March 5, 1968 G. C. FOX 3,371,455

SWIMMING POOL STRUCTURE

Filed Oct. 24, 1966 2 Sheets-Sheet 1

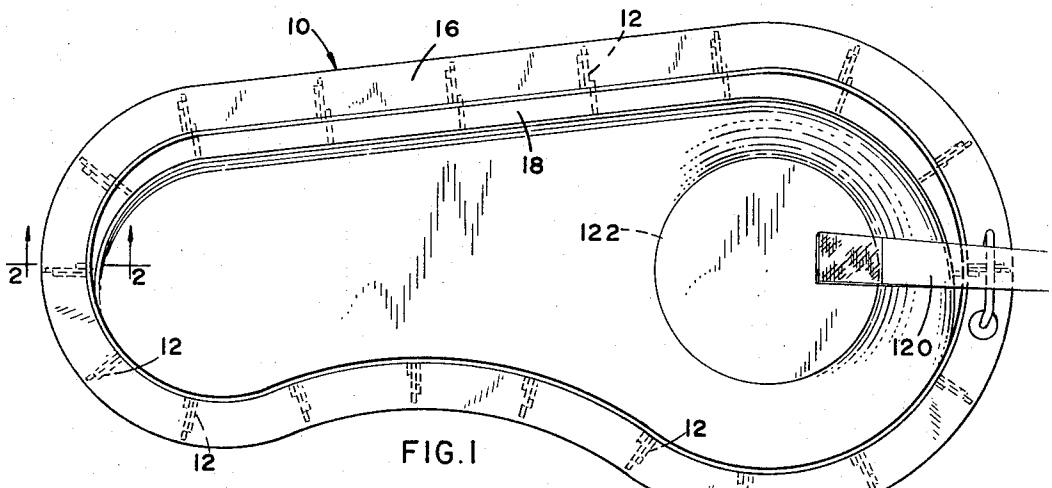


FIG. 1

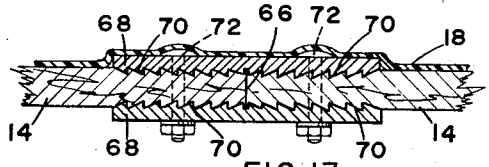


FIG. 13

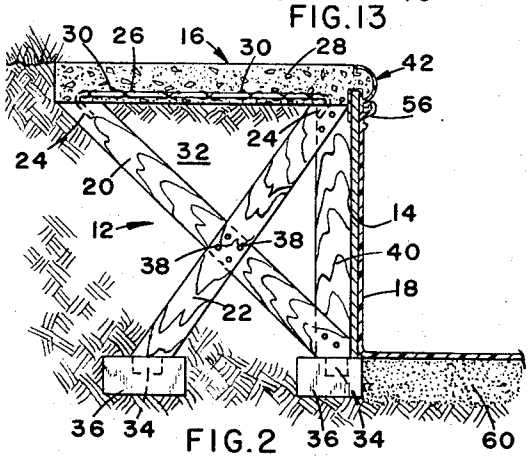


FIG. 2

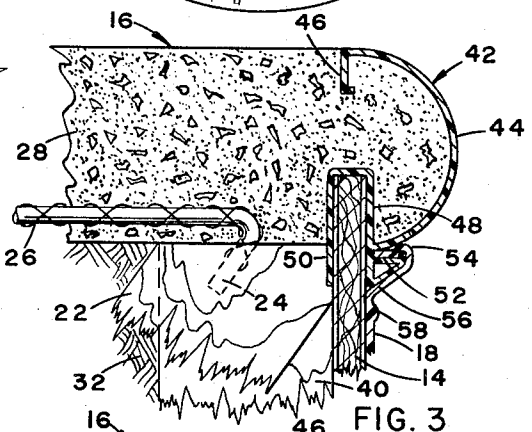


FIG. 3

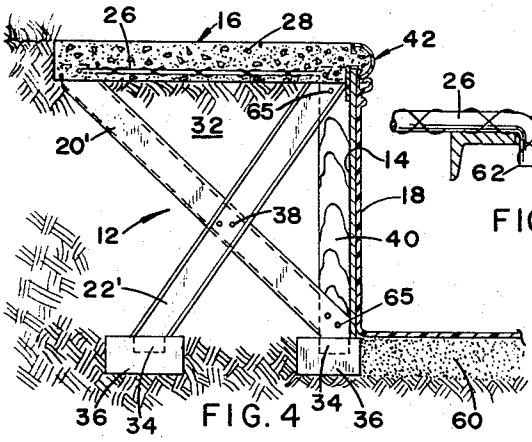


FIG. 4

FIG. 6

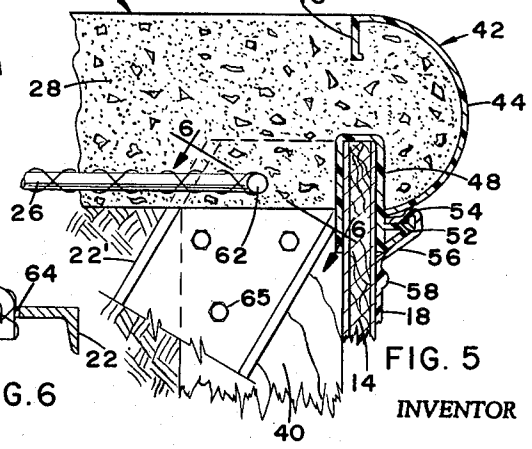


FIG. 5

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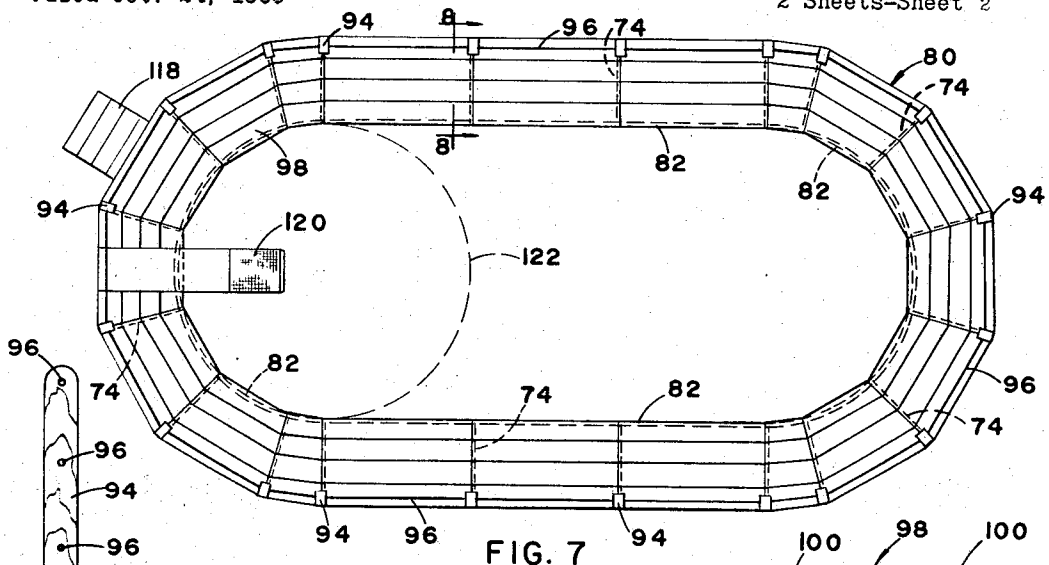


FIG. 7

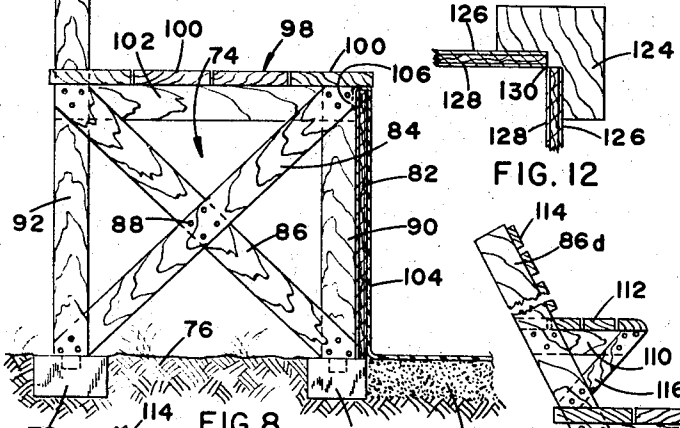


FIG. 8

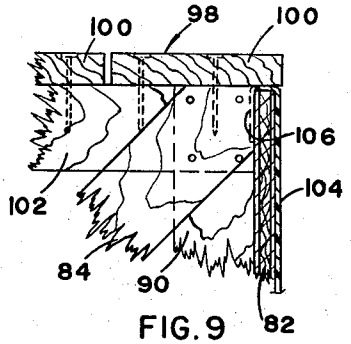


FIG. 9

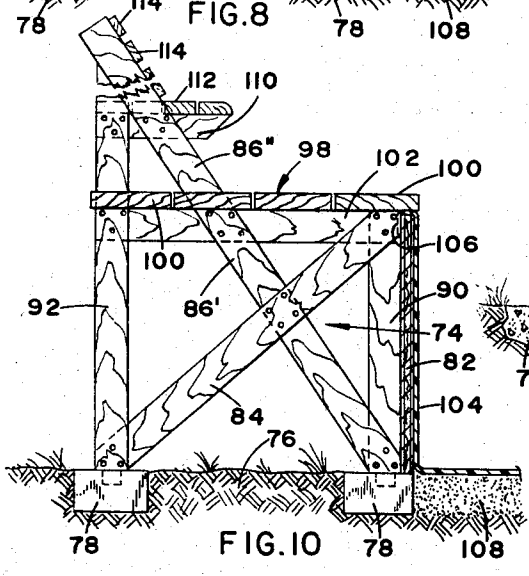


FIG. 10

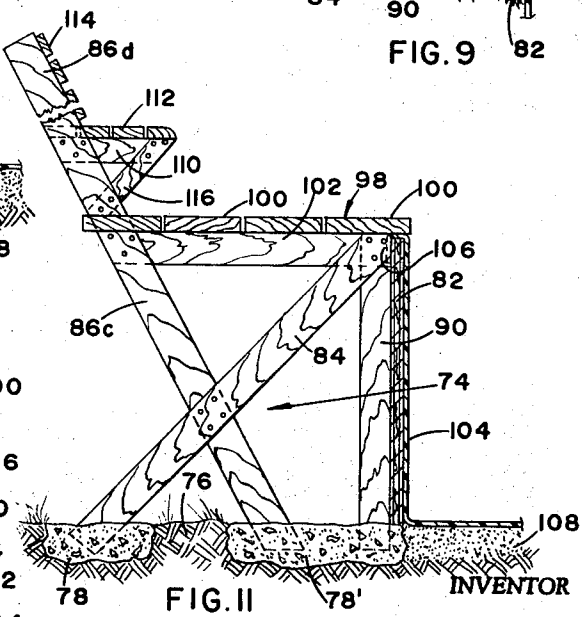


FIG. 11

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3,371,455

SWIMMING POOL STRUCTURE

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Filed Oct. 24, 1966, Ser. No. 588,957
10 Claims. (Cl. 52—169)

This invention pertains to swimming pool structures and incorporates the same novel features respectively in pools intended to be disposed substantially entirely above ground level or substantially entirely disposed below the level of the ground surrounding the pool.

It is the principal object of the present invention to provide a swimming pool structure selectively of the type which may be disposed substantially below the level of the ground surrounding the pool or substantially entirely above the ground level which is to support the pool, either of said structures being provided with a horizontally extending deck extending radially outward from the rim of the pool for a limited distance to provide a walk-way, means for sun bathing, or means upon which bathers may sit, said deck being supported by means serving the dual role of forming a physical support for the deck means and, simultaneously, forming brace means to support the sides of the pool and supplement the tensile strength afforded by connected sheets which comprise the principal side members of the pool

It is another object of the invention to provide a series of substantially X-shaped frames at circumferentially spaced locations along the sides of the pool and extending radially outward therefrom, away from the area occupied by water in the pool, said X-shaped frames being formed selectively from either metal structural members, such as channels, or wooden beams, and the upper ends of said frame members are interengaged by transversely extending tension members which prevent the upper ends of the frame members from spreading horizontally apart.

A further object of the invention, ancillary to the foregoing object, is to utilize said tension members as part of the means for supporting the deck surrounding the pool.

Still another object of the invention is selectively to provide either a deck made from wooden beams or a deck made from poured concrete and providing a slab thereof of suitable thickness, the poured concrete deck preferably being used in connected with pool structures disposed below the level of the ground surrounding the pool and the tension members extending between the upper ends of the X-shaped frame members comprising reinforcing steel rods disposed within the lower portions of the concrete slab when the deck is formed from concrete.

One further object of the invention is to provide an extruded coping which extends longitudinally along the edge of the deck adjacent the side walls of the pool when the deck is formed from poured concrete, said coping being substantially C-shaped in cross-section and the end flanges thereof extending into the poured concrete to become embedded therein and cured therewith so as to anchor the coping firmly to the deck when the latter has set.

Still another object of the invention ancillary to the foregoing is to form such extruded coping from pliable synthetic resin or plastic material capable of affording limited curving of the coping and thereby adapt the same to a curved configuration of the side wall of the swimming pool incident to conforming the deck to such contour of the pool.

One further object of the invention is to provide upwardly extending groove means in said coping to receive

the upper edge of the sheets of material comprising the side walls of the pool and thereby serve to anchor the upper edges of the side wall sheets relative to the coping and deck, said coping also including means to secure the upper edge of the flexible liner sheet material to the coping.

A still further object of the invention is to provide vertically extending members which are connected to the upper and lower outermost ends of the X-frame members for support thereby and the upper end of said vertical members extending above the level of the deck to afford support for horizontally extending confining means such as rails or ropes extending around the outer sides of the deck and thus affording fence-like enclosing means, said members also having bench-like seats or other forms of seating means associated therewith if desired

Still another object of the invention is to provide various details of support and attaching means in the various embodiments of the invention which stabilize the supporting means and particularly the X-frames relative to the ground, regardless of whether the pool is of the above-ground type or within-the-ground type, details of which are described hereinafter.

Details of the invention and the objects thereof, as well as other objects thereof, are set forth in the following specification and illustrated in the accompanying drawings comprising a part thereof.

In the drawings:

FIG. 1 is a substantially plan-like but somewhat perspective view of one exemplary configuration of swimming pool illustrated as being disposed within the ground level surrounding the pool.

FIG. 2 is a vertical sectional view on a larger scale than employed in FIG. 1 and showing the construction of one embodiment of pool as seen on the line 2—2 of FIG. 1.

FIG. 3 is a fragmentary vertical sectional view showing the upper right-hand corner of the structure illustrated in FIG. 2 but shown on a larger scale than employed in the latter figure.

FIG. 4 is a view similar to FIG. 2 but showing a slightly different embodiment of X-frame structure from the embodiment illustrated in FIG. 2.

FIG. 5 is a fragmentary vertical section view of the upper right-hand corner of the structure illustrated in FIG. 4 but shown on a larger scale than employed in the latter figure.

FIG. 6 is a fragmentary sectional detail as seen on the line 6—6 of FIG. 5.

FIG. 7 is an exemplary plan view of an embodiment of swimming pool in which the deck is formed from wooden planking.

FIG. 8 is an exemplary vertical sectional view showing one preferred construction of X-shaped frame employed in the embodiment of swimming pool shown in FIG. 7, as seen on the line 8—8 of said figure.

FIG. 9 is a fragmentary, enlarged vertical sectional view showing a portion of the structure illustrated in the upper right-hand corner of the embodiment shown in FIG. 8.

FIGS. 10 and 11 respectively are additional, different embodiments of X-shaped frame structures from those shown in FIG. 8 and all capable of being employed with the embodiment of swimming pool shown in FIG. 7.

FIG. 12 is a fragmentary top plan view of a corner structure of a rectangular type pool embodying the principles of the present invention.

FIG. 13 is a fragmentary top plan view illustrating an exemplary arrangement of clamping plates shown in engagement with abutting ends of two of the sheets from which the side walls of the pool are formed and par-

ticularly illustrating anti-slip ribbing means provided on one surface of said clamping plates.

As referred to hereinabove, the present invention pertains to a swimming pool structure which, in the preferred construction thereof, employs continuous decks surrounding the upper edge of the side walls of the pool. Particularly depending upon whether the pool is of the type commonly known as in-the-ground type or is of the above-the-ground type, the surrounding deck may be either a concrete slab structure or formed from wooden planking. The concrete slab type deck is preferred for use primarily with the in-the-ground type, whereby the ground or earth surrounding the side walls of the pool at least partially helps to support the concrete deck.

Further, as shown in exemplary manner in FIGS. 1 and 7, wherein the pools respectively are provided with concrete and wooden plank-type decks, the plan view shape of the pools may include interconnected curved and relatively straight portions, whereby there are no sharp corners. However, as illustrated in FIG. 12, the present invention also is applicable to pools having, for example, right-angled corners such as those employed in square or rectangular pools.

The basic components from which the several embodiments of pools are formed in accordance with the invention are relatively few in number. Referring initially to the embodiment illustrated in FIGS. 1–6, it will be seen that the pool **10** is formed from a plurality of exemplary X-shaped frames **12**; a series of preferably similar sized sheets **14** which, for example, may comprise plywood of suitable thickness, such as ½", said sheets being in abutting relationship at the ends and interconnected together in the manner shown in FIG. 13; a deck **16**; and a flexible sheet liner **18**. In the specific illustrations of FIGS. 2 and 3, the X-shaped frame is illustrated as being composed of a pair of crossed frame members **20** and **22** which, for example, may be formed from 2 x 4 beams. The upper ends thereof preferably are formed with longitudinally extending holes **24** complementary in size to a reinforcing rod comprising a horizontal tension member **26** which, for example, may be about ¼" in diameter. The opposite ends are bent at an acute angle to the rod and are disposed within the holes **24**.

Preferably, the rod **26** is disposed in spaced relationship to the upper ends of the frame members **20** and **22** so as to permit the reinforcing rod **26** to be positioned within the lower portion of the concrete slab **28** which comprises the deck **16**. By way of example, but without restriction thereto, the deck **16** may be of about 3' wide and 4" thick. Further, a series of parallel reinforcing rods **30** extending lengthwise of the slab **28** may be disposed therein adjacent the tension reinforcing members **26**, as shown in FIG. 2 for purposes of strengthening the slab, particularly the portions between the spaced X-frames **12** which, as will be seen somewhat diagrammatically from FIG. 1, are spaced circumferentially around the pool **10** beneath the deck **16**.

As also will be seen from FIG. 2, wherein the X-frame **12** is disposed within the ground **32** and the upper surface of the deck **16** preferably is substantially flush with the upper surface of the ground, the lower ends **34** of the frame members **20** and **22** preferably are shaped to extend vertically downward into appropriate recesses formed in the footer members **36**. If desired, said footer members may be preformed concrete blocks of the type, for example, having at least a central hole formed therein incident to molding the blocks, and the lower ends **34** of members **20** and **22** preferably are shaped so as to be complementary to said openings in said footer members.

The frame members **20** and **22**, where they cross each other, are connected together by suitable means such as a plurality of spikes or bolts **38** which extend through the members and preferably are rustproofed since they are disposed within the ground. Further, a vertical stud **40** extends between the upper and lower ends of the frame members **20** and **22** which are nearest the side walls of the pool and comprise the sheets **14** which abut each other and are suitably connected, such as by nails, to the vertical studs **40**.

The edge of the concrete-type deck adjacent the side members **14** of the pool preferably is smoothly rounded and faced with a coping **42**, details of which are best shown in enlarged manner in FIG. 3. In cross-section, the coping is C-shaped although, as viewed in FIGS. 2 and 3, the C is shown in reversed position. Said coping may be formed from any suitable material, preferably by extrusion molding, to provide the same with a smoothly curved nose **44**, a downwardly extending upper flange **46**, and an upwardly extending channel-shaped lower flange **48**.

The channel of flange **48** opens downwardly and is sufficiently wide to receive the upper edge of the sheets **14** which comprise the side walls of the pool. Preferably, the outer wall **50** of the channel-shaped flange **48**, at the lower edge thereof, initially extends toward its opposite channel wall a distance somewhat less than the thickness of the sheets **14**, whereby when the upper edges of the sheets **14** are forced into the channel, the side walls thereof will grip the opposite sides of the sheets **14** firmly to accurately position the same with respect to the coping **16**. Further, when the concrete from which the coping is formed is poured, the surface of the ground upon which it is poured preferably is smoothed and packed so as to form a smooth complementary bottom surface upon the coping. The fluid concrete readily flows into the interior of the coping **42** so as to firmly embed the upper flange **46** and the lower channel-shaped flange **48** therein. The coping is supported effectively by the side wall sheets **14** while the coping is being poured and united therewith.

The coping may be formed from metal, if desired, such as aluminum, thereby rendering the same rustproof. Such metal type coping is satisfactory for pools having substantially horizontally straight sides. However, where it is desired to employ such coping in pools having curved side walls, and correspondingly curved edges for the coping nearest the side walls, the coping **42** preferably is extruded from suitable pliable synthetic resin or plastic material of which a number are available, including vinyl materials, polyethylene, and the like. Such materials are sufficiently pliable, coupled with reasonable rigidity and strength, to at least permit smoothly curving the coping where the curves have radii of substantial distances such, for example, as the order of 8' or 10', but such dimensions are not to be regarded as restrictive.

The coping structure, regardless of whether formed from metal or synthetic resin material, is provided with an additional channel **52** extending longitudinally thereof, the same opening outwardly adjacent the lower edge of the curved nose **44**, as clearly shown in FIG. 3. Said channel is for purposes of receiving an enlarged bead **54** complementary in shape to the channel **52** and extending longitudinally along the upper edge of an attaching strip **56**, which is connected, for example, by a fused joint **58** extending longitudinally along the lower edge of the attaching strip **56** for connection to the upper edge of the flexible liner sheet **18** extending upwardly along the outer surface of the side wall members **14** of the pool. Such outer surface is that which is opposite the surface of the side walls which are abutted against the vertical studs **40**.

Preferably, but without restriction thereto, the flexible liner sheet material **18** is of suitable synthetic resin, such as pliable vinyl sheeting, which is thermoplastic and readily may be connected by the application of an appropriate amount of heat to the attaching strip **56**, as indicated by the joint **58** shown in FIG. 3. The strip **56** also preferably is formed from suitable thermoplastic synthetic resin.

Such arrangement provides a highly effective, waterproof attachment of the flexible liner sheets 18 to the upper edges of the side walls of the pool. Said sheet material 18 also extends horizontally along the bottom of the pool as shown in FIG. 2, the same preferably being disposed upon a layer of hard packed sand 60, for example.

Referring to FIGS. 4–6, a slightly modified version of the embodiment of the invention shown in FIGS. 1–3 is illustrated. The construction in these two modifications is substantially identical, with the exception of the crossed frame members comprising the X-shaped frames 12. In the modification shown in FIGS. 1–3, these are wooden, such as 2 x 4 beams, whereas in the modification shown in FIGS. 4–6, they are formed of metallic channels 20' and 22', such as steel suitably rustproofed, aluminum, or the like. Also, as shown particularly in FIGS. 4 and 5, the upper ends of said frame members 20' and 22' extend above the level of the ground or earth which forms the bottom of the concrete slab 28 comprising deck 16 so as to become embedded within the concrete.

The tension member 26, as shown in detail in FIG. 6, also has short laterally extending ends 62 which respectively extend through holes 64 formed in the upper ends of the frame members 20' and 22', as shown in detail particularly in FIG. 6. The surrounding concrete retains the same connected. However, wooden vertical struts 40 also preferably are used in the modification shown in FIGS. 4–6, especially for purposes of securing the sheets 14 comprising the side members of the pool thereto, such as by nailing. The upper and lower ends of the studs 40 are secured to the adjacent ends of the X-frame members 20' and 22', such as by appropriate bolts 66 extending through suitable holes in said studs and frame members.

The several modifications of the embodiments shown in FIGS. 1–6 preferably include side walls formed from sheets 14 of plywood, for example, in the average sized pool, it has been found that plywood ½" thick is fully adequate to sustain the pressures exerted against such walls, both by the earth or ground pressing against one side surface thereof and the force of the water, when the pool is filled, pressing against the opposite side surface. Particularly where the pool is of the in-the-ground type, as illustrated in FIGS. 1–6, such sheets of plywood are suitably treated to resist deterioration, especially inasmuch as the inner surface of said sheets is in direct contact with the earth or ground in back of the same, between the longitudinally spaced studs 40.

Particularly for purposes of providing adequate tensile strength to the side walls, especially in a longitudinal direction, the sheets of plywood 14, for example, are abutted at their vertically extending ends, as shown fragmentarily in a top plan view in FIG. 13, along a narrow vertical plane 66. Such sheets are maintained in such firm abutting relationship, for example, by vertically extending clamping plates 68, each of a pair of the same preferably being disposed respectively adjacent the opposite side surfaces of the sheets 14, as shown in FIG. 13. Said plates preferably are formed from suitable corrosion-resistant metal such as aluminum. From a practical standpoint, plates approximately 6" wide and as long as the vertical dimension of the wall sheets 14 have been found to be suitable.

Plates 68 also preferably are at least approximately ⅛" thick and are provided on the surfaces thereof which directly engage the sheets 14 with vertically extending ribs 70. Said ribs are defined by angularly related surfaces which, in horizontal cross-section, resemble sharp teeth which actually bite into the adjacent surfaces of the plates 14 when the plates are clamped in opposing relationship against such opposite surfaces by suitable securing means such as bolts 72. Preferably, the bolts 72 may be disposed in vertical rows each approximately 1½" from the outer edges of said plates 68 and said bolts are spaced vertically apart in the order of approximately 6". Such dimensions are not to be regarded as restrictive, however.

In the illustration shown in FIG. 3, it also will be seen that the flexible waterproof liner 18 is disposed over the plate which is nearest the water-side of the side walls 14. For purposes of preventing puncturing of the line 18, it is preferred that the bolts 72 be of the type having rounded heads. Such heads are disposed adjacent the liner 18 so as not to tend to puncture the same.

The X-frames 12 provide several advantages in the structure of the swimming pool comprising the present invention. One of these is particularly useful during the erection of the pool. For example, when the excavation for the pool has been completed and it is time to erect side walls 14, for example, the level for the bottom surface of the pool is established. The footers 36 are then placed suitably in such bottom surface. If desired, said footers, rather than comprising the preformed concrete blocks referred to above, may actually be formed from poured concrete, the same being poured, for example, after placement of the X-frames 12 at the desired level and after being suitably plumbed. After the footers 36 have set, the ends of the side wall sheets of plywood 14 are secured together, for example, by the means shown in FIG. 13, and the connected sheets are nailed in place to the studs 40 which actually comprise part of the X-frames 12 in the preferred construction.

Incident to preparing the ground to receive the X-frames 12, for erecting in-the-ground pools, one method of construction comprises the use of a back-hoe which prepares laterally extending channels sufficiently wide to receive the footers 36 and the X-frames 12, thereby not disturbing any more of the original earth which is to surround the pool than is necessary. After the X-frames 12 have been placed in such lateral slots, for example, and footers 46 have set, for example, back filling of the lateral slots takes place, but it will be seen that the X-frames 12 have stabilized the walls 14 under the circumstances.

A second advantageous function of the X-frames 12 is to support the deck 16. Although the deck usually is poured directly upon a smoothed ground surface adjacent the pool sides, when the deck has set, the X-frames assume full support because the surrounding ground usually settles a certain amount and this disengages the bottom of the deck. This is beneficial in freezing weather to afford a space to permit the frozen ground to rise without damage to the deck or related structure. Following such placement of the X-frames 12 and erection of the deck 16 in the manner just described, the hard packed sand subsurface 60, which may be of the order of a few inches in thickness, is placed within the pool and packed, and thereafter the waterproof lining 18 is mounted so as to extend along the outer surface of the side walls 14 and then across the bottom of the pool.

Referring to the embodiment of the invention shown in FIGS. 7–12, the construction shown therein may, if desired, be used either with in-the-ground type pools or in above-the-ground type pools. In the specifically illustrated arrangements shown in the various figures and especially FIGS. 8, 10 and 11, the pools are the above-the-ground type and, primarily, substantially the entire structure advantageously may be formed from wooden planking and the like, at least as to the structure of the deck and the X-frames which support the same, thereby effecting certain economies.

Referring to FIG. 7, it will be seen that pools having longitudinally straight extents of wall as well as curved portions of wall, may be constructed by use of the elements comprising this embodiment of the invention. As in regard to the embodiment illustrated in FIGS. 1–6, the X-frames 74 are initially stabilized with respect to the ground or earth 76 by the use of appropriate footers 78 which preferably are disposed within the ground 76. Said footers may be either preformed concrete blocks, for example, or may be poured from fluid concrete into suitable cavities. The erection of a series of the X-frames 74 in circumferentially spaced relationship around the area to define the pool 80 enables the sides 82 to be

placed and stabilized. Said sides **82** preferably comprise sheets of plywood of appropriate height and length, such as the order of 4' x 8', 4' x 12', etc., and appproximately ½" thick, as in regard to the preceding embodiment. Such sheets of plywood preferably are suitably treated to render the same resistant to deterioration but, if substantially the entire area of the sheets are disposed above ground, appropriate painting of the outer surfaces will serve reasonably well to resist deterioration by weather.

Referring to the modification of X-frame **74** shown in FIG. 8, the same comprises preferably a pair of cross frame members **84** and **86** which, for example, may comprise 2 x 4 beams connected together at their crossing points by spikes or bolts **88**. A vertical stud **90**, such as a wooden 2 x 4 beam, extends between the upper and lower ends of the frame members **84** and **86** adjacent one side of the X-frame for attachment of the side sheets **82** thereto such as by nailing after the vertical ends of the sheets have been secured together such as by the means shown in FIG. 13. The lower ends of the frame members **84** and **86** also are suitably formed to extend into the footer **78**, as shown in exemplary manner in FIG. 8.

Also extending vertically between the upper and lower ends of the frame members **84** and **86** adjacent the outside of the X-frame **74** is a post-like member **92**, such as a 2 x 4 beam, which is nailed or bolted to said ends of the frame members **84** and **86** and extends vertically above the upper portion of the X-frames **74**. Such upwardly extending ends provide supporting portions **94** for horizontally extending enclosing members such as ropes **96**, or an appropriate fence-like enclosure for the deck **98**. Said deck preferably comprises wooden planks, such as 2 x 4 beams **100**. The X-frames **74** each also comprise a horizontal joist member **102**, such as wooden 2 x 4 beams, the ends of which are nailed or bolted to the upper ends of the frame members **84** and **86**, for example, said nails or bolts also being used to connect the vertical studs **90** and vertical members **92** to the upper ends of the frame members **84** and **86**, if desired.

The deck planks **100** readily are connected by nailing to the joists **102** but before the plank **100** nearest the side walls **82** is finally nailed into place, the flexible, waterproof liner sheet **104** is disposed in operative position adjacent the inner surface of the side walls **82** which are those surfaces opposite the studs **90**. As best shown in FIG. 9, the upper edge **106** of the flexible liner extends sufficiently above the upper edge of the side walls **82** that the same may be draped over the upper edge of the side sheets **82** and overhang down the opposite side a limited distance as shown in exemplary manner in FIG. 9. The overhang edge **106** may be tacked to the surface of the side walls **82** nearest the X-frames to secure the liner in operative position. Said draped overhanging upper edge, for example, may be of the order of 2" or 3" long and thereby affords an adequate amount of the liner to be secured to the side walls. The lower surface of the deck plank **100** which is nearest said side of the pool, as also illustrated in exemplary manner in FIG. 9, preferably does not engage the overhanging liner and thereby does not pinch it. Hence, when the latter plank **100** is finally nailed in place, the liner **104** extends beneath it and is in position to be supported vertically from its upper edge portion and extend downwardly along the outer surface of the side sheets **82** of the pool as well as horizontally across the top of the layer of hard packed sand **108**, for example, which extends across the entire bottom surface of the pool.

Referring particularly to FIGS. 10 and 11, it will be seen that some variations in the shape of the X-frame to be used particularly in the above-the-ground arrangements of the pool are possible. These particularly are for purposes of supporting bench facilities at a level above the deck **98**. Referring to FIG. 10, for example, it will be seen that the vertical post-like members **92** extend above the deck **98** a limited distance, while the frame members **86'** are longer than the members **86** in the arrangement shown in FIG. 8 so as to provide an angularly directed upper extension **86"** for purposes of permitting horizontal wooden members **110** to be nailed or bolted to the members **92** and **86"** at a suitable height above the deck **98** to permit seat planks **112** to be secured thereto. Further, the uppermost portions of the upper extensions **86'** afford suitable inclined supporting means for a series of horizontal members **114** which constitute a back for the seat planks **112** and therefore provide a relaxing seat structure for persons enjoying the benefits of the pool.

The structure shown in FIG. 11 comprises a variation of seat means from that specifically shown in FIG. 10 in that while the X-frame **74** of FIG. 11 somewhat resembles that of FIG. 10, it will be seen that there is no outer vertical post-like member **92** in the arrangement of FIG. 11. Instead, the upwardly and outwardly extending frame member **86***c* shown in FIG. 11 is not connected at the lower end of the stud **90** but, rather, is spaced therefrom and is embedded in the footer **78'**. The lower end of the stud **90** is embedded preferably in the same footer **78'**. The upward extension **86***d* of the frame member **86***c* is sufficiently high to have the horizontal members **114** connected thereto to serve as a back for the seat planks **112** shown in FIG. 11, which are connected to horizontal members **110**. However, the forward ends of the horizontal members are braced by diagonal brace members **116** which extend downwardly and outwardly to the upward extension **86***d* and are connected thereto.

In the embodiment of the invention where the deck **98** is formed from wooden planks, it will be seen that such type of deck may be artistically and structurally conformed to curved sides of the pool by disposing the X-frames **74** in radial directions extending outwardly from the side walls **82** of the pool. By selecting suitable angles between adjacent radially extending X-frames **74**, it will be seen that without resorting to curved surfaces in the deck planks, suitable conformity of relatively short lengths of straight planking, having suitably angularly arranged and abutting ends, may be used to achieve such conformity.

Especially where the pool is of the above-the-ground type, appropriate steps **118** may be provided to afford ready access to the elevated deck **98** which, in average circumstances, will be of the order of about 4' above the level of the surrounding earth or ground **76**. An exemplary illustration of such steps **118** is shown in FIG. 7. Further, conventional auxiliary equipment, such as a diving board **120**, may be employed with the pools and suitably affixed to the deck structure, or otherwise, as illustrated in exemplary manner in FIGS. 1 and 7. Under such circumstances, it is customary to form the pool with a bottom portion **122**, outlined in exemplary manner in FIGS. 1 and 7, and of sufficient depth to permit diving. The flexibility of the sheet material from which the liners of the several embodiments are formed permits the same readily to be accommodated to variations in elevation of the bottom of the pool, such as the packed sand layers **60** and **108**.

Under circumstances where a square or rectangular pool is desired, an exemplary corner structure is illustrated in FIG. 12 in which it will be seen that a vertical corner post **124** is illustrated, the same being shaped to provide angularly related surfaces **126** to which the ends of sheets of plywood **128** which comprise the sides of the pool may be connected such as by nailing. By way of example and not restriction, the member **124** may comprise a 4 x 4 wooden member of appropriate height. It will be understood that the sheet-type flexible liner will be draped over the outer surfaces of the side-forming sheets **128** and edges of such liner material may be suitably fused at the vertical corner **130** formed by the adjacent ends of the side sheets **128**.

In the foregoing description, although reference has been made extensively to the use of plywood for form-

ing the side walls of the pool, it is to be understood that the pool structure contemplated by the present invention is such that other sheet-like material may be employed such as metallic sheet material of suitable thickness, as well as sheets of appropriate synthetic resin material of suitable gauge or thickness. Certain types of synthetic resin sheet material are available which are reinforced by glass fibers and the like and material of this type is also suitable for use in lieu of plywood. Under such circumstances, however, the width of the channel formed in the coping **42** of the embodiment of the invention shown in FIGS. 1–6 will have to be made of appropriate width to suitably accommodate wall-forming sheets of material other than plywood where the thickness of such sheets is less than that of the plywood for which the coping channel has been formed and as illustrated in FIGS. 3 and 5 of the drawings in particular.

While the invention has been illustrated and described in its several preferred embodiments, it is to be understood that the invention is not to be limited to the precise details herein illustrated and described since the same may be carried out in other ways falling within the scope of the invention as claimed.

I claim:

1. A swimming pool comprising sides formed from similar sheets of rigid material, means connecting the ends of said sheets together into adjoining side walls forming the interior confines of said pool, vertical studs spaced along the exterior of said wall and connected thereto, said studs being substantially coextensive with the height of said side walls, bracing means extending radially outward from each stud and comprising a pair of elongated members crossed intermediately of the ends thereof to form an X-frame positioned within a vertical plane, the upper and lower ends of said members at one side of said X-frame being connected to said studs adjacent the opposite ends thereof, a tension brace member extending between the upper ends of said members of each X-frame, footer means engaging the adjacent ground and fixed relative thereto and engaging the lower outwardly projecting end of one of said members of each X-frame to prevent the same from moving relative to the ground, a deck extending horizontally between the upper ends of said X-frame members adjacent said tension brace members and around at least a portion of the circumference of the pool adjacent the upper edge of said side walls, and a waterproof flexible sheet liner covering the inner surfaces of said sides and extending downward from said deck and across the bottom defined substantially by the lower edge of said sides.

2. The swimming pool according to claim **1** in which said X-frame members and tension members and deck formed from wooden planks and the portions thereof which are in contact with the ground being suitably treated to resist deterioration.

3. The swimming pool according to claim **2** in which said sheets which form the sides of said pool and the X-frame members and deck are disposed at least partially above ground level, and said pool further including outer members extending substantially vertically between the outermost ends of said X-frame members, the upper ends of said outer members extending sufficiently above the level of the deck to comprise post means, and rail-like enclosing means extending between successive post means.

4. The swimming pool according to claim **1** in which at least the major portions of said sheets defining the sides thereof are disposed within the ground and said deck being formed from concrete to provide a slab-type deck of suitable thickness, and said tension members comprising metal reinforcing rods embedded at least in the lower portion of said concrete deck and the ends of said reinforcing rods being fixed to the upper ends of said X-frame members to prevent said upper ends of said members from spreading apart.

5. The swimming pool according to claim **4** further including a coping extending around the rim of said deck adjacent the sides of said pool, said coping being an extruded form providing a rounded exterior surface into the interior of which the concrete from which the deck is formed flows when the deck is poured and thereby becomes integrally united with said coping, said coping also being connected to the upper edge of said sheets defining the side walls of said pool and said coping further including means to receive the upper edge of said liner disposed against said sides of said pool to attach the upper edge of said liner in fixed relationship relative to said coping.

6. The swimming pool according to Claim **5** in which said coping is formed from synthetic resin having at least limited pliability to permit the same to be curved at least within arcs having radii of appreciable dimension, thereby to permit the coping to be complementary to curved sides of a swimming pool, the edges of said concrete deck nearest the pool sides also being similarly complementary to the shape of the pool as defined by said sides thereof.

7. The swimming pool according to claim **6** in which said coping also includes a groove extending upwardly into the lower portion thereof to receive the upper edges of the sheets defining the side walls of the pool to form said connection between said coping and side walls, and said coping also including additional groove means opening laterally outward adjacent the lower edge of said coping and the upper edge of said flexible sheet liner having a thickened bead connected thereto and extending longitudinally therealong, said bead being received within said additional groove to form said connection between the upper edge of said sheet liner and said coping.

8. The swimming pool according to claim **5** in which said coping is substantially C-shaped in cross-section, whereby the downwardly extending upper flange thereon and the upwardly extending lower flange thereon extend into the concrete when poured to form said slab-like deck and said flanges thereby being embedded in the completed deck so as to be permanently united thereto and provide a smoothly rounded outer pool-side edge upon said deck.

9. The swimming pool according to claim **1** in which said sheets which form said side walls are of uniform thickness and the ends of said sheets abut each other along vertically extending narrow planes and the portions of said sheets adjacent said ends are within a common vertical plane, and said pool also including vertically extending clamping plates of similar width respectively extending vertically along opposite surfaces of said adjoining end portions of each pair of said sheets forming said side walls, said plates substantially equally overlying the abutting end portions of said adjacent pairs of sheets, and fastening means extending through the laminated arrangement of overlying clamping plates and side wall sheets at vertically and horizontally spaced locations to secure said abutting ends of each pair of sheets together substantially within said common vertical plane.

10. The swimming pool according to claim **9** in which said side wall sheets are formed of plywood and said clamping plates have vertically extending ribs in spaced relationship to each other on the inner surfaces thereof which directly abut a surface of said plywood sheets, said ribs having angular faces extending longitudinally and the angular faces on the ribs nearest one vertical edge of each of said plates extending oppositely to the angular faces on the ribs nearest the opposite vertical edge of said plates, said angular surfaces of said ribs being pressed into the outer surfaces of said plywood sheets incident to being connected thereto by said fastening means and certain faces of said ribs serving to prevent said connected ends of said plywood sheets from moving apart in longitu-

dinal direction while sustaining bursting forces induced by the pressure of water within the pool.

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