Nov. 10, 1964 M. A. ANDERSON 3,155,989

SWIMMING POOL SURFACE WATER REMOVAL SYSTEM

Filed Jan. 17, 1963 4 Sheets-Sheet 1

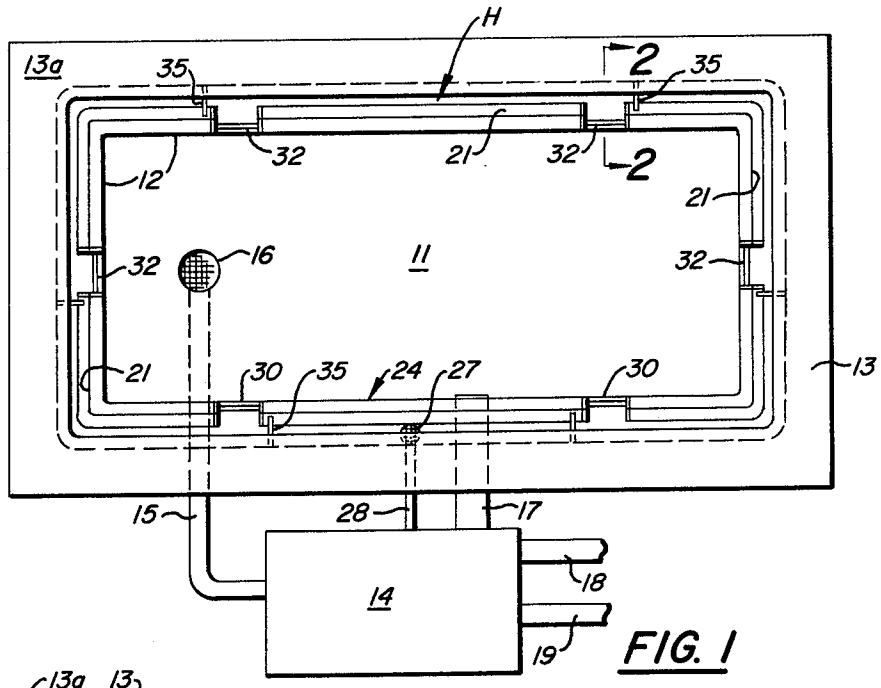


FIG. 1

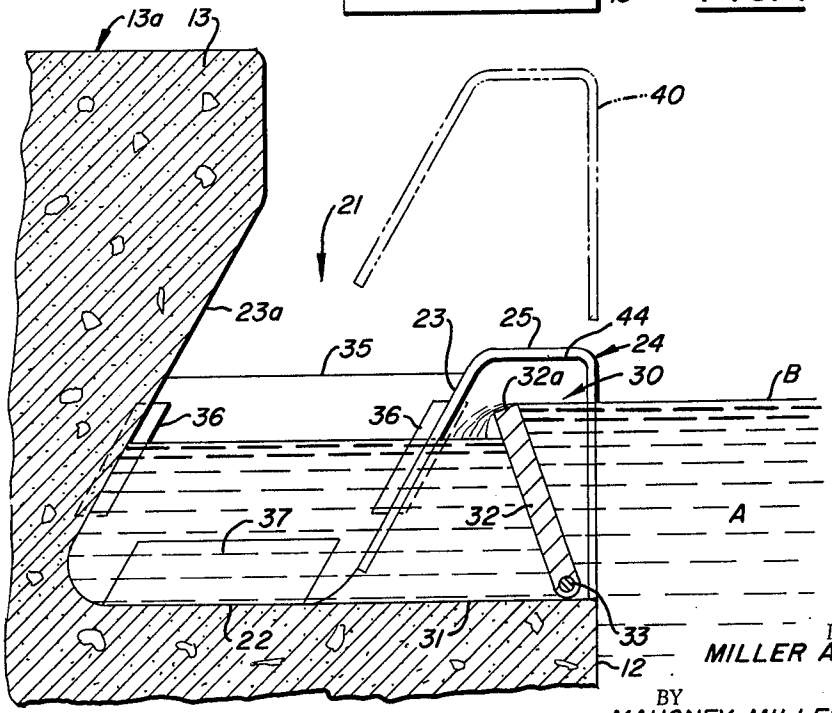


FIG. 2

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SWIMMING POOL SURFACE WATER REMOVAL SYSTEM

Filed Jan. 17, 1963 4 Sheets-Sheet 2

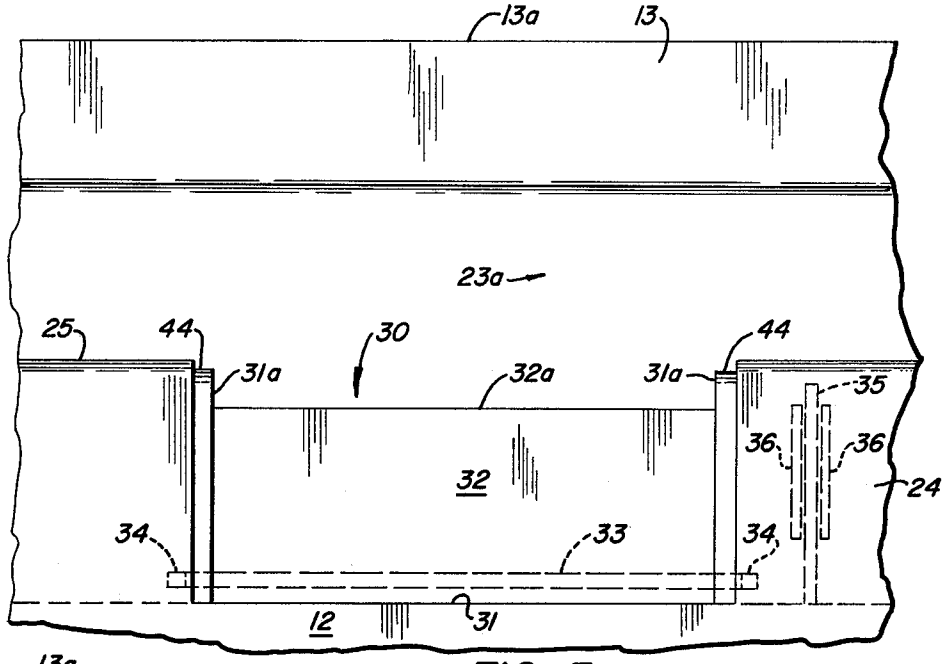


FIG. 3

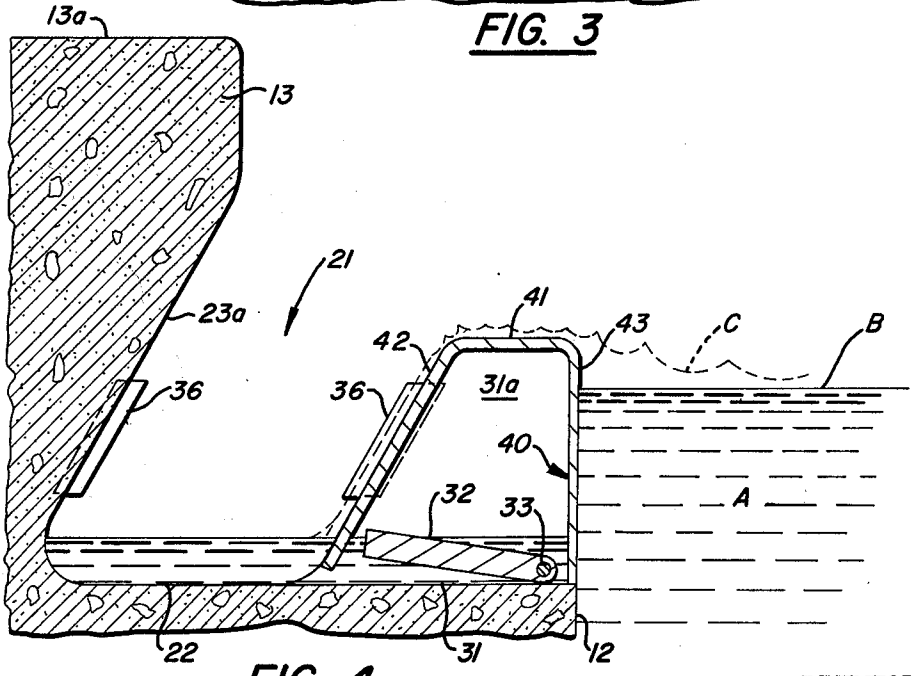


FIG. 4

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SWIMMING POOL SURFACE WATER REMOVAL SYSTEM

Filed Jan. 17, 1963 4 Sheets-Sheet 3

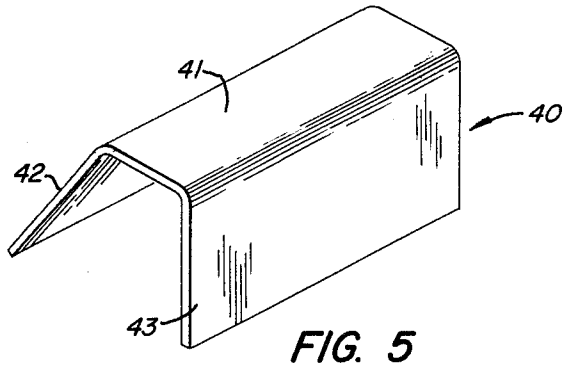


FIG. 5

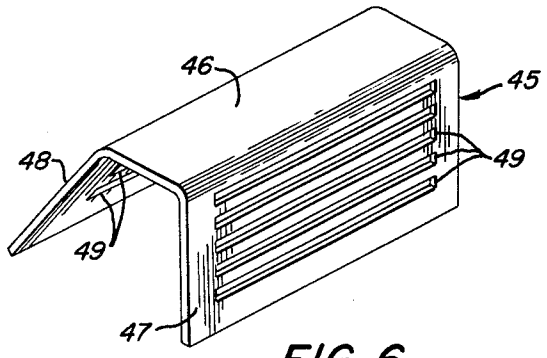


FIG. 6

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SWIMMING POOL SURFACE WATER REMOVAL SYSTEM

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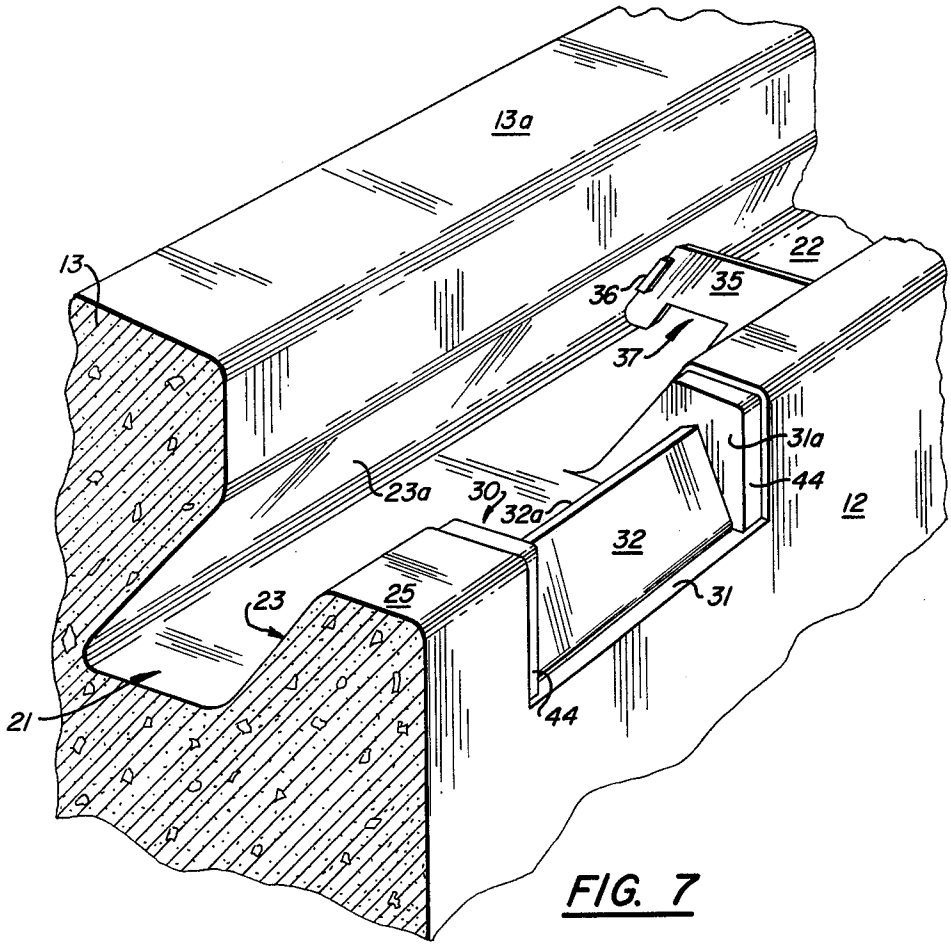


FIG. 7

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3,155,989

SWIMMING POOL SURFACE WATER REMOVAL SYSTEM

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Filed Jan. 17, 1963, Ser. No. 252,100
5 Claims. (Cl. 4—172)

This invention relates, in general, to a swimming pool surface water removal system. It relates, more specifically, to a novel and improved pool cleaning system for removing floating debris and surface impurities which may become stratified and to permit the overflow of turbulent water.

It is a well-known practice in the construction of swimming pools, particularly those of the larger sizes for public recreational facilities or educational institutions, to utilize water surface cleaning systems. Utilization of such devices is not only a practical design consideration but is often required by the appropriate governmental health and sanitation codes or regulations. The two most common types of pools designed to accomplish this objective are known as the gutter type and the skimmer type. Each of these two types are characterized by their specific advantages and disadvantages and have, therefore, been utilized where their respective advantages are of paramount importance. A gutter type pool comprises, in general, a gutter of open-topped channel form extending around the periphery of the pool having a side wall or lip forming a weir to prevent passage of the water into the gutter during quiescent periods. For this purpose, the side wall of the gutter is formed with a horizontal surface or upper edge disposed a slight distance above the normal, quiescent water level in the pool. This distance, however, which may be of the order of one to two inches, is not sufficient to prevent an overflow of water into the gutter should there be sufficient turbulence or waves to produce surging of the water toward the wall where it will spill over into the gutter. A sufficient turbulence is normally created by the swimmers in the pool. The undesirable debris which may be found floating on the water may thus be splashed or overflowed into the gutter. Similarly, impurities, such as body proteins and wastes which collect on or near the surface of the water will be splashed or overflowed into the gutter. The gutter is normaly connected with either a waste water system or a filtering and purification system permitting reuse of the water. This gutter type system has been proven to be satisfactory in pools subjected to a relatively large amount of activity and turbulence and is desirable for pools utilized for competitive swimming events. In competitive swimming, it is desirable to eliminate the possibility of backwash or the reflection of surges of water from the side walls of the pool which hamper the performance of the swimmers. The most readily apparent disadvantage of the gutter type pool is the relative ineffectiveness during quiescent periods, particularly at night when there is no swimming. This disadvantage can be at least partially eliminated by raising the water level sufficiently to permit a thin film of surface water to overflow the gutter weir. Less than satisfactory performance is obtained, however, since the velocity of the surface water is not sufficient to carry floating debris toward the gutter or over the upper edge thereof unless a large quantity of water is continuously pumped into the pool to cause a sufficient overflow.

The second type of surface cleaning system, referred to herein as the skimmer type, is specifically designed for effective operation in the complete absence of turbulence. The skimmer type pool continuously removes a quantity of surface water from the pool by way of a

plurality of relatively restricted openings, commonly referred to as skimmer weirs, creating outflowing currents which are generally confined to the upper surface film and includes the contaminated water and the floating debris. Usually, the skimmer type pool includes a plurality of openings formed in relatively spaced relationship, in the vertical side walls of the pool. Each opening is positioned at an elevation which coincides substantially with the normal water level and has a depth allowing for some variation in the water level. Also, each opening is of relatively short horizontal length to substantially increase the velocity of the water flow due to the limited area of the opening. To further increase the outflow velocity of surface water, the openings are provided with a pivoting gate operable to restrict the effective area of the opening to a relatively thin, horizontally disposed rectangle which may have a vertical dimension of only a few thousandths of an inch. Since the skimmer type pool is most effective when the water is in a quiescent state, the skimmer type pool is not ordinarily used in installations subject to prolonged periods of activity and relatively extreme turbulence. In addition, a skimmer type pool is not favored for competitive swimming events as surges of water will be reflected from the side walls. However, the skimmer type pool is of particular advantage for the continuous surface cleaning of the pool during non-use periods without an excessive water requirement since a relatively small volume of water flow will have sufficient velocity to perform the cleaning operation.

It is, therefore, the primary object of this invention to provide an improved surface water cleaning system for a swimming pool which combines the advantageous features for both the gutter and skimmer types of pools, and which largely eliminates the inherent disadvantages of each type.

It is another object of this invention to provide an improved surface water cleaning system for a swimming pool which utilizes a peripheral gutter provided with a plurality of skimmer weirs, and which functions efficiently to remove contaminated surface water and floating debris from the pool during periods when the water is turbulent as well as during periods of relative quiescence.

It is a further object of this invention to provide an improved surface water cleaning system for swimming pools which may be readily and easily converted into either an overflow gutter-type system or a skimmer type system through the manual installation or removal of a plurality of relatively simply applied cover plates and/or baffle devices.

These and other objects and advantages of this invention will become more readily apparent from the following detailed description and the accompanying drawings.

In the drawings:

FIGURE 1 is a diagrammatic plan view of a swimming pool provided with the combination gutter and skimmer-type cleaning system of the present invention.

FIGURE 2 is an enlarged fragmentary vertical sectional view taken along line 2—2 of FIGURE 1 and illustrates one of the skimmer weirs in operation.

FIGURE 3 is a fragmentary elevational view of one of the skimmer weirs as viewed from the interior of the pool.

FIGURE 4 is a view similar to FIGURE 2 with a cover plate installed to convert the pool to a gutter type.

FIGURE 5 is a perspective view of a cover plate used to enclose one of the skimmer weirs.

FIGURE 6 is a perspective view of a modified form of cover plate.

FIGURE 7 is a fragmentary perspective view showing a segment of the gutter and one of the skimmer weirs.

Referring to the drawings, a swimming pool which in-

corporates this invention is illustrated diagrammatically in FIGURE 1. The swimming pool comprises, in general, a tank-like structure of rectangular form having a bottom wall 11 and vertically disposed side and end walls 12 and which may be fabricated or formed from a suitable water-impervious material, such as concrete or steel. Around the periphery of the pool there is provided a walk-way or coping 13 having an upper horizontal surface 13*a* which may function as a marginal sidewalk or walkway around the pool. The pool, in the usual manner, is provided with a conventional-type pumping and filtering unit 14 for the recirculation, removal or purification of the water contained within the pool. For this purpose, a main drainage conduit 15 connected with a grilled opening 16 located in the bottom wall 11 of the pool at the lowermost level thereof, connects with the pumping and filtering unit 14 for removal of water from the bottom of the pool. A pool inlet conduit 17 interconnecting the filtering unit with the interior of the pool is also provided. The usual fresh water supply conduit 18 and sewer outlet 19 may also be connected to the filtering unit 14 for the addition of fresh water and for draining waste water from the pool and the filtering unit. If desired, the filter and pump unit 14 could be omitted and the fresh water conduit 18 connected directly to the inlet conduit 17 by any suitable valve means. The sewer outlet conduit 19 would then be connected to the drain conduit 15 through suitable valve means.

In acordance with this invention, the pool is provided with a combination gutter and skimmer type surface water cleaning system for the removal of impurities suspended in the water and floating debris from the surface portion of a body of water A contained in the pool. The present cleaning system includes a gutter 21 formed around the periphery of the pool beneath the coping or walk-way 13. The gutter 21, as best shown by FIGURES 2, 4, and 7, comprises a slightly undercut, open-topped channel defined by a bottom surface 22 which is at a level a slight distance below the normal water level B of the body of water A and oppositely disposed, parallel, downwardly sloping side wall surfaces 23 and 23*a*. In the illustrated embodiment, the pool is formed from concrete and the gutter 21 is integrally formed in the upper portions of the side and end walls 12 of the pool. The side and end walls 12 of the pool terminate in a substantially continuous gutter lip 24 which includes the sloping side wall surface 23. The gutter lip 24 projects a slight distance above the normal water level B and is formed with a substantially horizontal upper edge or surface 25 at a level to permit waves or surges of water created by turbulence within the pool to overflow the lip 24 into the gutter 21. Preferably, the corners of the lip 24 at each side of the surface 25 are rounded and smooth to reduce the possibility of injury to a swimmer coming in contact therewith.

A drain outlet 27 is positioned in the bottom of the gutter 21, preferably at a point therein closest to the filtering unit 14, and is connected by a conduit 28 to the pump and filter unit 14. Operation of the pump, or the provision of a sump at an elevation lower than the gutter bottom surface 22, will permit any water received by the gutter to flow outwardly through the drain outlet 27. The bottom surface 22 of the gutter may be sloped, if necessary, to further increase the flow of water in the gutter toward the drain outlet 27. The highest point H of the bottom surface 22 is preferably located in the gutter 21 along a pool wall opposite the outlet drain 27. Also, more than one drain outlet may be provided in accordance with design considerations or local health regulations.

The gutter lip 24 is interrupted at uniformly spaced intervals by a plurality of downwardly extending, rectangular, skimmer notches or openings 30. Each of the notches extends downwardly below the upper surface 25 of the lip and terminates in a bottom edge surface 31 disposed substantially below the normal water level B of the body of water A within the pool. The notches 30 are of comparatively short horizontal length and are defined at either end thereof by a vertical end wall 31*a*. If desired, the bottom edge 31 of the notches may be formed as a flush continuation of the bottom surface 22 of the gutter 21. Although the pool illustrated in FIGURE 1 is shown as being formed with six of the skimmer notches 30, it is to be understood that the number of notches will vary in accordance with the pool size and local health regulations for a given pool.

Each of the skimmer notches 30 is provided with a flow control means which takes the form of a gate 32 mounted for pivotal, swinging movement within the notch 30. The gate 32 is of rectangular form and has a lower longitudinal edge disposed adjacent the bottom edge 31 of the notch with its ends terminating adjacent the end walls 31*a* of the notch. An elongated shaft or hinge pin 33 extends through the lower edge portion of the gate 32 beyond each end thereof and is journaled in sockets 34 formed or otherwise provided in the end walls 31*a* of the notch 30. The shaft 33 thus supports the gate 32 for pivotal swinging movement about a horizontal axis adjacent the bottom edge 31 of the associated notch 30. The height or width of the gate 32 is slightly less than the depth of the notch 30. The gate 32 preferably forms a wiping seal with the bottom edge 31 and end walls 31*a* of the notch 30. The gate 32 is formed from or contains as a part thereof, a buoyant material having a density less than water, so that the gate will tend to stand erect within the notch when substantially surounded by water. Referring specifically to FIGURE 2, when the gutter 21 is at least partially filled with water, a buoyant force acting on the gate produces an angular moment about the shaft 33 causing the gate 32 to pivot in a clockwise direction toward an upwardly inclined position with its upper edge 32*a* at a relatively higher elevation than the shaft 33. When the surface level of the water in the gutter 21 is substantially below the water level in the pool, the gate 32 will swing inwardly toward the gutter 21 and operate in the well known manner of skimmer weirs. Operation of the gate 32 will be dependent on the level of the water in the gutter 21 which may be effectively controlled by regulation of the outflow of water from the gutter. Under normal operating conditions where the body of water A in the pool is substantially quiescent, it is desired that the gates 32 operate so as to permit a thin film of water of the order of several thousandths of an inch in thickness to continuously flow through the notches 30 over the upper edges 32*a* of the gates. A high velocity skimming action is thus produced at each notch 30 to remove and carry away undesired debris and impurities from the upper surface of the body of water A within the pool.

Regulation of the outflow of water from the gutter 21 may be readily accomplished by the positioning of a baffle plate 35 in the gutter 21 at the downstream side of each notch 30. Each of the baffle plates 35 may be formed from a relatively thin sheet of rigid material having side edges conforming substantially to the sides 23 and 23*a* of the gutter 21. The plates are disposed transversely in the gutter 21 and may be removably maintained in proper position by sets of spaced parallel guide strips 36 embedded in the walls 23 and 23*a*. Formed in each of the plates 35 is a notch or aperture 37 of predetermined area for restricting the flow of water through the gutter at this point. Preferably, as in the illustrated embodiment of the plate 35, the aperture 37 is formed along a marginal edge thereof disposed adjacent the bottom surface 22 of the gutter. Regardless of the amount of water which may flow through a given notch or opening 30 or over the lip 24 of the gutter, only a certain amount may flow downstream through an aperture 37 per unit of time. Should the level of water within the gutter 21 at the upstream side thereof be increased above a predetermined level, the gate 32 will be pivoted to-

ward a more vertical position and thereby prevent or at least reduce further flow of water into the gutter over the edge 32*a* of the gate. Similarly, should the water level within the gutter 21 be reduced below a predetermined level, the gate 32 will be pivoted inwardly of the gutter toward a more horizontal position permitting a large amount of water to flow through the notch 30. The larger flow of water will thereby refill the gutter 21 at the upstream side of the baffle plate 35 relative to the associated notch 30 and gradually return the gate 32 to its normal position whereby only a thin film of water flows over the upper edge 32*a* of the gate. The gate 32 also functions to continue the skimming action should the water level of the body of water A be reduced from its normal elevation. In that instance, the level of water on the upstream side of each of the baffle plates 35 will be automatically reduced by normal drainage through the drain outlet 27 to compensate for the difference.

In the illustrated embodiment of FIGURE 1, there are six baffle plates 35 to regulate the water flow in the gutter 21. Since each baffle plate 35 which is in the stream, three in this instance, assuming that the flow of water is toward the drain outlet 27 from both sides, must permit passage of an increased volume of water, the apertures 37 in the downstream baffles must be made progressively larger relative to the preceding baffle plate to accommodate a cumulative total volume. By properly dimensioning the apertures in each baffle in accordance with its relative position, the water level in the gutter adjacent each notch 30 may be maintained at a substantially uniform level. With a uniform water level in the gutter, each gate 32 will operate to allow a uniform water flow through its respective notch for a satisfactory balanced skimming action.

Although only one type of control for regulating the outflow of water from the gutter has been illustrated and described in detail, it will be readily apparent that other well known types may be substituted therefore, it is only necessary that the specific type utilized be capable of limiting the outflow relative to a particular notch in a predetermined maximum value.

Both the gutter type and skimmer type cleaning devices have their specific advantages and disadvantages as previously explained. Constructing the pool with both the gutter type and the skimmer type cleaning systems as described herein permits the pool to be operated simultaneously as either of the two types. At all times when there are relatively few swimmers or when the pool may be closed, such as overnight, the body of water A will be substantially quiescent. The gates 32 of the skimmer weirs, however, will be operative to provide the necessary skimming action for removal of floating debris and impurities as previously explained. During the times the pool is in use, or if waves are created by winds, the resulting turbulence in the pool will produce surges of water which may splash or flow over the upper edge 25 of the lip 24. Waves or surges of water thus produced will flow into the gutter 21 as shown in FIGURE 4 by the dotted line C. This action will carry contaminated water and floating debris into the gutter 21 from which it may be subsequently removed.

In pools where there is a large amount of activity or where competitive swimming events may be held, it is desirable that the gates 32 be protected from damage caused either by the excessive turbulence or by physical contact with the swimmers. In addition, the skimmer weirs will be relatively ineffective and closing the notches 30 will not affect the operation of the cleaning system as an exclusively gutter type pool. For this purpose, a cover plate 40 is provided for each of the notches 30 which may be removably disposed therein to protect the gate and prevent a flow of water therethrough regardless of any difference in water levels in the gutter 21 and pool. The embodiment of the cover plate 40, as best shown in FIGURE 5, comprises an elongated section of an open-ended channel which is generally U-shaped. The channel includes a web 41 interconnecting two longitudinally extending flanges 42 and 43 and is preferably shaped to conform with the surfaces of the gutter lip 24. The vertical flanges 42 and 43 of the cover are adapted to form smooth continuations of the interior surface of the pool walls 12 and the sloped surface 23 of the gutter lip 24 while the web 41 forms a continuation of the horizontal upper edge surface 25 of the lip. A smooth surfaced appearance of the lip 24 and cover plate 40 is obtained by forming a recess or notch 44 in the marginal ends of the gutter lip 24 adjacent each end wall 31*a* of the notches 30 to receive the marginal edges of the cover plate 40. The cover plate 40 is inserted in a notch 30 in an inverted position, as shown in FIGURE 4, to substantially prevent a flow of water through the notch. In FIGURE 2, a cover plate is shown supported in an inverted position directly above the notch 30 immediately prior to being positioned within the notch. The lower edge of the vertical flange 43 is disposed in contacting engagement with the bottom edge 31 of the notch. The extreme edge of the inclined flange 42 is not in contacting engagement with the edge 31 to allow any water that may enter the interior of the cover plate 40 to flow into the gutter 21. To prevent accidental removal of the cover plate 40, suitable fastening means (not shown) may be provided to secure the cover plate in fixed relationship to the gutter lip 24.

With a cover plate 40 positioned in each of the notches 30, the pool will operate exclusively as a gutter type requiring a sufficient amount of turbulence in the body of water A to provide the necessary cleaning action. It will be noted that, in reference to FIGURE 4, the adjacent baffle plate has been removed from the gutter thereby eliminating any obstruction to the flow of water. When operating exclusively as a gutter type pool, it is not necessary to maintain a predetermined water level therein and the water may be removed as quickly as it accumulates. Although the gate 32 will continue to float with the water it is ineffective to control the flow of water from the pool. The pool may be reconverted for simultaneous operation as a skimmer type by merely removing the cover plates 40 and assuring that the baffles 35 are properly positioned.

A modified form of cover plate 45 is shown in FIGURE 6. This cover plate is of the same general form having a web 46, a vertical flange 47 and a relatively inclined flange 48. Each of the flanges 47 and 48, however, are formed with a plurality of relatively spaced slots 49 to permit passage of water therethrough. The slots 49 extend longitudinally of the cover plate and will be horizontally disposed when the cover plate is installed in a notch 30. Assuming that the slots 49 are of sufficient width to allow passage of floating debris consisting of solid particles, there will be little obstruction to their passage through the notches 30. This modified cover plate may be left installed as the pool may then operate simultaneously as either a gutter type or a skimmer type. To permit simultaneous operation with the cover plate 45 installed, the gutter lip 24 must have a horizontal thickness sufficient to permit pivotal swinging movement of the gate 32 within the cover plate. During the times that the body of water A is quiescent, or if there is insufficient turbulence to splash water over the gutter lip 24, the gate 32 will control the flow of water through the notch 30 and produce a skimming action. Should the turbulence increase due to the presence of swimmers and destroy the effectiveness of the skimmer type cleaning system, the pool may operate as a gutter type with the contaminated water and floating debris being removed by the water overflowing the gutter lip 24 into the gutter 21. The baffles 35 would always remain in their respective positions for use of the modified cover plates 45.

A swimming pool constructed in accordance with this

invention may be utilized as either a gutter type or a skimmer type in accordance with the degree of activity. The surface water in the pool containing impurities as well as floating debris may be removed either by being splashed over the gutter lip **24** or by flowing through the notches **30**. Utilizing a solid form type cover plate **40** to cover each of the notches **30** converts the pool to a gutter type exclusively. Removing the cover plate **40** will allow a skimming action for removing the surface water impurities and floating debris. At any time there is insufficient turbulence, the surface water impurities and floating debris may be splashed or overflowed into the gutter **21**.

It is readily apparent that the swimming pool cleaning system of this invention is particularly capable of operating when the water in the pool is either quiescent or turbulent to effectively remove the surface water impurities and floating debris. Under turbulent conditions the skimming system will be ineffective but the impure surface water and floating debris will be satisfactorily removed by the waves or surges of water which may overflow the gutter lip. When the water is quiescent, the water will flow through the skimming system notches over the associated gate to remove the impure surface water and floating debris.

According to the provisions of the patent statutes, the principles of this invention have been explained and have been illustrated and described in what is now considered to represent the best embodiment. However, it is to be understood that within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

Having thus described this invention, what is claimed is:

1. In combination with a swimming pool having a main body portion adapted to contain a body of water; an open top, channel-form gutter extending completely around the periphery of the main body portion of said pool and including an upstanding gutter lip terminating in an upper edge portion disposed slightly above the level of water normally contained in said pool and which may be overflowed when the water in said pool is relatively turbulent, said gutter lip substantially separating said gutter from the body of water and being formed at longitudinally spaced intervals with a plurality of notches having a portion disposed above and the remaining portion extending downwardly a distance below the level of water normally contained in said pool; a movable, buoyant gate member occupying each of said notches, each of said gate members having an upper edge normally disposed substantially below the upper edge portion of said gutter lip and slightly below the level of water normally contained in said pool and operable to provide a substantially constant, but restricted, outflow of surface water from the main body portion of said pool into said gutter by way of said notches when the body of water is substantially quiescent.

2. In combination with a swimming pool having a main body portion adapted to contain a body of water; an open top, channel-form gutter extending completely around the main body portion of said pool and including a bottom surface portion disposed substantially below the level of water normally contained in said pool; said gutter being substantially separated from the body of water contained in said pool by an upstanding gutter lip which terminates in an upper edge portion disposed a distance above the level of water normally contained in said pool so as to permit an overflow of water when the body of water in said pool is relatively turbulent, said gutter lip being formed with a plurality of relatively spaced openings each of which opens to the upper edge portion of said gutter lip and includes a portion disposed below the level of water normally contained in said pool; a movable buoyant gate member occupying each of said openings, said gate members having an upper edge normally disposed substantially below the upper edge portion of said gutter lip and operable to provide a substantially uniform outflow of surface water from the main body portion of said pool into said gutter by way of said openings when the water contained therein is substantially quiescent and a cover plate positionable in each of said openings for rendering said gate member substantially inoperative when the water in said pool is sufficiently turbulent to overflow said gutter lip, each of said cover plates including a surface portion which forms a smooth continuation of the upper edge portion of said gutter lip.

3. In the structure of claim 2, each of said cover plates being removably engageable with said gutter lip and including a vertically disposable surface portion which forms a continuation of the gutter lip surface thereby preventing a flow of water through the respective opening.

4. In the structure of claim 2, each of said cover plates including a member adapted to be disposed at the inlet side of the respective opening, said member being formed with a plurality of relatively spaced slots permitting passage of water through said opening.

5. In the structure of claim 2, each of said cover plates comprising an elongated channel member of inverted U-form adapted to be disposed in a respective opening and having a web portion and a pair of depending flange members, each being in flush surface relationship with adjacent surface portions of said gutter lip, each of said flange members being formed with said web portion at the longitudinal marginal edges thereof and including a plurality of relatively spaced slots to permit a relatively free flow of water through said opening.

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