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CLEANING SYSTEM FOR A WATER POOL

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ABSTRACT

A cleaning system for a swimming pool having a base and peripheral circular wall defining a main pool volume, the cleaning system comprising: a main suction outlet centrally disposed in the base; a safety suction outlet disposed in the peripheral wall; a suction line connected to both the main suction outlet and safety suction outlet and terminating at an input of a water circulation and filtration system, the water circulation and filtration system employing a suction pump and filtration device; a return line connected at one end to an output of the water circulation and filtration system and at another end to one or more return jets disposed in or located on the peripheral cylindrical wall, and wherein an outlet of each jet is generally tangentially oriented with respect to the circular wall; and wherein, in use, actuation of the water circulation and filtration system causes water in the main pool volume to be sucked through the main suction before being pushed through the jet outlets thereby creating a vortex that operates to gather debris in the swimming pool for subsequent collection in the filtration device of the water circulation system.

(Fig. 1)

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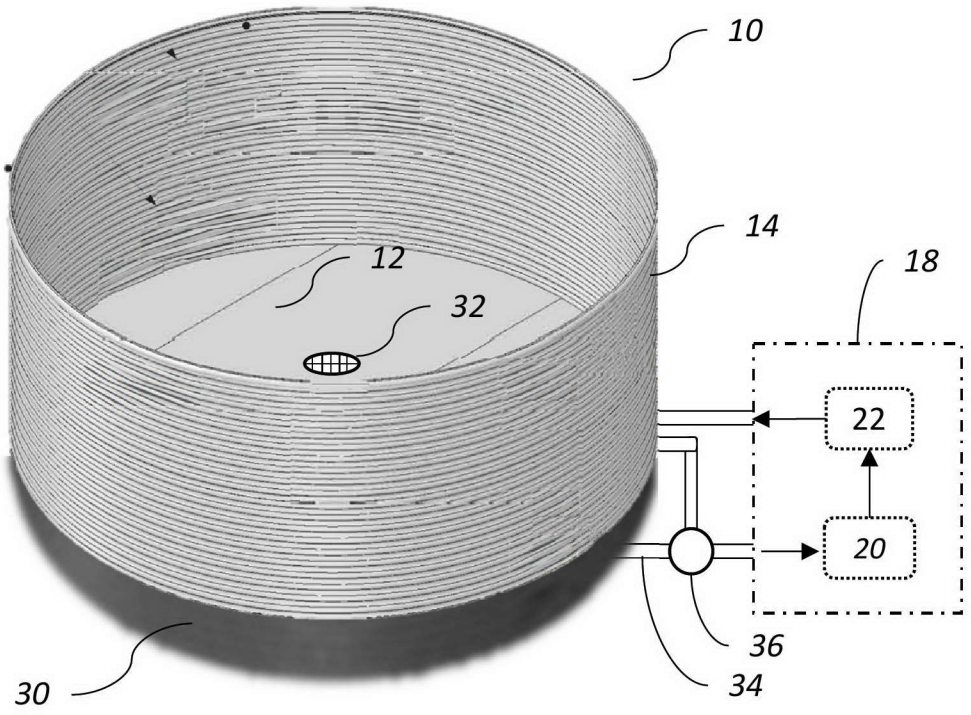

Figure 1

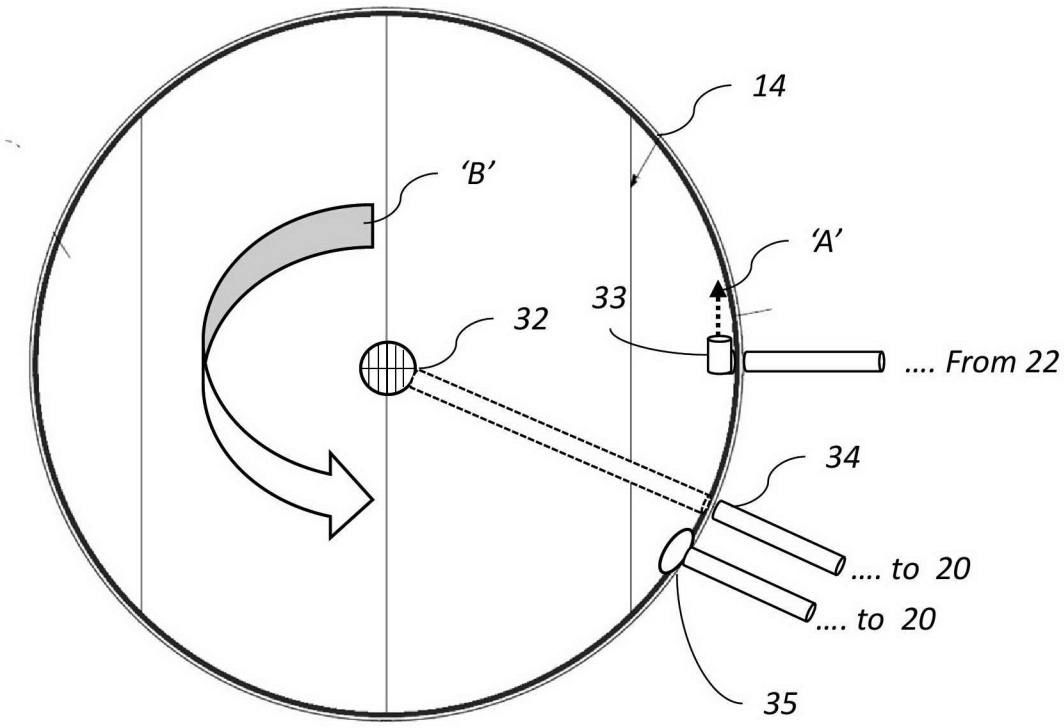

Figure 2

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CLEANING SYSTEM FOR A WATER POOL

Technical Field

This disclosure relates to a cleaning system for a water pool and particularly, but not exclusively, to cleaning systems for use with cylindrical “tank style” plunge pools.

Background

The cost of installing an inground pool is becoming increasingly prohibitive. As such, there is a trend to install smaller above ground pools which are substantially less expensive to make and install.

Above ground pools can take on many shapes and sizes. However, due to their compact shape and relatively low cost, cylindrical plunge pools are seen as desirable. Cylindrical plunge pools may be constructed of high-grade corrugated 316 stainless steel, thereby obviating the need for a liner and ensuring longevity. There is also a trend to re-purpose stock tanks for use as plunge pools.

Cylindrical plunge pools can be readily fitted with a standard water circulation system, typically consisting of a circulation pump and filter (and additionally chlorinator if a salt water pool is desired). Often, plunge pools will be delivered “self-plumbed”, having all the necessary outlets and returns installed on the pool for ready connection to the water circulation system. This typically includes one or more suction outlets located in the peripheral wall of the pool close to the base and one or more conventional pool jets usually located three quarters the way up the peripheral wall (and below the standard water line).

Like their inground counterparts, plunge pools are prone to getting dirty from organic debris and algae build-up. While conventional pool cleaners, such as suction and robot vacuums, can be used to clean a plunge pool they are an added expense and often struggle to successfully travel up and clean the 90-degree side walls (which then require separate manual cleaning).

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Summary

In a first aspect, embodiments are disclosed of a cleaning system for a swimming pool having a base and peripheral cylindrical wall defining a main pool volume, the cleaning system comprising: a main suction outlet centrally disposed in the base; a safety suction outlet disposed in the peripheral wall; a suction line connected to both the main suction outlet and safety suction outlet and terminating at an input of a water circulation and filtration system, the water circulation and filtration system employing a suction pump and filtration device; a return line connected at one end to an output of the water circulation and filtration system and at another end to one or more return jets disposed in the peripheral circular wall, and wherein an outlet of each jet is generally tangentially oriented with respect to the cylindrical wall; and wherein, in use, actuation of the water circulation and filtration system causes water in the main pool volume to be sucked through the main suction before being pushed through the jet outlet(s) thereby creating a vortex that operates to gather debris in the swimming pool for subsequent collection in the filtration device of the water circulation system.

In another aspect there is provided a cleaning system for a water pool having a base and peripheral cylindrical wall defining a main pool volume, the cleaning installation comprising: a main suction outlet centrally disposed in the base and sitting generally flush with an upper surface thereof; a suction line connected to the main suction outlet and terminating at an input of a water circulation and filtration system, the water circulation and filtration system employing a suction pump and filtration device; a return line connected at one end to an output of the water circulation and filtration system and at another end to one or more return jets disposed in the peripheral wall, and wherein an outlet of each jet is generally tangentially oriented with respect to the cylindrical wall; and wherein, in use, actuation of the water circulation and filtration system causes water from the water pool to be pushed through the jet outlets before being sucked through the main suction outlet thereby creating a vortex in the water pool that operates to gather debris in the water pool for subsequent collection in the filtration device of the water circulation and filtration system.

In an embodiment the outlets are placed at any height below a surface of the main pool volume.

In an embodiment the main suction outlet and safety suction outlet connect to the suction line at a 3-way gate valve disposed upstream of the water circulation system.

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In an embodiment the peripheral cylindrical wall is formed of stainless steel.

In an embodiment the diameter of the peripheral circular wall is greater than 1.5m and wherein the suction pump is at least .5HP.

The water pool may, for example, be a water tank.

In an embodiment the system further comprises a support structure on which the pool sits and wherein the suction line extends through the support structure for connection to the water circulation and filtration system.

In another aspect there is provided a cleaning system for a water pool having a base and peripheral wall defining a main pool volume, the cleaning installation comprising: a main suction outlet centrally disposed in the base and sitting generally flush with an upper surface thereof; a suction line connected to the main suction outlet and terminating at an input of a water circulation and filtration system, the water circulation and filtration system employing a suction pump and filtration device; a return line connected at one end to an output of the water circulation and filtration system and at another end to one or more return jets disposed in the peripheral circular wall, and wherein an outlet of each jet is generally tangentially oriented with respect to the adjacent portion of peripheral wall; and wherein, in use, actuation of the water circulation and filtration system causes water from the water pool to be pushed through the jet outlets before being sucked through the main suction outlet thereby creating a vortex in the water pool that operates to gather debris in the water pool for subsequent collection in the filtration device of the water circulation and filtration system.

In yet another aspect there is provided a cleaning system for a water pool having a base and peripheral cylindrical wall defining a main pool volume, the cleaning installation comprising: a main suction outlet centrally located with respect to the base; a suction line passing connected to the main suction outlet and extending through the cylindrical wall before terminating at an input of a water circulation and filtration system, the water circulation and filtration system employing a suction pump and filtration device; a return line connected at one end to an output of the water circulation and filtration system and at another end to one or more return jets located on the peripheral circular wall, and wherein an outlet of each jet is tangentially oriented with respect to the cylindrical wall; and wherein, in use, actuation of the water circulation and filtration

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system causes water from the water pool to be pushed through the jet outlets before being sucked through the main suction outlet thereby creating a vortex in the water pool that operates to gather debris in the water pool for subsequent collection in the filtration device of the water circulation and filtration system.

Other aspects, features, and advantages will become apparent from the following detailed description when taken in conjunction with the accompanying drawings, which are a part of this disclosure and which illustrate, by way of example, principles of the inventions disclosed.

Description of the Figures

The accompanying drawings facilitate an understanding of the various embodiments:

Figure 1 is a schematic of a convention cylindrical plunge pool implementing a cleaning system according to an embodiment of the invention;

Figure 2 is a top view of the pool shown in Figure 1; and

Figure 3 is a schematic showing a partial section of a tank incorporating a cleaning system according to an embodiment of the invention.

Detailed Description

Embodiments are hereafter described in the context of a cleaning system for a cylindrical swimming pool. However, it will be understood that embodiments may be suitable for use with any generally cylindrical water pool or tank (e.g., containing wastewater, potable water or any other water), including kidney shaped tanks/pools, where it is desirable to keep the internal surfaces, and particularly the base, clean of debris, calcium deposits and/or other sludge. It will also be understood that the cleaning system as described herein can work with above ground, in-ground or partially in-ground pool/tank installations.

With reference to Figures 1 and 2, there is shown a cylindrical plunge pool 10 incorporating a cleaning system in accordance with an embodiment of the invention. The pool 10 comprises a base 12 sealably joined to a cylindrical peripheral wall 14. According to the illustrated embodiment, the peripheral wall 14 is formed of high-grade

corrugated 316 stainless steel. The base is made of flat 316 stainless steel sheets that are welded together (by folding them onto each other). The periphery of the base 12 is then joined to the wall by folding the bottom edge of the wall onto the outer edge of the base 12. Typically, the plunge pool 10 will have a diameter ranging between 1.8m to 3.5m and height of between .8m to 1.6m, depending on the desired application.

Also shown in Figure 1 is a conventional water circulation and filtering system 18, comprising a pool pump 20 and filtration device 22. For the range of pool dimensions discussed above, a .5HP or greater pool pump is desirable for creating the necessary cleaning vortex, as will be described in subsequent paragraphs. The pump 20 may incorporate a lint pop basket or the like for filtering course debris prior to entering the pump's impellor. Downstream of the pump 20 is the filtration device 22 which may comprise a cartridge filter, sand filter or the like. Depending on the pool, the water circulation system may additionally comprise a chlorinator. The chlorinator will typically be located downstream of the filtration device 22.

A cleaning system for the pool of Figure 1 comprises a pool support structure 30 that operates to elevate the pool 10 off the ground for accommodating suction pipework of the cleaning system. According to the example support structure shown in Figure 1, the structure 30 comprises a framework having an outer diameter as wide as the pool 10 and a height of 120mm which is sufficient to accommodate suction pipework of the cleaning system (in this case 40mm). It will be understood that these dimensions may vary depending on the desired implementation and suction pipework sizing. The structure 30 may be formed from plastic pallets which are sturdy enough to support a 3.5m pool filled with water. In an alternative embodiment, the pool support structure 30 may be integrally formed with the pool 10. In yet another alternative embodiment, the pool support structure may take the form of a permanent base, with the suction pipework fixed therein. For example, the support structure 30 may be formed of poured concrete which encases the pipework. In yet another alternative embodiment, the support structure 30 may take the form of crushed granite which again encases the pipework. Such variations are within the purview of the skilled addressee.

The cleaning system further comprises a main drain suction outlet 32 centrally located in the pool base 12. The main suction outlet 32 depicted in the figures is circular in shape, having a diameter of 100mm. A lattice which covers the outlet acts as a course debris filter. The main suction outlet 30 may be formed of any suitable material, though the depicted outlet is made from UV stabilised chemical resistant materials to protect

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from chemicals and ensure longevity. An upper surface of the main suction outlet 30 may sit generally flush with an upper surface of the base 12.

The main suction outlet 32 is connected to a suction pipe 34 located within the support structure 30 and which extends through a side wall thereof for connecting to an inlet of the water circulation and filtration system (in this case an inlet of the pool pump 20). For safety reasons, the cleaning system additionally comprises a safety suction outlet 35 located in the peripheral wall 14 of the pool 10 adjacent the base 12 and which connects with the suction pipe 34 via a 3-way gate valve 36. The safety suction outlet 35 may be generally flush with an inner surface of the peripheral wall and is preferably located with 2 feet of the base. The safety suction outlet 35 depicted in the figures has a 40mm outer diameter. Again, the specific location and diameter of the safety suction outlet 35 may vary depending on the desired implementation.

The cleaning system further comprises return pipework connected at one end to an output of the water circulation and filtering system 18 and at another to one or more return jets 33 disposed in/on the peripheral wall 14 of the pool 10. An outlet of each jet 33 is generally tangentially oriented with respect to the wall 14 (as indicated by arrow 'A') for pushing circulating water along the wall 14 before being sucked through the main suction outlet 32, thereby creating a vortex (as indicated by vortex arrow 'B') in the water pool. According to the illustrated example, the jet comprises a 90-degree polypipe elbow that connects to an above ground wall fitting (including the necessary gaskets) secured to the peripheral wall using conventional techniques. The elbow may, for example, threadingly connect to the wall fitting. The outlet of the jet 33 may be pointed horizontally to the left for use in forming a clockwise vortex that may help to work with the Coriolis force. The greater the number of jets 33, the greater the ability to "push" debris off the pool bottom and toward the main suction outlet 32. The vortex advantageously acts to concentrate particulate matter within the water pool to the centre of the vortex whereafter it is drawn through the main suction outlet 32 for filtration by the water circulation and filtering system 18.

In an alternative embodiment to that described above, the cleaning system may be fitted to a water tank 10', such as depicted in the example of Figure 3. In this instance, the suction pipe 34' may extend inwardly into the main tank body through a sidewall 14' and terminate in a main suction outlet 32' centrally located within the tank 10'. In a preferred embodiment, the pipe 34' and outlet 32' are raised off the tank base so as not to impede movement of debris off the base during the cleaning cycle. A 90-degree

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elbow may be used to horizontally orient the main suction outlet 32'. In yet another alternative embodiment, the suction pipe 34' may terminate simply with a mesh cover, gridded cap or the like, for filtering course debris. Since the same regulatory safety requirements do not apply to water tanks, the cleaning system need not employ a safety suction outlet. Also, as shown in Figure 3, a 3-way automatic gate valve 43 may be positioned in-line between the pump 20' (in this case a pressure actuated pump) and filtration device 22', which additionally connects to a house supply line 45. In this manner, when the automatic gate valve 43 closes off the house line, the pressure acuate pump will start the cleaning cycle.

In an alternative embodiment, the pool or tank 10 10' may have a peripheral wall of sufficient thickness to incorporate the tangential jet 33 therein (thus allowing the jet opening to sit flush with the inner surface). For example, the wall may be formed of concrete, with the jet integrally formed therein.

It will be understood that on/off valves, such as gate valves may be fitted to the suction and return lines (i.e., between the pool wall connection and water circulation and filtration system) as required for any of the embodiments.

Various advantages arise through at least one embodiment described, including substantially reduced manual labour required for pool cleaning due to the ability to clean the entire water column (including the surface of the pool). Further, the cleaning system obviates the need to buy expensive pool cleaning vacuums. Since the cleaning system works concurrently with the pool circulation and filtration system, it may also dramatically reduce energy consumption and chemical costs. Embodiments may also advantageously be used to keep agricultural stock tanks clean and purify and clean potable water tanks (such as for domestic use).

In the foregoing description of certain embodiments, specific terminology has been resorted to for the sake of clarity. However, the disclosure is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes other technical equivalents which operate in a similar manner to accomplish a similar technical purpose. Terms such as "upper" and "lower", "above" and "below" and the like are used as words of convenience to provide reference points and are not to be construed as limiting terms.

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In this specification, the word “comprising” is to be understood in its “open” sense, that is, in the sense of “including”, and thus not limited to its “closed” sense, that is the sense of “consisting only of”. A corresponding meaning is to be attributed to the corresponding words “comprise", "comprised" and "comprises" where they appear.

The preceding description is provided in relation to several embodiments which may share common characteristics and features. It is to be understood that one or more features of any one embodiment may be combinable with one or more features of the other embodiments. In addition, any single feature or combination of features in any of the embodiments may constitute additional embodiments.

In addition, the foregoing describes only some embodiments of the inventions, and alterations, modifications, additions and/or changes can be made thereto without departing from the scope and spirit of the disclosed embodiments, the embodiments being illustrative and not restrictive.

Furthermore, the inventions have described in connection with what are presently considered to be the most practical and preferred embodiments, it is to be understood that the invention is not to be limited to the disclosed embodiments, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope of the inventions. Also, the various embodiments described above may be implemented in conjunction with other embodiments, e.g., aspects of one embodiment may be combined with aspects of another embodiment to realize yet other embodiments. Further, each independent feature or component of any given assembly may constitute an additional embodiment.

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CLAIMS

1. A cleaning system for a swimming pool having a base and peripheral cylindrical wall defining a main pool volume, the cleaning system comprising:

a main suction outlet centrally disposed in the base;

a safety suction outlet disposed in the peripheral wall;

a suction line connected to both the main suction outlet and safety suction outlet and terminating at an input of a water circulation and filtration system, the water circulation and filtration system employing a suction pump and filtration device;

a return line connected at one end to an output of the water circulation and filtration system and at another end to one or more return jets located on the peripheral circular wall, and wherein an outlet of each jet is generally tangentially oriented with respect to the cylindrical wall;

and wherein, in use, actuation of the water circulation and filtration system causes water in the main pool volume to be sucked through the main suction before being pushed through the jet outlet(s) thereby creating a vortex that operates to gather debris in the swimming pool for subsequent collection in the filtration device of the water circulation system.

2. A cleaning system for a water pool having a base and peripheral cylindrical wall defining a main pool volume, the cleaning installation comprising:

a main suction outlet centrally disposed in the base;

a suction line connected to the main suction outlet and terminating at an input of a water circulation and filtration system, the water circulation and filtration system employing a suction pump and filtration device;

a return line connected at one end to an output of the water circulation and filtration system and at another end to one or more return jets located on the peripheral circular wall, and wherein an outlet of each jet is tangentially oriented with respect to the cylindrical wall; and wherein, in use, actuation of the water circulation and filtration system causes water from the water pool to be pushed through the jet outlets before being sucked through the main suction outlet thereby creating a vortex in the water pool that operates to gather debris in the water pool for subsequent collection in the filtration device of the water circulation and filtration system.

3. A cleaning system in accordance with claim 1 or claim 2, wherein the outlets are placed at any height below a surface of the main pool volume.

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4. A cleaning system in accordance with claim 1, wherein the main suction outlet and safety suction outlet connect to the suction line at a 3-way gate valve disposed upstream of the water circulation system.

5. A cleaning system in accordance with any one of the preceding claims, wherein the peripheral cylindrical wall is formed of stainless steel.

6. A cleaning system in accordance with any one of the preceding claims, wherein the diameter of the peripheral circular wall is greater than 1.5m and wherein the suction pump is at least .5HP.

7. A cleaning system in accordance with claim 2, wherein the water pool is a water tank.

8. A cleaning system in accordance with any one of the preceding claims, further comprises a support structure on which the pool sits and wherein the suction line extends through the support structure for connection to the water circulation and filtration system.

9. A cleaning system for a water pool having a base and peripheral wall defining a main pool volume, the cleaning installation comprising:

a main suction outlet centrally disposed in the base and sitting generally flush with an upper surface thereof;

a suction line connected to the main suction outlet and terminating at an input of a water circulation and filtration system, the water circulation and filtration system employing a suction pump and filtration device;

a return line connected at one end to an output of the water circulation and filtration system and at another end to one or more return jets disposed in or located on the peripheral cylindrical wall, and wherein an outlet of each jet is tangentially oriented with respect to the adjacent portion of peripheral wall; and wherein, in use, actuation of the water circulation and filtration system causes water from the water pool to be pushed through the jet outlets before being sucked through the main suction outlet thereby creating a vortex in the water pool that operates to gather debris in the water pool for subsequent collection in the filtration device of the water circulation and filtration system.

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10. A cleaning system for a water pool having a base and peripheral cylindrical wall defining a main pool volume, the cleaning installation comprising:

a main suction outlet centrally located with respect to the base;

a suction line passing connected to the main suction outlet and extending through the cylindrical wall before terminating at an input of a water circulation and filtration system, the water circulation and filtration system employing a suction pump and filtration device;

a return line connected at one end to an output of the water circulation and filtration system and at another end to one or more return jets located on the peripheral circular wall, and wherein an outlet of each jet is tangentially oriented with respect to the cylindrical wall; and wherein, in use, actuation of the water circulation and filtration system causes water from the water pool to be pushed through the jet outlets before being sucked through the main suction outlet thereby creating a vortex in the water pool that operates to gather debris in the water pool for subsequent collection in the filtration device of the water circulation and filtration system.

11. A cleaning system in accordance with claim 10, wherein at least one of the main suction outlet and suction line are raised off the base.

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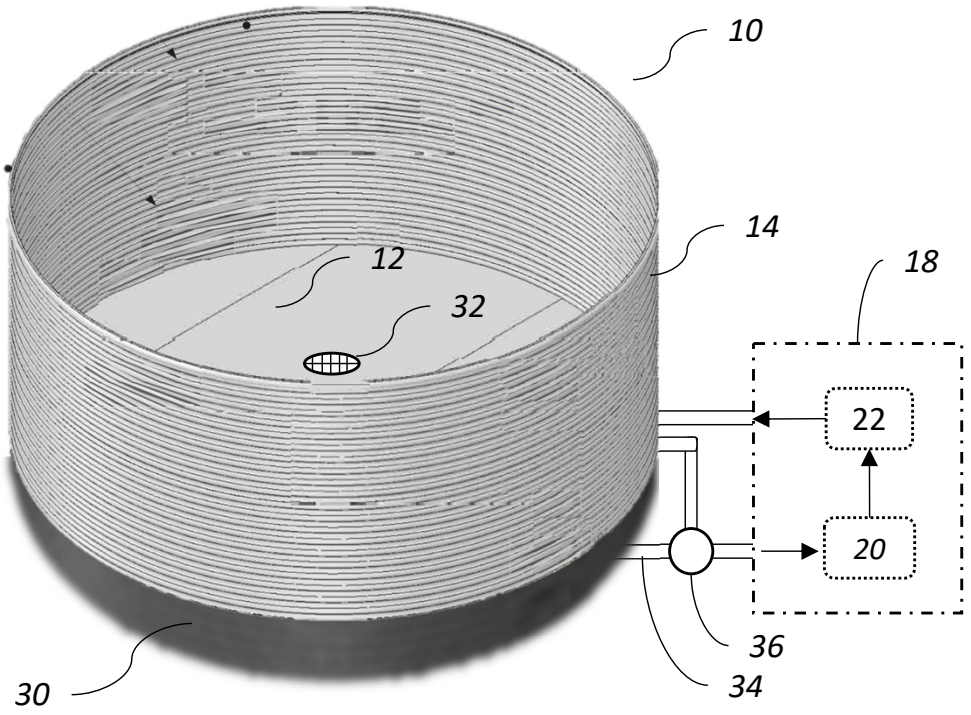

Figure 1

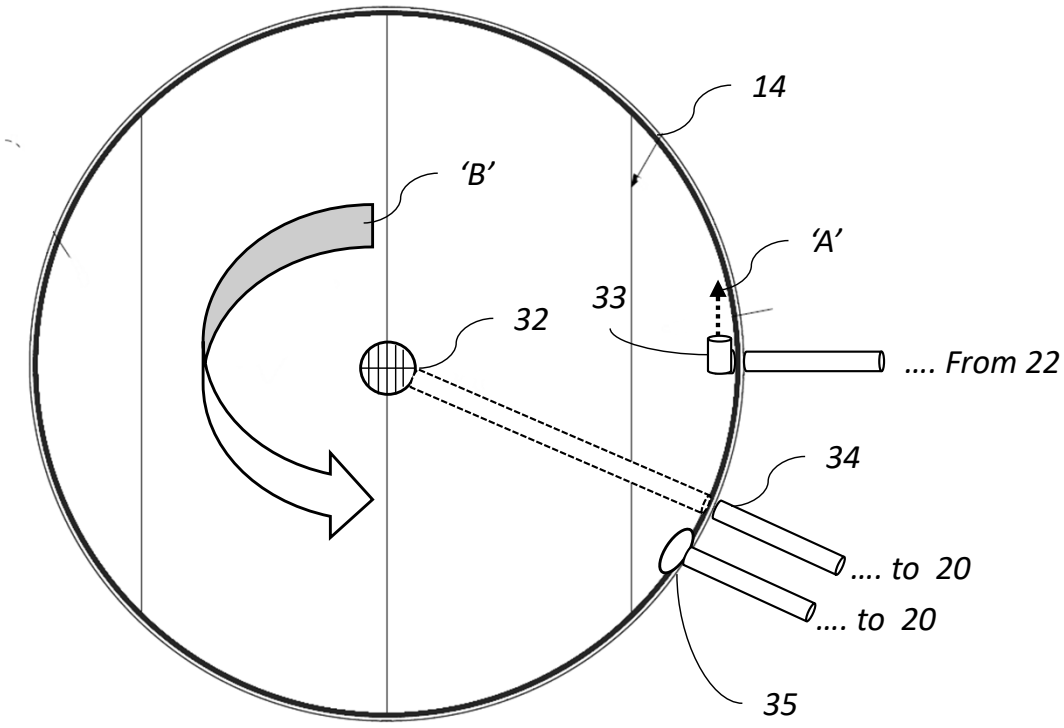

Figure 2

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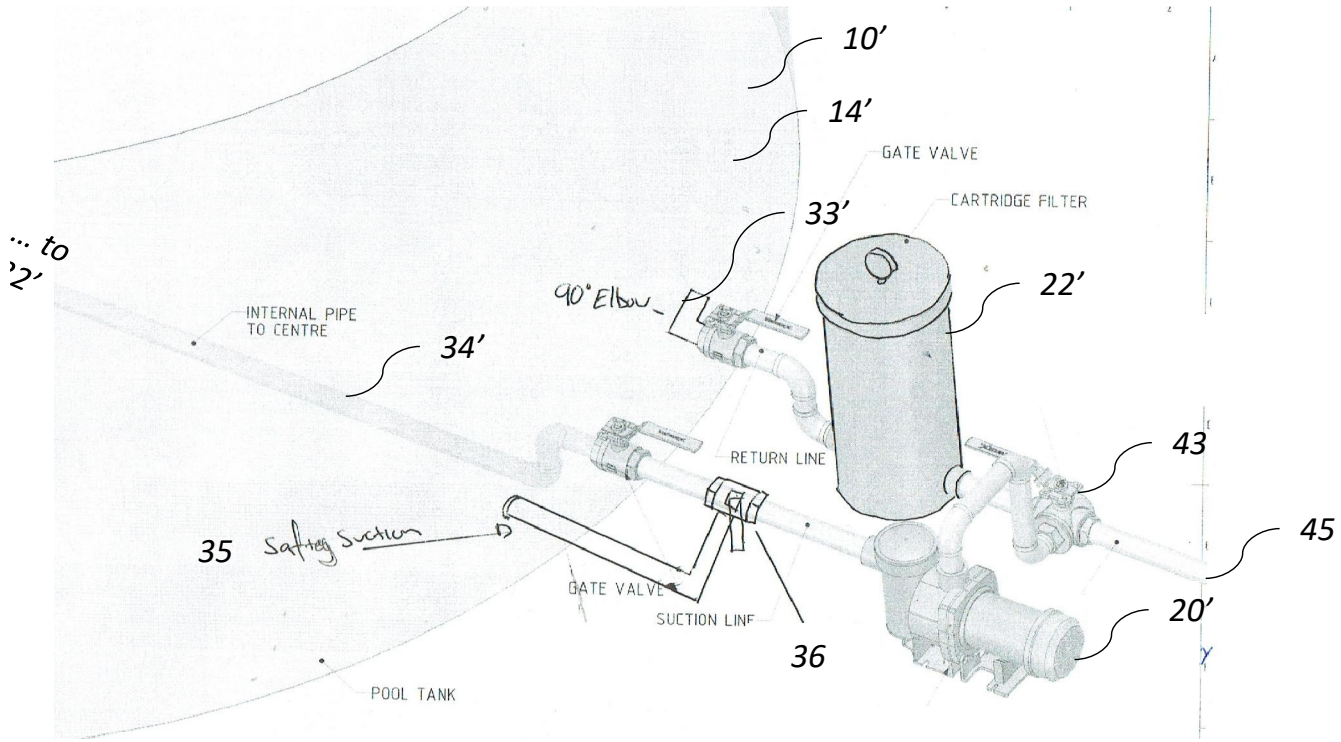

Figure 3