the cleaner head for co-rotation about the wand axis whilst permitting relative rotation of the wand and cleaner head about an axis which is non-parallel to the wand axis. This type of steering couple can be implemented relatively cheaply, whilst still providing a high degree of manoeuvrability for the cleaner.

The wand and the cleaner head may be coupled for relative rotation along a rotatable scarf joint or via an elbow joint. The use of a scarf joint is considered to be particularly advantageous, in that it provides a mechanical turning advantage for the cleaner head during steering.

The wand may be hingedly connected to the cleaner head passively for varying the lie angle between the wand and the cleaner head. A variable lie angle helps maintain the cleaner head in contact with the floor across a relatively wide range of turning angles during steering of the cleaner head. Here, the term "lie angle" is somewhat analogous to the lie angle between the sole of a golf club head and the shaft of the club.

In the case where the wand and cleaner head are coupled by an elbow joint, this elbow joint may be a hinged elbow joint for varying the lie angle between the cleaner head and the wand.

The dust-laden air may be ducted to the handheld vacuum cleaning unit through the wand. The wand thus advantageously serves the dual purpose of fluidly connecting the cleaner head to the hand held vacuum cleaner whilst also transmitting steering torque to the cleaner head.

The handheld vacuum cleaner may comprise a pistol grip handle. The provision of a pistol grip handle on the handheld vacuum cleaner is considered to be particularly advantageous in a stick-vac cleaner according to the present invention, because it tends to align a user's forearm with the wand (the wand being analogous to the barrel of a pistol). Consequently, steering of the cleaner can be controlled primarily through supination and pronation of the forearm, which is comfortable and natural for the user.

A pistol grip handle also provides good leverage for effective transmission of steering torque between the handle and the cleaner head (via the wand), and in particular reduces the tendency for a user's hand to roll "over the top" of the handle as the handle is rotated to steer the cleaner head. The provision of a straight pistol grip which extends perpendicular to the wand is considered to be particularly beneficial in this regard.

The provision of a pistol grip handle does not make it essential to use a trigger, though use of a trigger may of course be convenient, for example to switch the handheld cleaner on and off.

The handheld vacuum cleaner will comprise some form of motor, which will be a relatively heavy component in the handheld vacuum cleaner. Advantageously, this motor may be positioned at or near the upper end of the pistol grip, so that the weight of the motor may be supported more comfortably on top of the user's hand.

The handheld vacuum cleaner may incorporate a cyclonic separation system, in which case the wand may be axially aligned with a tangential inlet to the cyclonic separation system. The dirty air thus feeds directly into the cyclonic separation system along the preferred inlet axis. This reduces "discontinuity" pressure losses between the wand and the separation system, which is particularly advantageous in the present case because of the relatively high pressure drop across the ends of the (relatively long) wand.

Embodiments of the invention will now be described, with reference to the accompanying drawings, in which:

Figure 1 is a perspective view showing a stick vac cleaner in use;

Figure 2 is a close-up perspective view of part of the stick-vac cleaner in Figure 1;

Figure 3 is a perspective view of a floor tool forming part of the stick-vac cleaner shown in Figure 1;

Figure 4 is a view corresponding to Figure 1, but illustrating various operational axes of rotation associated with steering the stick-vac cleaner across the floor;

Figure 5 is a perspective view showing an alternative floor tool which may form part of a stick vac cleaner in accordance with the invention; and

Figure 6 is a cross-sectional side view of the tool shown in Figure 5.

Figure 1 shows a stick-vac cleaner 1 in use, comprising a handheld vacuum cleaner 3 which is carried in the hand, an elongate wand 5 attached to the handheld cleaner 3 and which reaches down to the floor and a cleaner head 7 provided at the end of the wand 5, which makes contact with the floor (the floor itself, though implicit, is not explicitly shown in Figure 1).

Referring to Figure 2, the handheld vacuum cleaner 3 comprises a motor-driven fan which is arranged inside a motor casing 9 for drawing air in through a suction nozzle 11 positioned at the front of the hand held vacuum cleaner 3. The elongate wand 5 is connected to the suction nozzle 11, and the cleaner head 7 is in turn connected to the lower end of the wand 5. In use, dirty air is drawn in through a suction opening 12 (Figure 3) on the underside of the cleaner head 7 and is ducted to the suction nozzle 11 on the handheld vacuum cleaner 3, through the wand 5.

Dirty air entering the suction nozzle 11 passes through a cyclonic separation system 13, where dirt is separated from the air, before the relatively clean air is then exhausted back to atmosphere via one or more fine-particulate filters (not visible). The dirt which is separated from the airflow inside the cyclonic separating system 13 is collected in a bin 15 for disposal. The hand held vacuum cleaner 3 is powered by a multi-cell rechargeable battery which is housed in a battery pack 17.

The cleaner head 7 forms part of a floor tool 19 which is detachable from the wand 5 by means of a catch 21. The wand 5 is in turn detachable from the handheld cleaner 3 by means of a catch 23. The handheld cleaner 3 can thus be used in isolation as a stand-alone handheld vacuum cleaner by detaching the wand 5 or, alternatively, the handheld vacuum cleaner 3 and wand 5 can be used in combination as a "long reach" handheld vacuum cleaner by detaching the floor tool 19. The use of a detachable floor tool is not essential: for example, the cleaner head 7 may be permanently secured to the wand 5.

The floor tool 19 is shown in more detail in Figure 3, detached from the wand 5.

The floor tool 19 comprises an articulated neck portion 25 which acts as a mechanical steering couple between the wand 5 and the cleaner head 7.

The neck portion 25 comprises a front part 27, the front end of which is connected to the cleaner head 7, and a rear part 29, the rear end of which incorporates the catch 21 for detachable connection to the wand 5. The front part 27 is pivotally connected to the rear part 29, so that the front an rear parts 27, 29 are constrained for relative movement about an axis A. The front and rear parts 27, 29 thus effectively form a hinged elbow joint which allows for variation in the lie angle θ between the cleaner head 7 and wand 5 when the floor tool is connected to the wand 5 (see Figure 4). Thus, the lie angle is adaptable to suit the height of the particular user and, in use, the cleaner can be moved into a lower profile orientation, as desired, for example to clean underneath a bed.

A flexible duct in the form of a hose 31 extends through the articulated neck portion 25. The hose 31 flexibly connects the cleaner head 7 to the end of the wand 5 in use so as not to hinder articulation of the neck portion 25 about the axis A.

The front end of the front part 27 is shaped as a cylindrical collar 27a. This cylindrical collar 27a is connected to the cylindrical end of a rear outlet duct 7a on the cleaner head 7 by a conventional circlip or snap ring arrangement (not visible in Figure 3) which constrains the cleaner head 7 and front part 27 for relative rotation about the axis B of the cylindrical collar 27a. A conventional gasket arrangement (not shown) can be used to form a compression seal between the cleaner head 7 and the neck portion 25; this seal should preferably be a low-friction seal (for example using a PTFE-coated gasket), so as not to hinder free rotation of the cleaner head 7 relative to the neck portion 25.

The neck portion 25 functions as a steering couple by constraining the cleaner head 7 and wand 5 for co-rotation about the wand axis C, whilst nevertheless permitting relative rotation of the cleaner head 7 and the front part 27 about the axis B, which in use is non-parallel to the axis C (see Figure 4). Accordingly, steering of the cleaner head 7 can be controlled by rotating the wand 5 about the wand axis C to direct the cleaner head 7 in the desired direction. As the wand rotates about the axis C, co-rotation of the cleaner head 7 with the wand 5 and relative rotation of the collar 8 and rear outlet duct 7a combine to turn the cleaner head 7 in plane parallel contact with the floor, so that the cleaner head 7 does not bank about the axis B as it turns. Hinging movement of the wand 5 and cleaner head 7 about axis A may also help to maintain the cleaner head 7 in plane parallel contact with the floor, particularly for large turning angles, though this hinging movement is not considered essential to obtain the benefit of directional steering.

A pair of domed wheels 33 is provided on the front part 27. The domed wheels 33 are mounted on stub axles (not visible) either side of the neck portion 25. These stub axles are each angled downwardly to set the respective wheel at a corresponding fixed, positive camber angle. This camber angle is the same for each of the wheels 33, so that

the wheels form a "V" when viewed from the front. As the wand 5 is rotated about the wand axis C, the dome-shaped wheels 33 bank accordingly to maintain rolling contact with the floor. The dome-shaped wheels 33 are thus better able to track through the turn than conventional "flat-sided" wheels.

The handheld vacuum cleaner 3 is provided with a pistol grip handle 35 (see Figure 2), which tends to position a user's forearm parallel to the wand 5. Consequently, steering of the cleaner 1 can be controlled primarily through supination and pronation of the forearm, and is therefore natural and comfortable for the user. A pistol grip also provides good leverage for effective transmission of steering torque from the handle 35 to the cleaner head 7 (via the wand 5 and neck portion 25), and in particular reduces the tendency for a user's hand to roll "over the top" of the handle as the handle is rotated to steer the cleaner head 7.

The motor casing 9 is provided at the upper end of the pistol grip handle 35. Consequently, the weight of the motor inside the motor casing 9 is comfortably supported on top of a user's hand during use of the cleaner 1.

Figure 5 shows an alternative floor tool 190 which may be connected to the wand 5 in accordance with the invention to provide a mechanical steering couple between the wand 5 and a cleaner head.

The floor tool comprises an articulated neck portion 250 which incorporates a front duct part 270 and a rear duct part 290. The front duct part 270 is fluidly connected to a cleaner head 70. The rear duct part 290 is configured to push fit onto the wand 5 (the end of the wand may need to be modified accordingly to accommodate the push fit).

The front duct part 270 is pivotally connected to the cleaner head 70 so that the front part 270 and cleaner head 70 are constrained for rotation about an axis D. This allows for variation of the lie angle between the wand 5 and the cleaner head 70 in use.

The front duct part 270 is connected to the rear duct part 290 by a rotatable scarf joint 300, which constrains the front duct part 270 and rear duct part 290 for rotation about an axis E, non-parallel with the longitudinal axis of the rear duct part 290.

The front duct part 270 and rear duct part 290 together form an air duct for fluidly connecting the cleaner head 70 to the wand 5 in use.

The neck portion 250 acts as a mechanical steering couple between the wand 5 and the cleaner head 70 in similar manner to the neck portion 25. Thus, the neck portion 250 is arranged to constrain the wand 5 and cleaner head 70 for co-rotation about the wand axis C whilst, nevertheless, permitting relative rotation of the wand 5 and cleaner head 70 about the axis E. Accordingly, as the wand 5 is rotated about the wand axis C, co-rotation of the cleaner head 7 with the wand 5 combines with relative rotation of the front part 270 and rear part 290 to turn the cleaner head 7 in plane parallel contact with the floor.

The axis E is non-parallel with the floor, so that relative rotation of the front and rear parts 17, 19 about the axis E involves both a horizontal and vertical component (cf. relative rotation about the axis B in Figure 4, which is solely in a vertical plane). Consequently, relative rotation of the front part 270 and rear part 290 not only counteracts undesirable banking of the cleaner head during steering, but also provides an associated mechanical advantage in turning the cleaner head 70 left or right, further improving manoeuvrability.

Air drawn in through the suction opening on the cleaner head need not be ducted through the wand. For example, the air may be ducted through a flexible hose running alongside the wand; in this arrangement, the wand would nevertheless couple to the cleaner head in similar manner for providing the necessary directional steering capability, so the wand would still physically connect the cleaner head to the handheld vacuum cleaner, but the wand itself need not be hollow.

A stick-vac cleaner according to the present invention, examples of which have been described, is considered to offer significantly better manoeuvrability than existing "stick- vacs" of the same general type, bringing the functionality of this type of stick-vac more into line with the stick-vac cleaners of the first general type described above.

CLAIMS

1. A stick-vac cleaner comprising a handheld vacuum cleaner which is attached to an elongate, rigid wand and which is fluidly connected to a cleaner head provided at the end of the wand, wherein the cleaner head is connected to the wand via a mechanical steering couple for directionally steering the cleaner head in plane parallel contact with the floor as the wand is rotated about its axis.

2. A stick-vac cleaner according to claim 1, wherein, in use, the mechanical steering couple constrains the wand and the cleaner head for co-rotation about the wand axis whilst permitting relative rotation of the wand and cleaner head about an axis which is non-parallel to the wand axis.

3. A stick-vac cleaner according to any preceding claim, in which the cleaner head and wand are coupled for relative rotation along a scarf joint or via an elbow joint.

4. A stick-vac cleaner according to any preceding claim, in which the wand is hingedly connected to the cleaner head for varying the lie angle between the wand and the cleaner head.

5. A stick vac cleaner according to claim 3, wherein the elbow joint is a hinged elbow joint for varying the lie angle between the cleaner head and the wand.

6. A stick-vac cleaner according to any preceding claim, wherein the handheld vacuum cleaner comprises a pistol grip handle.

7. A stick-vac cleaner according to claim 6, wherein the pistol grip handle is substantially straight.

8. A stick-vac cleaner according to claim 6 or 7, wherein the pistol grip handle extends substantially perpendicular to the wand.

03 12 12

9. A stick-vac cleaner according to any of claims 6 to 8, wherein the handheld vacuum cleaner comprises a motor which is positioned at or near the upper end of the pistol grip handle.

10. A vacuum cleaner according to claim any preceding claim, wherein the handheld vacuum cleaning unit incorporates a cyclonic separation system.

11. A vacuum cleaner according to claim 10, wherein the wand is axially aligned with a tangential inlet to the cyclonic separation system.

12. A stick-vac cleaner according to any preceding claim, wherein the wand fluidly connects the handheld vacuum cleaner to the cleaner head.

03 12 12

OFFICE FOR HARMONIZATION IN THE INTERNAL MARKET
(TRADE MARKS AND DESIGNS)

Trade Marks and Register Department

Alicante, 06/10/2010

Aktiebolaget Electrolux
Magnus Laurin
S:t Göransgatan 143
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SUECIA

Certificate of Registration[1]

Registration No.:	**000915269**
Your reference:	P-12449
Applicant:	Aktiebolaget Electrolux S:t Göransgatan 143 SE-105 45 Stockholm SUECIA

Please find enclosed the certificate of registration for Community Design no. 000915269-0001 which was published in the Community Designs Bulletin no. 2010/226 on 06/10/2010 (see OHIM's website: http://oami.europa.eu).

This certificate contains information from the Community Designs Register at the date of entry into the Register (see code 15 on the certificate). If you have filed a request for modification of data on or after that date, no new certificate will be issued. You will be notified separately of the change after which an extract from our database may be requested to reflect the administrative status of the design.

For an explanation of the codes on the certificate please see consult the Vademecum on OHIM's website: http://oami.europa.eu/pdf/design/vademecum-rcd-en.pdf.

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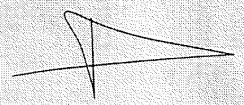
Catherine DOBSON

[1] in accordance with Article 17(1) of Commission Regulation (EC) No 2245/02 of 21 October 2002 implementing Council Regulation (EC) No 6/02 on the Community design (http://oami.europa.eu)

Registrerade / Registered 10/04/2008

No 000915269-0001

Ordförande / The President



Wubbo de Boer

KHIM - KONTORET FÖR HARMONISERING I DEN INRE MARKNADEN
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REGISTRERINGSBEVIS

Registreringsbevis utfärdas för nedan angivna, registrerade Gemenskapsformgivning. Motsvarande registerposter har registrerats i Registret för Gemenskapsformgivning.

OHIM – OFFICE FOR HARMONIZATION IN THE INTERNAL MARKET
TRADE MARKS AND DESIGNS

CERTIFICATE OF REGISTRATION

This Certificate of Registration is hereby issued for the Registered Community Design identified below. The corresponding entries have been recorded in the Register of Community Designs.

21 000915269-0001
25 SV - EN
22 10/04/2008
15 10/04/2008
45 06/10/2010
11 000915269-0001
46 06/10/2010
72 Oskar Fjellman
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74 Aktiebolaget Electrolux
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SUECIA
51 15 - 05
54 BG - Прахосмукачки (Част от -)

ES - Aspiradores de polvo (parte de -)

CS - Vysavače (část -)

DA - Støvsugere (del af -)

DE - Staubsauger (Teil von -)

ET - Tolmuimejad (osa -)

EL - Ηλεκτρικές σκούπες (τμήματά τους -)

EN - Vacuum cleaners (part of -)

FR - Aspirateur (partie de -)

IT - Aspirapolvere (parte di -)

LV - Putekļu sūcēji (- daļa)

LT - Dulkių siurbliai (dalis -)

HU - Porszívók (...része)

MT - Vacuum cleaners (parti minn -)

NL - Stofzuigers (deel van -)

PL - Odkurzacze (część -)

PT - Aspiradores de pó (parte de -)

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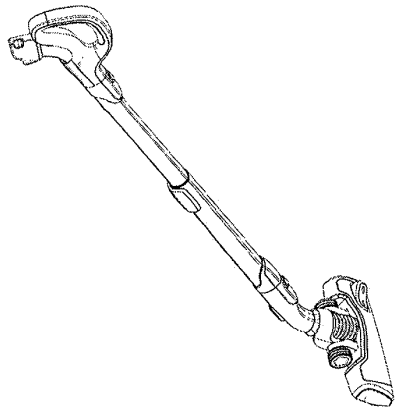
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SL - Vakuumski sesalci (del -)

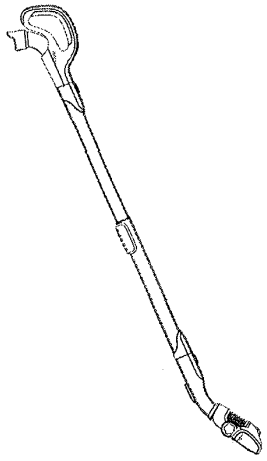
FI - Pölynimurit (osa -)

SV - Dammsugare (del av -)

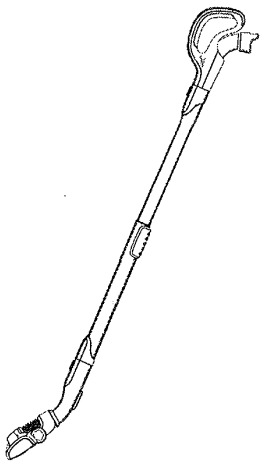
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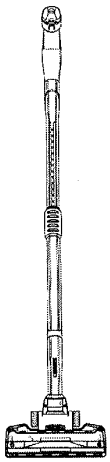
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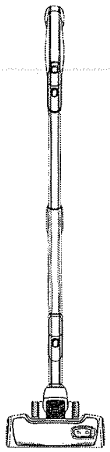
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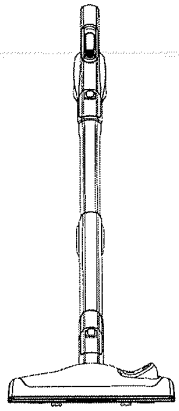
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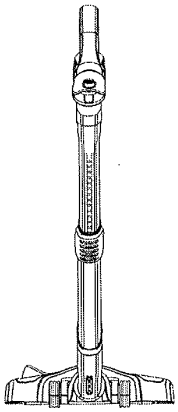
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Japan Patent Office

Issued 26 May 1986

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C3-410 D

679806 Design Application: 58-54734

Application date: 21 December 1983
Registered: 28 February 1986

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Attorney: NORICHIKA Kensuke, Patent Attorney, and one other
Examiner: MAEKAWA Yukihiko

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details.

Front view

Back view

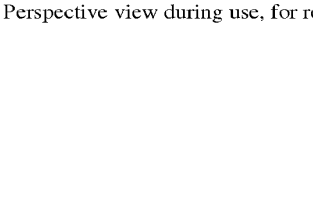
Plan view

Bottom view

Left side view

Right side view

Perspective view



Perspective view during use, for reference

日本国特許庁

昭和61年(1986)5月26日発行　意匠公報（S）　C 3-410 D

679806

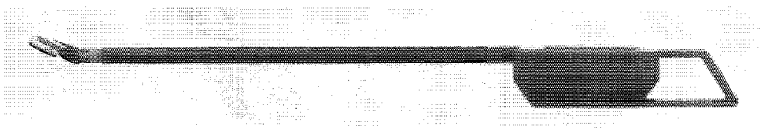
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登録 昭61(1986)2月28日

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意匠に係る物品　電気掃除機

この意匠は図面代用写真によって表わされたものであるから細部については原本を参照されたい

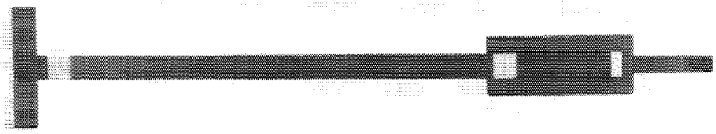
正面図



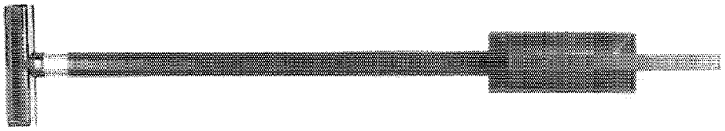
背面図



平面図

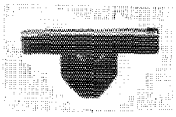


底面図

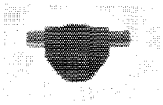


Dyson Ex1004
Page 361

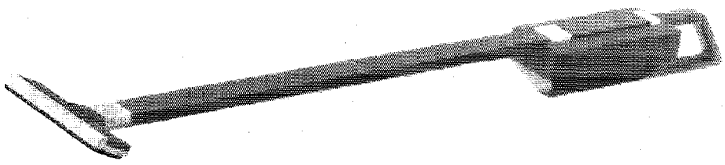
左側面図



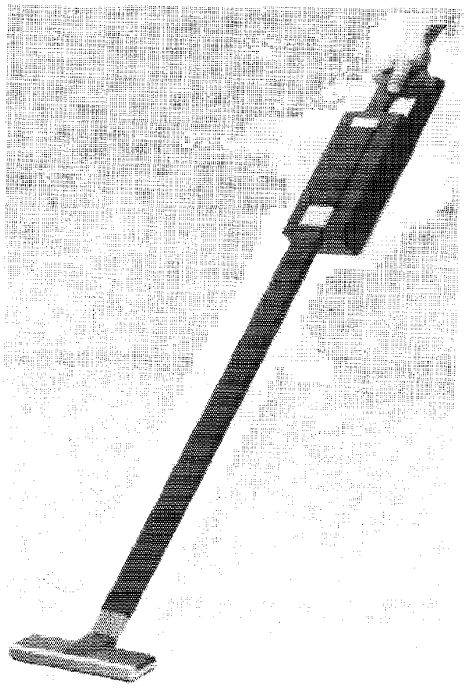
右側面図



斜視図



使用状態の参考斜視図



Dyson Ex1004
Page 362

Japan Patent Office

Issued 29 February 1988

Design Gazette (S)

C3-410 E

725983 Design Application: 60-17718

Application date: 30 April 1985
Registered: 17 November 1987

Designer: MIYAMOTO Isshin, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Designer: NAGAMATSU Yasuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Designer: TANAKA Yasuhiko, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Designer: SAKAMOTO Masaharu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Designer: HIDAKA Masataka, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Designer: SAKAMOTO Hideaki, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Attorney: NAKAO Toshio, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details.

Front view

Back view

725983			(2)		C3-410 E
	Left side view	Plan view	Bottom view	Right side view	Perspective view

日本国特許庁

昭和63年(1988)2月29日発行　意匠公報（S）　C3-410 E

725983

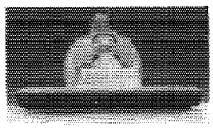
意願 昭60－17718　出願 昭60(1985)4月30日
登録 昭62(1987)11月17日

創作者　宮本一伸　大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者　長松康男　大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者　田中康彦　大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者　坂本雅春　大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者　日高正隆　大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者　坂本英明　大阪府門真市大字門真1006番地　松下電器産業株式会社内
意匠権者　松下電器産業株式会社　大阪府門真市大字門真1006番地
代理人　弁理士 中尾敏男　外1名
審査官　鍋田和宣

意匠に係る物品　電気掃除機

この意匠は図面代用写真によつて表わされたものであるから細部については原本を参照されたい

正面図

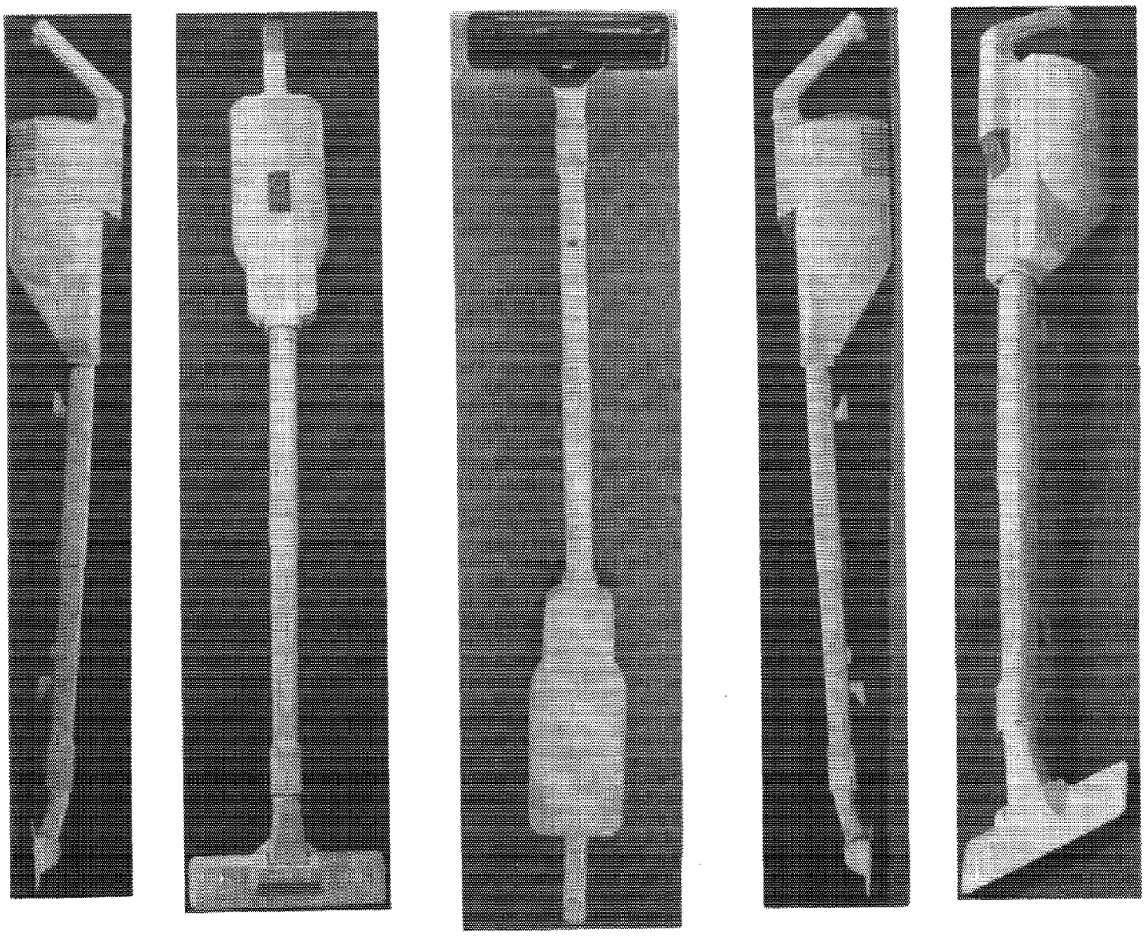


背面図



Dyson Ex1004
Page 365

左側面図 平 面 図 底 面 図 右側面図 斜 視 図



Dyson Ex1004
Page 366

Japan Patent Office

Issued 16 September 1988

Design Gazette (S)

C3-410 E

743619 Design Application: S61-15496

Application date: 24 April 1986
Registered: 10 June 1988

Designer: MIYAMOTO Isshin, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: NAGAMATSU Yasuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: TANAKA Yasuhiko, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: SAKAMOTO Masaharu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: HIDAKA Masataka, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Designer: SAKAMOTO Hideaki, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka
Attorney: NAKAO Toshio, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details

Front view



Back view



743619 (2) C3-410 E

Left side view Plan view Bottom view Perspective view Right side view

日本国特許庁

昭和63年(1988)9月16日発行　**意匠公報**（S）

C3-410 E

743619　　意願 昭61－15496　　出願 昭61(1986)4月24日
登録 昭63(1988)6月10日

創作者	宮本一伸	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	長松康男	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	田中康彦	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	坂本雅春	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	日高正隆	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	坂本英明	大阪府門真市大字門真1006番地　松下電器産業株式会社内
意匠権者	松下電器産業株式会社	大阪府門真市大字門真1006番地
代理人	弁理士 中尾敏男	外1名
審査官	鍋田和宣	

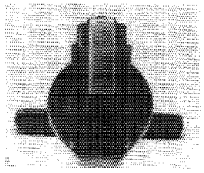
意匠に係る物品　電気掃除機

この意匠は図面代用写真によつて表わされたものであるから細部については原本を参照されたい

正面図

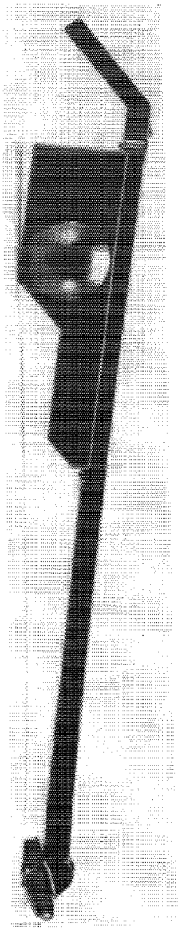


背面図

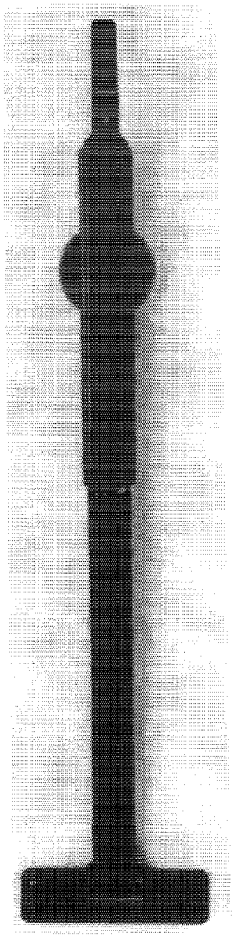


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Page 369

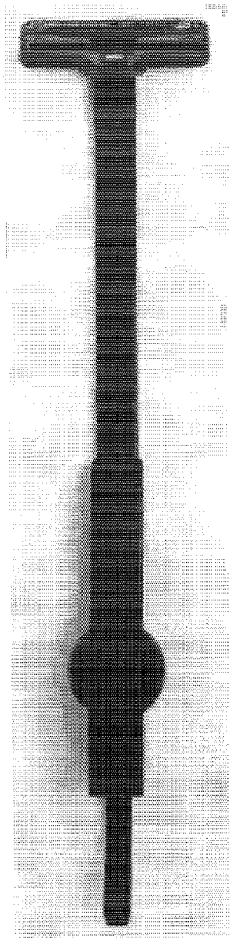
左側面図



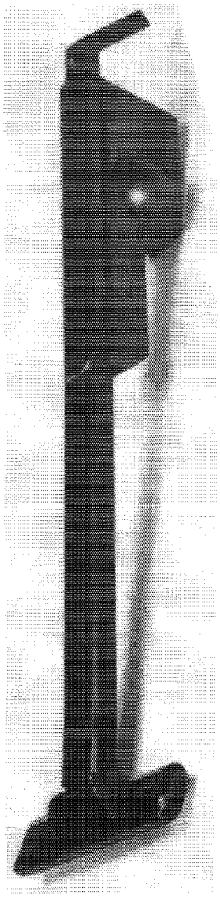
平 面 図



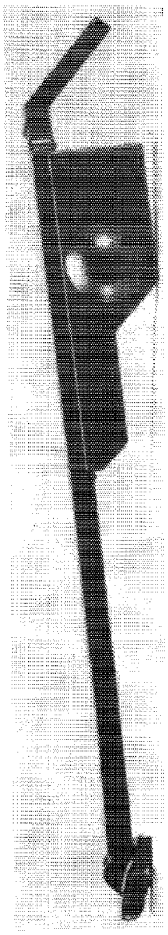
底 面 図



斜 視 図



右側面図



Dyson Ex1004
Page 370

Japan Patent Office

Issued 1 March 1988

Design Gazette (S)

C3-410 E

726042 Design Application: 60-34628

Application date: 13 August 1985
Registered: 17 November 1987

Designer: MIYAMOTO Isshin, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Designer: NAGAMATSU Yasuo, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Designer: TANAKA Yasuhiko, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Designer: SAKAMOTO Masaharu, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Designer: HIDAKA Masataka, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Designer: SAKAMOTO Hideaki, Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

Design right holder: Matsushita Electrical Industrial Co. Ltd, 1006 Oaza Kadoma, Kadoma-shi, Osaka-fu

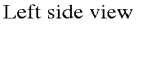
Attorney: NAKAO Toshio, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner
Since this design is shown by photographs in place of drawings, please refer to the original for details.

Front view

Back view

Left side view



Right side view

72604 2 (2) C3-410 E

Plan view Bottom view Perspective view

日本国特許庁

昭和63年(1988)3月1日発行　**意匠公報**　(S)

C3-410 E

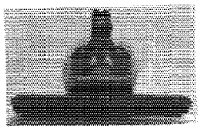
726042　　意願 昭60－34628　　出願 昭60(1985)8月13日
登録 昭62(1987)11月17日

創作者	宮本一伸	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	長松康男	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	田中康彦	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	坂本雅春	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	日高正隆	大阪府門真市大字門真1006番地　松下電器産業株式会社内
創作者	坂本英明	大阪府門真市大字門真1006番地　松下電器産業株式会社内
意匠権者	松下電器産業株式会社	大阪府門真市大字門真1006番地
代理人	弁理士 中尾敏男	外1名
審査官	鍋田和宣	

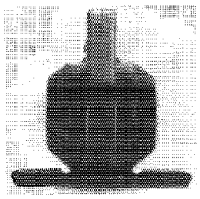
意匠に係る物品　電気掃除機

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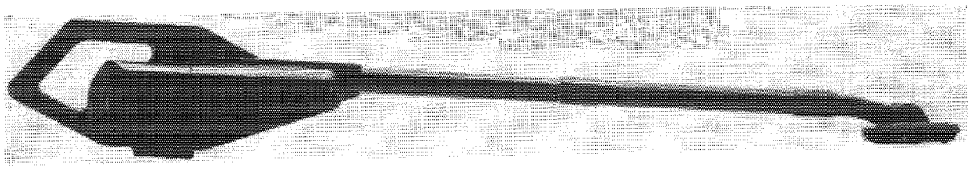
正面図



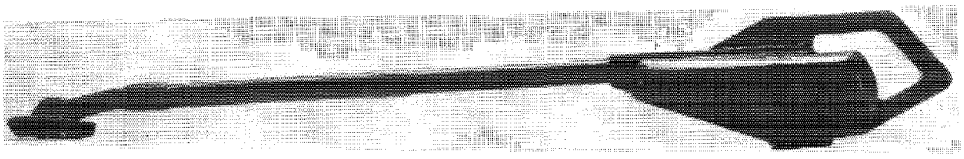
背面図



左側面図

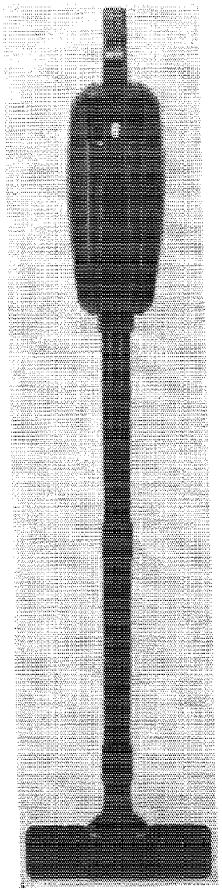


右側面図

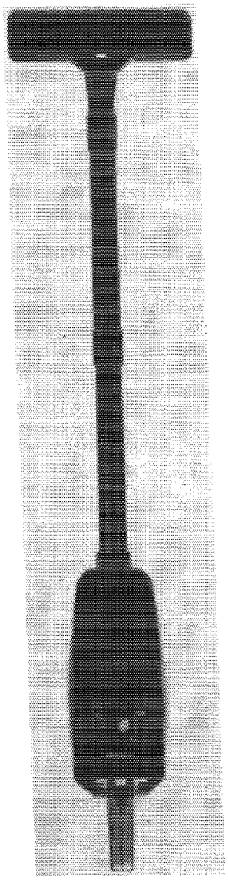


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Page 373

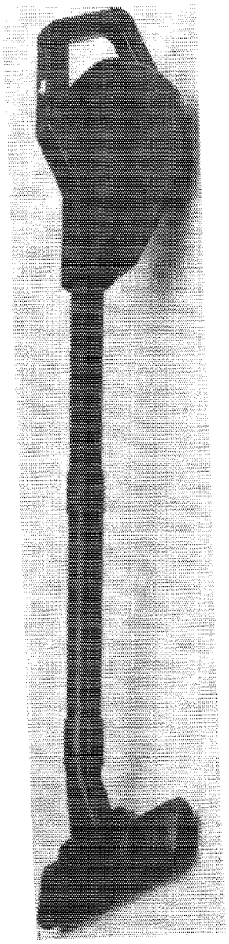
平 面 図



底 面 図



斜 視 図



Dyson Ex1004
Page 374

Japan Patent Office

Issued 12 September 1988

Design Gazette (S)

C3-410 E

743059 Design Application: S61-15719

Application date: 28 April 1986
Registered: 10 June 1988

Designer: KAMESHIRO Mikio, Toshiba Corporation Head Office, 1-1-1Shibaura, Minato-ku, Tokyo

Designer: SHIGEMURA Atsushi, Head Office, Tokyo Electric Industry Co. Ltd., 1-14-10 Uchikanda, Chiyoda-ku, Tokyo

Design right holder: Toshiba Corporation, 72 Horikawa-cho, Saiwai-ku, Kawasaki, Kanagawa

Design right holder: Tokyo Electric Industry Co. Ltd., 2-6-13 Nakameguro, Meguro-ku, Tokyo

Attorney: NORICHIKA Kensuke, Patent Attorney, and one other
Examiner: NABEDA Kazunori

Designed product: Vacuum cleaner

Since this design is shown by photographs in place of drawings, please refer to the original for details.

Front view

Back view

Plan view

Bottom view

743059 (2) C3-410 E

Left side view

Right side view

Perspective view

日本国特許庁

昭和63年(1988)9月12日発行　**意匠公報**　(S)

C3-410 E

743059

意願 昭61－15719

出願 昭61(1986)4月28日

登録 昭63(1988)6月10日

創作者　亀城幹雄　東京都港区芝浦1丁目1番1号　株式会社東芝本社事務所内

創作者　茂村篤　東京都千代田区内神田1－14－10　東京電気株式会社本社事務所内

意匠権者　株式会社東芝　神奈川県川崎市幸区堀川町72番地

意匠権者　東京電気株式会社　東京都目黒区中目黒2丁目6番13号

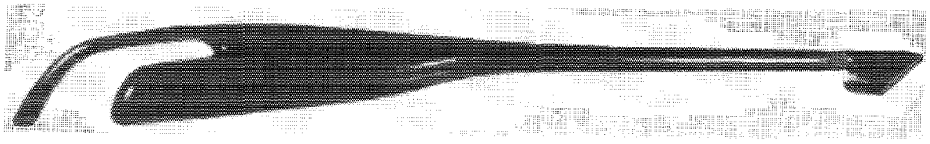
代理人　弁理士　則近憲佑　外1名

審査官　鍋田和宣

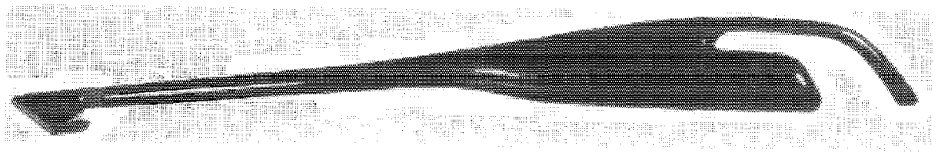
意匠に係る物品　電気掃除機

この意匠は図面代用写真によつて表わされたものであるから細部については原本を参照されたい

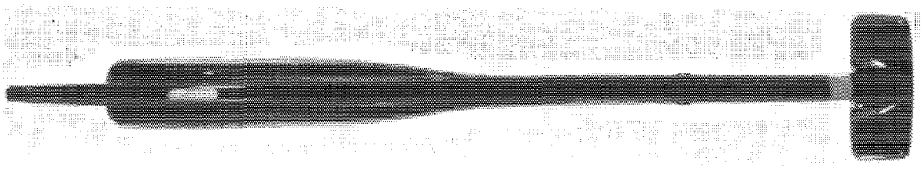
正面図



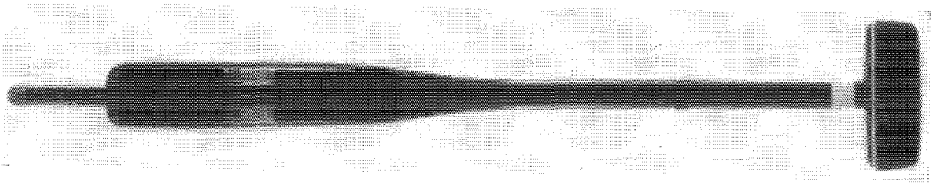
背面図



平面図

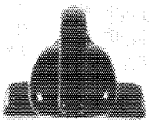


底面図

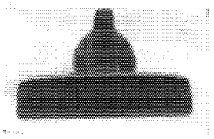


Dyson Ex1004
Page 377

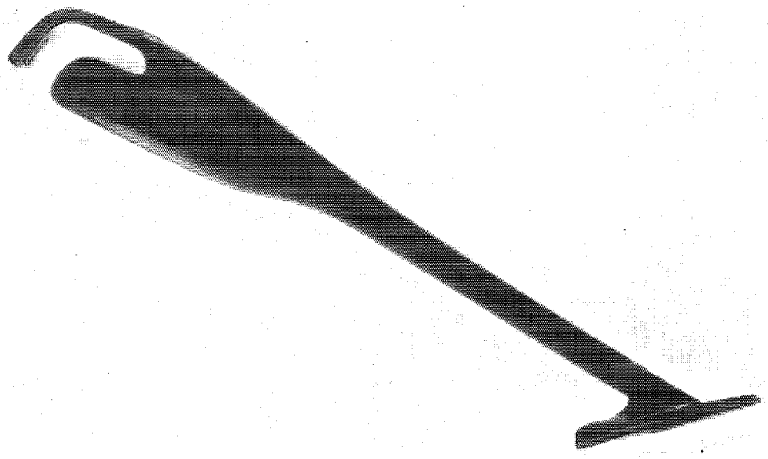
左側面図



右側面図



斜 視 図



Dyson Ex1004
Page 378

(12) UK Patent (19) GB (11) 2478614 (13) B

(45) Date of B Publication 29.02.2012

(54) Title of the Invention: A vacuum cleaner arrangement

(51) INT CL: ***A47L 5/24*** (2006.01) ***A47L 9/00*** (2006.01)

(21) Application No: **1014423.6**

(22) Date of Filing: **31.08.2010**

(30) Priority Data:
(31) **1004149.9** (32) **12.03.2010** (33) **GB**

(43) Date of A Publication **14.09.2011**

(56) Documents Cited:
GB 2441962 A **JP 010015020 A**
US 5035024 A

(58) Field of Search:
As for published application 2478614 A viz:
INT CL **A47L**
Other: **WPI, EPODOC**
updated as appropriate

(72) Inventor(s):
James Dyson
Timothy Nicholas Stickney
Peter David Gammack
Michael John Cox

(73) Proprietor(s):
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Tetbury Hill, MALMESBURY, Wiltshire, SN16 0RP, United Kingdom

(74) Agent and/or Address for Service:
Dyson Technology Limited
Intellectual Property Department, Tetbury Hill, MALMESBURY, Wiltshire, SN16 0RP, United Kingdom

GB 2478614 B

03 02 11

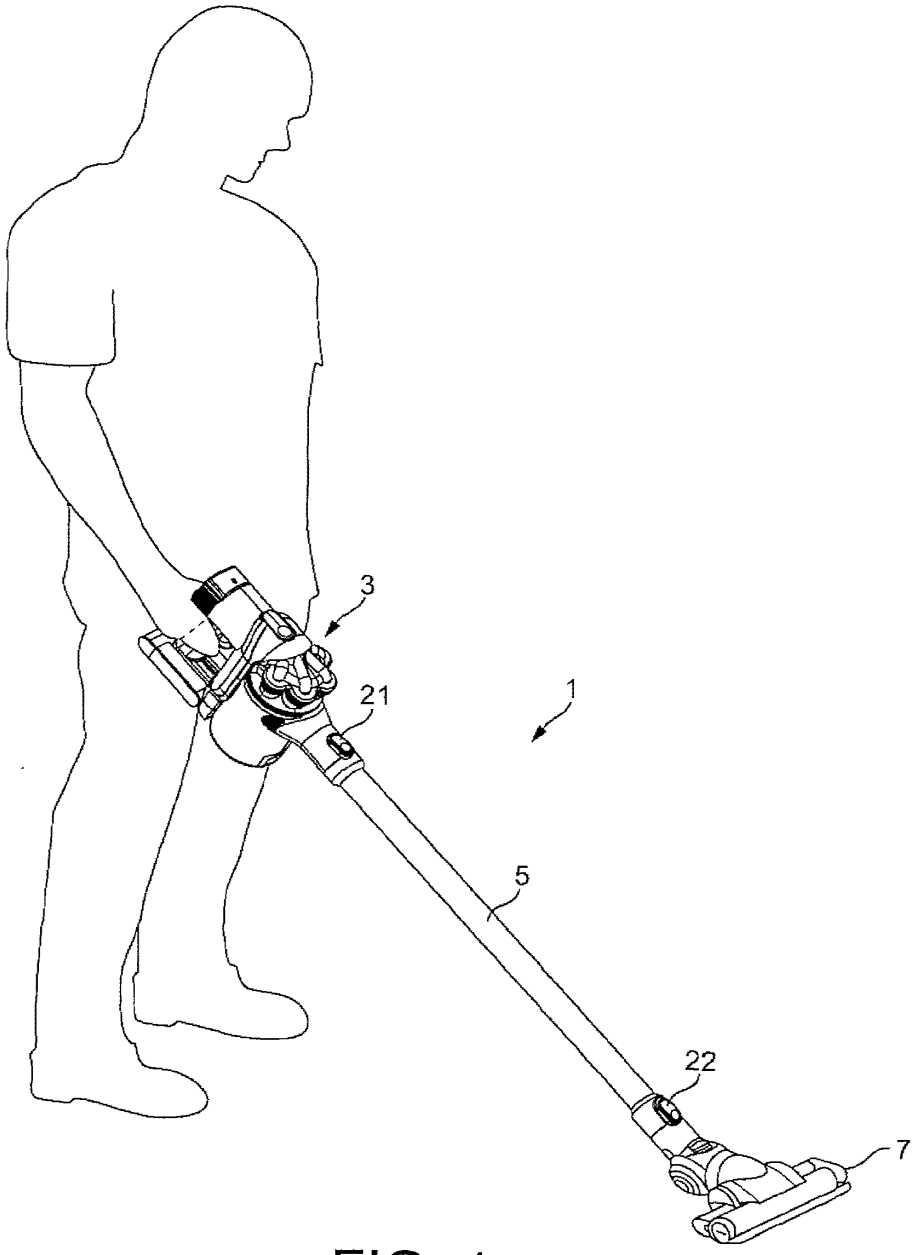


FIG. 1

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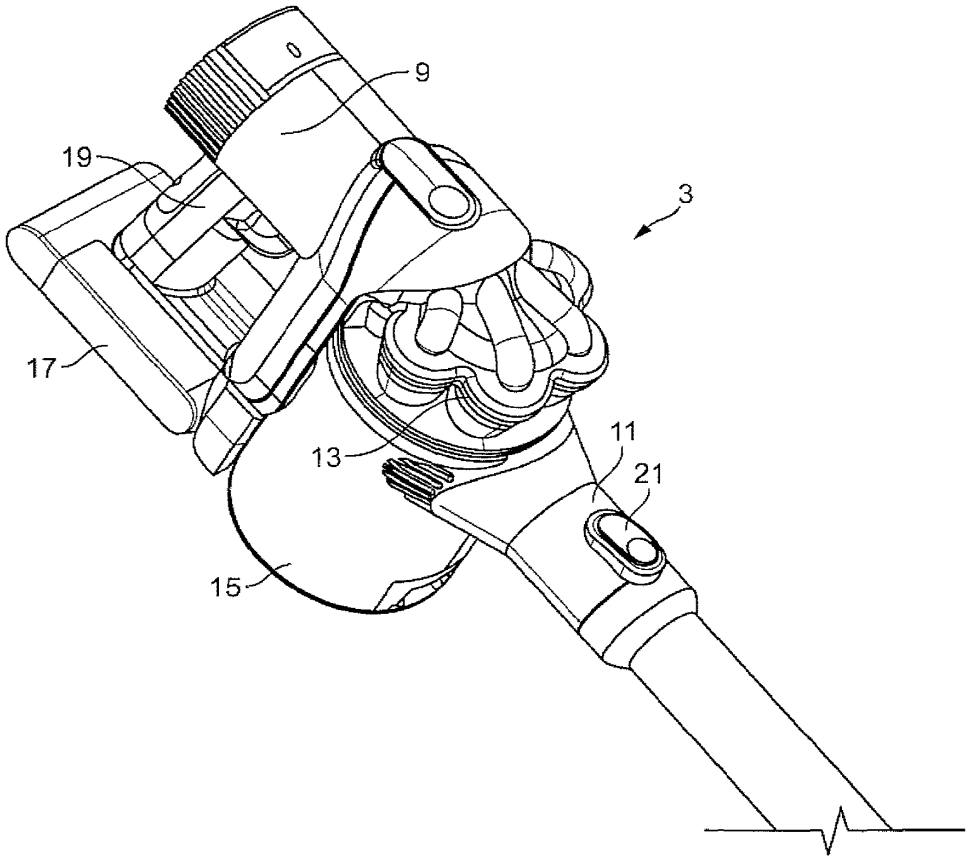


FIG. 2

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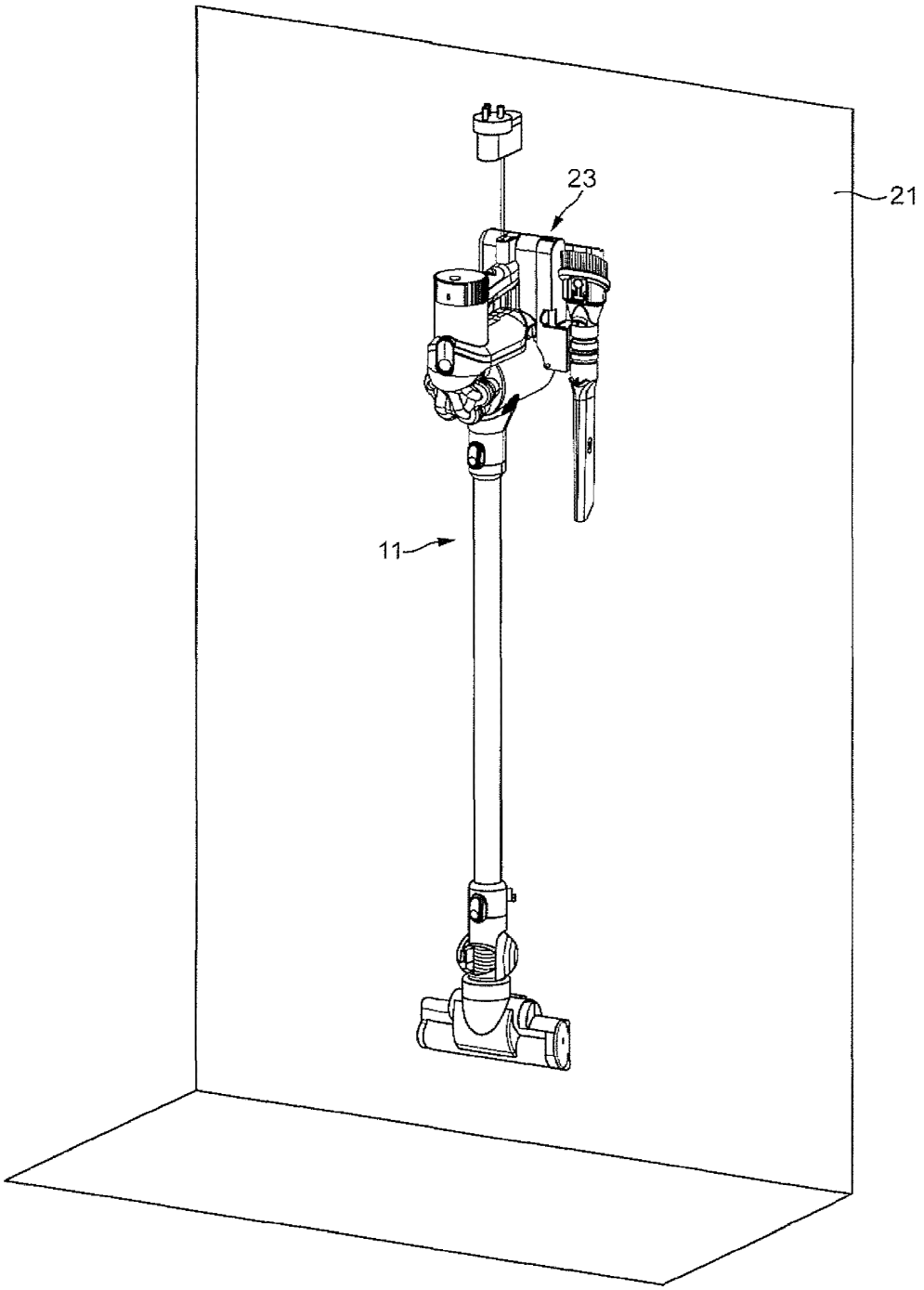


FIG. 3

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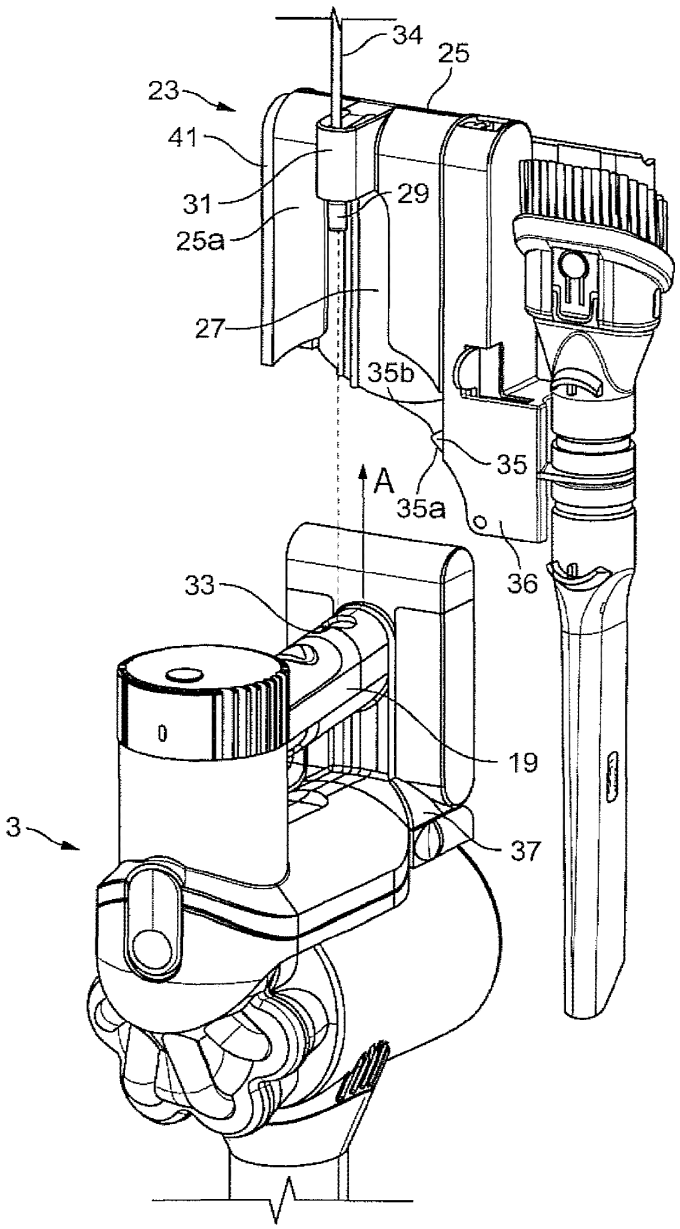


FIG. 4

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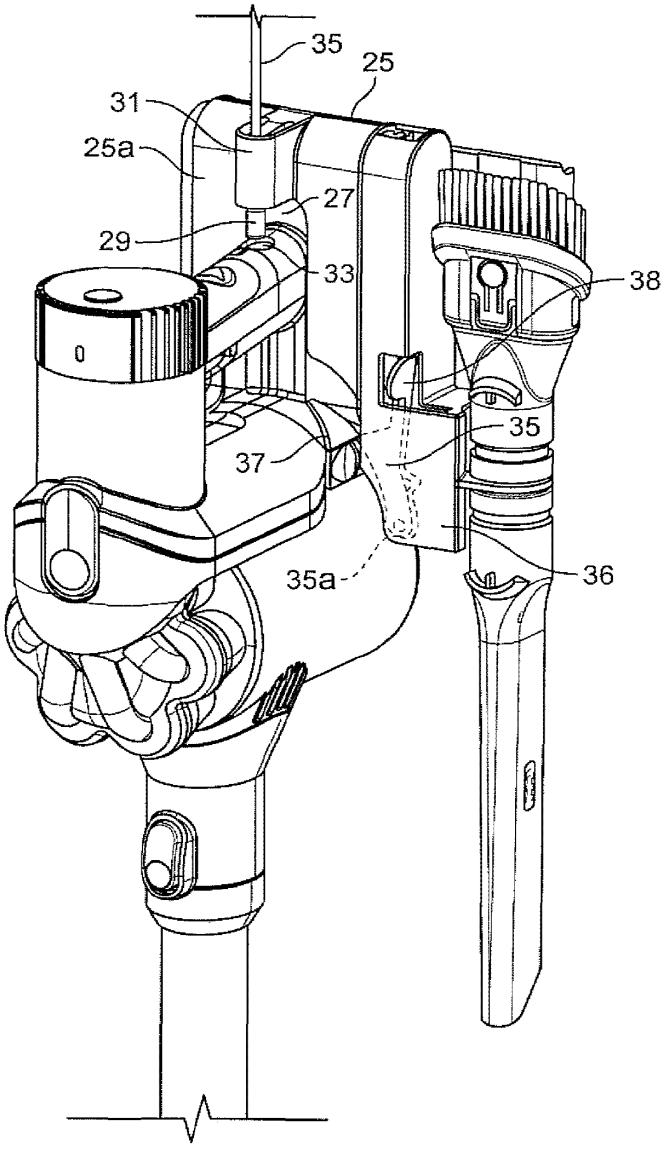


FIG. 5

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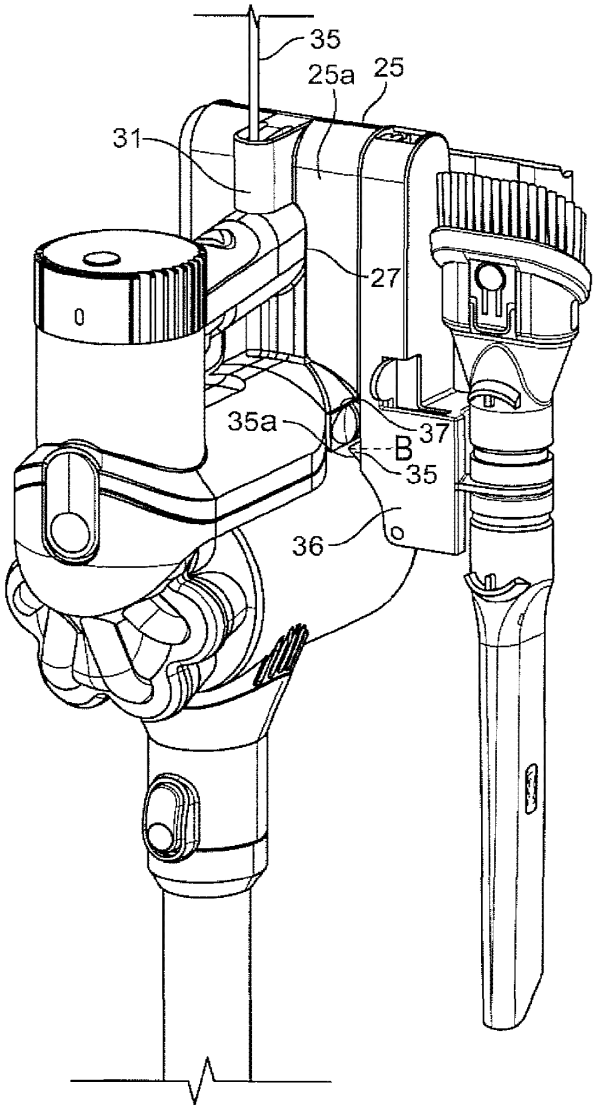


FIG. 6

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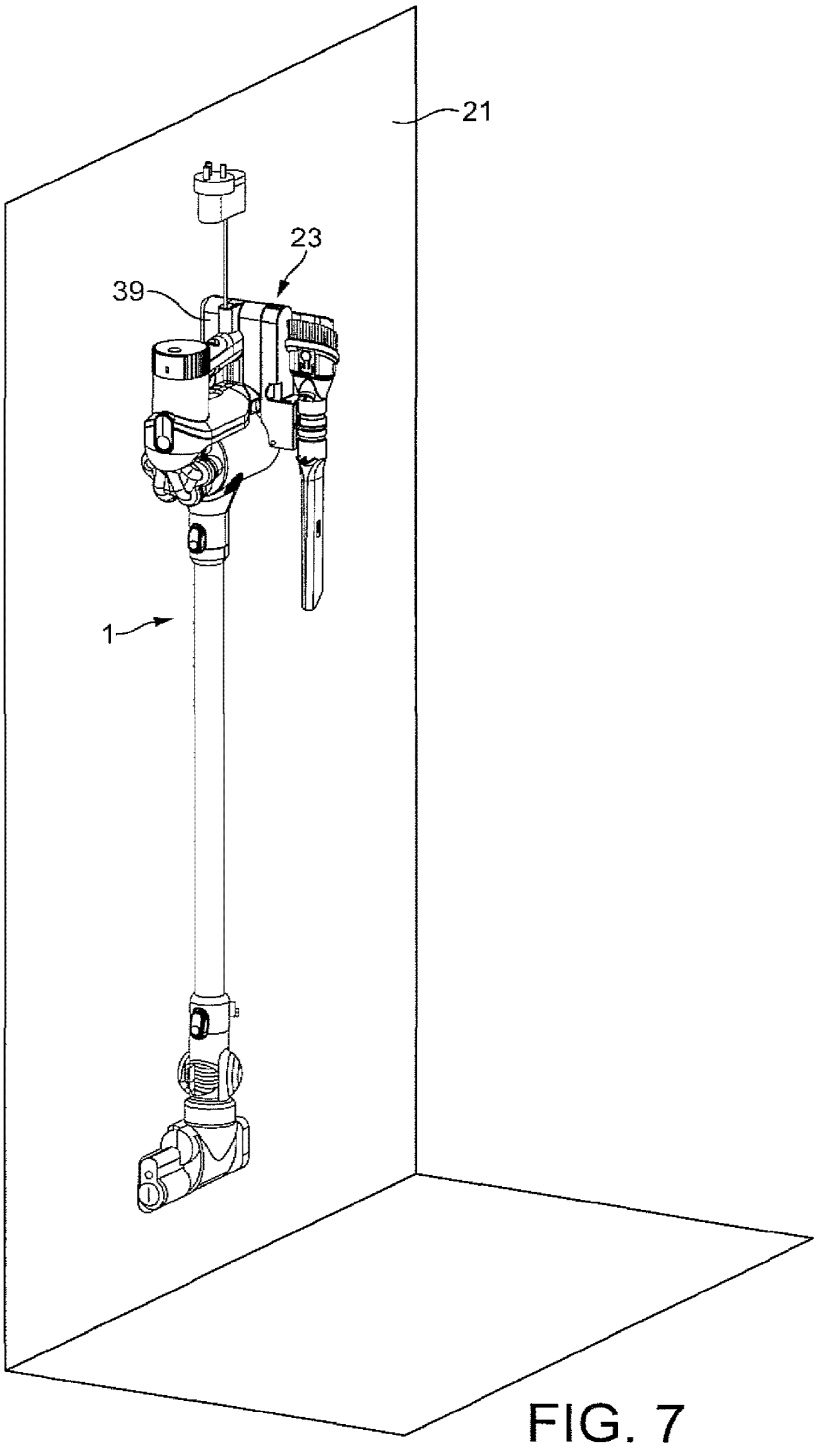


FIG. 7

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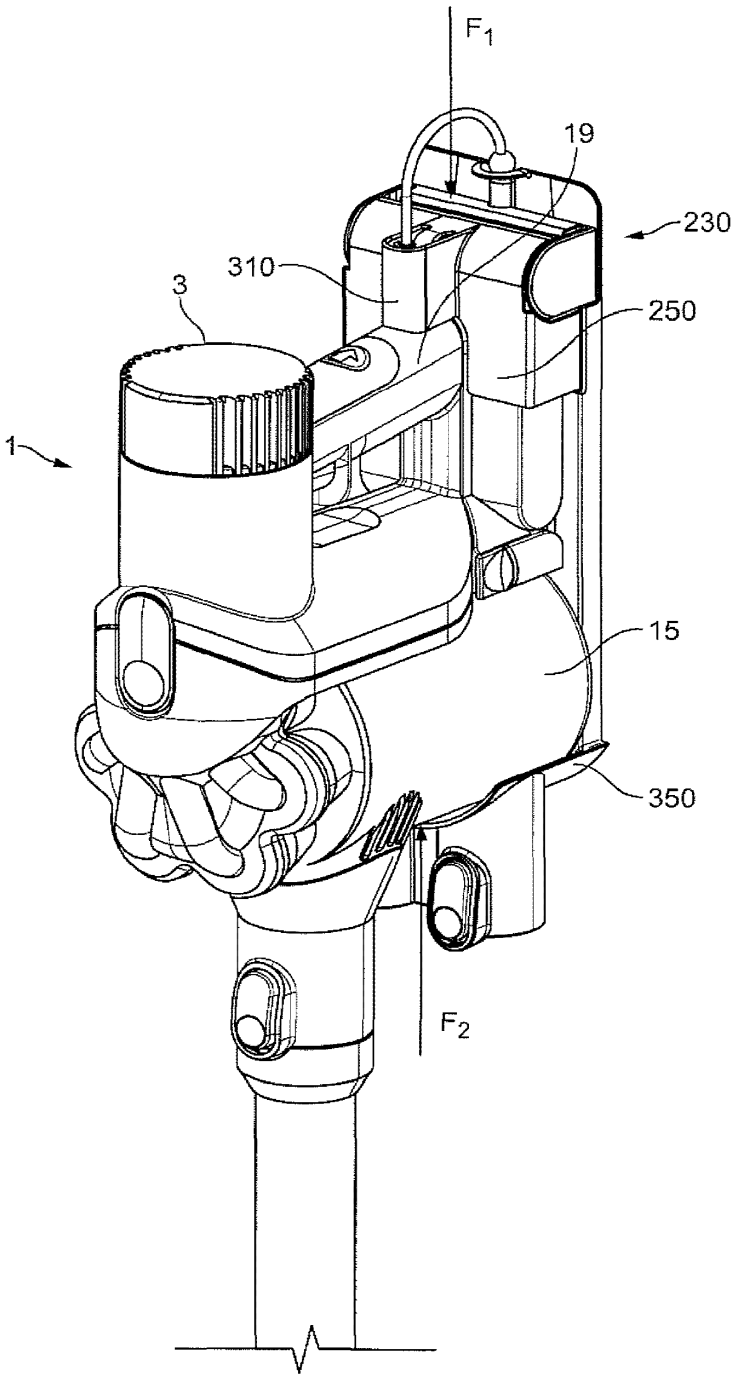


FIG. 8

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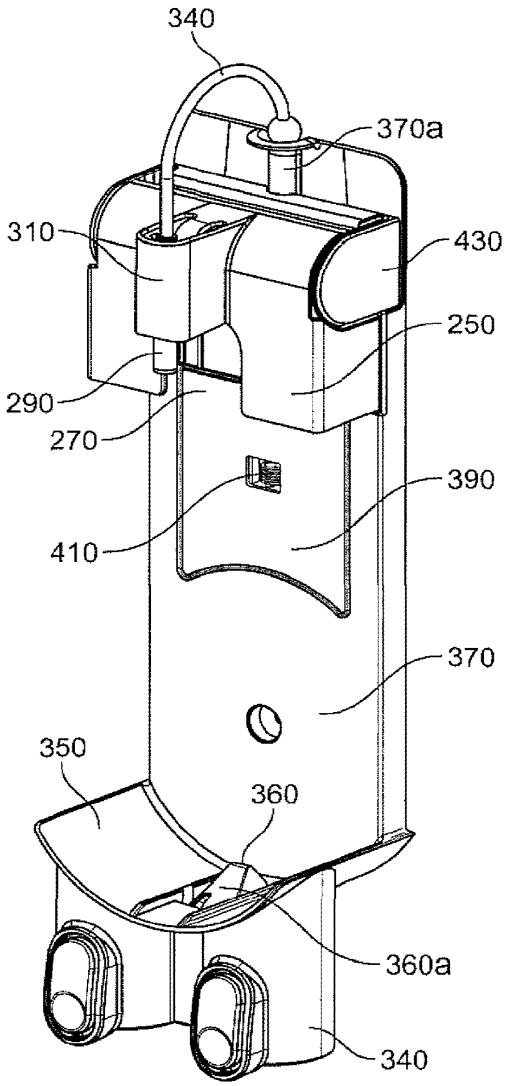


FIG. 9

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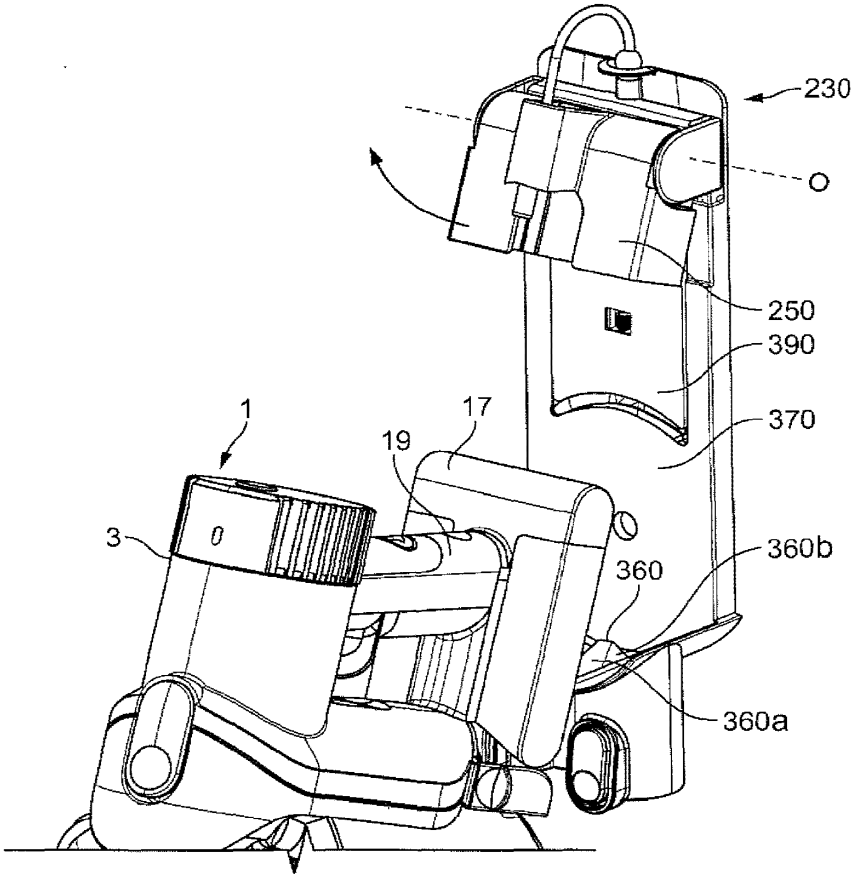


FIG. 10

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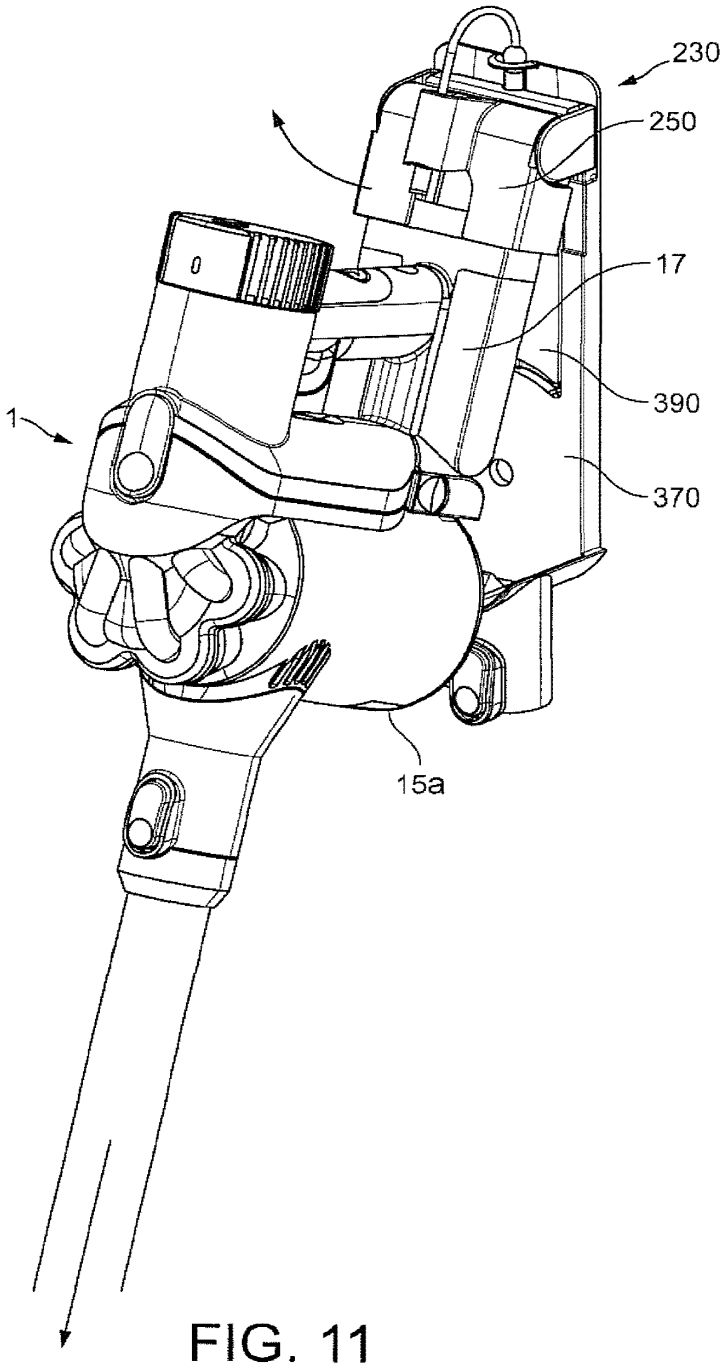


FIG. 11

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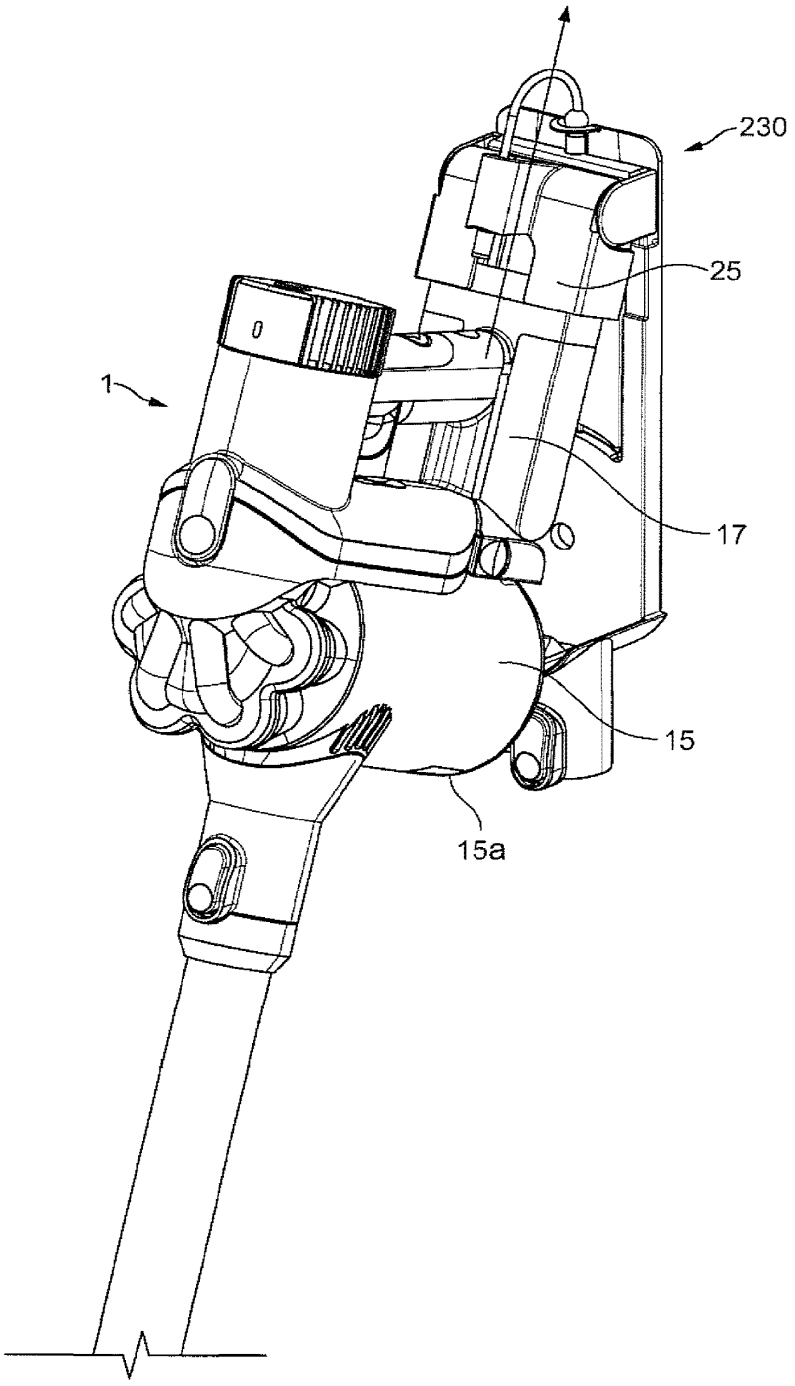


FIG. 12

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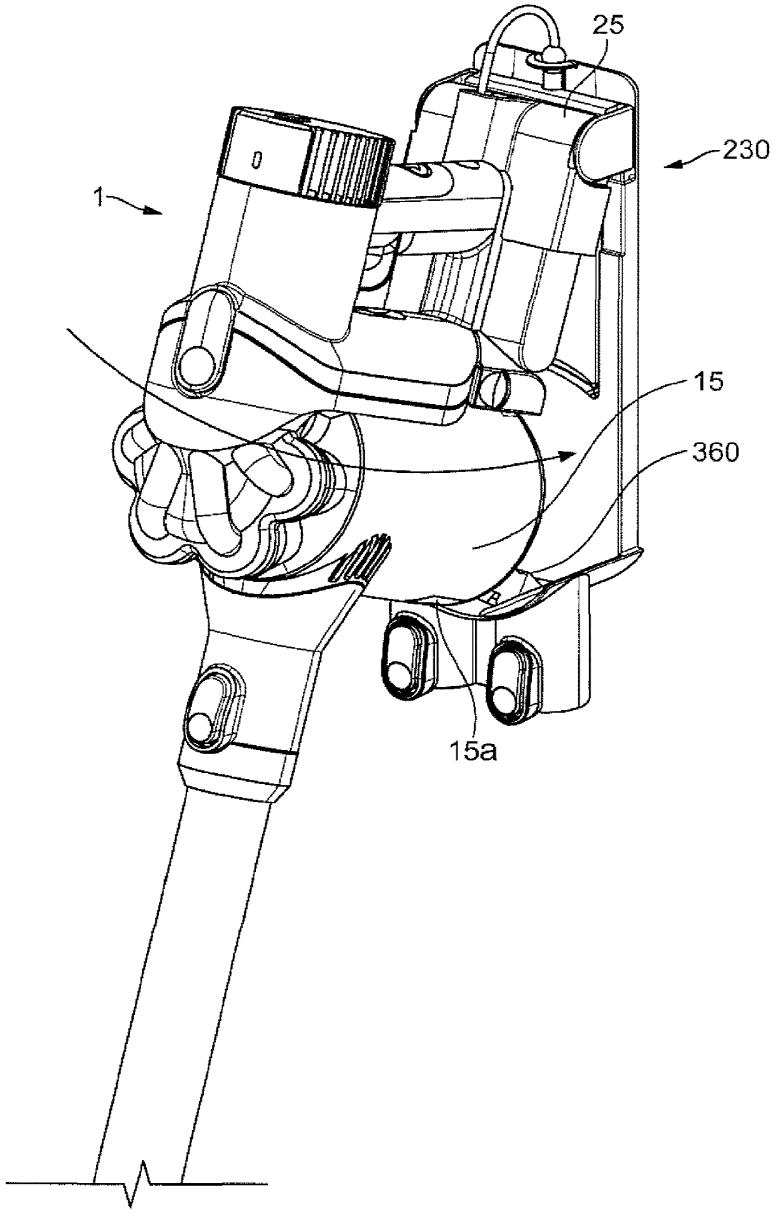


FIG. 13

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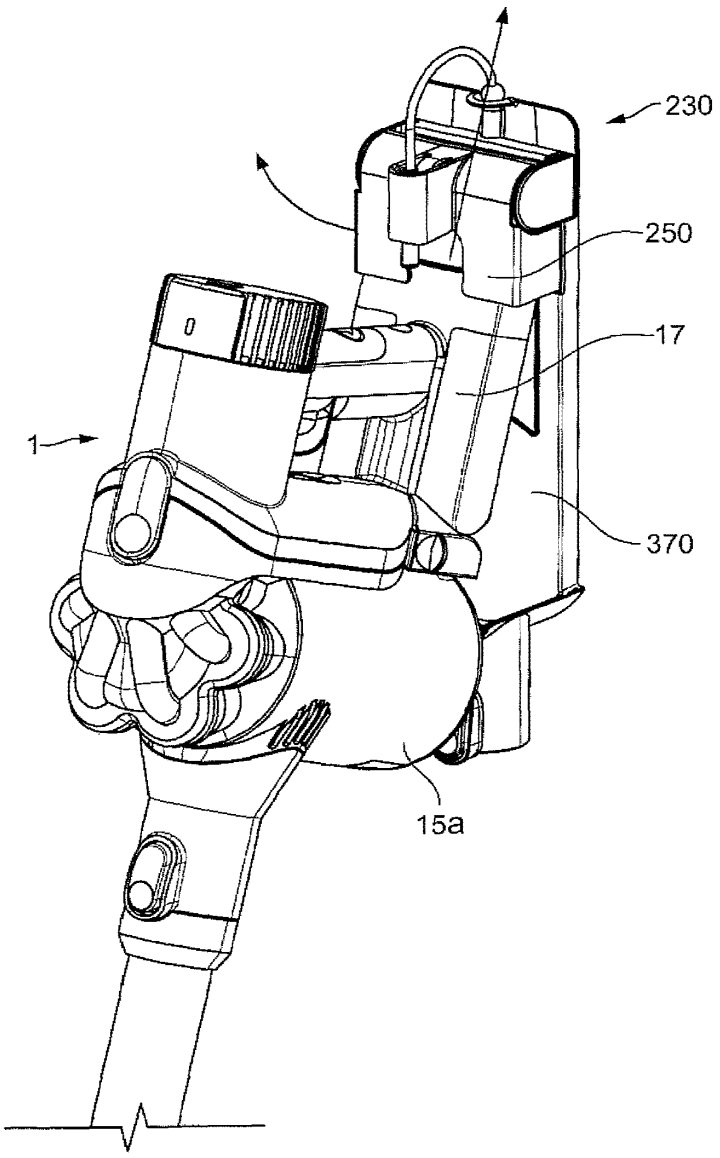


FIG. 14

A Vacuum Cleaner Arrangement

The present invention relates to the field of vacuum cleaners, and more specifically to 'stick vac' cleaners of the type generally comprising a handheld suction unit connected to a floor tool by an elongate suction wand.

Broadly speaking, there are four types of vacuum cleaner: "upright" vacuum cleaners, "cylinder" cleaners (also referred to as "canister" cleaners), "handheld" vacuum cleaners and "stick" vacuum cleaners, the latter being popularly referred to as "stick-vac" cleaners, or simply "stick-vacs".

Upright cleaners and cylinder cleaners are well known. They tend to be mains-operated and are used for relatively heavy-duty cleaning applications.

Handheld vacuum cleaners are relatively small, highly portable vacuum cleaners, best suited to relatively low duty applications such as spot cleaning floors and upholstery in the home, interior cleaning of cars and boats etc. Unlike upright cleaners and cylinder cleaners, they are designed to be carried in the hand during use, and tend to be battery-operated.

Stick-vac cleaners essentially offer a lightweight, functional alternative to upright cleaners for relatively low duty floor-cleaning applications, such as cleaning up floor spills.

Broadly speaking, there are two types of stick-vac. The first type is, in a sense, an ultra slim-line upright cleaner, though usually "cordless" rather than mains-operated. An example of this type of stick-vac cleaner is shown in UK Patent Application No. GB2377880A1, in this case additionally incorporating a removable, handheld vacuum-

cleaning unit. Stick-vacs of this first type may be free-standing; otherwise, they tend to be stored simply by leaning the stick-vac against a wall when not in use (in the manner of a long-handle brush or broom).

The second type of stick-vac cleaner is a spin-off from the handheld vacuum cleaner, and comprises a handheld suction unit which is carried in the hand in the same way as a handheld vacuum cleaner, but in combination with a rigid, elongate suction wand which effectively reaches down to the floor so that the user may remain standing while cleaning a floor surface. A floor tool is typically attached to the end of the rigid, elongate suction wand, or alternatively may be integrated with the bottom end of the wand. Designs of this type of stick-vac cleaner are shown in USD298875, USD303173 and USD280033. In each case, the handheld suction unit incorporates the motor, the fan and some sort of separating apparatus, which may be a bag or a cyclonic separation system.

Stick-vac cleaners of the second type are predominantly multi-mode, hybrid machines: in such cases, the wand is removable and the handheld suction unit may then be used independently as a handheld vacuum cleaner, as desired. However, this is not an essential feature of these types of stick-vac cleaners and it is conceivable that the wand may be permanently attached to the handheld suction unit.

A feature which distinguishes stick-vacs of the second type from stick vacs of the first type is that the first type is "bottom heavy" – the motor is located low down in similar manner to a full-sized upright cleaner –whereas the second type is "top heavy" – the use of a handheld suction unit in combination with an elongate suction wand means that the motor (being inside the handheld suction unit) is located nearer the top end of the machine.

The "top heavy" distribution of weight in stick vacs of the second type means that they are not particularly convenient to store in stick-vac mode. If the stick-vac cleaner is leant against a wall in an upright position with the floor tool supported on the floor and

the handheld suction unit resting against the wall, the relative weight of the handheld suction unit tends to make the stick-vac cleaner as a whole unstable. On the other hand, if the stick-vac cleaner is turned upside down and leant against the wall with the relatively heavy handheld vacuum cleaner supported on the floor, the relatively dirty lower end of the cleaner will consequently rest against the wall, which is undesirable. Also, when the stick-vac cleaner is stored in an upside down position rather than an upright position, the natural inclination is to grasp the stick-vac cleaner in the region of the relatively dirty lower end of the stick vac cleaner in order to turn the cleaner back round to the upright position for use.

Consequently, conventional stick vac cleaners of the second type often tend to be stored on the floor or, where there is insufficient space to do so, tend to be partly disassembled for storage after use and then reassembled again when it is desired to use the machine in stick-vac mode. The need for disassembly and reassembly in particular discourages use of the machine in stick-vac mode.

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According to the present invention, there is provided an arrangement comprising a stick-vac cleaner, the stick-vac cleaner comprising a handheld suction unit which is connected to a floor tool by an elongate suction wand, the arrangement further comprising a wall-mountable docking station arranged for releasably locking the stick-vac cleaner on a wall in an upright, docked position when not in use.
By "upright position" is meant a position in which the elongate suction wand extends downwardly from the handheld suction unit towards the floor. Storing the stick vac cleaner in the upright position has the advantage that a user may conveniently grasp the hand held vacuum cleaner in order to disengage the stick-vac from the docking station, at which point the stick-vac is ready for use in the upright position: there is no tendency for the user to grasp the relatively dirty, lower end of the stick-vac in order to manipulate the stick-vac cleaner into the upright position for use. At the same time, the "top heavy" stick-vac cleaner is advantageously supported in a relatively stable, upright position by the docking station (which laterally supports the stick vac cleaner in the upright position).

The docking station may be arranged for engaging the handheld suction unit in order directly to support the hand held suction unit when the stick vac cleaner is in the upright, docked position. Consequently, because the centre of mass is dictated largely by the position of motor, which is inside the handheld suction unit, the center of mass of the stick vac cleaner will be relatively near to the point of support on the wall; this provides a particularly stable upright, docked position, and results in relatively low stresses on the docking station components.

The handheld cleaner may be a battery-powered handheld cleaner, in which case it may incorporate a set of exterior charging contacts connected to an onboard rechargeable battery, and the docking station may comprise a respective set of charging contacts for connection to a mains supply, the charging contacts on the docking station being arranged for engagement with said exterior charging contacts on the handheld cleaner to form a battery-charging circuit when the stick vac cleaner is in the upright, docked position. Thus, the docking station advantageously charges the battery onboard the handheld unit when the stick vac cleaner is in the upright, docked position.

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The charging contacts on the handheld suction unit may be arranged in any suitable manner. In some cases, it may be desirable to arrange the contacts on the handheld suction unit in a way which means that the contacts face upwards when the stick vac cleaner is in the upright position.

If the charging contacts on the handheld suction unit are arranged so that they face upwards when the stick vac cleaner is in the upright position, it has been

there can be a tendency for the charging contacts to pull away from the respective contacts on the docking station, under the weight of the stick vac cleaner. To address this problem, the charging contacts on the docking station may be spring-biased for urging the charging contacts downwardly into engagement with said upward-facing charging contacts on the handheld suction unit.

The docking station may comprise a catch for engaging the handheld suction unit part to secure the stick-vac cleaner in the upright, docked position, the catch being arranged to hold the charging contacts on the handheld suction unit in engagement with the charging contacts on the docking station. Thus, reliable contact is ensured for charging the battery when the stick-vac cleaner is in the upright, docked position.

The catch may be spring-loaded for urging the charging contacts on the handheld suction unit into engagement with the charging contacts on the docking station. This may be in addition to, or alternative to, the charging contacts on the docking station being spring-loaded as mentioned above.

The docking station may comprise an opposing pair of clamping members, at least one of the clamping members being resiliently biased towards the other clamping member for resiliently clamping the stick-vac against the other clamping member to lock the stick-vac in the upright, docked position. This provides a particularly stable arrangement, wherein the stick-vac is clamped securely in the upright, docked position. Furthermore, docking and release of the cleaner is essentially one-handed, as described in more detail below.

The pair of clamping members may consist of a lower clamping member arranged for clamping upwardly against a respective lower part of the handheld suction unit and an opposing, upper clamping member arranged for clamping downwardly against a respective upper part of the handheld suction unit. This has the advantage that the clamping load on the cleaner is in direct opposition to the force of gravity.

In a particular arrangement, the lower clamping member is fixed in use, relative to the wall, and the upper clamping member is resiliently biased downwards towards the lower clamping member.

The clamping members may be arranged for relative sliding movement along a clamp axis to engage the stick vac, with at least one clamping member additionally arranged for movement into and out of clamping alignment with the other clamping member. The ability to take a clamping member out of clamping alignment with the other clamping member allows for sequential engagement of the cleaner with the clamping members, which makes dccking more convenient. The movement of the clamping member into and out of clamping alignment may be a pivoting movement. In particular, in use with the docking station mounted on a wall, said pivotable clamping member may be arranged such that, when the docking station si in use mounted on a wall, the clamping member is arranged for pivoting movement away from the wall. This latter arrangement is considered particularly advantageous in reducing the footprint of the docking station on the wall, because the pivotable clamping member moves within the footprint of the docking station.

In a particularly stable arrangement for locking the cleaner in the upright position, the upper clamping member is in the form of a docking cradle arranged to receive a first part of the handheld unit in a sliding fit, the docking cradle being slidable relative to the lower clamping member and resiliently biased towards the lower clamping member, the docking cradle additionally being pivotable away from the wall, in use, for movement out of clamping alignment with the lower clamping member in order to receive said first part of the handheld unit. In this case, the lower clamping member may be a fixed clamping member comprising a locking element for engagement with a second part of the handheld unit to secure the stick vac against lateral movement relative to the lower clamping member.

Embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a schematic view showing a stick vac cleaner in use;

Figure 2 is a close-up perspective view of part of the stick vac cleaner in Figure 1;

Figure 3 is a perspective view showing a stick vac cleaner supported on a wall by a docking station;

Figure 4 is a close-up, perspective view of the docking station and part of the stick vac cleaner, prior to docking of the stick vac cleaner;

Figure 5 is a close-up, perspective view of the docking station and part of the stick vac cleaner, during docking of the stick vac cleaner;

Figure 6 is a close-up perspective view showing the docking station and part of the stick vac cleaner, in the upright docked position.

Figure 7 is a perspective view showing a stick vac cleaner supported in an alternative orientation, but still in an upright position, by a docking station.

Figure 8 is a perspective view of the stick-vac cleaner docked with an alternative docking station;

Figure 9 is a perspective view of the alternative docking station in isolation;

Figure 10 is a perspective view showing part of the alternative docking station (and part of the stick-vac cleaner), illustrating pivoting movement of a docking cradle on the docking station;

Figure 11 is a perspective view of the stick-vac cleaner and alternative docking station, illustrating release of the stick-vac cleaner from the docking station;

Figure 12 is a perspective view of the stick-vac cleaner and alternative docking station, illustrating docking of the cleaner with the docking station;

Figure 13 is a perspective view of the stick-vac cleaner and alternative docking station, further illustrating docking of the cleaner with the docking station; and

Figure 14 is a perspective of the stick vac cleaner and alternative docking station, illustrating insertion of the cleaner at a relatively shallow angle for initially pivoting the docking cradle into alignment with a battery pack on the cleaner.

Figure 1 shows a stick-vac cleaner 1 comprising a hand held suction unit, in the form of a handheld vacuum cleaner 3, an elongate wand 5 and a floor tool 7.

Referring to Figure 2, the handheld vacuum cleaner 3 comprises a motor-driven fan which is arranged inside a motor casing 9 for drawing air in through a suction nozzle 11 positioned at the front of the hand held vacuum cleaner 3. Dirty air drawn in through the suction nozzle 11 is ducted under the fan-generated suction pressure through a cyclonic separation system 13, where dirt is separated from the air, before the relatively clean air is then exhausted back to atmosphere via one or more fine-particulate filters (not visible). The dirt which is separated from the airflow inside the cyclonic separating system 13 is collected in a bin 15 for disposal. The hand held vacuum cleaner 3 is powered by a multi-cell rechargeable battery which is housed in a battery pack 17.

In use, the handheld vacuum cleaner 3 is carried in the hand using a handle 19.

The handheld cleaner 3 is relatively compact. Nevertheless, to promote a balanced feel in the hand, the heavier components such as the motor and the battery pack 17 are deliberately located relatively close to the handle 19 and the relatively light components

such as the bin 15 are located further away from the handle 19. Thus, the bulk of the mass of the handheld cleaner 3 is distributed towards the rear of the handheld cleaner 3.

The elongate wand 5 is connected to the suction nozzle 11, and the floor tool 7 is in turn connected to the lower end of the wand 5. Dirty air is drawn in through a suction opening on the underside of the floor tool 5 and passes to the suction nozzle 11 via the wand 5.

A catch 21 is provided for disconnecting the wand 5 from the handheld cleaner 3, so that the handheld cleaner 3 can be used as a handheld cleaner rather than as part of the stick-vac cleaner 1. A catch 22 is also provided for disconnecting the floor tool 7 from the wand 5, so that rather than being used as part of the stick-vac cleaner 1, the handheld cleaner 3 and wand 5 can alternatively be used in combination with some other suction tool to form a "long-reach" handheld vacuum cleaner for cleaning into the upper corners of a room etc.

The stick-vac cleaner 1 is "top-heavy", and conventionally this type of stick vac cleaner has been awkward to store when it is not in use. If the stick vac cleaner 1 is propped up against a wall in the upright position, with the floor tool 7 supported on the floor and the handheld cleaner 3 resting against the wall, the stick-vac cleaner 1 as a whole tends to be relatively unstable; on the other hand, if the stick vac cleaner 1 is propped up against a wall upside down, with the handheld cleaner 3 supported on the floor and the floor tool 7 resting against the wall, the inclination is for a user to grasp the relatively dirty floor 7 tool in order to manipulate the stick-vac cleaner 1 back to the upright position for use. The relatively dirty floor tool 7 may also mark the wall.

Figure 3 illustrates an arrangement for conveniently storing the stick-vac cleaner 1 when it is not in use, in which the stick-vac cleaner 1 is supported in an upright position on a wall 21 by a wall-mounted docking station 23.

The docking station 23 is shown in more detail in Figures 4 to 6, which illustrate the stick-vac cleaner immediately prior to docking, during docking and in the docked position, respectively.

The stick vac cleaner 1 docks with the docking station 23 via the battery pack 17, which slots upwardly (in the direction A in Figure 4) into a docking cradle 25 shaped to receive the battery pack 17 in a close sliding fit. The front wall 25a of the docking cradle 25 incorporates a blind slot 27 extending back from the entrance of the cradle 25: this blind slot 27 accommodates the handle 19 as the battery pack is inserted upwardly into the docking cradle 25.

A set of charging contacts is provided on the docking station 23 in the form of a charging jack 29, which clips into a jack holder 31 positioned adjacent the end of the slot 27. The charging jack 29 connects to a mains supply via a plug-in power cord 34 and is arranged for engagement with a corresponding set of charging contacts on the handheld cleaner 3 in the docked position, via a charging socket 33 on the back of the handle 19. Engagement of the charging jack 29 with the charging socket 33 completes a battery charging circuit for charging the stick-vac cleaner 1 in the docked position.

A catch 35 is provided to lock the stick-vac cleaner 1 securely in the docked position shown in Figure 6.

The catch 35 is pivotally mounted on a catch housing 36 fitted to the side of the docking cradle 25 and is spring-biased towards a locking position shown in Figure 4. During docking of the stick vac cleaner 1, the catch 35 cooperates with a corresponding catch portion 37 on the handheld cleaner 3, which engages with a first cam surface 35a on the underside of the catch 35 to pivot the catch 35 away from the locking position shown in Figure 4 and into the position shown in Figure 5. As the handheld cleaner 3 is moved from the position shown in Figure 5 to the docked position shown in Figure 6, the catch portion 37 eventually clears the catch 35, which is then spring-biased back towards the

locking position, and into locking engagement against the underside of the catch portion 37 to hold the stick-vac cleaner 1 in the docked position.

When it is docked with the docking station 23, the stick vac cleaner 1 is laterally supported in the upright position by the side walls of the docking cradle 25. In addition, the side walls of the docking cradle 25 advantageously provide direct lateral support for the relatively heavy handheld cleaner 3.

The weight of the stick vac cleaner 1 is effectively supported on the catch 35. Again, the catch 35 advantageously directly supports the relatively heavy handheld cleaner 3.

The manufacturing tolerances are controlled so that the catch 35 holds the charging socket 33 in engagement with the jack 29 in the docked position. Thus the battery onboard the handheld cleaner is reliably charged when the stick vac cleaner 1 is in the upright, docked position.

Control of manufacturing tolerances may be particularly important in an arrangement such as the one shown in Figures 1 to 6, because the charging socket 33 faces upwards when the stick vac cleaner is in the upright, docked position so the weight of the stick vac cleaner tends to pull the socket 33 away from the jack 29.

The potentially negative effects of manufacturing tolerance on charging reliability can be mitigated by spring loading the charging contacts on the docking station. For example, in an alternative embodiment (not shown), the jack holder 31 may be spring-biased downwardly for ensuring positive engagement of the charging jack 29 with the charging socket 33.

In order to remove the stick-vac cleaner 1 from the docked position, a user simply releases the catch 35 using a manual release lever 38 and slides the stick vac cleaner downwardly until the battery pack 17 disengages from the docking cradle 25. The stick vac cleaner is then advantageously in the upright position ready for use.

In order to reduce the tendency for the catch 35 to jam in the locked position under the weight of the stick-vac cleaner 1, which might hinder manual release of the catch 35, the top side 35b of the catch 35 is ramped appropriately (see Figure 4). Alternatively, the top side of the catch 35 may be flat (indicated very schematically by the dotted line B in Figure 6), which has the advantage that the top side cannot then transmit any accidental lateral release force to the catch 35, for example as a result of the handheld cleaner 3 being knocked by a user in the docked position. If the weight of the stick vac cleaner 1 tends to jam the catch 35, it may be possible nevertheless to use a flat profile catch, but provide a small amount of play to allow a user to lift the stick vac cleaner 1 off the catch 35 prior to manual release of the catch; however, care may need to be taken to ensure that there is not sufficient play to allow the socket 33 to pull away from the jack 29 when the stick vac cleaner is in the upright, docked position shown in Figure 6.

This docking station 23 can be secured to the wall 21 using wall-fixing screws (not shown) which are screwed into the wall 21 through countersunk clearance holes (not visible) in the rear wall 25a of the cradle 25. Any other suitably strong conventional wall-fixings may be used to mount the docking station 23 on the wall 21, including surface fasteners such as adhesive pads or the like.

In this case, the stick-vac cleaner 1 is stored in a fully upright, docked position, with the wand 5 effectively "hanging" vertically downwards. However, this is not considered necessary to obtain the advantages of the invention, provided that the stick-vac cleaner is stored in an upright position.

Figure 7 shows the docking station 23 mounted on the wall 21 in an alternative orientation, using a mounting bracket 39 which is secured to the wall 21 (e.g. using screws) and which is arranged to engage with a mounting lug 41 (Figure 4) on the docking cradle 25 to support the docking station 23 on the wall.

The catch housing 36 incorporates mounting points for a crevice tool and an upholstery brush, which are retained on the catch housing in a friction-fit.

Figure 8 shows an alternative wall-mountable docking station 230 for locking the stick-vac cleaner 1 in an upright, docked position on a wall.

In this arrangement, the handheld unit 3 is clamped securely in the upright, docked position between an upper clamping member, in the form of a docking cradle 250, and a lower clamping member, in the form of a bin support 350. The clamping load is represented in Figure 8 by F_1 and F_2, and is in direct opposition to the weight of the cleaner.

The bin support 350 is fixed to a wall mounting plate 370 (Figure 9) which in use is secured flat against the wall, in the orientation shown, using suitable wall fixings. In this particular case, the lower bin support 350 is actually formed integrally with the wall mounting plate 370, though this is not essential. A locking element 360 (Figure 9) is provided on the bin support 350, which engages with a catch recess 15a (just visible in Figure 11) on the front of the bin 15 to secure the bin 15 against lateral movement in the docked position. 'Universal fit' tool holders 340 are provided on the underside of the lower bin support 350 for retaining tools, or possibly the wand 5.

The docking cradle 250 is similar to the docking cradle 25, albeit shorter in length, with the docking cradle 250 likewise being arranged to receive the battery pack 17 in a close sliding fit. A blind slot 270 is provided in the front wall of the docking cradle 250 to accommodate the handle 19, and a mains-operated charging jack 290 is held within a jack holder 310, adjacent the blind end of the slot 270, for engaging the charging socket 33 on the back of the handle 19 (Figure 8).

The docking cradle 250 is supported by a separate carriage plate 390 (Figure 9) which can move up and down relative to the wall mounting plate 370 to vary the (vertical) separation between the docking cradle 250 and the bin support 350. A biasing spring

410 (just visible in Figure 9 through a window in the carriage plate 390) acts between the carriage plate and the mounting plate 370 to bias the docking cradle 250 downwardly towards the bin support 350. The spring 410 thus provides a positive clamping action between the docking cradle 250 and the bin support 350 which helps to maintain a reliable electrical contact between the charging jack 290 and the charging socket 33 in the docked position.

The docking cradle 250 is pivotally mounted on the carriage plate 390 via a supporting yoke 430. This allows the docking cradle 250 to be pivoted away from the carriage plate 390, about the axis O, to move the docking cradle 250 out of clamping alignment with the bin support 350 (see Figure 10).

To release the stick-vac cleaner 1 from the docked position shown in Figure 8, the user grasps the stick-vac cleaner and pushes the stick-vac cleaner 1 upwards, moving the docking cradle 250 against the bias of the spring 410 until the locking element 360 clears the catch recess 15a in the bin 15. Once the locking element 360 has cleared the catch recess 15a on the bin 15, the stick-vac cleaner 1 can then be manipulated to pivot the docking cradle 250 laterally away from the mounting plate and out of clamping alignment with the bin support 350, which then allows the battery pack 17 to slide out of the docking cradle 250, past the front edge of the bin support 350, to release the cleaner 1 (Figure 11).

Release of the stick-vac cleaner 1 from the docked position shown in Figure 8 is a one-handed operation, in the sense that a user does not need to use one hand to hold the cleaner 1 and the other hand to operate the docking station 230 (the user may of course optionally grasp the cleaner 1 with two hands when docking or releasing the cleaner 1, and indeed the docking station 230 advantageously allows him or her to do so).

Docking of the cleaner 1 with the docking station 230 is also a one-handed operation. To dock the cleaner 1 with the docking station 230 following release of the cleaner 1, the battery pack 17 is simply slid back into the docking cradle 250 and the docking

cradle 250 is then moved, using the cleaner 1, back into clamping alignment with the lower bin support 350 (Figures 12 and 13). In this position - once the user lets go of the cleaner 1 - the cleaner 1 is automatically clamped between the docking cradle 250 and the bin support 350 under the action of the compression spring 410, with the locking element 360 engaging the catch recess 15a in the bin 15.

The plug-in power cord 340 extends down behind the mounting plate 370, through a channel 370a which is moulded into the mounting plate 370. The upper end of the channel 370a is trumpet-shaped: this helps reduce stress on the cord 340 during pivoting movement of the docking cradle 250. A stop 340a is provided on the power cord 340 to prevent take up of the power cord 340 inside the channel 370a as the docking cradle 250 is pivoted about the axis O; the use of the stop 340a further reduces stress on the power cord 340 by ensuring that the length of power cord 340 remains fixed between the upper end of the channel 370a and the jack holder 290.

The locking element 360 is provided with a ramped front surface 360a (Figure 10) to allow the bin 15 initially to bump over the locking element 360 as the docking cradle 250 is moved back into clamping alignment with the bin support 350. This simplifies the docking operation, but it is not essential. The locking element may alternatively have a flat front face, or indeed be a fixed locking element, which would then require the user to push the cleaner 1 and docking cradle 250 upwards to make sure that the bin 15 fully clears the locking element before the docking cradle 250 is moved back into clamping alignment with the bin support 350.

The docking station 230 incorporates a number of features which help reduce accidental damage to the cleaner 1 and/or docking station 230 if the cleaner 1 is subject to a lateral mechanical shock in the upright, docked position. These include the provision of ramped side surfaces (only side surface 360b is visible in Figure 10) on the locking element 360 which allow the bin 15 to bump laterally over the locking element 360 under a lateral impact force, and also the provision of a degree of lateral 'play' between the docking cradle 250 and the carriage 390. A guide surface (for example the curved

surface 350a of the bin support 350) may also be provided to guide the cleaner 1 upwards under a lateral force – so that the lateral load is taken up by movement of the docking cradle 250 vertically against the bias of the spring 410. Guide surfaces may also optionally be provided which guide the cleaner 1 under a lateral force so that the docking cradle 250 consequently rotates outwards about the axis O, in which case the cleaner 1 may "break out" and release automatically under a sufficient lateral load.

Figure 12 shows insertion of the battery pack 17 into the docking cradle 250 with the docking cradle 250 having already been moved out of clamping alignment with the bin support 350. In practice, following release of the cleaner 1 from the docked position the docking cradle 250 will tend to move under its own weight back into clamping alignment with the bin support 350. In this case, partially inserting the battery pack 17 into the docking cradle 250, as shown in Figure 14, will nevertheless tend to pivot the docking cradle 250 away from the wall and into alignment with the battery pack 17, so that one-handed docking of the cleaner 1 is still possible. This "self-alignment" of the docking cradle 250 is helped in part by the relatively short length of the docking cradle 250 (cf. docking cradle 25 in Figures 4 to 6) which allows the battery pack 17 to be inserted into the docking cradle 25 at a relatively shallow angle. A biasing spring (not shown) could be used deliberately to bias the docking cradle 250 back into clamping alignment with the bin support 350 following release of the cleaner 1, if desired.

According to the present invention, either or both of the clamping members on the docking station may be mounted for movement relative to the wall against the action of a resilient bias. For example, in the docking station 230 the docking cradle 250 could be fixed to the wall, and the bin support 350 could be mounted for sliding movement, relative to the docking cradle 250, against the action of a biasing spring. If the upper clamping member is fixed, the lower clamping member may be moveable into and out of clamping alignment with the upper clamping member, analogous to the operation of the docking cradle 250 in Figures 11 to 14. In the case of the docking station 23, the catch 35 and/or docking cradle 25 may also be arranged as clamping members. For example, the catch 35 may be spring biased so that, in the locking position, the catch