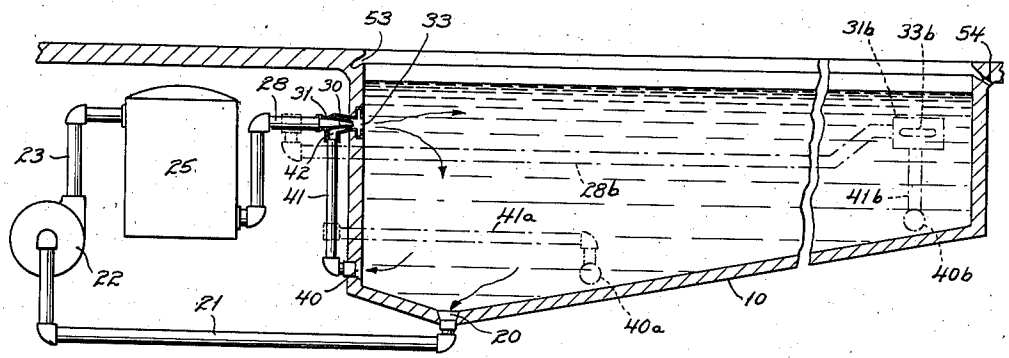
March 16, 1937. L. J. DAY 2,073,784

METHOD AND APPARATUS FOR CIRCULATING WATER IN SWIMMING POOLS

Filed Dec. 4, 1934 2 Sheets-Sheet 1

FIG. 1



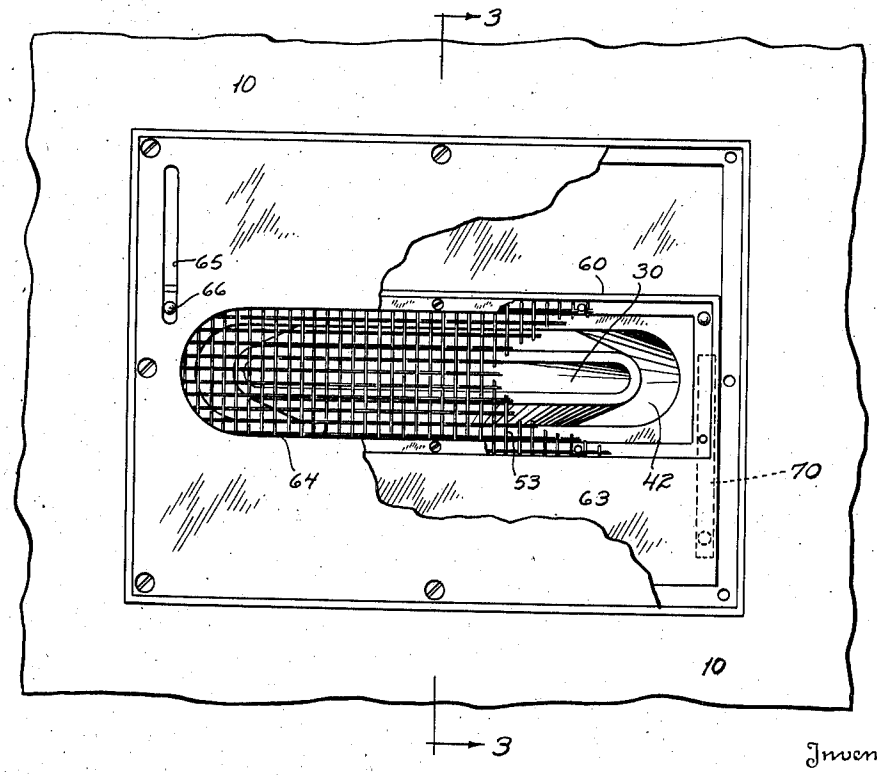


FIG. 2

Inventor

Louis J. Day

By Bates, Golwick, & Teare

Attorneys

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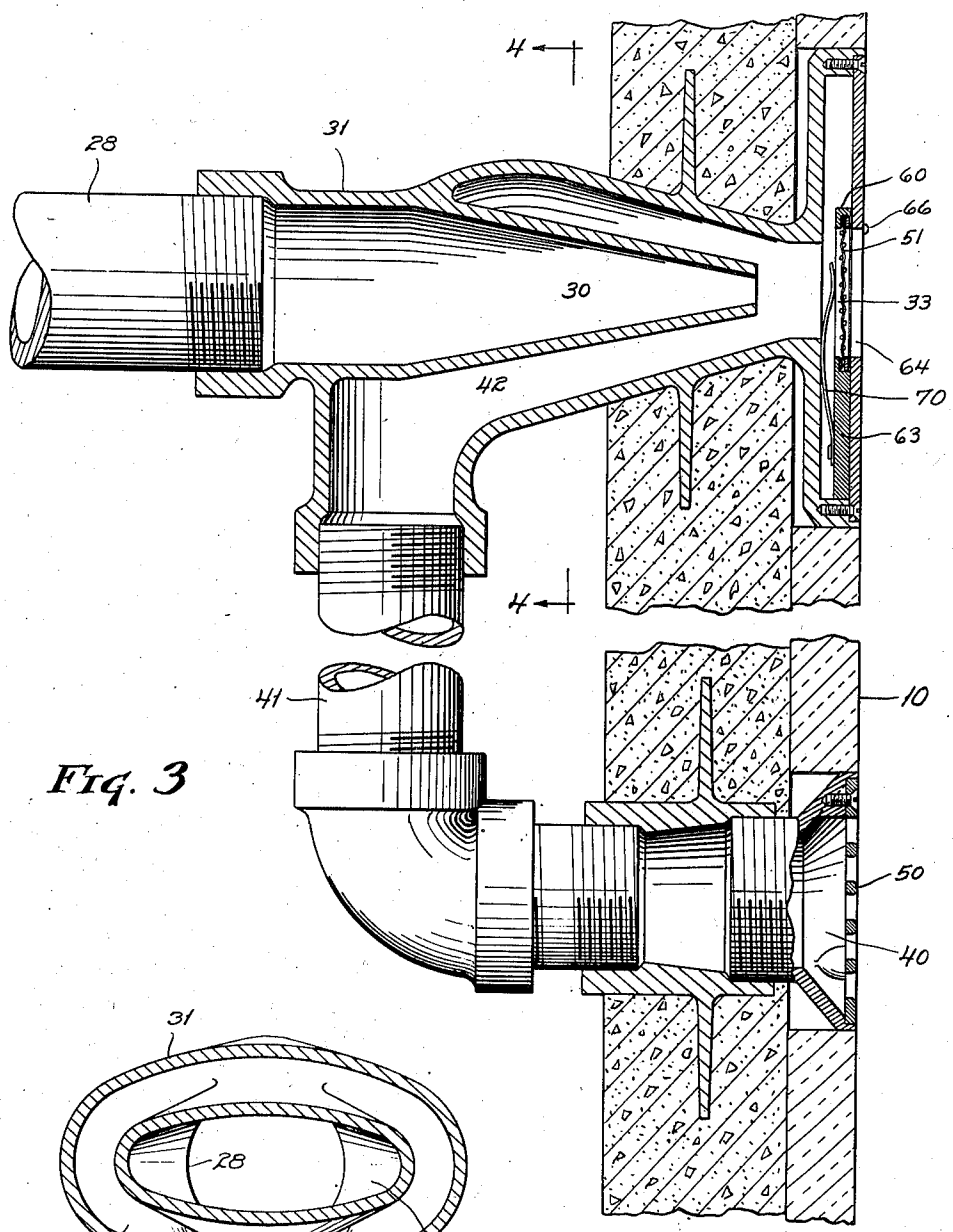

FIG. 3

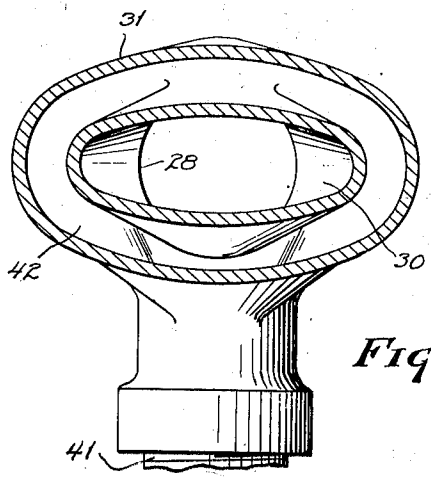

FIG. 4

Inventor

Louis J. Day

By Bates, Golrick & Teare

Attorneys

Patented Mar. 16, 1937 2,073,784

UNITED STATES PATENT OFFICE

2,073,784

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 December 4, 1934, Serial No. 755,955

8 Claims. (Cl. 210—11)

This invention relates to a method and apparatus for effecting circulation of water in a swimming pool or the like. This, therefore, is the general object of the invention.

In swimming pools it is customary at the present time to remove water, purify it and return it to the pool. This provides a certain amount of circulation. However, it has been found that "dead spots" exist, that is, in portions of the pool there is no circulation, allowing the collection or segregation of impure water. One of the objects of the present invention is to eliminate such so-called "dead" spots by effecting localized circulation of water in the pool and to facilitate also the maintenance of uniformity of temperature of the body of water comprising the pool.

A more specific object is to provide a method and apparatus for effecting a localized circulation of water in a swimming pool by maintaining at least two circulatory streams of water travel to and from the pool. One of these streams being a pump-forced stream directly to the pool and another stream being induced by an injector action, depending upon the flow action of the pump-forced stream.

Other objects of the invention will become more apparent from the following description, reference being had to the accompanying drawings, in which I illustrate a preferred form of mechanism for carrying out my improved method of circulation. The essential features of the invention will be set forth in the claims.

Referring now to the drawings, Fig. 1 is a typical cross-section of a swimming pool, and illustrates an improved form of apparatus for carrying out my method; Fig. 2 is a front elevation, partially broken away and on an enlarged scale, of the inlet for water to the pool; Fig. 3 is a vertical section, taken in substantially the same plane as Fig. 1, but on an enlarged scale; the section is also indicated by the line 3—3 on Fig. 2; Fig. 4 is a transverse vertical section, as indicated by the line 4—4 on Fig. 3.

My improved method of effecting a localized circulation of water in a swimming pool comprises, in general, maintaining at least two circulatory streams of water traveling to and from the pool, the flow of one of the streams being maintained by a pump, and the other stream being impelled by the flow of the pump-maintained stream. This enables the drawing of water from one point in the pool, by a pump, which forces the water into the pool at a distant point. The force of this circulating stream in turn causes an ejection of water from another point in the pool, mixes it with the pump-circulating stream and causes such water to be injected into the pool.

The pump circulated stream may pass through suitable filters, chlorinators, sterilizers and the like, in the usual manner to purify the water, while the other stream acts to maintain the circulation in the pool and prevent the accumulation of impurities in dead spots in the pool, by effecting localized circulation.

The above described method enables the maintaining of a high degree of purity at all points in the pool, with a minimum amount of equipment. The circulating stream of water induced by the pump circulated purified stream is injected into the pool by an injector action impelled by the purified stream, thereby causing both streams to co-mingle or mix at the point of injection and maintaining a constant circulation of water of a higher degree of purity than that which is removed from the pool without increasing the capacity of such a purification apparatus and mechanism.

Referring again to the drawings, and especially to Fig. 1, I have shown an improved form of apparatus for carrying out my method, as adapted for use in a swimming pool of the general type. As illustrated, the pool comprises a water-proof basin 10, having bottom walls sloping toward a drain outlet 20, which is connected by a suitable conduit 21 to the inlet of a pump 22.

The water flows from the pool by gravity into the pump which is operated by any suitable means, such as an electric motor, not shown. A conduit 23, communicating with the outlet of the pump 22, conducts the stream of water into a filter or purifying apparatus 25, through which the stream is forced by the pump. Suitable conduits 28 conduct the water from the purifying apparatus returning it to the pool slightly below the water level thereof or at any point below the water level. The water could flow by gravity to a surge tank or open sump, in which case the position of the pump, as shown in the drawings, would be reversed.

The water forced through the purifier by the pump is injected into the pool. The conduit 28, which leads from the purifier, communicates with an elongated nozzle 30 of an injector 31. The purified water is therefore forced from the nozzle 30, through a suitable opening or inlet 33, into the pool at a point slightly below the normal water level thereof. This provides for the circulation of one stream of water to and from the

pool, the circulation or flow being caused by the action of the pumping mechanism.

A second stream of water is circulated to and from the pool by the flow of the pump fed stream. As shown, a second outlet or drain **40**, spaced apart from the outlet **20**, permits the water from the pool to enter a conduit **41**, which communicates with a chamber **42** in the ejector. The chamber **42** surrounds the outlet of the nozzle **30** and communicates with the inlet **33**. Both the inlet opening **33** and the outlet **40** and the communicating passageway or conduit **41** lie below the normal water lever in the pool. Hence, the conduit **41** and the injector chamber **42** will be normally filled with water. The flow of the purified stream through the chamber **42** will therefore induce a flow of water through the conduit **41** and inject it into the pool.

In the drawings, I have indicated in dotted lines, a second inlet opening **40***a* connected to the conduit **41** by a suitable conduit **41***a*. This enables one injector mechanism to eject the water from two different localities in the pool and inject it together with the purified stream at one point.

In certain swimming pools, because of their size, I prefer to employ a plurality of injectors. As shown, in Fig. 1, I have indicated a second injector **31***b*, which is in communication with the pump **22**, through a conduit **28***b*, which is connected to and communicates with the conduit **28** heretofore mentioned. The flow of the pump forced stream through the injector **31***b* acts to cause the circulataion of another stream of water. As shown, I have provided a second ejector opening **40***b*, similar in all respects to the opening **40** which, through a conduit **41***b*, makes a communication with the ejector **31***b* in a manner similar to that described in connection with the injector **30**. Thus, it will be seen I am able to effect localized circulating streams of water in swimming pools with a minimum amount of apparatus, without necesitating or requiring addition or enlargement of purifying apparatus, and at the same time all of the water entering the pool is, to a certain degree, more pure than that withdrawn from the pool.

As shown in the drawings, each of the outlet members for the pool **40** and **20** are provided with suitable grills **50** to prevent the clogging of the system, and to prevent injury to those who use the pool. Each inlet member **33** or **33***b* is likewise provided with a grill **51**. However, in this instance I prefer to use a wire mesh or screen, as this form of grill permits the flow of water with less restriction than a cast grid.

Occasionally it is desirable to force or inject water into the pool adjacent its bottom wall. At times this is desirable to cause the surface water to flow into suitable gutters **53** formed in the side walls of the pool and communicating with suitable drain through passageways **54**. I accomplish the reversal of flow without reversing the flow of water through the filter or without necessitating the manipulation of a plurality of valves.

As illustrated in Figs. 2 and 3, I mount each grill or screen **51** in a frame **60**, which is slidably mounted at the forward face of the injector member **31**. The frame **60** is normally retained in position by springs **70**, which hold the frame in frictional engagement with the injector. The frame is manually movable to bring a plate portion **63** thereof in front of the opening **64** in the wall of the injector member to prevent egress of water from the ejector directly into the pool. A suitable lug **66**, carried by the frame **60** and extending through a slotted opening **65** in the wall of the ejector, enables the pool attendant to adjust the position of the frame **60**. When the frame is adjusted to prevent direct communication between the injector and the pool the pump fed or purified stream will be forced downwardly through the conduit **41** and outlet **40** into the pool.

From the foregoing description it will be seen that I have provided a method and apparatus for economically causing localized circulation of water in a swimming pool or the like, which method may be carried out in a simple manner and without necessitating expensive or bulky equipment. While I have described the invention as used with a filtering and purifying system, the circulating method and apparatus will function as well with or without such system.

I claim:

1. The method of locally redistributing water in an open swimming tank having continuous vertical walls and a bottom wall, comprising drawing a main stream of water from the tank from a point at the bottom wall remote from the junction between the vertical walls and the bottom wall, returning it to the tank at a point on a vertical wall remote from such junction, and simultaneously drawing a supplemental stream from the tank at a point relatively close to said junction and returning said supplemental stream to the pool with the main stream.

2. The method of locally redistributing water in an open swimming tank having a continuous vertical wall and a bottom wall, comprising drawing a main stream of water from the tank from a point at the bottom wall remote from the junction between the vertical wall and the bottom wall, returning it to the tank at a plurality of points on the vertical wall remote from such junction, and simultaneously drawing supplemental streams from the tank at a plurality of points relatively close to said junction and returning said supplemental streams to the pool with respective portions of the main stream.

3. In a swimming pool having a substantially continuous wall forming an open basin and means to establish a normal swimming level of water therein, the combination of means providing a plurality of spaced outlets leading from the basin below the normal swimming level, separate conduit means outside the inner basin surface to conduct water from the outlets, water conditioning and forcing means associated with one conduit means, means to mix the conditioned water with the water in the other conduit means, the mixing means including an injector device which is operated by the flow of conditioned water and which operates to maintain flow of water in said other conduit means, said injector device discharging the mixed water into the pool.

4. The method of locally redistributing water in an open swimming tank having a continuous vertical wall and a bottom wall, comprising drawing a main stream of water from the tank adjacent the bottom wall remotely with respect to the junction between the vertical wall and the bottom wall, returning it to the tank at a point on the vertical wall remote from such junction, and simultaneously drawing a plurality of supplemental streams from the tank at spaced points relatively close to said junction and returning the water of said supplemental streams to the pool with the main stream.

5. The method of locally redistributing water

in an open swimming tank having a continuous vertical wall and a bottom wall, comprising drawing a main stream of water out of the tank from adjacent the bottom wall remotely with respect to the junction between the vertical wall and the bottom wall, returning it to the tank at a point on the vertical wall remote from such junction, utilizing the water of said main stream simultaneously to draw a supplemental stream from the tank at a point relatively close to said junction, and returning the water of said supplemental stream to the pool.

6. The method of locally redistributing water in an open swimming tank having a continuous vertical wall and a bottom wall, comprising drawing a main stream of water out of the tank from adjacent the bottom wall remotely with respect to the junction between the vertical wall and the bottom wall, returning it to the tank at a point on the vertical wall remote from such junction, utilizing the water of said main stream simultaneously to draw a plurality of supplemental streams from the tank at a plurality of spaced points relatively close to said junction and returning the water of said supplemental streams to the pool.

7. The method of locally redistributing water in an open swimming tank having a continuous vertical wall and a bottom wall, comprising drawing a main stream of water out of the tank from adjacent the bottom wall remotely with respect to the junction between the vertical wall and the bottom wall, dividing the water of the main stream and returning it to the tank at spaced points on the vertical wall remote from such junction, utilizing water of each division simultaneously to draw respective supplemental streams from the tank at points relatively close to said junction, and returning the water of said supplemental streams to the pool.

8. A swimming pool, comprising a substantially continuous wall which forms an open basin in which water is free to flow from side to side in any horizontal direction, two conduits leading from the basin at normally submerged points spaced from each other and disposed directly adjacent the inner surface of said wall, pumping means operatively associated with one of said conduits intermediately of its effective ends to maintain flow of water in such conduit, and an ejector device arranged to discharge water into the basin, said device being disposed at the discharge end of the conduit through which water is forced by the pumping means for operation by such forced water, the suction side of the ejector device being connected to the other conduit whereby two localized circulating submerged streams are simultaneously maintained within the pool.

LOUIS J. DAY.