United States Patent [19]

Baker

[11] **3,815,160**

[45] **June 11, 1974**

[54] **NONFLOODING PERIMETER SKIMMING GUTTER WALL FOR SWIMMING POOLS**

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[22] Filed: **Apr. 9, 1973**

[21] Appl. No.: **349,910**

[52] **U.S. Cl.** **4/172.17,** 4/172, 4/172.18, 210/169

[51] **Int. Cl.** **E04h 3/16,** E04h 3/18

[58] **Field of Search** 4/172.18, 172.17, 172, 4/172.19, 172.21; 210/169

[56] **References Cited**

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3,668,712	6/1972	Baker	4/172.17
3,668,714	6/1972	Baker	4/172.17

Primary Examiner—Henry K. Artis

[57] **ABSTRACT**

A nonflooding perimeter skimming gutter wall for swimming pools is provided, including a first gutter conduit for disposition about the perimeter of a swimming pool, and adapted to carry water at a level below a predetermined level of water in the swimming pool, a retaining wall on the pool-side of the first gutter conduit over the top of which wall a skimming flow of water may run from the pool into the first gutter conduit, a second gutter conduit within a peripheral wall below the first gutter conduit and adapted to carry water at a level above a predetermined level of water in the first gutter conduit, and a fluid flow connection between the two gutter conduits at such level and below the top of the retaining wall allowing water to flow from the first gutter conduit into the second gutter conduit whenever the water level on the first gutter conduit reaches the fluid flow connection, thereby inhibiting filling of the first gutter conduit appreciably above such level.

18 Claims, 4 Drawing Figures

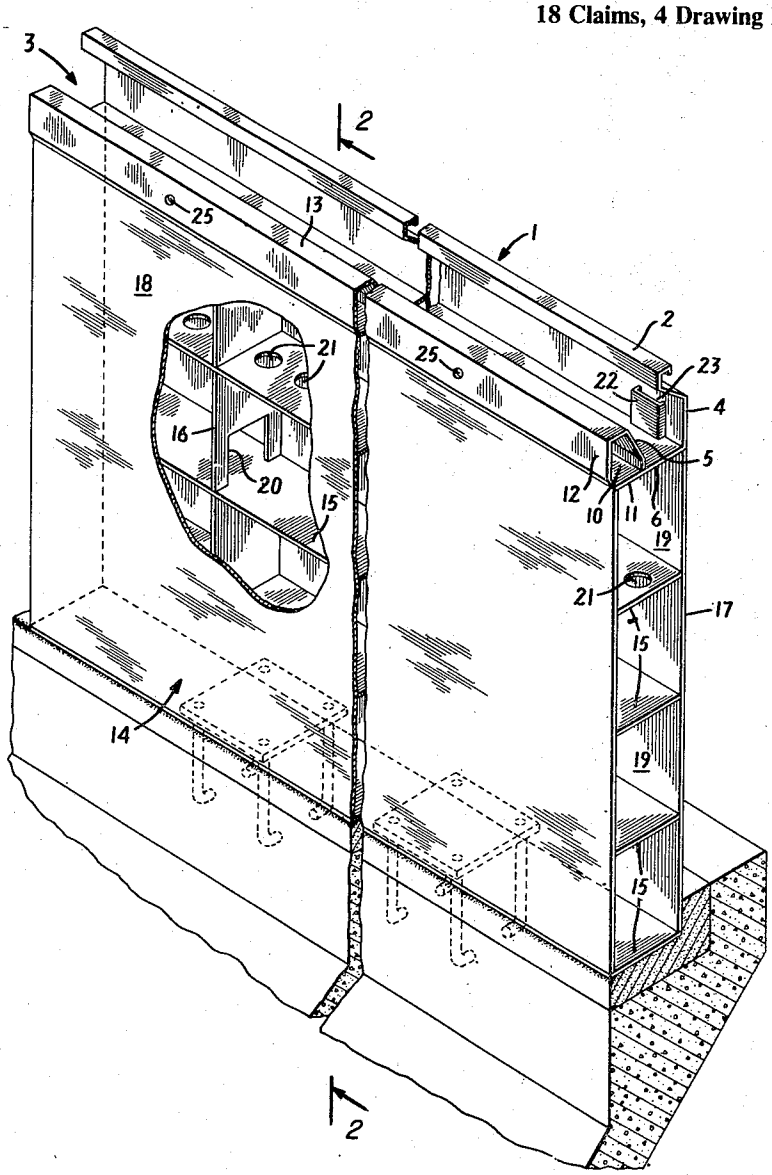
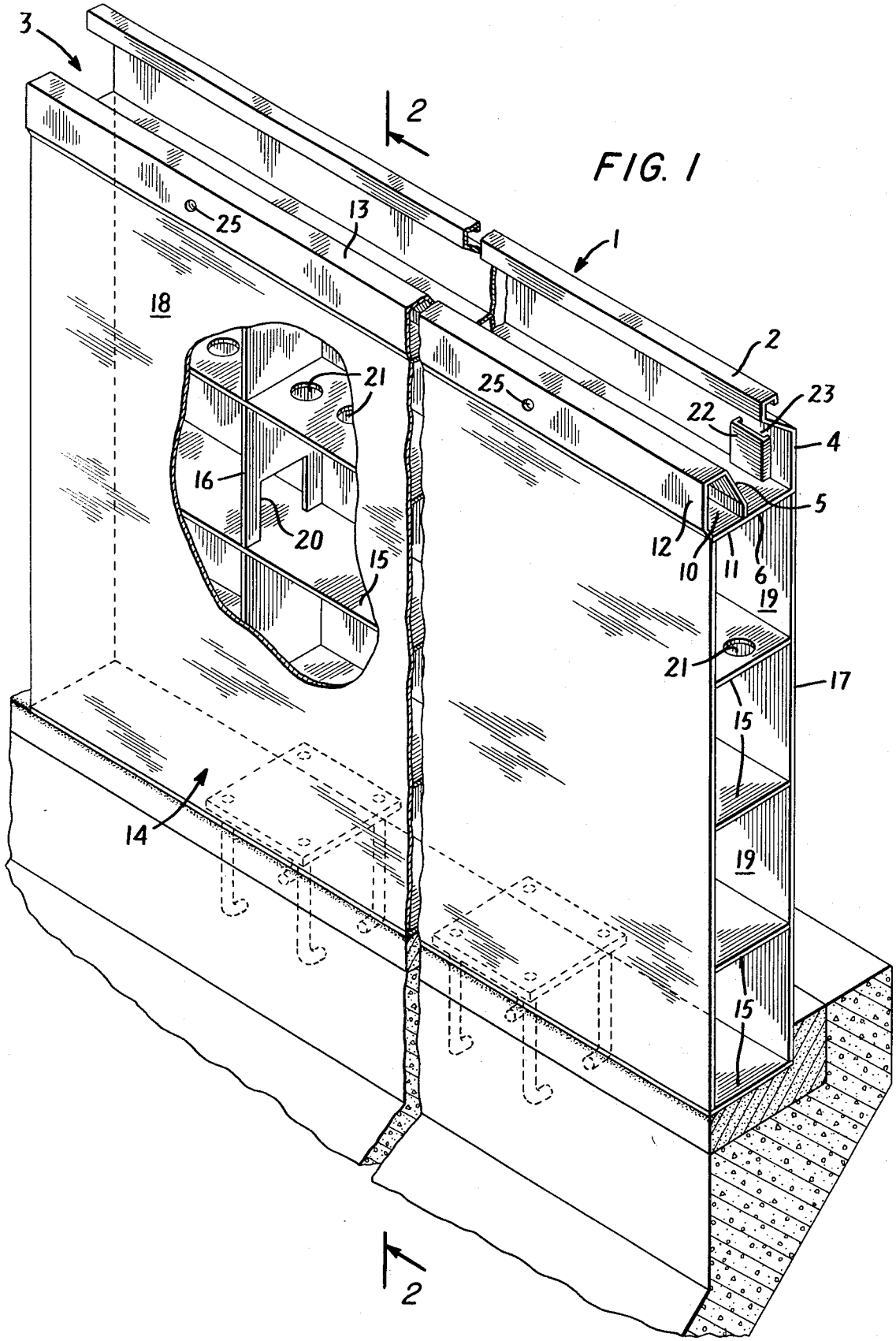


FIG. 1


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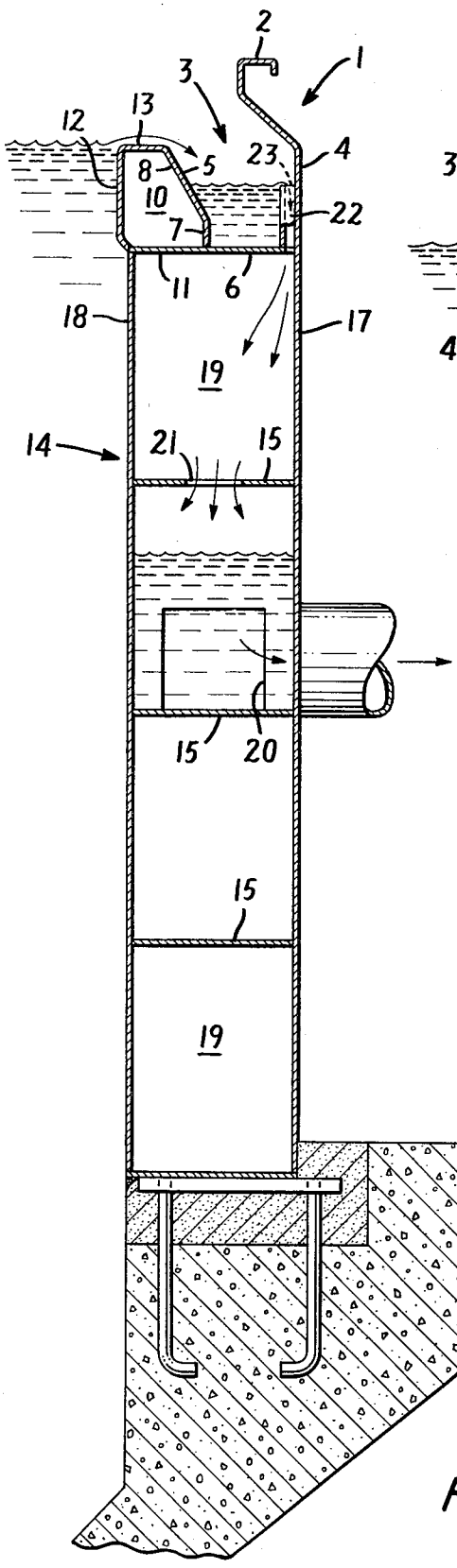

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FIG. 2

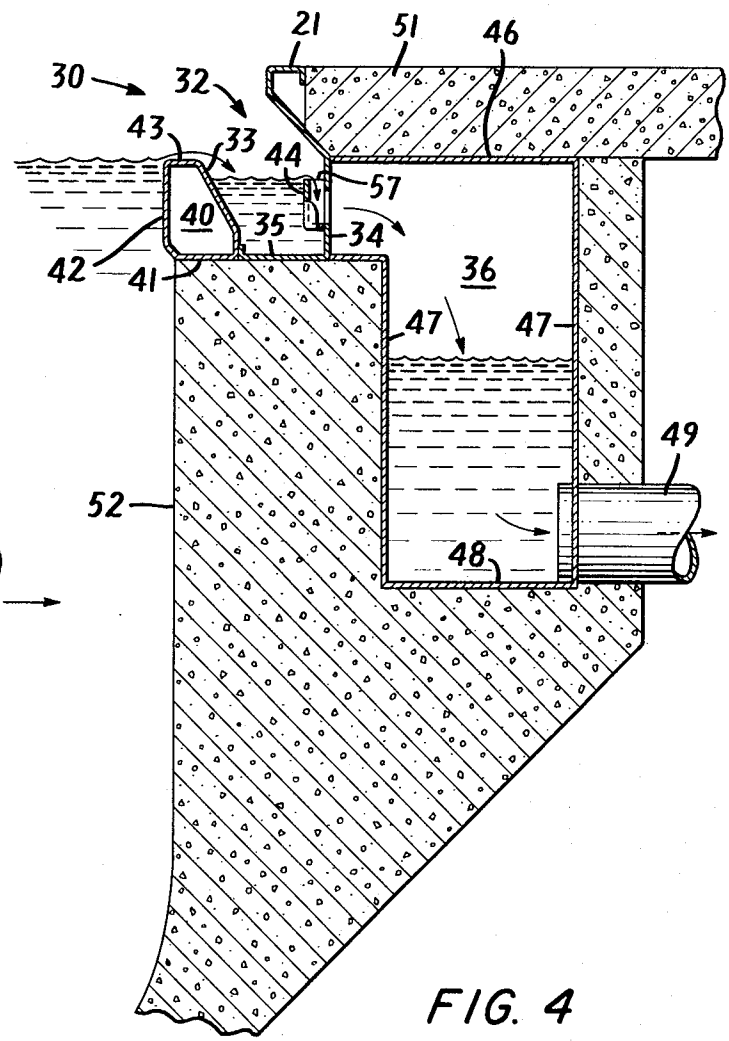

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FIG. 4

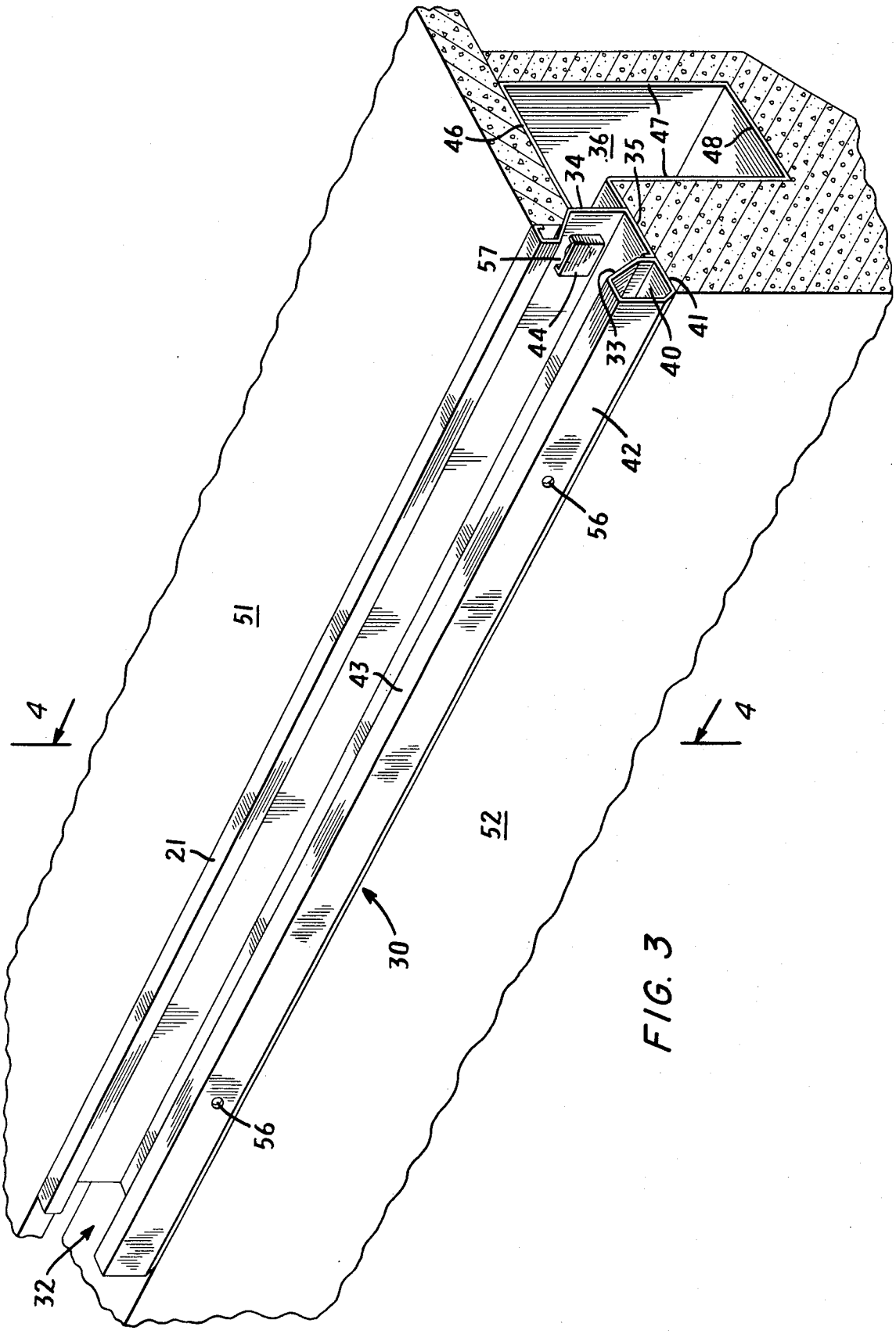


FIG. 3

NONFLOODING PERIMETER SKIMMING GUTTER WALL FOR SWIMMING POOLS

The gutter system of a swimming pool is one of its most important components, and its design is determinative of many of the characteristics of the pool. However, what constitutes good gutter design has long been a perplexing problem, in much dispute. What is recognized is that a swimming pool gutter system must provide an adequate surge flow capacity, especially when the pool is filled with swimmers, and it should not flood when a large group of swimmers enters the pool all at once. It should also provide a good surge and wave-quelling capacity. Its ability to cope with surges and waves produced by swimmers is quite important to the competitive qualities of the swimming pool.

A problem related to gutter design is the removal of surface dirt. Some types of gutters are designed to provide a skimming action, but it has generally been conceded that the most efficient type of skimming action is provided by the scum gutter type of pool, and on all pools over 1,600 square feet in area, scum gutters are provided as a matter of course. In fact, in some states, surface skimmers are not permitted.

One type of swimming pool with a perimeter gutter provides for flow of water over the top of the gutter wall into the gutter trough at all times. Such a gutter system is described in U.S. Pat. No. 2,932,397 to Ogden dated Apr. 12, 1960. Another and older design appears in U.S. Pat. No. 1,797,397 to Booraem dated Mar. 24, 1931. Such a gutter provides a most efficient skimming action under normal flow conditions, but as soon as swimmers enter the pool, or a heavy surge or wave action is encountered, the additional flow of water over the top of the gutter tends to flood the gutter, after which skimming action is lost until the water can be drained away, and in fact some of the dirt already in the gutter may be washed back.

In an attempt to alleviate such a condition, a modification of the Ogden gutter has been proposed in U.S. Pat. No. 3,363,767 to Ellis dated Jan. 16, 1968, incorporating a plurality of skimmer openings spaced around the gutter at a lower level than the top of the gutter. In this system, when the pool is not in use, the skimmer weir is opened and skimming is obtained via the openings into the gutter (column 2, lines 19 to 24). When the pool is in use, the skimmer weirs are closed (column 2, lines 12 to 13), but the water level is held down below the lip of the gutter, providing a certain in-pool surge capacity, and avoiding a flooded gutter condition at the time of flow surges. However, when the pool is in heavy use and there is considerable wave or surge action over the top of the gutter, surface contaminants washed into the gutter may still be washed back into the pool.

U.S. Pat. No. 3,668,712 to William H. Baker dated June 13, 1972, provides a perimeter skimming gutter for swimming pools including a gutter conduit for disposition about the perimeter of a swimming pool and adapted to carry water at a level below a predetermined level of water in the swimming pool, a retaining wall on the pool-side of the conduit, over the top of which wall water may flow from the pool into the gutter conduit, and a plurality of narrow elongated substantially horizontally disposed openings through the wall at a height to maintain a predetermined water flow, the top of the wall being spaced above the openings at a

height to retain the pool water within the pool perimeter at water flows, wave actions and surges up to a predetermined maximum, while allowing excessive water flows, wave actions and surges beyond such maximum to flow over the top of the wall into the gutter conduit.

U.S. Pat. No. 3,668,714 to William H. Baker dated June 13, 1972, provides a nonflooding perimeter skimming gutter for swimming pools including a first gutter conduit for disposition about the perimeter of a swimming pool, and adapted to carry water at a level below a predetermined level of water in the swimming pool, a retaining wall on the pool-side of the first gutter conduit over the top of which wall a skimming flow of water may run from the pool into the first gutter conduit, a second gutter conduit adapted to carry water at a level below a predetermined level of water in the first gutter conduit, and a fluid flow connection between the two gutter conduits at such level and below the top of the retaining wall allowing water flow from the first gutter conduit into the second gutter conduit whenever the water level on the first gutter conduit reaches the fluid flow connection, thereby inhibiting filling of the first gutter conduit appreciably above such level.

Both skimming gutter designs are quite satisfactory for most sizes of swimming pool, but even their unusually large gutter capacity can at times be exceeded.

In accordance with the invention, a nonflooding perimeter skimming gutter wall for swimming pools is provided which permits an adequate skimming action at all times, and also provides for virtually unlimited surge capacity when the pool is in use, without the possibility of the gutter's flooding, or dirt in the gutter's being washed back into the pool. This is accomplished by combining a second gutter conduit within a peripheral wall of the swimming pool, making available for gutter flow the internal volume of the wall, in fluid flow connection with the first gutter conduit, and adapted to receive water from the first gutter conduit whenever the level of water in that gutter exceeds a predetermined maximum, established at the level of the fluid flow connection therebetween. This fluid flow connection is below the top of the retaining wall, so that the water level in the first gutter conduit cannot reach the top of the retaining wall. The second gutter conduit within the wall is entirely separate from the first, and is designed to provide an ample reserve flow capacity to accommodate any heavy or surge action that may be likely to be encountered. The fluid flow connection between the gutter conduits can be arranged to skim the dirt off the top of the first gutter trough, thus assisting in preventing this dirt from being washed back into the pool.

In this gutter system, the water level in the pool is normally maintained at the level at the top of the retaining wall, which consequently serves as a skimmer gutter at the pool perimeter. The fluid flow connection may constitute a second skimming flow outlet, supplementing and continuing the skimming action of the first.

Accordingly, the nonflooding perimeter skimming gutter for swimming pools provided in accordance with the invention comprises, in combination, a first gutter conduit for disposition about the perimeter of a swimming pool, and adapted to carry water at a level below a predetermined level of water in the swimming pool; a retaining wall on the pool-side of the first gutter con-

duit, over the top of which wall water may flow from the pool into the first gutter conduit; and a second gutter conduit within a peripheral wall and below the first gutter conduit in fluid flow communication with the first, such fluid flow communication entering the first gutter conduit at a level below the top of the retaining wall, and adapted to drain off water from the first gutter conduit at any level exceeding a predetermined maximum level therein, so as to inhibit and preferably prevent the level of water in the first gutter conduit from ever reaching the top of the retaining wall.

The term "conduit" as used herein with respect to the first gutter conduit is inclusive of open conduits or troughs as well as partially or wholly enclosed conduits.

In a preferred embodiment of the invention the first gutter conduit is an open trough, with the fluid flow connection with the second gutter conduit being in the form of a plurality of openings at the predetermined maximum level of water in the first gutter conduit.

The second gutter conduit since it is within a peripheral wall is a closed conduit. The second gutter conduit can be within any peripheral wall of the pool. It can for example be within the peripheral pool-side retaining wall. It can also be within a peripheral external wall of the gutter, on the side away from the pool.

In a preferred embodiment of the invention, a water-feed conduit is provided in the gutter for feed of fresh water into the pool. This conduit is preferably an integral part of the non-flooding perimeter skimming gutter.

In the case where the two gutters are separated by a common wall, the fluid flow connection between the two gutters can be of any configuration, and is in sufficient number and at a high enough level to provide for an adequate flow capacity, to prevent the water level in the first gutter conduit from appreciably exceeding the height of the overflow connection under any water surge or wave conditions in the pool.

Such overflow connections may also serve as skimmers for dirt floating in the first gutter conduit.

The level of the overflow connections with respect to the bottom of the first gutter conduit can be adjustable, so as to provide adjustment of the water level permitted in the first gutter conduit before flow via the overflow connections into the second gutter conduit commences. This adjustment can be provided for by forming the overflow connections as vertical slots or with an extended vertical height, and disposing a movable barrier member over the overflow connections with the opening or openings of the desired size and shape in the barrier member. Vertical movement of the barrier member over the overflow connections adjusts the height of the overflow connections in the barrier member.

Preferred embodiments of the invention are illustrated in the drawings in which:

FIG. 1 represents a view in elevation of one embodiment of nonflooding perimeter skimming pool-side gutter wall in accordance with the invention.

FIG. 2 represents a view in cross-section, taken along the line 2 — 2 of FIG. 1;

FIG. 3 represents a view in elevation of a second embodiment of nonflooding external peripheral gutter wall in accordance with the invention; and

FIG. 4 represents a view in cross-section, taken along the line 4 — 4 of FIG. 3.

The perimeter pool-side gutter wall of FIGS. 1 and 2 is made of a number of modular units 1, of which one is shown in FIGS. 1 and 2, which are assembled on-site and bonded together by welding, soldering or brazing, to form a gutter wall extending around substantially the entire circumference of the swimming pool. Each wall unit 1 is made of stainless steel sheet in a honeycomb construction formed with a top coping 2 and an open gutter trough 3 with upstanding sides 4, 5 and a bottom 6. The side 5 is in fact made up of two sections, bonded together by welding, a lower flange 7 extending upwardly from the bottom 6 of the gutter trough 3, and the side 8 of a closed pure water feed conduit 10.

The conduit 10 has a bottom 11, two upstanding sides, a gutter side wall 8 and a pool side wall 12, and a top 13. The side 12 serves as a perimeter retaining wall for the pool water, as is best seen in FIG. 2.

The water feed conduit 10 includes in poolside wall 12 a plurality of openings 25, regularly spaced about the pool, and serving as pool feed inlets for clean water from the feed conduit 10 into the pool, below the surface of the water level in the pool, as seen in FIG. 1.

The poolside retaining wall 14 supports the gutter trough 3, and is of a honeycomb structure, with a plurality of horizontal supporting walls 15 and vertical supporting walls 16 retained between outside wall 17 and poolside wall 18. The resulting cells 19 are interconnected horizontally by passages 20 and vertically by apertures 21, so that the two top levels of hollow wall 14 is in fact an enclosed gutter. The entire wall can so serve, by providing passages 20 and apertures 21 throughout.

The side wall 4 of the gutter trough 3 has a plurality of vertical channels 22 which extend to a level just below the top 13 of the feed conduit 10. They feed water to the cells 19 below the gutter trough 3, and thus water gains entry to the interior of the gutter wall 14. The openings leading into the channels 22 are in the form of narrow slots 23. Water flowing into the slots 23 enters the gutter wall 14 and such water has its origin in the gutter trough 3, while water flowing over the top 13 of the closed conduit 10 enters the gutter trough 3.

During normal flow conditions, the skimming flow courses over the top 13 of the closed conduit 10. Water from the pool flowing across the top of the conduit 10 enters the gutter trough 3, and is thence led back through the pool recirculation system by way of the filter and pump to the water feed intake for the pool. Dirt washed into the gutter by the skimming action is removed at the filter. The recirculation system and dirt removal filter system are conventional, and are not shown.

When swimmers enter the pool, the water level may rise, and their movement may also create flow surges and waves. This increases the flow in water across the top 13 of the conduit 10 and the amount and level of water in the gutter trough 3 increases. In the event that the water level in the gutter reaches the level of the slots 23, such water can flow through the slots 23 into the gutter wall 14. The flow capacity of the slots 23 is such that the water level in the gutter trough 3 cannot rise appreciably above the level of the slots under any surge or wave flow conditions. A further and adequate reserve in surge flow capacity is provided by the additional height of the wall 5 between the slots 23 and the top 13 of the conduit 10, so that the gutter trough 3

never floods under any surge or wave conditions. Water entering the gutter wall **14** also is led back through the pool recirculation system by way of the filter and pump to the water feed intake for the pool.

While the water level in the gutter trough **3** is at the slots **23**, dirt at the level of the slots in the trough **3** may pass through the slots into the wall **14**. The dirt entering the wall **14** via slots **23** is kept completely separate from the gutter **3**, and is removed separately in the pool water recirculation system.

The gutter system in FIGS. **3** and **4** is similar to that of FIGS. **1** and **2**, but the gutter wall is a peripheral external wall of the gutter in this embodiment. This perimeter gutter is also made up of a number of modular gutter wall units **30**, which are fitted together about the perimeter of the pool during construction of the pool, the abutting ends being bonded together by welding, brazing or soldering. The open gutter trough **32** is made of a sheet of stainless steel, formed in the configuration shown in FIG. **4**, with a top coping **21** on the level of the pool deck **51** and the open gutter trough **32**, formed with upstanding sides **33**, **34** and the bottom **35**.

The inlet feed conduit **40** is formed of stainless steel tubing and has a bottom wall **41** and a poolside wall **42**, with a top **43**. The poolside wall **42** tops the retaining wall **52** about the perimeter of the pool, as is best seen in FIG. **4**.

The water feed conduit **40** includes in pool-side wall **42** a plurality of openings **56**, regularly spaced about the pool, and serving as pool feed inlets for clean water from the feed conduit **40** into the pool, below the surface of the water level in the pool, as is seen in FIG. **4**.

The external side wall **34** of the gutter conduit **32** is provided with a plurality of vertical channels **44**. These extend to a height just below the top **43** of conduit **40** and lead to the interior chamber **36** of the hollow external gutter wall **46**.

The gutter wall **46** is of a hollow construction, with sidewalls **47** and bottom wall **48**, and is connected via outlet line **49** to the filter of the pool recirculation system, as is gutter **30**.

The tops of the channels **44** are provided with a plurality of horizontal slots **57** leading into gutter wall **46**. Several of these are provided in a pool. The open area can be as much as desired, since they need provide only a gutter overflow capacity.

The skimming action of this gutter system is exactly the same as that of FIGS. **1** and **2**. The water level in the pool is at the top **43** of the conduit **40**, and the water flow across the top **43** provides the skimming action, dirt being washed over the top into the gutter trough **32**. Water in the trough is fed back through the water-recirculation system to the filter and pump, where it is cleaned, and then recirculated to the pool by way of the feed conduit **40** and inlets **56**. The water inlet feed by way of the conduit **40** and openings **56** through the wall **42** provides a uniform distribution of fresh water throughout the perimeter of the pool, matching the skimming flow, which is equally uniform about the perimeter of the pool by way of the top of the conduit **43**.

In the event that the water level in the pool rises, due to swimmers entering the water, and also in the case of water surges or wave action, the flow of water across the top **43** of the conduit is increased, and the amount of water in the gutter trough **32** rises. If the water level in the trough **32** reaches the slots **57**, flow then begins through the slots into the channels **44** and wall **46**, and such flow prevents the water level in the trough **32** from rising further. The flow capacity of the slots is such that it is most unlikely, if not impossible, that the water level in the gutter trough **32** will ever rise appreciably above this level, thus preventing flooding of the gutter, and also preventing any dirt in the gutter trough **32** from being washed back into the pool. Even if the flow capacity of the slots **57** is exceeded momentarily, there is still a reserve wall height between the slots **57** and the top **43** of the gutter which will prevent flooding. While the water level is at the slots **57**, the slots continue the skimming action of the top **43** of the gutter, and the dirt washed over the top **43** then proceeds through the slots **57** into the wall **46**, whence it is carried off by the pool recirculation system to the filter, and removed, before the water is recirculated to the pool.

The perimeter gutter walls shown in the drawings are made of stainless steel, but it will, of course, be understood that other metals can be used, such as galvanized iron and steel, and aluminum, as well as anodized aluminum. Whatever the metallic material, its surface should be treated so as to render it corrosion-resistant, as by plating, galvanizing, anodizing, porcelain-enamel coating, or painting. It is also possible to form the perimeter gutter walls of plastic material, either in whole or in part. There are plastics now available which are sufficiently strong to withstand the wear and tear of a perimeter gutter system, including, for example, acrylonitrile-butadiene-styrene resin, polycarbonate resin, polytetrafluoroethylene, polyvinyl chloride, polyvinylidene chloride, polyesters, polypropylene, polyamides, and synthetic rubbers such as polyisoprene, polybutadiene, butadiene-styrene copolymers, and butadiene-isoprene copolymers.

The preferred construction is from a sheet of several sheets of metallic or plastic material, which are formed into the desired honeycomb configuration, as is seen in the cross-sectional drawings. It is usually preferred that the coping portion at the top rear of the perimeter gutter extend at least partially, and preferably wholly, across an open gutter trough, so as to prevent people from stepping or falling into the gutter. Such can also be prevented by covering the gutter with a grating or grid of metal or plastic, the same or different material from the gutter.

It is also preferred that the gutter be made integral with the honeycomb wall, as in the construction shown in the drawings.

The use of modular units, such as are shown in the drawings, is preferred, because this permits mass production of the gutter wall system at a point remote from the swimming pool, with easy and inexpensive transportation from that point to swimming pool construction sites anywhere in the world. The modular units can then be assembled on site to form any type or configuration of swimming pool. The modulator wall units can be made in straight sections for rectangular or other straight-sided pool shapes, while curved sections can be made for pear-shaped, elliptical, circular, or other curved-side pool configurations.

The modular wall units can be fitted together by welding, soldering or brazing, in the case of metal units; by bonding, using various types of adhesives, in the case of metal or plastic units; or by heat-sealing, ultra-

sonic welding, or heat-bonding, in the case of thermoplastic plastic units. Plastic units which are not fully heat-cured can be bonded and then cured in situ to form a permanent bond on site, in the course of construction of the pool.

The perimeter gutter wall system of the invention can be used completely around the perimeter of a pool, or only partially around the pool perimeter, as desired. The most uniform skimming action and gutter action is, of course, obtained when the entire perimeter of the pool is provided with such a gutter wall.

While construction of the gutter wall in the form of modular units has been described, it will also be appreciated that the gutter wall system can be formed on-site in the configurations shown using concrete or plastic material, and can form an integral part of the pool wall, by casting or pouring into suitable frames, so that the material can harden and set in the desired pool shape. The construction of the gutter system is sufficiently simple so that this type of technique can be employed with good results. Since this requires more handwork, however, and is therefore a more costly method of construction, it would not usually be preferred, particularly in the case of large pools, where construction costs may be too high to permit the luxury of a handmade gutter system on the pool site.

The gutter wall system can also be made from bricks or tiles, which are built up in the desired configuration. These can be the usual types of materials, preferably with a ceramic facing, so that it is leak-proof, with the tiles being bonded together with water-resistant adhesive or cement.

The pool water feed conduit can be positioned beside the first gutter conduit, on the pool-side, as shown in FIGS. **1** to **4** which is preferred, or on the outside of the first gutter, such as to allow more room and a higher level for a water feed conduit, or to allow for a larger perimeter area.

The fresh water feed conduit can be fitted below the second gutter conduit, or to one side, or within the gutter wall. Thus an equally effective system is obtained if the feed conduit is placed within the wall, so that the top of the gutter wall serves as the top of the retaining wall at the side of the pool. This type of system lets the intake feed be injected into the pool at a lower level.

The swimming pool can be equipped with water filtration and cleaning recirculation systems. The gutters usually feed water therein to such systems by gravity. Pumps can be provided with jet water inlets to direct a driving flow of water along the gutters, to flush out the gutters, and to drive water along the gutter towards the water recirculation system. Such jet water inlets are described in U.S. Pat. No. 2,932,397 to Ogden dated Apr. 12, 1960.

Other variations and modifications in the invention will be apparent to those skilled in the art.

Having regard to the foregoing disclosure, the following is claimed as the inventive and patentable embodiments thereof:

1. A nonflooding perimeter skimming gutter wall for swimming pools comprising, in combination, a first gutter conduit for disposition about the perimeter of a swimming pool, and adapted to carry water at a level below a predetermined level of water in the swimming pool; a retaining wall on the pool-side of the first gutter conduit, over the top of which wall water may flow from the pool into the first gutter conduit; and a second gutter conduit within a peripheral wall below the first gutter conduit and in fluid flow connection with the first, such fluid flow connection entering the first gutter conduit at a level below the top of the retaining wall, and adapted to drain off water from the first gutter conduit at any level exceeding a predetermined maximum level therein, so as to inhibit the level of water in the first gutter conduit from reaching the top of the retaining wall.

2. A nonflooding perimeter skimming gutter wall in accordance with claim **1** in which the first gutter conduit is an open trough.

3. A nonflooding perimeter skimming gutter wall in accordance with claim **2** in which the fluid flow connection is in the form of a plurality of slots at the predetermined maximum level of water in the first gutter conduit.

4. A nonflooding perimeter skimming gutter wall in accordance with claim **2** in which a water-feed conduit is provided for feed of fresh water into the pool.

5. A nonflooding perimeter skimming gutter wall in accordance with claim **4** in which the water-feed conduit is disposed beside the first gutter conduit.

6. A nonflooding perimeter skimming gutter wall in accordance with claim **4** in which the water feed conduit is disposed within the first gutter conduit.

7. A nonflooding perimeter skimming gutter wall in accordance with claim **4** in which the water feed conduit is disposed within the wall.

8. A nonflooding perimeter skimming gutter wall in accordance with claim **1** in which the two gutter conduits are separated by a common wall, and the fluid flow connection between the two gutters is provided by a plurality of openings through the wall.

9. A nonflooding perimeter gutter wall in accordance with claim **1**, comprising at least one jet water feed inlet in either the first or the second gutter conduit or both, for driving water and debris along the gutter conduit.

10. A nonflooding perimeter skimming gutter wall in accordance with claim **1**, in the form of a modular wall unit adapted to be assembled end-to-end with other such units to form the perimeter gutter wall of a swimming pool.

11. A nonflooding perimeter skimming gutter wall in accordance with claim **1**, in which the second gutter is within the poolside retaining wall of the first gutter conduit.

12. A nonflooding perimeter skimming gutter wall in accordance with claim **1**, in which the second gutter is within an external peripheral wall of the first gutter conduit.

13. A swimming pool comprising side walls and a bottom adapted to retain water therewithin, and, extending about the upper perimeter of at least a portion of one side wall thereof, a perimeter skimming gutter wall in accordance with claim **1**.

14. A swimming pool comprising side walls and a bottom adapted to retain water therewithin, and, extending about the upper perimeter of at least a portion of one side wall thereof, a perimeter skimming gutter wall in accordance with claim **2**.

15. A swimming pool comprising side walls and a bottom adapted to retain water therewithin, and, extending about the upper perimeter of at least a portion of

one side wall thereof, a perimeter skimming gutter wall in accordance with claim **4.**

16. A swimming pool comprising side walls and a bottom adapted to retain water therewithin, and, extending about the upper perimeter of at least a portion of one side wall thereof, a perimeter skimming gutter wall in accordance with claim **5.**

17. A swimming pool comprising side walls and a bottom adapted to retain water therewithin, and, extending about the upper perimeter of at least a portion of one side wall thereof, a perimeter skimming gutter wall in accordance with claim **11.**

18. A swimming pool comprising side walls and a bottom adapted to retain water therewithin, and, extending about the upper perimeter of at least a portion of one side wall thereof, a perimeter skimming gutter wall in accordance with claim **12.**

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