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(54) **SYSTEM FOR FILTERING WATER FROM SWIMMING POOLS**

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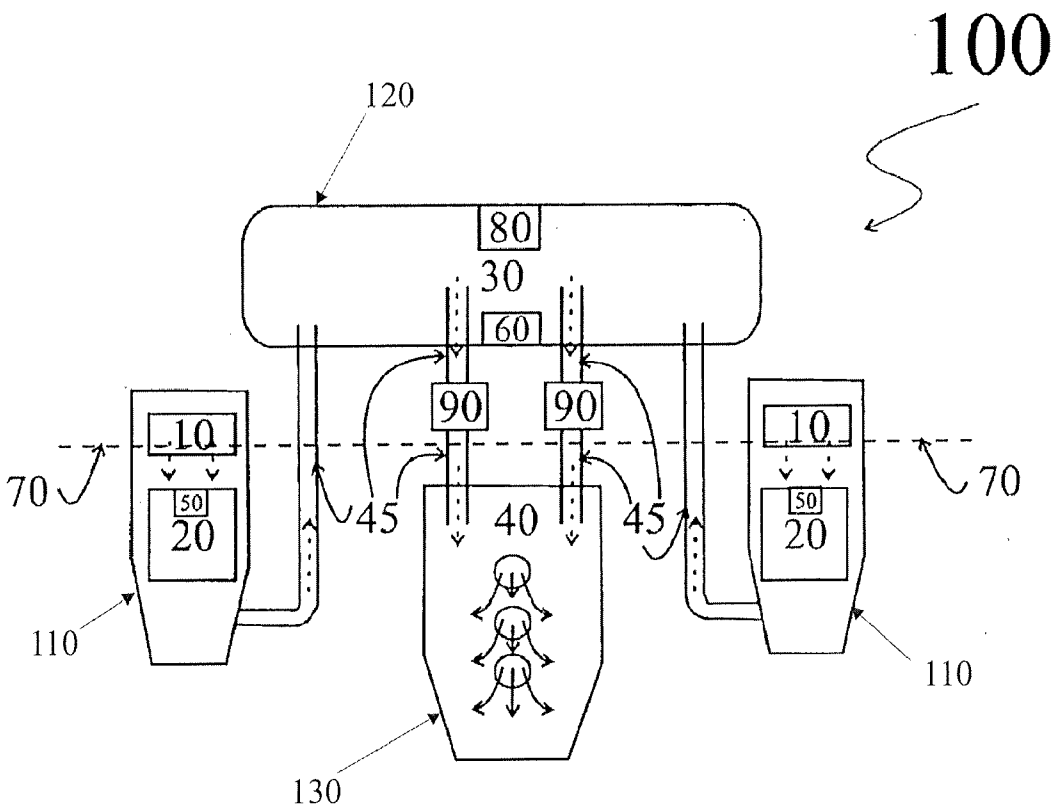
(57) **ABSTRACT**

A system for cleaning water of a swimming pool is disclosed. The system includes at least one first housing, at least one second housing, at least one third housing and pipes. The first housing includes at least one skimmer element and a corresponding filtration element. The skimmer element receives water. The corresponding filtration element filters water drawn via the skimmer element. The second housing includes a pump element spaced apart from the first housing and draws water from the swimming pool and pump water into the first housing through the skimmer element and the filtration element, for filtering and purification purposes and finally ejecting filtered water. The third housing is spaced apart from the first and second housing and includes an output element to receive and eject filtered water. The system of the present disclosure is non invasive in nature and provides flexibility of installation.



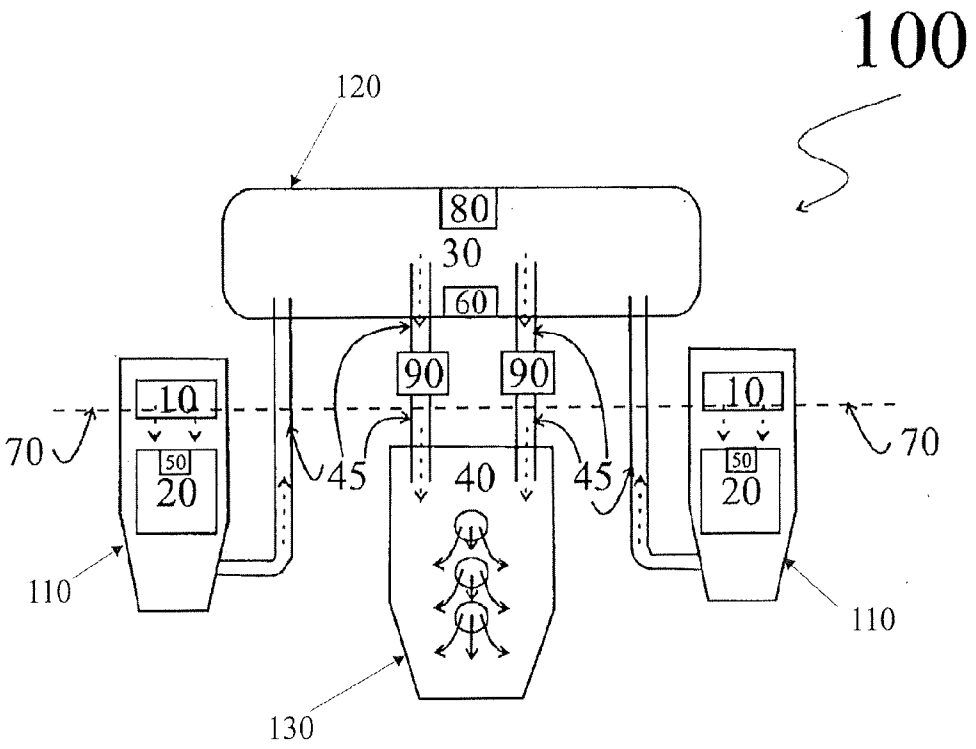


FIGURE 1

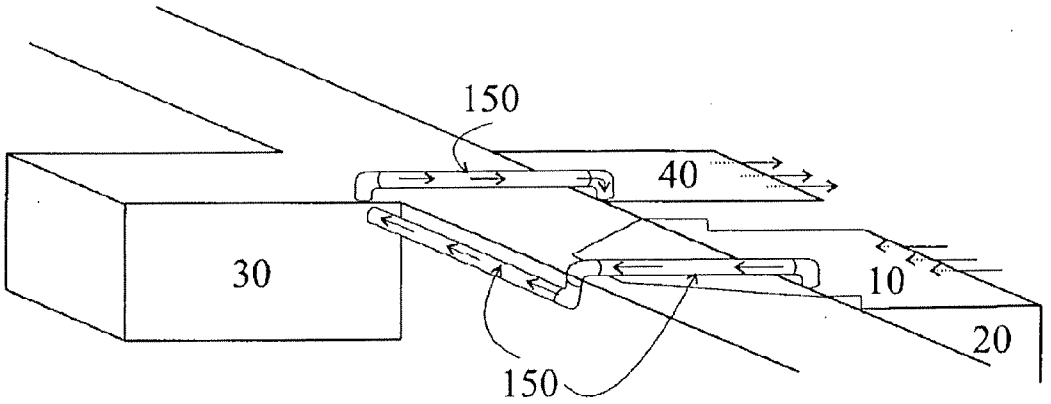


FIGURE 2

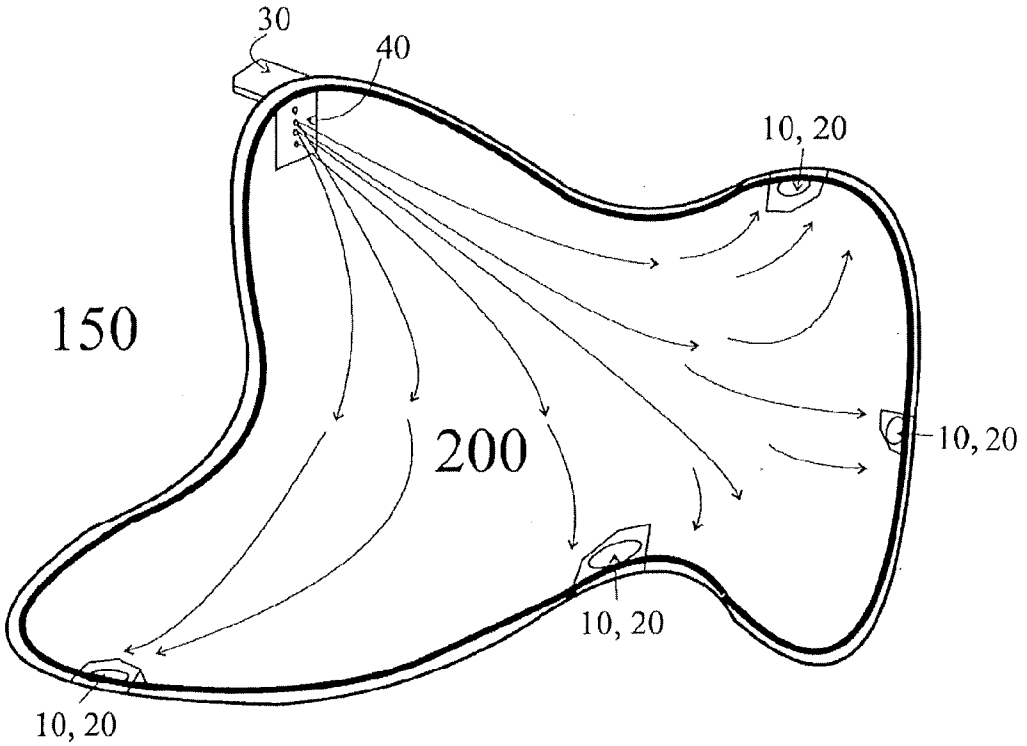


FIGURE 3

SYSTEM FOR FILTERING WATER FROM SWIMMING POOLS

FIELD OF THE DISCLOSURE

[0001] The present disclosure relates to the field of filtration systems.

[0002] In particular, this disclosure relates to a system for filtering water from swimming pools.

BACKGROUND

[0003] A body of water held within a defined space, for swimming purposes or for water-based activities, is the use and function of a swimming pool. Swimming pools mainly serve as centers for recreation and exercise. These may be located at homes for private use, or at clubs for public use.

[0004] Swimming pools may be both outdoor, open to sky, as well as be confined within closed spaces. In the open scenario, the water, especially, its surface level is susceptible to impurities. To maintain hygiene purposes suitable for human use, to maintain clarity levels, to impede the growth of micro flora and considering the volume of water, and the nature or impurities it is being exposed to, it is necessary that the pool be continuously filtered.

[0005] Conventional filtration pumps use skimmers to draw out water, and relay this drawn water to an externally located filtration plant, which usually consists of a sand based filter, where filtration takes place, before water is sent back into the pool. This arrangement is a highly power consuming mechanism, mainly because of the power needed to channel the flow of water from the pool to the filtration house, through the sand, and back again.

[0006] Set up costs of the filtration plant is huge, because of the plumbing required, and the need for a separate space renders this conventional filtration plant troublesome in many ways. Conventional filtration systems usually have concealed piping throughout the pool to facilitate proper circulation. This concealed piping is usually done by puncturing the structure of the pool. The concealed piping is used either for input of water, or output, or both. The said piping also carries the water between the pool and filtration unit. A leakage or fault in the concealed piping usually leads to major work in, and around, the pool.

[0007] Current developments in smaller units include a compact device which houses the pump which is externally located and the filter and output device which is located in the water of the swimming pool. One housing houses the pump, which is externally located, while the other housing houses a skimmer, a filter and the output device, which is located within the water of the swimming pool. These units may be compact, but have a limited input range and throughput capability.

[0008] There is a need for a swimming pool filtration system with a greater and flexible input flow range and a larger throughput capacity, a free flowing filtering medium and a relatively non-invasive installation. This is essential to facilitate proper, and faster, circulation of water in swimming pools without having to make large scale changes in the structure or internal liner of the swimming pool.

PRIOR ART

[0009] GB 1343894 discloses a swimming pool filter.

[0010] US2005092668 discloses a COMPACT FILTERING UNIT FOR A SWIMMING POOL BASIN. It discloses a filter which has a skimmer element along the pool wall, and a pump placed outside the pool. However, it specifically relates to a compact filtering unit. A single pump, in this case, does not service many separate skimmer elements.

[0011] US2007163933 discloses a SWIMMING POOL SKIMMER PUMP ASSEMBLY. This document is directed towards a skimmer element not being driven by a pump.

[0012] U.S. Pat. No. 4,781,827 discloses a PORTABLE SWIMMING POOL SKIMMER. The system discloses a portable skimmer element with its inventive concept directed towards its portability.

[0013] There is no filtration unit or apparatus or system which discloses an efficient or modular way to service any shape, specifically a free-form swimming pools.

[0014] There is no disclosure in relation to increase of coverage area for swimming pools filtration in an effective, economical and non-invasive method.

OBJECTS

[0015] Some of the objects of the system of the present disclosure, which at least one embodiment herein satisfies, are as follows:

[0016] It is an object of the system of the present disclosure to ameliorate one or more problems of the prior art or to at least provide a useful alternative.

[0017] Another object of the present disclosure is to clean water from a swimming pool

[0018] Yet another object of the system of the present disclosure is to provide an efficient filtration system which minimizes the loss of power and pressure associated with conventional filtration systems.

[0019] One more object of the system of the present disclosure is to have a continuously working system for cleaning water from a swimming pool.

[0020] Still another object of the system of the present disclosure is to have a flexible filtration system that can incorporate multiple water collection points by means of self contained water collection and filtration devices that can be placed within the body of the swimming pool to facilitate an efficient water circulation system with minimum intrusion to the structure of the swimming pool.

[0021] Still another object of the system of the present disclosure is to eliminate the ground preparation process which is generally required for other conventional filtration units.

[0022] Still another object of the system of the present disclosure is to provide an easy filtration replacement option for old/defunct filtration systems.

[0023] Still another object of the system of the present disclosure is to ensure a proper water circulation system for liner pools without making punctures in the liners for filtration elements.

[0024] Still another object of the system of the present disclosure is to eliminate the leakages that arise when liners are cut for openings like skimmers, input/output jets or sockets or for lights.

[0025] Still another object of the system of the present disclosure is to increase throughput flow rate and minimize the time taken for filtration of swimming pools.

[0026] These and other objects of the present disclosure are dealt with to a large extent by the descriptive matter and the

accompanying drawing(s) in which exemplary embodiments of the disclosure are illustrated.

SUMMARY

[0027] In accordance with one aspect of the present disclosure, a system for cleaning water of a swimming pool is disclosed. The system includes at least one first housing, at least one second housing, at least one third housing and pipes. The at least one first housing includes at least one skimmer element and a corresponding filtration element. The at least one skimmer element is adapted to receive water. The corresponding filtration element is adapted to filter water drawn via the skimmer element. The at least a second housing includes a pump element. The pump element is spaced apart from the first housing and adapted to draw water from the swimming pool and pump water into the first housing through the skimmer element and the filtration element, for filtering and purification purposes and finally ejecting filtered water. The filtration element is inline between the skimmer element and the pump element. The at least one third housing is spaced apart from the first and second housing. The at least one third housing includes an output element adapted to receive and eject filtered water. The pipes are non-invasive with respect to the main structure and inner wall of the swimming pool, the pipes are adapted to communicably couple the first housing, the second housing and the third housing. Each of the housings and pipes are placed in a spaced apart manner to contour the shape of the swimming pool, and the housings are adapted to be fixed only on the top ledge or outside of the swimming pool, thereby not damaging the inner walls of the swimming pool.

[0028] Typically, the pipes are placed along the outer surface of the pool, below removable gratings that run along the outer surface decking of the pool.

[0029] In one embodiment, the filtration element includes a reusable or disposable filtration media.

[0030] In another embodiment, the filtration element includes a free flowing filtering media that reduces pressure loss during the filtration process.

[0031] Further, the first housing, the second housing, and the third housing may include clamping mechanisms adapted to clamp the housings to the wall or edge of the swimming pool.

[0032] In one embodiment, the pumps include dual motor driving devices to increase or decrease throughput flow.

[0033] Typically, the pipes define airtight and watertight passageways for the flow of water.

[0034] Further, the system may include a disinfecting element adapted for treating water through the filter element with a disinfectant before its release into the swimming pool via the output element.

[0035] Furthermore, the system may include a flow rate control mechanism adapted for controlling the rate of flow of water into and out of the system based on pre-defined parameters.

[0036] In one embodiment, the system includes an electronic remote control management system for monitoring the health of, and for controlling the working of, the system.

[0037] The system may include sensors deployed at each element of the housing to sense individual health of each element in each of the housing.

[0038] Moreover, the sensors may be adapted to sense the flow rate of water in the pipes.

[0039] Typically, the system includes computation means adapted to compute differential flow-rate between various points in the pipes to determine chokes/blocks in the pipes.

[0040] Also, the system may include a heating unit adapted to heat the water before it is ejected from the output element.

[0041] The output element may include a plurality of jet elements in close proximity to increase the flow of water in a particular prescribed area to provide a wave like motion in the swimming pool.

[0042] Typically, the system includes sensors to sense water level and further includes a water level switch that can start or stop the pump(s) according to sensed height of the water, based on predefined conditions.

[0043] In one embodiment, the system includes sensors to sense water level and further includes water draining mechanism to drain out water from the swimming pool, based on pre-defined conditions.

[0044] In another embodiment, the system includes an additional filtering medium connected to the output element.

[0045] In yet another embodiment, the system includes light units placed at first housing and/or third housing for lighting the pool.

[0046] In another aspect of the present disclosure, a swimming pool is disclosed having a system, as disclosed hereinabove, for cleaning water thereof.

BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

[0047] The disclosure will now be explained in relation to the non-limiting accompanying drawings, in which:

[0048] FIG. **1** illustrates a schematic representation of the system for filtering swimming pools;

[0049] FIG. **2** illustrates a schematic representation of the piping between a skimmer element, an outlet element, and a pump element; and

[0050] FIG. **3** illustrates a schematic representation of a free-form swimming pool lined with the filtering system.

DETAILED DESCRIPTION

[0051] The present disclosure will now be described with reference to the accompanying drawings which do not limit the scope and ambit of the disclosure. The description provided is purely by way of example and illustration.

[0052] The embodiments herein and the various features and advantageous details thereof are explained with reference to the non-limiting embodiments in the following description. Descriptions of well-known components and processing techniques are omitted so as to not unnecessarily obscure the embodiments herein. The examples used herein are intended merely to facilitate an understanding of ways in which the embodiments herein may be practiced and to further enable those of skill in the art to practice the embodiments herein. Accordingly, the examples should not be construed as limiting the scope of the embodiments herein.

[0053] The description hereinafter, of the specific embodiments will so fully reveal the general nature of the embodiments herein that others can, by applying current knowledge, readily modify and/or adapt for various applications such specific embodiments without departing from the generic concept, and, therefore, such adaptations and modifications should and are intended to be comprehended within the meaning and range of equivalents of the disclosed embodiments. It is to be understood that the phraseology or termi-

nology employed herein is for the purpose of description and not of limitation. Therefore, while the embodiments herein have been described in terms of preferred embodiments, those skilled in the art will recognize that the embodiments herein can be practiced with modification within the spirit and scope of the embodiments as described herein.

[0054] According to this disclosure, there is provided a system (**100**) for cleaning water from a swimming pool.

[0055] FIG. **1** illustrates a schematic representation of the system (**100**) of this disclosure.

[0056] In accordance with an embodiment, there is provided a system (**100**) with multiple housings and elements for the filtration of water from a swimming pool.

[0057] The elements include input (skimmer) elements, output elements, filtration elements, pump elements in combinations and placed in housings.

[0058] In an embodiment, the multiple housings and elements may be assembled close to each other.

[0059] In accordance with another embodiment, there is provided a first element (**10**) which is a skimmer element (**10**) for receiving water from the swimming pool. The first element (**10**) serves as an inlet means for the filtration system (**100**). Many such skimmer elements may be used at multiple locations.

[0060] In accordance with yet another embodiment, there is provided a second element (**20**), the second element being a filtration element (**20**), and adapted to filter water drawn into the housing via the skimmer elements (**10**). The filtration element (**20**) includes a filtration media. The filtration media may be a disposable or reusable filtration media.

[0061] The filtration element (**20**) and the skimmer element (**10**) may be disposed in one sub-housing i.e. in a first housing (**110**). In one embodiment, the first housing (**110**) houses a skimmer element only. Alternatively, in another embodiment, the first housing (**110**) houses a filtration element only. This sub-housing can be strategically placed in different areas of the pool to ensure that the water enters the filtration elements in any desired area. The reference numeral (**70**) illustrates the water level in the swimming pool. The design of this sub-housing is such that they can be appended or attached to the said swimming pool ledge or other supporting device without any major changes to the structure or internal surface of the said swimming pool. This filtration sub-housing can also be placed side by side if required.

[0062] In accordance with still another embodiment of this disclosure, there is provided a third element (**30**), said third element being pumps (**30**), adapted to draw in water from the swimming pool and pump water into the first housing (**110**) through the skimmer element (**10**) and the filtration element (**20**), for filtering and purification purposes and finally ejecting filtered water out of a third housing (**130**). The pumps element (**30**) may be spaced apart from the skimmer element (**10**) and the filtration element (**20**). The pump element (**30**) will be in communication with the skimmer element (**10**) by means of pipes. In one embodiment, the pipes are adapted to be placed along the contour of the swimming pool. The pumps, are typically centrifugal pumps, to receive water, and for ejecting water there through.

[0063] A second housing **120** includes the third element **30**.

[0064] By having dual motor driving devices, throughput flow rate will be increased and the time taken for filtration of swimming pools will be consequently minimized. This dual motor system can also reduce filtration running time and save power when the pumps are running on power generation (gensets) systems that have a prescribed minimum power generation capacity without provision of reducing power generation as per power utilization requirement.

[0065] The filtration element (**20**) is inline between the skimmer element (**10**) and the pump element (**30**).

[0066] In accordance with an additional embodiment of this disclosure, there is provided an airtight and watertight passageway (**45**) for the flow of water. This passageway provides for communication between the skimmer element (**10**), the pump (**30**) and the output (**40**).

[0067] In accordance with yet an additional embodiment of this disclosure, there may be provided a disinfecting element (**50**) adapted for treating the water through the filter element (**20**) with a disinfectant before release into the swimming pool via the output element (**40**).

[0068] In accordance with still an additional embodiment of this disclosure, there is provided a flow rate control mechanism (**60**) adapted for controlling the rate of flow of water into and out of the system (**100**). Depending upon need, visual impurity, this could be turned up or down.

[0069] In accordance with yet an additional embodiment of this disclosure, there is provided a fourth element (**40**) which is an output element (**40**) adapted to receive and eject filtered water. The fourth element is provided inside the third housing (**130**).

[0070] In accordance with still an additional embodiment of this disclosure, there is provided a clamping mechanism adapted to clamp the housings of the system (**100**) on to the wall of the swimming pool. The first housing (**110**) can be attached to the wall of the pool by brackets.

[0071] In accordance with another additional embodiment of this disclosure, there is provided an electronic remote control management system (**80**) for monitoring the health of and for controlling the working of the system (**100**). Typically, sensors may be deployed at each element of the housing. These sensors may monitor individual health of each element. Further, the sensors may monitor the flow rate of the passageways. By computing difference in flow rates between sensors, chokes/blocks in the passageways may be determined.

[0072] In accordance with another additional embodiment of this disclosure, there is provided a heating unit (**90**) adapted to heat the water before it is ejected from the output element (**40**).

[0073] In accordance with yet another additional embodiment of this disclosure, the output element (**40**) includes a plurality of jet elements to increase the flow of water in a particular prescribed area. This concentrated flow of water gives a wave like flow and force. The strong current makes it possible for a swimmer to swim against the wave of the current, thereby remaining stationery due to the flow of the current, within a relatively constricted area.

[0074] In accordance with yet another embodiment of this disclosure, there is provided a water level switch that can start or stop the pump according to the height of the water. This device will essentially start the pump when the water level reaches a particular determined height in the swimming pool, as sensed by sensors placed in the pool, thereby activating an automatic water draining mechanism to drain out excess rain water.

[0075] In accordance with still another embodiment of this disclosure, there is provided a mechanism of connecting the external pipes in a detachable mechanism. Since the entire system is appended to the walls in a semi-permanent manner,

it is possible to remove the submerged or entire filtration system without any major change to the internal or external structure of the swimming pool. This feature is useful during winterization of pools to avoid pipes from freezing etc.

[0076] FIG. **2** illustrates a schematic of the piping (**150**) between the skimmer element (**10**), the outlet element (**40**), and the pump element (**30**). The arrows in the piping refer to the flow of water from the pool, through skimmer elements, to the pump element and to the outlet elements.

[0077] In the conventional filtration system, leakages arise when liners are cut for openings like skimmers, input/output jets or sockets or for lights. There is a chance of undue water pressure on one of these cuttings that may lead to leakages in the liner due to stress. The presence of skimmer elements and other outlets/inlets distributed around the pool can restrict the movement of the liner and result in undue pressure on certain areas of the pool which usually result in opening of punctures. This disclosure eliminates the requirement of punctures, yet maintains the flexibility of multiple skimmer elements to extend the life of the liners in swimming pools.

[0078] Further, these cuts or punctures, of the prior art, make it difficult to remove and re-fix a liner for alterations, repair or renovation. It is difficult to match all the punctures during refitting a liner, thus rendering the liner useless. This disclosure eliminates the requirement for puncturing the liner and gives the luxury to remove and refit the liner if and when required.

[0079] FIG. **3** illustrates a schematic of a free-form swimming pool (**200**) lined with the filtering system, depicting the circulation of water.

[0080] In accordance with another additional embodiment of this disclosure, there is provided an additional filtering medium connected to the output jet of the third housing **130**. This medium can serve as an additional filtration backup without reducing the water flow levels feeding into the pumps.

[0081] In accordance with yet another additional embodiment of this disclosure, different filtration mediums with varying micron levels of filtration can be placed in the filtration collection device to get the desired level of filtration. It is easy to alter and adjust the level of filtration required to clean the water. This micron level can be adjusted according to the quality of water and required flow rate of the water for the pumps.

[0082] In accordance with still another additional embodiment of this disclosure, there is a possibility of improving the aesthetic looks of the system by altering the shape and size of pipes and units that are part of the system. By deploying flat pipes/connectors in areas where the water travels through the system it is possible to make the system look sleeker and more non-obstructive. The skimmer elements and output elements can also be made sleeker looking by altering the size and shape of the filtering elements and output elements.

[0083] In accordance with yet an additional embodiment of this disclosure, additional skimmer elements (**10**) along with filtration elements (**20**) may be deployed in line along the walls of the swimming pool, and be adapted to be in communication with said output element (**30**) by means of pipes, laid along the outer wall.

[0084] In accordance with still an additional embodiment of this disclosure, there are provided light units placed at the first housing (**110**) and/or the third housing (**130**) for lighting the pool.

[0085] The advantage of the current swimming pool filtration system lies in its constructional embodiment that a plurality of skimmer elements, with filter elements, may be deployed around the pool, thereby covering any area or shape of a pool. These skimmer elements are typically fixed to the outer wall of the pool. They are in communication with a separately located pump element, which is placed out of the pool. The filtered water is ejected into the pool through a separate output element. These output elements may also be dispersed throughout the pool, thereby adequately covering any size or shape of the pool. Its modularity allows it to place multiple skimmers and multiple output elements in communication with at least a single pump in any size or shape of the pool.

[0086] Due to the relatively non invasive installation process of this disclosure, skimmer elements can now be easily placed in the same area as existing old skimmers and, by merely running a pipe along the decking to the pump and output elements, the pool can have a new filtration system without touching the old existing system. By placing the new skimmer elements over, or beside, the old existing skimmers, the pool can have an efficient and effective circulation system on the same circulating pattern as the original filtration system without major structural changes in the swimming pool.

[0087] Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

[0088] The use of the expression "at least" or "at least one" suggests the use of one or more elements or ingredients or quantities, as the use may be in the embodiment to achieve one or more of the desired objects or results.

[0089] Any discussion of documents, acts, materials, devices, articles or the like that has been included in this specification is solely for the purpose of providing a context for the disclosure. It is not to be taken as an admission that any or all of these matters form part of the prior art base or were common general knowledge in the field relevant to the disclosure as it existed anywhere before the priority date of this application.

[0090] The numerical values mentioned for the various physical parameters, dimensions or quantities are only approximations and it is envisaged that the values higher/lower than the numerical values assigned to the parameters, dimensions or quantities fall within the scope of the disclosure, unless there is a statement in the specification specific to the contrary.

1. A system for cleaning water of a swimming pool, said system comprising:

at least one first housing comprising:

at least one skimmer element adapted to receive water;

a corresponding filtration element adapted to filter water drawn via said skimmer element;

at least a second housing comprising:

a pump element spaced apart from said first housing and adapted to draw water from said swimming pool and pump water into said first housing through said skimmer element and said filtration element, for filtering and purification purposes and finally ejecting filtered water;

wherein said filtration element is inline between said skimmer element and said pump element;

at least a third housing spaced apart from said first and second housing comprising:

an output element adapted to receive and eject filtered water; and

pipes, non-invasive with respect to the main structure and inner wall of the swimming pool, said pipes adapted to communicably couple said first housing, said second housing and said third housing;

wherein, each of said housings and pipes are placed in a spaced apart manner to contour the shape of the swimming pool, and said housings are adapted to be fixed only on the top ledge or outside of said swimming pool, thereby not damaging the inner walls of said swimming pool.

2. A system as claimed in claim **1**, wherein said pipes are placed along the outer surface of the pool, below removable gratings that run along the outer surface decking of the pool.

3. A system as claimed in claim **1**, wherein said filtration element includes a reusable or disposable filtration media.

4. A system as claimed in claim **1**, wherein said filtration element comprises a free flowing filtering media that reduces pressure loss during the filtration process.

5. A system as claimed in claim **1**, wherein said first housing, said second housing, and said third housing include clamping mechanisms adapted to clamp said housings to said wall or edge of said swimming pool.

6. A system as claimed in claim **1**, wherein said pumps include dual motor driving devices to increase or decrease throughput flow.

7. A system as claimed in claim **1**, wherein said pipes define airtight and watertight passageways for the flow of water.

8. A system as claimed in claim **1**, wherein said system includes a disinfecting element adapted for treating water through the filter element with a disinfectant before its release into said swimming pool via said output element.

9. A system as claimed in claim **1**, wherein said system includes a flow rate control mechanism adapted for controlling the rate of flow of water into and out of said system based on pre-defined parameters.

10. A system as claimed in claim **1**, wherein said system includes an electronic remote control management system for monitoring the health of, and for controlling the working of, the system.

11. A system as claimed in claim **1**, wherein said system includes sensors deployed at each element of said housing to sense individual health of each element in each of said housing.

12. A system as claimed in claim **1**, wherein said system includes sensors adapted to sense the flow rate of water in said pipes.

13. A system as claimed in claim **1**, wherein said system includes computation means adapted to compute differential flow-rate between various points in the pipes to determine chokes/blocks in said pipes.

14. A system as claimed in claim **1**, wherein said system includes a heating unit adapted to heat the water before it is ejected from the output element.

15. A system as claimed in claim **1**, wherein said output element includes a plurality of jet elements in close proximity to increase the flow of water in a particular prescribed area to provide a wave like motion in said swimming pool.

16. A system as claimed in claim **1**, wherein said system includes sensors to sense water level and further includes a water level switch that can start or stop said pump(s) according to sensed height of the water, based on predefined conditions.

17. A system as claimed in claim **1**, wherein said system includes sensors to sense water level and further includes water draining mechanism to drain out water from said swimming pool, based on pre-defined conditions.

18. A system as claimed in claim **1**, wherein said system includes an additional filtering medium connected to said output element.

19. A system as claimed in claim **1**, wherein said system includes light units placed at first housing and/or third housing for lighting the pool.

20. A swimming pool having at least one system for cleaning water thereof as claimed in claim **1**.

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