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Schmidt

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[54] **WATER LEVEL MAINTENANCE DEVICE FOR SWIMMING POOLS**

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[51] **Int. Cl.** **E04h 3/16,** E04h 3/18

[58] **Field of Search** 4/172, 172.17, 172.15; 137/412, 428

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[57] **ABSTRACT**

A device for maintaining the water in a swimming pool at an established level, is disclosed. The subject device involves a water-level tank which has a fluid connection to the swimming pool such that water in both the water-level tank and the swimming pool are at the same level. A double-pole float switch is mounted within the water-level tank to continually sense the water level therein. Whenever the water level is below a selected fill level, the float switch activates an electrical solenoid valve which permits water to be added to the pool. Whenever the water level is above a selected level, the double-pole float switch operates to energize a drain pump which extracts water from the pool until the established water level is attained.

13 Claims, 2 Drawing Figures

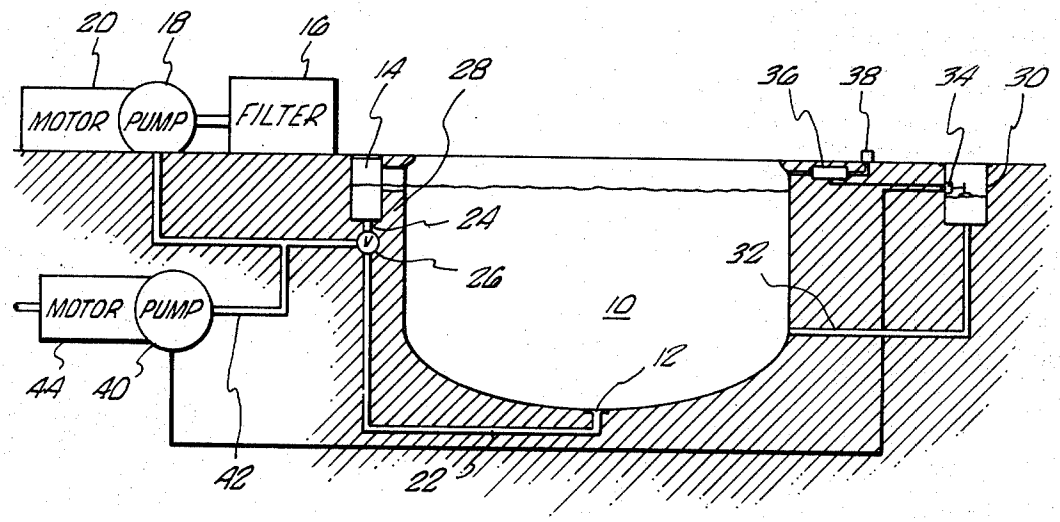
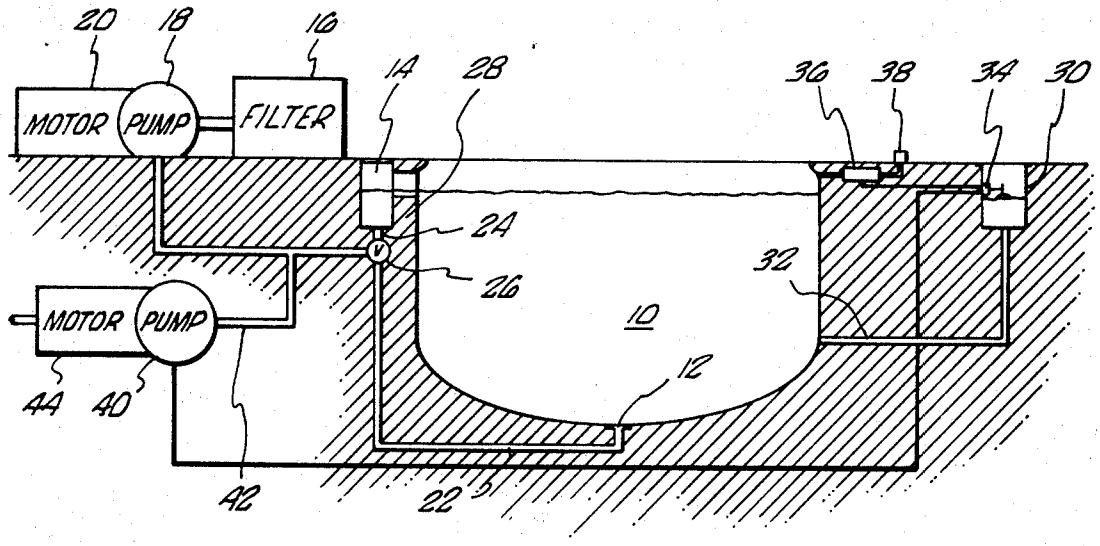


FIG. 1


20
18
16
14
28
36
38
34
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MOTOR
PUMP
FILTER
24
26
32
10
MOTOR
PUMP
12
44
40
42
22

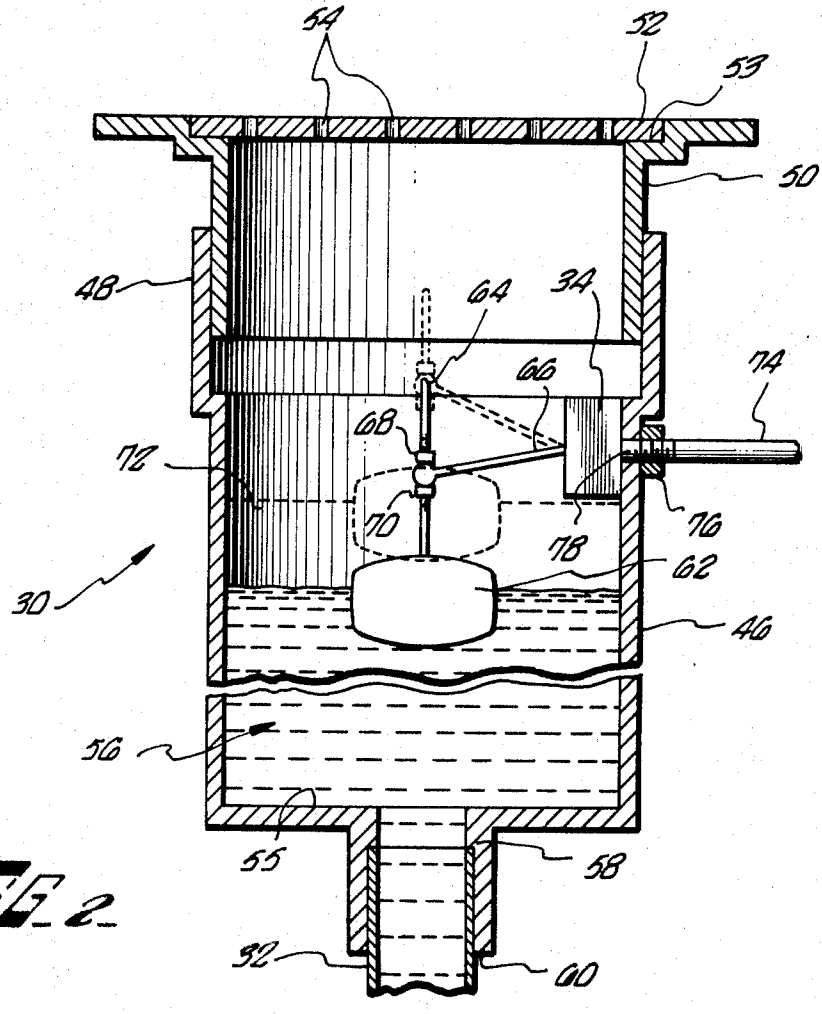

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FIG. 2

WATER LEVEL MAINTENANCE DEVICE FOR SWIMMING POOLS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention generally relates to devices for controlling the level of water in a swimming pool. More specifically, the present invention concerns apparatus for use in a control system to maintain the water in a swimming pool at an established level.

2. Description of the Prior Art

The maintenance of a swimming pool requires that a generally established range of water levels be maintained for the water in the pool. Failure to maintain this established water level can result in damage to circulation and filtration accessories and/or the area surrounding a swimming pool.

Considering first the circulation accessories, a swimming pool is typically equipped with a filtration system including a filter and a motor/pump combination that serves to pump water from the pool through the filter for return to the pool. The motor is normally designed to operate under a load provided by a continuing head of water in the pump. Should this load fail to be present while the motor is operated, serious and/or permanent damage may in time result. Clearly, such damage is costly and an inconvenience since the motor must be promptly repaired and/or replaced to avoid the growth of algae.

An abnormally low water level is one of the primary factors contributing to the absence of the water load at the pump. In turn, a decreased water level may be caused by the usual splashing by swimmers or, more commonly, evaporation. During the summer months, evaporation may require that water be added at least once a week. With such a requirement, it is inadvisable to leave a pool unattended for longer periods of time. Thus, vacationing pool owners must obtain the services of someone to maintain the pool while the owners are away, to avoid damage to the motor.

Damage to the area surrounding the swimming pool can result from the swimming pool overflowing. This may occur as a result of heavy rains. The damage usually results from the chemicals in the pool water harming surrounding foliage.

A number of devices have been designed for use in controlling the water level of a swimming pool. However, to the inventor's knowledge these prior art devices have the disadvantage of being affected by activity in the pool such that when the pool is in use, the water sensing device must frequently be disabled to prevent its false operation. Prior art devices also have the disadvantage of including some mechanical linkage between a sensor and a refill device. As a result, the flow of refill water is reduced to a dribble as the established normal level is approached. Finally, most prior art control systems are designed to add water to a pool, while ignoring the problem of overflow water.

It is thus the intention of the present invention to provide a water level maintenance device which operates to automatically maintain the water level of a swimming pool at an estabilished level or range of levels wherein water is automatically added to the swimming pool to avoid undesirably low levels and excessive water is automatically drained from the pool to avoid excessive water levels and/or overflow.

SUMMARY OF THE INVENTION

Briefly described, the present invention involves a water-level tank for sensing the water level in a swimming pool and correcting for abnormally low or high levels by respectively adding water to or draining water from the pool.

More particularly, the subject water level maintenance device includes a water-level tank that is connected via a conduit to receive water from the pool such that the level in both the pool and the tank are at the same level. A float switch is mounted to continually sense the water level in the tank and thus the water level in the swimming pool. Upon the detection of abnormally low levels, the float switch energizes an electrical solenoid valve coupled in a refill water line and hence permits water to be added to the swimming pool to correct for the water deficiency. Excessive water levels detected by the float switch causes the energization of a secondary pump which operates to drain water from the pool until the estabilished water level is attained.

The objects and many attandant advantages of the invention will be more readily appreciated as the same becomes better understood by reference to the following detailed description which is to be considered in connection with the accompanying drawings wherein like reference symbols designate like parts throughout the figures thereof.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic diagram illustrating a cross-sectional view of a swimming pool accompanied by a typical filtration system and a water level maintenance device connected in accordance with the present invention.

FIG. 2 is a schematic diagram illustrating a cross-sectional view of a water level maintenance device in accordance with the present invention.

Referring to FIG. 1 of the drawings, a swimming pool **10** is customarily provided with a main drain **12** situated at the bottom of the deep end of the pool **10** and a skimmer **14** situated along a side of the pool **10.** Characteristically, both the main drain **12** and the skimmer **14** operate to provide water to a filter **16** for return to the pool **10.** A pump **18** driven by a motor **20** serves to draw the water through the conduits **22** and **24** connected respectively to the main drain **12** and the skimmer **14.** A valve **26** is usually provided to adjust the distributed proportion of water flow from the main drain **12** and the skimmer **14.**

As is well known, the filtration system accompanying a swimming pool may be operated daily for five or more hours depending on the season and usage. The filtration, and circulation, of the water in the swimming pool is necessary to keep the water pure and the swimming pool generally clean. Excessive amounts of refuse, such as leaves and/or accumulated dust, generally must be removed with auxiliary equipment such as a swimming pool vacuum.

The skimmer **14** serves to cause circulation of the surface water of the swimming pool to prevent the accumulation of floating particles that may contribute to a scum forming at the surface if not drawn off by the skimmer **14.** Accordingly, the normal practice is to have both the main drain **12** and the skimmer **14** in operation concurrently. The proportional flow of pool

water through the main drain 12 and skimmer 14 is adjusted with the valve 26 as desired by a pool owner.

As earlier briefly mentioned, abnormally low water levels will result in the load on the motor 20 being either significantly decreased or eliminated all together. This will normally occur as a result of the water level dropping to a point that permits air, and hence less water, to be drawn through the skimmer 14. Of course, where the water level drops below the level of the weir 28 of the skimmer 14, no water at all will be drawn through the skimmer 14 and water will fail to be drawn by the pump 18. The motor 20 consequently will be operated under a no-load condition which will quickly cause overheating and consequent damage thereto.

Accordingly, the water level maintenance device of the subject invention operates to detect abnormally low water levels and automatically cause water to be added to the pool to maintain the water at an established normal level. To this end, a water level tank 30 is buried in reasonable proximity to the pool 10 and connected thereto via a conduit 32 such that the water level in the pool 10 and the tank 30 will be the same.

Briefly, the conduit 32 is connected to the swimming pool 10 at the deep end such that activity in the pool causing waves, or other undulation of the water surface, will leave the water level in the tank 30 unaffected. The water level in the tank 30 is thus calm despite activity in the swimming pool and hence nned not be disabled while a swimming pool is in use to prevent false operation. The conduit 32 may be buried and of the necessary length to permit the tank 30 to be installed in a remote location if desired.

The water level in the pool 10 and tank 30 is sensed by a double-pole float switch 34 which operates to energize a solenoid valve 36 coupled in series with a water main 38 from which water may be added to the pool 10. Any conventional electrically operated solenoid valve that is readily available and well known in the prior art may be used.

The subject water level maintenance device also operates to correct for excessive water in the pool. This is accomplished by having the float switch 34 also detect abnormally high water levels and cause the operation of a secondary pump 40 which serves to pump water out of the pool 10 and into a drain or sewer line as is convenient. The pump 40 may be connected to the pool 10 by having a conduit 42 connected to the conduits 22 and 24, as shown. In the alternative, the conduit 42 may be directly connected to the pool 10. The secondary pump 40 may be any conventional centrifugal pump similar to the pump 18 operated by a motor 44. The motor 44 may also be any conventional motor available and of adequate horse power to accomplish the stated purpose.

It is recognized that in some instances such as in the presence of heavy rainfall, water may be added to the pool at a somewhat high rate. Accordingly, the motor 44 and pump 40 should be adequate to prevent overflow and hence distribution of the pool water about the pool area.

The water level maintenance device may now be considered in greater detail by reference to FIG. 2. As shown, the water level tank 30 includes a main body 46 which is provided with an oversized upper portion 48. A deck flange 50 having an outer diameter sized to be snuggly received within the oversized upper portion 48, is positioned in telescoping relationship with the body 46 of the tank 30. A grate cover 52 is used to eliminate the aperture of the deck flange 50. A peripheral shoulder portion 53 is provided to support the grate cover 52. Numerous perforations 54 are provided in the grate cover 52 to permit the atmosphere to readily act upon the water 56 in the tank 30. The floor 55 of the tank 30 is provided with a drain 58 which is shaped to receive the conduit 32 at a mouth 60 thereof.

It is to be understood that the tank body 46 may have any reasonable configuration suitable for the described purpose. As an example, the tank body 46 may be cylindrical, etc.

The tank body 46 and deck flange 50 are preferably made of non-corrosive material to prevent and/or resist chemical reaction with either the chemicals in the swimming pool water and/or the soil in which the tank 30 is embedded.

The oversizing of the upper portion 48, to permit the telescoping adjustment of the flange 50, allows the tank body 46 to be readily emplaced to have the water level within the pool 10 and the tank 30 the same and within the operating range of the double pole solenoid switch 34. The flange 50 by being telescoping may then be readily, later leveled with the decking surrounding a pool, and yet have the tank 30 include a continuous wall between the deck, or ground level, and the tank floor 55.

Considering the double pole switch 34 in greater detail, any available double pole float switch, such as that marketed by Cutler Hammer, Inc., would be suitable. Characteristically, the switch 34 includes a float 62 attached to the end of a supporting rod 64 which is maintained at a generally vertical position on a switch arm 66. The rod 64 and hence the float 62 is adjustable on the arm 66 for the purpose of establishing a range of water levels. To this end, the mid portion of the supporting rod 64 may be threaded to accommodate a pair of lock nuts 68 and 70 which operate to secure the rod 64 in a selected position with respect to the arm 66. The end of the switch arm 66 may be notched or apertured to receive the supporting rod 64.

As an example, the water level shown in FIG. 2 may represent a low threshold below which the switch 34 is operated to energize the solenoid valve 36 by further downward rotation of the arm 66 to make a first electrical contact or connection. Excessive water in the swimming pool 10, represented by an abnormally high water level as illustrated by the dotted line 72, serves to raise the float 62.

The switch arm 66, as shown in dotted lines, is accordingly rotated upward to make a second electrical contact and thereby energize the motor 44 to cause the pump 40 to drain water from the pool 10. Upon restoration of the pool water level to the established range of levels, the first and second electrical contacts are broken and the energized solenoid 36 or pump motor 44 are deactivated. The use of the electrical switch 34 clearly presents the advantage of positive opening and closure of the electrical solenoid 36 and pump motor 44. As earlier mentioned, the prior art mechanical linkages are bulky and restrict the placement of the switch, valve, etc. with respect to each other.

An electrical conduit 74 may be used to direct the necessary electrical cable from the double pole float switch 34 to an appropriate power line and to the motor 44 and the solenoid 36. A lock nut 76 is adapted to communicate with the electric connection 78 of the

switch **34** which extends through the wall of the tank **30.**

In that the actual connection of the electric cables between the switch **34,** the solenoid **36,** the motor **44,** and a power source may be accomplished in any well known manner, a detailed description thereof has been omitted herefrom.

From the foregoing description, it is now clear that the subject invention provides a water level maintenance device which is unaffected by activity in the pool and which operates to automatically maintain the water level of a swimming pool within an established range of levels such that a load is always provided to the pump **18** of the filtration system and overflowing of the swimming pool is prevented.

While a preferred embodiment of the present invention has been described hereinabove, it is intended that all matter contained in the above description and shown in the accompanying drawings be interpreted as illustrative and not in a limiting sense and that all modifications, constructions and arrangements which fall within the scope and spirit of the invention may be made.

What is claimed is:

1. In a water-level control system for swimming pools, a tank for containing a portion of the pool water such that the pool water in both the pool and tank are at the same level, the tank including:

a body formed by a closed upright wall and a floor, said pool water being contained in said body;

an aperture situated in the floor of said body through which pool water is permitted to enter said body;

a deck flange positioned to be received by the uppermost portion of said closed upright wall of said body, said deck flange serving to extend said upright wall and having a telescoping relationship therewith, said deck flange including a hollow cylindrical portion having an outer diameter sized to permit said cylindrical portion to be received at the end thereof by the uppermost portion of said tank body, said cylindrical portion having a flared peripheral section at the other end thereof, said flared peripheral section adapted to be positioned at the surface level of the area in which the tank is located; and

a detector mounted on the upright wall of said body to detect the level of the pool water in said tank, said detector providing a low electrical connection whenever the pool water level is below an established low water level, and said detector providing a high electrical connection whenever the pool water level is above an established high water water level.

2. The apparatus defined by claim **1,** said detector including:

water level means for continually sensing the level of said pool water in the tank body by being maintained at the level of said pool water;

switching means for providing a high or a low electrical connection; and

connector means coupled between said water level means and said switching means for operating said switching means to produce a high connection or a low connection in response to the water levels above said established high water level or below said established low water level, respectively.

3. The apparatus defined by claim **2,** said water level means including a buoyant member situated to assume a position corresponding to the level of the pool water in said tank body, and a supporting rod connected at one end to said buoyant member and having a center portion adapted to permit adjustable attachment to said connector means.

4. The apparatus defined by claim **1,** further including a grate for covering any surface opening provided by said deck flange.

5. The apparatus defined by claim **1,** said aperture provided by a cylindrical section integrally formed with said floor and having an axial bore extending for the length thereof and through said floor, said cylindrical section extending to receive an end of a conduit for permitting water to flow between said pool and said tank.

6. The apparatus defined by claim **1** further comprising a grate sized to be centrally positioned within said flared peripheral section of said deck flange, said grate covering the central aperture of the flared end of said cylindrical portion of said deck flange.

7. The apparatus defined by claim **6,** said detector including:

water level means for continually sensing the level of said pool water in the tank body by being maintained at the level of said pool water;

switching means for providing a high or a low electrical connection; and

connector means coupled between said water level means and said switching means for operating said switching means to produce a high connection or a low connection in response to the water levels above said established high water level or below said established low water level, respectively.

8. The apparatus defined by claim **7,** said water level means including a buoyant member situated to assume a position corresponding to the level of the pool water in said tank body, and a supporting rod connected at one end to said buoyant member and having a center portion adapted to permit adjustable attachment to said connector means.

9. The apparatus defined by claim **8,** said aperture provided by a cylindrical section integrally formed with said floor and having an axial bore extending for the length thereof and through said floor, said cylindrical section extending to receive an end of a conduit for permitting water to flow between said pool and said tank.

10. A water level control for swimming pools including the combination of:

sensing means for continually monitoring the level of water in said pool, said sensing means capable of being remotely located away from said pool, said sensing means completing first and second electrical connections in response to the water level being above an established high level or below an established low level, respectively, said sensing means including:

a secondary tank for containing pool water therein, said tank including a closed wall and a floor, said conduit means being connected to permit pool water to be supplied to said secondary tank,

detector means positioned in said secondary tank to detect the level of pool water therein,

flange means for extending the wall of said tank, said flange having a flared peripheral portion suitable

for being maintained level with the surface of the area in which said secondary tank is positioned, said flange permitting said tank to be open at said surface, and

grate means for covering the tank at said surface, said grate means adapted to be centrally received by said flange means, said grate means having perforations therethrough for permitting said water in said secondary tank to be exposed to the atmosphere;

conduit means for connecting said pool to said sensing means to permit the flow of water therebetween such that said sensing means is unaffected by waves on the surface of the water in said pool;

draining means responsive to the completion of said first electrical connection for effecting the removal of water from said pool to have said water level adjusted to be no higher than said established high level; and

filling means responsive to the completion of said second electrical connection for permitting the addition of water to said pool to have said water level adjusted to be no lower than said established low level.

11. The apparatus defined by claim **10,** said draining means including a pump operatively connected to remove water from said pool in response to the presence of said first electrical connection, said water removal continuing until at least said established high water level is attained.

12. The apparatus defined by claim **10,** said filling means including a solenoid operated valve for permitting the flow of water into said pool in response to the presence of said second electrical connection, said addition of water continuing until at least said established low water level is attained.

13. The apparatus defined by claim **12,** said detector means including:

water level means for continually sensing the water level in said secondary tank, said water level means adapted to follow variations in the level of the water in said secondary tank;

switching means for completing said first and second electrical connections; and

arm means coupled to said water level means and said switching means for operating said switching means to produce said first electrical connection in response to water being at a level higher than said established high level and said second electrical connection in response to water receding below said established low level.

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