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(54) **Self-evacuating vacuum cleaner for cleaning ponds or swimming pools.**

(57) A vacuum cleaner (10) for cleaning ponds or swimming pools includes a tank (12) for holding debris and liquid material. Liquid material is filtered prior to being drawn into the tank (12), to then be pumped out of

the tank (12). Alternately, liquid material is drawn into the tank (12) and is filtered when being pumped out of the tank (12). A metering device (90) may be provided for restricting flow into the tank (12), thereby allowing the vacuum cleaner (10) to be operated continuously.

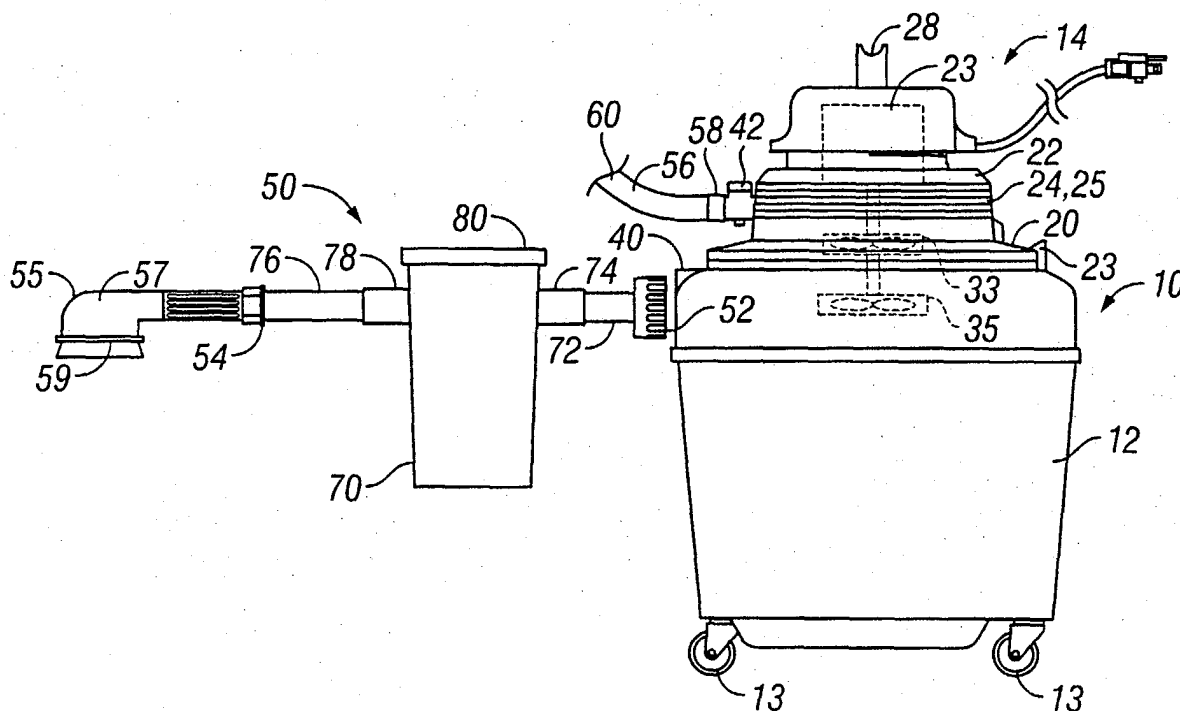


FIG. 1

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Description

FIELD OF THE DISCLOSURE

[0001] This disclosure relates generally to vacuum cleaners, and more particularly, to a self-evacuating vacuum cleaner for cleaning ponds or swimming pools.

BACKGROUND

[0002] Tank-type self-evacuating vacuum cleaners typically have the capability to vacuum debris and liquid material into a holding tank, and pump liquid material out of the holding tank. Such vacuum cleaners have a filter to prevent the collected debris from entering the motor assembly. If the vacuum cleaner is used to collect dry debris, such as dust, a user can open the tank and empty the collected dust out of the tank. However, when vacuuming liquid material or continuously vacuuming and pumping liquid material, the debris that is flowing with the liquid material or floating therein will be sucked into the holding tank with the liquid material and pumped out of the tank with the liquid material. Thus, the debris that is in the liquid material is not collected to effectively filter the liquid material.

BRIEF DESCRIPTION OF THE DRAWINGS

[0003]

FIG. 1 is a vacuum cleaner in accordance with a first example of the teachings of the instant disclosure.

FIG. 2 is a vacuum cleaner in accordance with a second example of the teachings of the instant disclosure.

FIG. 3 is an exploded view of a filter housing in accordance with the teachings of the instant disclosure.

DETAILED DESCRIPTION

[0004] Referring initially to FIGS. 1 and 2, a vacuum cleaner 10 in accordance with the teachings of the present disclosure is generally shown. The vacuum cleaner 10 includes a tank 12 and an upper vacuum assembly, indicated generally at 14. The tank 12 further includes casters 13 that may be used to move the tank 12 on a surface. In a first example of the present disclosure, liquid material is filtered prior to being drawn into the tank 12, to then be pumped out of the tank 12. In a second example of the present disclosure, liquid material is drawn into the tank 12 and is filtered when being pumped out of the tank 12.

[0005] The upper vacuum assembly 14 includes a lid 22 releasably attached to the tank 12. Attached to the lid are a cover 20, a motor housing 24, and a baffle 25. A motor 23 is disposed inside the motor housing 24. The

lid 22 makes up the bottom of the upper vacuum assembly 14 and may carry one or more latches 23 for attaching the upper vacuum assembly 14 to the tank 12. The motor housing 24 is disposed between the lid 22 and the cover 20. When a user wishes to connect the upper vacuum assembly 14 to the tank 12, the user lifts the upper vacuum assembly 14 above the tank 12, aligns the latches 23 with latch recesses (not shown) formed in the tank, lowers the upper vacuum assembly 14 until the lid 22 rests on top of the tank 12, and then, fastens the latches to the tank 12. A handle 28 is provided on the upper vacuum assembly for facilitating transportation of the assembled vacuum cleaner 10. Disposed in the upper vacuum assembly 14, among other things, are an air impeller 33 and a pump impeller 35. The motor 23 drives both the air impeller 33 and the pump impeller 35. The tank 12 includes an inlet 40 and an outlet 42, which are both in fluid communication with the tank. One of ordinary skill in the art will appreciate that the inlet 40 can be disposed either on the tank 12 or on the upper vacuum assembly 14. Similarly, the outlet can be disposed either on the tank 12 or on the upper vacuum assembly 14. The air impeller 33 creates a low pressure in the tank when driven by the motor 23. The low pressure creates suction at the inlet 40 to draw liquid material into the tank 12. The pump impeller 35 ejects liquid material out of the tank 12 through the outlet 42 when operating by the motor 23.

[0006] Referring to FIG. 1, the first example of the vacuum cleaner 10 in accordance with the teachings of the present disclosure is shown. The vacuum cleaner 10 includes an inlet hose 50 having an inlet end 52 and a nozzle end 54. The inlet end 52 is removably connected to the inlet 40, and a cleaning tool 55 removably connects to the nozzle end 54. The vacuum cleaner 10 also includes an outlet hose 56 having an outlet end 58 and a disposal end 60. The outlet end 58 of the outlet hose 56 removably connects to the outlet 42. A filter housing 70 is disposed in the flow path of the inlet hose 50. Accordingly, the inlet hose 50 includes two sections--a first inlet hose section 72 that fluidically connects the inlet 40 to a filter housing outlet 74, and a second inlet hose section 76 that fluidically connects the cleaning tool 55 to a filter housing inlet 78. Thus, during the operation of the vacuum cleaner 10, liquid material flows through the cleaning tool 56 and the second inlet hose section 76 before entering the filter housing 70 from the filter housing inlet 78. The liquid material then flows out the filter housing 70, through the first inlet hose section 72, to be deposited into the tank 12 from the inlet 40.

[0007] Referring to FIG. 3, the filter housing 70 includes a filter housing lid 80 and a filter 82 that removes debris from the liquid material. One of ordinary skill in the art will appreciate the numerous possible filter types and configurations that are well known in the art for removing debris from liquid material. In the disclosed examples, the filter 82 includes a mesh material (shown in FIG. 3) disposed in the flow path between the filter hous-

ing inlet 78 and the filter housing outlet 74 to intercept any debris that may be in the liquid material. One of ordinary skill in the art will appreciate that the smaller the mesh density of the filter 82, the smaller the size of particles the filter 82 can intercept. However, a filter 82 that has a very fine mesh can impede the flow of liquid material from the filter housing inlet 78 to the filter housing outlet 74. Conversely, a filter 82 that has a very coarse mesh will only intercept very large debris and allow smaller sized debris to pass through. Accordingly, the filter 82 can include a mesh material from a range of mesh densities to provide desired filtering of the debris from the liquid material without impeding the flow of liquid material through the filter housing 70.

[0008] One of ordinary skill in the art will appreciate that the filter 82 may be constructed from a variety of materials, including metal and plastic. However, the mesh material of the filter 82 is preferably constructed from a plastic material to prevent corrosion thereof as a result of continuous and repeated contact with liquid material. Furthermore, the mesh material of the filter 82 is preferably constructed from a flexible plastic material to facilitate easy removal of the filter 82 from the filter housing 70 for cleaning.

[0009] Referring to FIG. 2, the second example of the vacuum cleaner 10 in accordance with the teachings of the present disclosure is shown. In this embodiment, the filter housing 72 is disposed in the flow path of the outlet hose 56. Accordingly, the outlet hose 56 includes two sections—a first outlet hose section 84 that fluidically connects the outlet 42 to a filter housing inlet 78, and a second outlet hose section 86 that fluidically connects the filter outlet 74 to the disposal end 60. Thus, during the operation of the vacuum cleaner 10, liquid material flows from the outlet 42 through the first outlet hose section 84 before entering the filter housing 70. The liquid material then leaves the filter housing 70 through the filter housing outlet 74 for ejection from the disposal end 60.

[0010] When operating the vacuum cleaner 10, the rate at which liquid material is drawn into the tank 12 may not be equal to the rate at which the liquid material is pumped out of the tank 12. Accordingly, to provide for continuous operation of the vacuum cleaner 10, and to synchronize the in-flow of liquid material into the tank 12 with the out-flow of liquid material from the tank 12 (i.e., a one-to-one ratio), the vacuum cleaner 10 may include a metering device 90 (shown in FIG. 2). The metering device 90 regulates the in-flow of liquid material into the tank 12. Accordingly, the metering device 90 can be disposed anywhere in the flow path of the liquid material prior to entering the tank 12. In the first example of the vacuum cleaner 10 shown in FIG. 1, the metering device 90 is disposed in the filter housing 70 (shown in Fig. 1). In the second example of the vacuum cleaner 10 shown in FIG. 2, the metering device 90 is disposed in the flow path of the inlet hose 50.

[0011] One of ordinary skill in the art will readily ap-

preciate that any one of the described first and second examples of the disclosed vacuum cleaner 10 can be optionally practiced by a user. For instance, if a user chooses to operate the vacuum cleaner 10 in accordance with the first example, he can place the filter housing 70 in the flow path of the inlet hose 50 by connecting the first and second inlet hose sections 72 and 76, respectively, to the filter housing 70. Alternately, the user can operate the vacuum cleaner 10 in accordance with the second example by placing the filter 70 in the flow path of the outlet hose 56 between the first outlet hose section 84 and the second outlet hose section 86. To facilitate the alternate filter house positions, releasable couplings may be provided between the first and second inlet hose sections 72, 76 and the first and second hose sections 84, 86. One of ordinary skill in the art will further appreciate that the inlet hose sections 72 and 76 can be identical to the outlet hose sections 84 and 86. Accordingly, a user can simply use these hose sections interchangeably to easily and optionally practice the above-described first and second examples.

[0012] The cleaning tool 55 can be one of many vacuum cleaning tools that are well known to those of ordinary skill in the art. However, to clean contoured surfaces of ponds or swimming pools, a head 57 of the cleaning tool 55 is preferably flexible to conform to the contour of the surface to be cleaned. Furthermore, the cleaning tool 55 can be constructed in a non-linear shape, such as a curved shape, to closely match the contour of the surface to be cleaned. As is well known to those of ordinary skill in the art, the bottom surfaces of ponds or swimming pools need to be cleaned occasionally to remove a variety of debris and deposits therefrom. To dislodge such debris, the cleaning tool 55 can include a scrubbing brush 59.

[0013] When cleaning the bottom surface of a pond or a swimming pool, a user can dislodge debris from the bottom surface by scrubbing the cleaning tool 55 on the bottom surface. The dislodged debris and the surrounding water are then drawn into the inlet hose 50. If the filter housing 70 is attached to the inlet hose 50 in accordance with the first example of the present disclosure, the debris is removed from the water prior to reaching the tank 12. The filtered water is then pumped out of the tank 12 and back into the pond or swimming pool through the outlet hose 56. If the filter housing 70 is attached to the outlet hose 56 in accordance with the second example of the present disclosure, the debris and water are deposited into the tank 12. Prior to being ejected from the disposal end 60 of the outlet hose 56, the debris is removed from the water by the filter 82. A user can also remove debris that is floating in the water in a pond or swimming pool by simply placing the nozzle end 54 of the inlet hose 50 (if no cleaning tool 56 is attached, or the cleaning tool 56 if it is attached to the nozzle end 54) near the debris to draw the debris and the surrounding water into the inlet hose 50. As shown in FIG. 3, the user can at anytime or when necessary clean the filter

82 by opening the lid 80 of the filter housing to either remove the debris from the filter housing 70, or take the filter 82 out of the filter housing 70 to clean.

[0014] One of ordinary skill in the art will readily appreciate that the inlet hose sections 72 and 76, the outlet hose 56 or the outlet hose sections 84 and 86, the filter housing 70, and the metering device (not shown) can be used with any self-evacuating tank-type vacuum cleaner, as long as the inlet hose 50 and the outlet hose 56 are sized to provide removable connection to the vacuum cleaner's inlet and outlet, respectively. Accordingly, any tank-type self-evacuating vacuum cleaner can be modified to provide the function of pond or swimming pool cleaning.

[0015] Although certain apparatus constructed in accordance with the teachings of the invention have been described herein, the scope of coverage of this patent is not limited thereto. On the contrary, this patent covers all embodiments of the teachings of the invention fairly falling within the scope of the appended claims either literally or under the doctrine of equivalents.

Claims

1. A wet/dry vacuum cleaner for cleaning debris from a surface wetted with liquid material comprising:

a tank having an inlet for receiving the liquid material and an outlet for disposing the liquid material;
 an air impeller housing having an opening in air flow communication with the tank interior;
 an air impeller disposed inside the air impeller housing to create low pressure in the tank;
 a motor disposed inside a motor housing and operatively coupled to the air impeller;
 an inlet hose removably connected to the inlet;
 a nozzle removably attached to the inlet hose and adapted to engage the surface for dislodging the debris from the surface, the debris and liquid material being passed through the inlet hose; and
 a filter disposed in the inlet hose and adapted to remove debris from the liquid material;

wherein the nozzle dislodges debris from the surface, and the debris and the liquid material are pulled through the inlet hose.

2. The vacuum cleaner of claim 1, further comprising a filter housing sized to receive the filter, the filter housing having an inlet in fluid communication with an upstream portion of the inlet hose and outlet in fluid communication with a downstream portion of the inlet hose.

3. The vacuum cleaner of claim 1, wherein the filter

comprises a mesh material sized to remove the debris from the liquid material.

4. The vacuum cleaner of claim 1, wherein the nozzle comprises a cleaning tool adapted to clean the surface.
5. The vacuum cleaner of claim 4, wherein the cleaning tool includes a scrubbing brush.
6. The vacuum cleaner of claim 4, wherein the cleaning tool includes a flexible cleaning head.
7. The vacuum cleaner of claim 1, further comprising a metering device disposed in the inlet hose.
8. A wet/dry vacuum cleaner for cleaning debris from a surface wetted with liquid material comprising:

a tank having an inlet for receiving the liquid material and an outlet for disposing the liquid material;
 an air impeller housing having an opening in air flow communication with the tank interior;
 a pump impeller;
 a motor disposed inside a motor housing and operatively coupled to the pump impeller;
 an outlet hose removably connected to the outlet; and
 a filter disposed in the outlet hose and adapted to remove debris from the liquid material;

wherein the liquid material including debris in the tank are pumped through the outlet hose.

9. The vacuum cleaner of claim 8, further comprising a filter housing sized to receive the filter, the filter housing having an inlet in fluid communication with an upstream portion of the outlet hose and outlet in fluid communication with a downstream portion of the outlet hose.
10. The vacuum cleaner of claim 8, wherein the filter comprises a mesh material sized to remove the debris from the liquid material.
11. The vacuum cleaner of claim 8, further comprising an inlet hose removably connected to the inlet.
12. The vacuum cleaner of claim 11, further comprising a metering device disposed in the inlet hose.
13. A wet/dry vacuum cleaner for cleaning debris from a surface wetted with liquid material comprising:

a tank having an inlet for receiving the liquid material and an outlet for disposing the liquid material;

an air impeller housing having an opening in air
 flow communication with the tank interior;
 a vacuum impeller disposed inside the air im-
 peller housing to create low pressure in the
 tank; 5
 a pump impeller;
 a motor disposed inside a motor housing and
 operatively coupled to the vacuum impeller and
 the pump impeller;
 an inlet hose removably connected to the inlet; 10
 an outlet hose removably connected to the out-
 let;
 a nozzle removably attached to the inlet hose
 and adapted to engage the surface for dislodg-
 ing the debris from the surface, the debris and 15
 liquid material being passed through the inlet
 hose; and
 a filter disposed in one of the inlet hose or the
 outlet hose and adapted to remove debris from
 the liquid material; 20

wherein the nozzle dislodges debris from the
 surface, and the debris and the liquid material are
 pulled through the inlet hose and disposed through
 the outlet hose. 25

14. The vacuum cleaner of claim 13, in which the filter
 is disposed in the inlet hose, the vacuum cleaner
 further comprising a filter housing sized to receive
 the filter, the filter housing having an inlet in fluid 30
 communication with an upstream portion of the inlet
 hose and an outlet in fluid communication with a
 downstream portion of the inlet hose.
15. The vacuum cleaner of claim 13, in which the filter 35
 is disposed in the outlet hose, the vacuum cleaner
 further comprising a filter housing sized to receive
 the filter, the filter housing having an inlet in fluid
 communication with an upstream portion of the out-
 let hose and an outlet in fluid communication with a 40
 downstream portion of the outlet hose.
16. The vacuum cleaner of claim 13, wherein the filter
 comprises a mesh material sized to remove the de-
 bris from the liquid material. 45
17. The vacuum cleaner of claim 13, wherein the nozzle
 comprises a cleaning tool adapted to clean the sur-
 face. 50
18. The vacuum cleaner of claim 17, wherein the clean-
 ing tool includes a scrubbing brush.
19. The vacuum cleaner of claim 17, wherein the clean-
 ing tool includes a flexible cleaning head. 55
20. The vacuum cleaner of claim 13, further comprising
 a metering device disposed in the inlet hose.

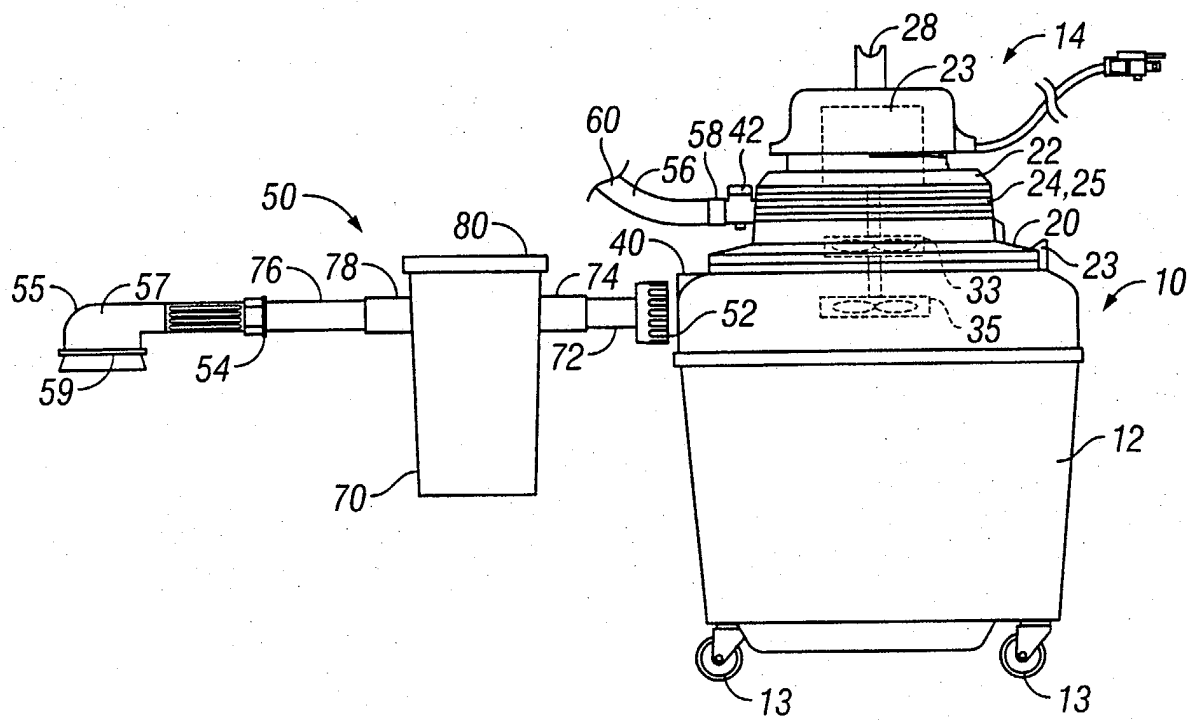


FIG. 1

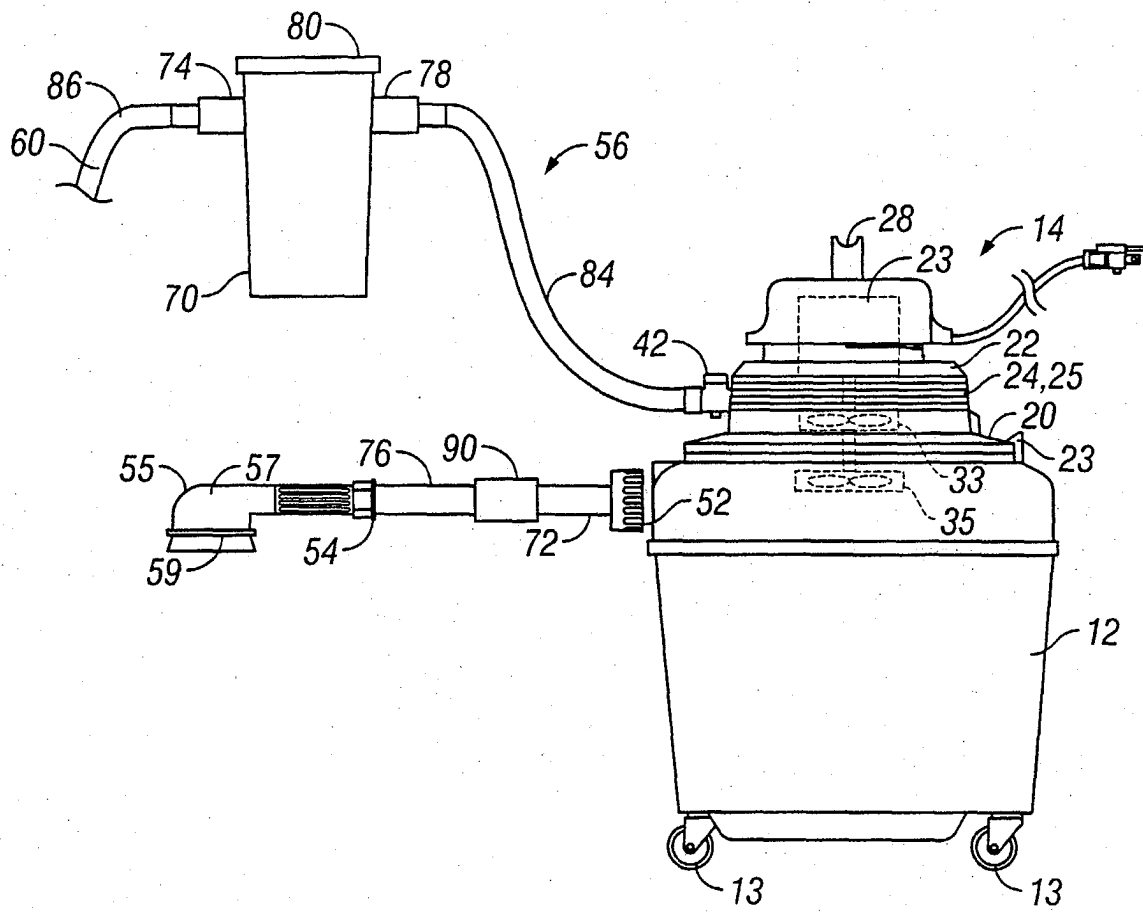


FIG. 2

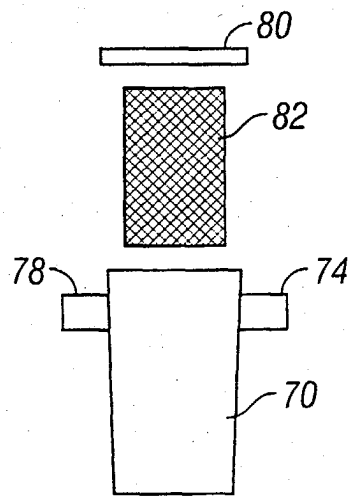


FIG. 3