United States Patent

[11] 3,620,372

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[54] **SKIM TANK**
5 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **210/169**
[51] **Int. Cl.** **E04h 3/20**
[50] **Field of Search** 210/169, 121, 129, 104, 119

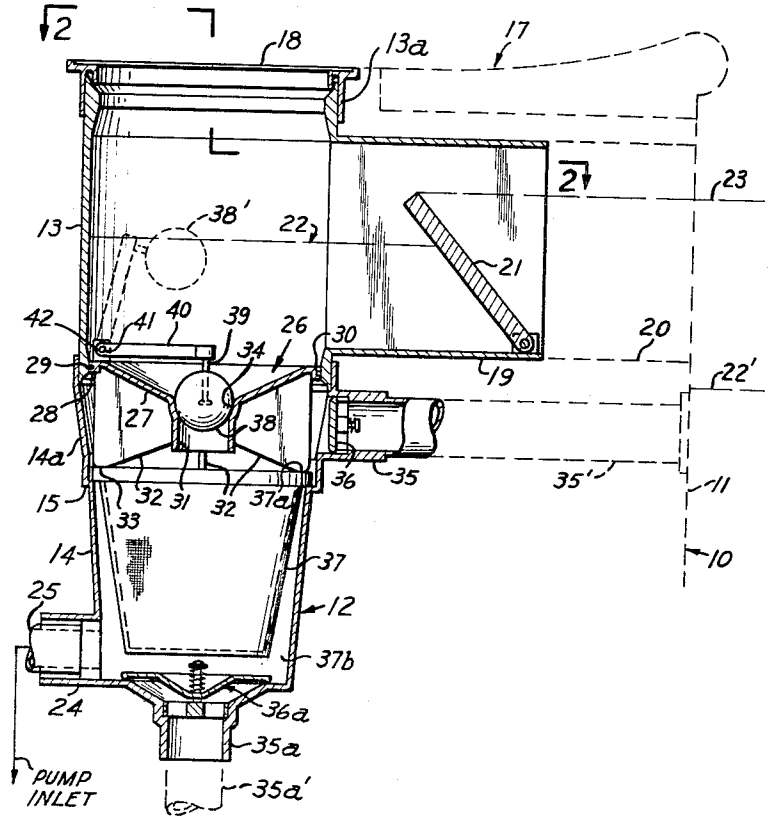
[56] **References Cited**

UNITED STATES PATENTS

597,822	1/1898	Martin	210/119 X
2,252,687	8/1941	Bassett	210/129 X
3,306,448	2/1967	Baker	210/121
3,067,879	12/1962	Baker	210/129

Primary Examiner—Reuben Friedman
Assistant Examiner—T. A. Granger
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ABSTRACT: A skim tank for skimming surface water of a pool has an inlet from the surface of the pool to an upper part of the tank. A rotatable plate extending across the tank at a level below the inlet separates the upper tank portion from a chamber below the plate, and an opening through the plate permits the pool water from the inlet and upper tank portion to flow down to the chamber when the opening is not closed by a stopper, from where it is withdrawn through a conduit by a suction pump for filtering. A bypass conduit connects to the chamber from the pool such that when the stopper closes the opening, water is drawn into the chamber through the bypass line to supply the pump. The pool may be vacuum cleaned through a vacuum line connected at the opening of the plate and in order to close the bypass line during the vacuum operation, the rotatable plate is provided with a closure gate depending from it which blocks the inflow from the bypass to the chamber when the plate is rotated to the blocking position.



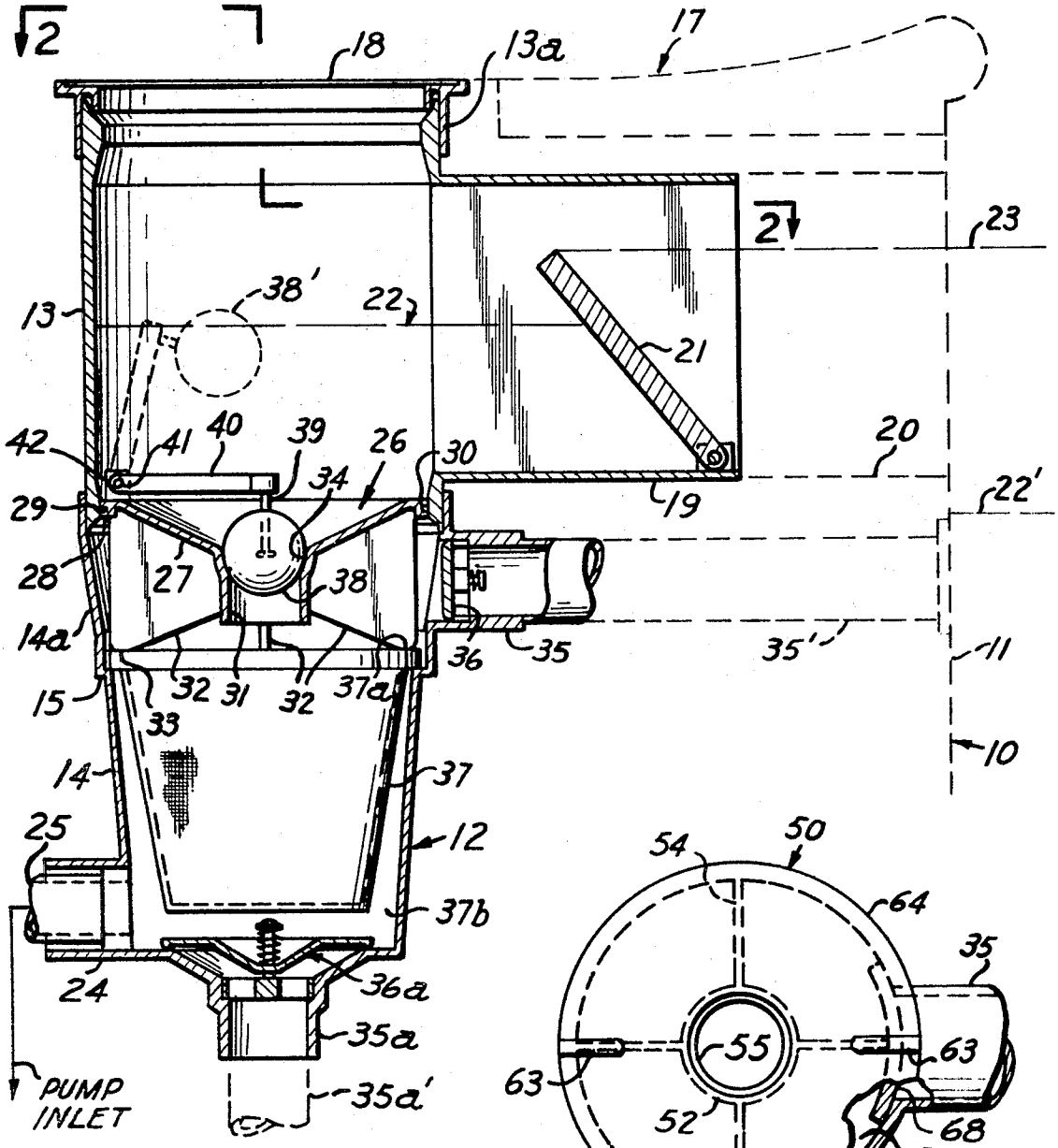


FIG. 1

FIG. 4

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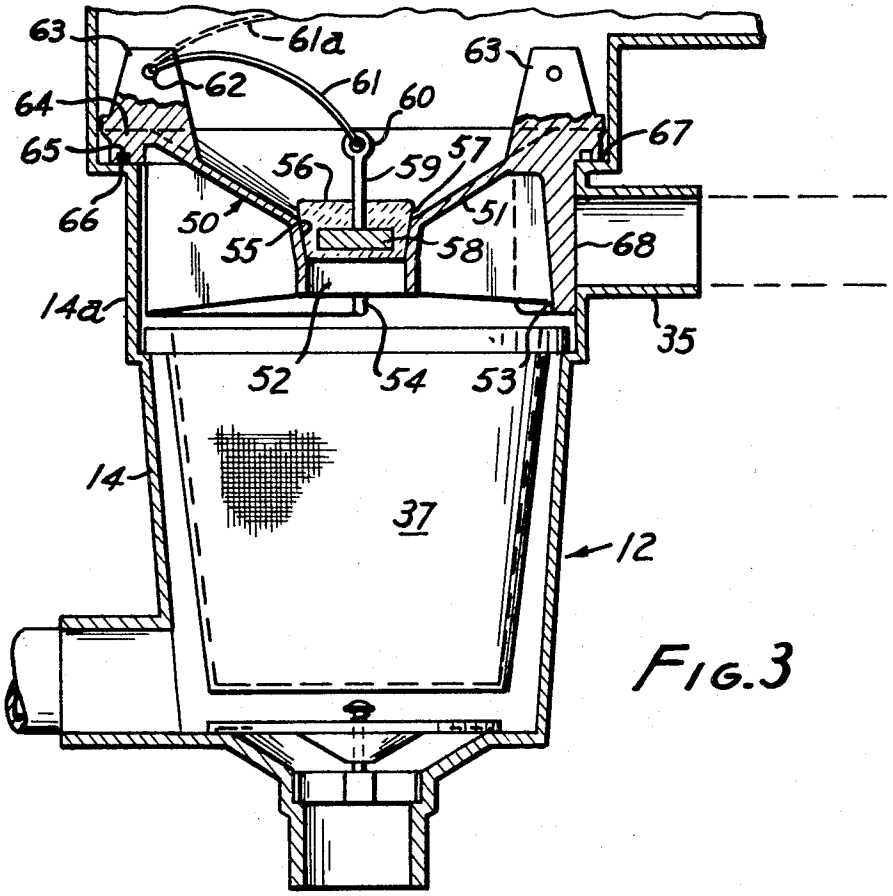


FIG. 3

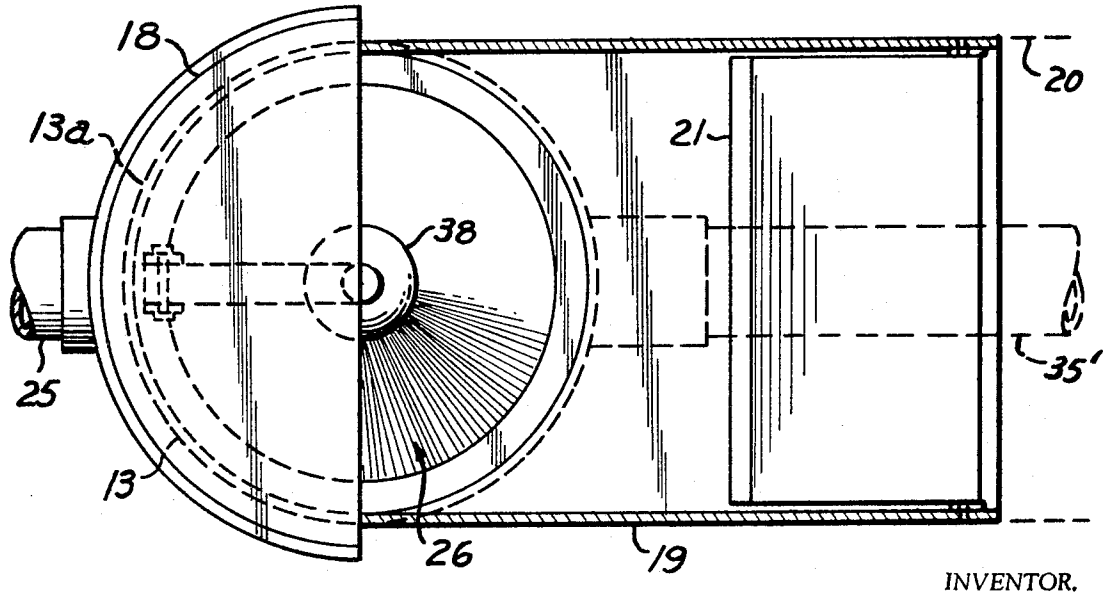


FIG. 2

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SKIM TANK

This invention relates to swimming pool equipment, and particularly to skim tanks and associated equipment.

Proper cleaning of the water of a pool such as a swimming pool depends in large measure on circulating and filtering the water drawn over a skimming ledge and into a tank generally referred to as a skim tank. Due to factors such as evaporation and splashing, followed by refilling the pool, the level of water in a pool is not maintained constant. In order to maintain proper flow from the surface of the pool to the filter despite changes of height of the water in the pool, floating weirs have been used.

In such arrangements, the water passing over the skimming weir is received in the tank, which supplies the inlet of a pump which does the recirculating. The floating weir is pivoted on a horizontal axis, and is responsive to the level of water in the tank, and it operates to keep the level constant for any given flow rate determined by the pump.

While this arrangement is operative throughout a substantial variation in the height of water in the pool, nevertheless there are limits to the range of operation of the floating weir. Thus, the level in the swimming pool may drop below the opening that feeds the weir, or so close to the weir axis, that the weir can no longer increase flow by lowering. In such circumstances, the tank will run dry and the pump will suck air. Apart from possible damage to the pump, this creates a nuisance as far as restarting the system is concerned.

In Baker U.S. Pat. Nos. 3,067,879 and 3,306,448, issued Dec. 11, 1962 and Feb. 28, 1967, respectively, there are shown and described skim tanks that protect automatically against the pump sucking air by closing a portion of the tank connected to the pump inlet automatically in response to the cessation of skimming action. The suction thus created in the tank portion in turn produces substantial bypass flow from an equalizer line or from the main drain as the case may be, and the pump accordingly is protected. By deliberate selection, the tank portion can be closed whatever the condition of the level in swimming pool might be, in order to create suction for inducing flow through a vacuum line, for example.

In Baker U.S. Pat. No. 3,067,879, the specific means for closing off a portion of the tank to prevent sucking of air is a floating weir, which when the pool water level becomes too low, drops down on a seat to cover an opening to the tank. In Baker U.S. Pat. No. 3,306,558, the means for closing off the portion of the tank to prevent sucking air comprises in one embodiment a float in the form of a ball mounted on a guided rod which is vertically slidable so that the ball drops down on a seat, and in other embodiments by a toroidally shaped float restrained from floating away by a cage, so that the float drops down on a seat, to act as a stopper, when the water level becomes too low. In those arrangements, the stopper, when floating, is restrained to a position directly above its seat.

An object of the present invention is to provide an automatic skim tank having some of the foregoing operative features, but which does not require that the stopper be restrained to a position directly above a seat for it.

In accordance with the present invention, there is used a stopper, preferably of the floating type which blocks an exit from the throat of the skimmer at a position above a lower tank chamber. The stopper may be restrained from moving or floating away by a fastening means such as a tether or arm. When the tether is of a flexible material it does not confine the stopper to any particular position or path of movement.

Where a tether is used for restraint, plugging of the exit by the stopper may be facilitated by any vortexing which may occur in the vicinity of the exit.

A feature resides in forming the exit opening in a rotatable plate provided with a gate member which blocks the entrance to the tank from a bypass conduit when the plate is rotated to this blocking position. This will permit the use of the opening for attachment of a vacuum hose line for cleaning the pool.

The foregoing and other features of the invention will be better understood from the following detailed description and the accompanying drawings of which:

FIG. 1 illustrates a vertical section view of an automatic skim tank embodying this invention which the stopper at the exit is in the form of a ball fixed to a pivoted arm;

FIG. 2 is a transverse sectional view taken along a plane at line 2—2 of FIG. 1;

FIG. 3 is a vertical sectional view of another tank embodying the invention in which the stopper is restrained by a tether; and

FIG. 4 illustrates a detail of a rotatable plate containing the exit member of FIG. 3, and adapted to shut off flow between the tank and the conduit leading to the pool.

In FIG. 1 there is illustrated a swimming pool wall **10**, having a vertical surface **11** exposed to the water in the pool. A skim tank **12** is embedded adjacent to or in the wall **10**, and is adapted to receive water withdrawn from the upper surface of the pool.

In the present example, the tank **12** comprises two tank parts **13** and **14**, which are upper and lower tank parts, respectively. The lower tank part **14** has an upper portion **14***a*, the bottom of which is defined by an annular flange **15**, which extends outwardly from the lower portion, forming the base of an upwardly extending circular wall forming the upper portion **14***a*.

The upper open end of tank part **14**, at **14***a*, fits around the upwardly extending hollow part **13**, the top of which is formed as a cylindrical opening **13***a*, set in the decking **17** adjoining the top of the swimming pool wall **10**. A removable cover **18** seated to the frame of opening **13***a* provides access to the interior of the tank **12**, as may be required.

The upper tank member **13** has an intermediate horizontally extending branch or throat **19** beneath the decking **17** and projecting toward the swimming pool surface **11**. The throat **19** registers with an opening **20** in the swimming pool wall **10**. Through the opening **20**, the surface water of the swimming pool may pass to the throat **19** and thence to the tank **12**.

The throat **19** mounts a floating skimming weir **21** that meters the flow of water in the tank in accordance with the level of water **22** therein. As the level **22** descends, the weir **21**, in a well-known manner, drops and the upper edge of the weir **21** is lowered relative to the surface **23** in the main body of the swimming pool.

The circulating pump (not shown) withdraws water from the tank **12**. For this purpose, the side of the lower tank portion **14**, near the bottom thereof, has a conduit fitting **24** cooperable with a conduit **25** that leads to the pump inlet, as indicated by the arrow labeled "Pump Inlet."

A removable debris-collecting basket **37** having a rim resting on the annular flange **15** serves to collect debris and prevent it from passing through conduit **25** to the pump. The bottom and sides of the basket are formed of a suitable perforate or screening material which will allow substantially unimpeded flow of water through it while retaining the debris.

When the water level in the tank **22** drops significantly, a portion of the tank above the conduit fitting **24** must be sealed to prevent the pump from sucking air. For this purpose there is provided a removable plate member **26**. The plate **26** is in the form of an upper frustoconical member **27**, the upper peripheral circular rim **28** of which meets an inside cylindrical surface of tank portion **13** to which it seals by an O-ring **29** placed within an exterior groove **30** of rim **28**. The frustoconical member **27** flares downwardly and inwardly toward a central location in the tank to form a downwardly extending cylindrical opening **31** which forms the exit opening from the upper tank portion **13** to the lower tank portion **14**. A number of ribs **32** extending radially outward from the cylinder **31** and attached to the cylinder and the cone **27** form footings **33** at their outer lower extremities which rest on the rim **37***a* of the basket.

The chamber **37***b* below the plate **26** has two sources of supply. One is the water flowing into the tank **12** over the skimming weir **21**. Access is provided via the exit opening **31** from the upper tank portion **13**, an upper annular region of which is provided with an internal spherical formation at **34**

for a purpose presently to appear. The second source of supply to chamber 37*b* is one or the other of a pair of equalizer inlets 35 and 35*a*, only one of which will ordinarily be left open at any time when installed in a pool. For example, for certain pool installations it will be desirable to utilize inlet 35 located above the basket, and for other pool installations, it will be preferable to use inlet 35*a*, located below the basket. The inlet 35 or 35*a* which is not put to use in any installation will ordinarily be plugged by a plug (not shown). The particular one of the two inlets 35 and 35*a* which is to be put to use will have connected to it a conduit leading to the pool.

Communication between the tank and the equalizer inlets 35 and 35*a* is normally closed by check valves 36 and 36*a*, respectively, of any suitable form, of a type requiring a predetermined pressure differential between the pool water and the water in the tank, to cause it to open. When inlet 35 is to be used, it has connected to it a conduit 35' which opens into the pool at wall 11 at a place normally substantially below the lowest usual level of the water in the swimming pool. When inlet 35*a* is to be used, it has connected to it a conduit 35*a*' leading to the pool water at the main drain at the bottom of the swimming pool. A spherical stopper 38 above the spherical portion 34 of exit opening 31 may close this exit 31, but only if the water level 22 drops critically. Hence, the chamber 37*a* is normally supplied by the water passing over the weir 21.

The stopper 38 has embedded within it a pin 39 fastened at one end of a rigid arm 40 which is pivoted on a pivot 41 in a pivot support 42 integral with the top of plate 26, at one side thereof. Thus, during the normal skimming operation, the stopper 38 floats at a position 38' at the water surface 22 in the tank.

Should the water drop substantially below the level 22, say to the level 22', the weir 21 has obviously lost control and the tank is about to be emptied. The stopper 38 will drop and set itself into spherical region 34 before the level reaches region 34, and the opening 31 will be sealed before any substantial air enters the chamber 37*a*. The pump suction will maintain the stopper 38 in its sealing position, and at the same time will open either equalizer inlet 35 or 35*a*, whichever is unplugged, by exerting the requisite force upon the respective check valve 36 or 36*a*. The pump is now supplied entirely by the operative equalizer line 35 or 35*a*, and the demand of the pump is met.

It is possible to use the exit opening 31 for attachment of a vacuum cleaner hose leading into a vacuum cleaner in the pool, in which case it is desired to have both openings 35 and 35*a* closed, which can be done by plugging, or by the arrangement shown in FIG. 3.

The embodiment of FIG. 3 is similar to that of FIGS. 1 and 2, in respect to the upper skim tank portion comprising the throat, the weir and the upper tank region. It differs, however, in the means for restraining the stopper, and also in the construction of the removable plate which receives the stopper. In FIG. 3, the plate 50 is substituted for the form of plate 26 in FIG. 1. The plate 50 is quiet similar to plate 26, in that it is formed with the frustoconical portion 51, leading to the centrally located exit 52.

The exit conduit 52 is formed somewhat differently from the exit conduit 31 of FIG. 1. In FIG. 3, the upper portion of exit 52 is somewhat flared upwardly and outwardly to form a frustoconical portion 55 which meets the frustoconical portion 51. Frustoconical portion 55 is adapted to receive a floatable stopper 56, the sidewall 57 of which is made frustoconical and of substantially the same conical angle as that of frustoconical wall 55, so that the stopper will snugly fit into the wall 55 preferably leaving a portion of the stopper above wall 55 as shown. Stopper 56 has formed or molded within it a plate 58 fastened to the lower end of an I-bolt 59, the eye 60 of which has attached to it a flexible tether or thong 61, the opposite end of which is attached at 62 to an upstanding member 63 integral with the upper part of plate 50 and at one side thereof.

There are a plurality of these upstanding portions 63 spaced from each other as shown, which facilitate rotating the plate 50 in a manner to be described. The upper circumferential portion of plate 50 is provided with a depending rim 64 having an annular groove 65 at its lower surface, in which there is fitted an O-ring 66 which rests on an annular ledge 67 at the top of tank portion 12. Thus, the plate 50 instead of resting on lower legs or footings, as the footings 33 of FIG. 1, rests on the O-ring which forms a seal at the ledge 67 and the plate 50 can be readily removed and replaced through top plate at 18 at the deck, which is the same as in FIG. 1.

Referring to the detail view of the plate 50 in FIG. 4, as well as to its illustration in FIG. 3, one side of the plate is provided with a gate member 68 which depends from the upper circumferential rim portion of plate 50. This gate member depends to a position somewhat below the level of the inlet conduit 35 from the pool and has an outer surface which is cylindrical and conforms with the cylindrical shape of the upper portion 14*a* of tank part 14. Its circumferential extent is made as great or preferably somewhat greater than the opening from inlet 35, and its position is such that when plate 50 is rotated somewhat when in the position shown in FIG. 3, as by manually handling the upstanding members 63, there will be just sufficient clearance between member 68 and the cylindrical wall of the tank to prevent binding. By thus rotating the member 50, the gate 68 can be made to cover as much of the inlet 35 as is desired, including substantially complete closure of the inlet if desired. This capability is desirable for closing inlet 35 (in installations where it is put to use) when the vacuum hose is to be attached to exit 51.

The provision of the gate attachment 68 on plate 50 is optional, as it is apparent that the circulating and filtering system can operate without this gate.

The operation of the system is analogous to that of FIG. 1 in that in the normal skimming operation when the pump is operated, the water level in the tank is substantially above the plate 50, in which case the stopper 56 floats up at the tank water surface with the tether 61 extending upwardly as shown at 61*a*. The floating stopper 56 is thus permitted to wander around the water surface within the tank. When, however, the water level in the tank drops down toward the plate 50 and its exit conduit 52, the stopper comes down with the water level. Owing to the placement of the relatively heavy plate 58 near the bottom part of the stopper, the stopper will come down with its smaller conical section lowermost in the general position shown in FIG. 3, so that the stopper will effectively seat itself within the frustoconical portion 55. This seating operation will usually be facilitated by such vortexing action of the water as may occur when the water level in the tank approaches the area 55 and facilitated by the frustoconical portion 51.

What is claimed is:

1. In combination, a tank having an inlet to an upper portion thereof to receive water from the upper surface of a pool, a plate extending across the tank below said inlet and forming a chamber in the tank below the plate, said plate having an opening through it adapted to be supplied by water entering the upper tank portion from the inlet, a seat at said opening adapted to receive a stopper which prevents a flow of water from the upper portion to the chamber, a floatable stopper adapted to float above the plate when there is sufficient water in the upper portion to float it, and to fit the seat to close the opening in response to a lowering of the level of water in the upper portion substantially below the normal operating level thereof, fastening means attached to the stopper and secured at a stationary part of the tank for confining the float to the vicinity of the seat, an outlet from the chamber adapted to be connected to the suction line of a pump, and a bypass conduit bypassing the inlet and the upper portion, leading to the chamber and operative upon seating of said stopper at said seat, to supply water from a source to the chamber, thereby supplying the pump, said plate being rotatable relative to the chamber and being provided with a gate member dimensioned and positioned to block the entrance of water from the bypass conduit to the chamber when the plate is rotated to the blocking position of the gate so that water can be drawn from

the pool through a vacuum line to the chamber when the vacuum line is connected to the opening.

2. A combination according to claim 1 in which the plate rests on an element within the tank and can be readily lifted out of the tank.

3. In combination, a tank having an inlet to an upper portion thereof to receive water from the upper surface of a pool, a plate extending across the tank below said inlet and forming a chamber in the tank below the plate, said plate having an opening through it adapted to be supplied by water entering the upper tank portion from the inlet, a seat at said opening a float in the upper portion, means restraining the float to a vicinity of the upper portion above the seat whereby the float floats at some distance above the seat when there is sufficient water in the upper portion to float it, and drops down on the seat to close the opening in response to a lowering of the level of water in the upper portion substantially below the normal operating level thereof, an outlet from the chamber adapted to be connected to the suction line of a pump and a bypass conduit bypassing the inlet and the upper portion upon seating of the float on said seat, to supply water from a source to the chamber, thereby supplying the pump, said plate being rotatable relative to the chamber and provided with a gate member dimensioned and positioned to block the entrance of water from the bypass conduit to the chamber when the plate is rotated to the blocking position, so that water can be drawn from the pool through a vacuum line to the chamber when the vacuum line is connected to the opening.

4. In combination, a tank having an inlet to an upper portion thereof to receive water from the upper surface of a pool, a plate extending across the tank below said inlet and forming a chamber in the tank below the plate, said plate having an opening through it adapted to be closed on occasions by a stopper such that when not closed by the stopper the chamber is supplied by water passing through the opening from the upper tank portion supplied from the inlet, an outlet from the chamber adapted to be connected to the suction line of a pump, and a bypass conduit bypassing the inlet and the upper portion, leading to the chamber and operative when the stopper closes the opening, to supply water from a source to the chamber, thereby supplying the pump, said plate being rotatable relative to the chamber and being provided with a gate member dimensioned and positioned to block the entrance of water from the bypass conduit to the chamber when the plate is rotated to the blocking position of the gate, so that water can be drawn from the pool through a vacuum line to the chamber when the vacuum line is connected to the opening.

5. A combination according to claim 4 including a stopper adapted to be fitted to the opening on said occasions.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,620,372 Dated November 16, 1971

Inventor(s) Gordon F. Ehret

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the Patent

Column 1, line 45

Change "3,306,558" to --3,306,448--

Column 2, line 2

after "invention" insert --in--

Signed and sealed this 13th day of June 1972.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents