

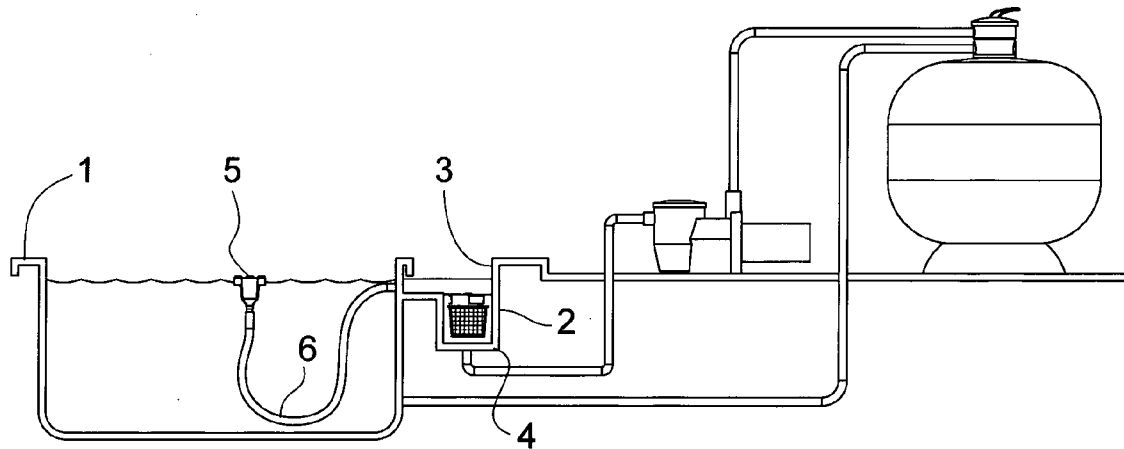


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(19) **United States**(12) **Patent Application Publication**
Palmer et al.(10) **Pub. No.: US 2012/0305498 A1**(43) **Pub. Date: Dec. 6, 2012**(54) **POOL SKIMMER ASSEMBLY****Publication Classification**(75) Inventors: **Ross Palmer**, Mt. Gravatt (AU);
Simon Fifield, MT Gravatt (AU)(51) **Int. Cl.**
E04H 4/16 (2006.01)(73) Assignee: **POOLRITE RESEARCH PTY LTD**, MT GRAVATT (AU)(52) **U.S. Cl.** **210/776**; 210/167.1; 210/136;
210/123(21) Appl. No.: **13/518,841**(57) **ABSTRACT**(22) PCT Filed: **Dec. 23, 2010**(86) PCT No.: **PCT/AU10/01742**§ 371 (c)(1),
(2), (4) Date: **Aug. 16, 2012**(30) **Foreign Application Priority Data**

Dec. 24, 2009 (AU) 2009906300

A pool skimmer assembly able to be fluidly connected to a pool pump, the pool skimmer assembly including: a first vacuum plate having a first opening through which pool water is able to be sucked from below the vacuum plate when the pool pump operates in suction; and a first valve member which is connected relative to the vacuum plate, the valve member being displaceable between a closed position in which the valve member closes off the first opening and an open position in which the valve member is spaced from the first opening.



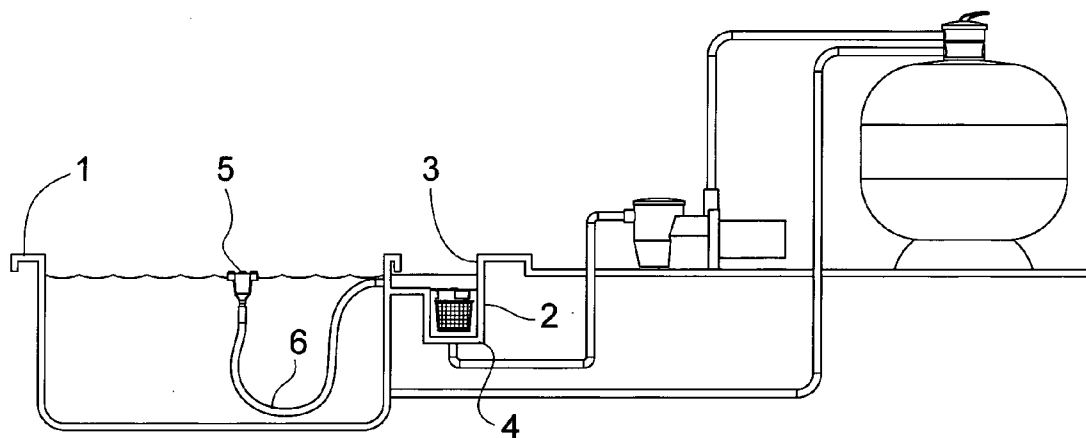


FIG. 1

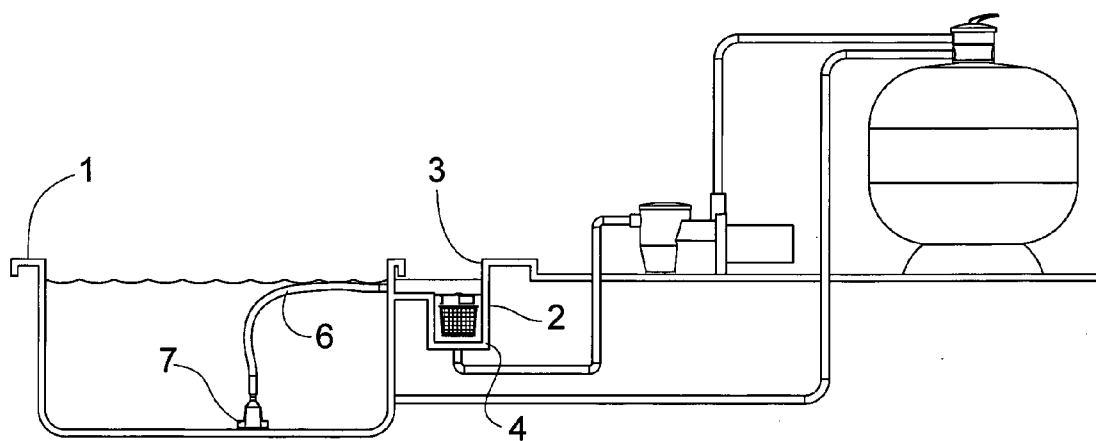


FIG. 2

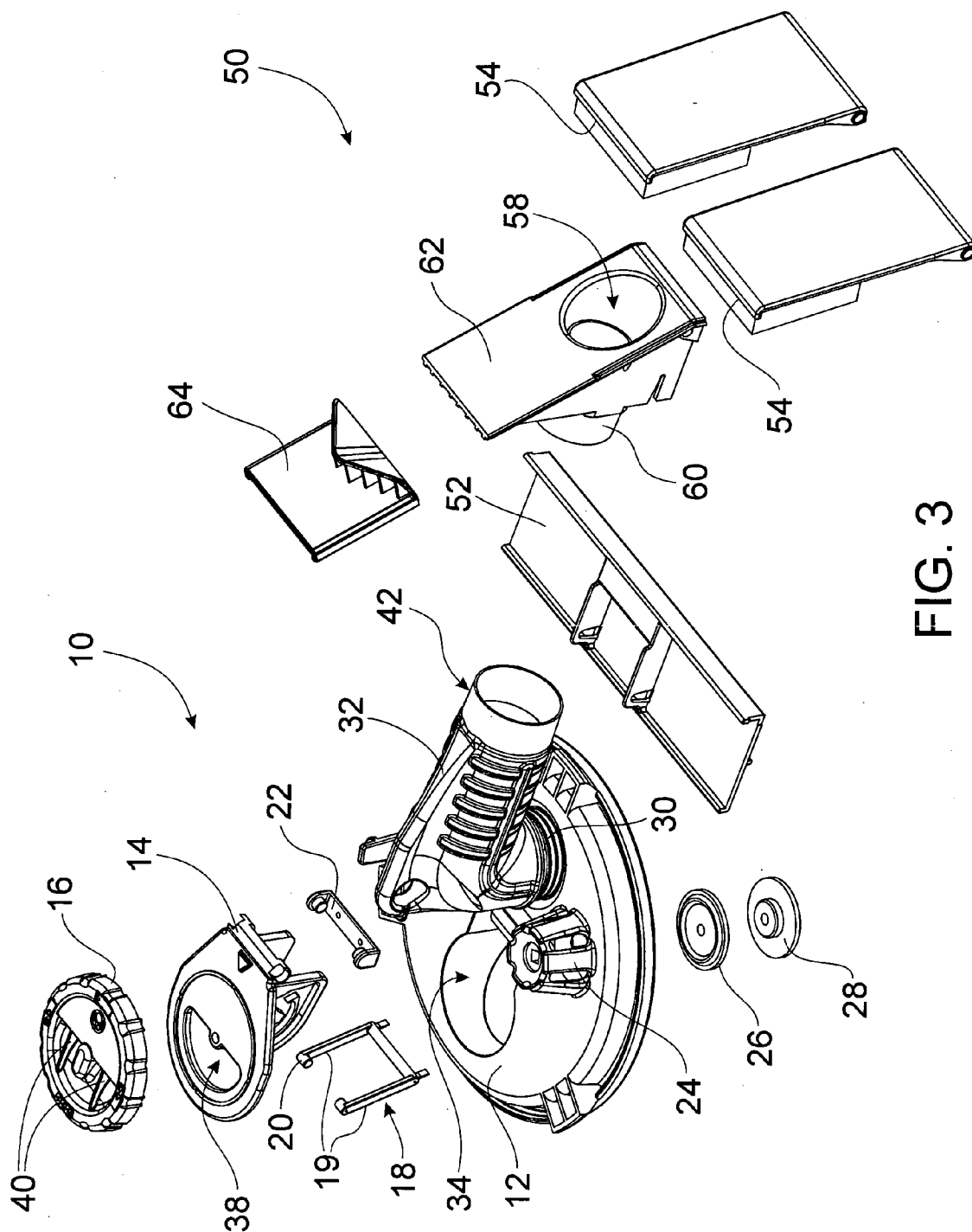


FIG. 3

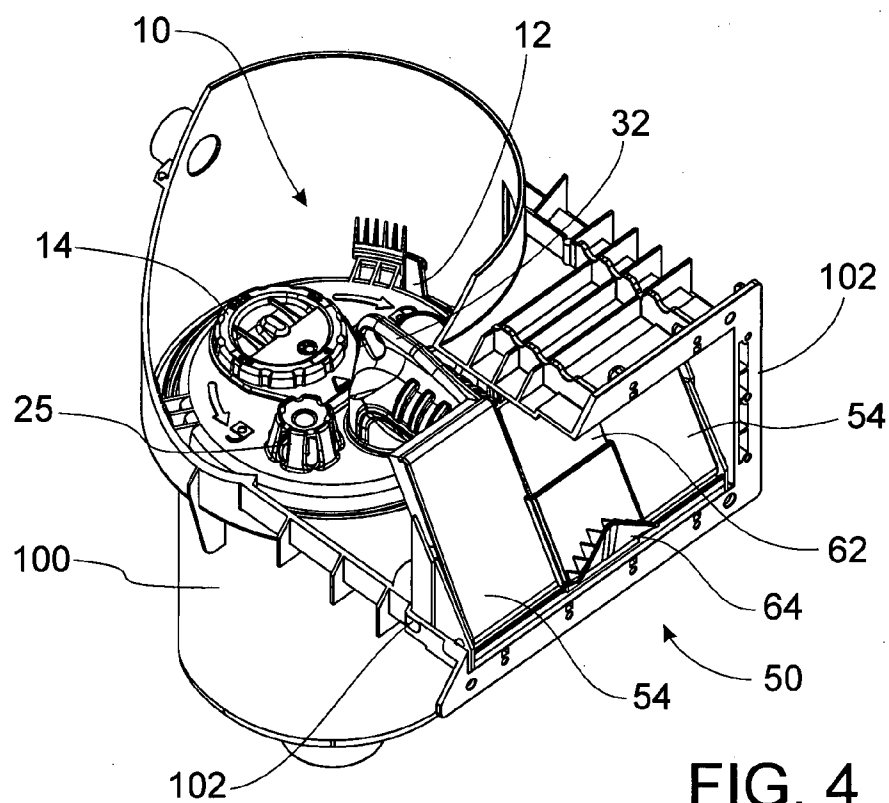


FIG. 4

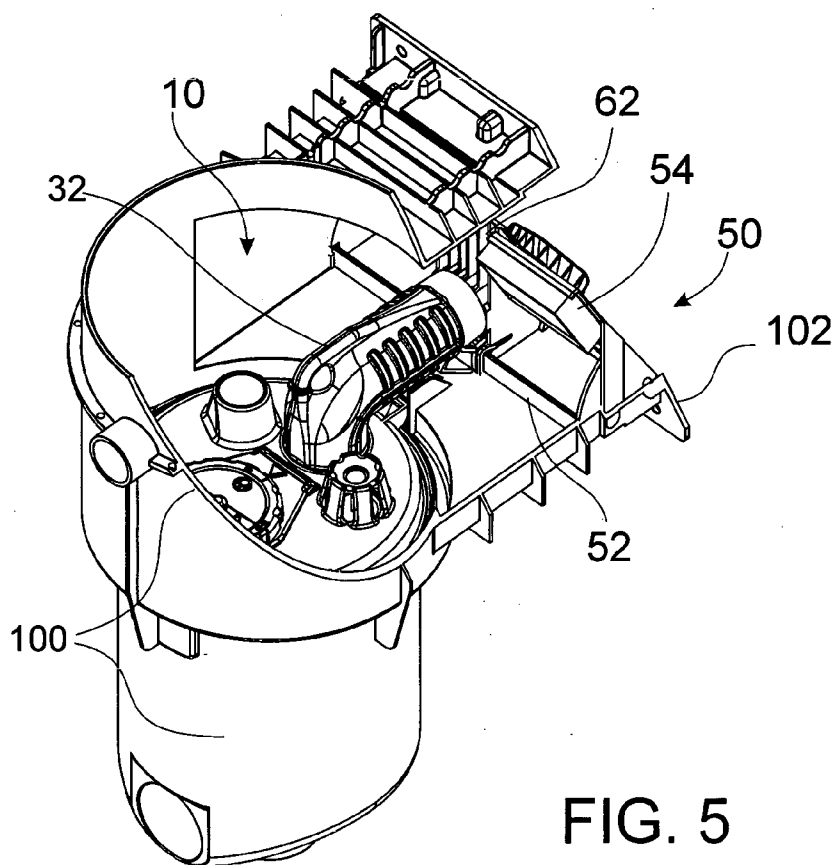


FIG. 5

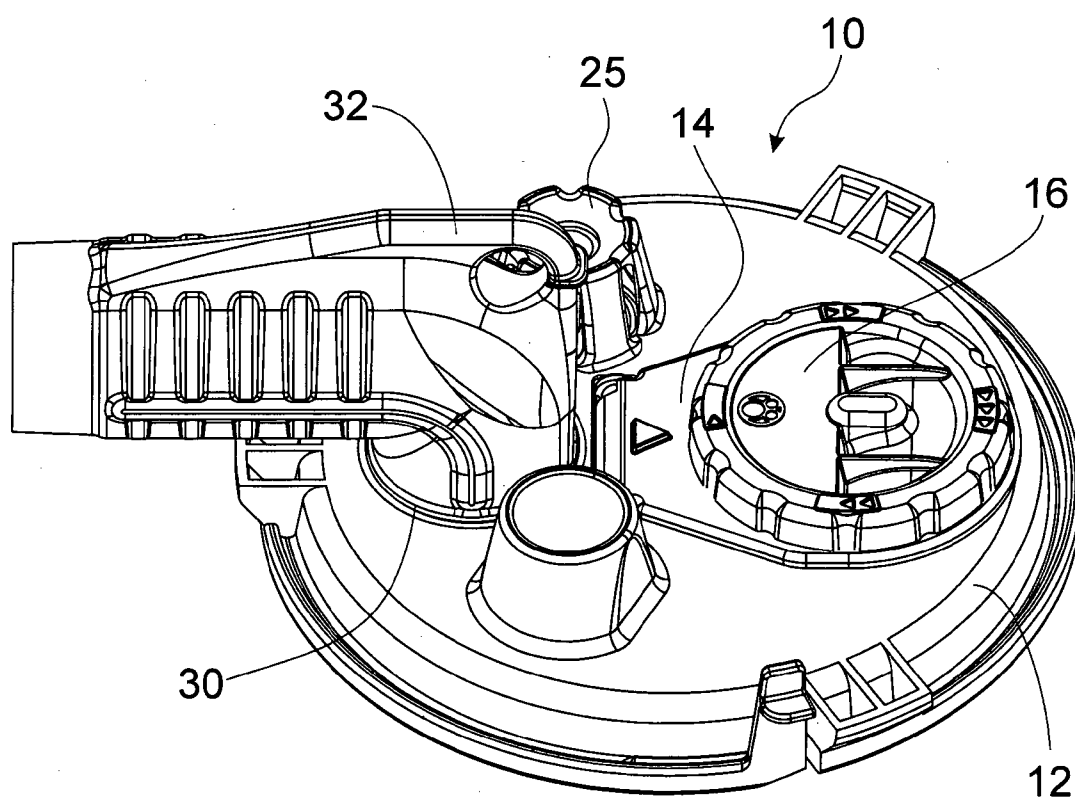


FIG. 6

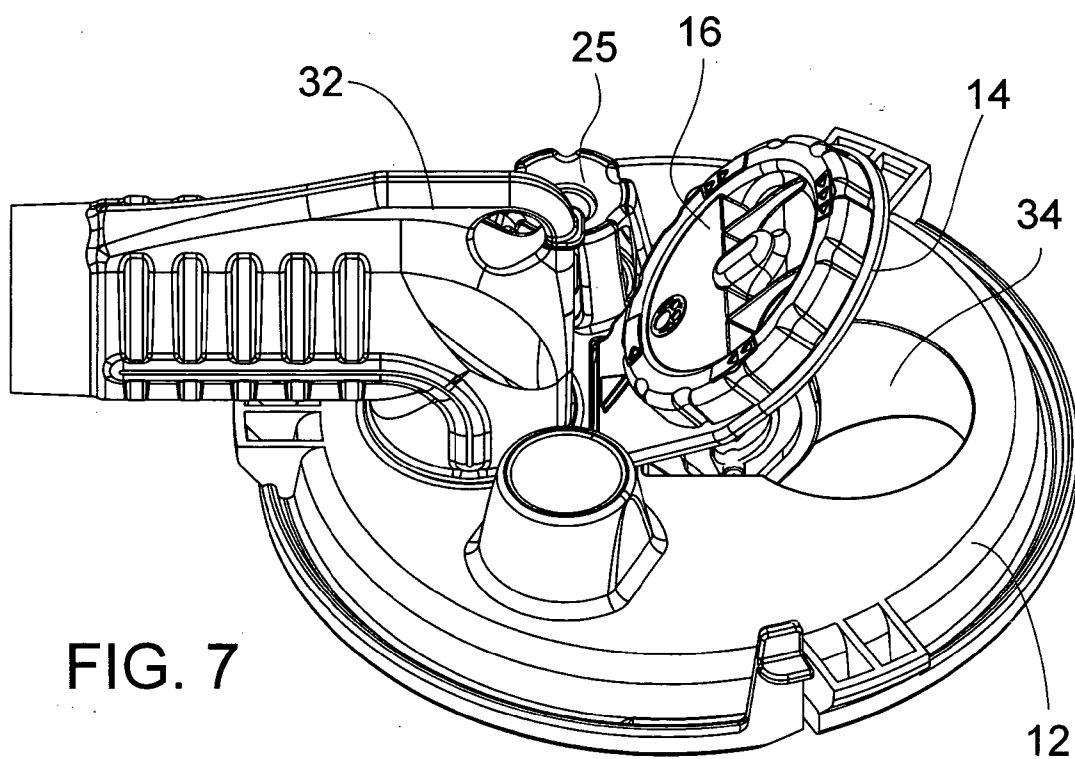


FIG. 7

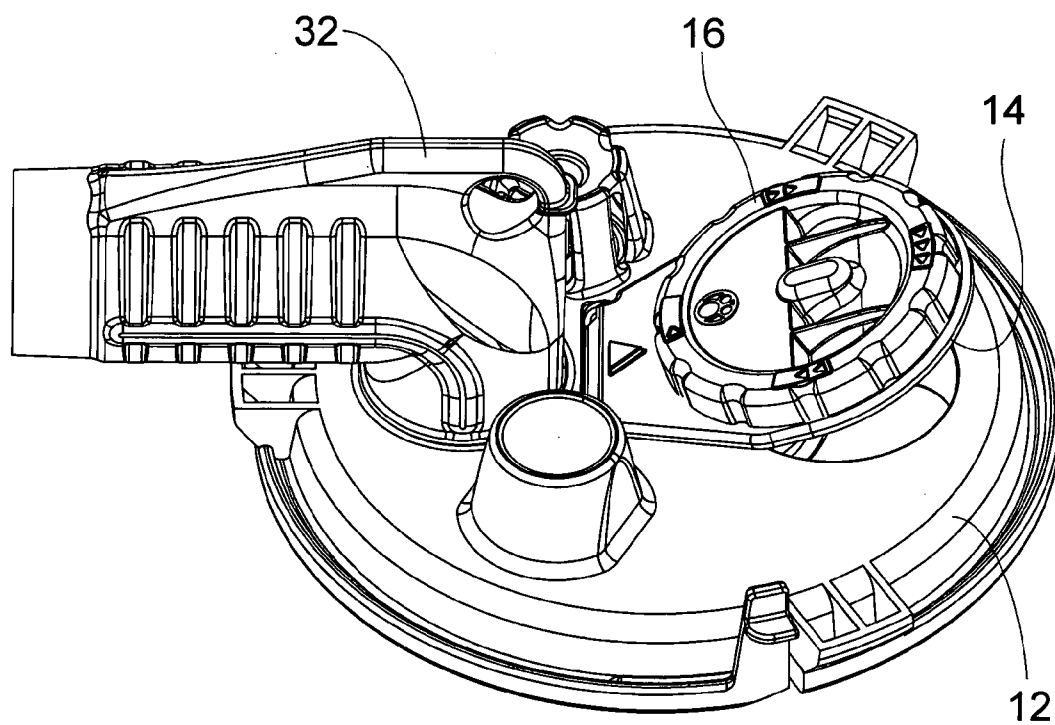


FIG. 8

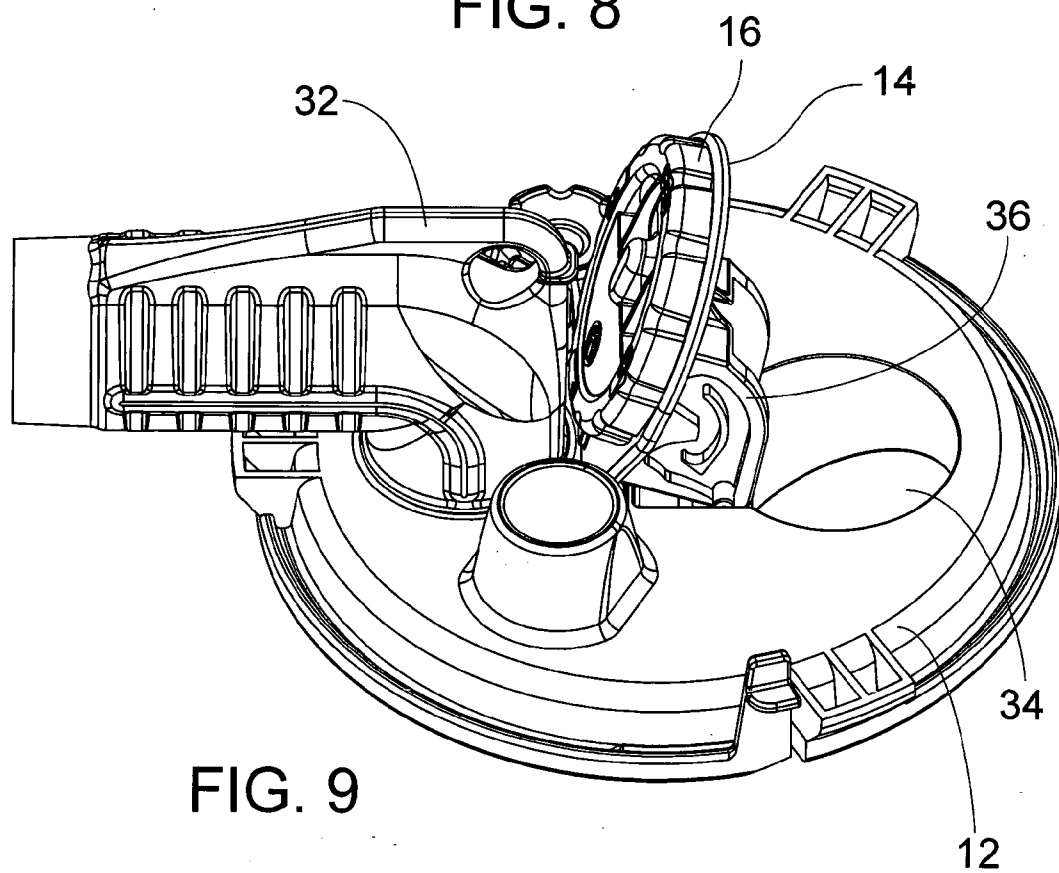


FIG. 9

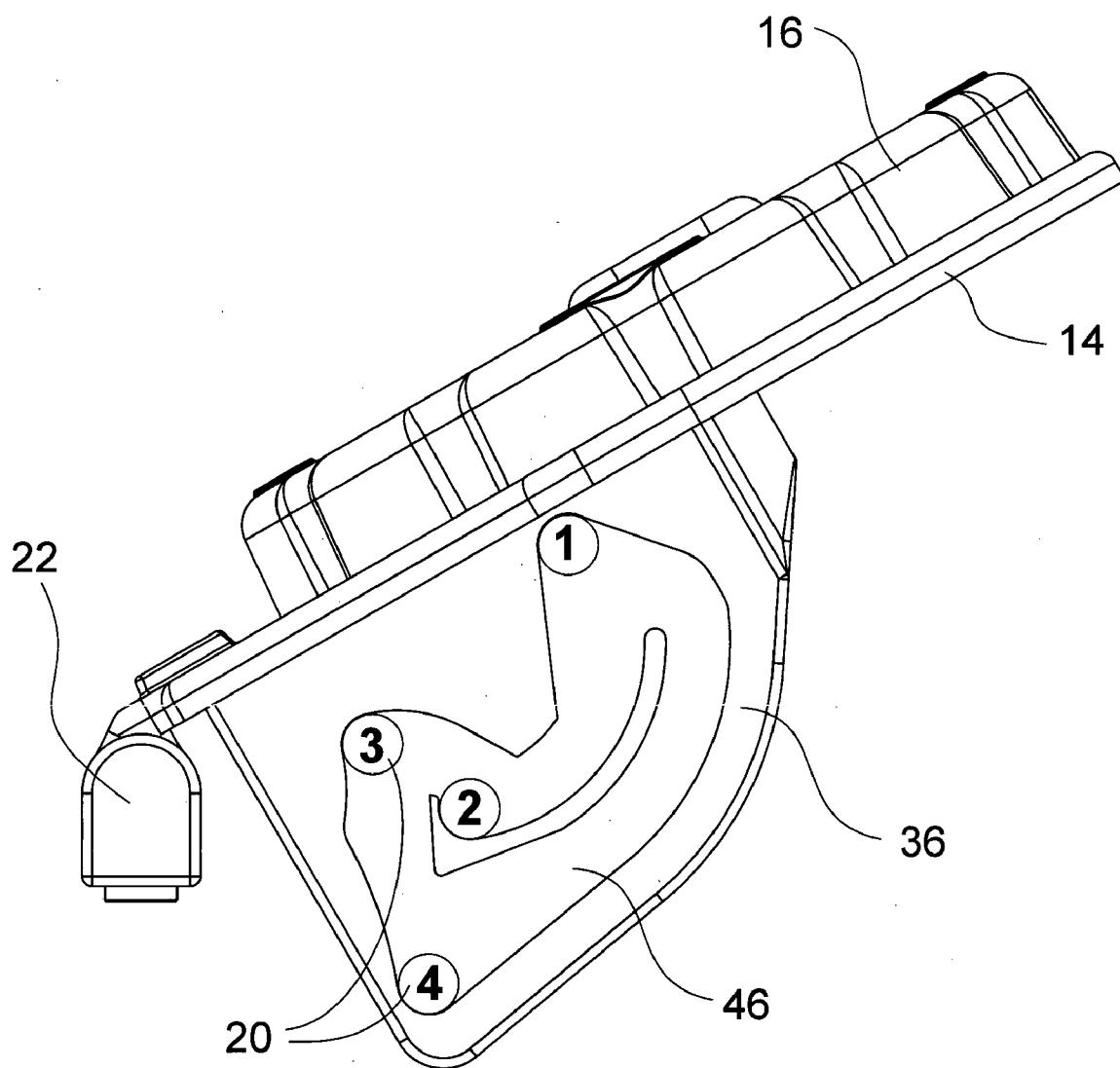


FIG. 10

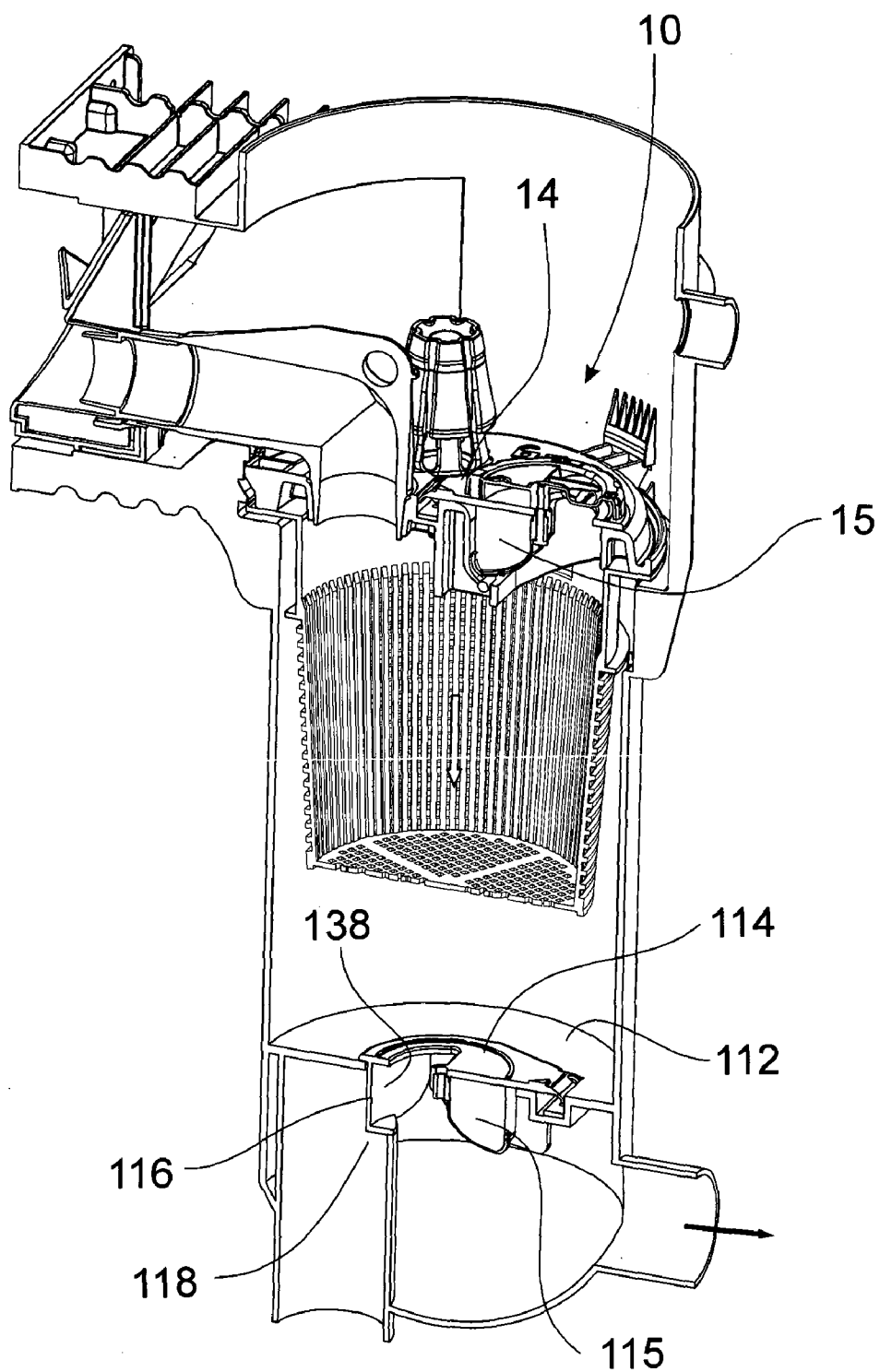


FIG. 11

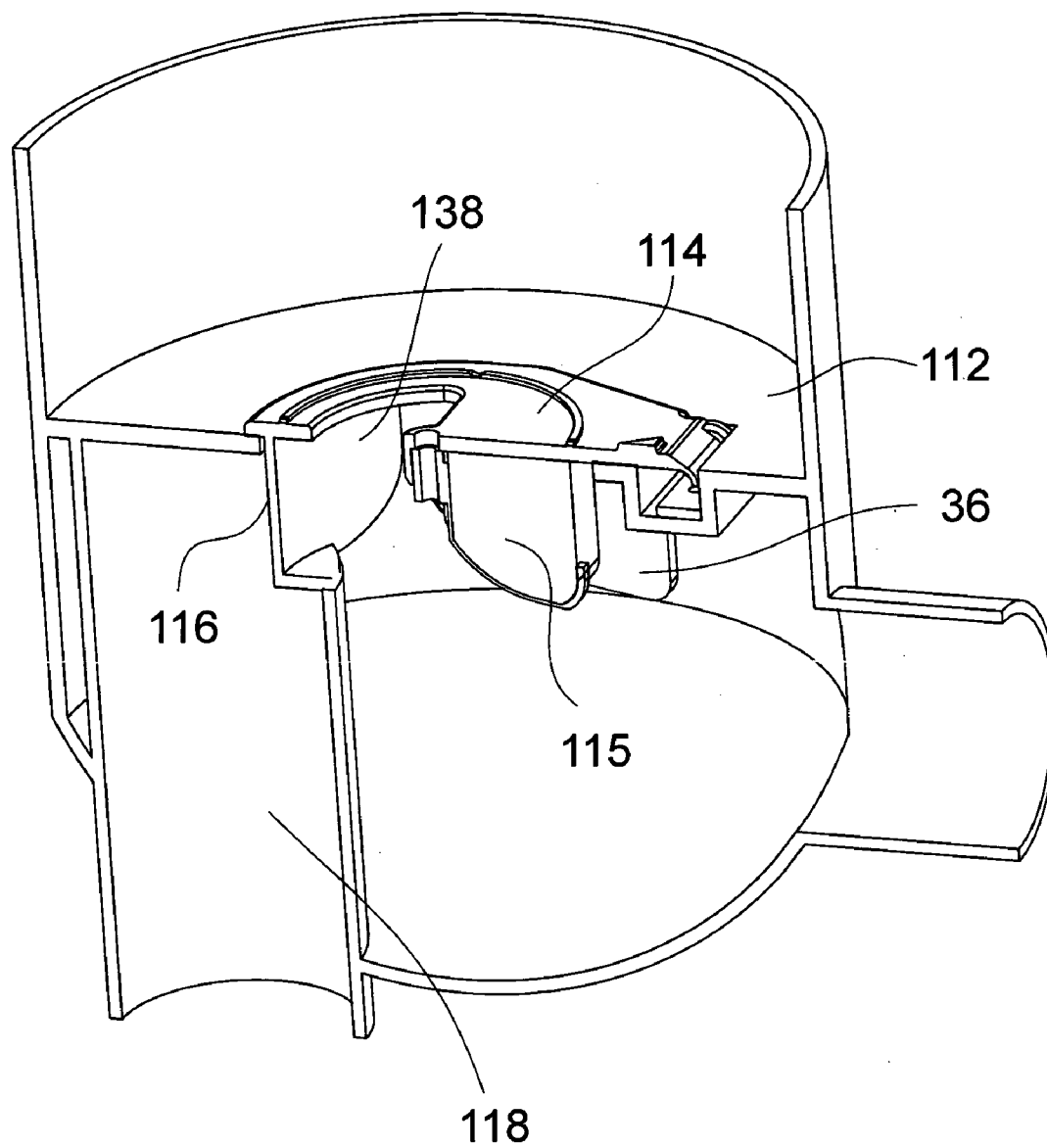


FIG. 12

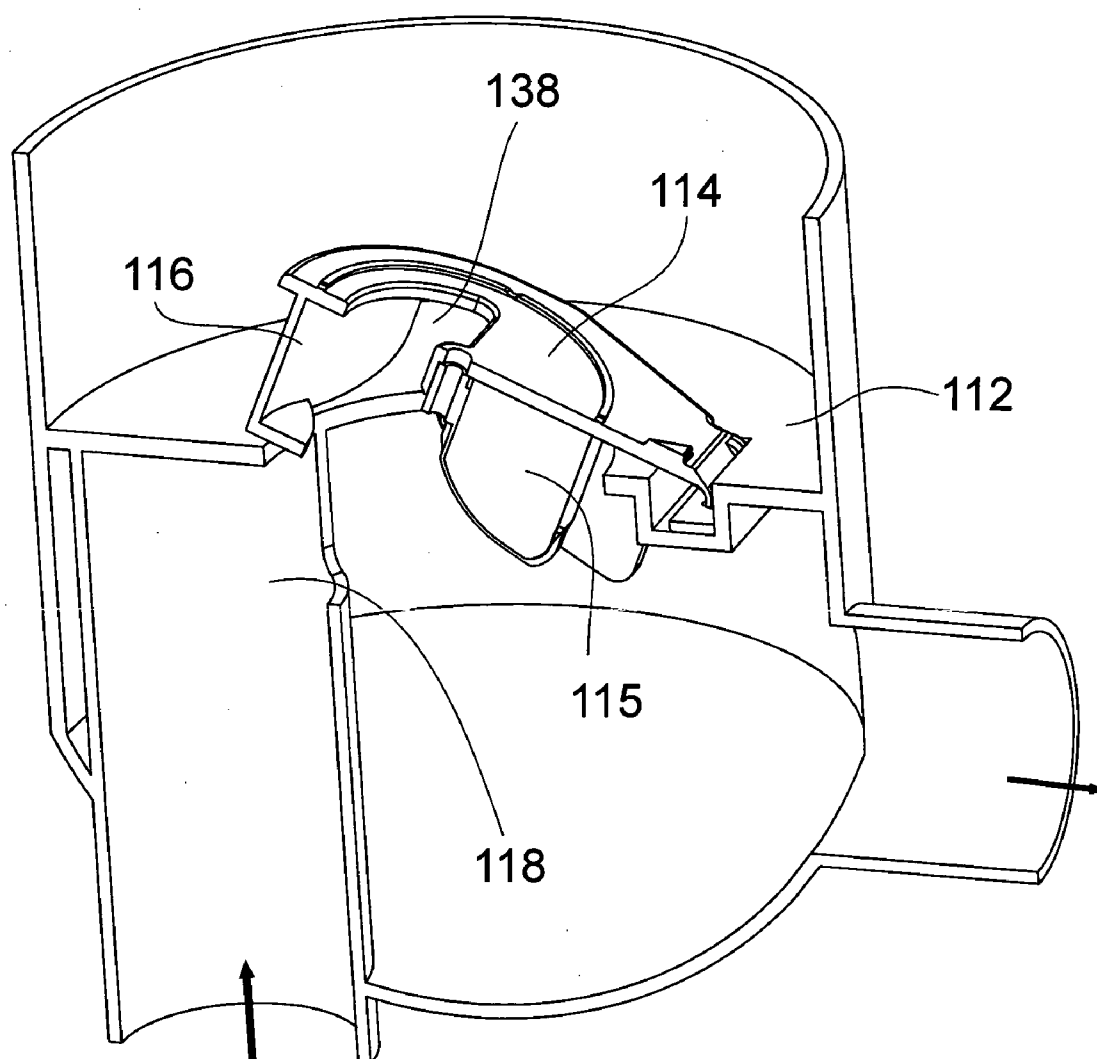


FIG. 13

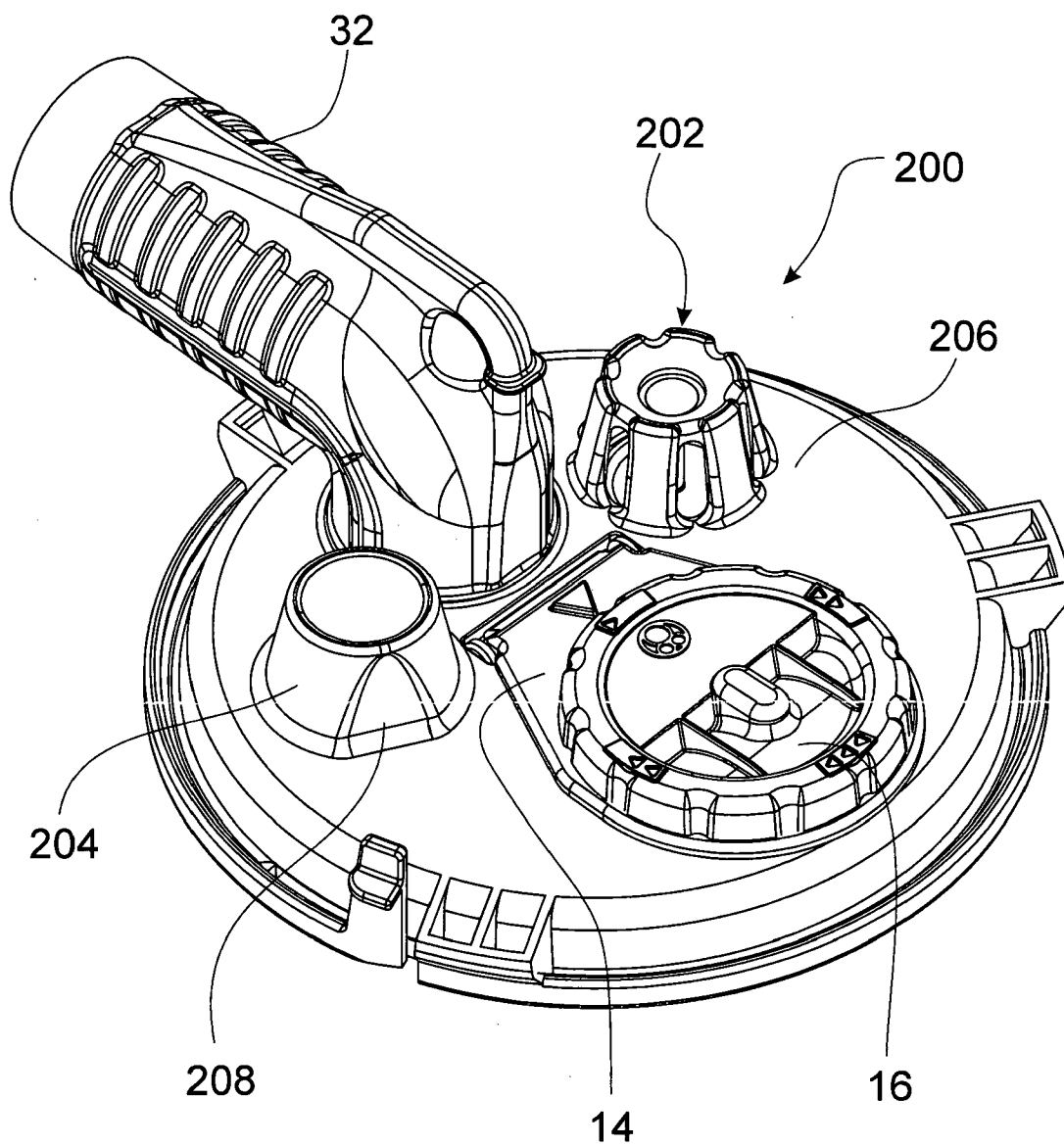


FIG. 14

POOL SKIMMER ASSEMBLY

FIELD OF THE INVENTION

[0001] The invention relates to a swimming pool skimmer assembly, and more specifically, to a pool skimmer assembly which provides for the alternate operation between suction cleaning and skimming. It also relates to a pool weir system for use with the pool skimmer assembly.

BACKGROUND TO THE INVENTION

[0002] Swimming pools are generally equipped with one or more fixed surface skimmers to remove surface debris, such as leaves, dust and the like. Surface skimmers have a skimmer throat opening in a skimmer throat at the pool water level through which the surface debris is drawn into the skimmer. The skimmer is connected to the suction side of a pool pump such that surface water is drawn into the skimmer when the pump is operated. Debris drawn into the skimmer is caught in a collection basket within the skimmer.

[0003] A vertically self-adjusting weir door may be provided in the skimmer throat which adjusts itself upwardly and downwardly in correspondence with variations in the water level of the pool. The principal purpose of the weir door is to provide maximum surface flow velocity of the water into the skimmer body which results in more effective and efficient removal of surface debris.

[0004] Surface skimmers cannot remove debris which has settled to the bottom of the pool. A wide variety of pools skimming assemblies have been provided with a vacuum plate which may be placed over the collection basket within the skimmer. The vacuum plate contains a suction opening to which a suction hose can be attached. Suction driven pool cleaning devices are connected to a free end of the suction hose. The suction driven pool cleaning devices may be configured to vacuuming the floor of the pool to remove submerged debris or may be configured to move about the surface of the pool to skim debris before the debris has a chance to sink to the bottom.

[0005] Because the suction hose is connected directly to the suction opening of the vacuum plate, the skimmer is disabled while the suction cleaning device is in operation. In order for the skimmer to operate, the suction hose must be disconnected from the suction opening. Disconnection of the suction hose requires inconvenient manually opening the lid of the skimmer to connect and disconnect the suction hose to permit alternate operation of the skimmer and the suction driven pool cleaning device. Consequently, most pool owners prefer to leave cleaning devices in the pool all of the time, either with the skimmer weir door jammed open or removed to maintain a better hose connection to the vacuum plate, or with the skimmer lid removed. With the suction hose permanently connected to the vacuum plate, the skimmer is rendered totally ineffective. Foreign bodies that gather on the water surface are therefore not skimmed off and are allowed to become waterlogged, sink to the bottom of the pool and consume excessive amounts of chlorine. Chlorine is consumed via a neutralisation by oxidation process that occurs on the floor of the pool. Permanently attaching a cleaning device to the skimmer is also not the correct configuration for effective function of a swimming pool circulation system. The top 150 mm layer of water is the warmest, where the most microbial activity occurs and where the least free chlorine resides.

Skimming of this top layer is the most effective means of removing microbes and reducing chlorine demand.

[0006] U.S. Pat. No. 4,776,953 (Frentzel) describes a pool skimmer assembly which tries to address the above problems by providing automatic alternate operation of the skimmer and a suction driven pool cleaning device. Frentzel discloses a valve which is movable between two positions, one of which restricts the fluid flow through the valve. When the valve is opened, debris will pass from the surface of the skimmer through the valve and into the collection basket. When the valve is closed, skimming action ceases and the suction driven pool cleaning device cleaner removes debris from the floor of the pool into the collection basket. The valve opens and closes in direct response to the cycling of the pool pump.

[0007] The pool skimmer assembly of Frentzel described above has disadvantages, inconveniences and potential safety risks (especially for children) due to the necessity to remove the skimmer lid to connect a suction cleaner hose. The valve also has many closely-toleranced moving parts, some of which are made of metal and are relatively expensive to manufacture. The valve is complex in operation, including biasing means in the form of a coiled spring and a number of spaced slots in a piston. The piston rotates in operation and this can cause twisting of the spring, preventing further rotational movement of the piston as unwanted torque develops in the piston. If the piston does not rotate sufficiently between pump cycles then the valve is rendered inoperative as the valve will continuously operate in one of its two operating positions. The valve requires a specific pressure differential for effective operation. Further, the round-shaped skimmer opening can create a vortex that can produce a noticeable noise which can be heard from a reasonable distance.

[0008] Frentzel also discloses a height adjustable pipe of the pool skimmer assembly to which the suction hose is connected. The pipe is adjustable so that the suction hose may be wedged against an upper surface of the skimmer throat. This is inconvenient as the hose is lifted out of the water in which it is usually supported. The hose including the weight of the water being pumped in the section of the hose above the water imparts unnecessary large axial forces on the weir door and bending moments on the pipe to which it connects.

OBJECT OF THE INVENTION

[0009] It is an object of the invention to overcome, or at least alleviate, one or more of the above problems and/or provide and/or provide the consumer with a useful or commercial choice of pool skimmer assembly and/or pool weir system.

SUMMARY OF THE INVENTION

[0010] In one form, although it need not be the only or indeed the broadest form, the invention resides in a pool skimmer assembly fluidly connected to a pool pump, the pool skimmer assembly including:

[0011] a first vacuum plate having a skimmer opening therein through which pool water can be sucked from below the first vacuum plate when the pool pump operates in suction;

[0012] a first valve member which is hingedly connected relative to the first vacuum plate, the valve member being hingedly displaceable between a closed position wherein the valve member closes off the skimmer opening in a hose suction mode of the skimmer assembly and an open position

wherein the valve member is spaced from the skimmer opening in a skimmer mode of the skimmer assembly; and

[0013] a cooperating cam and follower, one of the cam or follower forming part of the first vacuum plate and the other forming part of the valve member, the cam configured to alternate the valve member between the closed position and an open position for each cycle the pool pump operates in suction.

[0014] Preferably, the first vacuum plate includes a hose suction opening through which pool water may be sucked when the first valve member is in the closed position. A suction driven pool cleaning device is preferably fluidly connected to the hose suction opening by a hose.

[0015] Preferably, the first valve member is positively buoyant.

[0016] In another form, the invention resides in a pool skimmer assembly fluidly connected to a pool pump, the pool skimmer assembly including:

[0017] a first vacuum plate having a opening therein through which pool water can be sucked from below the first vacuum plate when the pool pump operates in suction;

[0018] a first valve member which is displaceable between a closed position wherein the first valve member closes off the skimmer opening in a hose suction mode of the skimmer assembly and an open position wherein the first valve member is spaced from the opening in a skimmer mode of the skimmer assembly; and

[0019] wherein the first valve member is positively buoyant so that it is urged away from the skimmer opening when there is no suction below the first vacuum plate.

[0020] The first valve member preferably includes a float which makes it positively buoyant.

[0021] Preferably, the skimmer assembly has a cooperating cam and follower, one of the cam or follower forming part of the first vacuum plate and the other forming part of the first valve member, the cam configured to cycle the first valve member between the closed position and open position as the valve is hingedly displaced during successive suction operation of the pool pump.

[0022] Preferably, the follower is resiliently displaceable relative to the cam.

[0023] The pool skimmer assemblies are configured so that suction through the skimmer opening when the pool pump operates in suction urges the first valve member towards the skimmer opening, and the positive buoyancy of the first valve member urges the first valve member away from the skimmer opening when the pool pump does not operate and there is no suction through the skimmer opening.

[0024] The cam is preferably designed so that each time the first valve member is urged towards the skimmer opening, the first valve member is urged alternately to the closed position or open position.

[0025] The pool skimmer assembly may include a vacuum release valve in the first vacuum plate.

[0026] The pool skimmer assembly may include two or more vacuum release valves, wherein the vacuum release valves are adapted to each be triggered at a different suction pressure.

[0027] The first valve member is preferably in the form of a flap.

[0028] In yet another form, the invention resides in a pool weir system having at least two weir members locatable in a skimmer throat, a first weir member having a passage there through for fluidly connecting a suction hose to a pool skim-

mer assembly and the other weir member being pivotal with respect to the first weir member.

[0029] The first weir member may include a cover for closing off the passage when a suction hose is not connected to the passage.

[0030] Preferably, the first weir member is fixed in the centre of the throat.

[0031] Preferably, the pool weir system comprises the first weir member in the centre of the throat and two side weir members in the form of weir doors on either side of the first weir member.

[0032] The pool weir system may include a flexible coupling having a fluid passage connecting the passage in the first weir member with a hose suction opening in the first vacuum plate.

[0033] In still another form, the invention resides in a vacuum plate of a pool skimmer assembly, the vacuum plate having two or more vacuum release valves, wherein the vacuum release valves are adapted to each be triggered at a different suction pressure.

[0034] The invention includes a method of suction pressure control for a pool skimmer assembly, including:

[0035] relieving suction pressure build-up below a suction plate of the pool skimmer assembly at a first suction pressure by way of a first vacuum release valve; and

[0036] relieving suction pressure build-up below the suction plate of the pool skimmer assembly at a second suction pressure which is higher than the first suction pressure by way of a second vacuum release valve. In yet another form, the invention resides in a method of operating a skimmer assembly, the method including the steps of:

[0037] applying suction below a vacuum plate to move a valve member to a closed position to close an opening located within the vacuum plate;

[0038] removing the suction below a vacuum plate to enable the valve member to move to a first float position; and

[0039] applying suction below a vacuum plate to move a valve member to an open position in which the valve member is spaced from the an opening located within the vacuum plate.

[0040] The method may further include the step of removing the suction below a vacuum plate to enable the valve member to move to a second float position.

[0041] The valve member may float to an first float position and/or second float position.

BRIEF DESCRIPTION OF THE DRAWINGS

[0042] To assist in understanding the invention and to enable a person skilled in the art to put the invention into practical effect, preferred embodiments of the invention will be described by way of example only with reference to the accompanying drawings, wherein:

[0043] FIG. 1 shows a diagrammatic sectional view of a swimming pool with a fixed skimmer, a roving skimmer connected to the fixed skimmer, and a pump;

[0044] FIG. 2 shows a diagrammatic sectional view of a swimming pool with a fixed skimmer, an underwater pool cleaner connected to the fixed skimmer, and a pump;

[0045] FIG. 3 shows a diagrammatic exploded view of one embodiment of a pool skimmer assembly in accordance with the invention;

[0046] FIG. 4 shows a part sectional diagrammatic perspective view of the pool skimmer assembly of FIG. 3 installed in a pool skimmer well and throat;

[0047] FIG. 5 shows a part sectional diagrammatic perspective view of the pool skimmer assembly from different angle to FIG. 4;

[0048] FIG. 6 shows a flap of the pool skimmer assembly of FIG. 3 in a closed position in a hose suction mode of the pool skimmer assembly;

[0049] FIG. 7 shows the flap of FIG. 6 in a first float position;

[0050] FIG. 8 shows the flap of FIG. 6 in an open position

[0051] FIG. 9 shows the flap of FIG. 6 in a second float position;

[0052] FIG. 10 shows a cam along a side of the flap of FIG. 6 and the positions a follower follows along the cam as the flap moves between the positions described in FIGS. 6 to 9;

[0053] FIG. 11 shows a perspective view of a pool skimmer assembly according to a further embodiment of the invention;

[0054] FIG. 12 shows a perspective view of a second flap in a closed position according to FIG. 11;

[0055] FIG. 13 shows a perspective view of a second flap in an open position according to FIG. 11; and

[0056] FIG. 14 shows a perspective view of another embodiment of a pool skimmer assembly in accordance with the invention including dual vacuum release valves.

DETAILED DESCRIPTION OF THE INVENTION

[0057] To assist with the understanding of this invention, a number of specific embodiments will be described with particular reference to a fixed skimmer box and attached suction driven cleaning devices as shown in FIG. 1 and FIG. 2.

[0058] FIG. 1 shows a typical swimming pool 1 having a fixed skimmer system. A skimmer 2 is built into the side of the pool 1. A skimmer throat 3 provides a fluid path from the swimming pool to a well 4 of the skimmer 2. Further, FIG. 1 illustrates a mobile suction driven cleaning device 5 connected to a vacuum plate of the skimmer 2 by a suction hose 6. In operation suction is applied to the device 5 through the suction hose 6. Fluid drawn through the device 5 provides the power that enables the device to move about the surface of the pool collecting floating debris. The debris is drawn up through the hose 6 into the skimmer 2.

[0059] FIG. 2 illustrates another mobile suction driven cleaning device 7. In operation suction is applied to the device 7 through the suction hose 6. Fluid drawn through the device 7 provides the power that enables the device to move about the floor and walls of the pool collecting sunken debris. The debris is drawn up through the hose 6 into the skimmer.

[0060] FIG. 3 shows an exploded view of one embodiment of a pool skimmer assembly 10 in accordance with one aspect of the invention. FIG. 3 also shows an exploded view of a one embodiment of a pool weir system 50 in accordance with another aspect of the invention.

[0061] The pool skimmer assembly 10 includes a vacuum plate 12, a first valve member in the form of a first flap 14, a speed control dial 16 rotationally mountable to the first flap 14, a follower 18 having follower pins 20 and resiliently deformable legs 19, a hinge 22 connectable between the vacuum plate 12 and the first flap 14, a suction relief valve formed from a suction relief valve housing 24 and associated washers 26, 28, a coupling connector 30 formed in the vacuum plate 12; and a flexible coupling 32.

[0062] The vacuum plate 12 has a skimmer opening 34 therein through which pool water can be sucked from below

the vacuum plate 12 when a pool pump operates in suction to decrease the water pressure in the well below the vacuum plate 12.

[0063] The first flap 14 is hingedly mounted to the vacuum plate 12 by means of the hinge 22. The first flap 14 has downwardly projecting parallel sidewalls 36. A cam 46 is formed in each of the sidewalls 36 as is more clearly illustrated in FIG. 10. The follower pins 20 are located in abutment with a cam surface of the cam. The follower 18 has resiliently deformable legs 19 which allow the follower pins 20 to follow a path along the cam as the legs 19 resiliently deform. The first flap 14 has a speed control hole 38 therein through which a selected amount of water may be sucked by adjustment of the speed selector dial 16. The first flap 14 includes a float 15 (shown in FIG. 11) for buoyancy. The first flap 14 is positively buoyant such that it is urged to an open position because of its buoyancy when there is no suction below the vacuum plate 12.

[0064] The speed selector dial 16 has inlet slots 40 which are open to one half of the underside of the dial 16. In use, the dial 16 is rotatable so that the slots 40 may come into and out of flow register with the speed control hole 38 of the first flap 14. The more the slots 40 are in flow register with the hole 38 the more water is allowed to flow through the hole 38. The shape of the inlet slots 40 are specific for vortex prevention that causes the water to straighten instead of to rotate as it is sucked through the inlet slots 40.

[0065] The coupling connector 30 is open to a hose suction opening in the vacuum plate 12. The coupling connector is generally cylindrical having an opening at one end about the hose suction opening. Water may freely flow from below the vacuum plate through the hose suction opening.

[0066] The flexible coupling 32 is connected to the coupling connector 30 at another end. An end 42 of the flexible coupling 32 is connectable to part of the pool weir system 50. The flexible coupling 32 is generally L-shaped and has a fluid passage connecting the weir system 50 to the hoses suction opening in the vacuum plate 12 via the coupling connector 30.

[0067] The pool weir system 50 comprises a bracket 52 and weir members in the form of two weir doors 54 and a fixed hose connector part 62.

[0068] The bracket 52 is mountable in a skimmer throat. Each of the weir doors 54 are hingedly mounted to the bracket 52 and the hose connector part 62 is releasably fixed to the bracket 52.

[0069] The hose connector part 62 includes a passage 58 there through. The end 42 of the flexible coupling 32 is connectable to one end 60 of the passage 58. A suction hose is connectable to the other side of the passage 58. A slide cover 62 forms part of the hose connector part 62 and is slidably displaceable to close off the passage 58 if there is no hose connected to the passage 58.

[0070] FIGS. 4 and 5 illustrate the assembled pool skimmer assembly 10 and pool weir system 50. Vacuum plate 12 covers a well 100 of a skimmer to generate suction below the vacuum plate 12 if a pool pump connected to the well 100 operates in suction. The pool skimmer assembly 10 includes a suction relief valve 25 as a safety feature that provides an alternative suction path should there be a blockage. Washers 26 and 28 (shown in FIG. 3) provide mating surfaces to form the suction relief valve 25 with the suction relief valve housing 24.

[0071] Skimmer throat 102 provides a housing in which the pool weir system 50 is installed. The bracket 52 is mounted to a floor of the skimmer throat 102 and the weir doors 54 and

hose connector part 62 are in turn mounted to the bracket 52. The weir doors 54 are mounted to produce a localized shallowing of the water entering the skimmer which increases the in-coming water velocity, thereby drawing more water from further across the surface of the pool. The hose connector part 62 is centrally mounted on skimmer bracket 52 in-between the weir doors 54. The combination of weir doors 54 and hose connector part 62 allows for either skimming or suction cleaning without the need to disassemble or disconnect the suction hose from the hose connector part 62. Slide cover 64 is used to close the inlet of the passage 58 in the hose connector part 62 when the suction hose 6 is not installed.

[0072] The double weir doors 54 act independently and provide redundancy should either be blocked or jammed. The weir doors 54 generate accelerated water flow for enhanced skimming over and above traditional single weir doors; that, in combination with hose connector part 62, allow direct install/remove of a suction hose without disturbing the weir door as is the case with traditional systems.

[0073] Flexible coupling 32 fluidly connects the passage 58 of the hose connector part 62 to the connector 30 of the vacuum plate 12. Water sucked through the hose suction opening in the vacuum plate 12 is thus sucked through a suction hose if connected to the hose connector part 62. The flexible coupling 32 is removable at both its ends. Flexible coupling 32 enables easy removal of vacuum plate 12 without the need to disconnect the hose from the hose connector part 62. The flexible coupling 32 is also a safety device that can be removed to break the suction force caused by a blocked suction hose.

[0074] Referring to FIGS. 6 to 9, different hinged positions of the first flap 14 are shown in different modes of the pool skimmer assembly 10. FIG. 10 shows follower pin 20 position on the cam 46 of the first flap 14 in the different positions of the first flap 14 as per the table below:

FIG	FLAP POSITION	Follower pin position (FIG. 10)	Mode
FIG. 6	Closed	1	Hose suction
FIG. 7	First float	2	
FIG. 8	Open	3	Skimmer
FIG. 9	Second Float	4	

[0075] The pool skimmer assembly 10 operates in one of two distinct modes when a pool pump creates suction below the vacuum plate 12. These modes are the hose suction mode when the first flap 14 is in the closed position (FIG. 6) and the skimmer mode when the flap is in the open position (FIG. 8). In between the modes the first flap 14 floats in either the first float position or the second float position.

[0076] In hose suction mode the first flap 14 fully closes off the skimmer opening 34, thereby generating the suction required at the hose suction opening to operate a suction driven cleaning device. The first flap 14 is moved from the second float position to the closed position of the hose suction mode by suction from below the vacuum plate 12 acting on the first flap 14. The suction is caused by a pool pump operating in suction. The speed selector dial 16 is rotated to allow a selected amount of water to enter through the first flap 14, thereby controlling the suction below the vacuum plate 12 and thus the speed of operation of the suction driven cleaning device.

[0077] When the pool pump is switched off and water flow stops, the positive buoyancy of first flap 14, assisted by the small backflow of water, causes the first flap 14 to float up to the first float position as shown in FIG. 7 (follower pin position 2).

[0078] When the pool pump is turned on again in suction, the first flap 14 moves to open position as shown in FIG. 8 (follower pin position 3) in skimmer mode of the pool skimmer assembly 10. The first flap 14 is moved from the first float position to the open position of the skimmer mode by suction from below the vacuum plate 12 acting on the first flap 14. The suction urges the first flap 14 to open position. In skimmer mode sufficient water flows through the skimmer opening 34 in the vacuum plate 12 to eliminate suction through the hose suction opening to operate the suction driven cleaning device. Water flow through the skimmer opening 34 rather allows effective surface skimming of the pool.

[0079] When the pump is switched off again, suction below the vacuum plate 12 stops and the positive buoyancy of the first flap 14, and a small backwash of water through the skimmer opening 34, causes first flap 14 to set to the second float position as shown in FIG. 9 (follower pin position 4).

[0080] When the pool pump is turned on again in suction, the first flap 14 snaps to the fully closed position of FIG. 6 and the cycle as described above starts anew.

[0081] By the action of the pump switching off and on the pool skimmer assembly 10 automatically alternates between hose suction mode and skimmer mode without the need to remove the suction cleaner as is the case with traditional skimmer systems. A means of cycling the pump may include manual operation, a programmable controller or an electrical timer. Programming times can be adjusted to vary the skim/suction cycle according to the amount of debris in the pool.

[0082] FIG. 10 shows the cam 46 on the first flap 14 and the cam follower pin 20 positions as described for FIGS. 6 to 9. The cam 46 has a cam surface along which the pin 20 rides as it follows a path in sequence. The pin 20 cycles from pin position 1 to 2, to 3, to 4 and then back to 1. The legs 19 of the follower 18 being resiliently deformable allows the pin 20 to be urged along the path described.

[0083] The automatic switching of the pool skimmer assembly 10 between the two modes alternately providing skimming and suction device cleaning is produced by the change in net effect of the opposing forces of: the upward positive buoyancy of the speed control flap; and the downward force caused by water flow.

[0084] The applicant envisages that the pool skimmer assembly 10 may further be used to control suction via one or more swimming pool main drains. Swimming pool main drains are used for the purpose of drawing debris from the floor of the pool in the proximity of the main drain to enhance floor cleaning. In most swimming pool, installations the main drain is connected to well 100 of the skimmer below the vacuum plate 12. The connection of the main drain outlet in well 100 would be such that suction through the main drain is controlled by the alternating modal operation of the pool skimmer assembly 10. Specifically, there will be suction through the main drain when the first flap 14 is fully closed in hose suction mode such that all the suction in the well is directed through the main drain and the suction hose. When the first flap 14 is open in skimmer mode there will still be suction through the main drain, but much less than in suction mode as water is mostly sucked through the open skimmer opening 34. The main drain inlet is usually at the lowest point

in the floor of the pool. In skimmer mode suction of water through the skimmer opening is favoured as there is a considerable head in the main drain to be overcome to suck water from the main drain inlet to the main drain outlet.

[0085] FIG. 11 shows second embodiment of a pool skimmer assembly 10 which includes a second valve member in the form of a second flap 114 that is pivotally mounted at a base of the well 100 by a hinge 22. The base of the well 100 forms a second vacuum plate 112. It should be appreciated that the second flap 114 may be mounted to a second vacuum plate 112 which is retro-fitted to adjacent the base of the well 100.

[0086] The second flap 114 is substantially similar to first flap 14. That is the second flap 114 has downwardly projecting parallel sidewalls 36 with a cam 46 formed in each of the sidewalls 36. Follower pins 20 again abut the cam 46. The follower 18 has resiliently deformable legs 19 which allow the follower pins 20 to follow a path along the cam as the legs 19 resiliently deform as described above. The second flap 114 has an open hole 138 through which passes water. The second flap 114 includes a float 115 for buoyancy. The second flap 114 is positively buoyant such that it is urged to an open position because of its buoyancy when there is no suction below the base of the well 12. A wall 116 of the second flap 114 is shaped so that it is able to cover a main drain opening 118.

[0087] In use, the second flap 114 is able to cycle through four positions as described in FIGS. 6 to 9. In a closed position, as shown in FIG. 12, the main drain opening 118 is blocked by the wall 116 of the flap 114 so that water sucked by the pump will flow solely through the open hole 138. When the pump ceases operation the float located within the second flap 114, causes the second flap 114 to rise to a first float position. When operation of the pump recommences, the second flap 114 moves to an open position which allows water to pass through main drain opening 118 as well as through the vacuum plate 12 as shown in FIG. 13. When the pump ceases operation the float 115 located within the second flap 114, causes the second flap 114 to rise to a second float position. When the pump recommences operation, the second flap 114 moves back to a closed position.

[0088] It should be appreciated that when the first flap 14 is in a closed position, the second flap 114 could be either in an closed position or a open position. Similarly, when the first flap 14 is in an open position, the second flap 114 could be either in a closed position or a open position. It is also envisaged that the cam may be changed so that the open and closed positions of the first flap 14 and the second flap 114 may be varied. For example, the cam of the second flap may have six positions namely a first open position, a first float position, a second open position, a second float position, a third float position and a closed position. This will enable the first flaps 14 and second flap 114 to be out of sequence with each other.

[0089] Referring to FIG. 14, another embodiment of a pool skimmer assembly 200 is shown. The pool skimmer assembly 200 is similar to the pool skimmer assembly 10, with the only difference being dual vacuum release valves 202, 204 in a vacuum plate 206 of the pool skimmer assembly 200. The same reference numerals are used in FIG. 14 to refer to the features which are the same as the features referred to in FIGS. 1 to 10. Vacuum release valve 202 is referred to as the first vacuum release valve and the vacuum release valve 204 is referred to as the second vacuum release valve. The vacuum release valves 202, 204 are adapted so that the first

vacuum release valve 202 is triggered at a suction pressure below the second vacuum release valve 204. If there is clogging in the vacuum hose for example, there will be suction pressure build-up below the vacuum plate 206 in the hose suction mode of the pool skimmer assembly 200. If the suction pressure builds up past a predetermined threshold, the first vacuum valve 202 will be triggered so that water may flow through the first vacuum valve 202 from below the vacuum plate 206, thereby relieving the pressure build-up. Should the first vacuum release valve 202 not allow adequate flow of water, the suction pressure build-up will increase up to a second predetermined threshold where the second vacuum release valve 204 is triggered so that even more water is allowed to flow through the vacuum plate 206 from below the vacuum plate 206. The applicant envisages that the pool skimmer assembly 200 may include even more vacuum release valves which are adapted to be triggered at staggered suction pressure intervals. The vacuum pressure release valves 202, 204 are similar to the vacuum pressure release valve 25 of the pool skimmer assembly 10 in that they each comprise a housing 208 and washers (not shown).

[0090] The combination of the pool skimmer assembly 10 and the pool weir system 50 allows the pool owner the convenience of leaving a suction driven cleaning device permanently installed in the skimmer without affecting the skimming process and alternately providing suction to operate the suction driven cleaning device. This has direct benefits on pool circulation and sanitation. The weir system 50 obviates the need to have the suction hose located over the weir door. The dual vacuum release valves 202, 204 are a safety feature to protect the components of the pool skimmer assembly 10 and all suction devices attached thereto. It also prevents children from unnecessarily inspecting the skimmer by lifting the skimmer lid to investigate a blockage or clogging. Dangerous animals such as snakes may sometimes seek refuge in the skimmer and this may be dangerous to children inspecting the skimmer.

[0091] The invention incorporates the ability to install either a surface suction cleaning device (for enhanced mobile surface skimming) or a floor suction cleaning device (for mobile cleaning of the pool floor). The invention also provides enhanced safety, as the suction hose can be removed/installed without the need to remove the skimmer lid.

[0092] Throughout the specification the aim has been to describe the invention without limiting the invention to any one embodiment or specific collection of features. Persons skilled in the relevant art may realize variations from the specific embodiments that will nonetheless fall within the scope of the invention. For example, the mobile suction cleaning device may be either a surface or floor cleaning device.

[0093] It will be appreciated that various other changes and modifications may be made to the embodiment described without departing from the spirit and scope of the invention.

1. A pool skimmer assembly able to be fluidly connected to a pool pump, the pool skimmer assembly including:

- a first vacuum plate having a first opening through which pool water is able to be sucked from below the vacuum plate when the pool pump operates in suction; and
- a first valve member which is connected relative to the vacuum plate, the valve member being displaceable between a closed position in which the valve member closes off the first opening and an open position in which the valve member is spaced from the first opening.

2. The pool skimmer assembly of claim 1 wherein the valve member is pivotally connected to the vacuum plate.

3. The pool skimmer assembly of claim 1 or claim 2 including a cooperating cam and follower, one of the cam or follower forming part of the vacuum plate and the other forming part of the valve member, the cam configured to alternate the valve member between the closed position and the open position.

4. The pool skimmer assembly of claim 3 wherein the follower is resiliently displaceable relative to the cam.

5. The pool skimmer assembly of any one of the preceding claims wherein the vacuum plate includes a hose suction opening through which pool water may be sucked when the valve member is in the closed position.

6. The pool skimmer assembly of any one of the preceding claims wherein the valve member is positively buoyant.

7. The pool skimmer assembly of any one of the preceding claims wherein the valve member preferably includes a float.

8. The pool skimmer assembly of any one of the preceding claims wherein the pool skimmer assembly includes a vacuum release valve in the vacuum plate.

9. The pool skimmer assembly of any one of the preceding claims wherein the pool skimmer assembly includes two or more vacuum release valves, wherein the vacuum release valves are adapted to each be triggered at a different suction pressure.

10. The pool skimmer assembly of any one of the preceding claims wherein the valve member is preferably in the form of a first flap.

11. The pool skimmer assembly of any one of the preceding claims including a second vacuum plate having a second opening through which pool water is able to be sucked and a second valve member which is connected relative to the sec-

ond vacuum plate, the second valve member being displaceable between a closed position in which the valve member closes off the second opening and an open position in which the valve member is spaced from the second opening, wherein the second vacuum plate and second valve member are located below the first vacuum plate and first valve member.

12. A pool weir system having at least two weir members locatable in a skimmer throat, a first weir member having a passage there through for fluidly connecting a suction hose to a pool skimmer assembly and the other weir member being pivotal with respect to the first weir member.

13. The pool weir system of claim 12 wherein the first weir member includes a cover for closing off the passage when a suction hose is not connected to the passage.

14. The pool weir system of claim 12 or 13 wherein the first weir member is fixed in the centre of the throat.

15. The pool weir system of claim of any one of claims 12 to 14 wherein the pool weir system comprises the first weir member in the centre of the throat and two side weir members in the form of weir doors on either side of the first weir member.

16. A method of operating a skimmer assembly, the method including the steps of:

applying suction below a vacuum plate to move a valve member to a closed position to close an opening located within the vacuum plate;

removing the suction below a vacuum plate to enable the valve member to move to a first float position; and

applying suction below a vacuum plate to move a valve member to an open position in which the valve member is spaced from the an opening located within the vacuum plate.

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