July 7, 1964 J. A. RICHARDS 3,139,628

AUTOMATIC WATER REFILL SYSTEM FOR SWIMMING POOL

Filed May 9, 1960 2 Sheets-Sheet 1

FIG. 1

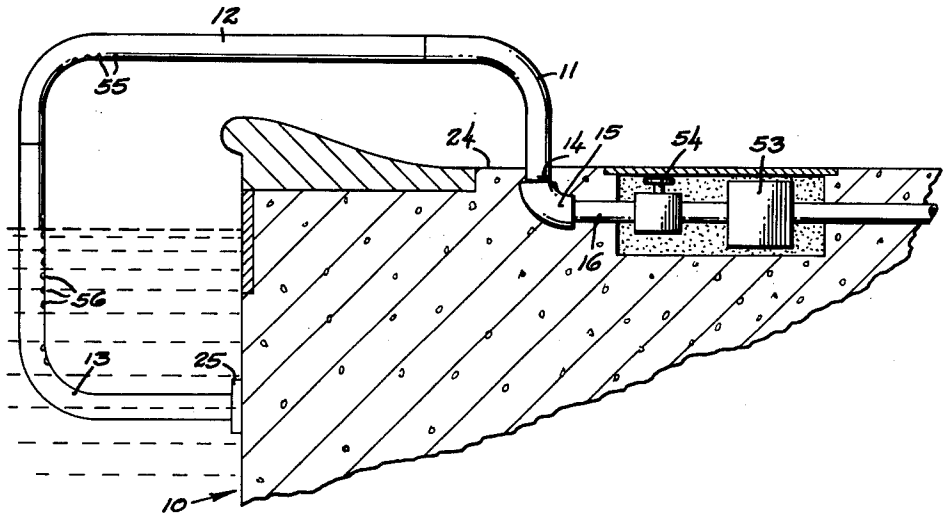


FIG. 2

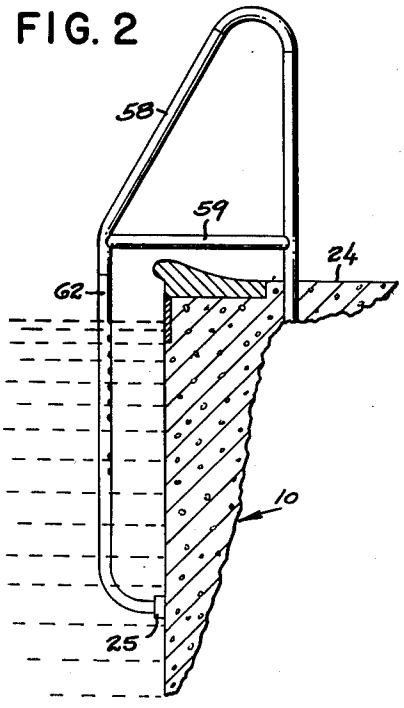
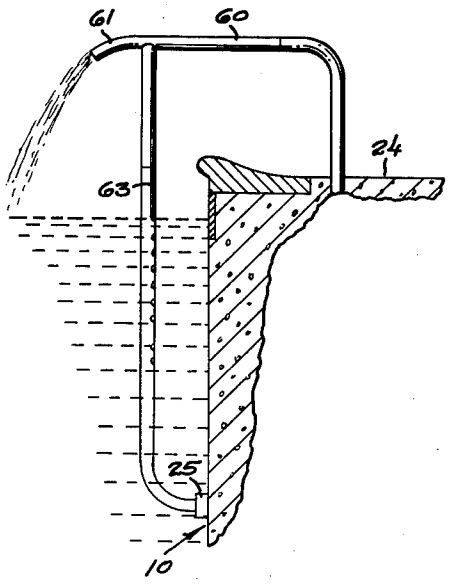


FIG. 3



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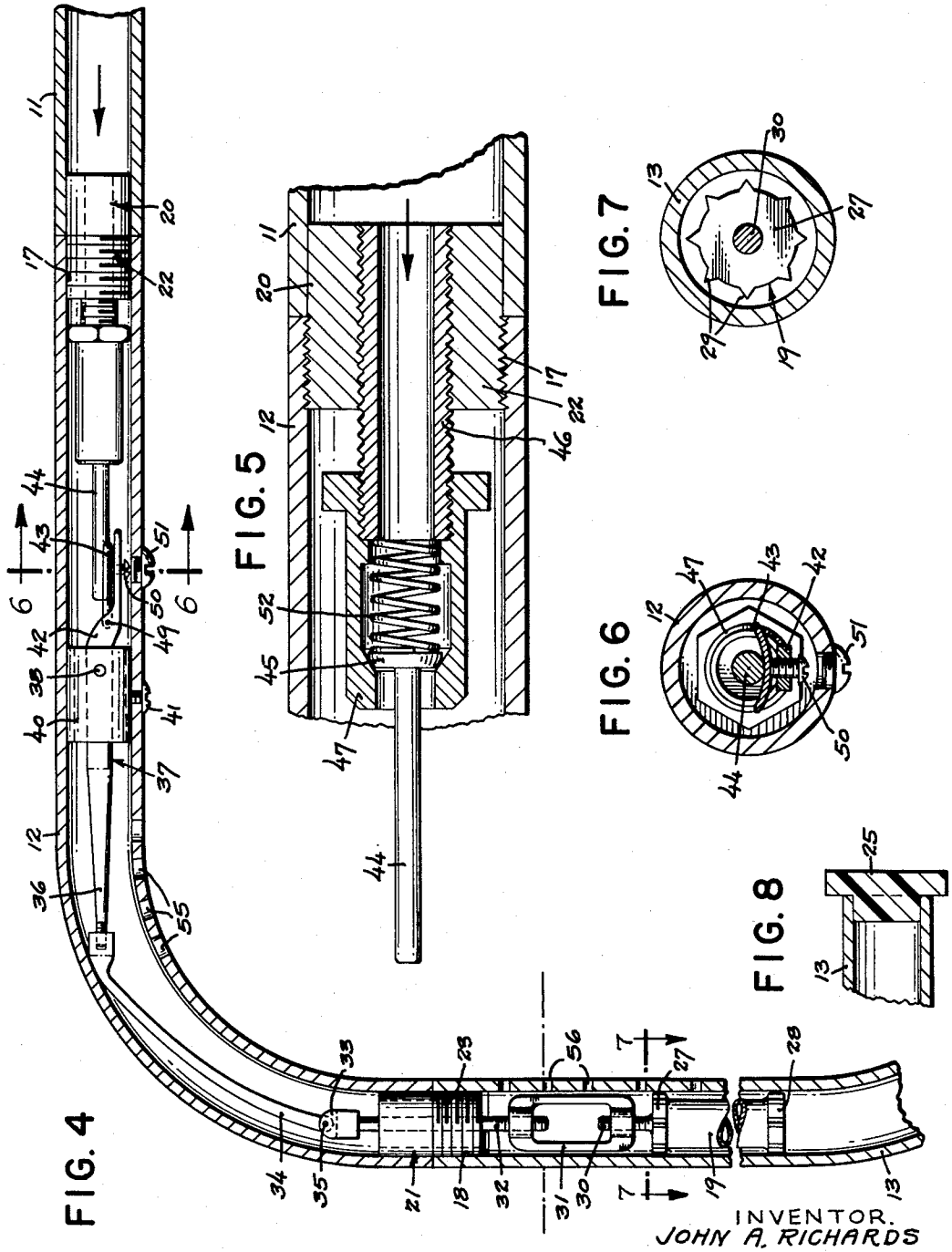


FIG. 4

FIG. 5

FIG. 7

FIG. 6

FIG. 8

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AUTOMATIC WATER REFILL SYSTEM FOR SWIMMING POOL

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9 Claims. (Cl. 4—172)

This invention relates to an automatic water-refill system, particularly one for use in conjunction with a swimming pool for maintaining a constant level of the water within the pool. For its general object the invention purposes to provide a perfected float-controlled and valve-operated system for this purpose which is of simple and inexpensive construction, which can be easily installed, which can be quickly and easily adjusted, and which will operate effectively against normal domestic water pressures.

A further and important object of the invention is to provide a system in which the float, its associated valve, and operating connections therebetween are all of a size and arrangement enabling the same to be housed in water pipe of the size ordinarily employed as the fill spout for a swimming pool.

The invention has the yet further object of devising such a refill system as will permit said water pipe to perform the function of a hand hold producing one of the two side structures of a ladder for the pool.

The foregoing with still additional objects and advantages in view will appear and be understood in the course of the following description and claims, the invention consisting in the novel construction and in the adaptation and combination of parts hereinafter described and claimed.

In the accompanying drawings:

FIGURES 1, 2 and 3 are each a fragmentary cross-sectional view of a swimming pool with different embodiments of the present invention being shown applied thereto, the scale of FIG. 1 being larger than that of FIGS. 2 and 3.

FIG. 4 is a fragmentary enlarged-scale longitudinal vertical sectional view through the embodiment of the invention portrayed in FIG. 1.

FIG. 5 is a fragmentary longitudinal vertical section drawn to a yet larger scale to detail the valve.

FIG. 6 is an enlarged-scale transverse vertical sectional view on line 6—6 of FIG. 4.

FIG. 7 is an enlarged-scale transverse vertical sectional view on line 7—7 of FIG. 4; and

FIG. 8 is a fragmentary longitudinal vertical sectional view employing the same scale as that of FIG. 4 and detailing the fitting by which the lower end of the refill pipe is plugged.

The pool proper is designated generally by the numeral 10. For purposes of illustration the same is here shown as being a poured-concrete structure.

First describing the embodiment shown in FIGS. 1 and 4 through 8, it will be seen that I fabricate a pipe loop from three special elbow pieces 11, 12 and 13 which are or may be in any standard diameter from 1" to 2½". The piece 11 has external threads 14 at one end, so as to be attached to a standard fitting such as an elbow 15 leading from a service pipe 16. Each of the other two pieces 12 and 13 has internal threads, as 17 and 18, respectively, at one end. Respective connectors 20 and 21

have one end, as 22 and 23, threaded to engage said threads 17 and 18, and have their other end sweated in the non-threaded end of the elbow piece 11 or 12, as the case may be, to produce the loop fabrication. Both the connector 20 and the connector 21 have a through-bore, that of the former being threaded. The function of these through-bores will appear in the course of the following description.

For ease of description the three component pieces 11, 12 and 13 of said loop will be termed the head, belly and tail piece, respectively. The head piece extends upwardly from the deck 24 of the pool and thence outwardly parallel to said deck. The belly piece extends outwardly and thence downwardly with its after end overhanging the water above the normal level of the latter. The tail piece extends downwardly to a point well below the water level and thence turns inwardly. The free end of such tail piece is fitted with a Neoprene plug 25 which bears against the vertical face of the pool's side wall. All three pieces 11, 12 and 13 occupy a common vertical plane lying normal to said side wall of the pool. The operating mechanism of the present invention is wholly housed within the belly and tail pieces 12 and 13 and is comprised of a valve, a float, and linkage therebetween.

The float 19 is composed of a cylindrical sleeve having a diameter somewhat smaller than the I.D. of the tail piece and sealed top and bottom headers 27 and 28 each of which has a radiated plan configuration so as to provide water passageways at spaced intervals of the circumference. The radial projections 29 which define said passageways are pointed and terminate short of the interior wall of the tail-piece 13, their purpose being to center the float and assure free vertical motion thereof.

A threaded stud 30 rises from the top header 27 as an integral axial prolongation of the float. This stud threads into one end of an adjusting turnbuckle 31. The other end of the turnbuckle threads on the lower end of a stem 32 which finds a slide journal in the center-bore of the connector 23. The other end of said stem projects above the connector and has a fork 33 fixed thereto. The lower end of an arm 34 is pivoted as at 35 to said fork, and at its upper end is secured, as by a stud-and-socket thread connection, to one arm 36 of a lever 37. This lever is received within the horizontal section of the elbow piece 12 and is a lever of the first order pivoted at 38 to a sleeve 40 fitted in said elbow piece 12 and secured by a set screw 41. The other arm 42 has a lift saddle 43 attached thereto. Such lift saddle underlies the stem 44 of a normally seated valve core 45 serving as a closure for a water-supply spout. The spout comprises a nipple 46 threaded in said center-bore of the connector 20, hence receiving a pressure supply of main-fed water from the service pipe 16, having a body 47 for the valve core threaded on the after end. The valve is near frictionless, being of that type in which the stem occupies a position co-axial with the water flow when the valve is seated and operates to rock the valve into an open position upon being tilted out of said normal position. In this type of valve it becomes important that a stop be provided for the activating lever, and that an adjustment substantially micrometer in nature be provided for the lift saddle so that the latter will center the valve stem in exact coincidence with the stop action. I employ the upper wall of the elbow piece 12 as a stop. The micrometer adjustment is provided by pivoting the lift saddle to the lever as

at 49, and providing a screw 50 threaded in the lever arm 42 and sustaining the free end of the saddle. A threaded plug 51 gives access to the interior of the tail piece 12 for adjusting said screw 50.

The valve core is here shown as being closed by a spring 52. The spring need be employed only where water pressures are extremely low. For extreme high pressures, a reducing valve 53 may be inserted in the line ahead of the device. 54 denotes a cut-off valve. For pressures which vary over a wide range the reducing valve may be used to drop the pressure to a low but constant amount and the spring load then added to insure closing.

For the discharge of water from the device into the pool a number of outlet orifices 55 are provided. To prevent a back siphon the total area of these openings should substantially exceed the pipe area. Access of pool water to the chamber which houses the float is provided by a number of orifices 56 which are rather widely spaced to obviate surges within the float chamber.

The embodiments of FIGS. 2 and 3 are distinguished from that of the described preferred embodiment only in the shape of the pipe sections from which the refill system is fabricated. In FIG. 2 a non-active inverted-V handhold portion 58 rises to a considerable height above a horizontal cross-branch 59 in which the valve and its operating lever are housed. The portion 58 is perforce plugged. In FIG. 3 a horizontal branch 60 housing the valve and its operating lever has an open-end prolongation 61 from which the re-fill water is delivered. It will be understood that in both of the embodiments shown in FIGS. 2 and 3 a functioning counterpart of the arm 34 is housed within the vertical branch 62 or 63, as the case may be. The characteristic common to all three embodiments is that the lift-augmenting linkage operates in two planes lying angular to one another.

The shape illustrated in FIG. 3 more or less corresponds to the usual ladder configuration. While not here shown it will be understood that rungs are or may be welded or otherwise attached between the refill assembly and a correspondingly shaped dummy complement spaced therefrom.

It is believed that the invention will have been clearly understood from the foregoing description of the illustrated embodiments. Changes in the details of construction will suggest themselves and may be restorted to without departing from the spirit of the invention. It is accordingly my intention that no limitations be implied and that the hereto annexed claims be given the broadest interpretation to which the employed language admits.

What I claim is:

1. In a swimming pool, a length of pipe having the general shape of an inverted L and secured to the pool so that one section occupies a generally horizontal position spaced above and approximately parallel with the deck of the pool and the other section is disposed in a vertical position located within the confines of the pool spaced from and approximately parallel with a side wall of the latter which is adjacent said deck, the one end of said horizontal section being connected to the upper end of said vertical section, the other end of said horizontal section being connected with a main-fed service pipe and the lower end of said vertical section being submerged below the water within the pool, a valve housed in the horizontal section, a float housed entirely within the upright section so as to be completely contained therein, openings in the pipe permitting free flow of water between the pool and the interior of the pipe so that the float will rise and fall with changes in the water level of the pool and so that replenishing water will issue from said interior into the pool upon an opening of the valve, and an interconnection between the float and the valve acting to open the latter from an otherwise closed condition automatically as the float falls upon a drop of the water in the pool below a predetermined level.

2. Structure according to claim 1 in which the valve has a core which closes with the pressure of the water against an annular seat and is unseated by the act of tilting a stem prolongation of the core out of a normal position co-axial with the seat.

3. Structure according to claim 2 in which said operative interconnection comprises a lever received in the horizontal section of the pipe and pivoted intermediate its ends about a transverse horizontal fulcrum with the inner end, and namely the end which lies closer to the source of water supply, underlying the outer end of the stem and with the outer end engaged by a lift member received in the upright section of the pipe and connected with the float so as to move vertically in concert with the rise and fall of the latter.

4. The structure recited in claim 1 having a dummy complement of the pipe paralleling and spaced therefrom with rungs extending between the two to produce a ladder for the pool.

5. In a swimming pool, a length of pipe having the general shape of an inverted L and secured to the pool so that one section occupies a generally horizontal position spaced above and approximately parallel with the deck of the pool and the other section is disposed in a vertical position within the confines of the pool spaced from and approximately parallel with a side wall of the latter which is adjacent said deck, the one end of said horizontal section being connected to the upper end of said vertical section, the other end of said horizontal section being connected with a main-fed service pipe and the lower end of said vertical section being submerged below the water within the pool, a valve housed in the horizontal section, a float housed entirely within the upright section so as to be completely contained therein, openings being provided in the pipe permitting free flow of water between the pool and the interior of the pipe so that the float will rise and fall with changes in the water level of the pool and so that replenishing water will issue from said interior into the pool upon an opening of the valve, said valve having a core which closes with the pressure of the water against an annular seat and is unseated by the act of tilting a stem prolongation of the core out of a normal position co-axial with the seat, a lever received in the horizontal section of the pipe and fulcrumed intermediate its ends for motion about a transverse horizontal axis with its said other end underlying the outer end of the stem, a rod extending upwardly within the upright section of the pipe as an axial prolongation of the float and journaled for slide motion in a direction endwise to the upright section, and means connecting the upper end of said rod with the outer end of the lever so that the inner end of said lever will lift the valve stem and unseat the valve from an otherwise closed condition automatically in response to a drop of the water in the pool below a predetermined level.

6. Structure according to claim 5 in which the upper wall of the horizontal section of the pipe performs a stop function limiting the degree to which the outer end of the lever may rise.

7. Structure according to claim 5 in which the end of the lever that is further from the upright section of said pipe transfers its motion to the valve stem by lifting the free end of an intervening lift saddle which is hinged to the lever and has said free end bearing upon a screw adjustably threaded in said inner end of the lever.

8. Structure as recited in claim 7 having a removable plug giving access to said adjusting screw from the exterior of the pipe.

9. In a swimming pool, a ladder structure fabricated from pipe stock to provide hollow side bars with connecting rungs and fixedly attached to the pool so as to be a permanent fixture occupying an upright position within the pool adjacent a side wall of the latter with a portion submerged below and a portion exposed above a predetermined normal water level for the pool and having a feed connection for the delivery of water from a main-fed

service pipe to the interior of said exposed portion of one of the hollow side bars, a float mounted for vertical motion entirely within the upright portion of said side bar to which the water is fed, so as to be completely contained in said upright portion, the submerged portion of said side bar in which the float is mounted having openings for the free flow of water between the pool and the interior of the pipe so that the float will rise and fall with changes in the water level of the pool, a closure valve for said feed connection, and an operative interconnection between the float and the valve causing the valve to close and open automatically as the water-borne movement of the float reflects a rise and fall, respectively,

of the level of water in the pool to and from said predetermined level.

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