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(54) **SOIL SEPARATION CHANNEL FOR DISHWASHER PUMP SYSTEM**

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(73) Assignee: **Whirlpool Corporation**, Benton Harbor, MI (US)

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Related U.S. Patent Documents

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(51) **Int. Cl.**[7] **B08B 3/02**

(52) **U.S. Cl.** **134/10**; 134/111; 134/104.1; 134/104.4; 134/25.2; 210/407

(58) **Field of Search** ..... 134/104.9, 104.1, 134/109, 110, 111, 176, 179, 56 D, 57 D, 58 D, 10, 25.2; 210/407

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(57) **ABSTRACT**

A soil separator for a dishwasher includes a centrifugal soil collection wall surrounded by a spill over guide channel, surrounded by a shallow annular soil accumulator channel. The soil accumulator channel is open to the dishwasher chamber but covered by a filter screen. The accumulator channel is shallow beneath the screen and empties downwardly into an accumulator sump where accumulated soil is periodically drained. The shallow accumulator channel allows water to flush an inside of the screen to carry soil to the accumulator sump.

39 Claims, 4 Drawing Sheets

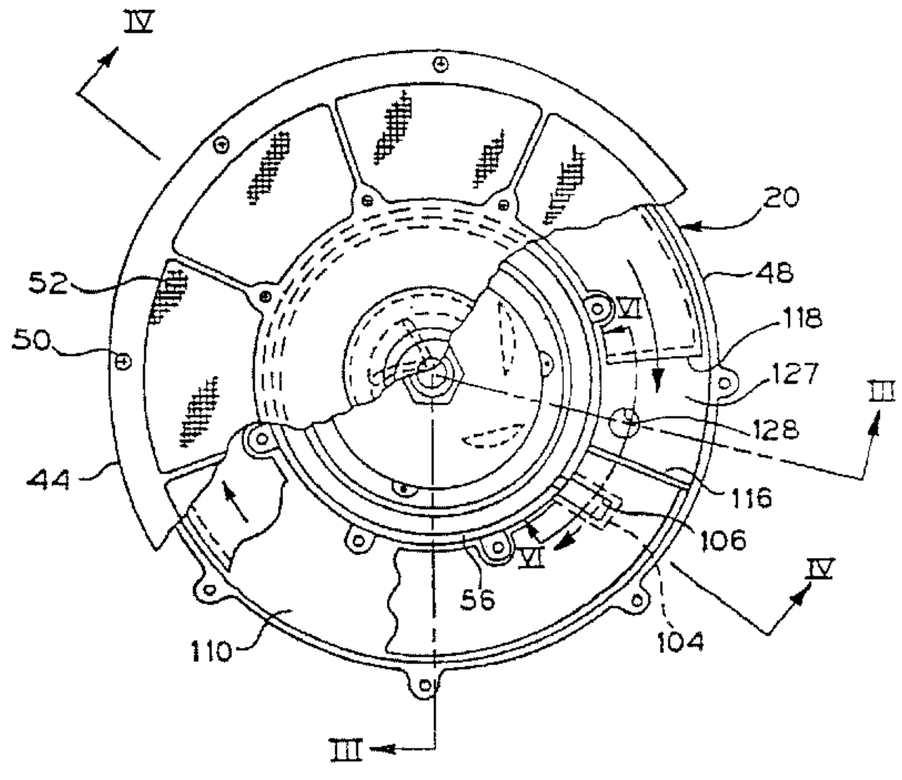

FIG.1

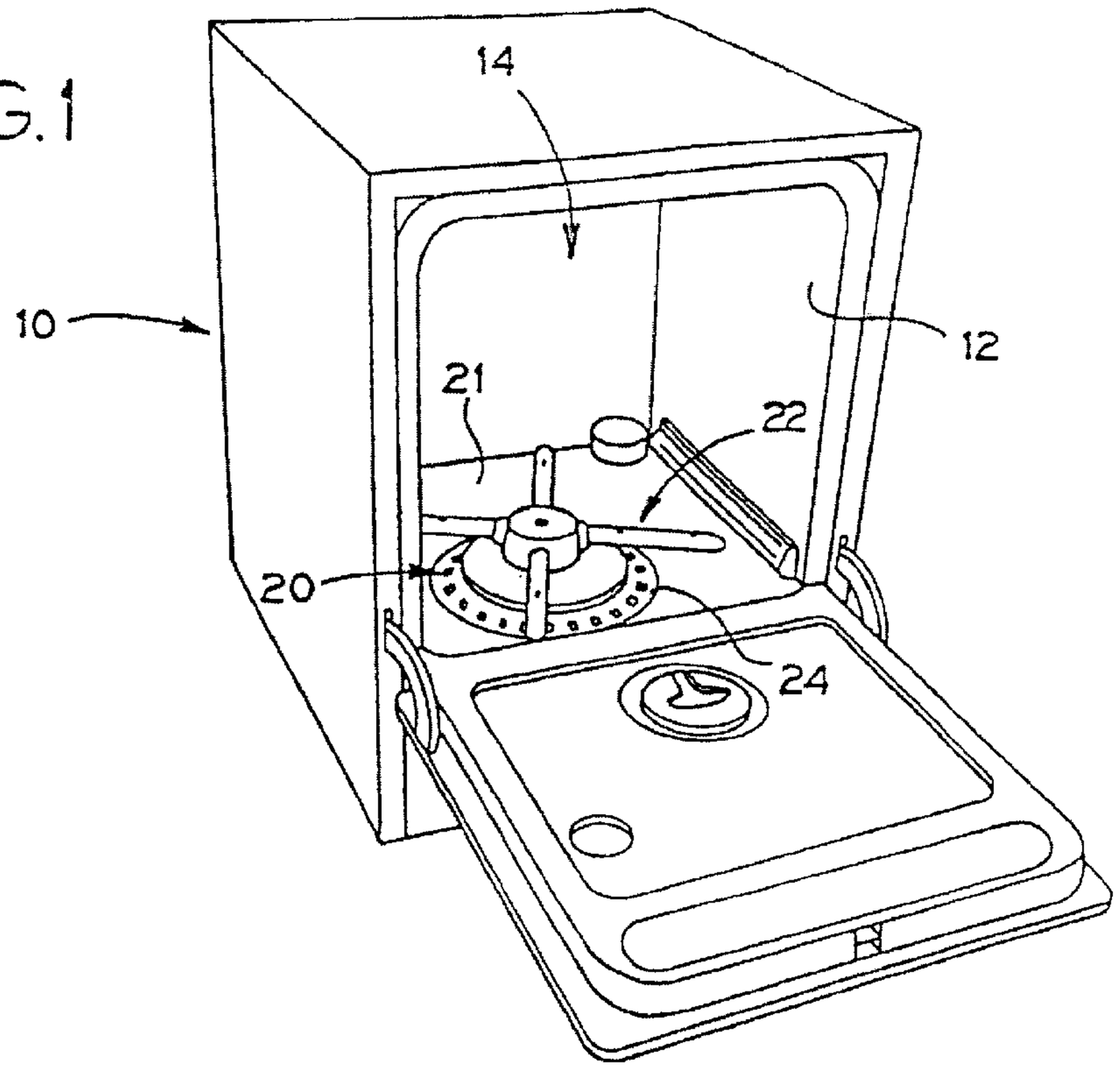
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FIG.2

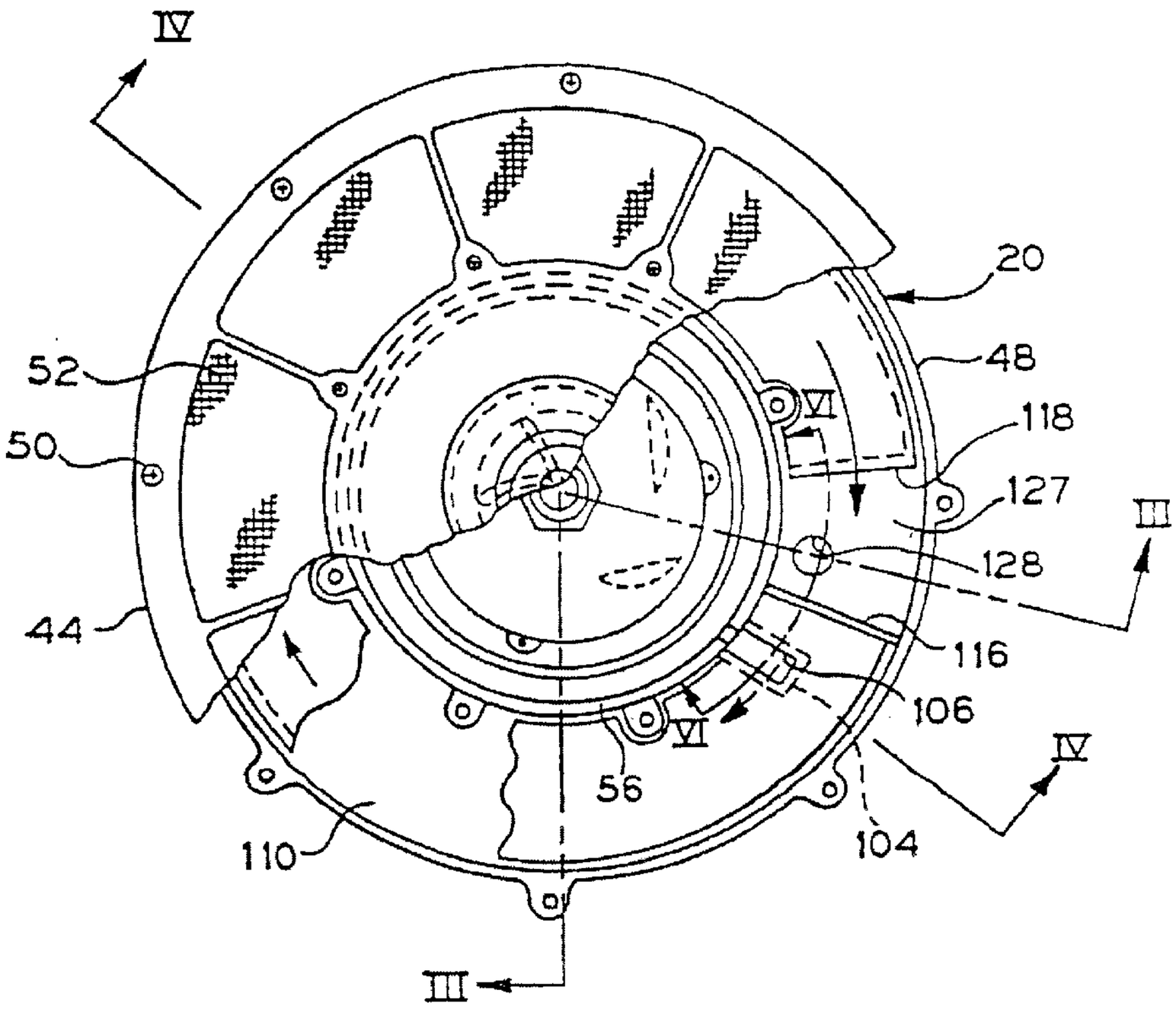
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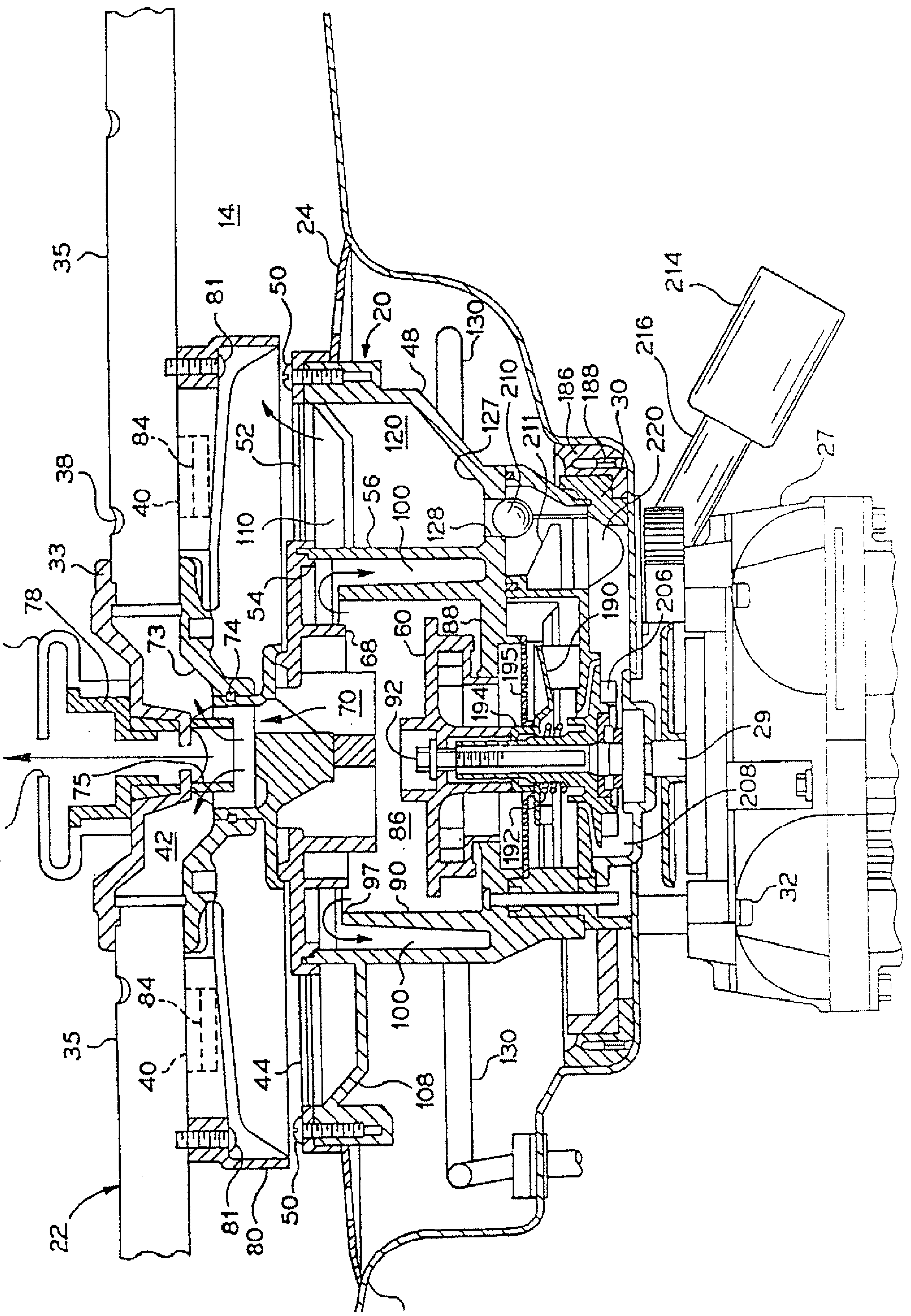
FIG. 3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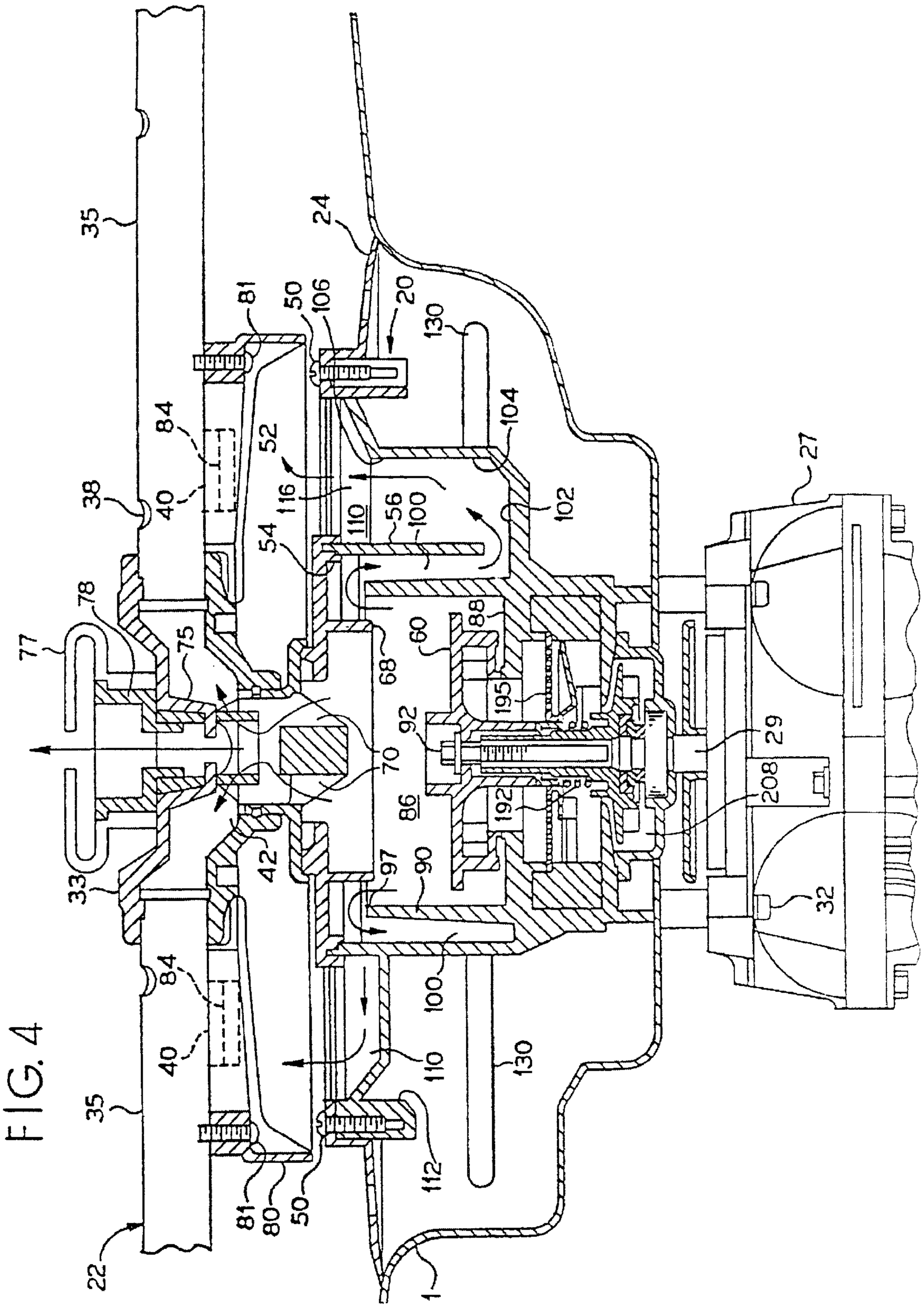
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FIG. 4

FIG. 5

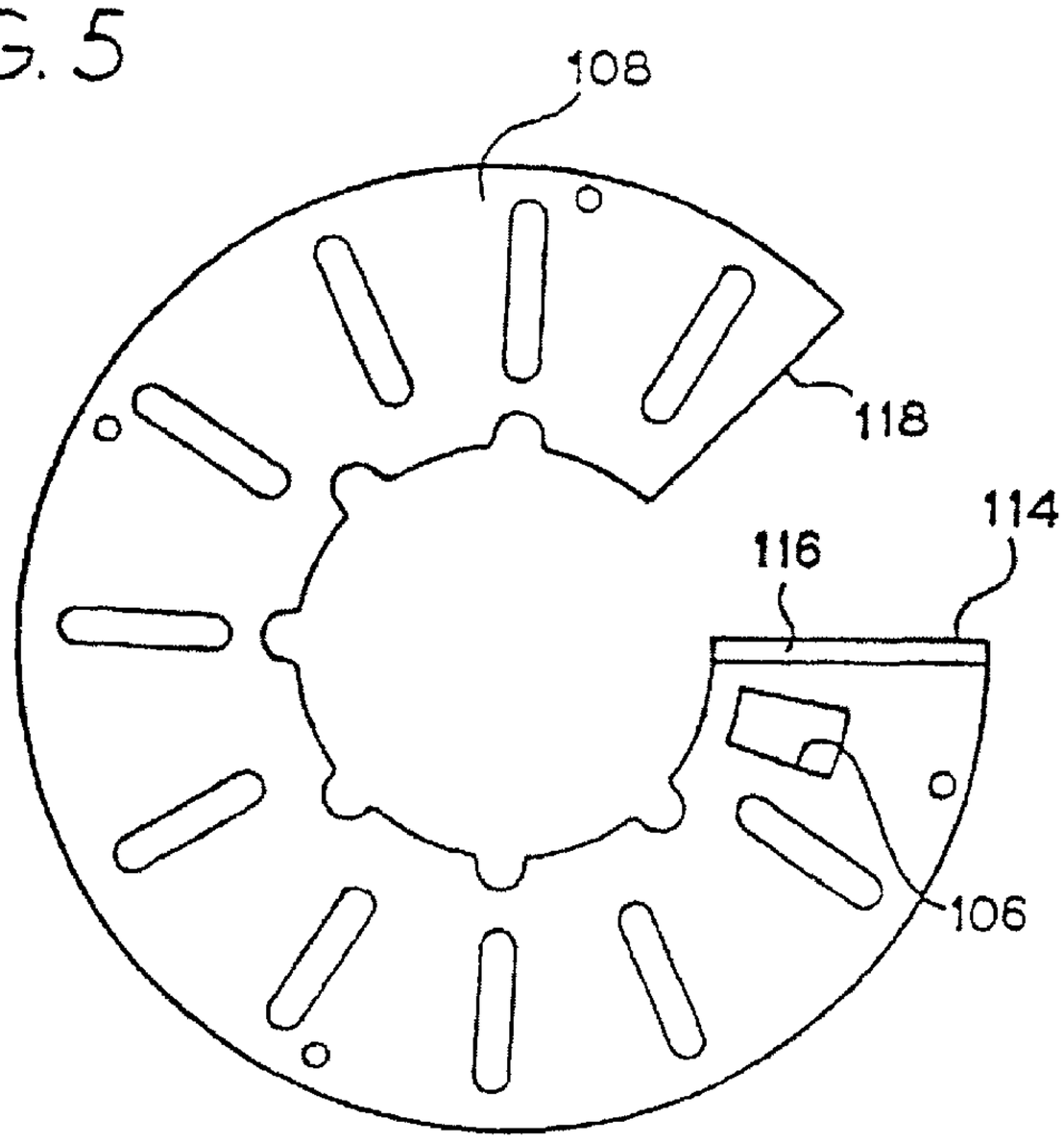
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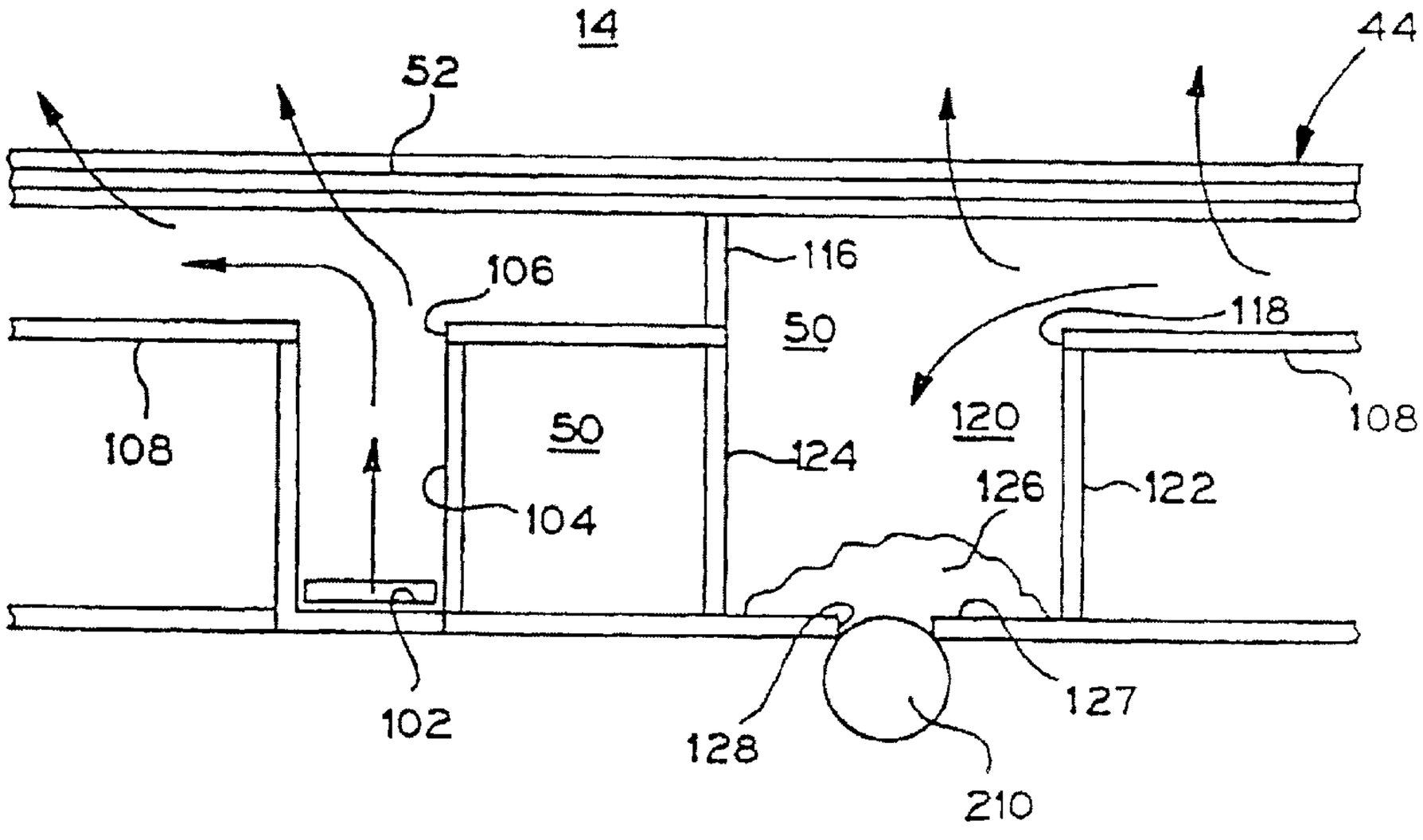
FIG. 6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SOIL SEPARATION CHANNEL FOR DISHWASHER PUMP SYSTEM

Matter enclosed in heavy brackets [ ] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

This application claims the benefit of U.S. Provisional Application No.: 60/003,275 filed Aug. 25, 1995.

BACKGROUND OF THE INVENTION

The present invention is directed to a soil separator for a dishwasher and particularly an arrangement between a soil separator chamber and a soil accumulator chamber which provides an improved apparatus and method for collecting and filtering soil from dishwasher water.

A known arrangement for removing soil from dishwasher water is described in U.S. Pat. No. 5,165,433. This apparatus includes a combination motor-pump and soil separator assembly. The motor-pump assembly includes a wash impeller, which operates within a pump cavity located within the soil separator. As the impeller operates in a wash or rinse mode, a swirling motion is created in the wash liquid passing through the pump cavity, thereby creating a centrifugally sampled annular layer of wash liquid on the annular interior wall. A portion of the wash liquid having a high concentration of entrained soil (food particles, etc.) passes over an upper edge of the annular interior wall and into an annular guide chamber.

Wash liquid from this guide chamber travels to an annular soil collection chamber at a high flow rate. This high flow rate is achieved by use of a relatively small aperture located in a lower portion of the annular wall separating the guide chamber and the soil collection chamber. Upon entering the soil collection chamber, wash liquid flows outwardly and upwardly through a screen which separates the water from the soil. The wash liquid is prevented from draining out of the soil collection chamber by a ball check valve seated within a drain port. The screen contains an annular arrangement of fine mesh filters, which prevent soil particles entrained in the wash liquid from reentering the dishwasher space. The cleansed wash liquid returns to the dishwasher floor where it is picked up by the motor driven pump for recirculation within the dishwasher.

Typically, the apparatus such as described above allows water to pass through the hole between the guide channel and the collector chamber at a rate of about 4 gallons per minute. This flow rate can cause the heavily concentrated mixture of soil and water within the accumulator chamber to be agitated, preventing soils from readily settling. With this flow rate and configuration, there may be a tendency for the mechanical filter to clog even though back wash nozzles for spraying the filter from above are provided. Collecting soil at these flow rates cause filter screens with a 0.0049 inch mesh to have a tendency to clog. It was necessary to increase screen mesh to 0.0079 inch to prevent this clogging. However, the larger mesh screen allowed soils of larger particle size to escape through the screen and may be seen as "grit" on the dishes.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a dishwasher soil collection system which is compatible with a high flow rate soil removal dishwasher while at the same time allowing for adequate screening of soil in the dish water return to the dish compartment in a recirculating dish water system. It is an object of the invention to provide a more efficient method of soil collection and retention while reducing water and energy usage.

The objects are inventively achieved in that an annular soil separator wall is provided around the dish washer pump for accumulating solids by centrifugal action, a soil guide channel is provided surrounding the separator wall, and a shallow soil accumulator channel or "screening channel", substantially annular, is arranged beneath the filter screen surrounding the soil guide channel. The soil accumulator channel is flow connected to the guide channel by a vertical tube at a first closed end of the channel and the channel surrounds the guide channel to an open channel end which empties, to an accumulator sump having a drain port closed by a ball check valve. Water and soil proceed around the accumulator channel, soil is retained beneath the filter screen and water proceeds through the filter screen. Back wash nozzles are provided to wash the filter screen of soil from a dish compartment side of the filter screen. Thus, by directing inlet water from the guide channel to the shallow accumulator channel, the inside of the filter screen is washed by the water, while the outside of the screen is washed by the backwash nozzles above. Therefore, food particles which are temporarily dislodged from the screen by the backwash nozzles may not immediately return to the screen after the backwash nozzle passes, due to the direction of flow on an inside surface of the filter screen from the water flowing inside the accumulator channel.

Inlet water flow into the accumulator channel is directed in a circulatory path and kept in the shallow accumulator channel in close proximity with the screen. As particles are dislodged by the backwash nozzles, they are moved around toward the stagnant soil accumulator sump. The sump is located away from the accumulator channel water inlet and therefore, more isolated and stagnant, allowing soil to settle. This is due to the fact that water and soil lose velocity as they approach the accumulator sump while most of the water escapes through the screen. The accumulator sump can be configured more compact when using the shallow accumulator channel of the present invention. The physical configuration of the system reduces water held in the accumulator by 60% or greater.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a perspective view of a dishwasher including a soil separator in accordance with the present invention;

FIG. **2** is a plan view of the soil separator having the wash arm assembly removed therefrom and with a portion of the soil separator screen cut away;

FIG. **3** is a diametric section of the soil separator including the wash arm assembly taken generally along line III-III of FIG. **2**;

FIG. **4** is a sectional view of the soil separator taken generally along line IV—IV of FIG. **2**;

FIG. **5** is a plan view of an accumulator chamber grating; and

FIG. **6** is a partial sectional view taken generally along VI—VI of FIG. **2**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In accordance with the invention as shown in the drawings, and particularly as shown in FIG. **1**, an automatic dishwasher generally designated **10** includes an interior tank wall **12** defining a dishwashing space **14**. A soil separator **20**

is centrally located in floor **21** and has a lower wash arm assembly **22** extending form an upper portion thereof. Coarse particle grate **24** permits wash liquid to flow from floor **21** to soil separator **20**, while preventing foreign objects, such as apricot pits and pop tops, from inadvertently entering soil separator **20**.

The basic constructional features of the soil separator are explained in U.S. Pat. No. 5,165,433 herein incorporated by reference. Referring now to FIG. **3**, the soil separator and pump assembly generally comprises a motor **27** having an output shaft **29** secured to base plate **30** by bolts **32**. The motor **27** is a reversing motor which normally operates in a clockwise direction, as viewed in FIG. **2**. When operated in a clockwise direction, such as in a wash mode or a rinse mode, the motor **27** provides a pumping action within soil separator **20**, thereby providing pressurized wash liquid to lower wash arm assembly **22**.

As shown in FIG. **3**, lower wash arm assembly **22** includes a central hub **33** having a plurality of wash arms **35** extending radially therefrom. Each wash arm **35** includes one or more upwardly directed spray nozzles **38** for directing wash liquid upwardly within dishwashing space **14**, and one or more downwardly directed spray nozzle **40** for providing a back-washing action, as will become apparent. Liquid passageway **42** in central hub **33** permits pressurized wash liquid to flow to the lower wash arm assembly **22**.

As shown in FIG. **2**, the soil separator **20** further includes an annular cover **44** which is disposed over and secured to soil container wall **48** by screws **50**. When in place, cover **44** and soil container wall **48** combine to form a low-pressure water seal, preventing leakage of water therebetween. Cover **44** includes a series of fine mesh filter segments **52** which are radially disposed about a central axis of the cover. Fine mesh filter segments **52** are preferably formed of a synthetic material such as nylon or polyester and have a mesh on the order of 0.0049" to 0.0106". Depending on the material desired to be filtered, however, a larger or smaller mesh filter may be used.

Referring back to FIG. **3**, located radially inwardly from the fine mesh filter segments **52** and depending downwardly from cover **44** is an annular lip **54**. Annular lip **54** forms a high-pressure seal in combination with an upstanding annular wall **56**, as will become apparent.

Further located radially inwardly from the annular lip **54** of the cover **44** is a downwardly depending annular wall **68**. Annular wall **68** defines a centrally located interior area containing a plurality of vanes for directing pressurized wash liquid.

In the embodiment shown, water flows upward in passages **70** and into passages **73** into wash arms **35**. Water also flows into a channel pipe **75** to be directed vertically to feed an upper wash arm (not shown). The hub **33** holds the arms **35**. The channel pipe **75** penetrates the hub **33**. A rubber boot **77** is fastened to hub **33** and is open at a bottom thereof and has an aperture **77**a for passing water therethrough. A retainer ring **78** with external threads **78**a screws into the channel pipe **75** at internal threads **75**a to retain the boot **77**.

Under water pressure, the boot **77** seals against an upstanding tower (not shown) attached to the bottom rack (not shown) for delivery of water to the upper wash arm (not shown).

Although a top delivery of water to the upper wash arm is described, water can be delivered to the upper wash arm by a pipe such as described in U.S. Pat. No. 5,165,433. Alternately, a pipe or channel can be arranged from the passages **70** for supplying water to the upper arms and the

channel can be located above the screen elements **52** extending radially from the hub **33** on the floor **21** of the dish compartment.

Referring to FIG. **3**, it may be seen that lower wash arm assembly **22** is freely rotatably mounted about a seal ring **74**. A filter guard **80** is mounted to wash arms **35** by screws **81**. Filter guard **80** overlies the fine mesh filter segments **52** of cover **44**, protecting fine mesh filter segments **52** from damage caused by falling utensils or tableware. In operation, pressurized wash liquid flows past into wash arms **35**. Upwardly directed nozzles **38** are positioned on wash arms **35** so as to provide a chordally directed thrust, causing lower wash arm assembly **22** to rotate about the seal ring **74** when pressurized wash liquid is pumped through nozzles **38**.

As lower wash arm assembly **22** rotates, pressurized wash liquid is emitted from downwardly directed nozzles **40**. A deflector tab **84** integrally formed as part of filter guard **80** is disposed directly beneath each nozzle **40**, impinging on the flow of wash liquid emitted therefrom. As the flow of water from each nozzle **40** strikes the associated deflector tab **84**, a fan-shaped spray is formed. Each fan-shaped spray sweeps the top of the fine mesh filter segments **52** as lower wash arm assembly **22** rotates, thereby providing a back-washing action to keep fine mesh filter segments **52** clear of soil particles which may impede the flow of cleansed wash liquid into dishwashing space **14**.

The wash impeller **60** is located within pump cavity **86**. Pump cavity **86** is generally defined by the soil separator lower housing wall **88**, an inside upstanding annular wall **90**, and cover **44**.

Wash impeller **60** is secured to the output shaft **29** of pump motor **27** by impeller retaining bolt **92**, and pumps wash liquid when in operation. The majority of the pressurized wash liquid enters the area beneath the cover **44** defined by downwardly depending annular wall **68**, and is directed to the lower wash arm and to the upper wash arm. Under normal operating conditions, flow of pressurized wash liquid is provided to the lower wash arm and to the upper wash arm.

During normal operation, a third portion of the wash liquid is maintained within the soil separator to be cleansed and returned to circulation. In pump cavity **86**, a portion of the wash liquid having a high concentration of entrained soil tends to accumulate on the inside upstanding annular wall **90**. The swirling motion of the liquid tends to carry the soil upwardly over the upper edge **97** of wall **90**, whereupon the soil-laden liquid collects within annular guide chamber **100** defined between the inside upstanding annular wall **90** and the outside upstanding annular wall **56**. Undesirable pressure loss within the annular guide chamber **100** is prevented by forming a relatively water-tight, high pressure seal at the juncture of cover **44** and the outside upstanding annular wall **56**.

As shown in FIG. **4**, soil laden water flows through an inlet **102** into a tube **104** and upward through a hole **106** into soil accumulation channel **110**.

Although a relatively tall wall **90** is shown, it is possible to significantly shorten the wall **90** and the wall **56** and correspondingly also lower the channel **110** and still retain effective soil separation. The tube **104** can become shorter and in effect become a nearly horizontal passage into the channel **110**.

In operation the soil laden water proceeds through the hole **106** and proceeds in a clockwise direction in FIG. **2**. Water passes upwardly through the screen segments **52** and the soil proceeds to the accumulator sump **120** at the second

end **118**. As the water proceeds around the soil separation channel its velocity slows and soil settles out into the sump **120**.

By maintaining a shallow soil separation channel **11 0** under screen segments **52**, from the tube **104** to the sump **120**, any clogging of the screen segments **52** on an inside thereof can be effectively alleviated. When the backwash nozzle **40** passes, soil is back washed away from the screen, and water passing within the channel **110** moves the soil toward the sump **120** and prevents repositioning of the soil against the screen segments **52**.

Fine mesh filter segments **52** in cover **44** permit flow of cleansed wash liquid to return to dishwasher space **14** for recirculation. Light soil particles are screened by fine mesh filter segments **52** and retained in soil accumulator sump **120**. Accordingly, both heavy and light soil particles remain within the soil accumulator sump **120**.

FIG. **6** illustrates the soil accumulator channel **110** beginning at the wall **116** and terminating at the end **118**. The sump **120** is defined by walls **56, 48** and side walls **122, 124**. Soil **126** is collected within the sump **120** on the floor **127** and expelled during the drain cycle through the drain port **128**.

When operated in a wash or rinse mode, the dishwasher functions as a continuous fluid circuit. In a wash mode, for example, wash liquid flows from dishwashing space **14** to dishwasher floor **21** and is gravity-fed to coarse particle grate **24**. Wash liquid flows past heating unit **130** to soil separator **20**, where it is drawn inwardly by negative pressure created by impeller **60**. Wash liquid flows over sealing ring **186**, which, in combination with floor **21** and retainer ring **188**, serve to support and seal the soil separator and pump assembly within the dishwasher. Wash liquid continues to flow horizontally and inwardly over base plate **30**, until encountering soft soil chopper **190**.

As may best be observed in FIG. **3**, soft soil chopper **190** is located on motor shaft **29** and rotates therewith to macerate large soft soil particles which travel past grate **195**. Torsion spring **192** both supports and drives chopper **190**, urging chopper **190** upwardly against collar **194**, which in turn is held in place on output shaft **29** by a downwardly depending shoulder of wash impeller **60**.

After passing soft soil chopper **190**, wash liquid is drawn through grate **195** and further upwardly into pump cavity **86** by wash impeller **60**. Wash impeller **60** imparts a swirling motion to the wash liquid, forcing a majority of the wash liquid upwardly to the lower wash arm and to the upper wash arm. Wash liquid sprayed from upwardly directed spray nozzles **38**, downwardly directed spray nozzles **40** and cleansed wash liquid emitted from fine mesh filter segments **52** into dishwashing space **14** returns to floor **21** to be recycled.

Due to centrifugal force acting on the swirling liquid in pump cavity **86**, the remainder of the wash liquid forms a band or layer on the interior of inside upstanding annular wall **90**. This band of wash liquid contains a heavy concentration of entrained soil particles having a relatively high specific gravity, which tend to be forced outwardly by centrifugal force. This band of wash liquid also contains approximately the same concentration of soil particles having a relatively low specific gravity representative as the wash liquid as a whole.

As soil-laden wash liquid flows around soil accumulator channel **110**, its velocity is reduced, permitting heavy soil particles to collect in sump **120** on lower housing wall **127**. As the clockwise rotation of wash impeller **60** forces soil-laden wash liquid into soil accumulator channel **110**, clockwise rotation of drain impeller **206[**, as shown in FIG. **5**,**]** causes a clockwise flow of wash liquid within drain pump chamber **208**.

Pressure created by wash liquid flow within drain pump chamber **208** causes ball check valve **210** to rise from a resting position on ball check valve support **211** to a seated position on the bottom side of soil container drain port **128**, as shown in FIG. **3**. When so positioned, ball check valve **210** prevents flow of accumulated soil particles and wash liquid therethrough. Check valve **214** located in line with and downstream of a drain port **216** prevents air from entering the drain port during operation of drain impeller **206** in a clockwise direction.

Upon completion of a wash or a rinse cycle, a drain cycle is initiated. At that time, pump motor **27** is reversed, causing drain impeller **206** to rotate in a counter-clockwise direction**[**, as**]** *when* viewed *from a top view as shown* in FIG. **2**. Drain impeller **206** causes negative pressure to be applied within conduit **220**, which causes ball check valve **210** to fall away from soil container drain port **128**. Soil-laden water and accumulated soil within soil accumulator sump **120** is rapidly pumped out by drain impeller **206**, and expelled through drain port **216**. In addition, drain impeller **206** is further in fluid connection with floor **21**. Wash or rinse liquid draining from soil separator **20** accumulates on base plate **30**, and is pumped out through drain port **216** along with liquid from floor **21**. Accordingly, when operated in a counterclockwise direction, drain impeller **206** rapidly and effectively drains soil separator **20**.

An alternate further embodiment (not shown) includes providing **[**that**]** *a* plate **108** *which* is substantially annular with a plurality of spaced apart slots**[**and that the**]**. *The* sump **120** is also annularly shaped and is arranged below and coextensive with said plate **108**. Soil accumulated on said plate passes through said slots to settle to the sump below where a port **128** operates during the claim cycle as described above.

A further alternate embodiment (not shown) provides that two sumps, such as the sump **120** be provided below the plate **108** substantially located at 180° diametrically opposed, and that 180° of the cover **44** be fine mesh screen elements and 180° of the cover **44** be coarse mesh screen elements. The screening channel is divided into two sub channels, a fine screening channel (0.0049" mesh) and a coarse screening channel (0.0079" mesh). When the fine screening channel is sufficiently clogged to cause a predetermined back pressure, a valve means opens the fine screening channel to the coarse screening channel to allow soil laden water to at least be coarse screened. As described above, the fine and coarse screening channels are arranged to be shallow to allow soil to be washed from inside the screens.

Both of these alternate developments are the subject of other patent applications.

Although the present invention has been described with reference to a specific embodiment, those of skill in the art will recognize that changes may be made thereto without departing from the scope and spirit of the invention as set forth in the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A soil separator for a dishwasher comprising:

a cylindrical wall;

a water impeller arranged for rotation within said cylindrical wall;

a shallow arcuate channel covered by a screen and flow connected to the area within the cylindrical wall;

a guide channel surrounding said cylindrical wall between said cylindrical wall and said shallow arcuate channel and said cylindrical wall comprises a height providing a spill over into said guide channel:

an inlet tube from said guide channel into said shallow arcuate channel; and

a soil accumulation area for collecting soil from the water, flow connected to said shallow arcuate channel.

2. The soil separator according to claim **1**, wherein said shallow arcuate channel comprises a substantially annular horizontal plate surrounding said guide channel elevated from a bottom of said guide channel, and said screen comprises a substantially annular horizontal screen arranged above said plate.

3. The soil separator according to claim **1**, wherein said guide channel comprises an outer wall surrounding said cylindrical wall with an aperture flow connected to said inlet tube, said inlet tube located at one end of said shallow arcuate channel and said accumulator sump located at an opposite end.

4. A centrifugal soil separator, comprising:

a rotating element;

a surrounding wall;

an outlet water conduit receiving water flow from said rotating element;

a soil/water flow channel receiving water with entrained soil from adjacent said surrounding wall;

a soil screening channel having a screen element on a top side thereof for passing water therethrough while retaining soil below, said screening channel surrounding said surrounding wall, said soil/water flow channel flow connected to a first end of said screening channel; and

a soil accumulator sump flow connected to a second end of said screening channel; and

means for draining soil from said accumulator sump.

5. The soil separator according to claim **4**, wherein said soil/water flow channel comprises an outer wall surrounding said surrounding wall and an open top annular gap provided between said surrounding and outer walls, and a vertical tube connecting said annular gap and said screening channel.

6. The soil separator according to claim **5**, wherein said screening channel is formed by a substantially annular shaped plate mounted beneath an annular screening member, said substantially annular shaped plate having an aperture connected to said vertical tube, and a opening above said accumulation sump.

7. The soil separator according to claim **6**, wherein said means for draining comprises a drain port closed by a ball check valve.

8. A dishwasher soil separator comprising:

a rotating wash impeller;

a circular surrounding wall;

a outlet water conduit receiving water flow from said rotating impeller;

a soil/water flow channel receiving water with entrained soil from adjacent said surrounding wall;

a soil screening channel with a soil/water inlet end having an end wall and outlet end having a discharge opening, and having a screen element on a top side thereof for passing water therethrough while retaining soil below, said screening channel surrounding said surrounding wall, said soil/water flow channel flow connected to said inlet end of said screening channel; and

a soil accumulator sump flow connected to said outlet end of said screening channel; and

means for draining soil from said accumulator sump.

9. The soil separator according to claim **8**, wherein said soil/water flow channel comprises an outer wall surrounding said surrounding wall forming a guide channel therebetween and a spill over water path provided between said surrounding and outer walls, and a vertical tube connecting said guide channel and said screening channel.

10. The soil separator according to claim **9**, wherein said screening channel is formed by a substantially annular shaped plate mounted beneath an annular screening member holding said screen clement, said substantially annular shaped plate having an aperture connected to said vertical tube, and said discharge opening is located above said accumulation sump allowing soil to pass downwardly through said opening.

11. The soil separator according to claim **8**, wherein said means for draining comprises a drain port closed by a ball check valve.

12. A centrifugal soil separator, comprising:

a rotating element;

a surrounding wall;

an outlet water conduit receiving water flow from said rotating element;

a soil screen channel having a screen element on a top side thereof for passing water therethrough while retaining soil below, said soil screen channel having a first end and a second end wherein said first end of said soil screen channel receives water flow from said rotating element;

a soil accumulator sump flow connected to said second end of said soil screen channel; and

means for draining soil from said accumulator sump.

13. The soil separator according to claim 12, further comprising a channel flow connected between said surrounding wall and said first end of said soil screen channel.

14. The soil separator according to claim 12 comprising an inlet tube connected to said first end of said soil screen channel and wherein water flow from said rotating element is directed into said soil screen channel through said inlet tube.

15. A centrifugal soil separator, comprising:

a pump cavity;

a wash impeller arranged for rotation within said pump cavity;

an outlet water conduit receiving water flow from said pump cavity;

a soil screen channel having a screen element on a top side thereof for passing water therethrough while retaining soil below, said soil screen channel having a first end and a second end wherein said first end of said soil screen channel receives water flow from said pump cavity;

a soil accumulator sump flow connected to said second end of said soil screen channel; and

means for draining soil from said accumulator sump.

16. The centrifugal soil separator according to claim 15, further wherein

said pump cavity has an inlet through which liquid is drawn by said wash impeller and a secondary outlet,

wherein wash liquid is pumped out of said pump cavity through said outlet water conduit and through said second outlet, said soil screen channel receiving water flow passing from the pump cavity through said secondary outlet.

17. The centrifugal soil separator according to claim 15, further comprising a channel flow connected between said pump cavity and said first end of said soil screen channel.

18. The centrifugal soil separator according to claim 15 further wherein an inlet tube is connected to said first end of said soil screen channel and wherein water flow from said pump cavity is directed into said soil screen channel through said inlet tube.

19. A centrifugal soil separator, comprising:

a pump cavity having an inlet, a primary outlet and a secondary outlet;

a wash impeller arranged for rotation within said pump cavity;

a soil screen channel having a screen element on a top side thereof for passing water therethrough while retaining soil below, said soil screen channel having a first end and a second end wherein said first end of said soil screen channel receives water flow from said pump cavity through the second outlet;

a soil accumulator sump flow connected to said second end of said soil screen channel, said soil accumulator sump having a bottom drain port closed by a check ball;

a drain pump chamber fluidly connected to said drain port of said soil accumulator sump; and

a drain impeller disposed within said drain pump chamber for drawing water with entrained soils from said soil accumulator sump through said drain port.

20. The soil separator according to claim 19, further comprising:

a conduit extending between said drain port of said soil accumulator sump and said drain pump chamber,

wherein said check ball is disposed within said conduit, said check ball is seated in said drain port when said drain impeller is operated in a first direction and falls away from said drain port when said drain impeller is operated in a second direction.

21. The soil separator according to claim 19 further wherein an inlet tube is connected to said first end of said soil screen channel and wherein water flow through said secondary outlet is directed into said soil screen channel through said inlet tube.

22. A centrifugal soil separator, comprising:

a rotating element;

a surrounding wall;

an outlet water conduit flow connected to said rotating element;

a soil screen channel surrounding the surrounding wall and having a screen element on a top side thereof, said rotating element flow connected to an inlet of said soil screen channel;

a soil accumulator sump flow connected to an outlet of said soil screen channel; and

a drain port in said accumulator sump.

23. The centrifugal soil separator according to claim 22, further comprising a channel flow connected between said rotating element and said first end of said screening channel.

24. The centrifugal soil separator according to claim 23, wherein said channel has an arcuate shape and extends around an outside of said surrounding wall.

25. A dishwasher soil separator, comprising:

a pump cavity;

a wash impeller arranged for rotation within said pump cavity;

a soil accumulation channel flow connected to receive liquid from said pump cavity and having a fluid filter at a fluid outlet and further having a floor;

a sump fluidly connected to the soil accumulation channel and extending below said floor of said soil accumulation channel; and

a drain opening in said sump.

26. The dishwasher soil separator of claim 25, wherein a first end of said soil accumulation channel is fluidly connected to said pump cavity, and a second end of said soil accumulation channel is fluidly connected to said sump.

27. A dishwasher soil accumulator, comprising:

an arcuate top wall having a filter outlet;

an arcuate bottom wall below said top wall;

inner and outer walls connected to said top and bottom walls;

a soil accumulating space defined by said top, bottom, inner side and outer side walls;

an accumulator inlet flow connected to said soil accumulating space;

a soil outlet open to the soil accumulating space; and

a chamber flow connected to said soil outlet and extending downward from the soil outlet, said chamber having a drain port.

28. The dishwasher soil accumulator of claim 27, further comprising an upstanding wall inside of said dishwashing soil accumulator, said accumulator inlet and said soil outlet being on opposite sides of said upstanding wall.

29. A method of separating soil from water in a dishwasher comprising the steps of:

drawing soil entrained water into a pump cavity;

flowing soil entrained water into a channel from said pump cavity;

filtering the soil entrained water and flowing the filtered water out of said channel;

moving at least some of the soil retained in said channel from said channel to a sump; and

preventing removal of soil and water from said sump and said channel through a drain opening in said sump by closing said drain opening.

30. A method of flowing water having soil through a dishwasher soil separator, comprising the steps of:

drawing soil entrained water into a pump cavity;

passing soil entrained water from said pump cavity into a soil accumulation channel;

flowing water and soil inside of said soil accumulation channel in a horizontal path;

flowing water out of said soil accumulation channel while removing at least some soil from the water and retaining the removed soil inside of said soil accumulation channel;

flowing at least some water and heavier-than-water soil from inside of said soil accumulation channel vertically downwardly into a chamber having a drain; and

holding the at least some heavier-than-water soil inside said chamber until said dishwasher soil separator is placed in a drain mode.

31. The method of claim 30, wherein the flowing vertically downward step further comprises the step of flowing the at

least some water and heavier-than-water-soil through a lower outlet in said accumulation channel and into said chamber, said chamber having a closed drain port.

32. A dishwasher soil separator comprising:

a pump having a primary outlet and a secondary outlet;

a soil accumulator having an inlet fluidly connected to the secondary outlet of the pump, the soil accumulator having a filtered outlet and a non-filtered outlet:

a drain port fluidly connected to the non-filtered outlet of the soil accumulator and spaced vertically downward away from the non-filtered outlet of the soil accumulator; and

a ball check valve below the drain port.

33. The dishwasher soil separator of claim 32, further comprising a sump fluidly connected to the non-filtered outlet of the soil accumulator, the drain port located at a lower portion of the sump.

34. The dishwasher soil separator of claim 32, further comprising a wall which extends from the non-filtered outlet downward to a floor having the drain port.

35. The dishwasher soil separator of claim 32, wherein the inlet and the non-filtered outlet are located at opposite end portions of the soil accumulator.

36. A centrifugal soil separator according to claim 12, further comprising a channel having an inlet opening adjacent said surrounding wall and an outlet opening at said first end of said soil screen channel.

37. A centrifugal soil separator according to claim 15, further comprising a channel having an inlet opening at said pump cavity and an outlet opening at said first end of said soil screen channel.

38. A dishwasher soil separator according to claim 25, further comprising a channel having an in let opening at said pump cavity and an outlet opening at said soil accumulation channel.

39. A dishwasher solid accumulator according to claim 32, further comprising a channel having an inlet opening at said secondary outlet and an outlet opening at said soil accumulator inlet.

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