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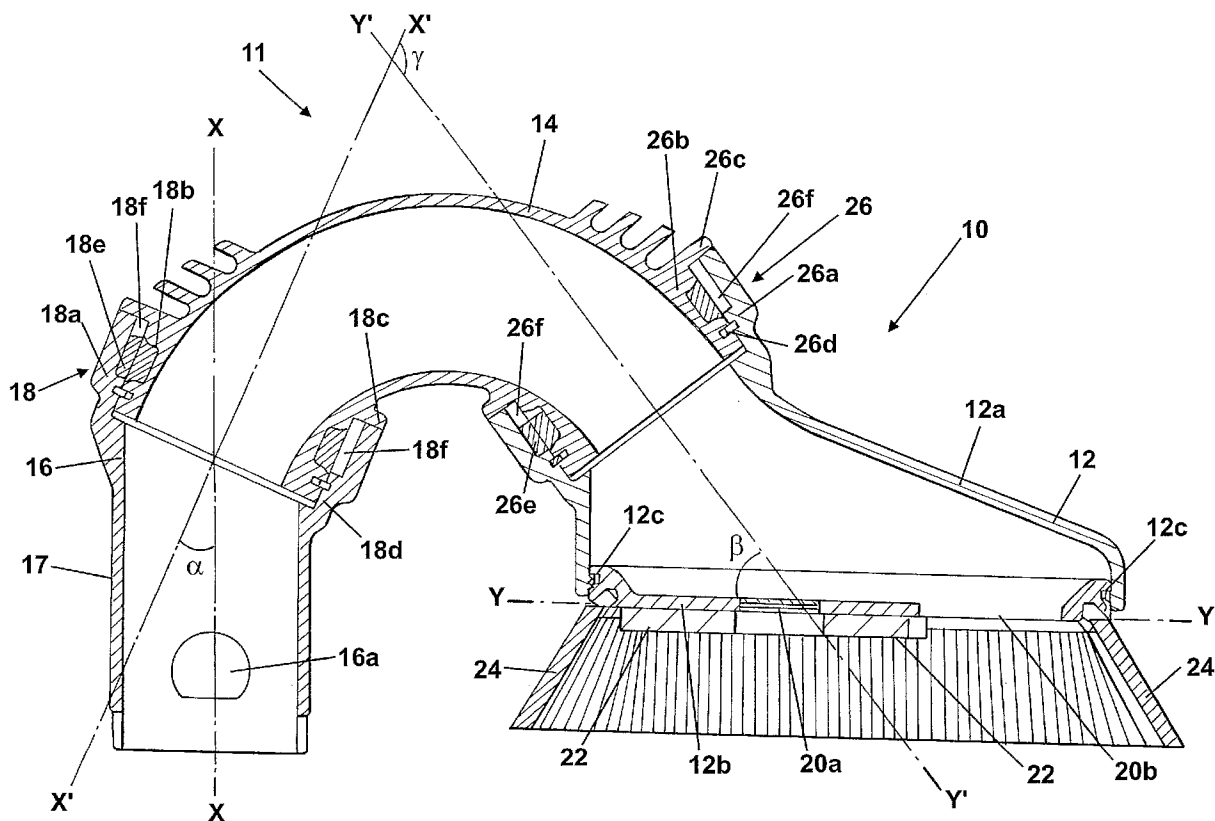
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(54) Title: AN ATTACHMENT FOR A CLEANING APPLIANCE



(57) Abrégé/Abstract:

The invention provides an attachment (10; 100) for a cleaning appliance comprising a head (2; 112) and a neck (11; 111) the head (12; 112) including a suction opening (20a, 20b; 112b) and the neck including an intermediate portion (14; 114) and an end



(57) Abrégé(suite)/Abstract(continued):

portion (16; 116) for connection to the mouth of a wand or hose . The end portion has a longitudinal axis -(X-X) . The attachment further comprises a first rotatable connection (18; 118) located between the end portion and the intermediate portion (14; 114) having a first axis of rotation (X' -X' ; X' '-X' ') , and a second rotatable connection <26; 126) located between the head (12;- 112) and the intermediate portion (14; 114) having a second axis of rotation (Y' -Y' ; Y' '-Y' ') . Each rotatable connection (18, 2-6; 118, 126) allows relative movement of the end portion with respect to the head (12; 112) . The axis of rotation (X'-X' ; X' '-X' ") of the first rotatable connection (18; 118) is inclined with respect to the longitudinal axis -(X-X) of the end portion . By providing an attachment (10; 100) for a cleaning appliance which has a first rotatable connection (18; 118) having an axis of rotation (X'-X' ; X' '-X' ') which is inclined with respect the longitudinal axis (X-X) of the end portion , the head (12; 112) of the attachment (10; 100) -can be moved into a variety of useful positions to allow easier cleaning of walls and high-level horizontal surfaces.

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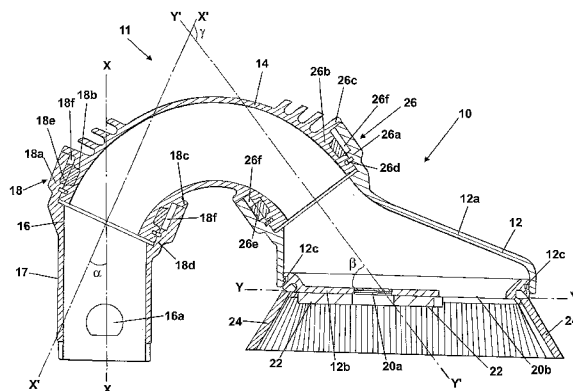
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(54) Title: AN ATTACHMENT FOR A CLEANING APPLIANCE



(57) Abstract: The invention provides an attachment (10; 100) for a cleaning appliance comprising a head (2; 112) and a neck (11; 111) the head (12; 112) including a suction opening (20a, 20b; 112b) and the neck including an intermediate portion (14; 114) and an end portion (16; 116) for connection to the mouth of a wand or hose. The end portion has a longitudinal axis -(X-X). The attachment further comprises a first rotatable connection (18; 118) located between the end portion and the intermediate portion (14; 114) having a first axis of rotation (X'-X'; X''-X''), and a second rotatable connection (26; 126) located between the head (12; 112) and the intermediate portion (14; 114) having a second axis of rotation (Y'-Y'; Y''-Y''). Each rotatable connection (18; 26; 118, 126) allows relative movement of the end portion with respect to the head (12; 112). The axis of rotation (X'-X'; X''-X'') of the first rotatable connection (18; 118) is inclined with respect to the longitudinal axis -(X-X) of the end portion. By providing an attachment (10; 100) for a cleaning appliance which has a first rotatable connection (18; 118) having an axis of rotation (X'-X'; X''-X'') which is inclined with respect the longitudinal axis (X-X) of the end portion, the head (12; 112) of the attachment (10; 100) can be moved into a variety of useful positions to allow easier cleaning of walls and high-level horizontal surfaces.

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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.

An Attachment for a Cleaning Appliance

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

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
10 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.

In order to clean effectively, it is important that a suction opening of an attachment is
15 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
20 picked up and the cleaning performance of the vacuum cleaner will be reduced.

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
25 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
30 the user.

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.

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.

Attachments for vacuum cleaners having two rotatable connections are known from US 1,658,311 and JP 2003-000483. US 1,658,311 discloses a vacuum cleaner attachment which comprises two perpendicular elbow joints connected by a plurality of coupling nuts. 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.

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.

It is an object of the present invention to provide an attachment for a cleaning appliance
5 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.

10 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
15 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
20 suction plane.

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

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.

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

- 5 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.

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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.

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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.

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

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Figure 1 is a perspective view of an attachment according to a first embodiment of the present invention showing the attachment in a first configuration;

Figure 2 is a side view of the attachment of Figure 1;

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Figure 3 is a section through the attachment of Figure 1;

Figure 4 is a perspective view of the attachment of Figure 1 showing the attachment in a second configuration;

- 5 Figure 5 is a side view of the attachment of Figure 1 showing the attachment in the second configuration;

Figure 6 is a perspective view of the attachment of Figure 1 showing the attachment in a third configuration;

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Figure 7 is a side view of the attachment of Figure 1 showing the attachment in the third configuration;

- 15 Figure 8 is a side view of an attachment according to a second embodiment of the invention showing the attachment in the first configuration; and

Figure 9 is a perspective view of the attachment of Figure 8 showing the attachment in a fourth configuration.

- 20 Figures 1 to 7 show a first embodiment of the present invention. Referring firstly to Figures 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.

25 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 (Figure 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.

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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.

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° .

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.

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.

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.

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°.

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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

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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.

5 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° .

10 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.

15 Figures 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.

20 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. Figures 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

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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.

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Figures 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.

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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.

15

A second embodiment of the invention is shown in Figures 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.

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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°.

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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

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112b is formed at the distal end of the head 112. The suction opening 112b lies in a suction plane Y-Y.

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° .

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° .

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 the axis of the wand or hose. Figure 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 Figures 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.

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.

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

- 5 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.

10 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.

15 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.

20 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.

CLAIMS

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 any one of the preceding claims, wherein the first axis of rotation is at an angle to the second axis of rotation.
5. An attachment according to claim 5, 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 any one of the preceding claims, wherein the first and second axes of rotation lie in a common plane.
7. An attachment according to any one of the preceding claims, wherein the sum of the angle between the first axis of rotation and the longitudinal axis and the angle

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between the second axis of rotation and the suction plane is in the range of 40° to 130°.

8. An attachment according to any one of the preceding claims, wherein the intermediate portion is curved.

9. An attachment according to any one of the preceding claims, wherein the first rotatable connection comprises first engaging means for holding the first rotatable connection in at least one discrete angular orientation.

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

11. An attachment according to any one of the preceding claims, wherein the second rotatable connection comprises second engaging means for holding the rotatable connections in at least one discrete angular orientation.

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

13. An accessory tool as hereinbefore described with reference to any one of the embodiments shown in the accompanying drawings.

14. A vacuum cleaner including the accessory tool according to any one of the preceding claims.

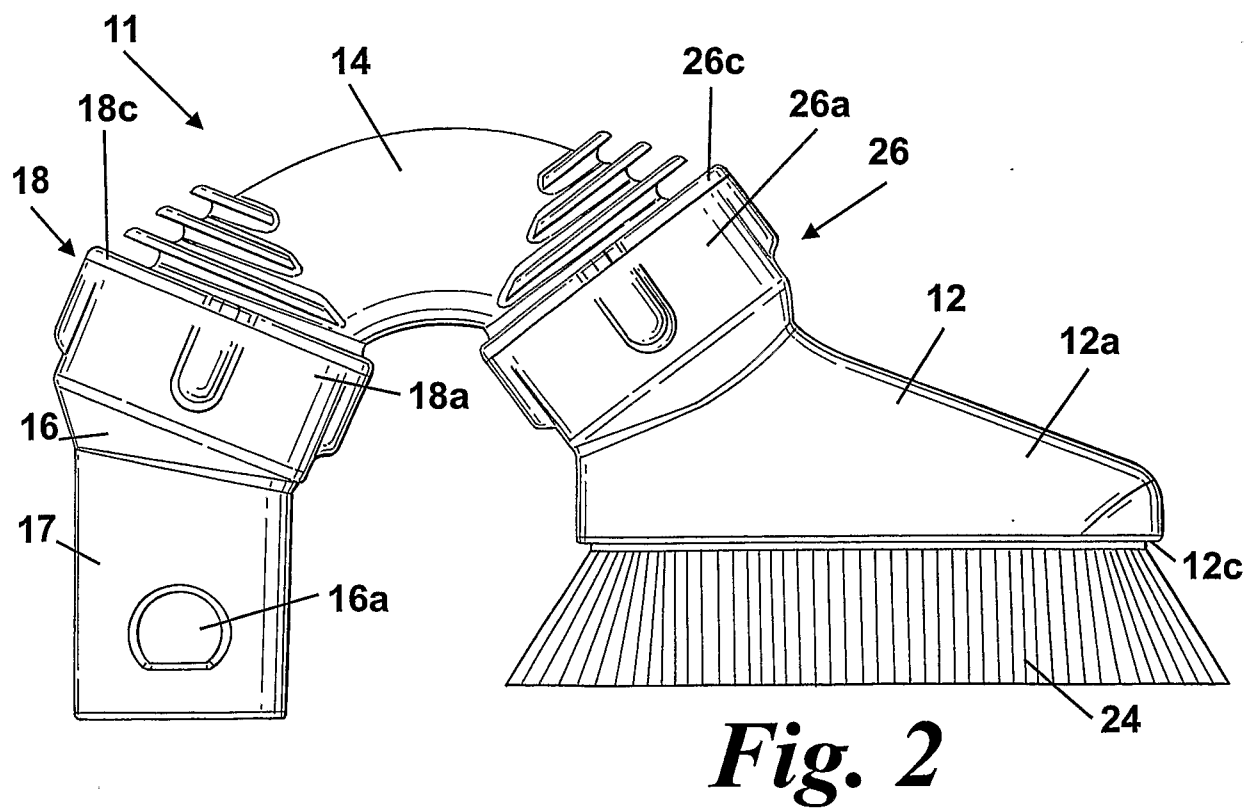
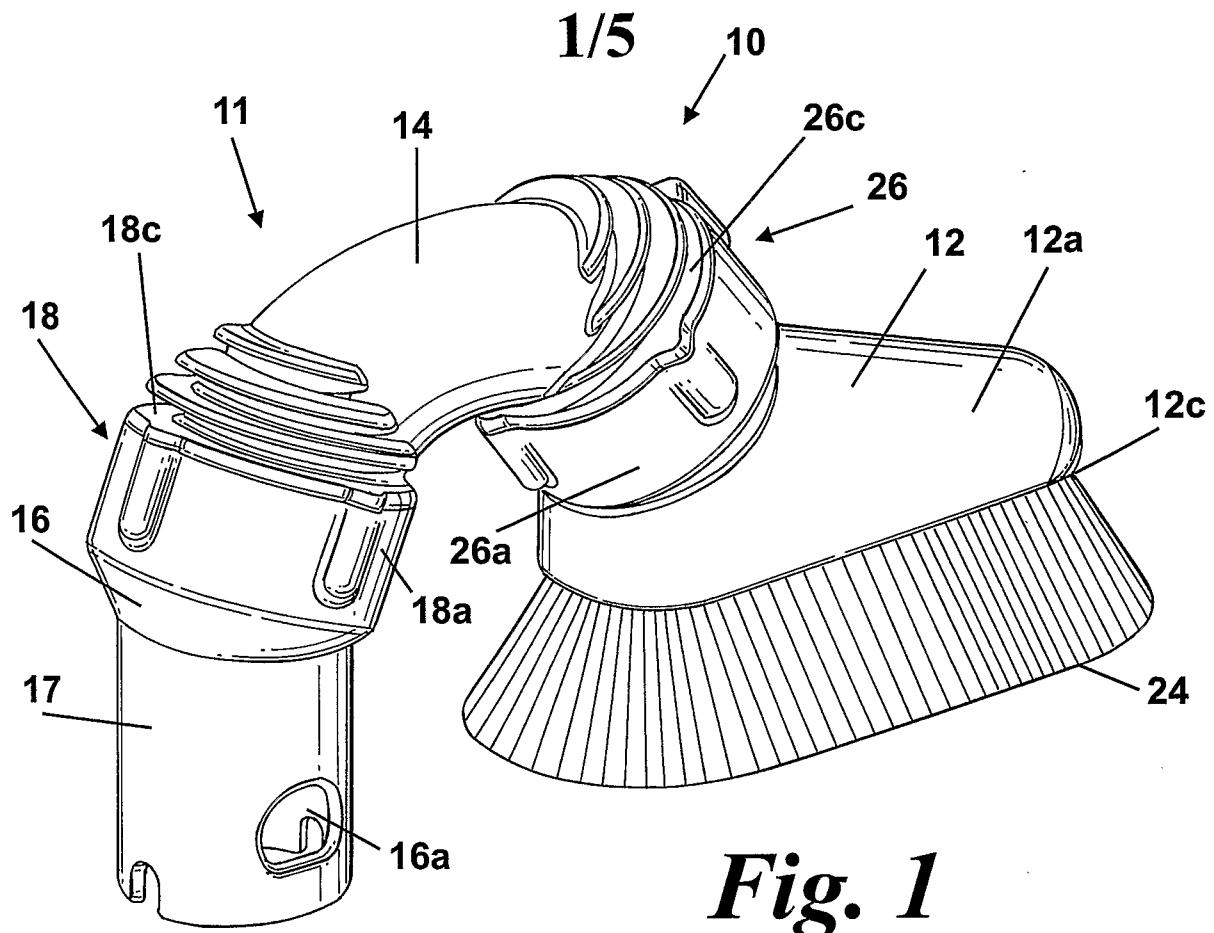
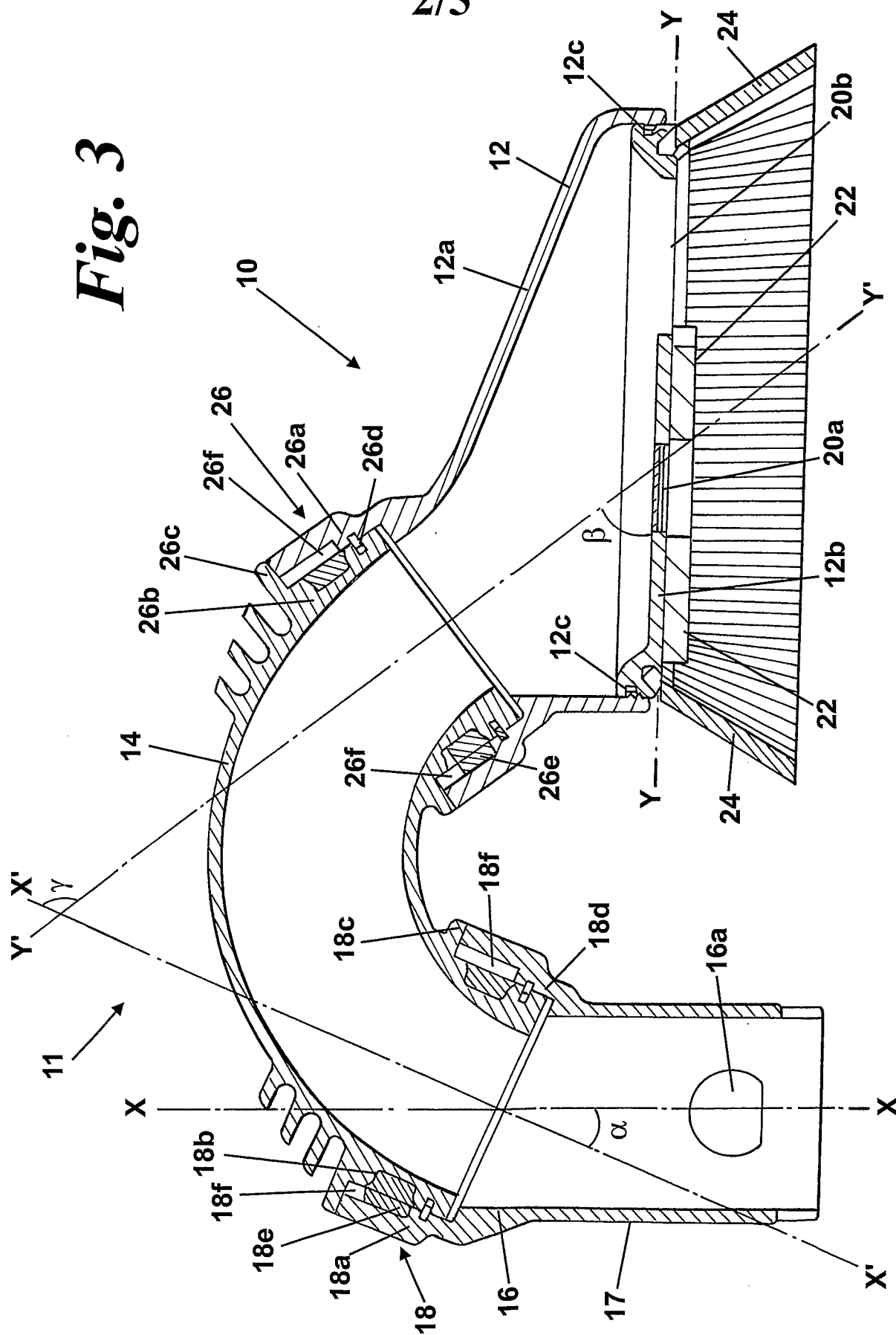


Fig. 3



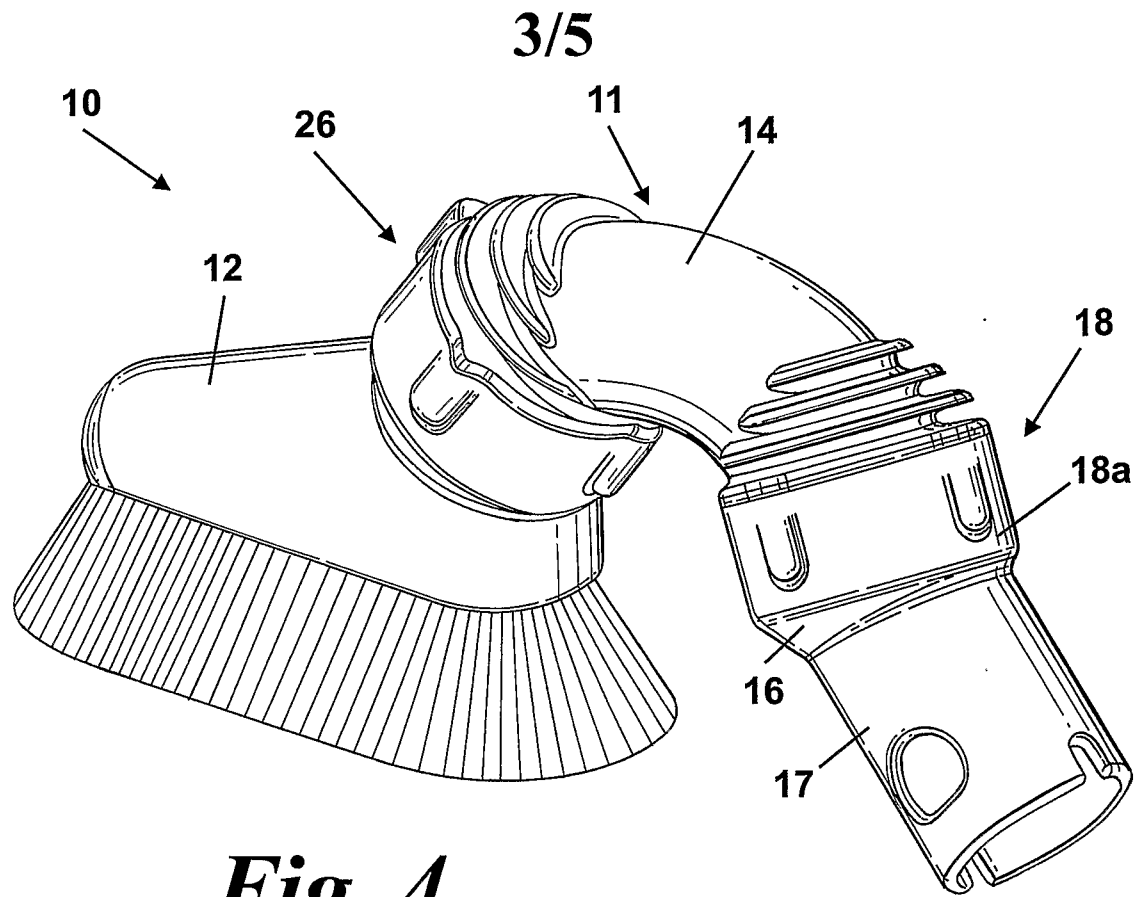


Fig. 4

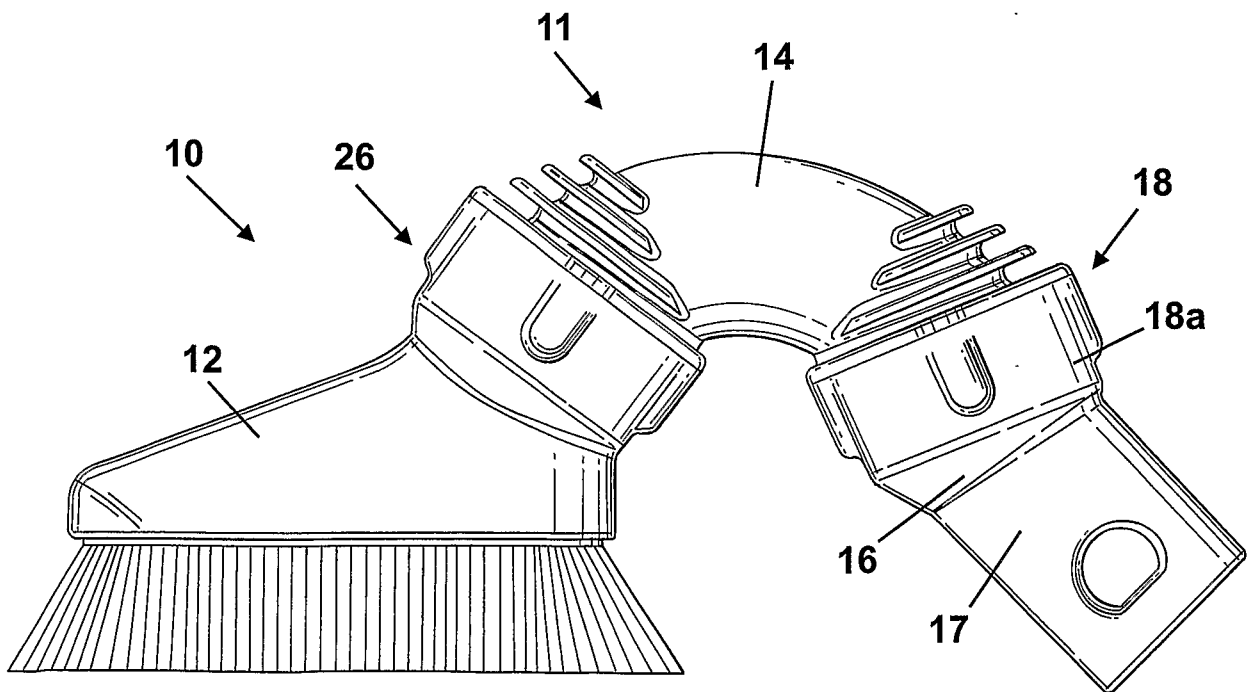
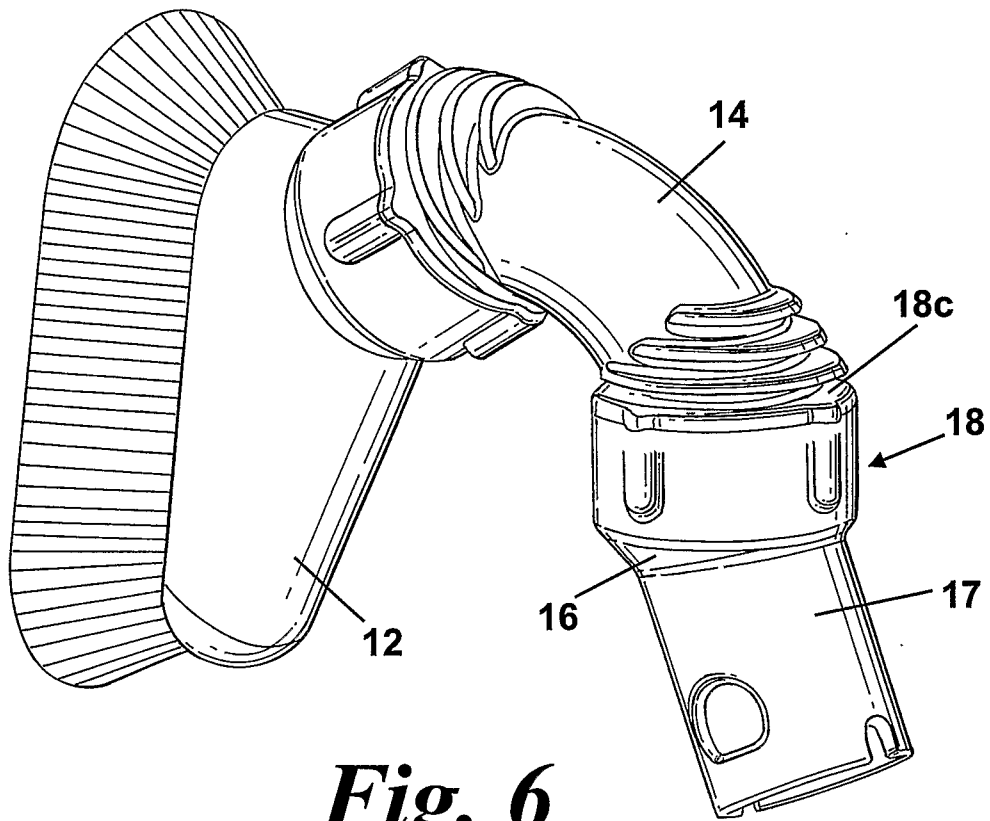
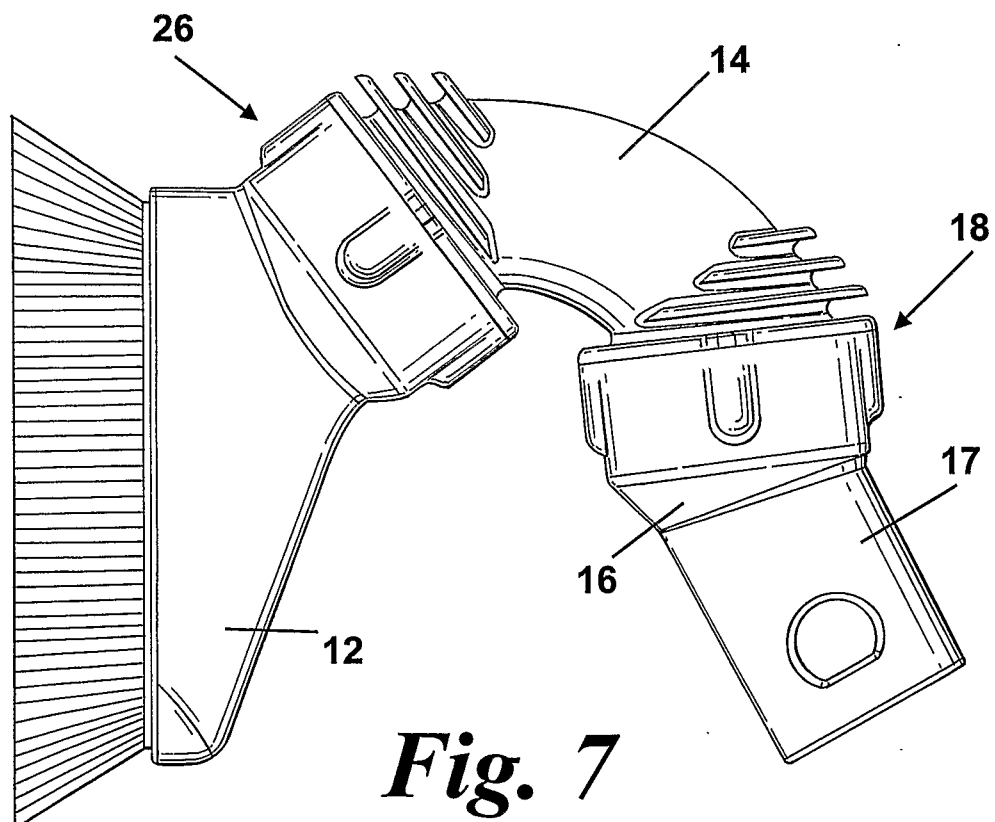
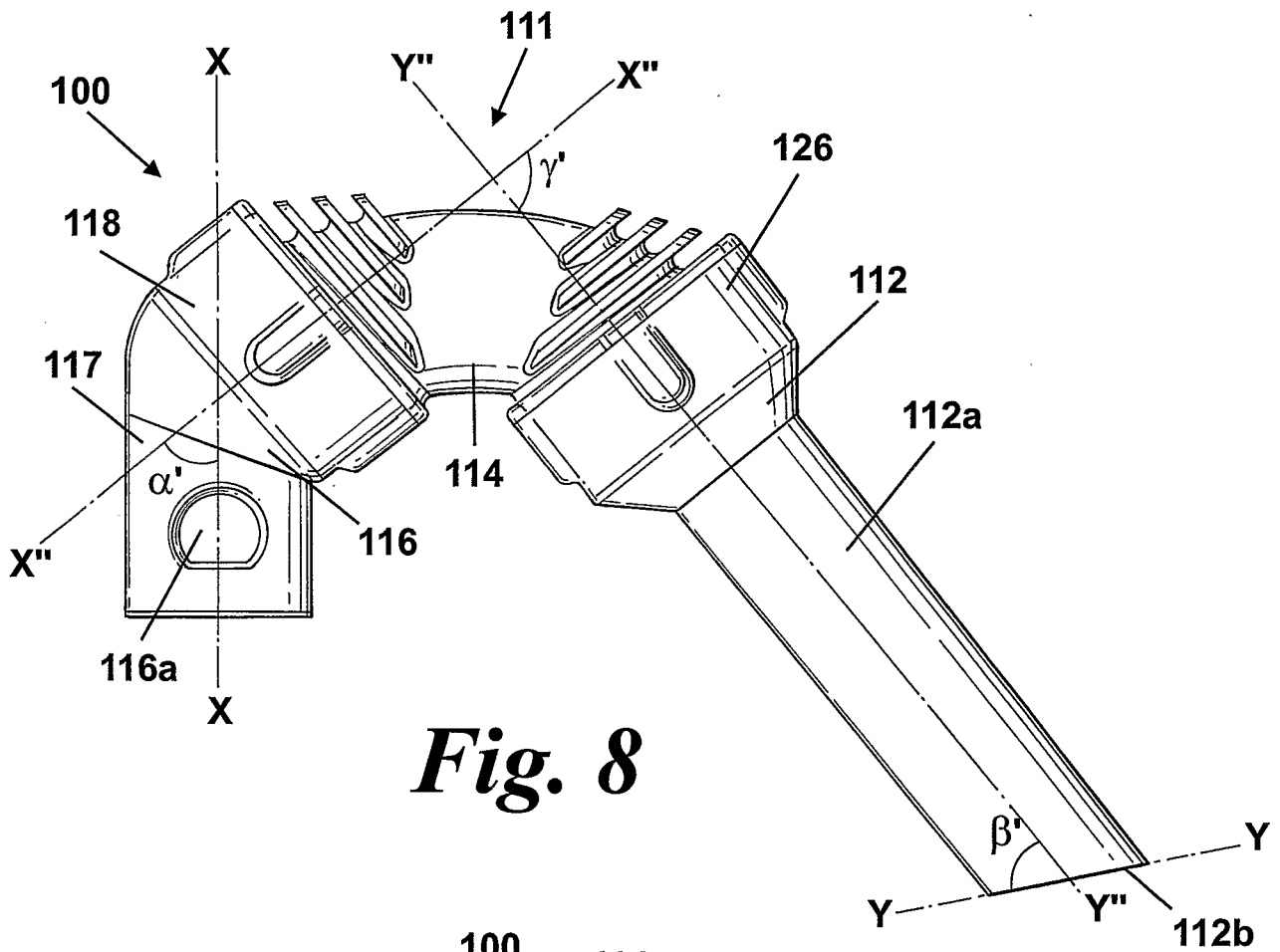
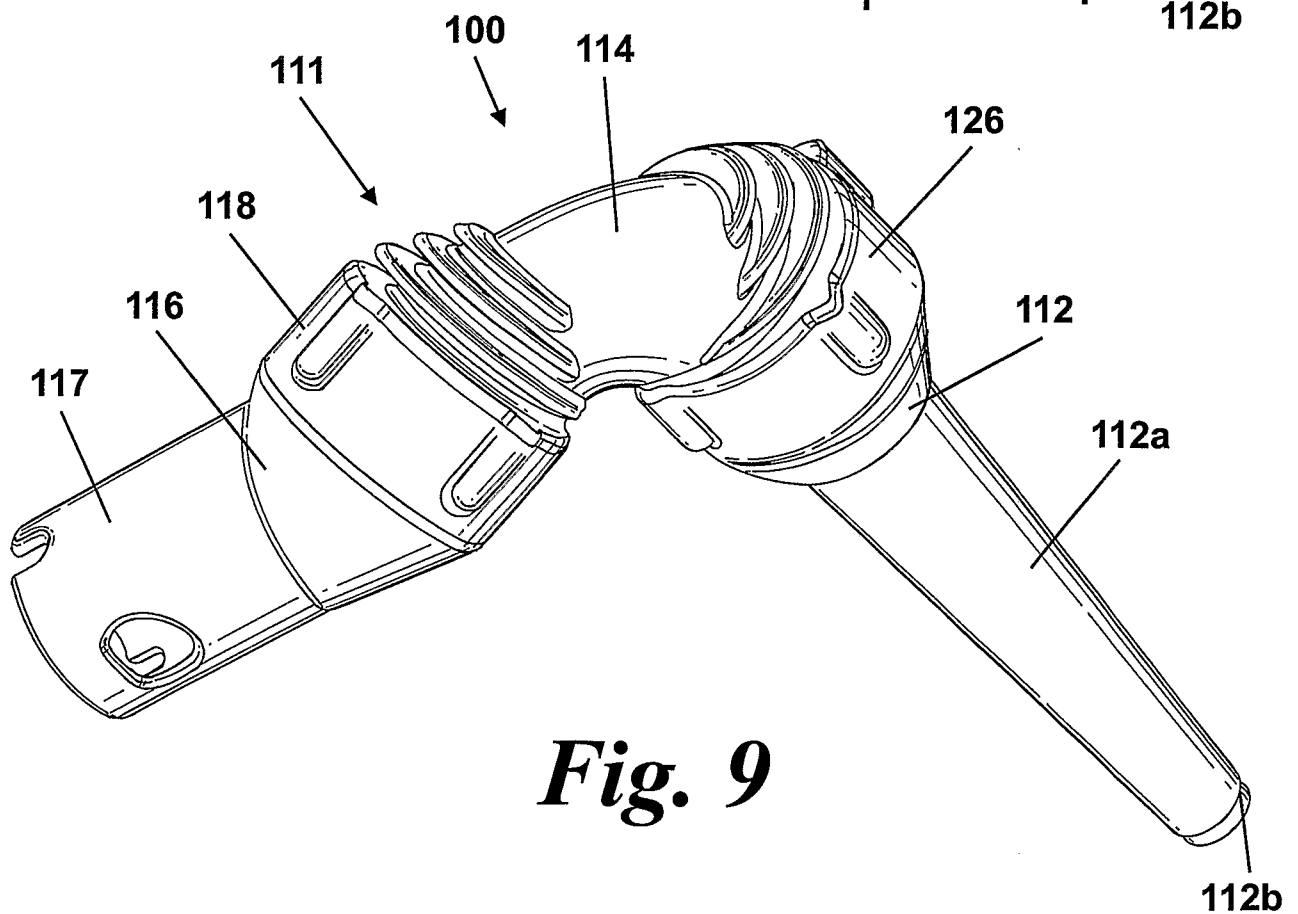


Fig. 5

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*Fig. 6**Fig. 7*

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*Fig. 8**Fig. 9*

