United States Patent [19]

Orndorff

[11] **3,753,327**

[45] **Aug. 21, 1973**

[54] **METHOD OF CONSTRUCTING A SWIMMING POOL**

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[73] Assignee: **Penn-Aquatic Industries, Inc.,** Mechanicsburg, Pa.

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Related U.S. Application Data

[62] Division of Ser. No. 52,250, July 6, 1970.

[52] **U.S. Cl.** **52/742,** 4/172.19

[51] **Int. Cl.** **E04g 21/02,** E04h 3/18

[58] **Field of Search** 52/742, 741, 745, 52/744, 364, 295, 587, 169, 247, 21, 300, 265; 4/172, 172.19; 61/31

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[57] **ABSTRACT**

A method for constructing an in-ground swimming pool having a poured concrete bottom, an upstanding wall composed of a series of vertically corrugated metal panels bonded to the bottom, and a coping around the top of the wall. The wall is bonded to the bottom by means of an epoxy resin applied along the lower margin of the wall and in a continuous recess formed in the periphery of the bottom during pouring. A layer of deformable leveling material is applied in the recess in the bottom of the pool for supporting the wall. The leveling material permits the wall to be leveled before being permanently bonded to the bottom by the epoxy. The coping means may be provided with an upwardly open water channel at water level in which case, a layer of epoxy resin is disposed between the top of the wall and the underside of the coping. The channel coping is supported on a series of horizontally disposed members which are vertically adjustable by means of threaded fasteners to enable the position of the coping to be adjusted before a layer of concrete is poured therearound to effect permanent installation of the coping in the ground.

1 Claim, 7 Drawing Figures

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[11] **3,753,327**
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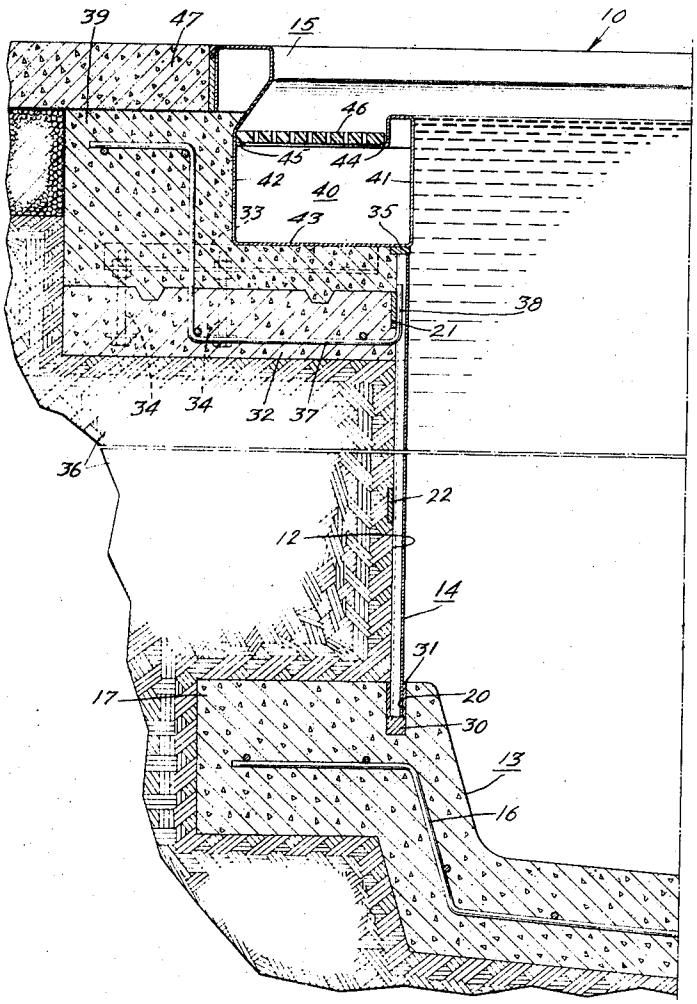


FIG. 1.

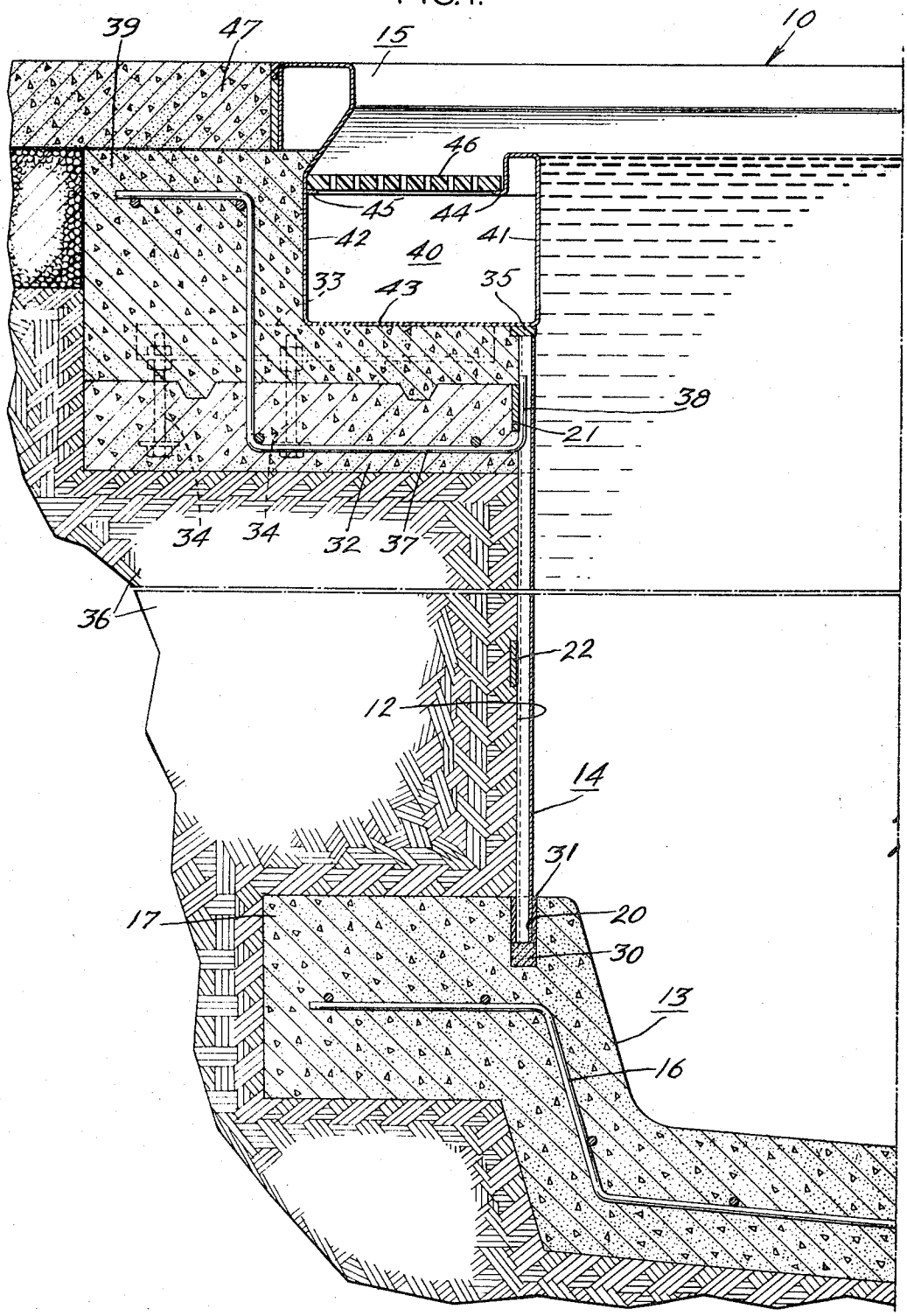

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FIG. 3.

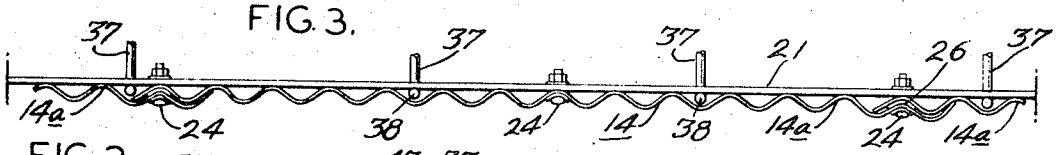

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FIG. 2.

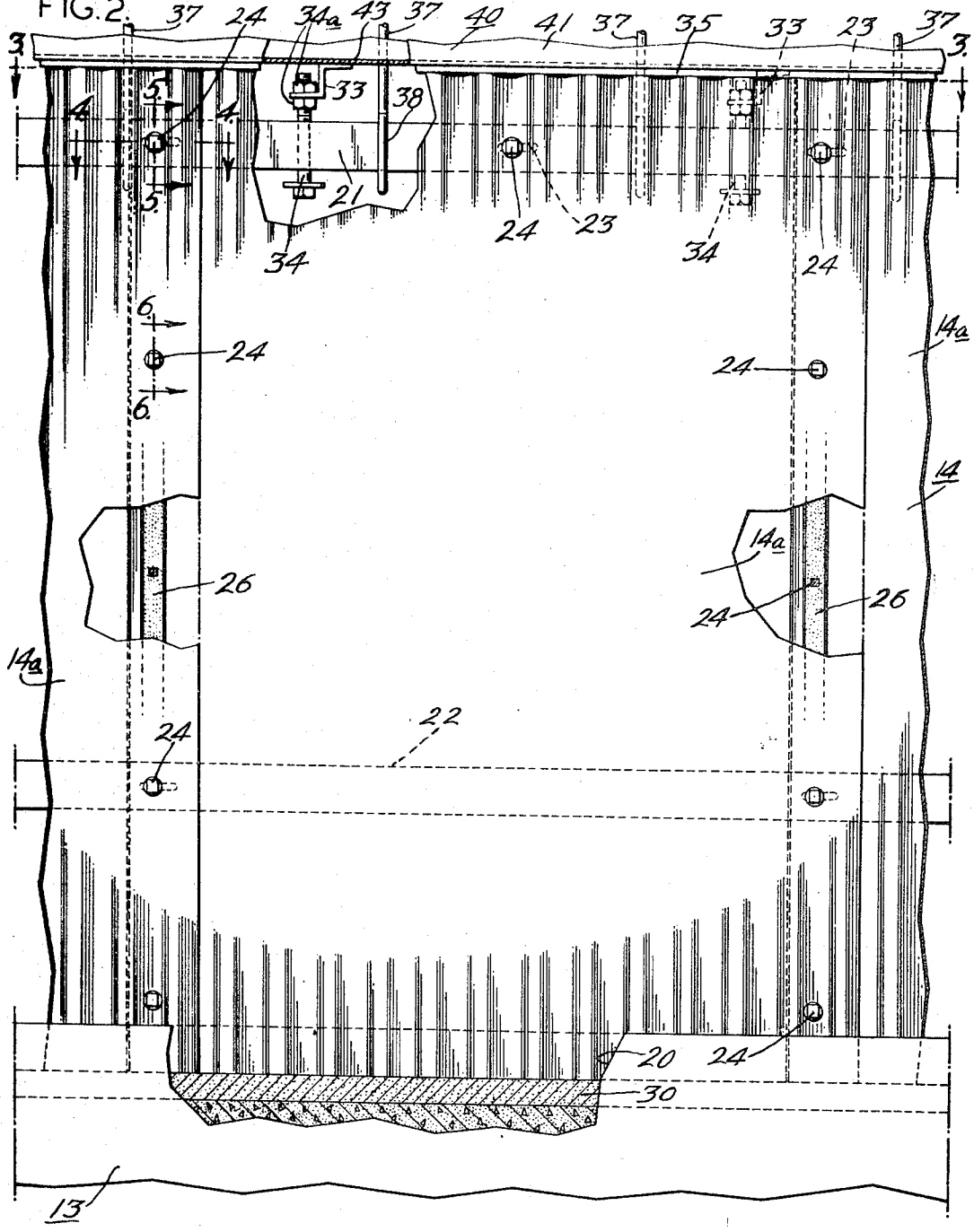

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FIG. 4.

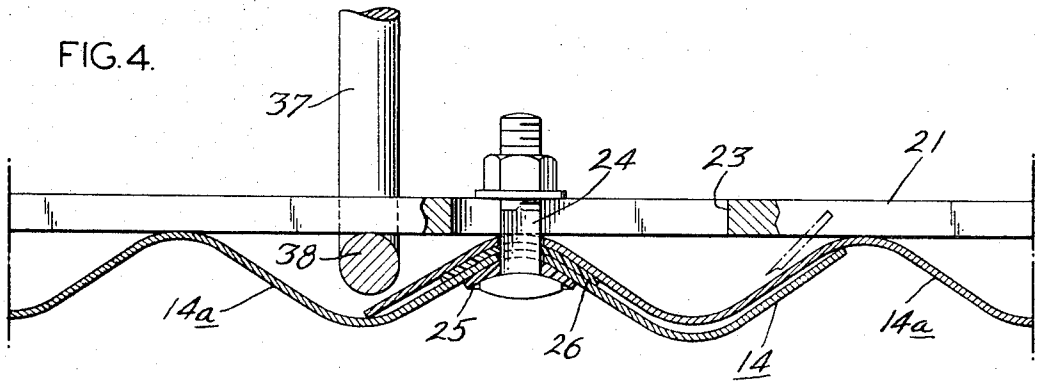


FIG. 5.

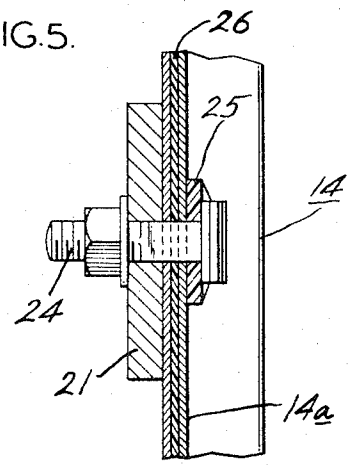


FIG. 6.

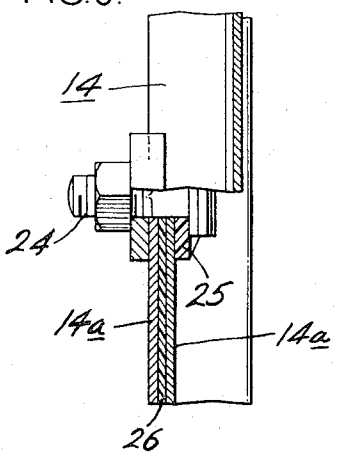
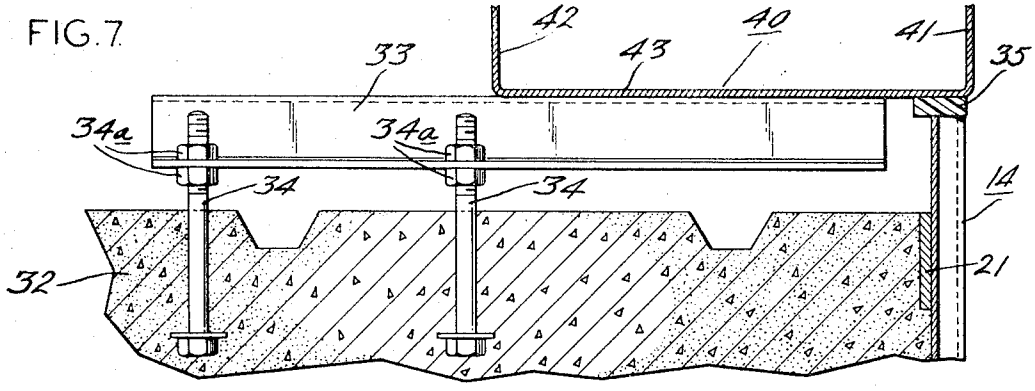


FIG. 7.



METHOD OF CONSTRUCTING A SWIMMING POOL

This application is a division of my copending application Ser. No. 52,250, filed July 6, 1970, and allowed July 23, 1971.

The present invention relates to a method of constructing inground swimming pools having concrete bottoms and steel sidewalls.

Swimming pools having poured concrete bottoms and upstanding metal walls have been constructed. Examples of pools constructed in this manner are disclosed in U.S. Pat. Nos. 2,888,818 and 3,031,801 issued to E. G. Leuthesser; however, pools constructed according to the teachings of these patents possess certain limitations. For instance, in pools of this type, the metal sidewalls are normally erected before the bottom is poured. As a result, the walls must be securely shored during pouring, since the forces of the moving concrete during the pouring operation may tend to cause the walls to bow outwardly. Skilled workmen are required to effect proper shoring, plumbing and leveling of the walls, and the additional materials required for these purposes prevents pool construction economies from being realized.

In pools constructed as described above, there is an absence of adequate means for providing a water tight seal around the bottom of the pool along the intersection of the concrete bottom and the metal wall. It is possible for cavities and small passages to be formed in the vicinity of the wall bottom by air entrapped or entrained in the concrete during pouring, and such passages can enable water to leak outwardly from underneath the wall. Thus, caution must be exercised by skilled workmen to ensure construction of a leak-proof pool. Furthermore, limited movement of the wall relative to the bottom, caused by shifting earth, thermal expansion and contraction, and like factors may tend to cause the concrete to crack along the bottom of the wall, thereby permitting water to leak from the pool.

With the foregoing in mind, it is a primary object of the present invention to provide a novel method of constructing a swimming pool which enables the pool to be constructed with a minimum of skilled labor.

As a further object, the present invention provides a swimming pool having a unique method of forming a water-tight seal is provided between its metal wall and concrete bottom.

It is a still further object of the present invention to provide an improved process for temporarily mounting coping around the top of the wall of the pool to enable the position of the coping to be adjusted before concrete is poured therearound to permanently integrate the coping in the structure of the pool.

More specifically, in a swimming pool having a poured concrete bottom, a corrugated metal sidewall composed of a series of panels fastened together, and means providing coping around the top of the wall, the present invention contemplates a structure which provides an improved water-tight seal along the juncture of the sidewall and bottom. The seal is effected by first pouring the concrete bottom of the pool in a cavity excavated in the earth, and during pouring, disposing a form having a predetermined peripheral shape in the concrete so as to form a continuous peripheral recess around the bottom upon removal of the form. Next, a layer of deformable leveling material is placed in the recess and the metal wall is inserted downwardly into

the recess to rest on the leveling material. After the wall has been leveled, plumbed, and properly bolted, a sealing and bonding agent such as an epoxy resin is applied along the lower margin of the wall in the recess. Thereafter, the earth cavity is backfilled to a level below the top of the wall and is tamped, and coping is installed around the top of the wall. In some installations, the coping is formed of metal and has a water-receiving channel, and it is temporarily supported on a series of horizontally disposed members which are mounted for vertical displacement by means of threaded fasteners to enable the position of the coping to be adjusted with respect to the top of the wall. In such case, a layer of epoxy sealing material is disposed between the underside of the coping and the top of the wall to provide a leak-proof joint. After the level of the coping has been adjusted, an additional layer of concrete is poured around the support members and the fasteners, thereby permanently integrating the coping into the pool structure.

These and other objects, features and advantages of the present invention should become apparent from the following description when taken in conjunction with the accompanying drawings in which:

FIG. 1 is a vertically-foreshortened sectional view of a swimming pool embodying the present invention;

FIG. 2 is a fragmentary elevational view of the wall of the pool illustrated in FIG. 1 and with portions broken away, the view looking outwardly from the inside of the pool;

FIG. 3 is a sectional view taken along line 3—3, FIG. 2;

FIGS. 4, 5 and 6 are sectional views taken along lines 4—4, 5—5, and 6—6 of FIG. 2; and

FIG. 7 is an enlarged side elevational view of the structure for temporarily supporting the coping before concrete is poured therearound as illustrated in FIG. 1.

Referring now to the drawing, there is illustrated in FIG. 1 a portion of swimming pool **10** constructed in accordance with the present invention. As illustrated therein, the pool **10** is set below ground level in a cavity **12** which is excavated in the earth in the advance stages of construction. The pool **10** has a bottom **13**, a wall **14** upstanding from the bottom **13**, and means which provides coping **15** around the top of the wall **14**.

The bottom **13** of the pool is of poured concrete construction and it is reinforced by rods or wire mesh **16** in the customary manner. As illustrated in FIG. **1**, the bottom **13** has an upwardly, offset peripheral flange **17** which mounts the wall **14**, the wire mesh **16** also being upwardly offset and extending into the flange **17** below the wall **14**. The bottom **13**, is formed in one of many conventional plan shapes, such as oval, kidney or the like, and the bottom is contoured to provide the pool with deep and shallow zones.

As may be seen in FIG. **3**, the metallic wall **14** is vertically corrugated and is preferably of type 304 Stainless Steel metal construction. The wall **14** is composed of a series of panels **14***a*, **14***a* which are connected together with their vertical margins in overlapping relation (see FIG. **4**) by means of threaded fasteners **24**, **24** which also connect the panels **14***a*, **14***a* to each of a pair of tie bars **21** and **22** extending continuously around the outside of the wall **14** adjacent its upper and lower margins, respectively. Each panel **14***a* is also connected to the adjoining panels intermediate its upper and lower margins and to the tie bars by threaded fasteners

24, 24. As illustrated in FIG. 4, each tie bar, for example, the top bar 21, has a series of horizontally elongated through slots 23, 23 located at spaced intervals corresponding approximately to the spacing of the fasteners 24, 24 (FIG. 3) to permit limited horizontal adjustment of the panels 14*a*, 14*a* relative to the tie bars 21 and 22 during erection of the wall 14. In order to connect the panels 14*a*, 14*a* in a leak-proof manner, a resilient washer 25 (FIG. 4) is provided between the head of each fastener and the inside of the wall 14. Also, a gasket 26 of resilient material is disposed between the overlapping margins of the adjacent panels 14*a*, 14*a* and extends from top to bottom in the wall 14. The fasteners 24 and the washers 25 and gaskets 26 are shaped to engage in the grooves formed between adjacent corrugations in the panels. Thus, when the fasteners 24 are tightened, a relatively fluid-tight joint is provided between the panels and a strong upstanding wall which is resistant to bowing during further stages in the construction process is provided.

According to the method of the present invention, the bottom 13 is poured before the wall 14 is erected. During pouring, a form having a rectangular transverse cross-section and a peripheral shape which is determined by the desired shape of the pool is disposed in the poured concrete with a portion projecting below the surface of the concrete until the concrete has at least partially set so as to create an upwardly open recess 20 upon its removal from the concrete. Preferably, the recess has a depth of substantially 3 inches and a width of substantially 1 inches and is continuous in the flange 17 in the periphery of the bottom 13. Although preferably formed during pouring of the bottom 13, the recess 20 may be formed with slightly more difficulty by employing suitable concrete-cutting apparatus after the concrete has set.

In the normal course of erection, the panels 14*a*, 14*a* are inserted downwardly into the recess 20 before being fastened together and plumbed and leveled. However, prior to their being inserted in the recess 20, a layer of leveling material 30 is placed in the recess 20 to a depth of substantially 1 inches. Thus, the panels 14*a*, 14*a* rest endwise on the material 30, and the material 30 is readily deformable to enable the top edges of the panels 14*a*, 14*a* to be leveled, for example, to permit one end of a panel to be lowered by compressing the material 30.

In order to provide a strong water-tight sealed joint between the bottom of the wall and the bottom 13, a sealing and bonding agent 31 is flowed into the recess 20 and along the lower margin of the panels 14*a*, 14*a*. In the present instance, the sealing and bonding agent is an epoxy resin which, after setting under normal ambient conditions, provides a flexible and water-tight seal which possesses high strength and which is resistent to deterioration. Many types of epoxy resins are available for bonding steel to concrete; however, an epoxy resin such as Royston C–210 sold by the Royston Laboratories of Pittsburgh, Pennsylvania, has been employed with satisfactory results.

In some pool installations, the copying means 15 around the top of the wall 14 may possess a water-conveying channel 40. In the illustrated embodiment, the metallic coping 15 of type 304 Stainless Steel is shaped to have an upstanding inner wall portion 41 and an upstanding outer wall portion 42 connected thereto by a substantially horizontal web 43 which extends across the top of the wall 14. The upper margin of the inner wall 41 is reversely and outwardly turned and terminates in a lip 44, and the outer wall 42 has a lip 45 in registry with the lip 44 for horizontally supporting a screen 46. The upper margin of the outer wall 42 is also reversely and outwardly turned to butt against a top layer of concrete or tile 47.

The coping 15 is temporarily supported adjacent the top of the wall 14 by means of a structure which permits the position of the coping to be adjusted before concrete is poured therearound to effect permanent installation in the ground as illustrated in FIG. 1. As may be seen in FIG. 7, the support structure comprises a supporting or lower layer of concrete 32 overlying a layer of earth 36 which is backfilled against the outside of the wall and tamped before the concrete 32 is poured. A double-flanged angle member, in this case a Z-shaped member 33, engages the underside of the coping 15 and extends laterally outward therefrom, in the present instance at a right angle. The member 33 is mounted for vertical displacement toward or away from the concrete 32 by adjusting means comprising a pair of threaded fasteners 34, 34 each of which has its threaded portion projecting upwardly through the member 33 and each of which threadedly carries adjusting nuts 34*a*, 34*a* engaging opposite sides of the member 33. The heads of the fasteners 34, 34 are embedded in the concrete 32, and both fasteners are spaced outwardly of the outer wall portion 42 of the coping 15 to support the coping in cantilever fashion for providing ready access to the nuts 34*a*, 34*a* so that vertical adjustment of the coping 15 may be effected upon rotation of the nuts in the proper directions. It is to be noted, however, that before leveling of the coping 15, a layer of sealing material 35, for instance like the aforementioned epoxy resin, is applied on the top of the wall 14 and along the underside of the coping 15 to provide a water-tight and flexible sealed joint around the top of the wall 14. Like the fasteners 34, 34 a series of reinforcing rods 37, 37 are embedded in the concrete and each has at its inner end an upturned hook end 38 which engages between the upper tie bar 21 and the outside of the wall 14 to strengthen the structure of the pool.

After the coping 15 has been leveled, it is anchored in place by an upper layer of concrete 39 poured onto the layer 32 and around the coping support structure to permanently integrate the coping 15 with the pool. Thereafter, the tile or concrete blocks 47 are positioned above the upper layer 39 and in abutting relation with the outermost surface of the coping 15 (see FIG. 1), thereby completing construction of the pool 10.

In view of the foregoing, it should be apparent that a novel process has been provided for constructing a swimming pool which resists leakage and which enables the pool to be constructed in an expeditious manner.

While a preferred embodiment of the present invention has been described in detail, various modifications, alterations or changes may be made without departing from the spirit and scope of the present invention as defined in the appended claims.

I claim:

1. A method of constructing a swimming pool comprising the steps of: excavating a cavity in the earth, pouring concrete in the bottom of the cavity to form the bottom of the pool, providing a recess having a pre-

determined configuration in said poured concrete, inserting a layer of deformable leveling material in the bottom of said recess, inserting downwardly into said recess an upstanding wall having a top edge, adjusting the level of said top edge, applying sealing means on said leveling material and along the lower margin of said wall in said recess, pouring a lower layer of concrete between said wall and said earth cavity to dispose the top of the concrete layer below the top of the wall, supporting in the poured concrete layer, until said layer has at least partially set, a pair of threaded fasteners with their threaded portions projecting upwardly and disposed in a line intersecting said wall, mounting a member onto said fasteners in a substantially horizontally disposed position, supporting coping on said member, and pouring an upper layer of concrete onto said lower layer to cause the concrete to surround the fasteners, the member and at least part of the coping for permanently integrating the coping with the structure of the pool.

* * * * *