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(54) **A surface treating appliance**

(57) The invention provides a surface treating appliance (10) comprising a main body (12), a head (14) and a connector (40). The connector (40) is adapted and arranged to connect the head (14) to the main body (12) whilst allowing relative rotation therebetween. The connector (40) includes a connecting member (54) which is removable from the remainder of the connector (40) to allow the head (14) to be released from the main body

(12). At least a part of the connecting member (54) forms a part of the external surface of the surface treating appliance (10). By providing such an arrangement, the connecting member (54) is immediately visible to the user and can be accessed easily. Further, only the connecting member (54) needs to be removed in order to release the head (14) from the main body (12), making removal of the head (14) a simple and straightforward process.

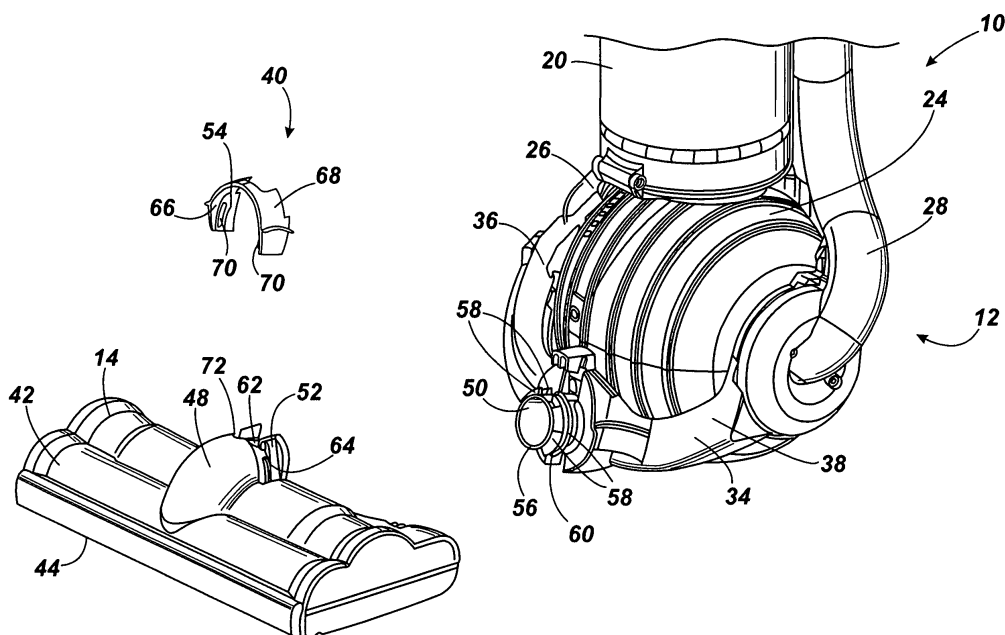


Fig. 2

Description

[0001] The present invention relates to a surface treating appliance. Particularly, but not exclusively, the present invention relates to a vacuum cleaner.

[0002] Upright vacuum cleaners are well known and generally comprise a cleaner head and a main body. The cleaner head is pivotably attached to the main body which is supported on a pair of wheels and has a handle to allow the vacuum cleaner to be manipulated by a user. An example of such a cleaner is sold by Dyson™ under the trade name DC07™.

[0003] An alternative arrangement is disclosed in WO 2004/014211, which describes an upright vacuum cleaner having a cleaner head and a main body which is supported and steered on a ball-type rolling member to improve manoeuvrability. A rotatable connection is provided between the cleaner head and the main body to ensure that the cleaner head remains on the floor surface when the vacuum cleaner is turned.

[0004] In both of the above cases, it is useful for the cleaner head to be removable from the main body of the vacuum cleaner for storage and packaging purposes. A removable cleaner head can be either stored separately from the main body or placed in a more compact arrangement with respect to the main body, reducing the storage space needed for the vacuum cleaner and the size of the box required for transportation. Further, a cleaner head is more convenient to clean when separated from the main body of the vacuum cleaner.

[0005] Examples of removable cleaner heads are shown and described in US 2,619,671 and US 2,734,215. Each of the cleaner heads shown therein has a rotatable connection which allows the cleaner head to be rotated with respect to the remainder of the vacuum cleaner. The cleaner head is removable by first releasing a lower part of the cleaner head, before removing a U-shaped clip to release the cleaner head from the remainder of the vacuum cleaner. Therefore, a number of steps must be undertaken in order to remove the cleaner head. This is inconvenient and time consuming for a user.

[0006] An alternative arrangement is used on a range of vacuum cleaners sold by Dyson™ under the trade name DC18™. These vacuum cleaners comprise a removable cleaner head which is rotatable with respect to a main body of the vacuum cleaner. A rotatable connector is provided on the main body, the cleaner head being attached to a part of the connector which is rotatable with respect to the main body. However, whilst robust, such a connector is relatively large and so is unsuitable for use in a small vacuum cleaner due to size constraints.

[0007] It is an object of the present invention to provide a surface treating appliance having a removable cleaner head which is rotatably connectable to the remainder of the surface treating appliance, but which is more straightforward to remove and more compact than known arrangements.

[0008] According to the invention, there is provided a

surface treating appliance comprising a main body, a head and a connector adapted and arranged to secure the head to the main body whilst allowing relative rotation therebetween, the connector including a connecting member which is removable from the remainder of the connector to allow the head to be released from the main body, wherein at least a part of the connecting member forms a part of the external surface of the surface treating appliance.

[0009] By providing a connecting member which forms a part of the external surface of the surface treating appliance, the connecting member is immediately visible to the user and can be accessed easily. Further, only the connecting member needs to be removed in order to release the head from the main body, making removal of the head a simple and straightforward process.

[0010] Preferably, the connector further includes a first part located on the main body and a second part located on the head, the first and second parts being connectable and rotatable with respect to one another about a common axis. More preferably, the first and second parts are rotatably secured to one another by the connecting member. The removable connecting member can be used to secure easily the first and second parts of the connector to one another, facilitating easy removal of the head from the main body.

[0011] Preferably, the connecting member is snap-fitted to one of the first and second parts. A snap-fitting connecting member is easy to attach and remove, and is cost-effective to produce.

[0012] Preferably, one of the first and second parts includes at least one groove for receiving a part of the connecting member. More preferably, the connecting member includes at least one flange which is resiliently biased into the at least one groove. By providing such an arrangement, the first and second portions are able to rotate with respect to one another about a common axis, but are prevented from being moved apart along the axis. Therefore, the flange and groove arrangement secures the cleaner head to the main body whilst allowing free rotation therebetween.

[0013] Preferably, two grooves are provided on either side of one of the first and second parts to secure more reliably the head to the main body. By providing such an arrangement, the head is better secured to the main body, whilst also providing space between the two grooves to accommodate additional parts of the surface treating appliance.

[0014] Preferably, the first and second parts are adapted and arranged to carry a fluid flow from the cleaner head to the main body. By providing such an arrangement, only the connector also acts as a fluid conduit, reducing the number of components required, and simplifying the removal of the head from the main body.

[0015] An embodiment of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 shows an upright vacuum cleaner according to the invention;

Figure 2 is an exploded view of parts of the vacuum cleaner of Figure 1;

Figure 3 is a side view of a cleaner head forming part of the vacuum cleaner of Figure 1;

Figure 4 is a section through the cleaner head of Figure 3 taken along the line A-A of Figure 3;

Figure 5 is a side section through the cleaner head of Figure 3;

Figure 6 is a rear view of the cleaner head of Figure 3; and

Figure 7 is a section through the cleaner head of Figure 3 taken along the line B-B of Figure 3.

[0016] An upright vacuum cleaner 10 according to the invention is illustrated in Figure 1. The vacuum cleaner 10 has a main body 12 and a cleaner head 14. The main body 12 includes a spine 16 which extends upwards and merges into a handle 18. The handle 18 can be manipulated by a user to manoeuvre the vacuum cleaner 10 across a floor surface.

[0017] Separating apparatus 20 is releasably attached to the spine 16. The interior of the separating apparatus 20 is in communication with the main body 12 by way of ducting 22 located on the spine 16. The ducting 22 carries an airflow leaving the separating apparatus 20. In the embodiment shown, the separating apparatus 20 comprises a cyclonic separator but this could be replaced by a filter, a bag or a combination of different known separation devices. The nature of the separating apparatus 20 is not material to the present invention.

[0018] A rotatable support member 24 is located at the base of the main body 12 and supports the main body 12 on the floor surface. The support member 24 is rotatably connected to two support arms 26, 28 forming part of the main body 12. The support member 24 has an arcuate outer surface 30 when viewed in a lateral direction. The shape of the outer surface 30 allows the vacuum cleaner 10 to be manoeuvred more easily across the floor surface than traditional vacuum cleaners having a pair of wheels.

[0019] A motor and fan unit (not shown) for drawing an airflow into the vacuum cleaner 10 is mounted inside the support member 24. The motor and fan unit is mounted so that the outer surface 30 of the support member 24 rotates around the motor and fan unit. The inlet to the motor and fan unit is formed in the support arm 28 which is in communication with the ducting 22. The support arm 28 and the ducting 22 define an airflow path from the separating apparatus 20 to the motor and fan unit.

[0020] In order to support the vacuum cleaner 10 when

in an upright, stored position (as shown in Figure 1), the main body 12 is provided with a stand 32. The stand 32 comprises a frame and a pair of wheels, and is shown in an extended position in Figure 1. The stand 32 is retractable so that the vacuum cleaner 10 can be manoeuvred in use. An example of a suitable stand is shown and described in EP 1 838 195.

[0021] The main body 12 further includes a yoke 34. The yoke 34 comprises two arms 36, 38 which are pivotably connected to the support arms 26, 28 on either side of the support member 24. The arms 36, 38, support arms 26, 28 and support member 24 are all connected about a common axis X-X. A duct is formed in the left-hand arm 36 of the yoke 34 and provides an airflow path between the cleaner head 14 and the separating apparatus 20.

[0022] The cleaner head 14 is rotatably connected to the yoke 34 by a connector 40. The cleaner head 14 has an upper surface 42 and a lower surface 44. The lower surface 44, which can be seen in Figure 5, is arranged to face towards the floor surface and has a suction opening 46 formed therein. The suction opening 46 extends across substantially the entire width of the cleaner head 14. A suction conduit 48 is formed within the cleaner head 14 and is delimited by the upper and lower surfaces 42, 44. The suction conduit 48 forms a communication path between the suction opening 46 and the duct in the arm 36 of the yoke 34.

[0023] The cleaner head 14 and the connector 40 are shown in more detail in Figures 2 to 7. As shown in Figure 2, the cleaner head 14 is removable from the main body 12. The connector 40 comprises a first part 50 located on the main body 12, a second part 52 located on the cleaner head 14 and a removable connecting member 54. The removal of the connecting member 54 from the remainder of the connector 40 enables the cleaner head 14 and the main body 12 to be separated from one another as described below.

[0024] The first part 50 is located on the main body 12 and comprises a cylindrical portion 56 which is hollow and forms an inlet to the duct located in the left-hand arm 36 of the yoke 34. Four walls 58 are located on the cylindrical portion 56 and extend around a part of the outer circumference thereof. The four walls 58 are arranged in two groups of two diametrically-opposed parallel walls 58, each group defining a groove 60 therebetween. The grooves 60 extend around a part of the outer circumference of the cylindrical portion 56. This is best shown in Figure 2.

[0025] The second part 52 is located on the cleaner head 14 and comprises a cylindrical portion 62 located at one end of the suction conduit 48. The cylindrical portion 62 is dimensioned to receive the cylindrical portion 56 of the first part 50. Two elongate openings 64 are formed in the sides of the cylindrical portion 62. This can be seen most clearly in Figures 2 and 4.

[0026] The connecting member 54 is U-shaped and has inner and outer surfaces 66, 68. The inner surface

66 has two flanges 70 projecting therefrom. The flanges 70 project inwardly, perpendicular to the inner surface 66. The outer surface 68 is curved and is shaped to conform to the external surface of the vacuum cleaner 10. In other words, the outer surface 68 of the connecting member 54 forms a part of the external surface of the vacuum cleaner 10 when the connecting member 54 is located on the cleaner head 14. This can be seen in Figure 3, which shows the connecting member 54 in place on the cleaner head 14. The connecting member 54 is resilient and is able to flex such that the separation between the flanges 70 can be increased or decreased. This allows the connecting member 54 to be snap fitted to the cleaner head 14.

[0027] Figures 4 and 5 show cross sections through parts of the main body 12 and the cleaner head 14 showing the connector 40 in more detail. The first part 50 is received in the second part 52 such that the cylindrical portion 56 is located within the cylindrical portion 62. When the first and second parts 50, 52 are correctly located with respect to one another, each elongate opening 64 is aligned with a respective groove 60.

[0028] The connecting member 54 connects and secures the first and second parts 50, 52 to one another. Each flange 70 located on the connecting member 54 extends through a respective elongate opening 64 and into a respective groove 60. This is shown in Figure 4. Due to the resilience of the connecting member 54, the flanges 70 are biased into the grooves 60 in a snap-fit arrangement. In this configuration, the first and second parts 50, 52 are able to rotate freely about an axis Y-Y (Figures 4 and 5), but cannot be disconnected due to the engagement between the flanges 70 and the grooves 60. In other words, the first and second parts 50, 52 are prevented from moving relative to one another along the axis Y-Y when the connecting member 54 connects the first and second portions 50, 52.

[0029] The provision of two grooves 60 which each cooperate with a flange 70 means that space is available between the grooves 60 around the circumference of the cylindrical portions 56, 62 for additional components of the vacuum cleaner 10, as will be described later.

[0030] The upper surface 42 has a notch 72 located adjacent the connecting member 54. This is shown most clearly in Figures 2 and 5. The notch 72 is provided so that the user can remove the connecting member 54 from the cleaner head 14 by inserting a suitable implement, such as a coin or screwdriver into the notch 72 and levering the connecting member 54 away from the cleaner head 14. Due to the resilience of the connecting member 54, the connecting member 54 is arranged to flex and snap out of position when levered away from the cleaner head 14.

[0031] As shown in Figure 5, a rotatable brush bar 74 is located in the suction conduit 48. The brush bar 74 is driven by a brush bar motor (not shown) which has an electrical connection to the main body 12 of the vacuum cleaner 10. The electrical connection comprises a first

electrical connector 76 located on the yoke 34, and a second electrical connector 78 located on the cleaner head 14. The first and second electrical connectors 76, 78 are shown in Figure 5 and are located below the first and second parts 50, 52 of the connector 40 respectively. The first electrical connector 76 is fixed with respect to the first part 50 and is located between the grooves 60 around the circumference of the first part 50. The first and second electrical connectors 76, 78 connect to one another in a standard male/female arrangement which is well known.

[0032] Figures 6 and 7 show rear views of the cleaner head 14. The second electrical connector 78 is located in a curved channel 80 and is free to move therein. The curved channel 80 is located on the circumference of the cylindrical portion 62 between the two elongate openings 64. The channel 80 is arcuate and, along the length of the channel 80, is spaced at a substantially constant distance from the axis Y-Y. This means that, when the cleaner head 14 is rotated with respect to the main body 12 about the axis Y-Y, the second electrical connector 78 is able to slide smoothly within the channel 80. The second electrical connector 78 is able to move within the channel 80 with respect to the remainder of the cleaner head 14.

The second electrical connector 78 is connected electrically to the brush bar motor by an electrical wire 82. The electrical wire 82 is able to move with the second electrical connector 78 and is sufficiently long so that it does not impede the movement of the second electrical connector 78.

[0033] When the cleaner head 14 is attached to the main body 12 (as shown in Figure 5), the second electrical connector 78 is connected to, and remains fixed with respect to, the first electrical connector 76. Therefore, when the cleaner head 14 is rotated with respect to the main body 12 about the axis Y-Y, the second electrical connector 78 moves along the curved channel 80 relative to the cleaner head 14 but remains fixed relative to the main body 12.

[0034] The arrangement described above is particularly suited to a small upright vacuum cleaner, commonly known as a stick-vacuum. Stick-vacuums are generally much smaller in size than conventional upright vacuum cleaners. The above arrangement allows the connector to be small, yet to be robust and easy to disconnect. Consequently, the provision of a smaller connector allows the vacuum cleaner to be reduced in size.

[0035] In use, the user starts with the vacuum cleaner 10 in the stored configuration shown in Figure 1. In the stored configuration, the cleaner head 14 is attached to the main body 12, the spine 16 is upright and the stand 32 is in the extended position. To use the vacuum cleaner 10, the user switches the vacuum cleaner 10 on so that the motor and fan unit draws a dirty airflow into the vacuum cleaner 10 via the suction opening 46 and the brush bar motor rotates the brush bar 74.

[0036] The brush bar 74 agitates the floor surface and dislodges dirt and dust from the floor surface. This dirt

and dust is carried in the dirty airflow from the suction opening 46, through the suction conduit 48, along the duct 36 and into the separating apparatus 20. Dirt and dust is separated from the airflow by the separating apparatus 20 and retained therein. The cleaned air then passes from the separating apparatus 20 along the ducting 22, through a pre-motor filter (not shown), across the motor and fan unit for cooling and through a post-motor filter (not shown) before being exhausted from the vacuum cleaner 10.

[0037] In order to move the vacuum cleaner 10 from the stored position to an in-use position, the user must retract the stand 32. The user can then manipulate the handle 18 to manoeuvre the vacuum cleaner 10 across the floor surface to be cleaned. In order to turn the vacuum cleaner 10 in a new direction (for example, to clean around furniture or walls), the user twists the handle 18, which causes the main body 12 to rotate. When the main body 12 is rotated, the first and second parts 50, 52 rotate with respect to one another about the axis Y-Y so that the cleaner head 14 remains on the floor surface when the user twists the handle 18.

[0038] When the first and second parts 50, 52 are rotated with respect to one another, the cylindrical portion 56 rotates inside the cylindrical portion 62. Each of the flanges 70 formed on the connecting member 54 slides within a respective groove 60, allowing rotational movement whilst preventing the first and second parts 50, 52 from becoming separated. In other words, the connecting member 54 connects and secures the cleaner head 14 to the main body 12, preventing the cleaner head 14 from becoming detached, but allowing free rotation therebetween. The flanges 70 run smoothly inside the grooves 60 so that there is little frictional resistance to rotation between the first and second parts 50, 52. This makes the vacuum cleaner 10 easy to turn in a new direction.

[0039] The brush bar motor located in the cleaner head 14 is electrically connected to the main body 12 by the connection between the first and second electrical connectors 76, 78 and the electrical wire 82. Further, when the cleaner head 14 is rotated with respect to the main body 12, the second electrical connector 78 will move within the channel 80. Since the electrical wire 82 is able to move with the second electrical connector 78, the electrical connection between the main body 12 and the brush bar motor is maintained even when the main body 12 is rotated with respect to the cleaner head 14. This arrangement is small in size, simple to implement and requires fewer components than known arrangements which use, for example, slip rings to transfer electric current across a rotatable connection.

[0040] When the user has finished the cleaning operation, the vacuum cleaner 10 is switched off. In order to return the vacuum cleaner 10 to a storage configuration as shown in Figure 1, the user pushes the handle 18 and spine 16 back into the vertical position. This action extends the stand 32. The vacuum cleaner 10 is now back in the configuration shown in Figure 1.

[0041] It may be desired to remove the cleaner head 14 for cleaning, storage or transportation. In order to do this, the user inserts a suitable tool (such as a coin or screwdriver) into the notch 72 and levers the connecting member 54 upwards. Since the connecting member 54 and notch 72 are located on the external surface of the vacuum cleaner 10, they are immediately visible and easy to access. As the connecting member 54 is moved upwards, the outer surface 68 of the connecting member 54 is no longer flush with the upper surface 42 of the cleaner head 14 and the yoke 34. Therefore, it can easily be grabbed by the user and removed. Further, due to the resilience of the connecting member 54, the connecting member 54 flexes and snaps out of position when levered away from the cleaner head 14.

[0042] When the connecting member 54 is removed, the flanges 70 are removed from the grooves 60. Therefore, the first and second parts 50, 52 can be separated, and the cleaner head 14 can be removed from the main body 12.

[0043] When the cleaner head 14 is removed in this manner, the first and second electrical connectors 76, 78 are pulled apart. This breaks the electrical connection between the cleaner head 14 and the main body 12, preventing electrical shocks and allowing the cleaner head 14 to be cleaned, stored or packed separately from the remainder of the vacuum cleaner 10.

[0044] The invention is not limited to the detailed description given above. Variations will be apparent to the person skilled in the art. For example, other forms and arrangements of the connector may be used. There need not be first and second parts which are connectable and, instead, the connecting member may directly attach the cleaner head to the main body.

[0045] The connecting member need not be snap fitted. Other arrangements could be used, for example, clamped or press-fitted connecting members. Additionally, other securing arrangements other than a flange and groove may be provided. For example, locking pins or screws may be used. If a flange and groove arrangement is used, then a single groove may be provided.

[0046] The connector need not be adapted to carry a fluid flow. A separate fluid conduit, such as a hose, may be provided separate from the connector.

[0047] The main body need not be supported on a rolling support member. Other support arrangements could be used, for example a pair of wheels. Further, the head may be rotatable in a different plane from that described above, or may be rotatable about more than one axis; for example, if the cleaner head is connected to the main body by a universal joint.

[0048] The term "surface treating appliance" is intended to have a broad meaning, and includes a wide range of machines having a head for travelling over a surface to clean or treat the surface in some manner. It includes, inter alia, machines which apply suction to the surface so as to draw material from it, such as vacuum cleaners (dry, wet and wet/dry), as well as machines which apply

material to the surface, such as polishing/waxing machines, pressure washing machines, ground marking machines and shampooing machines. It also includes lawn mowers and other cutting machines.

the form of an upright vacuum cleaner.

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Claims

1. A surface treating appliance comprising a main body, a head and a connector adapted and arranged to secure the head to the main body whilst allowing relative rotation therebetween, the connector including a connecting member which is removable from the remainder of the connector to allow the head to be released from the main body, wherein at least a part of the connecting member forms a part of the external surface of the surface treating appliance. 10
2. A surface treating appliance as claimed in claim 1, wherein the connector further includes a first part located on the main body and a second part located on the head, the first and second parts being connectable and rotatable with respect to one another about a common axis. 15 20
3. A surface treating appliance as claimed in claim 2, wherein the first and second parts are rotatably secured to one another by the connecting member. 25
4. A surface treating appliance as claimed in claim 3, wherein the connecting member is snap-fitted to one of the first and second parts. 30
5. A surface treating appliance as claimed in any one of claims 2, 3 or 4, wherein one of the first and second parts includes at least one groove for receiving a part of the connecting member. 35
6. A surface treating appliance as claimed in claim 5, wherein the connecting member includes at least one flange which is resiliently biased into the at least one groove. 40
7. A surface treating appliance as claimed in claim 5 or 6, wherein two grooves are provided on either side of one of the first and second parts to secure more reliably the head to the main body. 45
8. A surface treating appliance as claimed in any one of claims 2 to 7, wherein the first and second parts are adapted and arranged to carry a fluid flow from the cleaner head to the main body. 50
9. A surface treating appliance as claimed in any one of the preceding claims in the form of a vacuum cleaner. 55
10. A surface treating appliance as claimed in claim 9 in

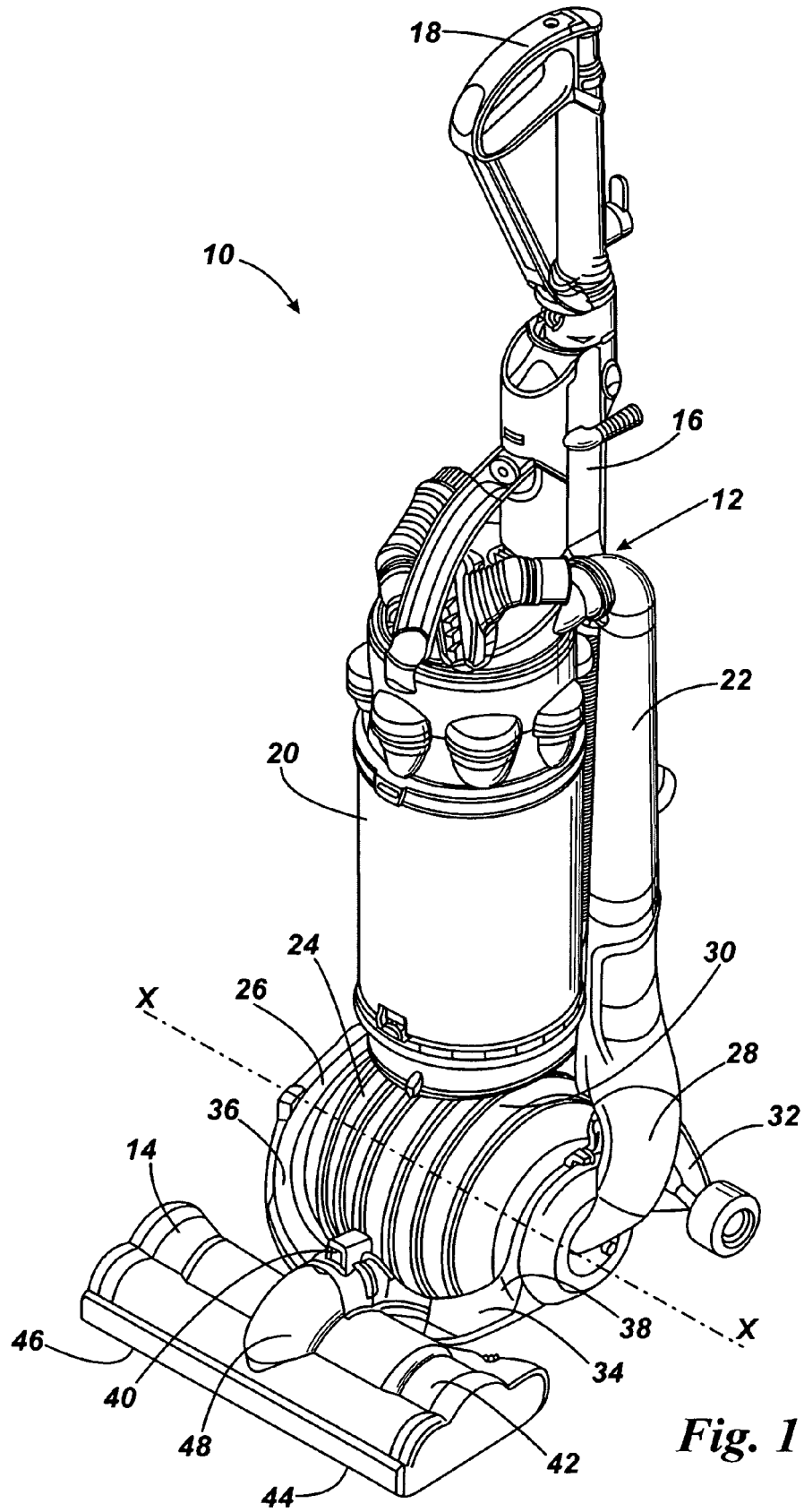


Fig. 1

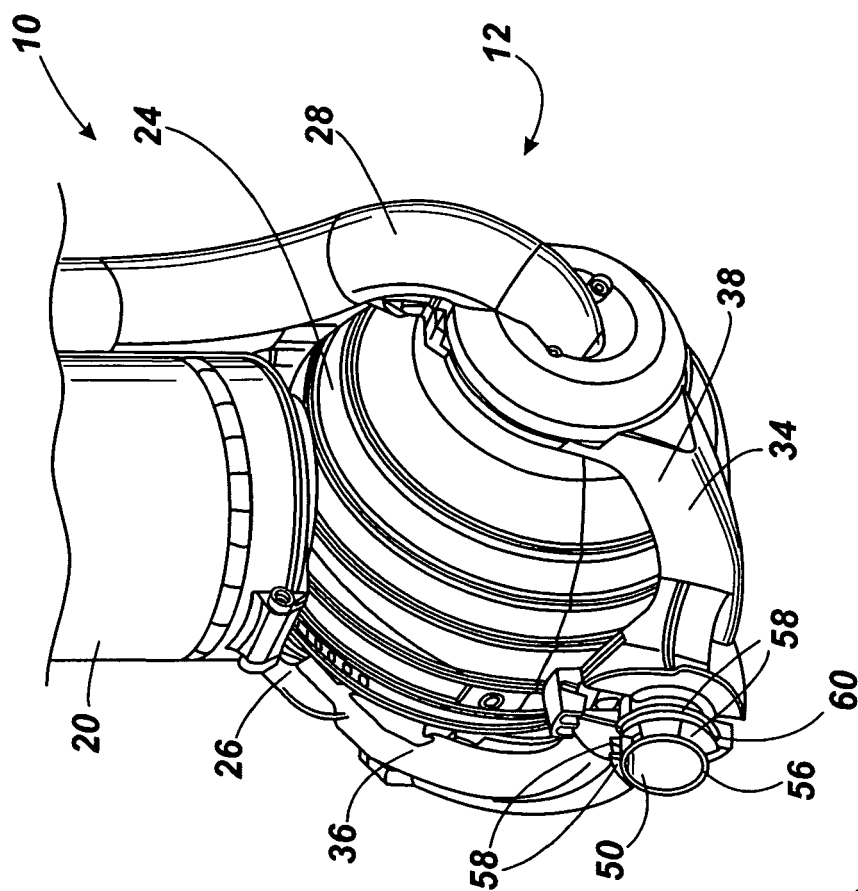
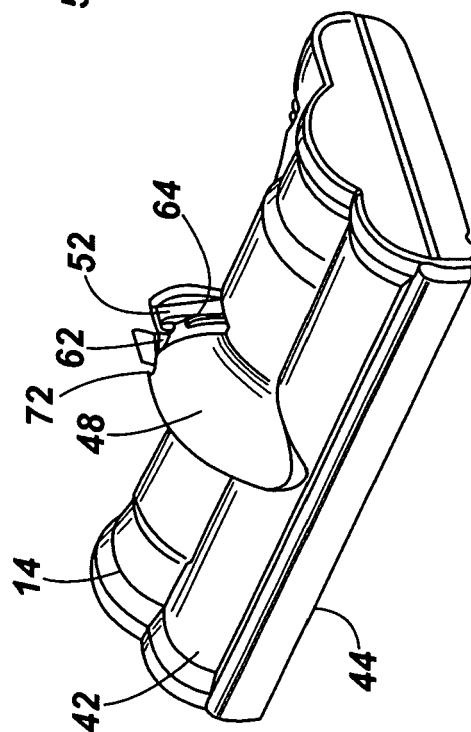
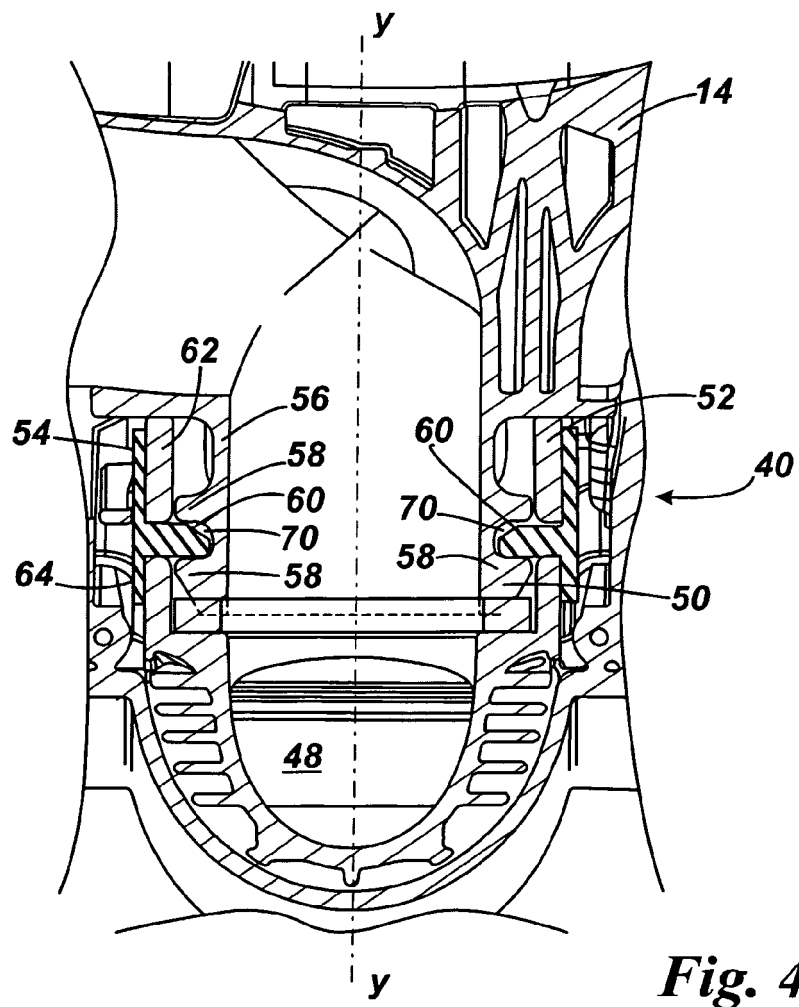
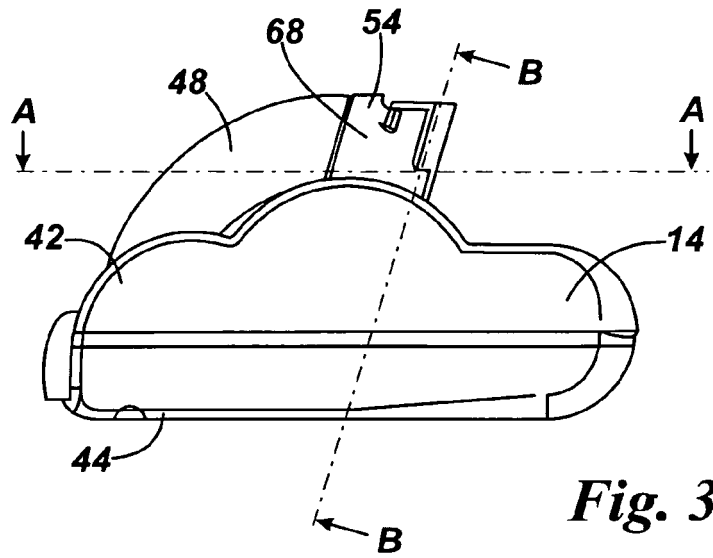
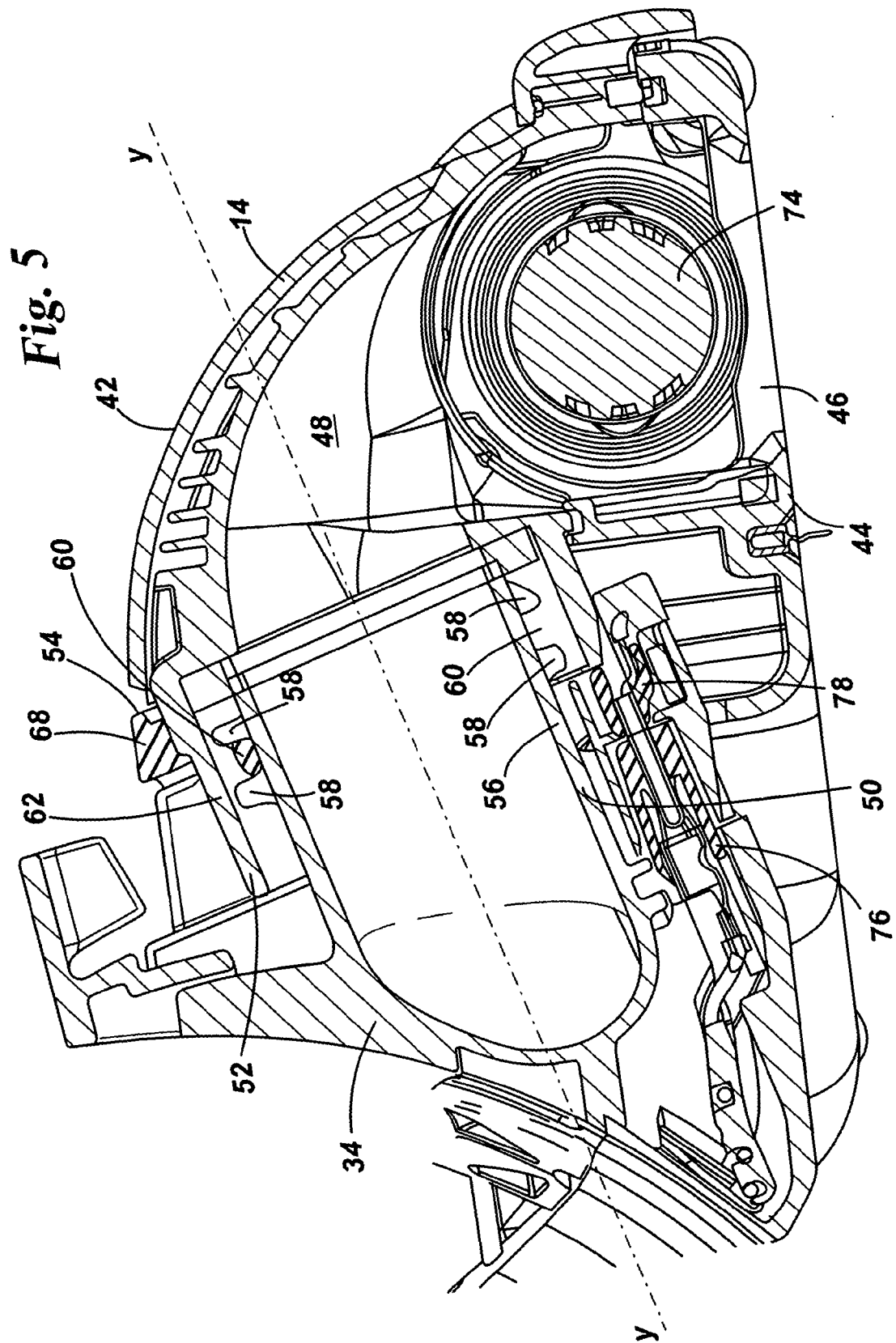


Fig. 2







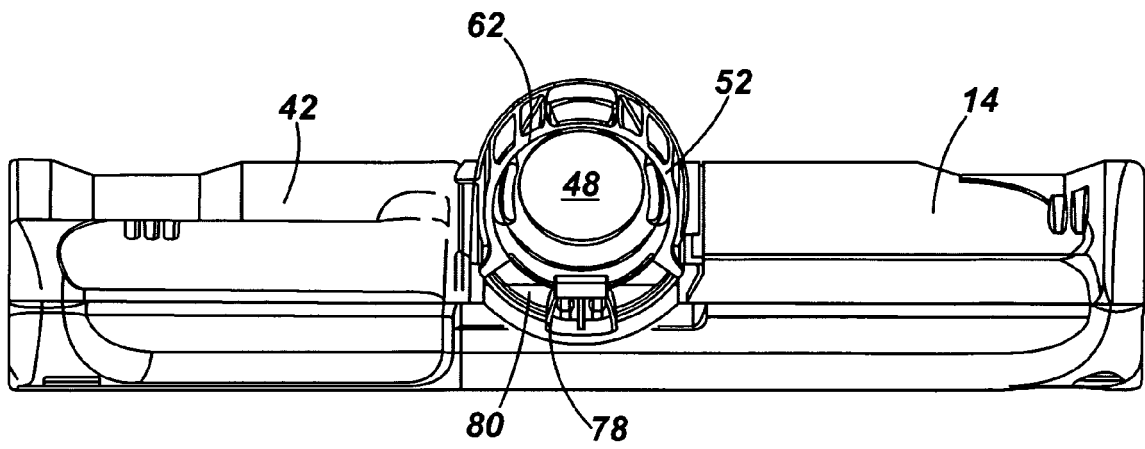


Fig. 6

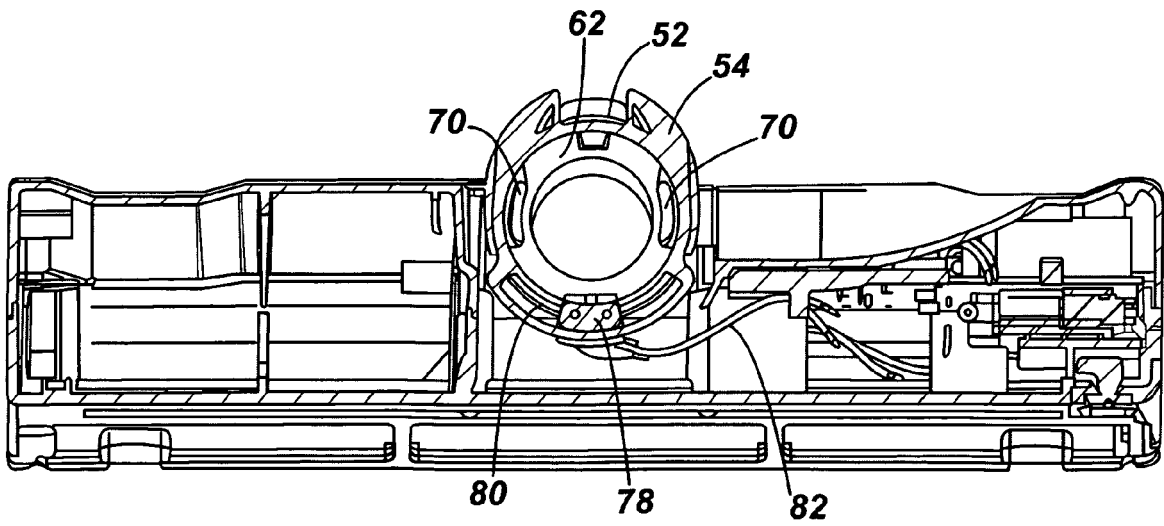


Fig. 7

REFERENCES CITED IN THE DESCRIPTION

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