Jan. 20, 1970 J. F. OGDEN 3,490,081

SWIMMING POOL CIRCULATORY SYSTEM

Filed March 24, 1967

2 Sheets-Sheet 1

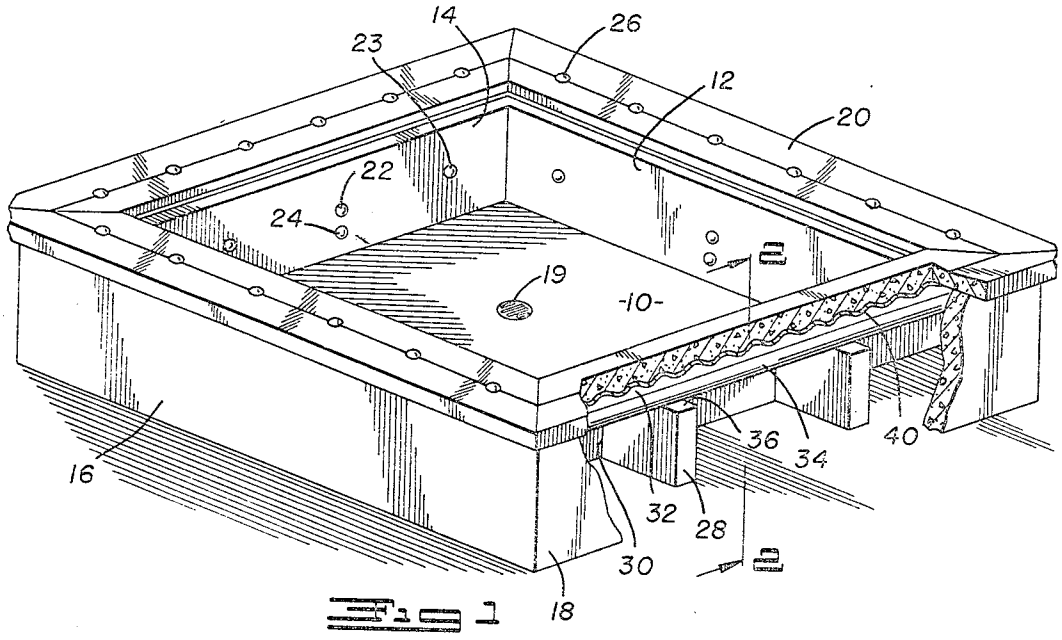


Fig 1

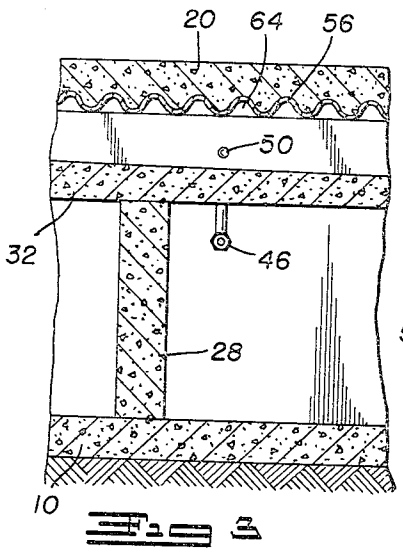


Fig 3

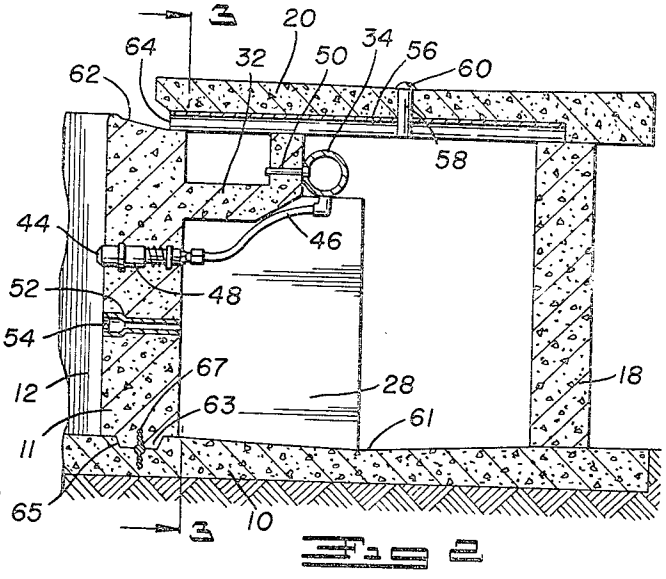


Fig 2

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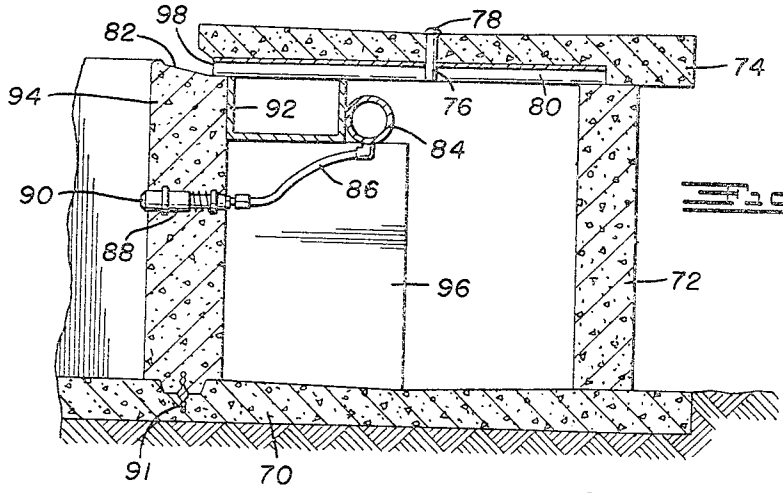


Fig. 4

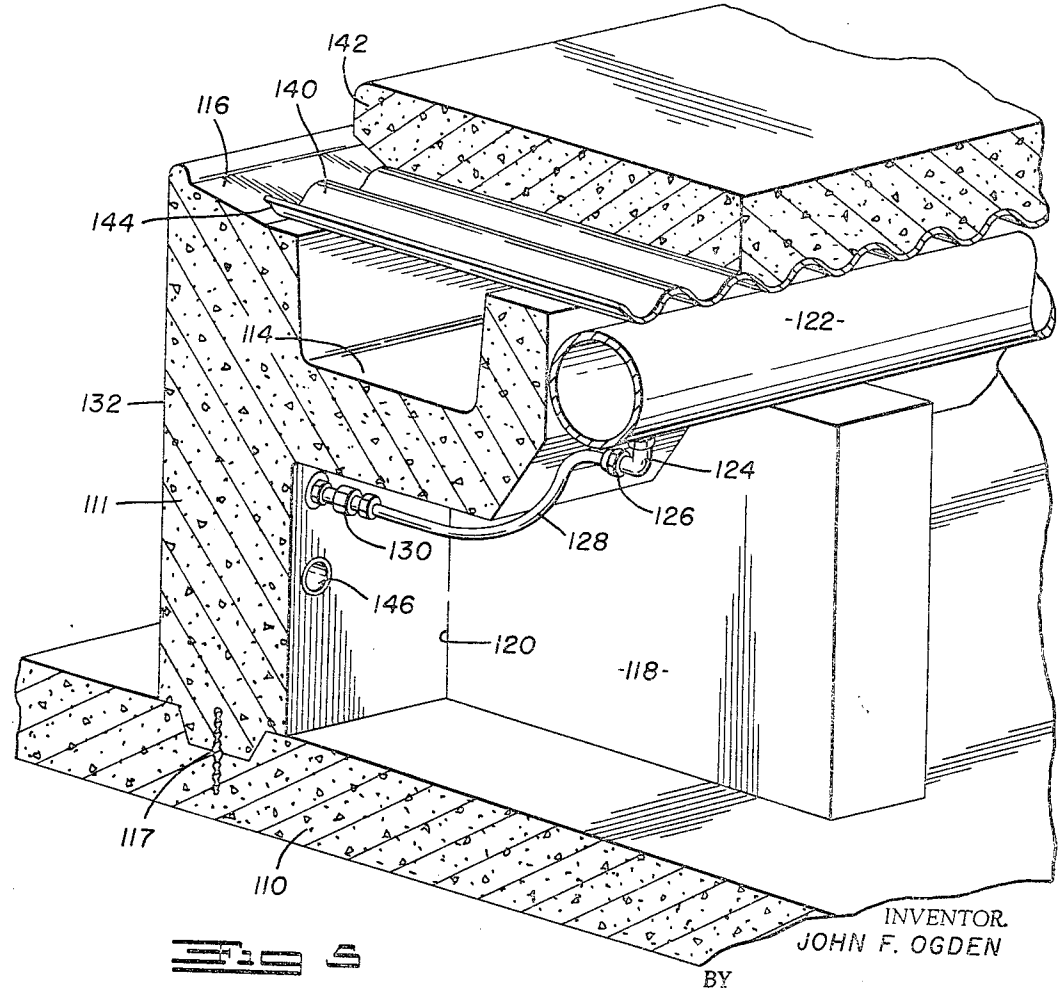


Fig. 5

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SWIMMING POOL CIRCULATORY SYSTEM

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U.S. Cl. 4—172.17 3 Claims

ABSTRACT OF THE DISCLOSURE

Swimming pool water is fed into a swimming pool by means of a circumferential supply pipe surrounding the outside of the pool walls in a crawl space, and a plurality of conduits branching from the supply pipe at spaced intervals, which conduits are connected through sleeves in the pool walls to a plurality of nozzles at similarly spaced intervals positioned at the inner surface of the pool walls below the water surface.

Swimming pool water is removed from the pool by a surface drain comprising a guttter chute formed by an outward, downward pitch in the top of the pool walls, a peripheral gutter trough adjacent to, parallel to, and longitudinally co-extensive with the pool walls, and a corrugated sheet seated on the gutter chute covering the gutter trough and itself conformably covered with concrete. Pitched decks provide drainage from the deck, the gutter troughs are continuously rinsed with clean chlorinated water fed through a tube connecting the supply pipe with the gutter trough. A non-corrosive high expansion piping system is used.

BACKGROUND OF THE INVENTION

Field of the invention

The circulatory system described in this application relates generally to the input and removal of liquid from liquid containing tanks. So, for example, it could be used in the treatment of sewage or the mixture and processing of chemicals. However, as described in the preferred embodiments, the circulatory system is particularly applicable to the field of swimming pools and their construction and maintenance.

DESCRIPTION OF THE PRIOR ART

With a swimming pool, it is necessary, or at least desirable, to provide a water circulation system. Water must continuously be removed, filtered, and pumped back into the pool. The purpose of the circulation system is to remove water with foreign material in it from the pool, remove the foreign material from the water, and return clean water into the pool.

The modern swimming pool is generally provided with both a large floor drain for the removal of water and the sediment it contains and also surface drains for the removal of surface water and the surface borne body oils, suntan lotion, and debris it contains. Water removed by these drains is pumped through a filter and returned to the pool through peripheral water inlets.

Prior to my invention, the peripheral water inlets have been considered difficult and expensive to construct, install, and maintain. As a result, pools are often constructed with the water inlets spaced apart as far as local building codes will permit. Because of this spacing, there are regions in the pool where relatively little water circulation occurs. These regions are termed dead spots. Such dead spots exist in the corners of the pool and between the water inlets. At these dead spots, sediment, algae, and bacteria tend to collect. There is therefore a need for an inlet system which will permit elimination of these dead spots.

The reason that peripheral water inlets are difficult and expensive to construct, install, and maintain is that the inlet piping system is buried either in hardened concrete or in the terrain below the concrete. If a defect occurs in such a buried piping system and needs repair, the defective part of the system is almost totally inaccessible. Making repairs and replacements becomes extremely difficult and expensive.

Furthermore, desirable non-corrosive piping, made of plastic for example, may not be used in a buried system because of its large coefficient of expansion. There is therefore a need for an inlet system which is easily accessible for repairs and which can be constructed of non-corrosive piping materials.

The surface drains now provided for pools are usually gutters having a bottom below the water surface and having an inward side just above the water level. Waves or ripples in the water carry water into these gutters. Such gutters may be longitudinally inclined to cause the water to flow by gravitational force to a single outlet. Alternatively, such gutters may be equipped with periodically spaced outlets. In either case, at least two disadvantages can be noted.

First, because gutters, as now constructed, have a solid outermost wall opposite their innermost wall, waves of appreciable magnitude will splash across the inner gutter wall, hit the outer gutter wall, and be reflected back into the pool carrying out with them not only the foreign material the waves brought into the gutter, but also some of the foreign material which had settled in the gutter from prior waves. Furthermore, foreign materials often collect in these gutters. This occurs because the velocity of water flowing along the gutter to an outlet is too slow. the velocity is too slow because the longitudinal incline of the gutter is too slight. This incline is limited by the fact that the innermost gutter wall must remain slightly above the water level all along each wall. The slowness of the velocity of the gutter water has an additional detrimental effect. If the rate of flow of water along such a gutter is small, relatively few gallons of water may be filtered per minute. A more rapid water flow would allow a more rapid water cleaning rate. There is, therefore, a great need for a surface drain which will efficiently remove all the water and foreign material passing into the gutter and will do this at a high rate of flow.

OBJECTS

It is therefore an object of my invention to provide an improved pool circulatory apparatus.

A further object of my invention is to provide an apparatus which will remove foreign material from water located in all parts of the pool.

A further object of my invention is to provide more efficient removal of water and foreign material through a splash trough outlet.

A still further object of my invention is to provide an apparatus which will permit the cleaning of pool water at a rapid rate.

A yet further object of my invention is to permit the the exclusive use of non-corrosive piping and to provide an entirely accessible circulatory system.

Further objects and features of my invention will be apparent from this specification and the following claims when considered in connection with the accompanying drawings illustrating several embodiments of my invention.

SUMMARY OF THE INVENTION

I have invented a pool outlet and outlet system and apparatus.

The inlet apparatus comprises a circumferential supply

pipe surrounding the pool within a crawl space which supplies water to a plurality of nozzles, spaced around the inner periphery of the pool, each nozzle being fed through a separate conduit from the supply pipe to the nozzle.

The outlet apparatus comprises an outwardly, downwardly inclined gutter chute around the periphery of the water, a coextensive gutter trough having some longitudinal slope and positioned below and adjacent to the outer side of the gutter chute, and a corrugated sheet positioned on the gutter chute and extending over the gutter trough.

This system and apparatus provide a pool having adequate water circulation everywhere within the pool. Dead spots are eliminated. The advantages of modern inexpensive non-corrosive material may be applied to pool circulatory systems. All portions of the apparatus are conveniently accessible and easily replaced. Water is cleaned at a greatly increased rate, and foreign material is more thoroughly and efficiently removed from the pool. Other advantages will become obvious from the description below.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a view in perspective of a swimming pool, with a section removed, the embodiment being constructed according to my invention;

FIG. 2 is a view in section of a portion of a swimming pool constructed according to my invention and taken substantially along the line 2—2 in FIG. 1;

FIG. 3 is a view in section taken substantially along the line 3—3 in FIG. 2;

FIG. 4 is a view in section, similar to FIG. 2, but showing another embodiment of my invention; and

FIG. 5 is a view in section and in perspective of a fragment of another embodiment of my invention.

In describing the preferred embodiments of the invention illustrated in the drawings, specific terminology will be resorted to for the sake of clarity. However, it is not intended to be limited to the specific terms so selected, and it is to be understood that each specific term includes all technical equivalents which operate in a similar manner to accomplish a similar purpose.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Structure.—A swimming pool constructed according to my invention is shown in FIG. 1. The pool has a floor **10**, four inner walls of which two inner walls **12** and **14** are visible. Four outer walls enclose the pool and its circulatory system. Only one outer wall **16** and a portion of another outer wall **18** are visible. A peripheral deck **20** surrounds the pool and rests on the inner and outer pool walls. A plurality of nozzles, like nozzles **22** and **23**, are shown protruding from the inner surfaces of the inner walls **12** and **14**. Below some of the nozzles, as below nozzle **22**, is a winter drain outlet such as winter drain outlet **24**. Each portion of the deck **20** is pitched toward its longitudinal center so that it is concave. Spaced along the lowest level of the deck are a plurality of deck drain holes, like deck drain hole **26**, which may be covered with a suitable grating. A floor drain **19** is located on the pool floor **10**.

A portion of the wall **18** and the deck **20** have been removed to expose a portion of an embodiment of my circulatory system. Two buttresses, like the buttress **28**, are shown, each having its inner end butting against the outer surface of the inner wall as at **30**. In addition to serving as buttresses the buttresses support a portion of a gutter trough **32**. A portion of a supply pipe **34** also rests on the buttress, as at **36**, an supplies water to the peripheral nozzles through conduits (not visible in FIG. 1). A portion of the corrugated sheet **40** which is positioned on the gutter trough **32**, and on which the deck was poured, is visible in cross section. Substantially similar structure is below the remainder of the deck **20** around the whole pool.

FIG. 2 is a view in section taken substantially along the line 2—2 of FIG. 1. The floor **10**, one inner wall **11**, another inner wall **12**, the deck **20**, and outer wall **18** are shown.

The buttress **28** butts against the inner wall **11** and supports the gutter trough **32** and the supply pipe **34**. In FIGURE 2, the gutter trough **32** and the inner wall **11** are a unitary body. The supply pipe **34** supplies water to a nozzle **44** through a conduit means **46** which passes through a sleeve **48**. The conduit means comprises the elbows, tubes, and other connectors, the selection and design of which could be done by anyone with ordinary skill in the art. I prefer that the supply pipe **34**, the conduit means **46**, the sleeve **48**, and the nozzle **44** all be constructed of a non-corrosive material such as synthetic plastic. A small rinse pipe **50**, through the gutter trough wall, supplies water from the supply pipe **34** to rinse the gutter trough **32**. This may, for example, have one tenth the capacity of the conduit means **46**.

A cylindrical tube with an enlarged end portion has been molded into the concrete to provide a winter drain outlet **52**. The enlarged end of the winter drain outlet **52** has internal threads mating with the external threads on a removable closure **54**.

The deck **20** comprises a corrugated sheet **56**, with concrete conformably resting upon it. The deck is pitched so that water will drain toward the deck drain hole **58**, having a grating **60** covering it. The portion of the pool floor **10** which is the flood of the crawl space below the deck **20** is pitched to form a trough **61**. Additionally, this trough is pitched longitudinally to carry any water to a suitable outlet. At the junction of the inner pool walls I prefer to use a keyway, tongue, and waterstop. The inner wall **11** has a tongue **63** fitted into a keyway **65** in the pool floor. A waterstop **67** has been molded transverse of the tongue **63** and the keyway **65**.

FIG. 2 also shows the detail of the gutter chute **62** which is formed by an outward, downward incline in the top surface of the inner wall **11**. Between the lower portions of the gutter chute **62** and the bottom surface of the corrugated sheet **56** are a series of adjoining openings which connect the gutter chute **62** with the gutter trough **32**.

These adjoining openings, such as opening **64**, are more clearly visible in FIG. 3. FIG. 3 is a view in section taken substantially along the line 3—3 of FIG. 2. In FIG. 3, the deck **20** can be seen as conformably above and adjacent to the corrugated sheet **56**.

Also shown in FIG. 3 are the pool floor **10**, buttress **28**, the gutter trough **32**, the rinse pipe **50**, and the conduit means **46**.

The structures shown in FIG. 2 and FIG. 3 are, of course, repeated around the whole pool. Each nozzle is supplied by a conduit means connecting the nozzle to the supply pipe which surrounds ths pool.

The structure shown in FIG. 4 is constructed and positioned substantially the same as the embodiment shown in FIG. 2 and includes the floor **70**, the outer wall **72**, the deck **74**, the deck drain hole **76**, the grating **78**, the corrugated sheet **80**, the gutter chute **82**, the supply pipe **84**, the conduit means **86**, the sleeve **88**, the nozzle **90**, and the waterstop **91**.

The gutter trough **92**, however, is a body separate from the inner pool wall **94**, and is formed from a sheet of metal or other suitable material. This separate gutter trough **92** is supported by buttresses like buttress **96**.

The separate metal gutter trough **92**, shown in FIG. 4, like the gutter trough **32** shown in FIG. 2, must be positioned so that water, splashed onto the gutter chute **82**, will, by gravity, drain through the series of adjoining openings **98** into the gutter trough **92**.

As another embodiment of my invention (not shown)

the buttress **96** could be replaced by a structural steel frame.

FIG. 5 shows in perspective and in section the detail of the preferred embodiment of my invention.

The pool floor **110** may be on or embedded in the surrounding terrain. The pool inner wall **111** has formed as an extension thereof the gutter trough **114**. The top of the inner wall **111** is downwardly, outwardly inclined to form the gutter chute **116**. A waterstop **117** is constructed at the junction of the inner wall **111** with the floor **110**. The buttress **118** butts against the inner wall **111** at **120** and supports the gutter trough **114** and the supply pipe **122** which surrounds the pool. Conduit means, such as an elbow **124**, a fitting **126**, a tube **128**, and fittings **130**, carry water from the supply pipe **122** to a portion of the inner surface **132** of the inner wall **111**. At this inner surface, a nozzle (not visible) is connected to the conduit means.

A sheet of corrugated material **140**, which I prefer to be 1½" corrugated transite, rests on the gutter chute **116** and has concrete **142** conformably adjacent to and above it to form the deck. Of the series of adjoining openings formed by the space between the corrugated material **140** and the gutter chute **116** and connecting the gutter chute **116** with the gutter trough **114**, only a portion of one opening **144** is visible. A tubular winter drain outlet **146** provides a passageway through the inner wall **111** when the threaded closure (not visible) is removed from its inner end.

The walls, gutter trough, buttresses and deck may be pre-cast in segments and assembled at the building site. The inner walls and gutter trough could be formed separately or could be pre-cast as a unitary body as shown in FIG. 5.

Operation.—From a filtration unit, water is pumped along the supply pipe **34** shown in FIG. 1. Because this pipe **34** is not buried but rather is totally exposed in the crawl space below the deck **20**, it may be made of a non-corrosive material, and furthermore is at all points accessible for repair or replacement. It may expand and contract. The individual conduit means, connecting the pipe **34** to nozzles **22, 23**, etc. such as the conduit means **46** in FIG. 2, are free to flex.

Simultaneously, water flows from the supply pipe **34** through all the conduit means, similar to conduit means **46**, to the several nozzles, like nozzle **23**, spaced around the inner surfaces of the inner pool walls. Thus water is continuously entering the pool from closely spaced inlets which are positioned so that there can be no dead spots in the pool. The water is in constant movement. It is always circulating. I construct the nozzles so that the incoming streams will be directed in a downward direction. The downward flow of water from each of the inlet nozzles provides a sweeping action on the bottom of the pool. This inhibits the collection of sediment on the bottom of the pool and the growth of algae and bacteria. Any foreign matter in the vicinity of the pool floor is swept up by the current from the several nozzles.

Because all of the conduit means, such as conduit means **46**, are exposed in the crawl space, they too are accessible for replacement or repair. They may, with little manipulation, be detached from or connected to the sleeves through the inner walls, such as sleeve **48**. Furthermore, because they are not buried, they may be constructed of a non-corrosive material such as plastic. Expansion and contraction will not damage the circulatory system.

In operation, the surface drain constructed according to my invention provides greatly improved cleaning of the pool and the water. As in other surface drain systems, water enters my surface drain by being splashed over the high edge of the gutter chute, like gutter chute **116** in FIGURE 5. However, when prior art surface drains are used, water, with foreign material in it, may be reflected back into the pool and, furthermore, sediment may collect in the splash chute.

With my surface drain, no substantial reflection or bouncing back of the water can occur because my drain provides a continuous series of adjoining openings which the water will pass through rather than being reflected. Water will not stand in the gutter chute waiting to drain out at a particular drain. This immediate and continuous movement from the pool, down the chute into the gutter trough, does not allow time for the foreign materials to settle out of the water onto the guttter chute. The water will immediately fall into the gutter trough where it will immediately be swiftly carried away. Because of the number, size, and position of the openings, and because of the size and position of the gutter trough, water may be drained at a very rapid rate from the surface. Therefore, it can be seen that my gutter chute will not fill with water due to the activity in the pool even of many people. In my surface drain there are no grates to become clogged. A surface drain constructed according to my invention can remove over 600 gallons of water per minute from the pool.

There are also instances when very few persons are in the pool causing waves. To thoroughly clean the gutters under such a condition, several rinse tubes, like rinse tube **50** shown in FIG. 2, may be provided to continuously provide a stream of clean chlorinated water along the gutter. The streams of clean chlorinated water from the rinse tubes, like rinse tube **50**, constantly serve to begin the process of treating the oils and bacteria in the water removed from the pool surface. Thus, the water purification treatment actually begins in the gutter trough and is not delayed until the water has drained from the trough into the filter system.

The deck in FIG. 2 is shown pitched so that it is concave. Any water which gets on the deck, for example, by the splashing of swimmers, flows through the several deck drains onto the trough formed in the pool floor along the crawl space. Due to the longitudinal pitch of the trough, the water flows by gravity to a suitable outlet. This longitudinal pitch generally runs from the shallow end of the pool downward toward the deep end.

As shown best in FIG. 2, I provide also several winter drain outlets like outlet **52**. As winter approaches, the incoming water is shut off and the threaded closures, like closure **54**, are removed from the winter drain outlets. The majority of the water drains from the pool leaving a shallow layer of water. Any rain or melted snow will not be able to raise the level of water but rather will be immediately drained off. Nevertheless, a shallow layer of water remains to protect the pool in winter. The next spring the closures are replaced in the winter drain outlets and the pool is filled.

It is to be understood that while the detailed drawings and specific examples given describe preferred embodiments of my invention, they are for the purposes of illustration only, that the apparatus of the invention is not limited to the precise details and conditions disclosed, and that various changes may be made therein without departing from the spirit of the invention which is defined by the following claims.

I claim:

1. In a pool comprising walls and a bottom and intended to contain liquid, a surface drain comprising

(1) a gutter chute having its higher edge substantially level with the top surface of said liquid and surrounding at least a portion of the periphery of said liquid;

(2) a gutter trough having one of its upper edges adjacent to the lower edge of said gutter chute and longitudinally coextensive therewith; and

(3) an imperforate corrugated sheet positioned on said gutter chute, and extending above and over said gutter trough, having its corrugations transverse to

said gutter chute and having a paving material conformably thereon for providing a pool deck.

2. The surface drain according to claim 1 comprising

(1) a vertical pool wall portion having an inclined top surface;

(2) a flange portion extending horizontally from an intermediate portion of said wall; and

(3) a vertical gutter trough wall adjacent to, extending above, and co-extensive with said flange portion.

3. The surface drain of claim 1 wherein the pool deck is concrete poured on said corrugated sheet and is slanted downward toward said splash chute.

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