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White et al.(10) **Pub. No.: US 2009/0188067 A1**(43) **Pub. Date: Jul. 30, 2009**(54) **ATTACHMENT FOR A CLEANING APPLIANCE**(75) Inventors: **William Robert James White,**
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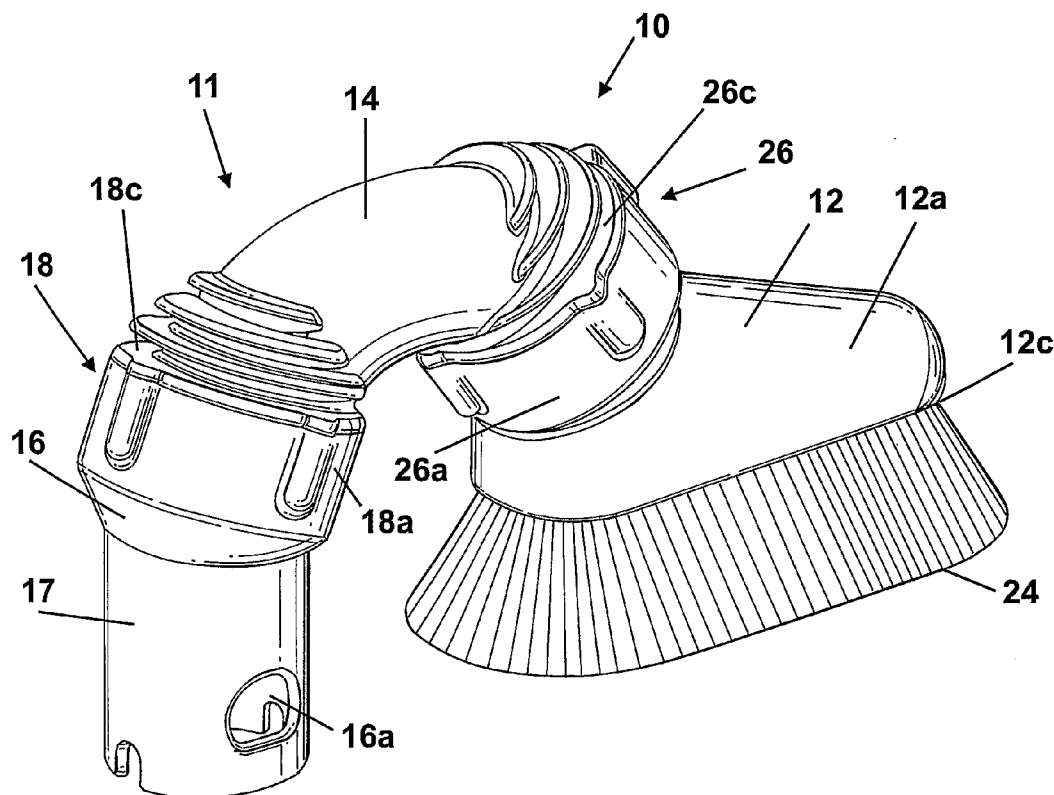
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Malmesbury (GB)(21) Appl. No.: **12/282,122**(22) PCT Filed: **Mar. 1, 2007**(86) PCT No.: **PCT/GB07/00730**§ 371 (c)(1),
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A47L 9/00 (2006.01)(52) **U.S. Cl.** **15/246.2**(57) **ABSTRACT**

An attachment for a cleaning appliance includes a head including a suction opening and a neck including an intermediate portion and an end portion for connection to the mouth of a wand or hose having a longitudinal axis. The attachment also includes a first rotatable connection located between the end portion and the intermediate portion having a first axis of rotation and a second rotatable connection located between the head and the intermediate portion having a second axis of rotation. Each rotatable connection allows relative movement of the end portion with respect to the head. The first axis of rotation is inclined with respect to the longitudinal axis of the end portion. By providing such an attachment for a cleaning appliance, the head of the attachment can be moved into a variety of useful positions to allow easier cleaning of walls and high-level horizontal surfaces.



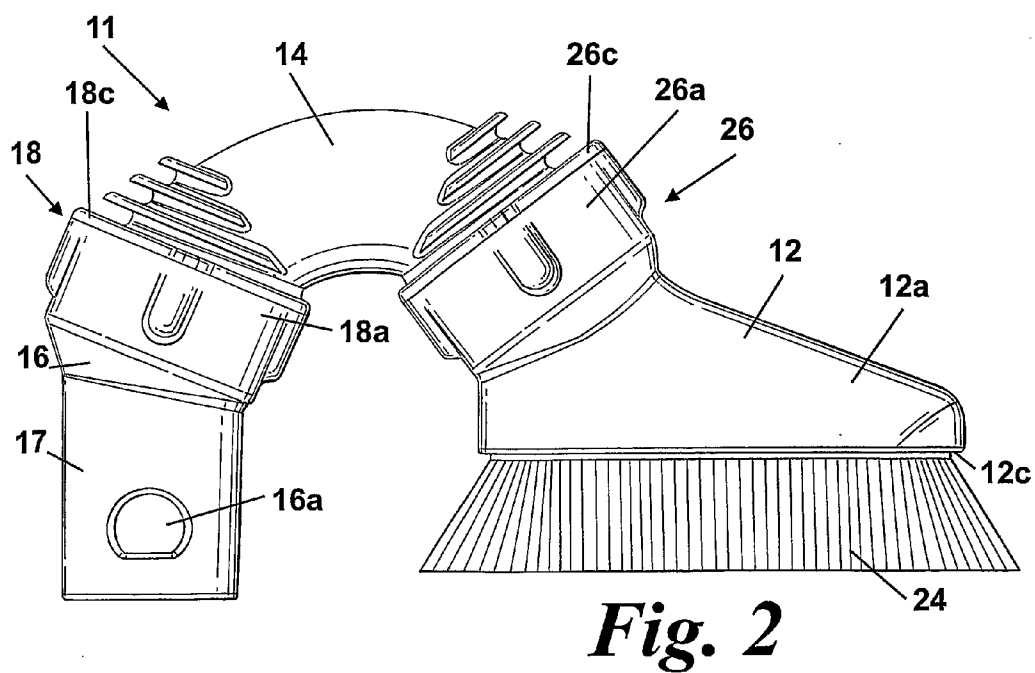
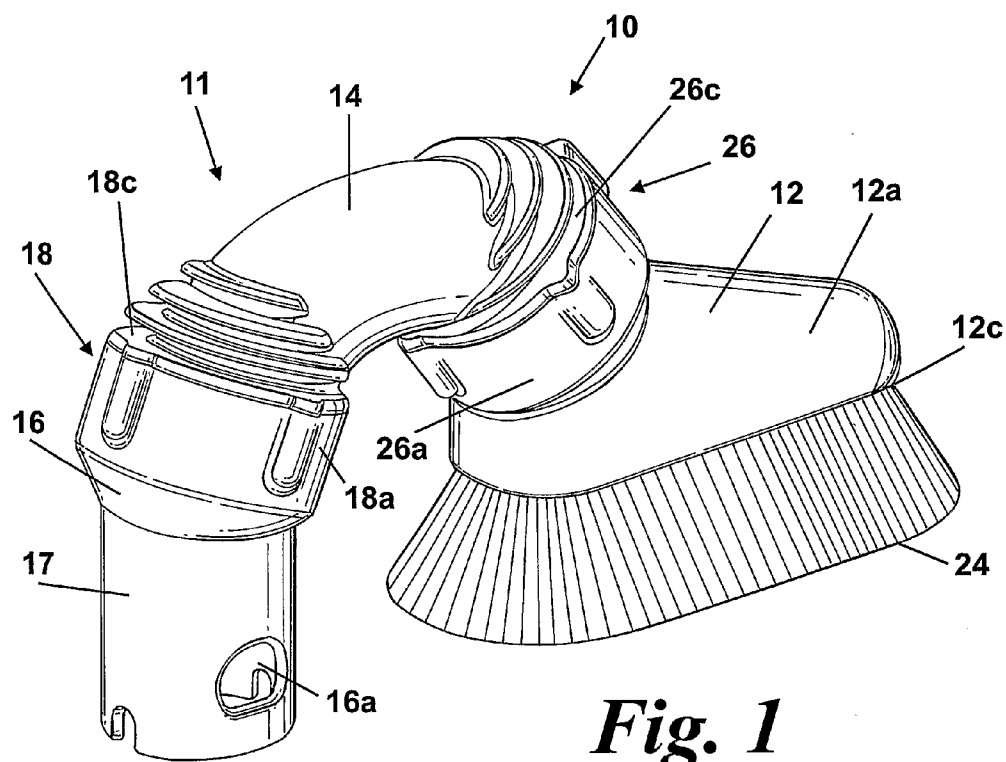
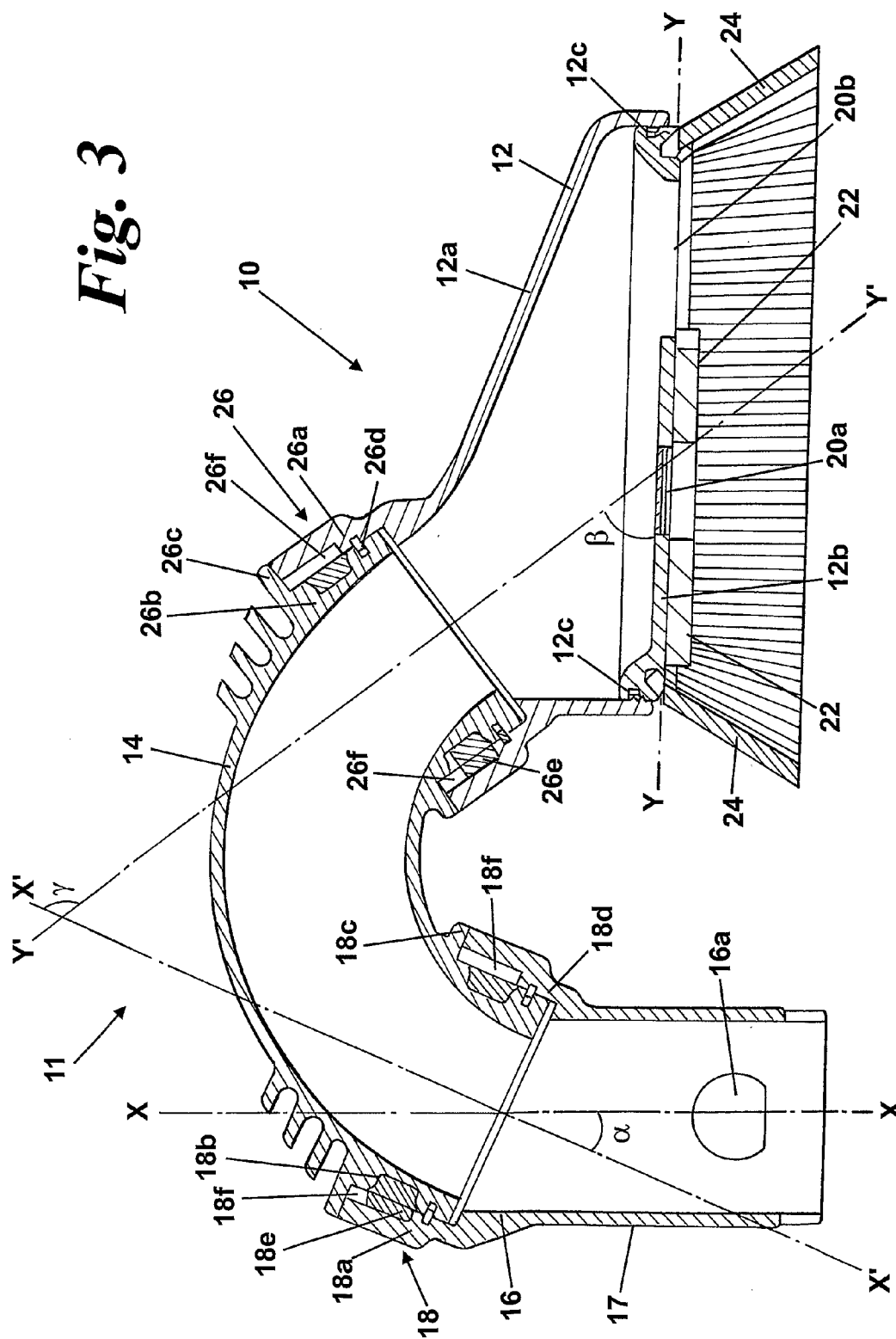


Fig. 3



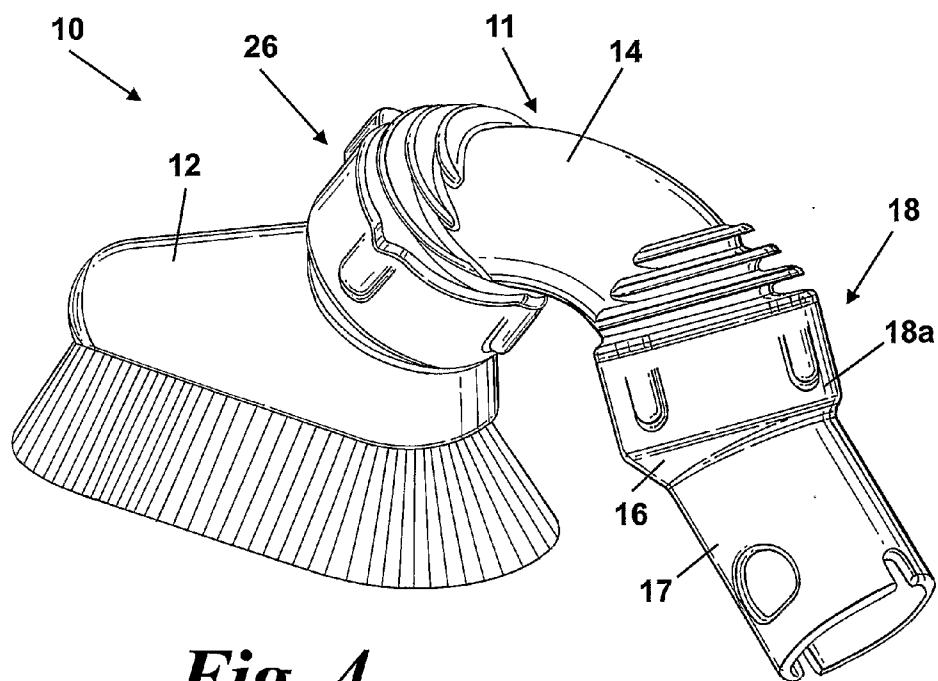


Fig. 4

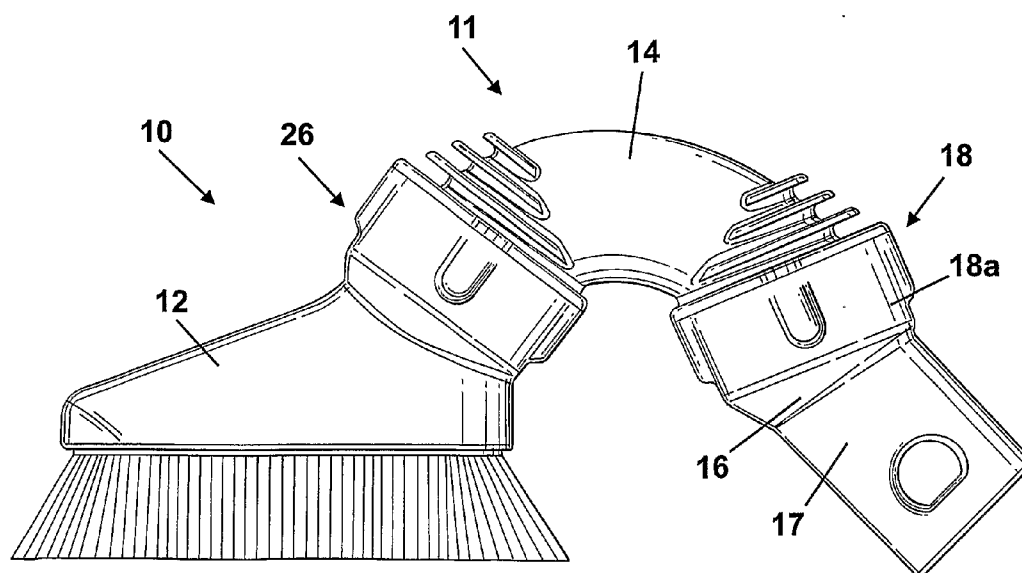


Fig. 5

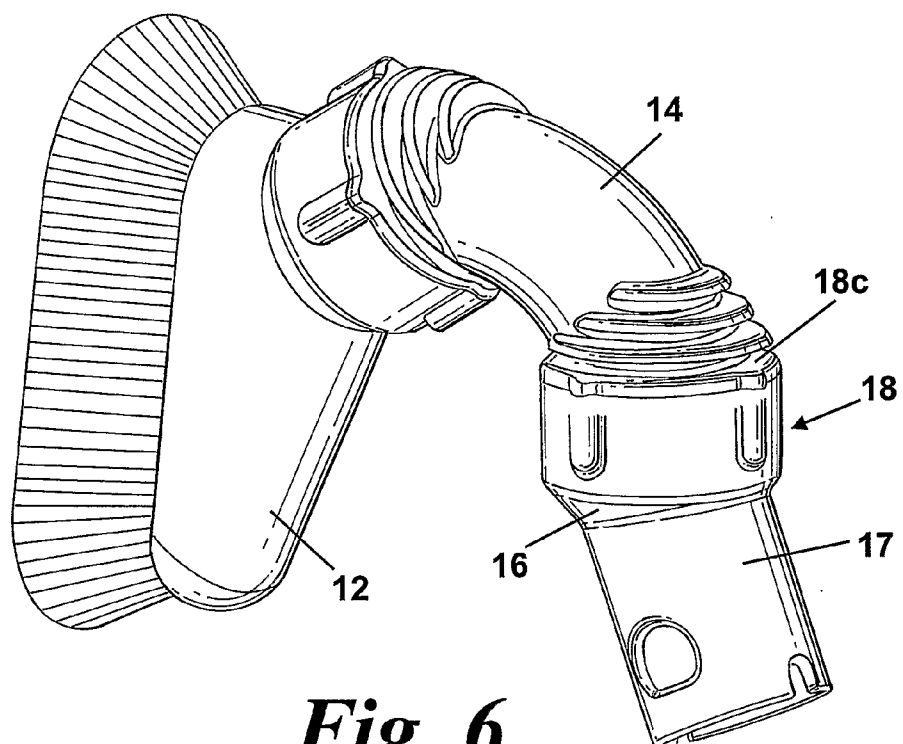


Fig. 6

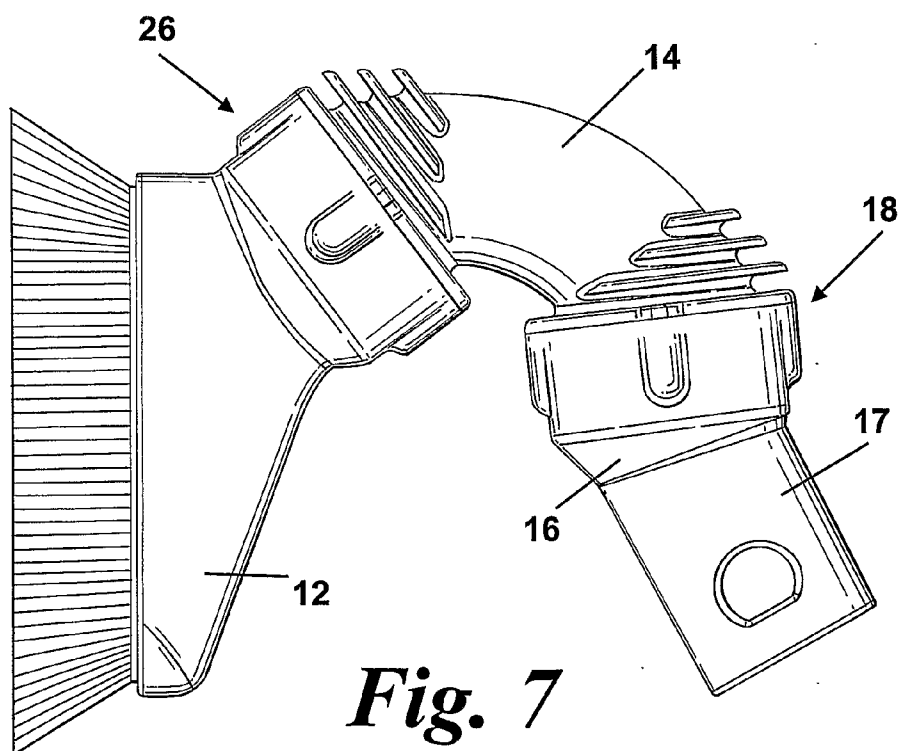


Fig. 7

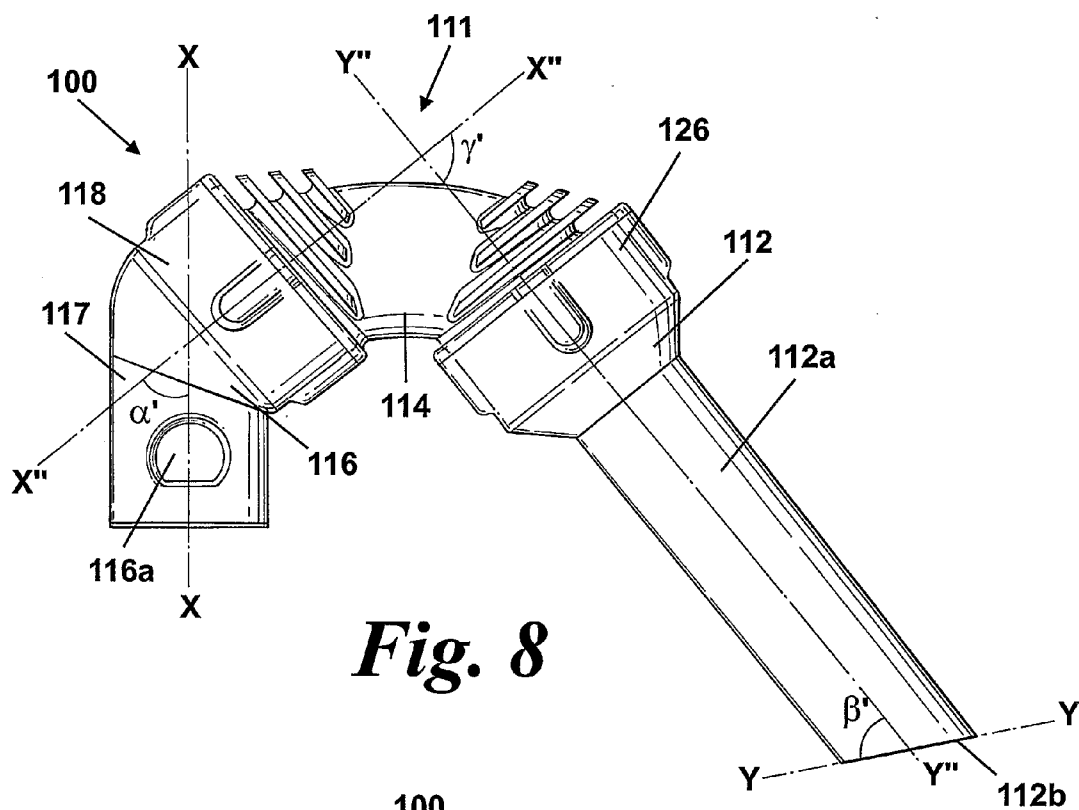


Fig. 8

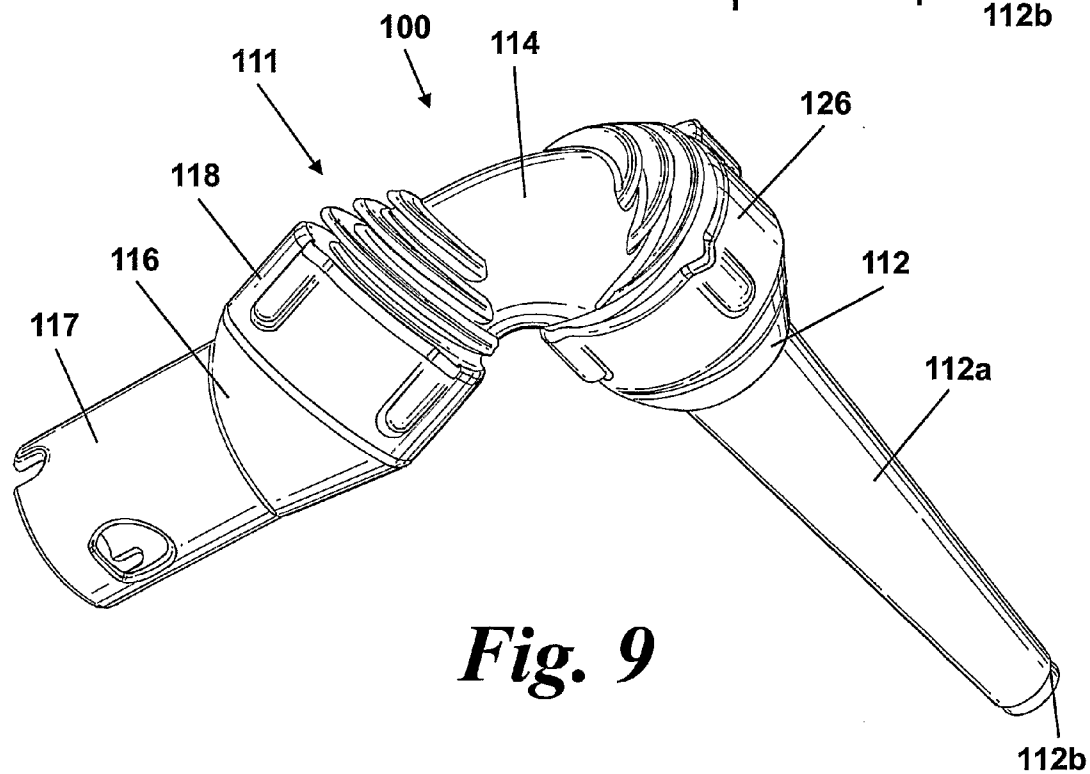


Fig. 9

ATTACHMENT FOR A CLEANING APPLIANCE

REFERENCE TO RELATED APPLICATIONS

[0001] This application is a national stage application under 35 USC 371 of International Application No. PCT/GB2007/000730, filed Mar. 1, 2007, which claims the priority of United Kingdom Application No. 0604654.4, filed Mar. 8, 2006, the contents of both of which prior applications are incorporated herein by reference.

FIELD OF THE INVENTION

[0002] The invention relates to an attachment for a cleaning appliance particularly, but not exclusively, for a vacuum cleaner.

BACKGROUND OF THE INVENTION

[0003] Attachments for vacuum cleaners are well known in the art. Vacuum cleaners are frequently sold with a range of attachments for different cleaning purposes. These attachments are usually fitted onto the end of a wand or hose of an upright or cylinder vacuum cleaner. For example, a vacuum cleaner may be provided with a brush tool for dusting surfaces, a stair tool for cleaning stairs, and a crevice tool for cleaning hard-to-reach areas which are difficult to access with larger attachments.

[0004] In order to clean effectively, it is important that a suction opening of an attachment is close to, or in contact with, a surface to be cleaned. Preferably, the whole of the suction opening should be in close proximity to the surface to be cleaned. If there is too great an air gap between the suction opening of the attachment and the surface to be cleaned, the air gap will act as an air bleed and less of the air entering the suction opening will have passed across or through the surface to be cleaned. Therefore, less dirt and dust will be picked up and the cleaning performance of the vacuum cleaner will be reduced.

[0005] In order to achieve sufficient proximity between the suction opening of an attachment and the surface to be cleaned, the wand or hose of the vacuum cleaner to which the attachment is connected must often be held at a particular angle. Therefore, there may be some surfaces which are orientated or positioned such that they either cannot be cleaned effectively or can only be cleaned with great difficulty using a conventional attachment. This is because the user may not be able to hold the wand or hose at the required angle in order to clean these surfaces. For example, the tops of doors, shelves or cabinets are particularly problematic due to their location at a high level relative to the user.

[0006] In order to reduce this problem, an attachment for a vacuum cleaner such as a stair tool or a brush tool is often provided with a rotatable connection located between the head of the tool and the connection part of the tool (which connects to the mouth of a wand or hose). The rotatable connection may be angled relative to the head or the connection part such that different angular orientations of the head with respect to the wand or hose can be achieved. This allows a user to clean more easily surfaces orientated or positioned awkwardly.

[0007] However, whilst an improvement on an attachment without a rotatable connection, a disadvantage of the above type of attachment is that a single rotatable connection only allows a limited range of angular positions of the head of the

attachment relative to the wand or hose. In particular, it is difficult to clean surfaces at a high level (for example the tops of shelving units, cupboards or light fittings) with this type of attachment. This is because the limited range of movement of the head of the attachment will mean that the wand or hose of the appliance must be held at an awkward angle in order to clean effectively. This is undesirable because it may be uncomfortable for a user to hold, or may result in some surfaces being impossible to clean.

[0008] Attachments for vacuum cleaners having two rotatable connections are known from U.S. Pat. No. 1,658,311 and JP 2003-000483. U.S. Pat. No. 1,658,311 discloses a vacuum cleaner attachment which comprises two perpendicular elbow joints connected by a plurality of coupling nuts.

[0009] The coupling nuts allow relative rotation between the elbow joints. This permits the nozzle of the attachment to be moved into different angular arrangements relative to a handle member. JP 2003-000483 discloses a vacuum cleaner attachment which comprises a square nozzle and a rear pipe which are connected together by a movable joint. The joint comprises a pair of parallel pivotable connections. The pivotable connections pivot the square nozzle up and down relative to the connecting portion.

[0010] However, the rotatable connections or pivots of the above-described attachments only allow movement of the respective nozzles in planes perpendicular to or parallel to the handle member or rear pipe of the respective attachments. This limits the range of potential orientations of the nozzle with respect to the handle.

SUMMARY OF THE INVENTION

[0011] It is an object of the present invention to provide an attachment for a cleaning appliance which allows the suction opening to be orientated with greater flexibility relative to the wand or hose than has been provided by the prior art. It is a further object to provide an attachment which is capable of cleaning a range of surfaces, in particular walls and high-level surfaces, with greater convenience for the user.

[0012] The invention provides an attachment for a cleaning appliance comprising a head and a neck, the head including a suction opening that lies in a suction plane, the neck including an intermediate portion and an end portion for connection to the mouth of a wand or hose, the end portion having a longitudinal axis, the attachment further comprising a first rotatable connection located between the end portion and the intermediate portion having a first axis of rotation, and a second rotatable connection located between the head and the intermediate portion having a second axis of rotation, each rotatable connection allowing relative movement of the end portion with respect to the head, wherein the first axis of rotation is inclined with respect to the longitudinal axis of the end portion, and the second axis of rotation is inclined with respect to the suction plane.

[0013] By providing an attachment for a cleaning appliance which has a first rotatable connection having an axis of rotation which is inclined with respect to the longitudinal axis of the end portion, the head of the attachment can be moved into a variety of useful positions to allow easier cleaning of walls and high-level horizontal surfaces.

[0014] By having the second axis of rotation inclined with respect to the suction plane, the head may be positioned in a wide range of angular orientations relative to the wand or hose such that a user can select the most appropriate orientation for the cleaning task in hand.

[0015] Preferably, the second axis of rotation is inclined to the suction plane at an angle in the range of 20° to 70°.

[0016] It has been shown by empirical analysis that the above ranges of angles produce the most useful range of positions of the head of the attachment. The criteria used to assess the usefulness of each angular orientation include the physical structure of the attachment, the ease of use of the resultant positions of the head and the useful difference in orientation between each resultant position of the head.

[0017] Preferably, the first axis of rotation is at an angle to the second axis of rotation. This permits an even greater range of movement of the head with respect to the end portion. More preferably, the first axis of rotation is at an angle in the range of 80° to 130° to the second axis of rotation. This range of angles has been shown by empirical analysis to produce the most useful range of positions of the head of the attachment whilst still allowing a compact, easy to manufacture attachment.

[0018] Preferably, the sum of the angle between the first axis of rotation and the longitudinal axis and the angle between the second axis of rotation and the suction plane is in the range of 40° to 130°. This combination of angles produces the most useful range of positions of the head of the attachment.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] Embodiments of the invention will now be described with reference to the accompanying drawings, in which:

[0020] FIG. 1 is a perspective view of an attachment according to a first embodiment of the present invention showing the attachment in a first configuration;

[0021] FIG. 2 is a side view of the attachment of FIG. 1;

[0022] FIG. 3 is a section through the attachment of FIG. 1;

[0023] FIG. 4 is a perspective view of the attachment of FIG. 1 showing the attachment in a second configuration;

[0024] FIG. 5 is a side view of the attachment of FIG. 1 showing the attachment in the second configuration;

[0025] FIG. 6 is a perspective view of the attachment of FIG. 1 showing the attachment in a third configuration;

[0026] FIG. 7 is a side view of the attachment of FIG. 1 showing the attachment in the third configuration;

[0027] FIG. 8 is a side view of an attachment according to a second embodiment of the invention showing the attachment in the first configuration; and

[0028] FIG. 9 is a perspective view of the attachment of FIG. 8 showing the attachment in a fourth configuration.

DETAILED DESCRIPTION OF THE INVENTION

[0029] FIGS. 1 to 7 show a first embodiment of the present invention. Referring firstly to FIGS. 1 to 3, the attachment 10 comprises a neck 11 and a head 12. The neck 11 includes a curved intermediate portion 14 and an end portion 16.

[0030] The end portion 16 has a cylindrical part 17 which is dimensioned to connect to a mouth of a wand or hose (not shown) of a vacuum cleaner. The end portion 16 has an axis X-X (FIG. 3) which lies coaxially with the cylindrical part 17. Two diametrically opposed apertures 16a are formed in the cylindrical part 17. The apertures 16a are dimensioned to receive lugs located on an outer wall of the wand or hose (not shown). This allows the attachment 10 to be attached to the wand or hose in a snap-fit fashion.

[0031] The end portion 16 is connected to the intermediate portion 14 through a first rotatable connection 18. The first rotatable connection 18 comprises a first connector 18a formed on the end portion 16 and a second connector 18b formed on the intermediate portion 14. The second connector 18b is located radially inwardly of, and in contact with, the first connector 18a. The internal surface of the second connector 18b is smoothly shaped to allow air to flow freely through the interior of the attachment 10. The distal end of the first connector 18a abuts an annular projection 18c. The annular projection 18c extends radially outwardly from the intermediate portion 14 at the proximal end of the second connector 18b. A metallic clip 18d is located in a groove in the second connector 18b and holds the first and second connectors 18a, 18b together whilst allowing relative rotation therebetween.

[0032] The first rotatable connection 18 has a first axis of rotation X'-X'. By this we mean that the first and second connectors 18a, 18b are able to rotate relative to one another about the first axis of rotation X'-X'. When the first and second connectors 18a, 18b are rotated relative to one another, the intermediate portion 14 is rotated relative to the end portion 16 about the first axis X'-X'. The first axis of rotation X'-X' is inclined to the axis X-X of the end portion 16 at an angle α . In this embodiment, α is 22.5°.

[0033] The first rotatable connection 18 has a first engaging means. The first engaging means allows the first connector 18a to be held in a series of discrete angular orientations relative to the second connector 18b. The first engaging means comprises a lug 18e attached to the second connector 18b and a plurality of recesses 18f formed in the first connector 18a. In this embodiment, four recesses 18f are provided. The recesses 18f are equispaced about the axis of rotation X'-X' of the first rotatable connection 18. Therefore, the recesses 18f have an angular separation of 90° to one another. The lug 18e is capable of engaging with each recess 18f to hold the first and second connectors 18a, 18b in position relative to one another.

[0034] The head 12 of the attachment 10 has an upper surface 12a and a planar lower surface 12b. Two suction openings 20a, 20b are formed in the planar lower surface 12b. The suction openings 20a, 20b lie in a common suction plane Y-Y. By this we mean that the planar lower surface 12b lies in the suction plane Y-Y and the suction openings 20a, 20b are formed in the planar lower surface 12b. A lint picker 22 is located on the planar lower surface 12b. A curtain of bristles 24 projects from a rim 12c of the lower surface 12b and surrounds the suction openings 20a, 20b.

[0035] A second rotatable connection 26 connects the head 12 to the intermediate portion 14. The second rotatable connection 26 is similar in construction to the first rotatable connection 18. The second rotatable connection 26 comprises a third connector 26a located on the proximal end of the head 12 and a fourth connector 26b located on the intermediate portion 14. The third connector 26a is located radially outwardly of, and in contact with, the fourth connector 26b. The end of the third connector 26a abuts an annular projection 26c which extends radially outwardly from the intermediate portion 14 at the proximal end of the fourth connector 26b. A metallic clip 26d is located in a groove in the fourth connector 26b and holds the third and fourth connectors 26a, 26b together whilst allowing relative rotation therebetween.

[0036] The second rotatable connection 26 has a second axis of rotation Y'-Y'. By this we mean that the third and fourth connectors 26a, 26b are able to rotate relative to one

another about the second axis of rotation $Y'-Y'$. When the third and fourth connectors **26a**, **26b** are rotated relative to one another, the head **12** is rotated relative to the intermediate portion **14** about the second axis $Y'-Y'$. The second axis of rotation $Y'-Y'$ is inclined to the suction plane $Y-Y$ of the end portion **16** at an angle β . In this embodiment, β is 37.5° .

[0037] The second rotatable connection **26** has a second engaging means. The second engaging means allows the third connector **26a** to be held in a series of discrete angular orientations relative to the fourth connector **26b**. The second engaging means comprises a lug **26e** attached to the fourth connector **26b** and a plurality of recesses **26f** formed in the third connector **26a**. In this embodiment, four recesses **26f** are provided. The recesses **26f** are equispaced about the axis of rotation $Y'-Y'$ of the first rotatable connection **26**. Therefore, the recesses **26f** have an angular separation of 90° to one another. The lug **26e** is capable of engaging with each recess **26f** to hold the third and fourth connectors **26a**, **26b** in position relative to one another.

[0038] The intermediate portion **14** is curved such that the first and second axes of rotation $X'-X'$, $Y'-Y'$ lie at an angle to one another. By this we mean that the first axis of rotation $X'-X'$ lies at an angle γ to the second axis of rotation $Y'-Y'$. In addition, both axes $X'-X'$, $Y'-Y'$ lie in a common plane. In this embodiment, γ is 120° .

[0039] In use, the attachment **10** can be connected to a wand or hose of a vacuum cleaner or other cleaning appliance (not shown). This is done by inserting the mouth of the wand or hose into the end portion **16**. Lugs (not shown) located on the mouth of the wand or hose engage with the apertures **16a** to prevent the attachment **10** from becoming detached when in use.

[0040] FIGS. 1 to 3 show the attachment **10** in a first configuration. This configuration is useful to clean, for example, the tops of doors and also allows the attachment **10** to be stored in a compact manner. In the first configuration, each of the first and second rotatable connections **18**, **26** are in a first position.

[0041] However, the first and second rotatable connections **18**, **26** can be moved into a variety of positions to allow the user to clean a range of surfaces. FIGS. 4 and 5 show the attachment **10** in a second configuration. In the second configuration, the first rotatable connection **18** is in a second position and the second rotatable connection **26** is in the first position. Starting from the first position, in order to reach the second position the first connector **18a** must be rotated through an angle of 180° relative to the second connector **18b**. To select this position, the user grasps the attachment and twists the intermediate portion **14** relative to the end portion **16**. When the applied twisting force is sufficient to disengage the lug **18e** from the respective recess **18f**, the intermediate portion **14** can be rotated with respect to the end portion **16** about the axis $X'-X'$. The lug **18e** can then be rotated through 90° to reach the next recess **18f**. This process can be repeated to rotate the lug **18e** through another 90° to engage with a recess **18f** which is diametrically opposed to the starting recess **18f**. The attachment **10** is now in the second configuration. In this configuration, a user can clean easily the tops of cabinets and high shelves.

[0042] FIGS. 6 and 7 show the attachment **10** in a third configuration. In this configuration, both of the first and second rotatable connections **18**, **26** are in the second position (i.e. rotated through 180° with respect to the first position).

When the attachment **10** is in the third configuration, a user is able to clean easily vertical or near vertical surfaces such as blinds and walls.

[0043] Positions intermediate to the first and second positions can also be selected. These additional positions allow the head to be angled sideways in addition to vertically up/down relative to the axis of the wand or hose. This allows a user to clean awkward areas such as the corners of a room or a cabinet.

[0044] A second embodiment of the invention is shown in FIGS. 8 and 9. The attachment **100** is similar in construction to the attachment **10** of the first embodiment. The attachment **100** comprises a neck **111** and a head **112**. The neck includes a curved intermediate portion **114** and an end portion **116**. The end portion **116** includes a cylindrical part **117** for attachment to a wand or hose of a vacuum cleaner or other cleaning device.

[0045] The attachment has a first rotatable connection **118**. The first rotatable connection **118** has a first axis of rotation $X''-X''$ which is inclined with respect to an axis $X-X$ of the end portion **116** which lies coaxially with the cylindrical part **117**. In this embodiment, the angle α' between the first axis of rotation $X''-X''$ and the axis $X-X$ of the end portion **116** is 50° .

[0046] In this embodiment, the head **112** takes the form of a crevice tool. Expressed another way, the head **112** comprises an elongate, tapered member **112a**. A suction opening **112b** is formed at the distal end of the head **112**. The suction opening **112b** lies in a suction plane $Y-Y$.

[0047] The head **112** is attached to the intermediate portion **114** by a second rotatable connection **126**. The second rotatable connection **126** is similar to the second rotatable connection **26** of the first embodiment. The second rotatable connection **126** has a second axis of rotation $Y''-Y''$ which is inclined with respect to the suction plane $Y-Y$. The angle β' between the second axis of rotation $Y''-Y''$ and the suction plane $Y-Y$ in this embodiment is 60° .

[0048] The intermediate portion **114** connects the first and second connectors **118**, **126**. In this embodiment, the angle γ' between the first axis of rotation $X''-X''$ and the second axis of rotation $Y''-Y''$ is 90° .

[0049] In use, the attachment **100** can be connected to a wand or hose (not shown) to be used in a similar manner to the attachment **10** of the first embodiment. However, the combinations of the angles α' , β' and γ' in this embodiment allow different positions of the head **112** relative to the axis of the wand or hose. FIG. 9 shows the attachment **100** in a fourth configuration. In the fourth configuration, both of the first and second rotatable connections are in positions intermediate to the first and second positions as illustrated in FIGS. 1 to 7 of the first embodiment. This position allows the head **112** of the attachment **100** to be inserted into difficult to reach areas that are orientated and positioned awkwardly. Further, the provision of the head **112** which comprises a crevice tool allows the cleaning of surfaces that are difficult to reach with a brush-type head; for example, confined spaces such as the foot well of a motor vehicle.

[0050] Variations will be apparent to the person skilled in the art. For example, more than two rotatable connections may be provided. All that is required is that at least two rotatable connections are provided and that one of the rotatable connections must have an axis of rotation that is inclined with respect to the axis of the end portion of the attachment.

[0051] Further, the two rotatable connections do not need to be similar and could involve different types of connection such as pivots or gimbals.

[0052] Additionally, any number of suction openings can be provided. If more than one suction opening is provided, they do not need to lie all in the same plane.

[0053] The head of the attachment need not comprise a brush head or a crevice tool and instead may take any suitable form. For example, it may comprise a stair tool, a comb or other grooming implement.

[0054] The angles α , α' , β and β' do not have to take the values described in the embodiments and can be varied independently according to the particular design requirements of the attachment. It is only required that α , α' , β and β' take values which are not 0° , 90° , 180° or 270° . Additionally, the angles γ and γ' do not need to be 90° or 120° and may take any reasonable value.

[0055] The attachment may also be used in a variety of cleaning appliances, for example carpet sweepers, vacuum cleaners, industrial suction devices or tank vacuums. If the attachment is to be used with a domestic vacuum cleaner, any suitable type of vacuum cleaner may be used, for example upright vacuum cleaners, cylinder vacuum cleaners, stick-vacuum type machines or hand-held spot cleaners.

1. An attachment for a cleaning appliance comprising a head and a neck, the head including a suction opening that lies in a suction plane, the neck including an intermediate portion and an end portion for connection to the mouth of a wand or hose, the end portion having a longitudinal axis, the attachment further comprising a first rotatable connection located between the end portion and the intermediate portion having a first axis of rotation, and a second rotatable connection located between the head and the intermediate portion having a second axis of rotation, each rotatable connection allowing relative movement of the end portion with respect to the head, wherein the first axis of rotation is inclined with respect to the longitudinal axis of the end portion, and the second axis of rotation is inclined with respect to the suction plane.

2. An attachment according to claim 1, wherein the first axis of rotation is inclined to the longitudinal axis of the end portion at an angle in the range of 20° to 60° .

3. An attachment according to claim 1 or 2, wherein the second axis of rotation is inclined to the suction plane at an angle in the range of 20° to 70° .

4. An attachment according to claim 1 or 2, wherein the first axis of rotation is at an angle to the second axis of rotation.

5. An attachment according to claim 4, wherein the first axis of rotation is at an angle to the second axis of rotation in the range of 80° to 130° .

6. An attachment according to claim 1 or 2, wherein the first and second axes of rotation lie in a common plane.

7. An attachment according to claim 1 or 2, wherein the sum of the angle between the first axis of rotation and the longitudinal axis and the angle between the second axis of rotation and the suction plane is in the range of 40° to 130° .

8. An attachment according to claim 1 or 2, wherein the intermediate portion is curved.

9. An attachment according to claim 1 or 2, wherein the first rotatable connection comprises a first engaging device for holding the first rotatable connection in at least one discrete angular orientation.

10. An attachment according to claim 9, wherein the first engaging device is adapted to hold the first rotatable connection in one of four discrete angular orientations.

11. An attachment according to claim 1 or 2, wherein the second rotatable connection comprises a second engaging device for holding the rotatable connections in at least one discrete angular orientation.

12. An attachment according to claim 11, wherein the second engaging means are adapted to hold the second rotatable connection in one of four discrete angular orientations.

13. (canceled)

14. A vacuum cleaner comprising the attachment according to claim 1 or 2.

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