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(54) WASHER AND VACUUM SYSTEM

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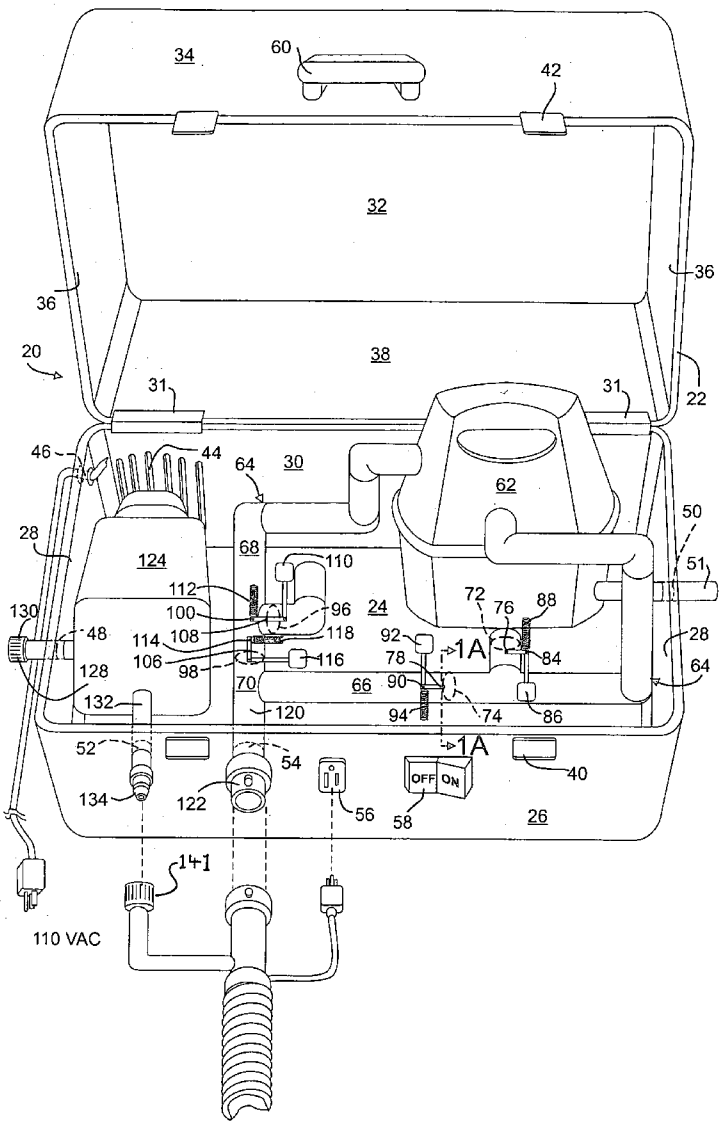
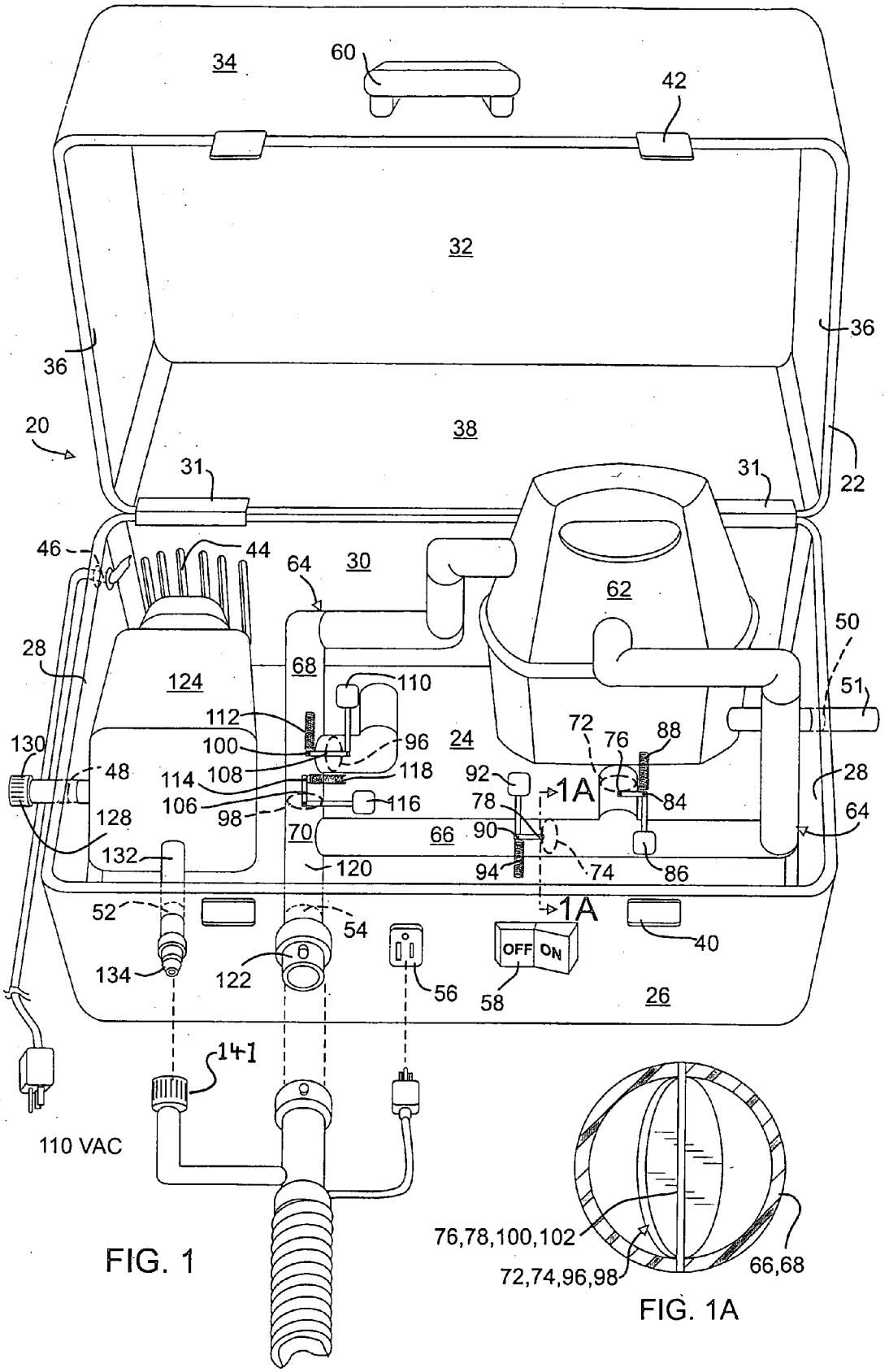
(57) **ABSTRACT**

A washer and vacuum system having a vacuum unit that discharges and intakes gas, usually air. A washer unit discharges liquid, usually water. A tube selection system within a tube arrangement extending from said vacuum unit enables the vacuum unit to selectively intake air, or discharge air. The washer unit is indirectly connected to a water discharge hose. The water discharge hose has a portion that is disposed within said vacuum hose. The water discharge hose extends through said vacuum hose, having a distal end disposed outside of said vacuum hose. The water discharge hose has a distal end for the removable connection of various accessories. The vacuum hose has a distal end for the removable connection of various accessories. The washer and vacuum unit can be disposed in a casing for easy transport. Or it can be hard wired into a vehicle, such as a boat.

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72
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114
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1A
28
106
116
78
84
64
128
98
70
66
90
132
120
94
74
86
52
1A
54
40
OFF ON
134
122
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141
110 VAC

FIG. 1

76,78,100,102
72,74,96,98
66,68

FIG. 1A

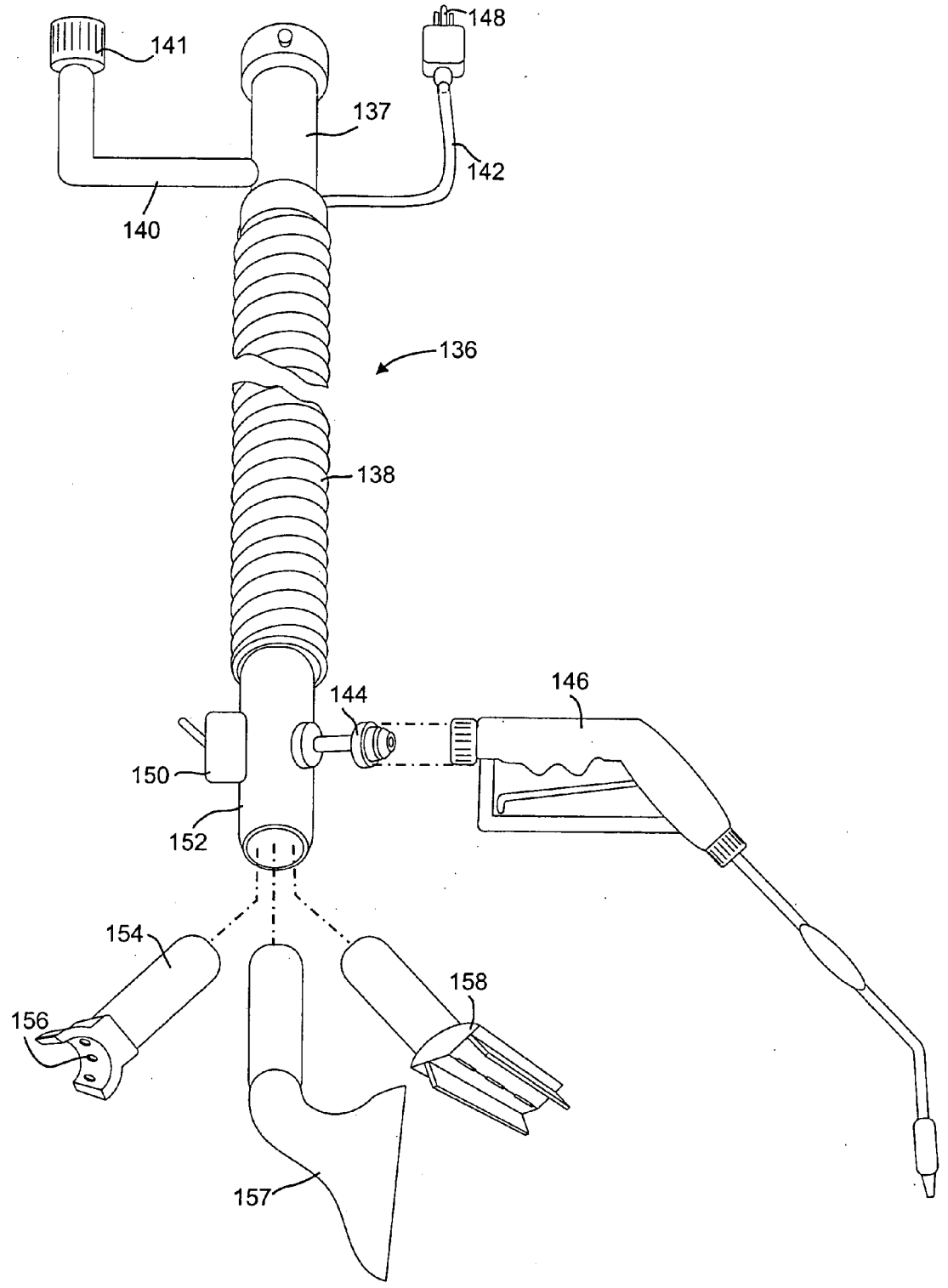


FIG. 2

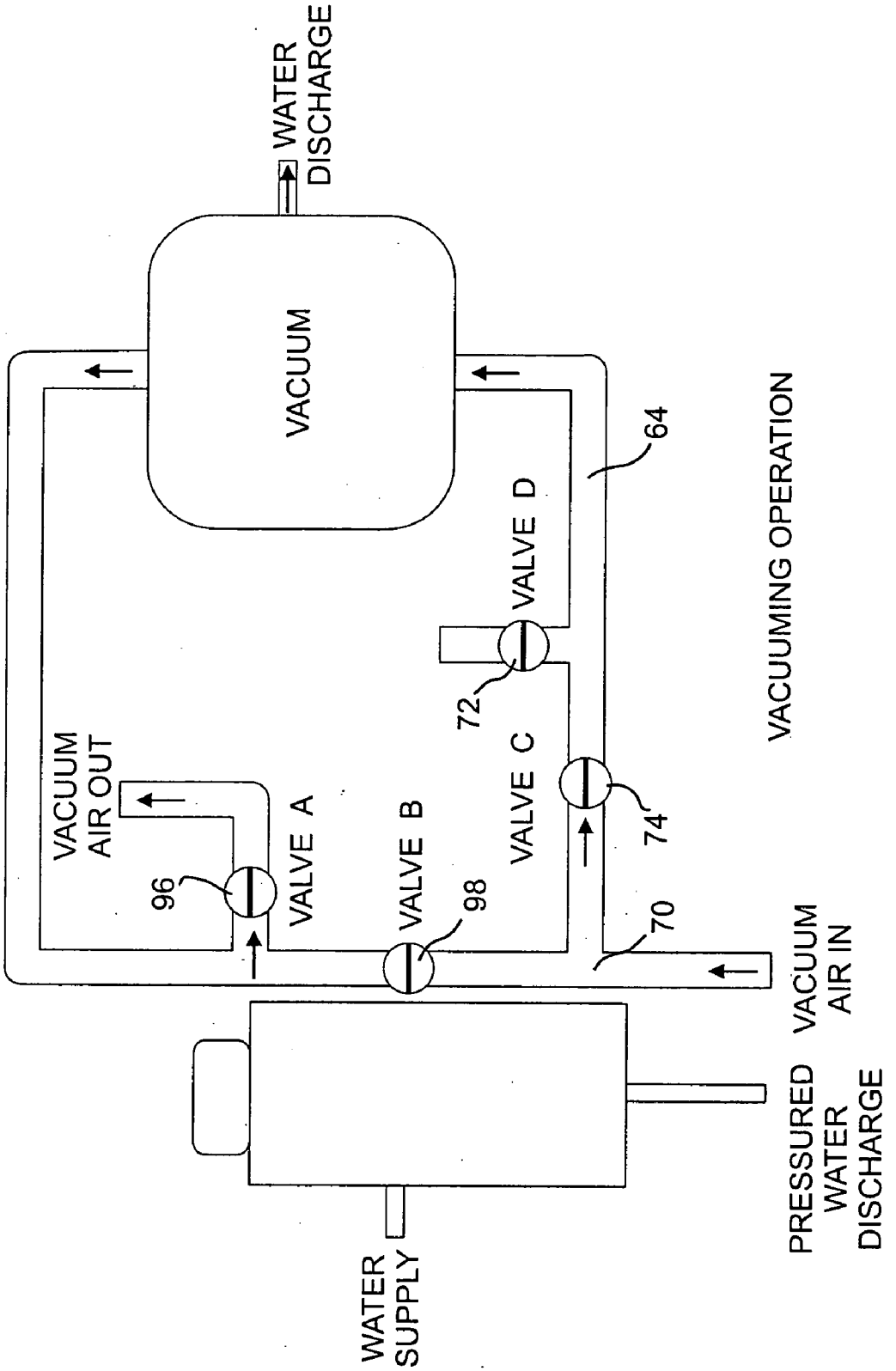

WATER DISCHARGE
VACUUM
64
VALVE D
72
VALVE C
74
VACUUMING OPERATION
VACUUM AIR OUT
96
VALVE A
VALVE B
98
70
VACUUM AIR IN
PRESSURED WATER DISCHARGE
WATER SUPPLY

FIG. 3

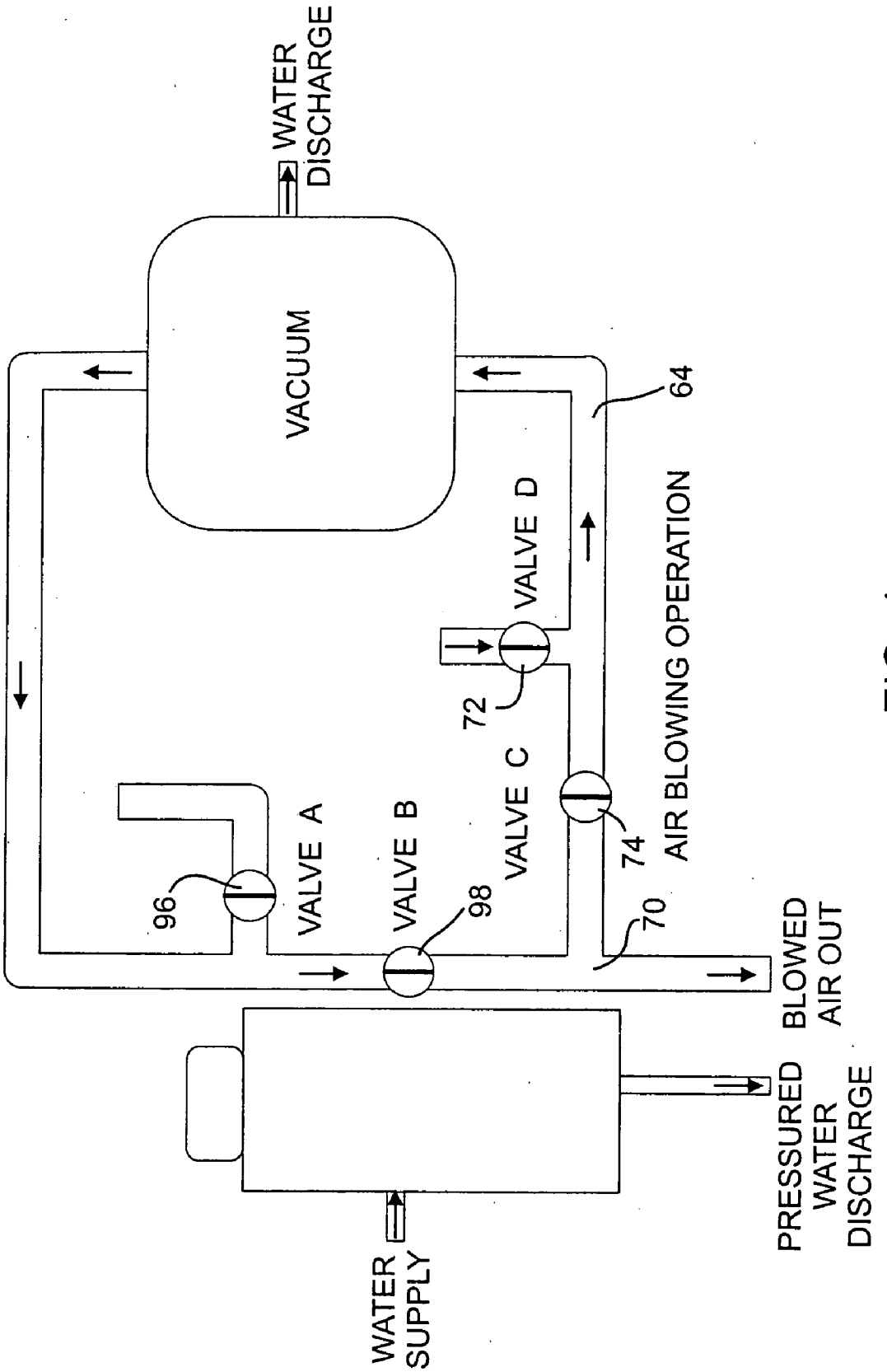
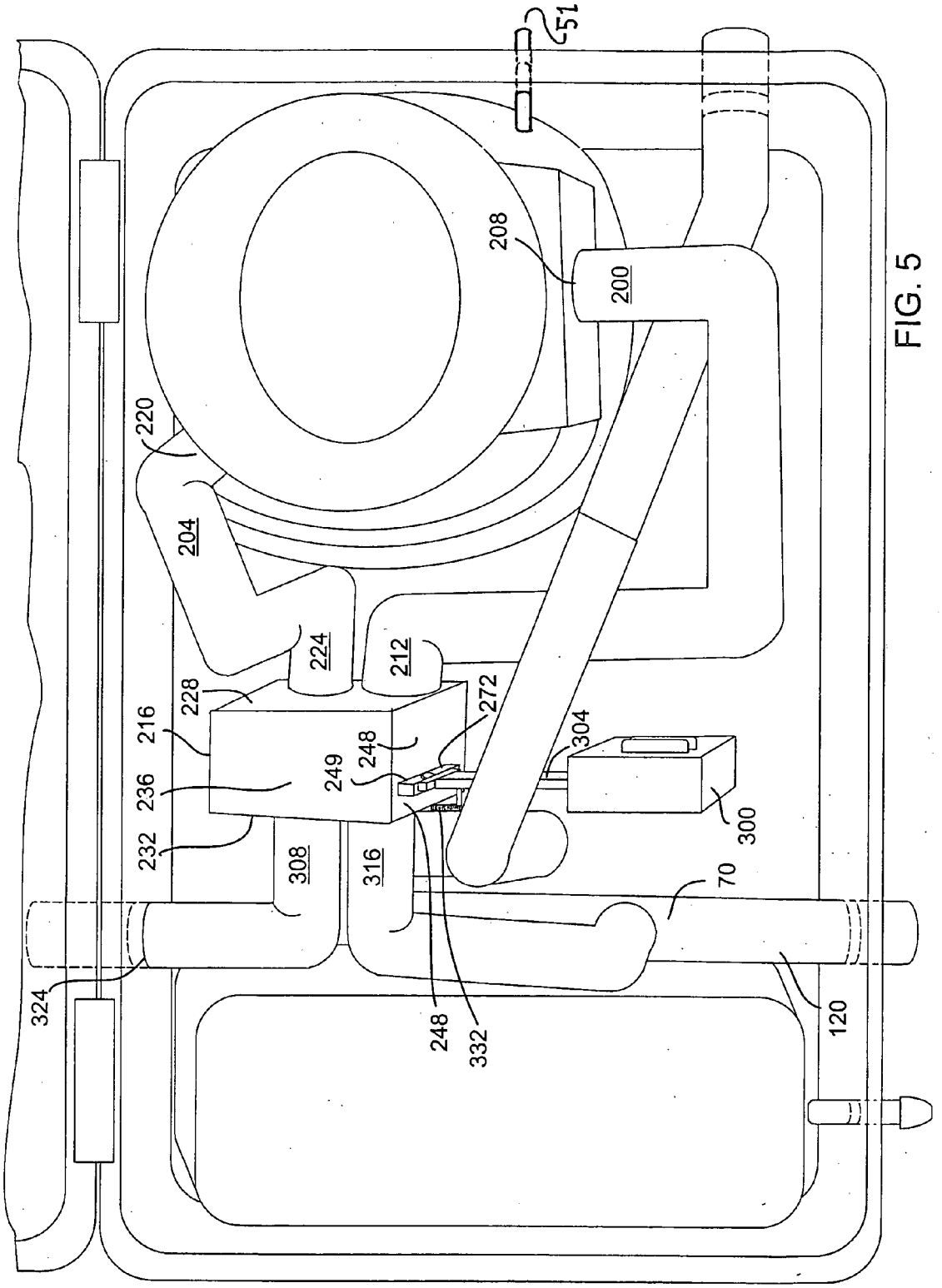

WATER DISCHARGE
VACUUM
64
VALVE D
72
AIR BLOWING OPERATION
VALVE C
74
VALVE A
VALVE B
96
98
70
BLOWED AIR OUT
PRESSURED WATER DISCHARGE
WATER SUPPLY

FIG. 4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208
200
220
204
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70
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248
332
120

FIG. 5

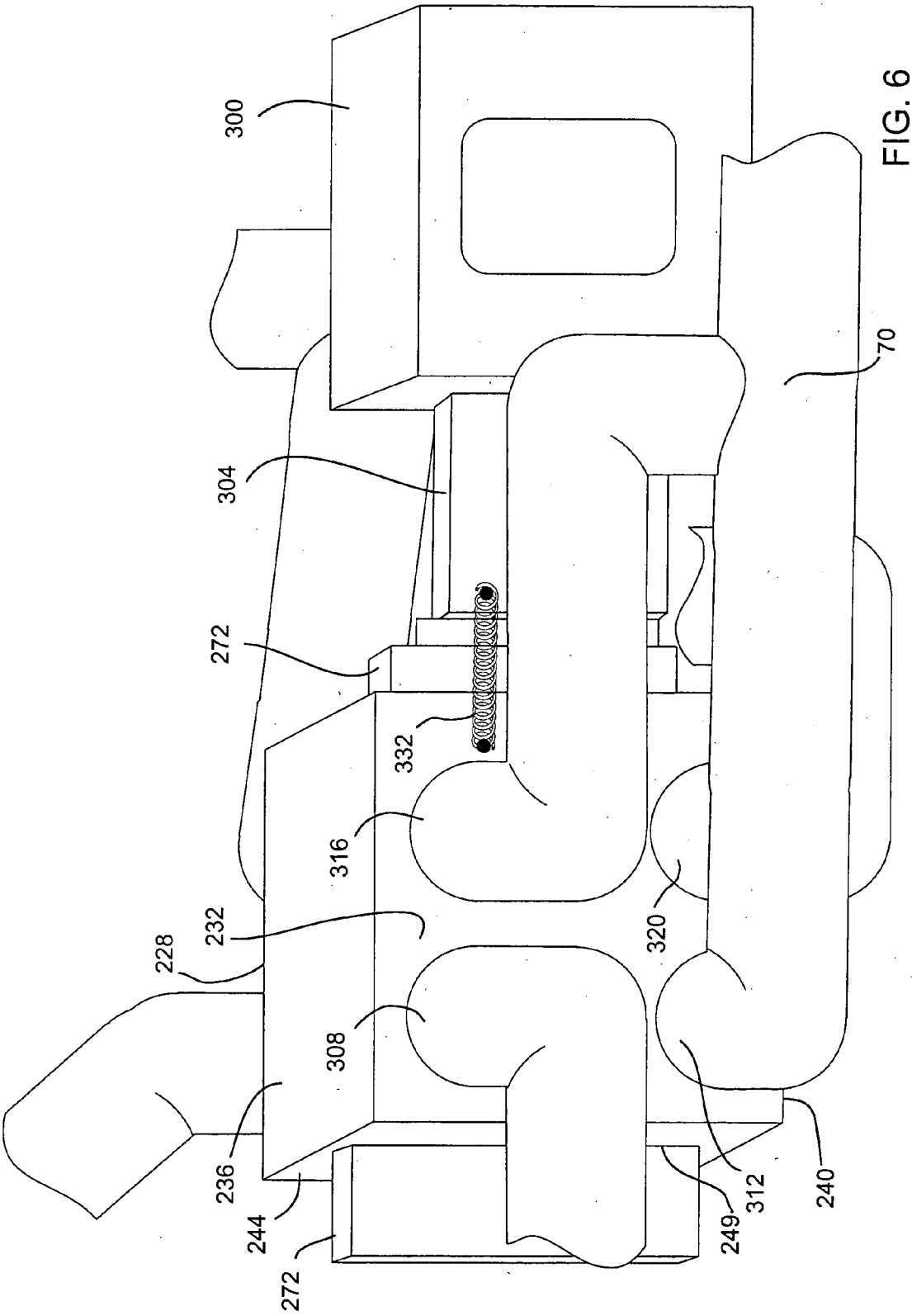


FIG. 6

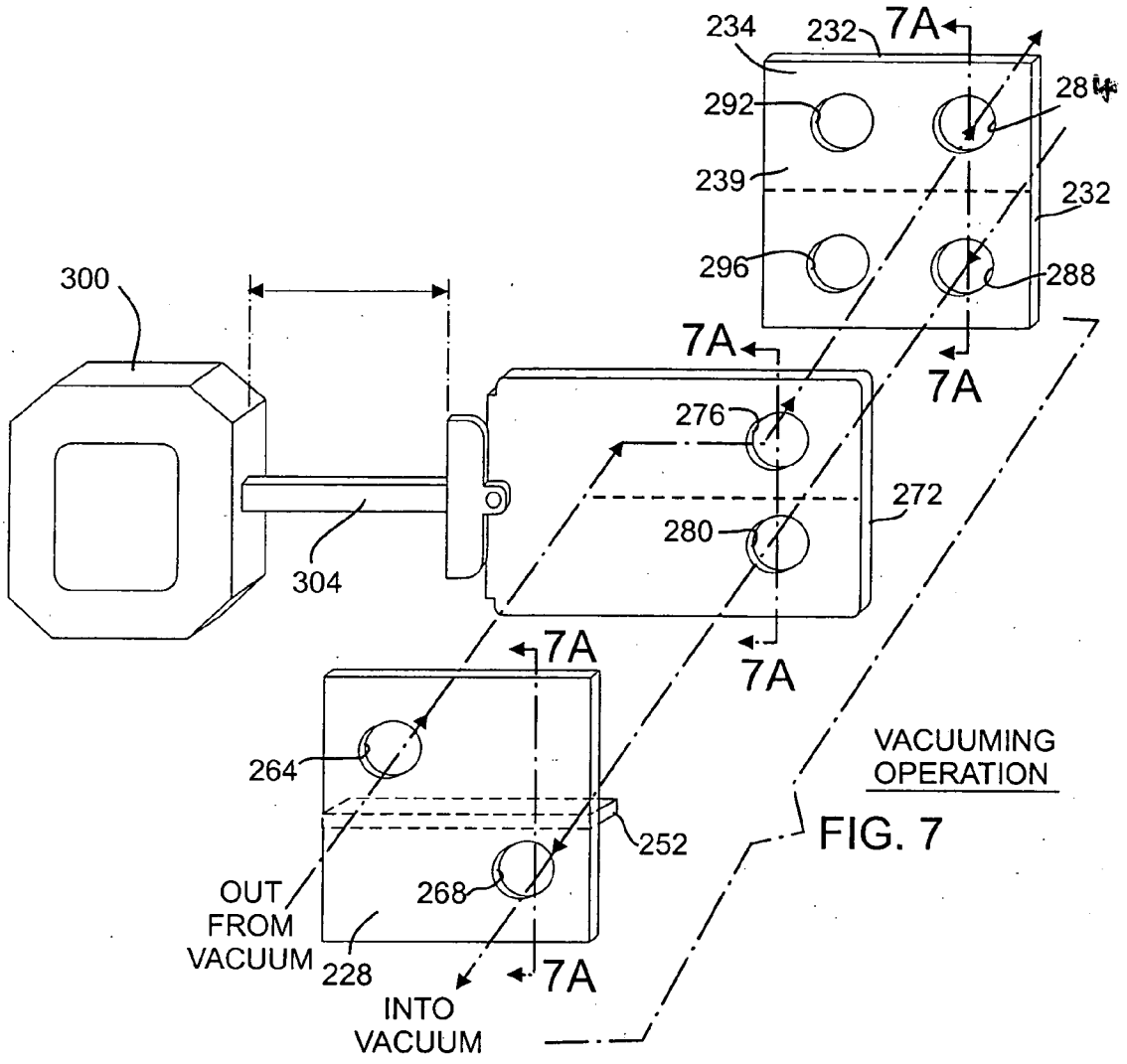
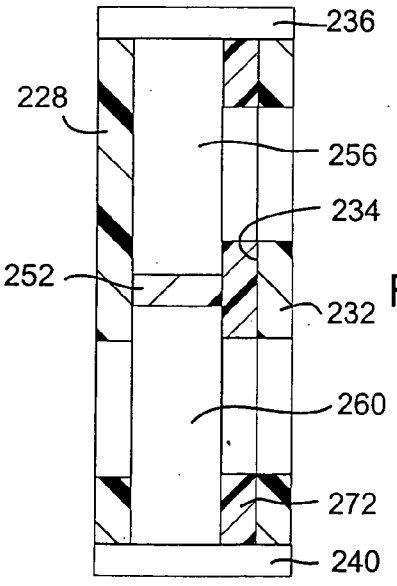

234
232
7A
292
288
239
232
296
288
300
7A
7A
276
272
280
304
7A
7A
264
252
268
OUT
FROM
VACUUM
228
7A
INTO
VACUUM
VACUUMING
OPERATION

FIG. 7


236
228
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234
252
232
260
272
240

FIG. 7A

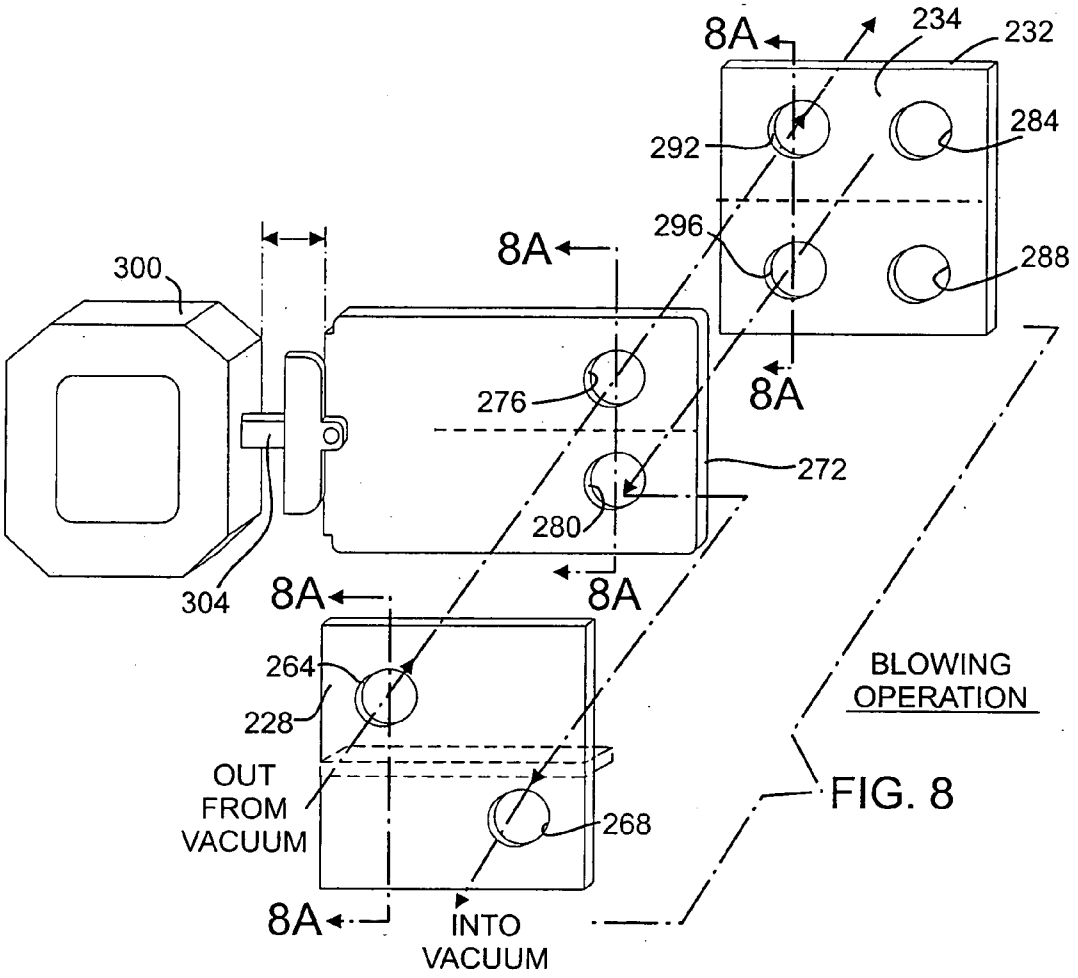
8A
234
232
284
292
296
288
300
276
272
280
304
264
228
OUT
FROM
VACUUM
268
INTO
VACUUM
BLOWING
OPERATION

FIG. 8

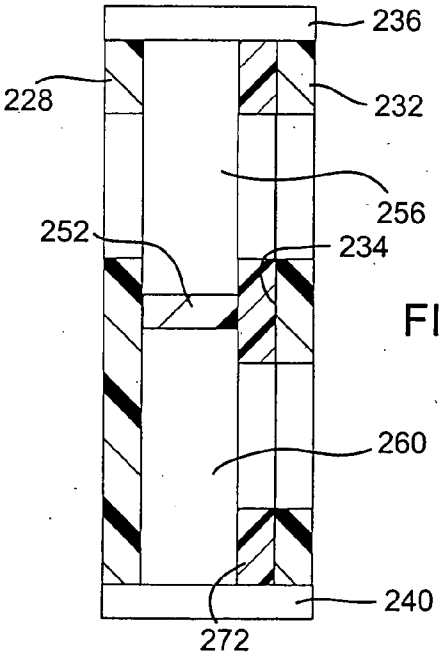
236
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FIG. 8A

WASHER AND VACUUM SYSTEM

FIELD OF THE INVENTION

[0001] The invention relates to a washer and vacuum system with capability for forward and reverse air flow, and more particularly, to a unified and compact power washer and vacuum system that is portable, or that can be hard-wired and fixed within a vehicle, such as a boat or recreational vehicle.

BACKGROUND OF THE INVENTION

[0002] Boaters maintain their boats by regular washing and vacuuming. This is true for the exterior and interior of the boat. For example, in the morning, it is common to have dew, insects, and other debris on a boat cover, or on the boat exterior, which includes the windows and hull. To remove the dew, insects, and other debris, boaters commonly wipe them off with a rag or brush. Alternatively, removal can be performed by spraying the cover or boat with water from a spicket and hose at a dock, if the boat is docked and the dock has such facilities. Then the water must be wiped off to dry the cover or boat. However the boat is usually in the water. Thus, climbing over the boat, and reaching down to wipe and spray the cover or boat is impractical, inefficient, and dangerous. Also, cleaning of the rails and other accessories on a boat also require wiping down and cleaning by spraying, or with a separate rag or towel. A vacuum is also used to vacuum debris.

[0003] Conventional means for cleaning the interior of a boat also include the use of a vacuum or a water sprayer. But it is impractical to carry or transport both the vacuum and water sprayer with an accompanying hose. The water sprayer can be a power washer.

[0004] The washer and vacuum system of this invention has capabilities of positive and negative air pressure, or in other words, forward and reverse air pressure. Thus the washer and vacuum system includes: (1) a water power washer assembly; (2) an assembly that can discharge air by positive air pressure, also referred to as forward air pressure, which occurs during the blowing operation; and (3) an assembly that can intake air by negative air pressure, also referred to as reverse air pressure, which occurs during the vacuuming operation.

[0005] The system can be portable, and supported by wheels for easily transporting the washer and vacuum system. The system is powered by electricity. For example, 120 volts in North America, or 110 volts in Europe, and the Middle East.

[0006] In a different embodiment the washer and vacuum system can be mounted and hard-wired within the vehicle, having hose hook-ups located on a console.

[0007] Multiple embodiments of the washer and vacuum system are disclosed herein. It will be understood that other objects and purposes of the invention, and variations thereof, will be apparent upon reading the following specification and inspecting the accompanying drawings.

BRIEF SUMMARY OF THE INVENTION

[0008] The present invention solves the problems of inconvenient cleaning practices that are presently employed with boats, vehicles, or household use. Use of the applicant's invention enables a person to clear debris and wash a vehicle with a single compact system.

[0009] Alternatively, the unit can be permanently or removably installed within a vehicle. If the system is installed in the vehicle, then the system would have conveniently located hook-ups or connections for the vacuum (including the hook-ups for positive and negative airflow) and fluid washing members. The hook-ups or connections would be disposed on a console.

[0010] The system can be used not only in conjunction with boats, but also for household use or with other vehicles. Such as recreational vehicles, commercial cruisers and vessels, submarines, airplanes, and spacecraft. Further, the system can be used at camp sites, military installations, or similar remote areas.

[0011] This invention comprises a vacuum unit, a washer unit, and a fluid displacement assembly. The vacuum unit and washer unit can be one single unit, capable of performing both tasks.

[0012] The washer and vacuum system, if in a portable case, can be carried or rolled onto the boat or dock, and plugged into an electrical socket located on either the boat or dock. Then, the appropriate hose, sprayer, or accessory is attached for appropriate washing, blowing, or vacuuming. The system can be powered from a switch located on the portable case, or located at a distal end of the vacuum hose near the handle of the sprayer or accessory.

[0013] If the washer and vacuum system is installed in a vehicle, then the electrical system will be hard-wired into an electrical or other power system of the vehicle. The user then attaches the appropriate vacuum or water hose, or accessory to a hook-up or connection located on a console. The unit can be powered from a switch on the console or at a distal end of the hose, washer, or accessory.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] **FIG. 1** is a pictorial view of a washer and vacuum system.

[0015] **FIG. 1A** is a sectional view of a valve, taken along the section line **1A-1A** of **FIG. 1**.

[0016] **FIG. 2** is a pictorial view of a vacuum hose with a sprayer, and optional vacuum attachments.

[0017] **FIG. 3** is a schematic of the valve system during the vacuuming operation.

[0018] **FIG. 4** is a schematic of the valve system during the air blowing operation.

[0019] **FIG. 5** is a pictorial view of a second embodiment of the washer and vacuum system.

[0020] **FIG. 6** is a pictorial view of a portion of a tube arrangement of **FIG. 5**.

[0021] **FIG. 7** is an exploded view of a tube selection junction box of **FIG. 5** during the vacuuming operation.

[0022] **FIG. 7A** is a sectional view of a portion of **FIG. 7** taken along section line **7A**.

[0023] **FIG. 8** is an exploded view of a tube selection junction box of **FIG. 5** during the blowing operation.

[0024] **FIG. 8A** is a sectional view of a portion of **FIG. 8** taken along section line **8**A.

[0025] Certain terminology will be used in the following description for convenience and reference only, and will not be limiting. For example, the words "upwardly,""downwardly,""rightwardly," and "leftwardly" will refer to directions in the drawings to which reference is made. The words "inwardly" and "outwardly" will refer to directions toward and away from, respectively, the geometric center of the system and designated parts. Said terminology will include the words specifically mentioned, derivatives, and similar words.

DETAILED DESCRIPTION

[0026] Referring to **FIG. 1**, a washer and vacuum system **20** of the first embodiment is illustrated and includes an openable and closeable substantially rigid rectangular cube-shaped casing **22** that has a substantially flat bottom **24**, a substantially flat bottom front wall **26** extending upwardly from said bottom **24**, substantially flat bottom side walls **28** extending upwardly from said bottom and perpendicular to the bottom front wall **26**, and a substantially flat bottom rear wall **30** extending upwardly from said bottom **24** and parallel with the bottom front wall **26**. The casing **22** has a substantially flat top **32** that is oriented essentially parallel with the flat bottom **24** when the casing **22** is closed. The casing **22** also has a substantially flat top front wall **34**, substantially flat top side walls **36**, and a substantially flat top rear wall **38** to enclose the washer and vacuum system **20** when the casing **20** is closed. The substantially flat bottom rear wall **30** is hingedly connected to the substantially flat top rear wall **38** via a hinge **31** having one side fixed to an inside edge of the top rear wall **38** and the other side of the hinge **31** fixed to a corresponding inside edge of the bottom rear wall **30**. Alternatively, the hinge **31** can be disposed on corresponding outside edges. A bottom locking member **40** is fixed to an outside surface of the substantially flat bottom front wall **26**, and engages with a top locking member **42** fixed to the top front wall **34**, to disengagably close the casing **22**. The substantially flat bottom rear wall **30** has vents **44** within the casing **22**. The vents **44** can be used to release heat or to equalize pressure, among other things. The substantially flat bottom sidewalls **28** have a power supply aperture **46**, a water intake aperture **48**, and a vacuum water discharge aperture **50**. The substantially flat bottom front wall **26** has a power washer discharge aperture **52**, a vacuum-blower aperture **54**, a power socket **56**, and a master power switch **58**. The substantially flat top front wall **34** has a carrying handle **60** secured thereon.

[0027] Other embodiments of the casing **22** suggest that the casing **22** has more or less venting as described above. Also, the apertures **46**, **48**, **50**, **52**, **54**, can be disposed anywhere in the casing **22**. It is also suggested that a single aperture can replace some of the above described apertures. For example, one aperture can be used for both a power supply and a water intake. It is also suggested that the on-off switch can be replaced with a switch that can power the wash and vacuum system **20** as a whole, or can separately be selected to power only a vacuum unit **62**, or a washer unit **124**. It is further suggested that the bottom locking member **40** and top locking member **42** can be replaced with other locking arrangements, such as the use of magnetic forces, or spring forces.

[0028] The system of the preferred embodiment is powered by electricity. For example, in North America, 120 volts power the system. In Europe and the Middle East, 110 volts power the system.

[0029] The vacuum unit **62** is fixed in the casing **22** to the substantially flat bottom **24** adjacent a right bottom side wall **28**. A tube arrangement **64** comprises two tubes that are secured at one end to the vacuum unit **62**, which extend from the vacuum unit **62**. The first tube is a vacuum intake tube **66** to intake debris into the vacuum unit **62**. The second tube is the blower tube **68** to discharge air from the vacuum unit **62**. The tubes **66** and **68** intersect at an intersection point **70**, forming a single vacuum-blower tube **120**. The vacuum-blower tube **120** extends forwardly through the vacuum-blower aperture **54**, which also supports the tube arrangement **64**.

[0030] The vacuum unit **62** can intake liquids, solids, or gasses.

[0031] The tube arrangement **64** is comprised of tubes that are circular in diameter, rigid, and have an inside diameter of about 2.54 cm (1 inch).

[0032] Both tubes **66**, **68** intersect, thereby defining a tube intersection point **70**. The intersection point is located within the casing **22**.

[0033] The tube arrangement **64** includes a tube selection system, which in the embodiment shown in **FIG. 1** comprises four valves discussed below.

[0034] The vacuum intake tube **66** has a first valve **72** disposed between a second valve **74** and the vacuum unit **62**. Thus the second valve **74** is disposed between the first valve **72** and the tube intersection point **70**.

[0035] As seen in **FIG. 1A**, each valve **72**, **74** is a circular butterfly valve having a shape that is substantially the same as the inside diameter of the vacuum intake tube **66**. Thus preventing fluid flow when the valve **72** is closed. Each valve **72**, **74** is fixedly mounted to a first and second rotatably vertically oriented valve pin **76**, **78**. Thus the respective pin **76**, **78** and valve **72**, **74** rotate in unison.

[0036] As illustrated in **FIG. 1**, a first horizontally oriented valve lever **84** has a first end that is fixedly secured at a top of the first valve pin **76**. A first valve solenoid **86** is fixed to the casing bottom **24**. The first valve solenoid **86** has a linearly movable actuating arm pivotally and forwardly secured to the first valve lever **84** at an opposed second end, to rotate the first valve pin **76**, and thereby open and close the first valve **72**. When the valve **72** is open, fluid e.g. air, can flow through. When the valve **72** is closed, fluid e.g. air can not flow through. A first valve spring **88** is tensionally, fixedly, and rearwardly mounted to the second end and the vacuum unit **62** to assist the first valve solenoid **86** to close the first valve **72**, or to maintain a closed position. In other words one end of the spring **88** is connected to the second end, and the other end of the spring **88** is fixed to the tube arrangement **64** or casing **22**. And being so fixed, the spring **88** is in tension. The spring **88** is aligned substantially coaxial and parallel to the solenoid's **86** motion of travel.

[0037] A second horizontally oriented valve lever **90** is fixedly disposed at a top of the second valve, pin **78** at one end. A second valve solenoid **92** is fixed to the casing **22**. The second valve solenoid **92** having a linearly movable

actuating arm pivotally and rearwardly secured to the second valve pin lever **90** at an opposed end, to rotate the second valve pin **78**, and thereby open and close the second valve **74**. When the valve **74** is open, fluid e.g. air, can flow through. When the valve **74** is closed, fluid e.g. air, can not flow through. A second valve spring **94** is tensionally, fixedly, and forwardly mounted to the opposed end and the wall **26** to assist the second valve solenoid **92** to close the second valve **74**, or to maintain a closed position. In other words, one end of the spring **94** is attached to the opposed end, and the other end of the spring **94** is attached to the wall **26**. Here, the spring **94** is in tension.

[**0038**] The blower tube **68** has a third valve **96** disposed between a fourth valve **98** and the vacuum unit **62**. Thus the fourth valve **98** is disposed between the third valve **96** and the tube intersection point **70**. Each valve **96**, **98** is a circular butterfly valve having a shape that is substantially the same as the inside diameter of the blower tube **68**. Each valve **96**, **98** is fixedly mounted to a third and fourth valve pin **100**, **102**. Thus the respective pin **100**, **102** and valve **96**, **98** rotate in unison.

[**0039**] As illustrated in **FIG. 1**, a third horizontally oriented valve lever **108** is fixedly connected between its ends on a top portion of the third valve pin **100**. A third valve solenoid **110** is fixed to the casing bottom **24**. The third valve solenoid **110** has a linearly movable actuating arm pivotally secured and disposed rearwardly of a rightward end of the third valve lever **108**, to rotate the third valve pin **100**, and thereby open and close the third valve **96**. When the valve **96** is open, fluid e.g. air, can flow through. When the valve **96** is closed, fluid e.g. air, can not flow through. A third valve spring **112** is tensionally, fixedly, and rearwardly connected to the leftward end of the third valve lever **108** and the blower tube **68** to assist the third valve solenoid **110** to close the third valve **96**, or to maintain a closed position. In other words, one end of the spring **112** is connected to the leftward end, and the other end of the spring **112** is fixed to the casing **22** or the tube arrangement **64**. Here the spring **112** is held in tension. The spring **112** is aligned leftwardly transverse from, and substantially parallel to the solenoid's **110** motion of travel.

[**0040**] A fourth horizontally oriented valve lever **114** is fixedly connected between its ends on a top of the fourth valve pin **102**. A fourth valve solenoid **116** is fixed to the casing bottom **24**. The fourth valve solenoid has a linearly movable actuating arm pivotally and rightwardly connected to a front end of the fourth valve lever **114**, to rotate the fourth valve pin **102**, and thereby open and close the fourth valve **98**. When the valve **98** is open, fluid e.g. air, can flow through. When the valve **98** is closed, fluid e.g. air can not flow through. A fourth valve spring **118** is tensionally, fixedly, and rearwardly connected to a rear end of the fourth valve lever **114** and either the casing **22** or the tube arrangement **64** to assist the fourth valve solenoid **116** to close the fourth valve **98**, or to maintain a closed position. In other words, one end of the spring **118** is fixedly connected to the most rear end of the fourth valve lever **114**, and the other end of the spring **118** is fixed to, for example, the casing **22** or the tube arrangement **64**. The spring **118** is aligned rearwardly transverse from and substantially parallel to the solenoid's **116** motion of travel.

[**0041**] In a further embodiment, each solenoid **86**, **92**, **110**, **116** is fixedly secured to at least either the vacuum intake tube **66**, the blower tube **68**, a portion of the casing **22**, or a frame or platform fixed to the casing **22**. Therefore, when the solenoid **86**, **92**, **110**, **116** is activated, it moves the respective valve lever, **84**, **90**, **108**, **114**, which repositions e.g. opens and closes the respective valve **72**, **74**, **96**, **98**. Each solenoid has specifications that include 110 volts, 60 kilohertz, and has about a 2.54 cm (1 inch) length of travel. Dayton Electrical Co. of Dayton, Ohio sells one such solenoid.

[**0042**] Extending rightwardly from the vacuum unit **62** is a vacuum water discharge member **51**, which extends out of casing **22** and through the vacuum water discharge aperture **50**. If the vacuum unit **62** intakes liquid, the liquid is discharged through member **51**. This can be performed by a pump fixedly disposed in the vacuum unit **62**.

[**0043**] As stated above, the vacuum intake tube **66** and blower tube **68** intersect at the tube intersection point **70**. This intersection of the vacuum intake tube **66** and the blower tube **68** form a vacuum-blower tube **120**. The vacuum-blower tube extends forwardly from the tube intersection point **70**, and through the vacuum-blower aperture **54**, terminating at a vacuum-blower hook-up **122**.

[**0044**] Referring to **FIG. 2**, the vacuum-blower hook-up **122** (as shown in **FIG. 1**) removably holds, via a force fit or snap fit connection, an elongate flexible fluid displacement assembly **136** at the assembly's **136** proximal end **137**.

[**0045**] In one embodiment, the vacuum unit **62** has a five (5) horse power motor. In a further embodiment the vacuum unit has a one (1) horse power motor.

[**0046**] As seen in **FIG. 1**, a washer unit **124** is fixedly disposed to the casing bottom **24**, leftwardly of the vacuum unit **62**. The washer unit **124** has a fan that displaces air rearwardly towards and through vertically oriented vent slots **44**.

[**0047**] The washer unit **124** has a water supply intake tube **128** extending leftwardly through the water intake aperture **48**, terminating in a water intake connection **130**. A conventional hose can be connected to the water intake connection **130** to supply water from a water source, such as a spicket. The washer unit **124** has a washer water discharge tube **132** extending forwardly through the water discharge aperture **50**, terminating in a washer water discharge connection **134**.

[**0048**] In one embodiment the washer pumps water out at about 1.2 gallons per minute at 1300 psi.

[**0049**] The elongate flexible fluid displacement assembly **136** comprises a vacuum hose **138**, a washer water discharge hose **140**, and a wiring harness **142**. The washer water discharge hose **140**, at its proximal end **141**, removably engages with the washer water discharge connection **134** via a snap-fit connection. Extending from the proximal end **141** of the washer water discharge hose **140**, the washer water discharge hose **140** becomes disposed within the vacuum hose **138**, having a distal end that extends outside the vacuum hose **138**, terminating in a sprayer connection **144**, as shown in **FIG. 2**.

[**0050**] Here, a sprayer **146** is removably connected to the sprayer connection **144**. The wiring harness **142**, at its proximal end has male connectors **148** to removably plug into the power socket **56**. The wiring harness is disposed and extends within the vacuum hose **138**, and at its distal end, is

connected to a distal switch **150**. The distal switch **150** is fixed to the distal end of the vacuum hose **138**.

[**0051**] The wiring harness **142** and all other wiring include approved wiring such as 14-gage wire in one embodiment.

[**0052**] In one embodiment the water discharge hose **140** has an inside diameter of about 0.635 cm (0.25 inch).

[**0053**] As illustrated in **FIG. 2**, a designated middle portion of the vacuum hose **138** is flexible. The proximal end and distal end of the vacuum hose **138** is each rigid. The vacuum hose distal end terminates in a vacuum-blower accessory connection **152**.

[**0054**] Referring to **FIG. 3**, the tube arrangement **64** and the first **72**, second **74**, third **96**, and fourth valve **98**, are shown during the vacuuming operation. When vacuuming, instead of blowing, the second **74** and third **96** valves are open, and the first **72** and fourth **98** valves are closed.

[**0055**] As illustrated in **FIG. 4**, the tube arrangement **64** and the first **72**, second **74**, third **96**, and fourth valve **98**, are shown during the blowing operation. When blowing, instead of vacuuming, the first **72** and fourth **98** valves are open, and the second **74** and third **96** valves are closed.

[**0056**] Referring to **FIG. 2**, accessories removably connect to the vacuum-blower accessory connection **152**. Accessories include a rail accessory **154**, for vacuuming or blowing air through rail apertures **156**, while placing the rail accessory **154** adjacent to rails of boats or other vehicles. Another accessory includes a flat surface accessory **158**. The flat surface accessory **158** used for vacuuming or blowing while placing the flat surface accessory **158** adjacent a flat surface, such as a window. Or a common vacuum accessory **157** can be attached.

[**0057**] To operate the wash and vacuum system **20**, the master power switch **58** is turned on. To use the washer, the sprayer **146** is connected to the sprayer connection **144**. The distal switch **150** is set to activate the washer unit **124**. Water enters the water supply intake tube **128** via a conventional hose that is removable secured to the water intake connection **130**. The washer unit **124** pumps water out through the water discharge tube **132**, through the water discharge hose **140**, and then through the sprayer **146**. The washer can be turned off from the distal switch **150**.

[**0058**] Next, for vacuuming, the desired accessory is attached to the vacuum-blower accessory connection **152**. The distal switch **150** is moved to a position to activate the vacuum unit **62**, and arrange the valves as shown in **FIG. 3**. If the vacuum unit **62** takes in liquid, the liquid is discharged out of the vacuum discharge member **51**.

[**0059**] For blowing, the desired accessory is attached to the vacuum-blower accessory connection **152**. The distal switch **150** is moved to a position to activate the vacuum unit **62**, and arrange the valves as shown in **FIG. 4**.

[**0060**] In one embodiment, the entire portable unit of the wash and vacuum system **20** weighs about 11.34 kg (25 pounds). The height, length, and width dimensions are about 76.2 cm×45.72 cm×25.4 cm (2.5 ft×1.5 ft×10 inches).

[**0061**] It is also suggested that a ground fault breaker be incorporated because of the wash and vacuum system's use near water.

[**0062**] It is also suggested that a variable pressure valve and controller be employed to vary the pressure that water is pumped from the washer unit **124**. Similarly, the vacuum unit's **62** vacuum and blower air pressure can be varied.

[**0063**] In a further embodiment, the vacuum unit **62** and washer unit **124** are disposed within the vehicle body, such as a boat hull. In this case each unit **62**, **124** is hard-wired into the vehicles electrical system. All of the hook-ups or connections are conveniently located on a console. The power can be activated by simply engaging a hose with a hook-up or connection. Or an appropriate controller or switch can be located on the console and on the distal end of the fluid displacement assembly **136**.

[**0064**] In other embodiments the units **62**, **124** are disposed within other vehicles such as recreational vehicles, or spacecraft.

[**0065**] In a further embodiment, the vacuum unit **62** and washer unit **124** can be combined, so a single vacuum-washer unit can perform the same functions as the separate units **62**, **124**.

[**0066**] In a further embodiment, the vacuum unit **62** and washer unit **124** can be combined, so a single vacuum-washer unit can perform the same functions.

[**0067**] In one embodiment, a soap dispenser is adapted so as to dispose soap from the sprayer **146**. The soap dispenser could be either within the casing **22**, or outside of casing **22**. The soap dispenser would a venturi pump system to dispense soap within the water.

[**0068**] In one embodiment a rotating or aggitatingly movable brush is movably connected at a distal end of the sprayer **146**. This brush is powered by water pressure. The brush can be used to clean roughly textured, and difficult to reach surfaces.

[**0069**] The preferred embodiment is disclosed in **FIG. 5**. Like reference numerals above correspond to like elements. In this embodiment the tube selection system comprises a tube selection junction box **216**, which is defined by a substantially vertically oriented square first wall **228**, a substantially vertically oriented square second wall **232**, a substantially horizontally oriented rectangular top panel **236**, a substantially horizontally oriented rectangular bottom panel **240** (shown in **FIGS. 7A, 8A**), a substantially vertically oriented rectangular third wall **244** (shown in **FIG. 6**), a substantially vertically oriented rectangular fourth wall **248**, and a substantially horizontally oriented rectangular center divider **252** (shown in **FIGS. 7A, 8A**).

[**0070**] Referring to **FIGS. 7 and 8**, the second wall **232** has an inner face **234** that faces the first wall **228**. The bottom panel **240** is fixedly secured to the casing bottom **24**.

[**0071**] The third wall **244** and opposed fourth wall **248** each have a slot **249** aligned with the other. The slot **249** is about 8.89 cm (3.50 inch) high by about 0.64 cm (0.25 inch) wide.

[**0072**] A rectangular tube selection plate **272** is fixedly connected to an arm **304** of a solenoid **300**; so as to be moveably disposed within said slots **249** adjacent the inner face **234** in the horizontal direction. The tube selection plate **272** has a tube selection plate discharge hole **276**. The tube

selection plate **272** has a tube selection plate intake hole **280** aligned vertically below the tube selection plate discharge hole **276**.

[**0073**] The first wall **228** and the second wall **232** are fixedly disposed to and between the top panel **236** and the bottom panel **240**. Also, the first wall **228** and the second wall **232** are fixedly disposed to and between the third wall **244** and the fourth wall **248**.

[**0074**] Referring to **FIGS. 7A and 8A**, the center divider **252** is fixedly secured to the first wall **228**, extending toward the tube selection plate **272**, and is disposed between the top panel **236** and the bottom panel **240**, to define an upper chamber **256**, and a lower chamber **260** of the junction box **216**, as seen in **FIGS. 7A and 8A**.

[**0075**] As shown in **FIGS. 7A and 8A**, the first wall **228** has a first wall upper chamber opening **264** in the left-upper quadrant (as seen in **FIGS. 7A and 8A**), and a first wall lower chamber opening **268** in the right-lower chamber (as seen in **FIGS. 7A and 8A**).

[**0076**] As shown in **FIGS. 7A and 8A**, the second wall **232** has four holes, a second wall vacuuming operation discharge hole **284** is disposed in the right-upper quadrant, or in other words, between the top panel **236** and a second wall vacuuming operation intake hole **288**. Thus hole **284** provides access to the upper chamber **256** via the second wall **232**. And the hole **288** disposed substantially vertically below the hole **284**, provides access to the lower chamber **260** via the second wall **232**. Further, the second wall vacuuming operation intake hole **288** is between the second wall vacuuming operation discharge hole **284** and the bottom panel **240**. A second wall blowing operation discharge hole **292** is disposed in the left-upper quadrant, or in other words, between the top panel **236** and a second wall blowing operation intake hole **296**. Thus hole **292** provides access to the upper chamber **256** via the second wall **232**. And hole **296** provides access to the lower chamber **260** via the second wall **232**. Further, the second wall blowing operation intake hole **296** is disposed in the left-lower quadrant, or in other words, between the second wall blowing operation discharge hole **292** and the bottom panel **240**.

[**0077**] Hole **292** is adjacent both top panel **236** and the fourth wall **248**. Hole **284** is adjacent both the top panel **236** and the third wall **244**. Hole **296** is adjacent the bottom panel **240** and the fourth wall **248**. Hole **288** is adjacent the bottom panel and the third wall **244**.

[**0078**] Referring to **FIG. 5**, a blower tube, also called an air discharge tube **200**, has a first end **208** that is connected to the vacuum unit **62**, and a second end **212** that is connected to the first wall top chamber opening **264** (as seen in **FIGS. 7 and 8**). Air is discharged from the vacuum unit **62** by the air discharge tube **200**. A vacuum tube, also called an air intake tube **204** has a first end **220** that is connected to the vacuum unit **62**, and a second end **224** that is connected to the first wall bottom chamber opening **268** (as seen in **FIGS. 7 and 8**). Air is drawn into the vacuum unit **62** by the air intake tube **204**.

[**0079**] Except for any tube openings, each chamber **256**, **260** is sealed from the other, and from the ambient. In a further embodiment each chamber **256**, **260**, except for any tube openings, is hermetically sealed.

[**0080**] As seen in **FIGS. 5 and 6**, a vacuuming operation discharge tube **308** has a first end that is connected to the second wall vacuuming operation discharge hole **284**, and a second end that extends out of the bottom rear wall **30** of the casing **22**, via a vacuuming operation discharge tube aperture **324** (**FIG. 5**). When air is drawn into the vacuum unit **62**, air is expelled from the vacuum unit **62** through the discharge tube **308**.

[**0081**] Referring to **FIG. 6**, a vacuuming operation intake tube **312** has a first end that is connected to the second wall vacuuming operation intake hole **288** and extends to the intersection point **70**.

[**0082**] A blowing operation intake tube **320** has a first end that is connected to the second wall blowing operation intake hole **296** and extends out of casing **22**, to intake air, as seen in **FIG. 5**.

[**0083**] A blowing operation discharge tube **316** has a first end that is connected to the second wall blowing operation discharge hole **292** and extends to the intersection point **70** to intersect with the vacuuming operation intake tube **312**. And, like the earlier embodiment, from the intersection point **70**, the tube extends through the vacuum-blower aperture **54** to the vacuum-blower hook-up **122**.

[**0084**] The fourth wall **248** and third wall **244** each have a plate slot **249** to moveably receive the tube selection plate **272**.

[**0085**] A solenoid **300** is fixedly mounted to the casing bottom **24**. The solenoid **300** has a horizontally displaceable arm **304** fixed to the tube selection plate **272**. Thus the solenoid **300** can be selected to align the tube selection plate discharge hole **276** and tube selection plate intake hole **280** for either the vacuuming or blowing operation.

[**0086**] Referring to **FIG. 7**, when the arm **304** is in the extended or at-rest position for the vacuuming operation, the selection plate holes **276**, **280** are aligned concentric with the second wall vacuuming operation discharge hole **284** and the second wall vacuuming operation intake hole **288**, respectively.

[**0087**] Referring to **FIG. 8**, when the arm **304** is in the retracted or actuated position for the blowing operation, the selection plate holes **276**, **280** are aligned concentric with the second wall blowing operation discharge hole **292** and the second wall blowing operation intake hole **296**, respectively.

[**0088**] A solenoid arm extension spring **332** is tensionally mounted with one end fixed to the solenoid arm **304**, and the other end fixed to the second wall **332** to maintain the arm **304** in the extended position when at-rest, as shown in **FIG. 7**.

[**0089**] As shown in **FIGS. 5, 6, 7, 7A, 8**, and **8A**, the preferred embodiment uses only one solenoid **300**, instead of the four solenoids **86**, **92**, **110**, **116** described earlier. Also, there are no valves **72**, **74**, **96**, **98**.

[**0090**] In one embodiment, the solenoid arm **304** has a 2.54 cm (1 inch) length of travel. Thus the second wall vacuuming operation discharge hole **284** and the second wall vacuuming operation intake hole **288** are horizontally separated by about 2.54 cm (1 inch). Similarly, the second wall blowing operation discharge hole **292** is horizontally displaced about 2.54 cm (1 inch) from the blowing operation intake hole **296**.

[0091] In one embodiment, the tube selection junction box first wall **228** and second wall **232** are about 10.16 cm×10.16 cm (4×4 inches) in height and width. And the thickness of the firs wall **228** and second wall **232** are both about 1.27 cm (0.5 inch). The thickness of the tube selection plate **272** is about 0.16 cm (0.06 inch). With these dimensions, both the upper chamber **256** and lower chamber **260** have about the same volume, which is about 23.16 cm^3 or 1.41 $inch^3$.

[0092] In one embodiment, the system **20** uses wireless technology to eliminate wiring. Other suggestions include the use of ground fault breakers to prevent electrocution, or check valves in any of the tubes or hoses.

[0093] In a further embodiment, either the air discharge tube **200** or the air intake tube **204** can be eliminated. An impeller would be integrated into the vacuum unit **62**. The impeller would rotate in a first direction to blow air out from the vacuum unit **62** and the blower tube **120**. The impeller would also rotate in an opposite direction to intake air into the vacuum unit **61** and into the blower tube **120**.

[0094] Although a particular preferred embodiment of the invention has been disclosed in detail for illustrative purposes, it will be recognized that variations or modifications of the disclosed apparatus, including the rearrangement of parts, changes in sizes and dimensions, variances of voltages, kilohertz and horse power lie within the scope of the present invention.

What is claimed is:

1. A washer and vacuum system comprising:

a vacuum unit that selectively either discharges or intakes gas, said vacuum unit fixedly disposed in a casing;

a washer unit that discharges liquid, said washer unit fixedly disposed in said casing;

a tube arrangement having a vacuum tube and a blower tube, said tube arrangement fixedly disposed in said casing, said vacuum tube extending from said vacuum unit, said blower tube extending from said vacuum unit, said vacuum tube and said blower tube intersecting at an intersection point, hereby forming a single vacuum-blower tube, said vacuum-blower tube extending from within said casing, through an aperture in a bottom front casing wall, to terminate outside of said casing;

a tube selection system coacting with said tube arrangement;

a washer liquid discharge tube extending from said washer unit, through a bottom right side casing wall, to terminate outside of said casing; and

a controller to selectively activate said washer unit, said vacuum unit, and to further activate said tube selection system, whereby said tube selection system can be selected to enable said vacuum unit to either intake gas, or discharge gas through said vacuum-blower tube.

2. The washer and vacuum system of claim 1, further comprising:

a tube selection system being a tube selection junction box.

3. The washer and vacuum system of claim 1, further comprising:

a first valve openably and closably disposed within said vacuum tube between the vacuum unit and said intersection point;

a second valve openably and closably disposed within said vacuum tube between said first valve and said intersection point;

a third valve openably and closably disposed within said blower tube between said vacuum unit and said intersection point; and

a fourth valve openably and closably disposed within said blower tube between said third valve and said intersection point, whereby said controller can be selected to open said first valve and said third valve, and close said second valve and said fourth valve to enable said vacuum unit to intake gas through said intake tube, and said controller can be selected to open said second valve and said fourth valve, and close said first valve and said third valve to enable said vacuum unit to discharge gas through said blower tube.

4. The washer and vacuum system of claim 1 further comprising:

a vacuum water discharge member extending from the vacuum unit through a casing wall.

5. The washer and vacuum system of claim 1, further comprising:

a caster disposed on the outside of said casing; and

a handle disposed on the outside of the casing, whereby the handle can be gripped while walking, and said caster rollingly supports said casing off of the ground.

6. The washer and vacuum system of claim 1, further comprising:

said casing having a top part, and a bottom part; and

a hinge member attached so that said casing can be opened and closed.

7. The washer and vacuum system of claim 1, further comprising:

an electrical plug connected to said washer unit and said vacuum unit, whereby said electrical plug is adapted so as to enable said washer unit and said vacuum unit to be powered by electricity.

8. The washer and vacuum system of claim 1, further comprising:

said vacuum-blower tube terminating in a vacuum-blower hook-up outside of said casing;

said washer water discharge tube terminating in a water discharge connection outside of said casing;

a washer water discharge hose is removably connected to said water discharge connection; and

a vacuum hose is removably connected to said vacuum-blower hook-up.

9. The washer and vacuum system of claim 8, further comprising:

said water discharge hose extends from said washer water discharge connection, a portion of said washer water discharge hose is disposed within said vacuum hose.

10. A washer and vacuum system of claim 1, wherein said tube selection system being a tube selection junction box

fixedly disposed to said tube arrangement between said intersection point and said vacuum unit, said tube selection junction box comprising:

a bottom panel fixedly disposed to the casing bottom;

a first wall extending upwardly from and fixedly secured to said bottom panel;

said first wall having a first wall upper chamber opening and a first wall lower chamber opening;

a second wall extending upwardly from and fixedly secured to said bottom panel substantially parallel to said first wall;

a third wall extending upwardly from and fixedly secured to said bottom panel, said third wall disposed perpendicular to said bottom panel, said first wall, and said second wall;

a fourth wall extending upwardly from and fixedly secured to said bottom panel substantially parallel to said third wall;

a top panel fixedly disposed to the first wall, second wall, third wall, and fourth wall, and substantially parallel to said bottom panel, whereby said first wall, said second wall, said third wall, said fourth wall, said bottom panel, and said top panel define an enclosed cube;

said second wall having an inner face that faces said first wall;

said second wall has a second wall vacuuming operation discharge hole disposed between a top panel and a second wall vacuuming operation intake hole, said second wall also has a second wall blowing operation discharge hole between said top panel and a second wall blowing operation intake hole;

said third wall and said fourth wall each having a plate slot aligned with the other;

a tube selection plate that horizontally biases through said plate slots;

said tube selection plate having a tube selection plate discharge hole and a tube selection plate intake hole disposed vertically below said tube selection plate discharge hole;

a center divider fixedly disposed to said first wall, extending toward said tube selection plate, whereby said enclosed cube is divided into an upper chamber and a lower chamber, each of said chambers having substantially equal volumes;

a solenoid that is fixedly secured to the casing bottom, and having an arm that is fixedly secured to the tube selection plate, whereby the solenoid can be selected to bias the tube selection plate so as too enable said vacuum unit to either intake gas, or discharge gas through said vacuum-blower tube;

whereby when said solenoid arm is extended away from said solenoid, the vacuum unit can be used to intake air through said vacuum blower tube and said second wall vacuuming operation intake hose, and when said solenoid arm is retracted toward said solenoid, the vacuum unit can be used to discharge air through said vacuum blower tube and said second wall blowing operation discharge hole.

11. A washer and vacuum system of claim 10, further comprising:

said vacuum tube extending from said vacuum unit to said first wall lower chamber opening;

said blower tube extending from said vacuum unit to said first wall upper chamber opening;

a vacuuming operation discharge tube having a first end connected to said second wall vacuuming operation discharge hole and a second end that extends out said casing;

a vacuuming operation intake tube having a first end connected to said second wall vacuuming operation intake hole and extending from said first end to said intersection point;

a blowing operation intake tube having a first end connected to said second wall blowing operation intake hole and extending to said intersection point, to intersect with said vacuuming operation intake tube, thereby forming said single vacuum-blower tube; and

a blowing operation discharge tube having a first end connected to said second wall blowing operation discharge hole, and having a second end extending out of said casing.

12. A washer and vacuum system comprising:

a vacuum unit that coacts with an impeller to selectively discharge or intake gas, said vacuum unit fixedly disposed in a casing;

a washer unit that discharges liquid, said washer unit fixedly disposed in said casing;

a tube arrangement having a single vacuum-blower tube, said vacuum-blower tube extending from within said casing, through an aperture in a bottom front casing wall, to terminate outside of said casing;

a washer water discharge tube extending from said washer unit, through a bottom right side casing wall, to terminate outside of said casing; and

a controller to selectively activate either said washer unit, or said vacuum unit, and to further activate said valve, whereby said valve can be selected to enable said vacuum unit to either intake gas, or discharge gas through said vacuum-blower tube;

said vacuum-blower tube terminating in a vacuum-blower hook-up outside of said casing;

said washer water discharge tube terminating in a washer water discharge connection outside of said casing;

a washer water discharge hose at its proximal end is removably connected to said washer water discharge connection;

a vacuum hose has a proximal end that is removably connected to said vacuum-blower hook-up, said washer water discharge hose extends from said washer water discharge connection, a portion of said washer water discharge hose is disposed within said vacuum hose; and

said washer water discharge hose extending from within said vacuum hose through a wall of said vacuum hose, terminating at a sprayer connection at its distal end; and

said vacuum hose terminating at a distal end to removably receive vacuum accessories;

whereby, when said impeller rotates in a first direction, said vacuum-blower tube intakes air, and when said impeller rotates in a second direction, said vacuum-blower tube discharges air.

13. The washer and vacuum system of claim 1, further comprising:

a vacuum accessory removably attached to said distal end of said vacuum hose.

14. The washer and vacuum system of claim 1, further comprising:

a sprayer accessory removably attached to said sprayer connection.

15. The washer and vacuum system of claim 13, further comprising:

said vacuum accessory being arcuate in shape, whereby it can be used to clean cylindrical shaped objects.

16. The washer and vacuum system of claim 13, further comprising:

said vacuum accessory being squeegee in shape, whereby it can be used to clean flat shaped objects.

17. The washer and vacuum system of claim 15, further comprising:

said sprayer accessory having a brush movably mounted on said sprayer accessory, said brush movement powered by water pressure.

18. A washer and vacuum system that is installed in a vehicle comprising:

a vacuum unit that selectively discharges or intakes gas, said vacuum unit fixedly disposed in the vehicle;

a washer unit that discharges liquid, said washer unit fixedly disposed in said vehicle;

a tube arrangement having a vacuum tube and a blower tube, said tube arrangement fixedly disposed in the vehicle, said vacuum tube extending from said vacuum unit, said blower tube extending from said vacuum unit, said vacuum tube and said blower tube intersecting at an intersection point, hereby forming a single vacuum-blower tube, said vacuum-blower tube extending from within said vehicle, through an aperture in a console, to terminate outside of said console;

a valve disposed in said tube arrangement;

a washer water discharge tube extending from said washer unit, through a console, to terminate outside of said console; and

a controller to selectively activate either said washer unit, or said vacuum unit, and to further activate said valve, whereby said valve can be selected to enable said vacuum unit to either intake gas, or discharge gas through said vacuum-blower tube.

* * * * *