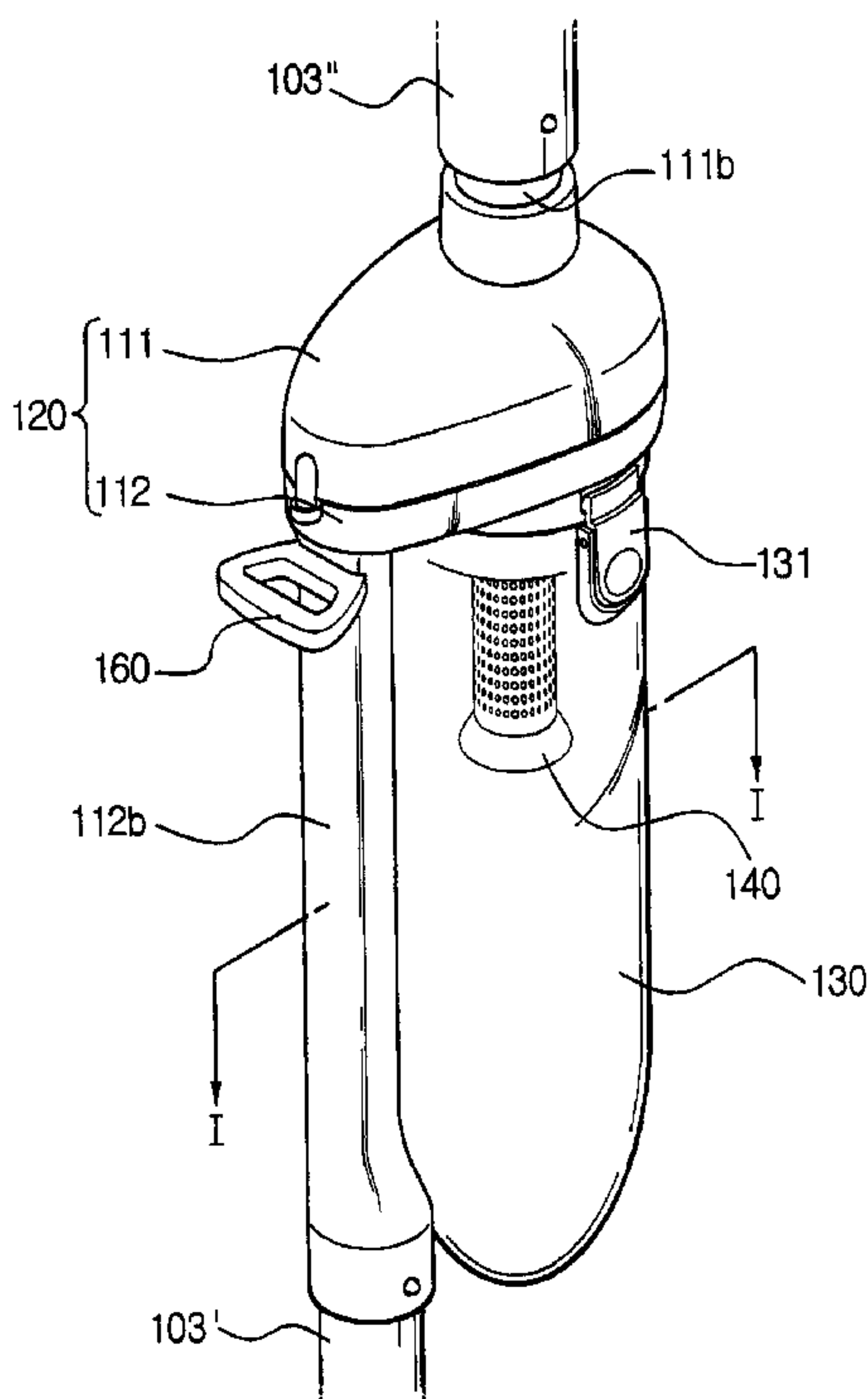




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(54) Titre : ASPIRATEUR MUNI D'UN CYCLONE DEPOUSSIÉREUR
 (54) Title: VACUUM CLEANER HAVING CYCLONE DUST COLLECTING APPARATUS



(57) **Abrégé/Abstract:**

A cyclone dust collecting apparatus for a canister type vacuum cleaner has a connection pipe connected to a suction brush, a cyclone body, and a dust collecting receptacle provided in the cyclone body. The dust collecting receptacle is positioned alongside the connection pipe, and the contacting side of the connection pipe is contoured to correspond to the shape of the outer contour of the dust collecting apparatus. The mating contact of the connection pipe and the dust collecting receptacle reduces the overall thickness of their coextensive lengths and provides a secure connection therebetween. The resulting compact configuration enables a user to use or carry the cyclone dust collecting apparatus more conveniently.

ABSTRACT OF THE DISCLOSURE

A cyclone dust collecting apparatus for a canister type vacuum cleaner has a connection pipe connected to a suction brush, a cyclone body, and a dust collecting receptacle provided in the cyclone body. The dust collecting receptacle is positioned alongside the connection pipe, and the contacting side of the connection pipe is contoured to correspond to the shape of the outer contour of the dust collecting apparatus. The mating contact of the connection pipe and the dust collecting receptacle reduces the overall thickness of their coextensive lengths and provides a secure connection therebetween. The resulting compact configuration enables a user to use or carry the cyclone dust collecting apparatus more conveniently.

VACUUM CLEANER HAVING CYCLONE DUST COLLECTING APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a vacuum cleaner, and more particularly to a vacuum cleaner having a cyclone dust collecting apparatus matingly disposed along a connection pipe, and capable of filtering out and collecting relatively large particle contaminants from dirt-laden air drawn in through a suction port.

10 2. Description of the Prior Art

 As shown in FIG. 1, a vacuum cleaner has a cleaner body 1, a connection hose 2 connected to the cleaner body 1, an extension pipe 3 connected to connection hose 2 and a suction port 4 connected to an end of the extension pipe 3. A cover 5 is pivotally mounted on cleaner body 1, and cover 5 is connected to connection hose 2. Cleaner body 1 has a dust
15 collecting chamber 6 inside. A paper filter 7 is removably received in chamber 6 to collect contaminants such as dust which are vacuumed through suction port 4. A handle grip 8 is provided between connection hose 2 and extension pipe 3. The handle grip provides a location for a user to easily manipulate extension pipe 3 and thereby guide suction port 4 during the cleaning operation.

20 The vacuum cleaner also includes a motor (not shown) mounted in the cleaner body 1 to generate a suction force to draw in dirt-laden air through suction port 4. The dirt-laden air is drawn into cleaner body 1 via extension pipe 3 and connection hose 2. Solid contaminants are filtered at paper filter 7 that is disposed in the dust collecting chamber of the cleaner body

1, while the exiting air is discharged outside of the cleaner body 1.

In the general vacuum cleaner as described above, all of the solid contaminants in the dirt-laden air that is drawn in through the suction port 4 are filtered out at only a single paper filter 7 disposed in the dust collecting chamber 6 of the cleaner body 1. As a result, paper
5 filter 7 becomes filled with contaminants quickly and must be replaced often in order to prevent overloading the motor and decreasing the suction force. Accordingly, frequent replacement of this disposable filter increases waste and the cost of operation due to the need to purchase replacement filters.

In an attempt to solve this problem, a vacuum cleaner having a cyclone dust collecting
10 apparatus 10 has been suggested. A cyclone dust collecting apparatus serves as a first stage filtration area so the filter in body 1 can serve as a second stage filtration area. The collected debris in the cyclone dust collecting apparatus can be simply dumped without the use of disposable filters.

As shown in FIGS. 1 and 2, the cyclone dust collecting apparatus 10 is connected and
15 thus disposed at a part of the extension pipe 3 that connects the cleaner body 1 and the suction brush 4.

Cyclone dust collecting apparatus 10 includes a cyclone body 20 having first and second connection pipes 11 and 12, respectively, a dust collecting receptacle 30 removably connected to cyclone body 20, and a filter member 40 positioned in dust collecting receptacle
20 30. The first connection pipe 11 is connected to extension pipe 3' proximate suction port 4 and second connection pipe 12 is connected to extension pipe 3'' proximate cleaner body 1. Dust collecting receptacle 30 has a substantially cylindrical shape. Dust collecting receptacle 30 can also have a shape of a tapered cylinder which grows narrower as it extends downward.

In operation, dirt-laden air, drawn in through the suction port 4, is drawn through an air inlet 11a of first connection pipe 11 into the cyclone body 20 in a diagonal relation with respect to cyclone body 20. As the air current flows diagonally into the cyclone body 20, an air vortex is generated in cyclone body 20 and dust collecting receptacle 30 in a direction indicated by the solid-lined arrows in FIG. 2. As a result of the vortex air current, a centrifugal force is generated, separating large particle contaminants from the air. The separated contaminants fall and then are entrained in an upturning air current (indicated by the dot-lined arrows of FIG. 2) and then reflected from the bottom of dust collecting receptacle 30. In the upturning air current, the separated contaminants are discharged toward the cleaner body 1 through an air outlet 12a formed in the cyclone body 20.

Meanwhile, filter member 40 within receptacle 30 prevents the contaminants from reversing together with the air flowing through air outlet 12a of cyclone body 20 during the operation of cyclone dust collecting apparatus 10.

The vacuum cleaner having such a cyclone dust collecting apparatus 10, is constructed such that the large particle contaminants of the dirt-laden air drawn in through the suction port 4 are pre-filtered in the cyclone apparatus before the dirt-laden air flows to the paper filter 7. In this manner, the cyclone apparatus functions as a first stage filtration device, and the air exiting the apparatus is directed to paper filter 7 to undergo an additional filtration step. Accordingly, the amount of contaminants to be filtered by paper filter 7 decreases, and the lifespan of paper filter 7 is lengthened. Also, by pre-filtering large particle contaminants, other advantages like prevention of suction force deterioration and motor overload are expected.

A detraction of the vacuum cleaner having the cyclone dust collecting apparatus 10 as

described above, is that, the presence of cylindrical dust collecting receptacle 30 along cylindrical extension pipe 3 inevitably increases the overall volume of the cleaner. The rather bulky volume of the cleaner is cumbersome, and a user often finds it tiresome to use the cleaner and to move it as necessary during the cleaning operation.

5

SUMMARY OF THE INVENTION

The present invention has been made to overcome the above-mentioned problems of the prior art. Accordingly, it is an object of the present invention to provide a cyclone dust collecting apparatus for use in a vacuum cleaner having a reduced size.

10 Another object of the present invention is to provide a cyclone dust collecting apparatus which facilitates easy manipulation for a user to carry the same during a cleaning operation.

The cyclone dust collecting apparatus for use in a vacuum cleaner according to the present invention includes many of the same features as the vacuum cleaner described
15 above. The dust collecting receptacle is positioned along side the connection pipe, with the connection pipe having a shape that matingly follows the outer surface of the dust collecting receptacle.

The dust collecting receptacle has a generally cylindrical shape so that in a horizontal sectional view its profile is substantially circular. The side of the connection pipe proximate
20 the receptacle is contoured to correspond to the outer side of the cylindrical dust collecting receptacle. The cross-section of the connection pipe is substantially rectangular with a contoured side that is concave to matingly accommodate the circular profile of the receptacle.

According to the present invention, the overall width of the extension pipe and the

dust collecting receptacle is reduced by this mating geometry, and accordingly, the vacuum cleaner is more compact and easier to manipulate, carry and use.

The cyclone dust collecting apparatus also has a handle formed on the cyclone body. The handle is integrally formed with the cyclone body. Accordingly, the user can grip the handle, and perform the cleaning operation or carry the cyclone dust collecting apparatus with ease.

The above objects are also accomplished by a vacuum cleaner according to the present invention having the above cyclone dust collecting apparatus.

10 BRIEF DESCRIPTION OF THE DRAWINGS

The above-mentioned objects and the feature of the present invention will be more apparent by describing the preferred embodiment of the present invention in detail referring to the appended drawings, in which:

FIG. 1 is a perspective view of a vacuum cleaner with a conventional cyclone dust collecting apparatus;

FIG. 2 is an enlarged sectional view of the cyclone dust collecting apparatus of FIG. 1;

FIG. 3 is an exploded perspective view of a cyclone dust collecting apparatus according to the present invention;

FIG. 4 is a view of the cyclone dust collecting apparatus of FIG. 3 assembled; and

20 FIG. 5 is a cross-section taken on line I-I of FIG. 4.

DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT

A preferred embodiment of the present invention will be described in greater detail

with reference to FIGS. 3 through 5. The description will focus on the novel aspects of the present invention with reference to the vacuum cleaner described above for aspects in common with the present invention. For convenience of description only, the location of elements of the vacuum cleaner will be described with respect to the one-directional airstream or suction force. For example, extension pipe 103' is upstream of cyclone body 120, and connection hose 103'' is downstream of cyclone body 120. As shown in FIGS. 3 and 4, the cyclone dust collecting apparatus according to the present invention includes a first member 111 and a second member 112, constituting a cyclone body 120 in cooperation with each other, a filter member 140 is disposed in second member 112, and a dust collecting receptacle 130 is formed at a lower portion of second member 112. A connection pipe 111b is provided on an upper portion of first member 111 connecting to connection hose 103'' that is connected with the cleaner body. At an end of connection pipe 111b, a discharge outlet 111a is formed. A connection pipe 112b is formed on second member 112, having a suction inlet 112a formed at an end thereof. The connection pipe 112b is connected to extension pipe 103' that is connected to the suction port of the vacuum cleaner.

Filter member 140 is disposed in second member 112, and dust collecting receptacle 130 is held at the lower portion of second member 112 by a fastening member 131. The air drawn in through the suction inlet 112a of cyclone body 120 forms a vortex air current in dust collecting receptacle 130, and then is discharged to connection hose 103'' via discharge outlet 111a. Dust collecting receptacle 130 is positioned along side of connection pipe 112b. Connection pipe 112b of the present invention has a cross-sectional profile that matingly accommodates the cross-sectional geometry of receptacle 130 along at least a portion of their lengths. As shown in FIG. 5, a surface of connection pipe 112b which is proximate dust

collecting receptacle 130 has a shape corresponding to the outer surface of dust collecting
receptacle 130 so that these two pieces are fitted closely together along their coextensive
portions. More specifically, dust collecting receptacle 130, in cross-section, is substantially
circular, while the side of connection pipe 112b that extends alongside is contoured
5 substantially in the shape of an arc to form a concave surface that geometrically mates with
the receptacle wall. Since connection pipe 112b and dust collecting receptacle 130 are in
tight contact with each other due to these respective structural characteristics they form a
more compact overall profile and thus occupy less space.

The overall shape of connection pipe 112b in a horizontal cross-section along most of
10 the portion that it is coextensive with the receptacle is approximately a rectangular shape.

The lower end of connection pipe 112b is cylindrical as shown in FIGS. 3 and 4 so as
to be connectible to cylindrical extension pipe 103'. Thus, connection pipe 112b is designed
such that the rectangular portion thereof transitions smoothly into the cylindrical portion.

Another feature to facilitate handling of the present invention is a handle 160 integrally
15 formed on second member 112 of the cyclone body 120, and designed to have the size and
shape that are appropriate for a user to easily grip the same. Handle 160 provides a user with
a convenient grip when he/she performs a vacuum cleaning operation or carries the cyclone
dust collecting apparatus.

The vacuum cleaner having the above-described cyclone dust collecting apparatus
20 operates in a similar manner as the prior art vacuum cleaner described above in the
Background section.

As described above, according to the present invention, the overall thickness of the
combination of extension pipe 112b and dust collecting receptacle 130 is reduced, and

accordingly, the vacuum cleaner is easier to use. Geometrically mating the outer surfaces of extension pipe 112b and receptacle 130 not only renders the apparatus more compact, but also provides an assembly guide surface along their contact areas for easy placement and assembly of the receptacle. In addition, an enhanced attachment is provided as the two elements have
5 mating bearing surfaces, compared to the sole use of a fastener to join together two circular shapes along a single line as previously used instead of a surface. Further, the structural features are provided to facilitate cleaning operation or easy transport of the cyclone dust collecting apparatus by provision of handle 160 provided thereon .

Although the preferred embodiment of the present invention has been
10 described, it will be understood by those skilled in the art that the present invention should not be limited to a described preferred embodiment, but various changes and modifications can be made within the spirit and scope of the present invention as defined by the appended claims.

WHAT IS CLAIMED IS:

1. A cyclone dust-collecting apparatus for use in a vacuum cleaner, the apparatus being arranged, in use, between a suction port and a main body of the vacuum cleaner, the main body containing a motor and a filter, the apparatus comprising:
- 5 a connection pipe for connection to the suction port of the vacuum cleaner;
a cyclone body in communication with the connection pipe and connectable to a connection hose that leads to the main body, the cyclone body comprising:
- 10 a dust-collecting receptacle containing a filtering mechanism, whereby dirt-laden air drawn in through the suction port forms a whirling current in the dust-collecting receptacle and is then discharged to the connection hose; and
- wherein the dust-collecting receptacle and the connection pipe are disposed alongside, and in contact with, one another, those side portions of the connection pipe and the dust-collecting receptacle in contact with one another having a complementary
- 15 shape.
2. The apparatus as claimed in claim 1, wherein the dust-collecting receptacle has a substantially cylindrical shape and that portion of the connection pipe in contact therewith is contoured to correspond to the shape of the substantially cylindrical
- 20 dust-collecting receptacle.
3. The apparatus as claimed in claim 2, wherein the remaining side portions of the connection pipe are substantially flat to define a generally rectangular cross-section of the connection pipe.
- 25
4. The apparatus as claimed in any one of claims 1 to 3, further comprising a handle provided on the cyclone body.
5. The apparatus as claimed in claim 4, wherein the handle is integrally formed with
- 30 the cyclone body.

6. A vacuum cleaner including a main body containing a filter and a motor for generating a suction force, a connection hose extending from the main body, a suction port for contacting a surface to be cleaned, an extension pipe connecting the suction port to the connection hose, and a cyclone dust-collecting apparatus disposed between
5 the connection hose and the extension pipe, the cyclone dust-collecting apparatus comprising:

a connection pipe in communication with the connection hose and the extension pipe to channel an airstream therethrough;

10 a cyclone body attached to a downstream end of the connection pipe and containing a filtering mechanism;

a dust-collecting receptacle for collecting solid particles trapped by said filtering mechanism and for causing the airstream to travel in a cyclone current therein, the receptacle being attached to the cyclone body and arranged alongside, and in contact with, at least a portion of the connection pipe;

15 wherein the connection pipe and the receptacle have complementarily-shaped contacting surfaces.

7. The vacuum cleaner as claimed in claim 6, wherein the dust-collecting receptacle has a substantially cylindrical shape.

20

8. The vacuum cleaner as claimed in claim 7, wherein the connection pipe has a contoured surface configured to complement the substantially cylindrical shape of the receptacle.

25

9. The vacuum cleaner as claimed in claim 8, wherein the connection pipe has a substantially rectangular cross-section along at least a portion thereof, one side of the rectangular cross-section being concave to complement the substantially cylindrical shape of the receptacle.

30

10. The vacuum cleaner as claimed in claim 9, wherein the connection pipe comprises a portion of substantially circular cross-section to complement a substantially circular cross-section portion of the extension pipe, and a transition

portion between the portion of substantially rectangular cross-section and the portion of substantially circular cross-section.

11. The vacuum cleaner as claimed in any one of claims 6 to 10, further comprising a
5 handle provided on the cyclone body to facilitate use and handling of the vacuum cleaner.

12. The vacuum cleaner as claimed in claim 11, wherein the handle is integrally moulded with the cyclone body.

10

13. A vacuum cleaner comprising a main body containing a filter and a motor for generating a suction force, a connection hose extending from the main body, a suction port for contacting a surface to be cleaned, an extension pipe connecting the suction port to the connection hose, and a cyclone dust-collecting apparatus disposed between
15 the connection hose and the extension pipe, the cyclone dust-collecting apparatus comprising:

a connection pipe having a substantially rectangular cross-section along at least a portion thereof, one side of said rectangular cross-section being concave to provide a contoured surface, the connection pipe being in communication with the connection
20 hose and the extension pipe to channel an airstream therethrough;

a cyclone body attached to a downstream end of the connection pipe and containing a filtering mechanism;

a dust-collecting receptacle for collecting solid particles trapped by said filtering mechanism and for causing the airstream to travel in a cyclone current therein,
25 the receptacle having a substantially cylindrical shape attached to the cyclone body and arranged alongside, and in contact with, at least a portion of the connection pipe; and

a handle provided on the cyclone body to facilitate use and handling of the vacuum cleaner;

wherein the contoured surface of the connection pipe complements and
30 contacts the substantially cylindrical shape of the receptacle.

FIG. 1 (Prior Art)

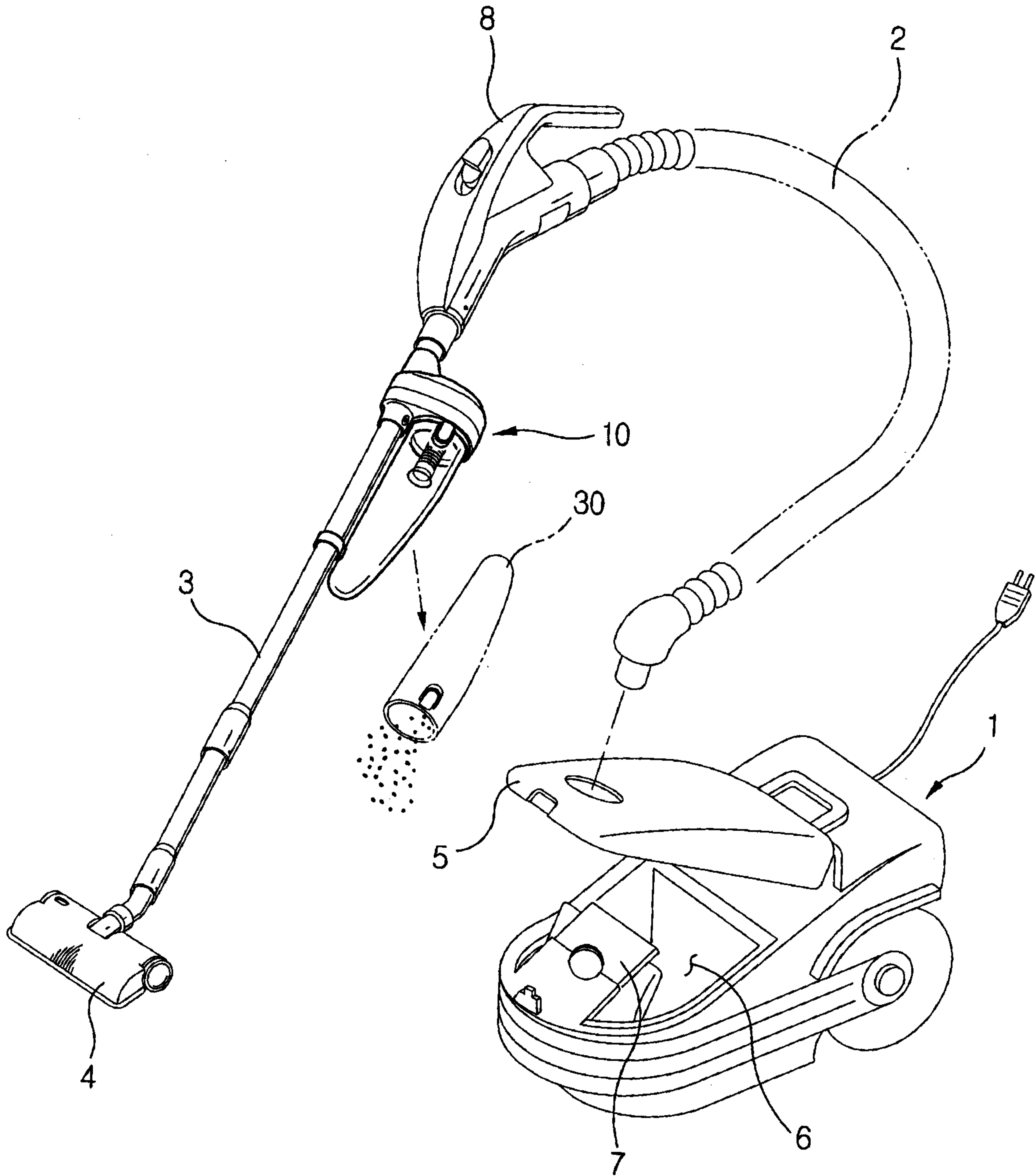
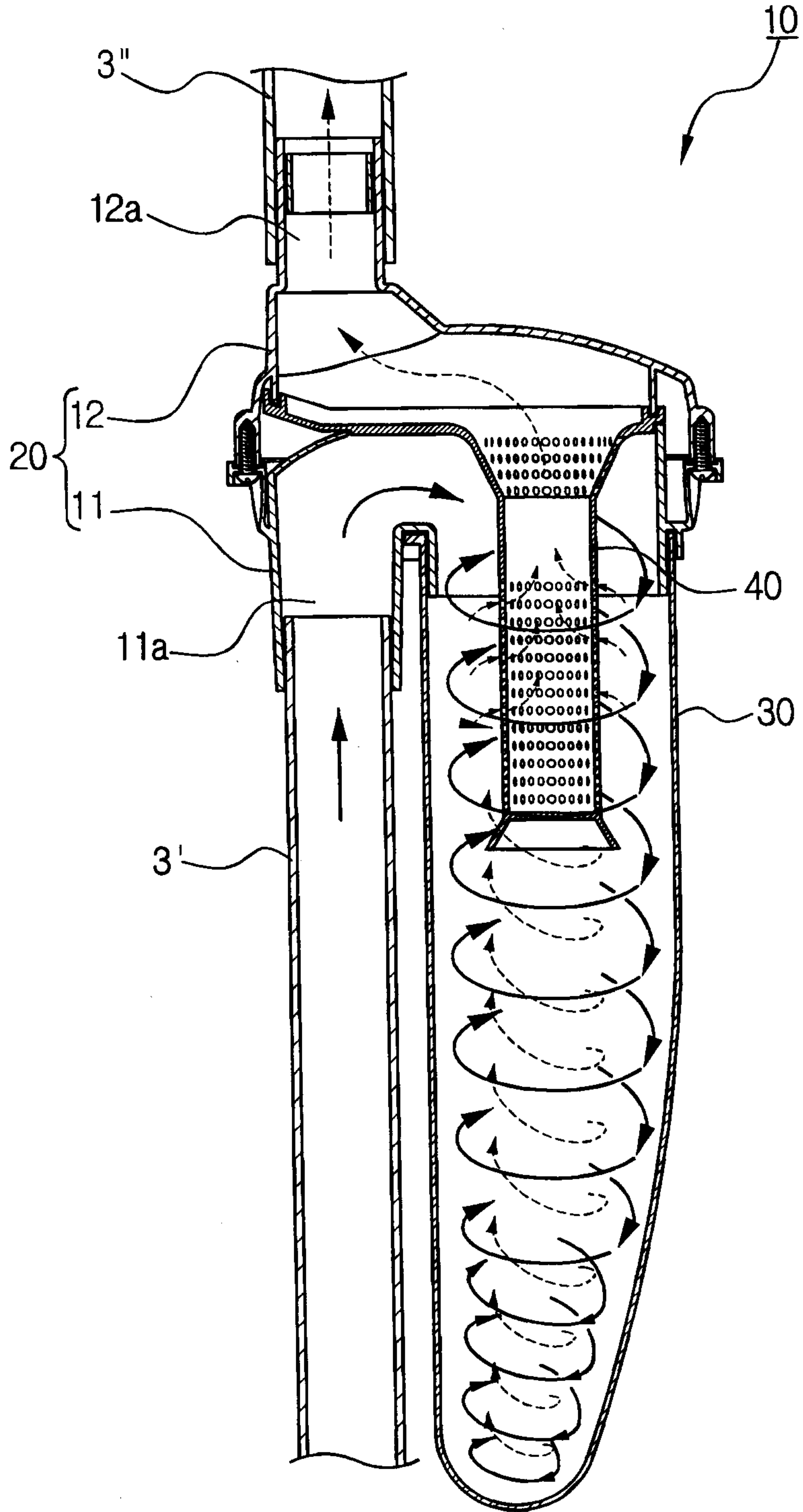


FIG. 2 (Prior Art)



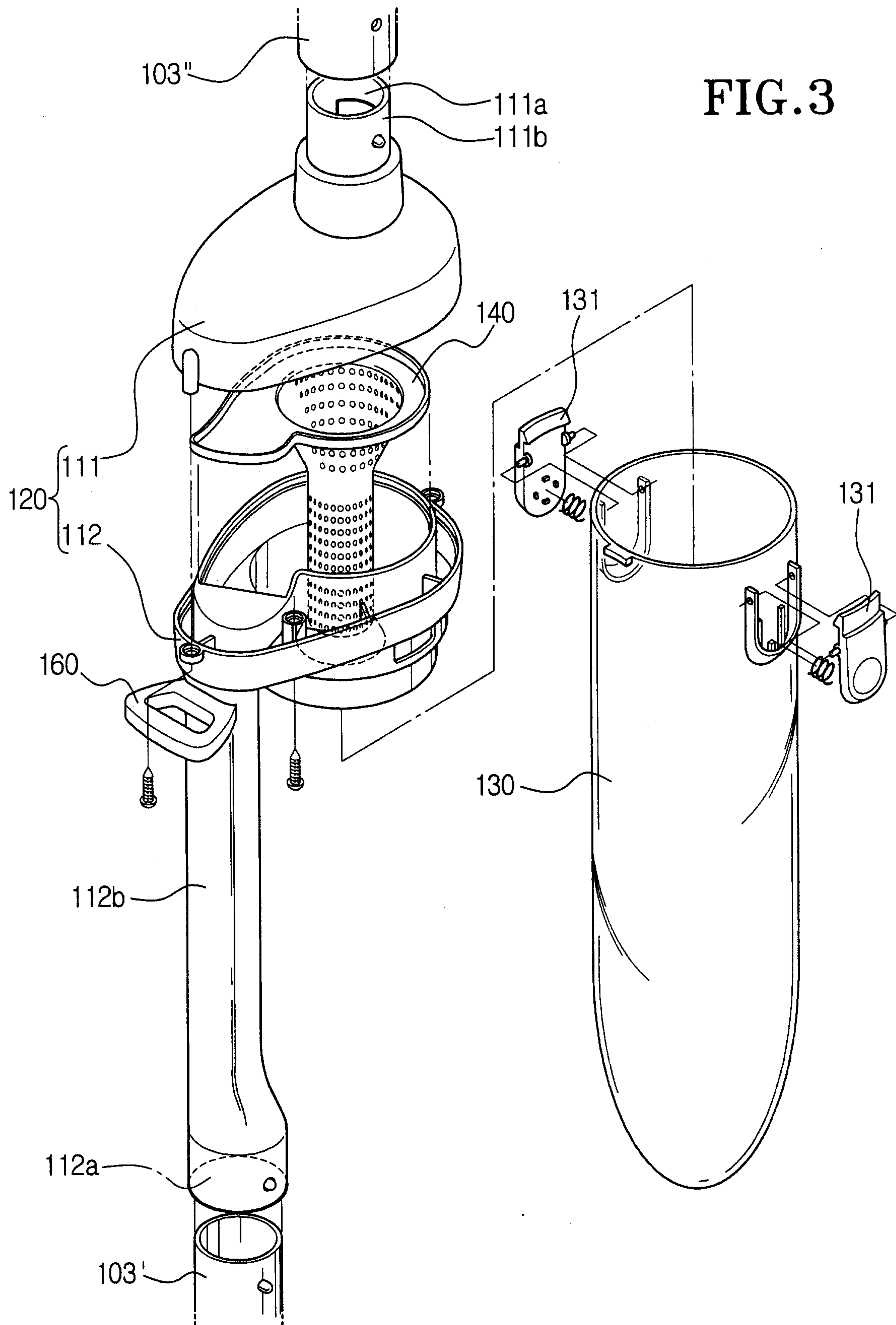


FIG. 3

FIG. 4

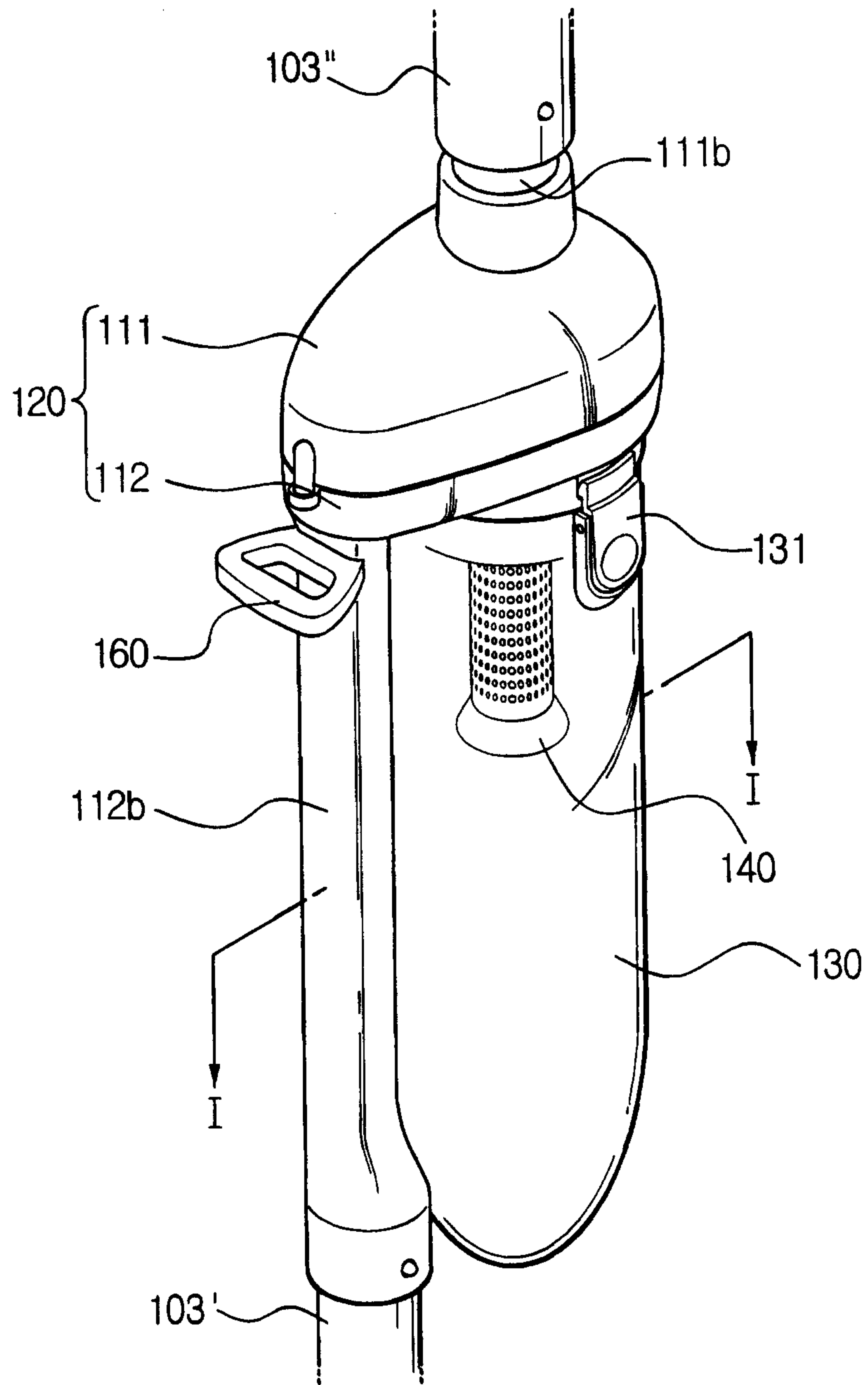


FIG. 5

