Oct. 22, 1940. L. J. DAY 2,218,507

METHOD AND APPARATUS FOR CIRCULATING WATER IN SWIMMING POOLS

Filed March 13, 1937 3 Sheets-Sheet 1

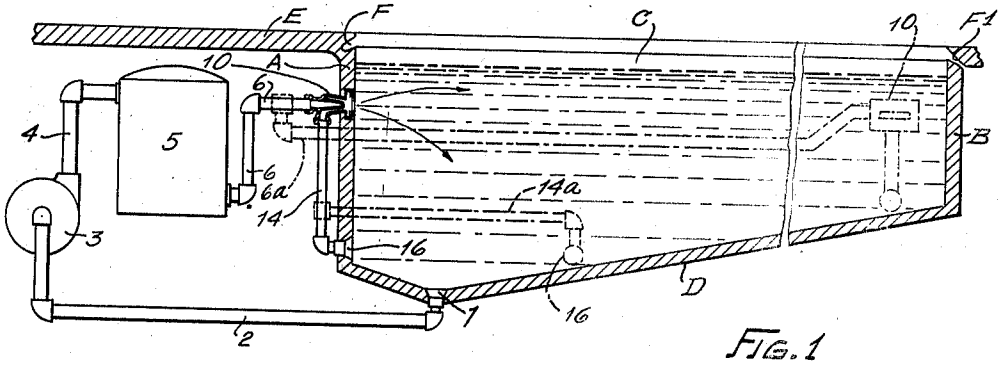


FIG. 1

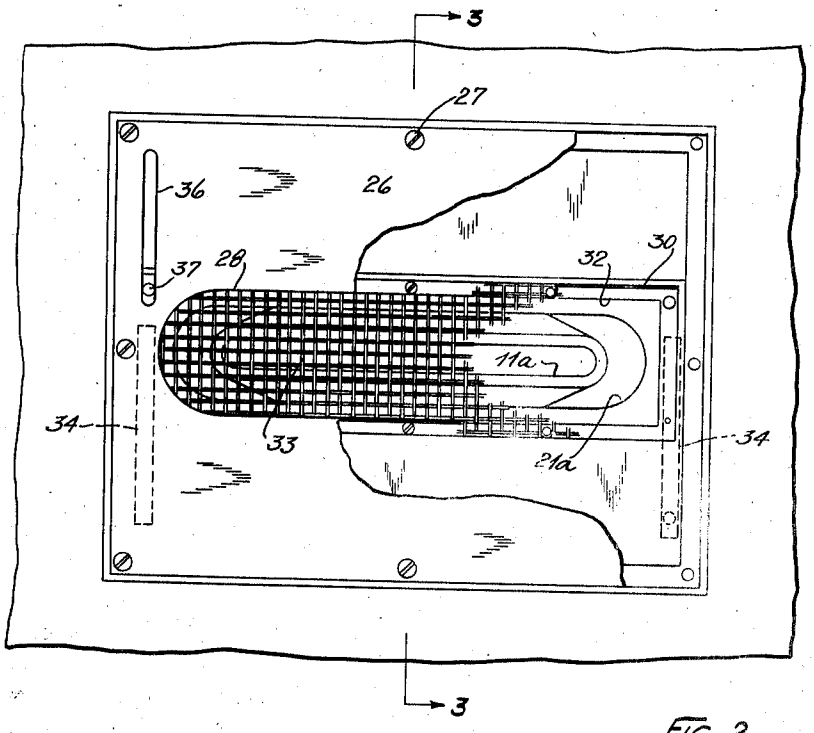


FIG. 2

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Filed March 13, 1937 3 Sheets-Sheet 2

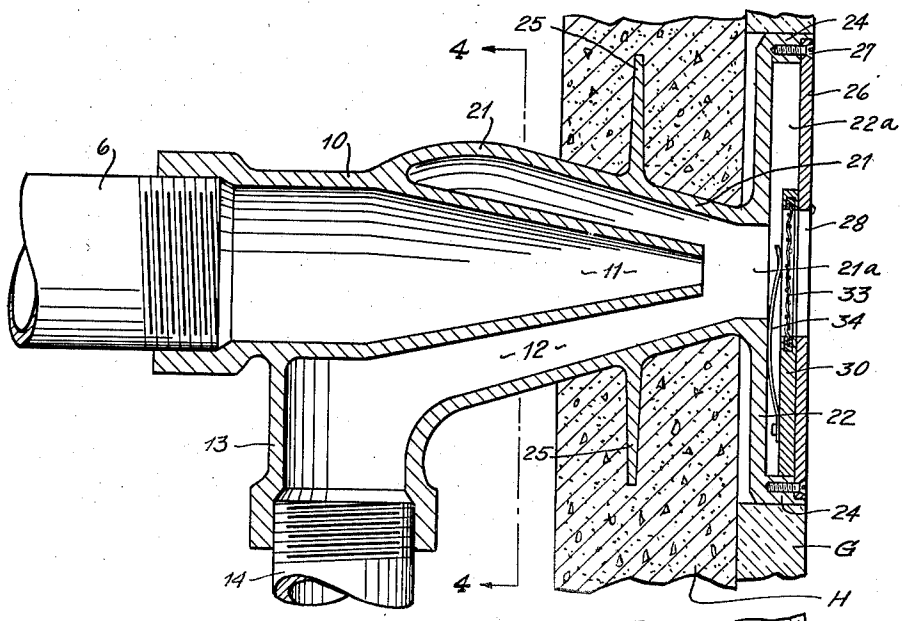
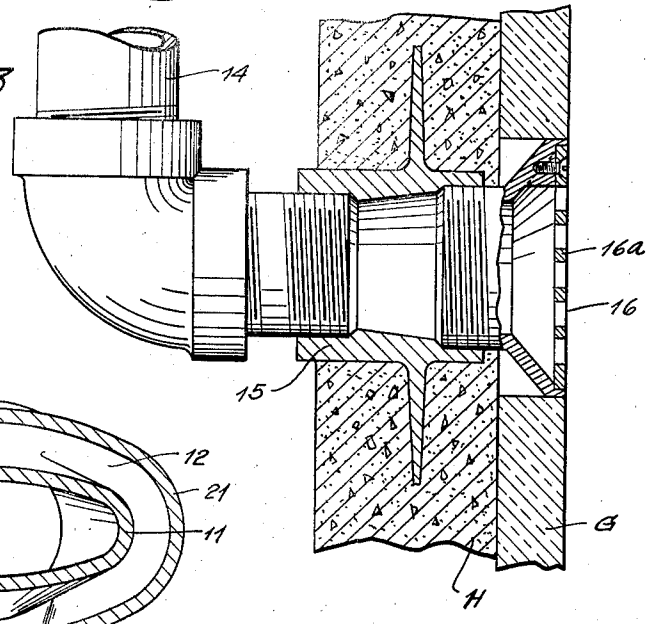


FIG. 3



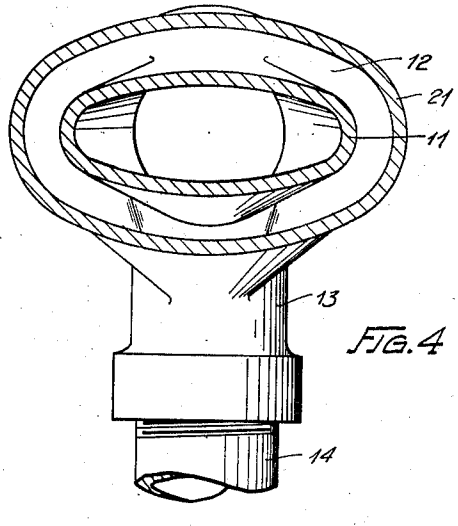


FIG. 4

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METHOD AND APPARATUS FOR CIRCULATING WATER IN SWIMMING POOLS

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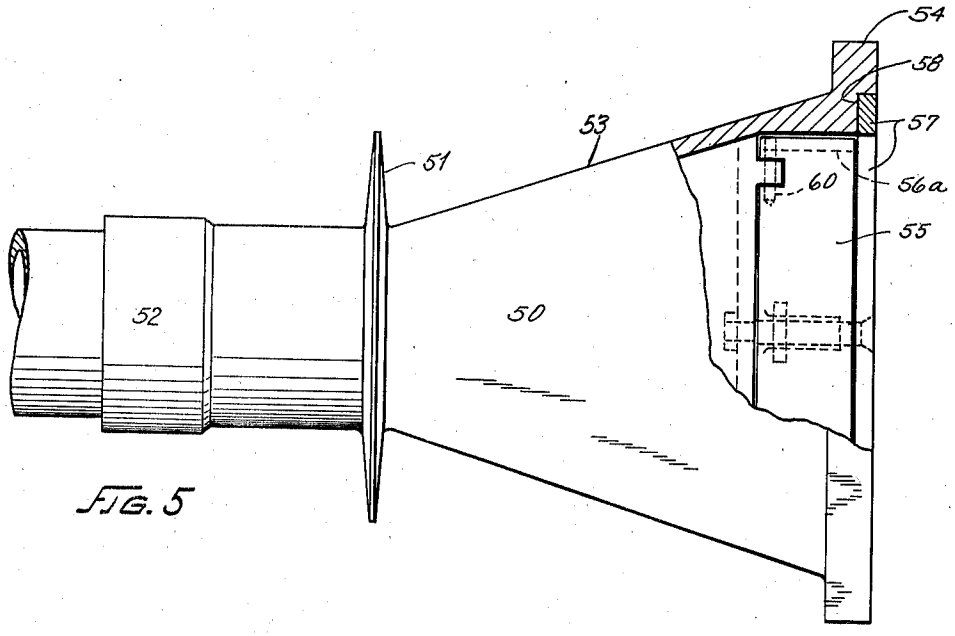


FIG. 5

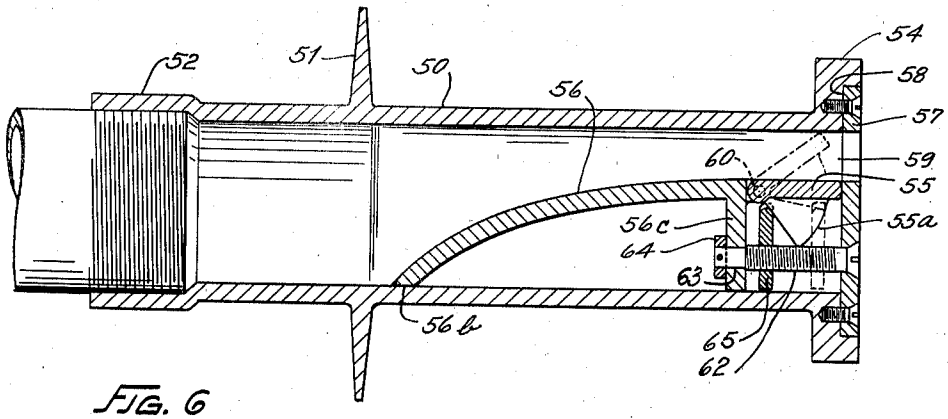


FIG. 6

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UNITED STATES PATENT OFFICE

2,218,507

METHOD AND APPARATUS FOR CIRCULATING WATER IN SWIMMING POOLS

Louis J. Day, Floral Park, N. Y., assignor to Josam Manufacturing Company, Cleveland, Ohio, a corporation of Delaware

Application March 13, 1937, Serial No. 130,781

5 Claims. (Cl. 210—11)

This application is a continuation in part of my prior application Serial No. 755,955, filed December 4, 1934, (owned by the assignee hereof), now Patent No. 2,073,784 issued March 16, 1937.

The invention relates to a method and apparatus for circulating water in swimming pools. An object is to provide a water circulation arrangement whereby definite submerged streams may be caused selectively to move or circulate in different locations as may be desired or required for different conditions or operations of the pool.

Another object is to provide an apparatus for determining selectively the direction of water circulation in a swimming pool, which apparatus is simple in construction, efficient in operation, unlikely to get out of order, and which is settable for the selective controlling operation from a convenient point or from convenient points inside the pool.

Another object is to provide an improved feed water inlet for swimming tanks, and, more specifically, an adjustable device for admitting water into a swimming tank at different points depending upon its adjustment, which device tends to maintain a setting conducive to general circulation of water in the pool as against special circulation for localization of flow, as for clean-out purposes.

Other objects include the provision of an injector arrangement which is adjustable for diversion of water in at least two materially different directions, without having to make the adjustment apparatus unduly large or expensive.

Other objects and features of the invention will become apparent from the following description relating to the accompanying drawings which show the preferred form of apparatus in connection with the water conditioning and forcing arrangement and distribution system of the parent application above identified. The essential characteristics are summarized in the claims.

Referring to the drawings, Fig. 1 is a sectional view in a vertical plane showing portions of opposite side walls and a bottom wall of a swimming tank or pool, together with more or less diagrammatic representations of the water conditioning and forcing means above mentioned; Fig. 2 is a detail front elevation of the injector and flow selector arrangement, in one form, as viewed from inside the tank; Fig. 3 is a sectional view taken in a vertical plane such as indicated at 3—3 on Fig. 2 (same as the left-hand portion of Fig. 1), showing the injector, exemplary conduits connected therewith and further details of the selector device hereof; Fig. 4 is a detail transverse sectional view taken as indicated by the line 4—4 in Fig. 3; and Figs. 5 and 6 are plan and central longitudinal sectional views respectively of a modified inlet fitting.

Referring to the general arrangement (Fig. 1), end or side walls of the tank are indicated at A and B (contiguous with opposite vertical walls, one of which is shown at C), and a bottom wall D which slopes downwardly from the vertical walls to a main outlet or drain 1 of any suitable form. A platform or floor adjacent the tank is indicated at E, and a gutter F is shown as formed in underhanging relation to the edge of the platform adjacent the vertical walls A, B and C. Such gutter usually runs entirely around the pool.

The water circulation system, as shown in Fig. 1, includes the drain 1 which may be connected as by one or more conduits 2, with a water forcing apparatus, such as a rotary pump 3. The pump discharges into a conduit 4 leading to a water treatment plant 5 comprising a tank or series of tanks as desired. Such plant may comprise filtering means and/or medicating means and/or heating means of any type. The conditioned water flows from the plant 5 as through conduit 6 to one or more inlet fittings 10. Two such fittings are indicated, one at each of two contiguous vertical walls; a branch line 6a being shown in broken lines leading to the fitting 10 on the wall C.

As indicated, each fitting 10 is, principally, a single metal casting. The fitting, in the form shown, operates as an injector (called also "ejectors"), the same having a tapered injector nozzle 11, the diminishing walls of which are in spaced relation to the outer walls, said walls being properly arranged and proportioned to cause the flow through one portion to induce flow through the other. The suction side of the injector (space 12 for normal operation with water forced through 11) communicates, as by a downward branch 13, with a conduit 14 which may have one or more points of communication with the interior of the tank. As shown in full lines, there is an outlet fitting 15 provided with a strainer or grill fitting 16, the fitting 15 being connected as by an elbow with one portion of the conduit 14. In addition, there may be any suitable number of branches 14a, one being shown by broken lines in Fig. 1. Such may be connected with the conduit 14 or directly with the suction side of the injector fitting, as desired. Water is drawn from the tank at outlets 16 by the injector action of water passing through

the nozzle 11 from the treatment plant. Water is thus forced to leave the tank at various locations other than the main drain 1. The outlets are preferably normally submerged, but may be located adjacent any of the tank walls. For instance, the suction side of the injector may be connected in part with the scum gutter F to convey water therefrom, which connection, or connections, would ordinarily include a valve or valves, so that water would be drawn from the gutter, only at certain times, as during cleaning-out of the pool.

Referring further to the fitting 10, both the nozzle 11 and shell portion 21 of the casting are horizontally elongated, as shown in Fig. 4, the inner termini of both portions 11 and 21 being nearly rectangular as shown in Fig. 2, wherein the ultimate discharge opening of the nozzle is indicated at 11*a* and the discharge opening of the outer portion 21 at 21*a*. An enlargement 22 is formed on the extremity of the portion 21 of the fitting, this being rectangular in form as shown in Fig. 2 and having peripheral flanges 24 which, as shown in Fig. 3, are set flush with the veneer or tiling material C which, in turn, is secured to and supported by the usual masonry wall construction G (e. g. concrete). An integral flange 25 is formed on the portion 21 of the fitting 10, intermediately of its ends, the flange being embedded in the concrete. The fitting 15 and grill body 16 are similarly related to the veneer and masonry (e. g. concrete) of the tank wall, as will be obvious from inspection of Fig. 3. The construction of the outlet fittings 15 and 16 leading into the conduit 14 may include a cast or other suitable grill plate 16*a* secured to the fitting 16 as by screws. The flanged fitting 15 may be internally threaded at its opposite ends for reception of the fitting 16 and the conduit piping 14 respectively.

An important feature of the present invention is the arrangement for controlling, selectively, the submerged flow of water in the pool in connection with a circulating system which includes means for recirculating water in the pool without having to pass such water through the entire water treatment plant or circulating system. This has many advantages including the provision of greater water turn-over and effecting practical elimination of stagnant zones, without having to increase, or materially increase, the capacity of the treatment plant or pumping means.

As claimed in the parent case, localized submerged flow occurs in directions towards the outlets 16 whenever the injectors are operated by water forced from the pumping means. This occasions no special load on the pumping means, and, by judicious placement of a sufficient number of induced flow outlets, all dead-spots may be eliminated from the pool. However, the induced flow is normally in constant directions because the positions of the outlets must necessarily be fixed as a practical matter. The present arrangement allows the same apparatus to be used to create flow in other directions, and includes provision of a very simple means to adjust and/or block the normal outlet of the injector devices, as will now be described.

Referring further to the enlargement 22 of the injector fitting 10, it will be noted that the space 22*a* afforded by the enlargement 22 and its flanges 24, is partially covered by a plate 26 secured as by screws 27 to the flanges. This plate has a generally rectangular opening 28 aligned with the discharge orifice of the injector, somewhat larger, but of similar shape, as shown. The space 22*a* forms a vertical guideway for a rectangular frame 30. The frame 30 rests on the bottom of said space, i. e. against the lower flange 24 as a stop, and in this position of the frame water can get through an opening in it at 32 which may comprise grill work formed in the frame, or wire screen 33 such as shown. Leaf springs 34 secured to the back of the frame and reacting on the adjacent surface of the enlargement 22 of the fitting 10 press the frame forwardly against the plate 26 and form a retaining means for the frame, particularly when the same is elevated in normal discharge position, i. e. when adjusted so that its lower imperforate portion blocks (wholly or partially as desired) the passage of water through the opening 28 in the plate 26. For this purpose guide slots 36 are provided in the outer plate 26 into which pins 37 (fixed to the frame) extend a sufficient distance to permit the frame to be raised manually from inside the tank. By governing the spring strength, the frames can be retained in raised position indefinitely, but the tendency (weight of frames) is for the frames to move toward or stay in the normal setting shown.

If one or more of the normal inlet openings 28 associated with the injectors is, or are, closed as by the means just described, then the injector or injectors so affected function to pass water in a direction reverse of normal, i. e. through the conduit or conduits 14, 14*a*, etc. This in the particular arrangement of tank outlets 16 shown, would be used principally when it is desired to flush the tank as by overflowing it, because such reversal of direction would tend to lift water from the bottom of the tank toward the top where it overflows into the gutter F and is drained out as at F'. However, the system can also be used by effectively blocking some of the injectors from their normal action causing reversal of flow on one or more of the conduits 14, 14*a*, etc., while one or more other injectors functions or function in the normal manner above described to create induced streams outwardly toward the fittings 16.

It will be noted that while positive locking means may be provided to hold the frames 30 in lifted position, this is unnecessary because the springs 34 are sufficient to insure maintenance in such position during short periods. Gravity tends to lower the frames, which is a desirable feature because in general, maintenance of induced flow through the conduits 14 has been found most effective in overcoming dead-spot conditions in the pool or tank.

Referring to Figs. 5 and 6, the construction there shown may be used for the outer end of the fitting 10 (or independently of any injectors for that matter) as, for instance, an alternative means for controlling feeding of water into the pool. In other words the fitting 50 may be formed in include an injector as part of its construction or it may be used as illustrated at the discharge end of a conduit such as 6.

The fitting has an anchor flange 51 intermediately of its ends, an internally threaded inlet at 52 and a laterally widened discharge and adjustment containing portion 53 flanged at its outer end as at 54. The outer face of the flanged end may be set flush with the inside wall surface of the tank.

Discharge through the fitting can be controlled or blocked by the gravity opened control device

shown inside the widened end of the fitting **50**, of which device **55** is a valve plate and **56** a supporting body for the plate. The body **56** has a flanged outer end portion **57**, open at **59**; the portion **57** being set into a recess **58** in the flanged part of the fitting, and adapted to be secured as by screws. The body **56** is extended around the valve plate at both side edges of the latter, see **56***a* Fig. 5, and thence inwardly and downwardly substantially into contact with the floor portion of the fitting as at **56***b*. The valve plate is pivoted at **60** to the support **56** in such position that it may be swung upwardly into the broken line position to close the outlet.

Water in order to pass out of the opening **59** has to rise over the body **56** and, in the position of the valve plate shown in full lines, such water merely flows over the top face of the valve plate.

To adjust the plate **55** there is provided an adjusting screw **62** (may be more than one, e. g. two) supported to turn in aligned openings **63** in spaced depending portions of the body **56**, including a depending portion **56***c*, and held against endwise movement as by the head of the screw and a collar **64** opposite the head. The screw is accessible for adjustment from inside the pool as by means of a screw driver. The threaded shank of the screw threadingly engages a pusher plate **65**, the upper end of which travels back and forth against the under side of a cam **55***a* on the under side of the valve plate to open and close the valve when the screw is turned in opposite directions.

I claim:

1. The method of re-distributing water in a swimming tank comprising withdrawing separate streams of water from the tank at intake points adjacent its wall, conditioning the water in one of the streams and returning a part of the conditioned water with the stream of unconditioned water for re-circulation to the tank at an outlet point, and thereafter returning the conditioned water alone to the tank through one of the intake points.

2. The method of re-distributing water in a swimming tank comprising withdrawing separate streams of water from the tank at intake points adjacent its wall, one of said streams being withdrawn by the suction induced by forcing the water of the other stream to flow back into the tank at an outlet point, conditioning the water from the forced stream and returning the conditioned water with the unconditioned water from the induced stream for re-circulation to the tank and thereafter reversing the direction of the induced stream and returning the conditioned water to the tank through the intake point of the induced stream.

3. In an apparatus for circulating water in a swimming pool, a conduit leading from one point in the pool to another point therein, means for circulating water through said conduit, a second conduit leading from the pool and communicating with the first named conduit in such relation thereto that a supplemental stream is maintained in the second conduit, and means operable selectively to divert the egress of water from the first-named conduit into the second named conduit, whereby water will be forced through both conduits in series and enter the pool through the normal intake for the second named conduit.

4. In a swimming tank apparatus of the class described, a tank having spaced normally submerged outlets, conduits leading from said outlets, injector means communicating with both conduits and having a discharge duct arranged to return the mixed water from both conduits to the tank, a pump in one of said conduits arranged to force water therein toward the injector means thereby to maintain simultaneous circulation of two localized streams of water in the tank, and selectively operable means adapted and arranged to block the exit of the discharge duct thereby to render the injector means inactive as such and active as a passage connecting the two conduits, whereby to maintain one circulating stream in the tank in a location different from either aforesaid circulating stream.

5. The method of purifying the water in a swimming tank comprising withdrawing water from the tank at one point adjacent to the wall of the tank, conditioning such water and returning it to the tank at a point spaced from the point of withdrawal, withdrawing a second stream by suction induced by the flow of water to the tank and returning such induced flow to the tank with the returning stream of conditioned water and thereafter reversing the direction of the induced flow by returning the purified stream to the tank at the point which previously was the outlet point for the induced stream, and thereafter again permitting the flow of the induced stream to thereby purify the water in the pool by the alteration of the circulatory currents flowing to and from the pool.

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