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(56) Related Art
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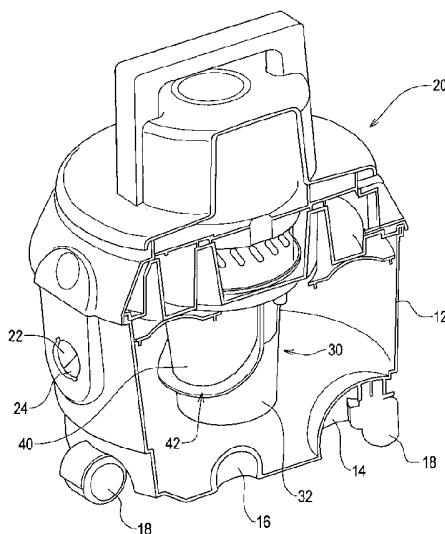
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(54) **Title:** WET TYPE SUCTION CLEANERS



(57) **Abstract:** A wet type suction cleaner comprising a tank (10) having an inlet (22) for suction-induced air flow and an outlet leading to a fan for creating the suction; and a float valve assembly (30) including a housing (32) and a float member movable relative to the housing (32) to cause closure of the outlet; wherein the inlet (22) directs the suction air flow to impinge on a part (40) of the housing (32), and the housing (32) has an opening (54) leading to the outlet which opening (54) is at a part of the housing (32) facing away from the inlet (22), the housing (32) further comprising deflecting means (42) for deflecting impinged matter away from the opening (54).

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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.

Wet Type Suction Cleaners

This invention relates to suction cleaners (vacuum
cleaners) of the so called "wet" type, i.e. able safely to
5 suck up liquids.

Wet type suction cleaners are well known, their ability to
suck up liquids being useful for cleaning up spillages.
Also, such cleaners may be adapted for floor, e.g. carpet,
10 cleaning by applying liquid to a surface which is to be
cleaned and removing it by suction. One very common form
of such a cleaner has a body in the form of or including a
tank into which matter including liquid can be drawn
through a suction hose connected thereto. An electric
15 motor and fan are arranged to draw air out of the tank and
lower the pressure therein, so that air and entrained
liquid or other matter can be drawn into the tank through
the hose. An outlet passage from the tank, leading to the
fan, is disposed at an upper part thereof and it is usual
20 to provide in association with such an outlet passage a
float valve arrangement so that when the tank is full the
outlet passage is closed, thus preventing liquid from
being drawn into the fan and expelled from the cleaner
through an exhaust passage from the fan. One known form of
25 such a float valve comprises a housing extending
downwardly into the tank from the outlet passage
therefrom, containing a buoyant element which, as the tank
fills, floats upwards within the housing until it reaches
the outlet passage and blocks it.

30

To be able effectively to suck up liquids, wet type vacuum
cleaners usually have relatively powerful motors and fans,
and the speed of air flow through the fan, tank, suction
hose, and whatever cleaning head or fitting is provided at
35 the free end of the hose, is high. Liquid entrained in
such air flow should be, as far as possible, separated
from the air flow so that it remains within the tank and

not expelled through the fan even when the tank is not full. It is known that the suction hose can be connected to the tank at a fitting which incorporates a bend or elbow so that any entrained liquid is separated from the
5 air flow by causing a change in the direction of flow and hence a slowing in the flow speed at the point of entry to the tank. However such provision at the inlet to the tank involves the use of an additional and more complex component, which can be vulnerable to blockage if any
10 large solid items are ingested.

DE9405605 and US4114231 describe float valve assemblies for wet type suction cleaners, each having a surface against which the inlet air impinges and upon which
15 entrained liquid is deposited. This deposited liquid forms a stream that runs down the surface and there is a need to mitigate re-entrainment of this liquid in the air flow.

20 It is to be understood that, if any prior art publication is referred to herein, such reference does not constitute an admission that the publication forms a part of the common general knowledge in the art, in Australia or any other country.

25 With this in mind, it is broadly the object of the present invention to attempt to provide an improvement in the way in which liquid entrained in the machine's air flow is dealt with in the tank.

30 According to one aspect of the invention, there is provided a float valve assembly for fitting in a wet type suction cleaner, comprising a housing having or adapted for co-operation with an outlet port, a float member
35 movable relative to the housing to cause closure of the outlet port, an impingement surface on the housing exterior, facing in a first direction, an opening in the

housing exterior, leading to the outlet port, the opening facing in a direction generally opposite to that faced by the impingement surface, and a deflecting means for deflecting matter from the impingement surface away from the opening in the housing, wherein the deflecting means comprises a wall formation extending outwardly from the housing exterior and disposed between the opening and the impingement surface, the deflecting means having opposite end portions extending downwardly from an upper end of the housing at opposite sides thereof, opposite parts) of the deflecting means converging to meet one another at a lower part of the housing opposite the opening.

According to another aspect of the invention, there is provided a wet type suction cleaner comprising a tank having an inlet for suction-induced air flow, a fan for creating the suction and a float valve assembly according to the one aspect above, wherein the inlet directs the suction-induced air flow against the impingement surface.

The housing of the float valve assembly may be generally circular in cross section, of constant or non-constant diameter, or any other appropriate shape; the impingement surface may comprise about half the peripheral extent of the housing and the opening, leading to the interior of the housing and thence to the outlet port, comprise about the opposite half of its peripheral extent.

The tank of the suction cleaner may be substantially circular, or of other shape, in plan view, and the float valve assembly extend downwardly into the tank from a position at or close to the centre of a body fitting on top of the tank (which body contains the electric motor and fan); in this case the outlet port may be at the top end of the housing, either defined by the housing or a part of body of the vacuum cleaner to which the housing connects. The inlet to the tank would be provided in the

peripheral wall thereof at a suitable distance above the bottom of the tank, and extend radially, to face the float valve assembly.

5 Thus the wall formation or rib may, as a whole, be generally C-shaped. The opening in the housing would be provided at an upper part of the housing (above the maximum liquid level which can be expected therein) on the side thereof facing away from the inlet.

10

The float member may be spherical or cylindrical, guided for movement upwardly and downwardly within the housing by formations, for example inwardly extending ribs, which are oriented upwardly and downwardly of the housing interior.

15

While it would be within the scope of the invention for the deflector means to be provided by a separate component, or components, secured to or associated with the housing of the float valve assembly, preferably the deflector means is integral with the housing, e.g. as part
20 of a plastics moulding.

The invention will now be described by way of example with reference to the accompanying drawings, of which:

25

Figure 1 is a partly-section side elevation of a part of a cleaner in accordance with the invention.

Figure 2 is a partly broken-away perspective view of the
30 cleaner.

Figures 3 and 4 are respectively a front and side elevation of the float valve housing of the cleaner.

Figure 5 is a perspective view of the housing.

35

Referring firstly to figures 1 and 2 of the drawings, these illustrate a "wet" type of suction cleaner in

accordance with the invention. The cleaner comprises a tank 10 which is of circular shape in plan view, having a peripheral wall 12 which is slightly tapered from top to bottom with a lower wall which is of a complex shape, having a number of peripheral upwardly and radially-inwardly extending recesses, two of which are indicated at 14, 16 in which are disposed respective castors 18 enabling the cleaner to be moved over a floor surface. The top of the tank 10 is closed by a body indicated generally at 20.

The body 20 extends upwardly from the top of the tank 10, and has fitted within it an electric motor and fan assembly by which air can be drawn from the interior of the tank 10 and cause air to be drawn into the tank through an inlet aperture 22 in the peripheral wall 12 of the tank. The inlet 22 has a fitting 24 for bayonet-type connection of a suction hose, not shown. Such provision of an inlet in the peripheral wall of a tank of a wet-type suction cleaner, and the disposition of an electric motor and fan in an upper body part of the cleaner, are well known and hence will not be described in any greater detail herein. Facing the interior of the tank 10, the body 20 has an outlet port which leads to the fan, and from the fan an exhaust passage for air sucked through the tank by the fan leads to the external atmosphere.

A float valve assembly indicated generally at 30 extends downwardly within the tank 10 from the centre of the body 20. The float valve assembly comprises a housing whose configuration is shown in greater detail in figures 3 to 5 of the drawings. The housing indicated generally at 32 is of downwardly-tapering part-conical configuration, with a lateral flange 34 at its uppermost end. The flange 34 has three circumferentially spaced apertures one of which is indicated at 36, for receiving fasteners such as bolts or screws by which the housing can be secured to the lower

surface of the body 20 around the outlet port therein. The housing is provided with six circumferentially spaced radially inwardly extending guide ribs as indicated at 38, which guide a float member (not shown) for movement
5 upwardly and downwardly within the housing 32. The float member may be spherical, or possibly of cylindrical or some other form, and is arranged to contact and occlude the outlet port when the level of liquid in the tank has reached an acceptable maximum, thereby preventing any
10 further suction of air from the interior of the tank by the fan of the cleaner and thus any further sucking up of liquid. Such provision in wet type suction cleaners is well known.

15 The housing 32 has, on one side thereof in its upper region, an impingement surface 40 which faces the inlet 22 to the tank. The impingement surface is bounded by a deflector formation 42 in the form of a wall which extends radially outwardly from the exterior surface of the
20 housing 32. Opposite ends 44, 46 of the deflector formation 42 extend downwardly from the peripheral flange 34 at the top of the housing 32, and then the respective parts of the deflector formation are curved at 48, 50 until they extend circumferentially of the housing and
25 meet one another, at 52. Thus the deflector formation as a whole is generally C- or U-shaped.

At the opposite side of the housing 32 from the impingement surface 40, the housing is provided with an
30 opening 54 leading into the interior of the housing, the opening being divided into three parts by two of the ribs 38. These provide for access of air to the interior of the housing 32 whence it is drawn through the outlet port to the fan and is then expelled to the external atmosphere,
35 provided the level of liquid within the tank 10 is not sufficient to cause the float member to rise sufficiently far within the housing 32 to block the outlet port.

The impingement surface 40 of the housing faces the inlet opening 22. If liquid is entrained in the suction air flow entering the tank through the inlet 22, it impinges on the surface 40 which causes drops of the liquid to be separated from the air flow. Such separated liquid runs under gravity down the surface 40, being guided by the deflector formation 42 to the lower part 52 of the formation to fall into the tank. The parts 44, 46 of the deflector formation keep such liquid from being drawn by the suction air flow through the opening 54 to reach the outlet port and fan.

It will be appreciated that modifications may be made, relative to the illustrated embodiment of the invention, while remaining within the broad scope of the invention. For example, the tank of the cleaner may be of other than a circular shape in plan view, as may the float valve assembly, and the latter need not be at the centre of the tank but instead may be nearer one wall post of the tank than another.

When used in this specification and claims, the terms "comprises" and "comprising" and variations thereof mean that the specified features, steps or integers are included. The terms are not to be interpreted to exclude the presence of other features, steps or components.

The features disclosed in the foregoing description, or the following claims, or the accompanying drawings, expressed in their specific forms or in terms of a means for performing the disclosed function, or a method or process for attaining the disclosed result, as appropriate, may, separately, or in any combination of such features, be utilised for realising the invention in diverse forms thereof.

The claims defining the invention are as follows:

1. A float valve assembly for fitting in a wet-type
5 suction cleaner, comprising
a housing having, or adapted for co-operation with, an
outlet port,
a float member movable relative to the housing to cause
closure of the outlet port,
10 an impingement surface on the housing exterior and facing
in a first direction,
an opening in the housing exterior, leading to the outlet
port, the opening facing in a direction away from that
faced by the impingement surface, and a deflecting means
15 for deflecting matter from the impingement surface away
from the opening in the housing, and wherein the
deflecting means comprises a wall formation extending
outwardly from the housing exterior and disposed between
the opening and the impingement surface, the deflecting
20 means having opposite end portions extending downwardly
from an upper end of the housing at opposite sides
thereof, opposite parts of the deflecting means converging
to meet one another at a lower part of the housing
opposite the opening.
25
2. A float valve assembly according to claim 1 wherein
the impingement surface comprises about half the
peripheral extent of the housing.
- 30 3. A float valve assembly according to claim 2 wherein
the opening comprises about the opposite half of the
peripheral extent of the housing.
4. A float valve assembly according to any one of the
35 preceding claims, wherein the housing is generally
circular in cross section.

- 5
6. A float valve assembly according to any one of the preceding claims, wherein the float member is guided for movement upwardly and downwardly within the housing.
- 10
7. A float valve assembly according to claim 5 wherein the float member is guided by inwardly extending ribs oriented upwardly and downwardly of the housing interior.
- 15
8. A wet type suction cleaner comprising a tank having an inlet for suction-induced air flow, a fan for creating the suction and a float valve assembly as claimed in any one of claims 1-6, wherein the inlet directs the suction-induced air flow against the impingement surface.
- 20
9. A suction cleaner according to claim 7 wherein the float valve assembly extends downwardly into the tank, at or close to the centre thereof in plan view, from a body fitting on top of the tank.
- 25
10. A suction cleaner according to claim 8 wherein the inlet to the tank is provided in a peripheral wall thereof, spaced above the bottom of the tank and extending substantially radially to face the impingement surface of the float valve assembly.
- 30
11. A suction cleaner or float valve assembly substantially as hereinbefore described with reference to and as shown in the accompanying drawings.

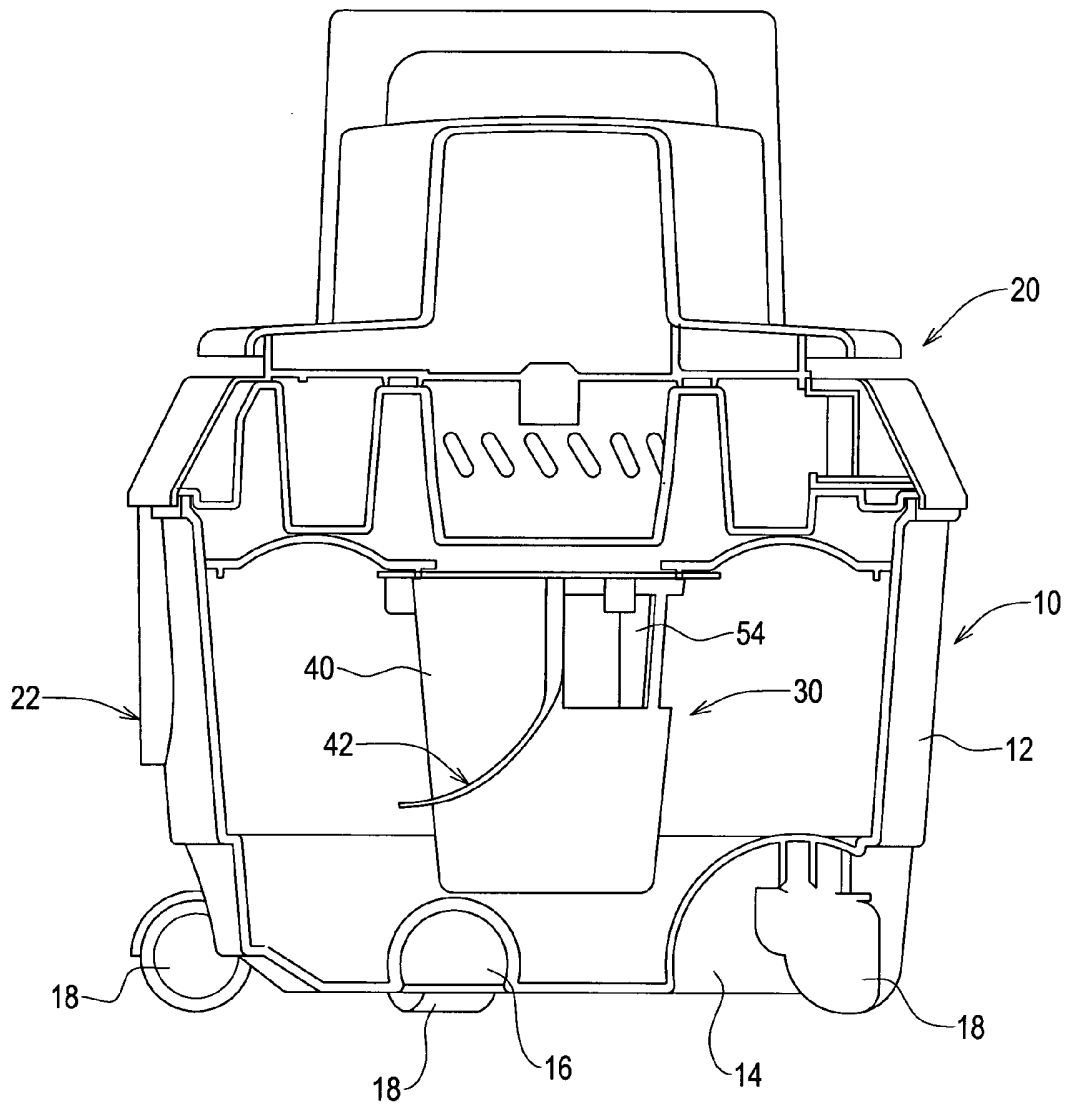


FIG. 1

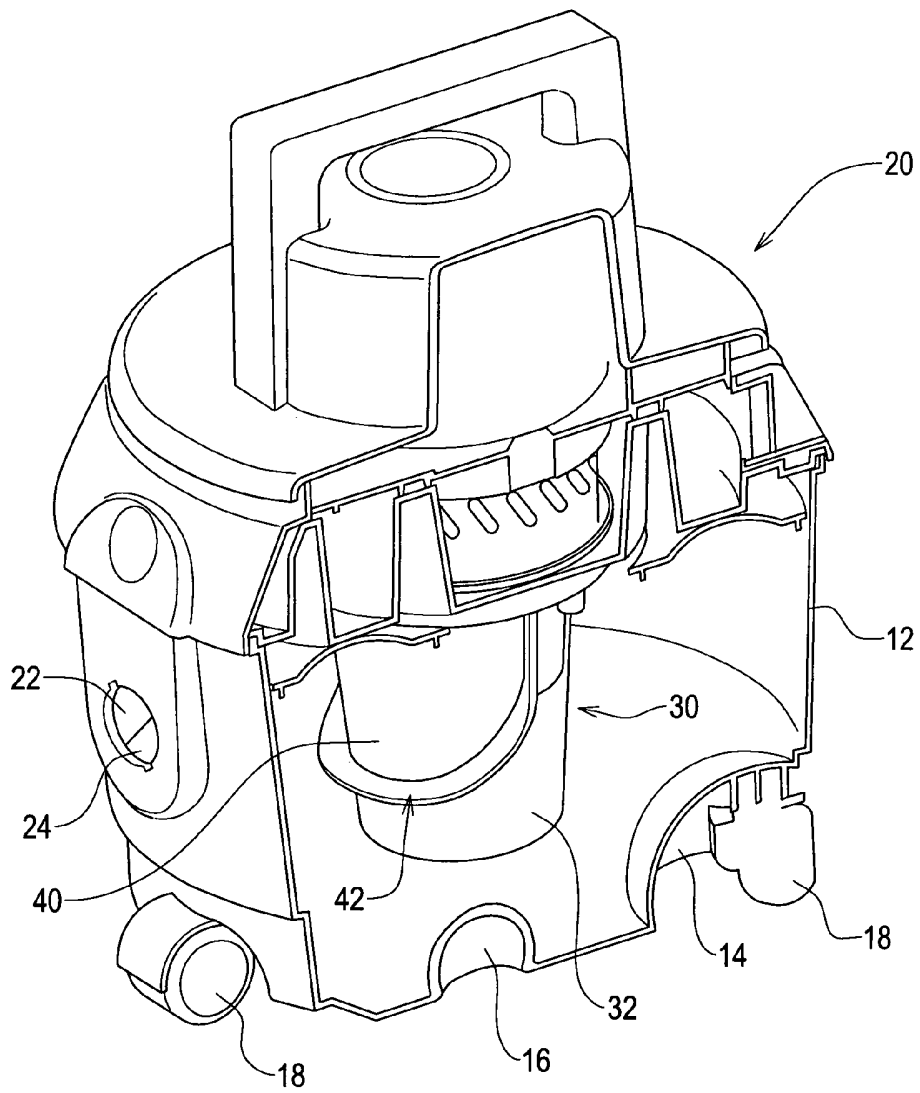


FIG. 2

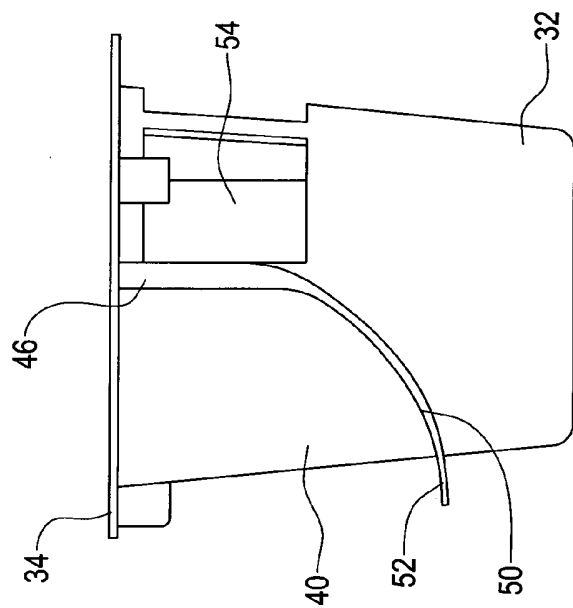


FIG. 4

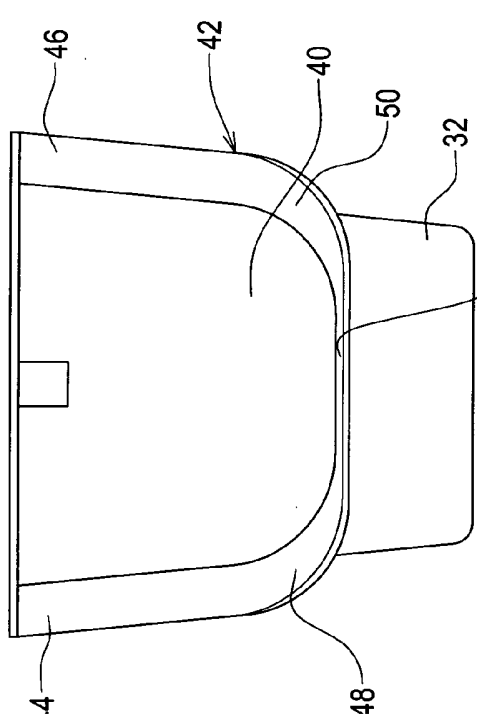


FIG. 3

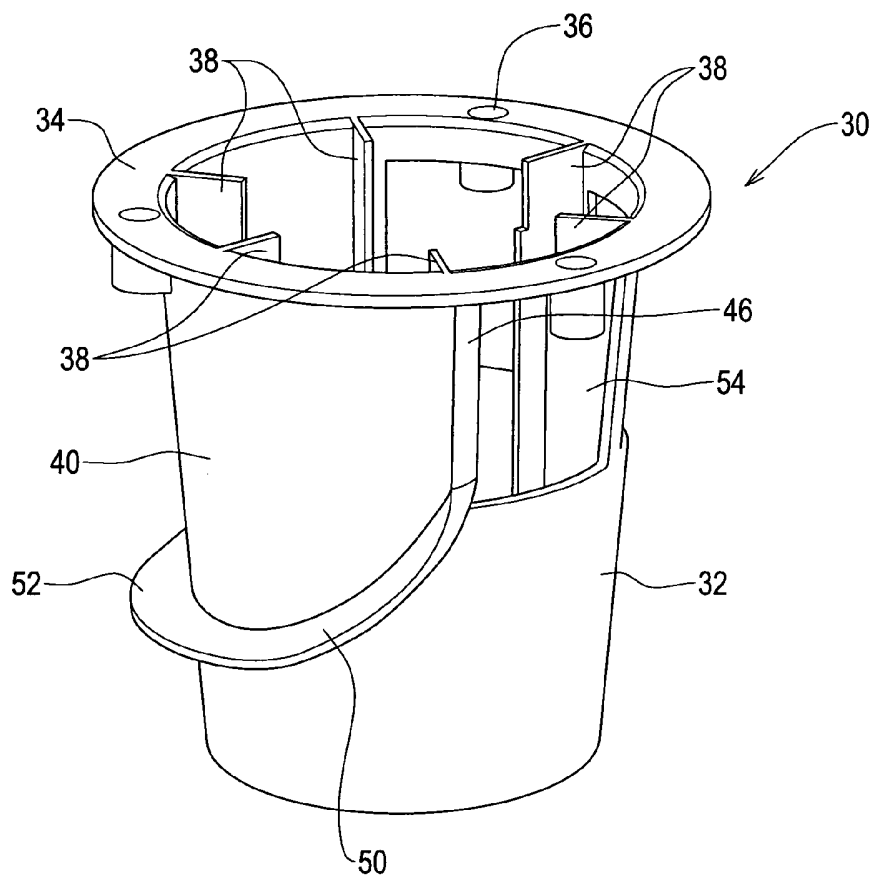


FIG. 5