US010167646B1

(12) **United States Patent**
Sirco et al.

(10) **Patent No.: US 10,167,646 B1**
(45) **Date of Patent: Jan. 1, 2019**

(54) **POOL, METHOD OF FABRICATING A POOL, AND A POOL PANEL JUNCTION**

(71) Applicant: **Trojan Leisure Products, LLC**, Albany, NY (US)

(72) Inventors: **Collin J. Sirco**, Ballston Lake, NY (US); **David A. Steele**, Gansevoort, NY (US); **Stephen E. Deeb**, Selkirk, NY (US)

(73) Assignee: **Trojan Leisure Products, LLC**, Albany, NY (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 65 days.

(21) Appl. No.: **15/169,392**

(22) Filed: **May 31, 2016**

(51) **Int. Cl.**
E04H 4/00 (2006.01)

(52) **U.S. Cl.**
CPC ***E04H 4/0043*** (2013.01)

(58) **Field of Classification Search**
CPC E04H 4/0043; E04H 4/005; E04H 2004/0068; E04H 4/0087; E04H 4/0093; E04H 4/145; E04H 4/144
See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

5,010,699	A	4/1991	Maiuccoro et al.	
5,086,595	A	2/1992	Maiuccoro et al.	
5,720,056	A *	2/1998	Aymes	E04H 4/005 4/488
5,752,350	A	5/1998	Maiuccoro	
D431,303	S	9/2000	Maiuccoro	
8,266,845	B2 *	9/2012	Desjoyaux	E04H 4/0062 256/19
8,950,155	B2	2/2015	Maiuccoro	
9,080,338	B2	7/2015	Maiuccoro	
2007/0039091	A1 *	2/2007	Foy	A47K 3/006 4/488
2008/0104745	A1 *	5/2008	Beaudoin	E04C 2/292 4/506

OTHER PUBLICATIONS

Radiant Pool's "Inground Pool Installation Manual" (Apr. 2014), 28 pages.
Imperial Pools Royal Specbook, 2004, 101 pages.
Imperial Pools Royal Component Book, 2004, 41 pages.

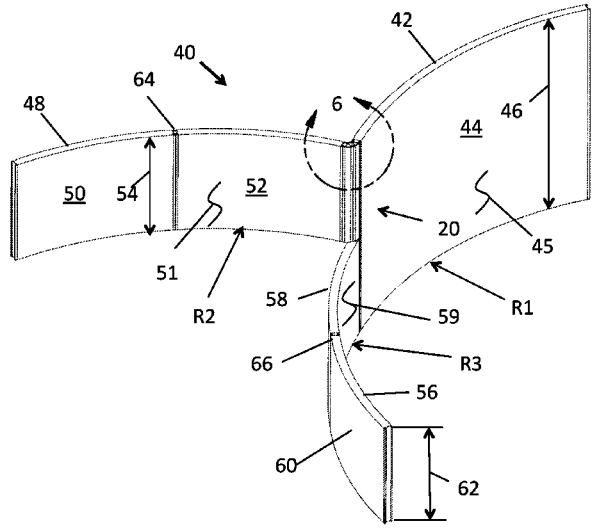
* cited by examiner

Primary Examiner — Janie Loeppke
(74) *Attorney, Agent, or Firm* — Tech Valley Patent, LLC; John Pietrangelo

(57) **ABSTRACT**

Pools, methods of fabricating pools, and pool panel junctions are provided. The pool includes a first internal surface having a first radius; a second internal surface, for example, of a wading pool, having a second radius; a third internal surface having a third radius, different from the second radius; and a junction where the first internal surface transitions to the second internal surface at a first elevation and the first internal surface transitions to the third internal surface at a second elevation, different from the first elevation. The pool panel junction includes at least one elongated member having a pair of opposing sides defining planes that converge at an apex, such as, a triangular member, and wherein each of the opposing sides is adapted to engage an adjacent connector operatively mounted to a pool panel. An elongated pool panel structural member and a method of fabricating a pool are also provided.

23 Claims, 10 Drawing Sheets



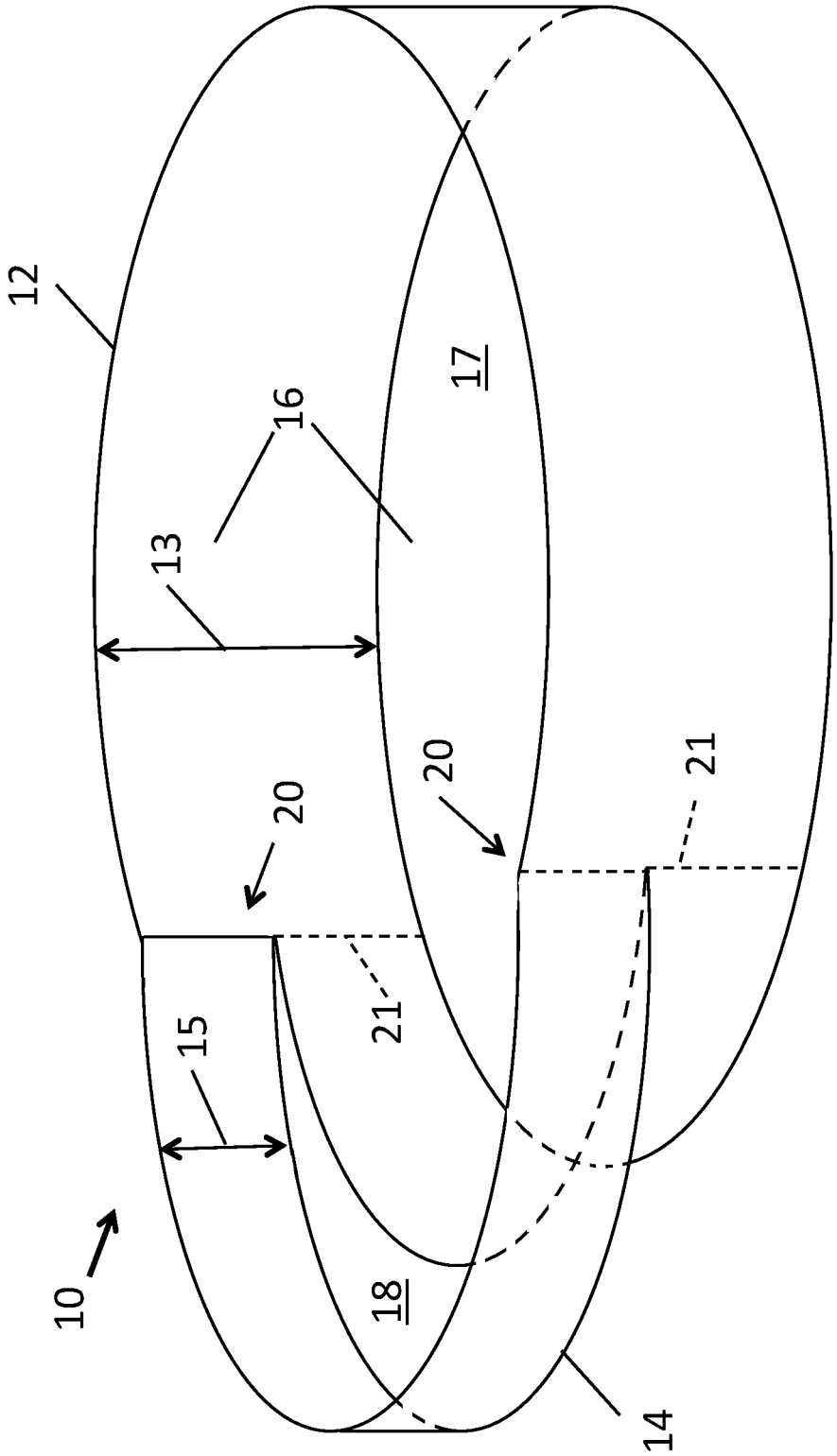


Figure 1

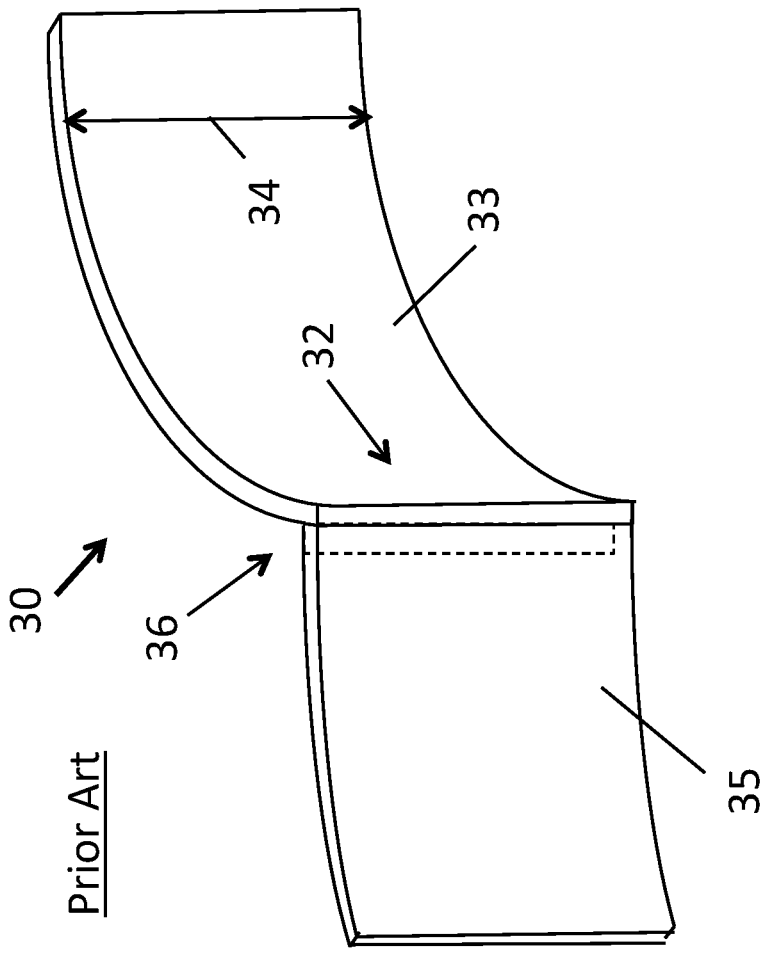


Figure 2

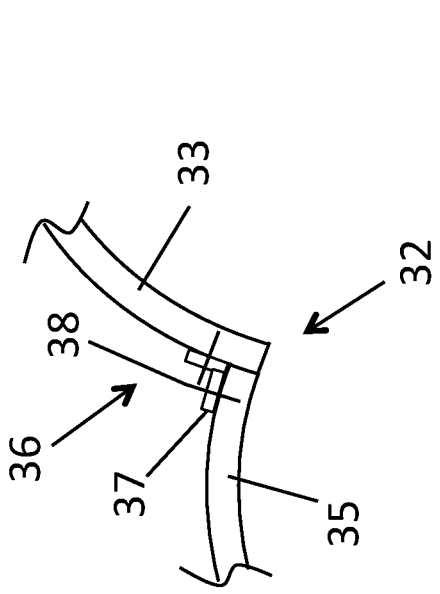


Figure 3

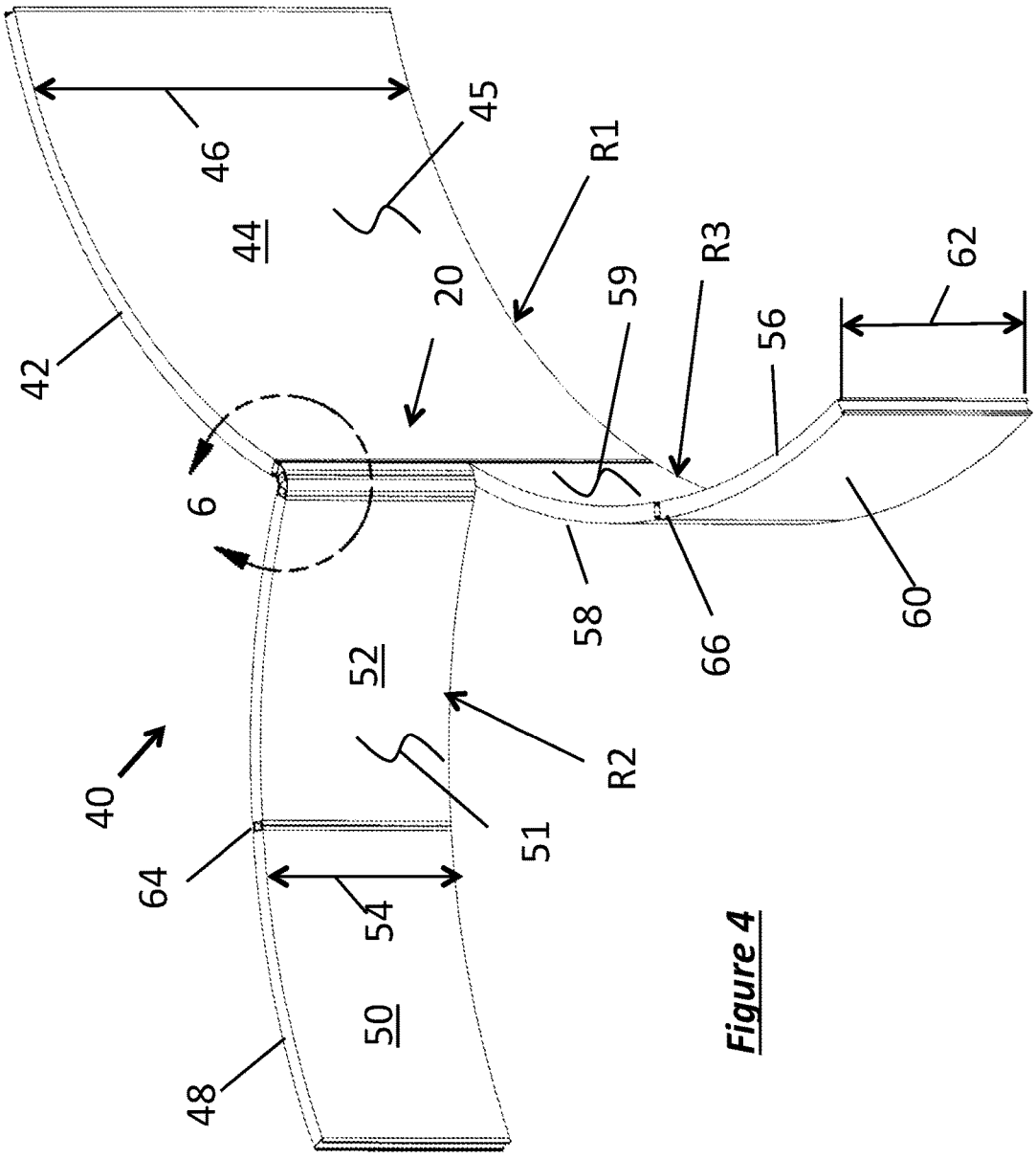


Figure 4

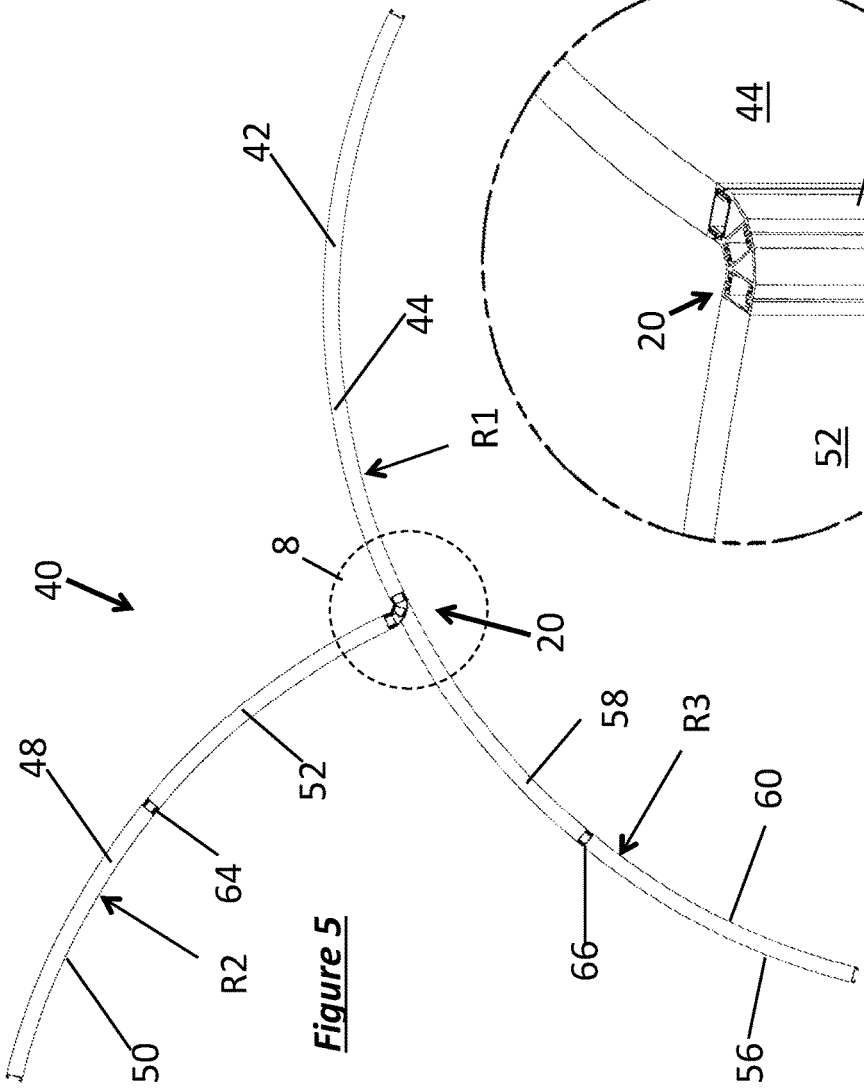


Figure 5

Figure 6

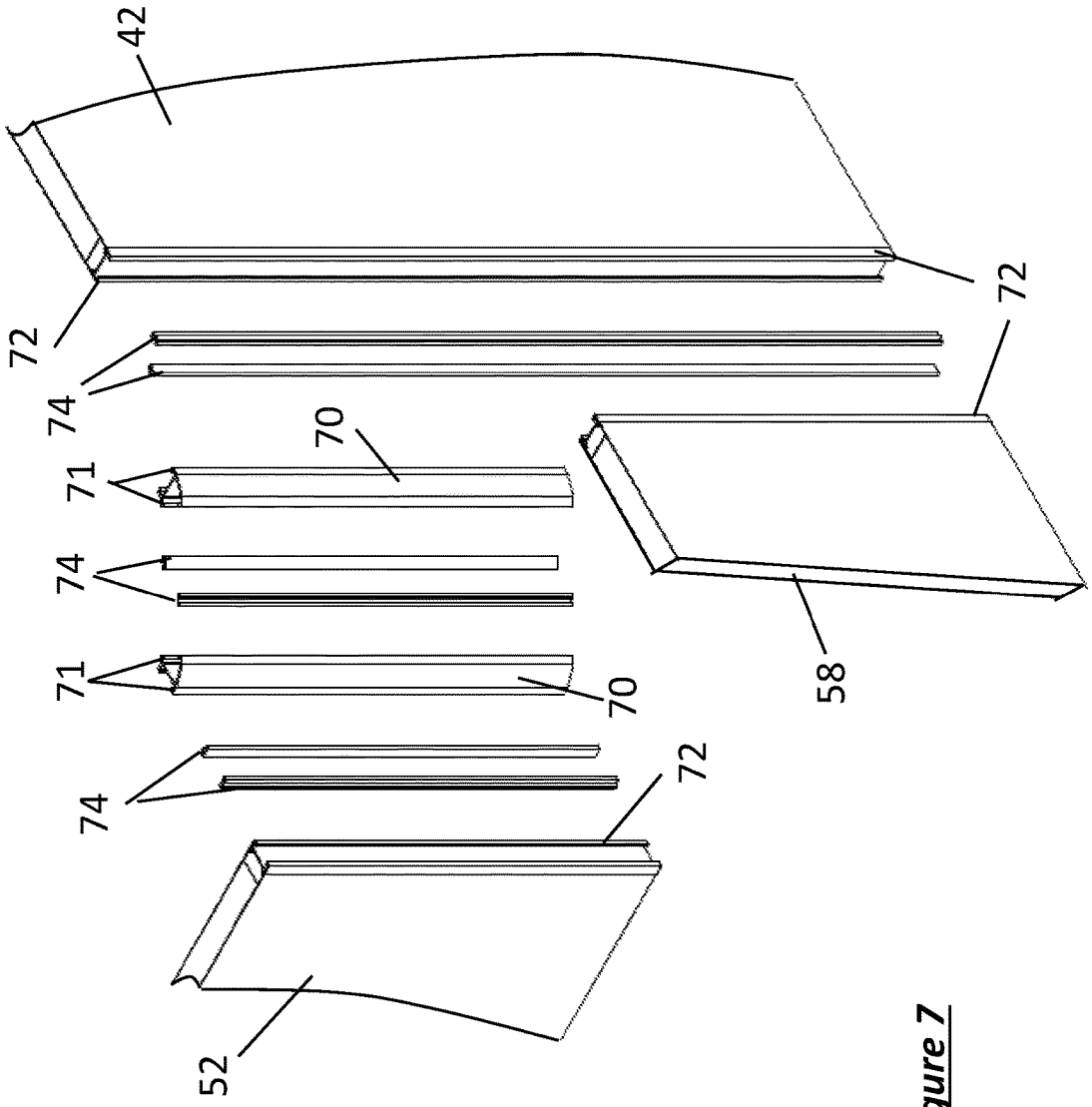


Figure 7

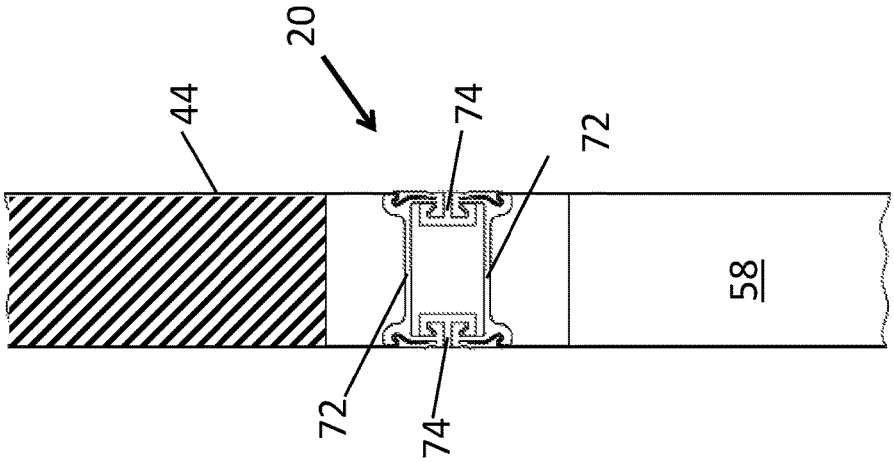


Figure 9

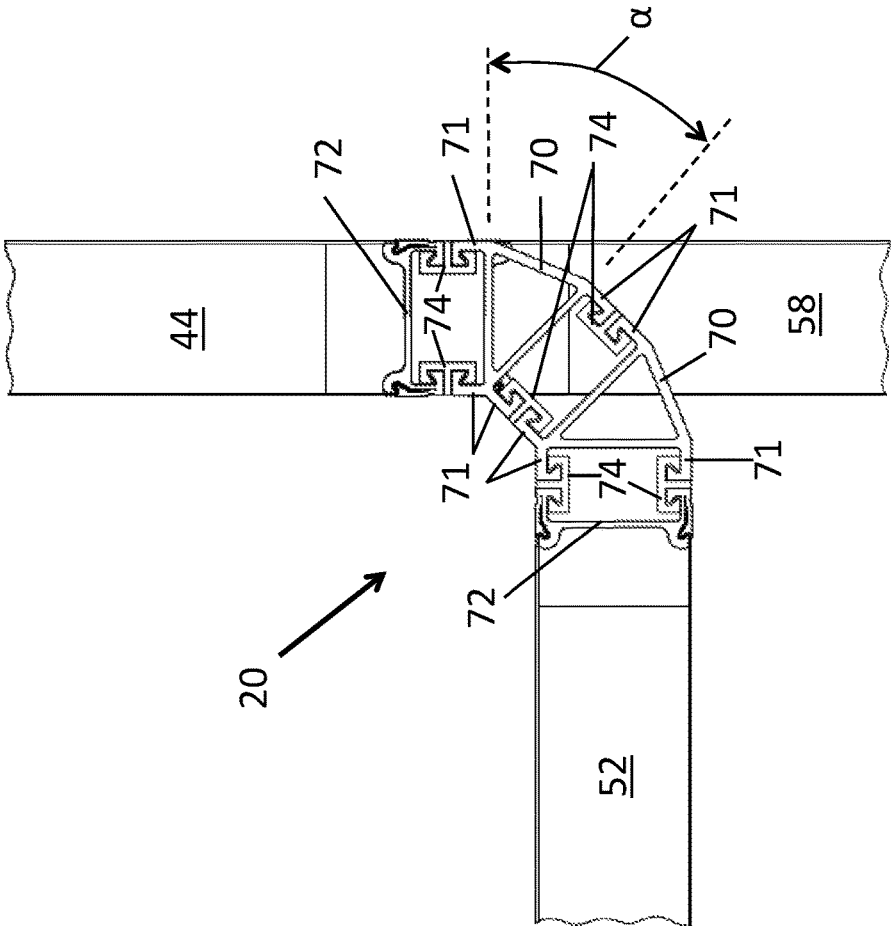


Figure 8

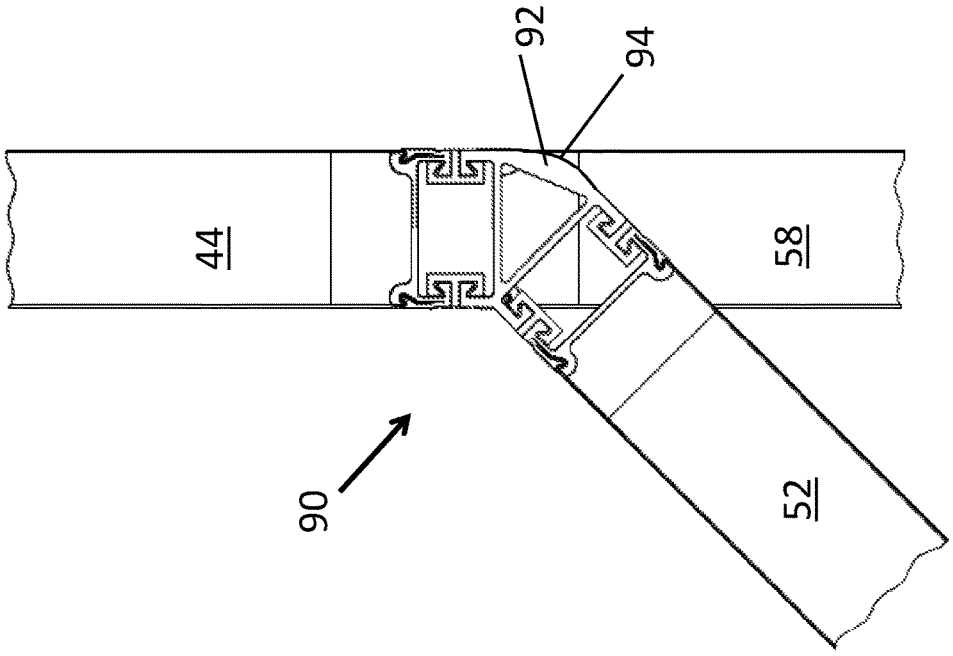


Figure 11

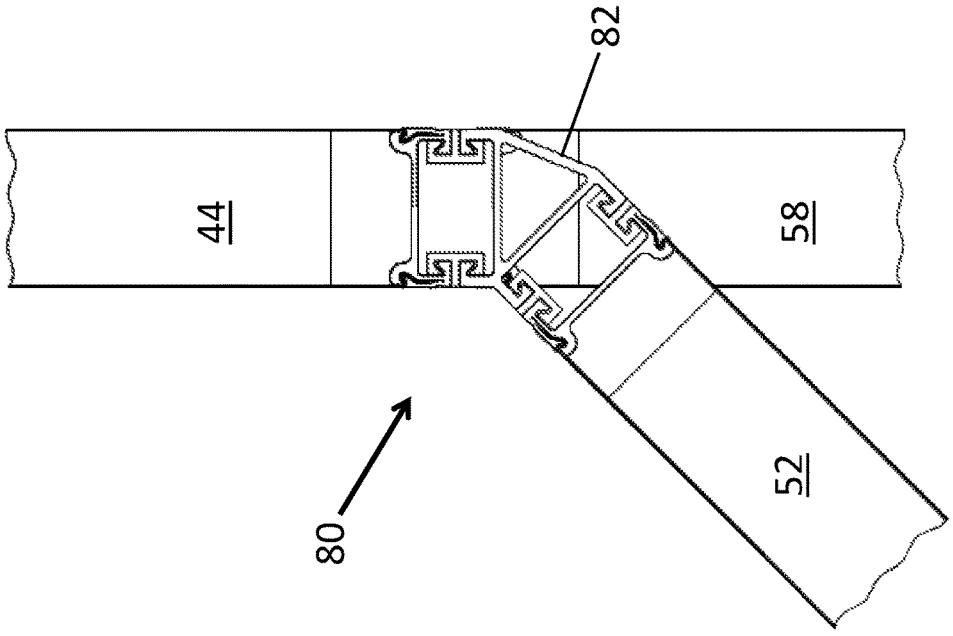


Figure 10

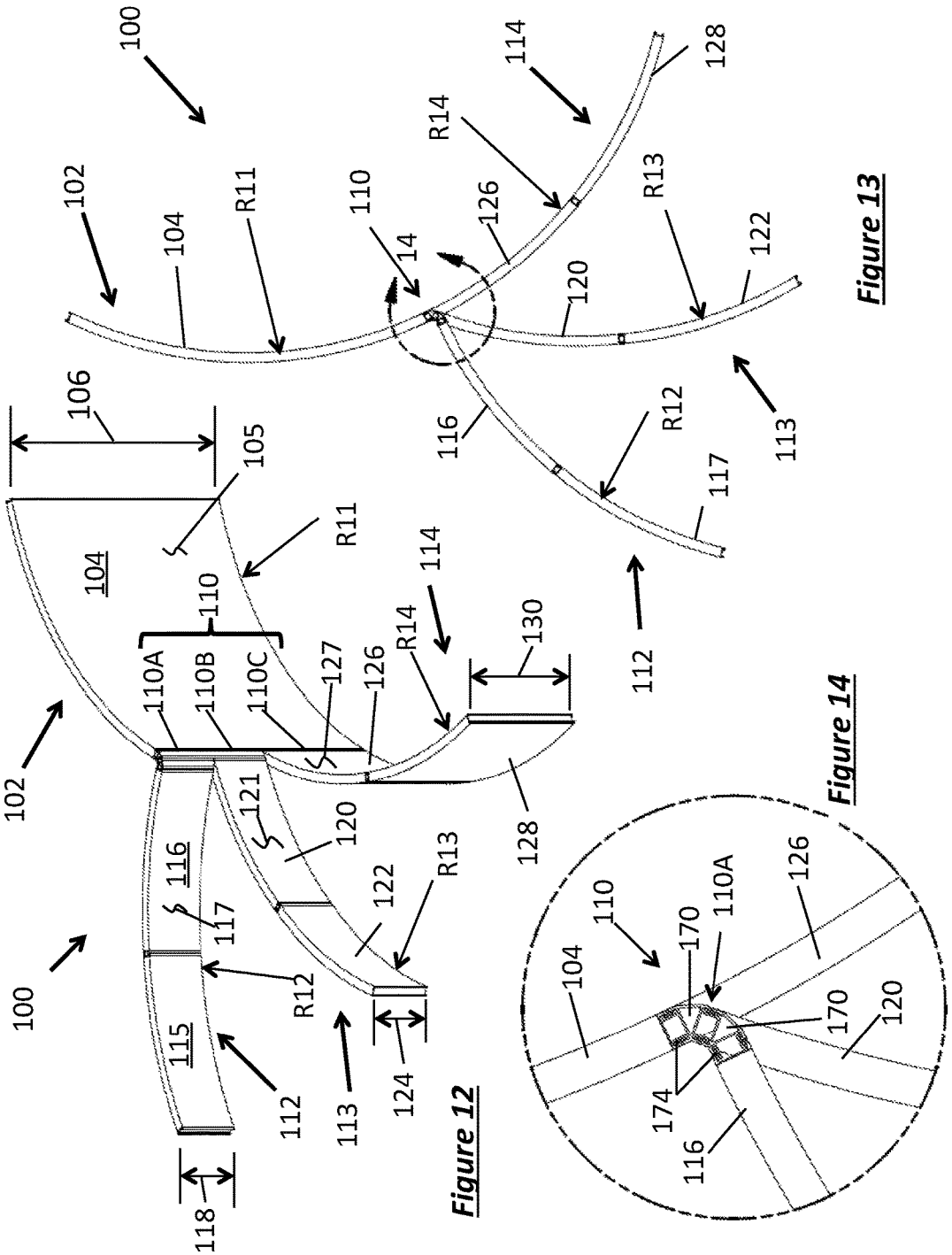


Figure 12

Figure 14

Figure 13

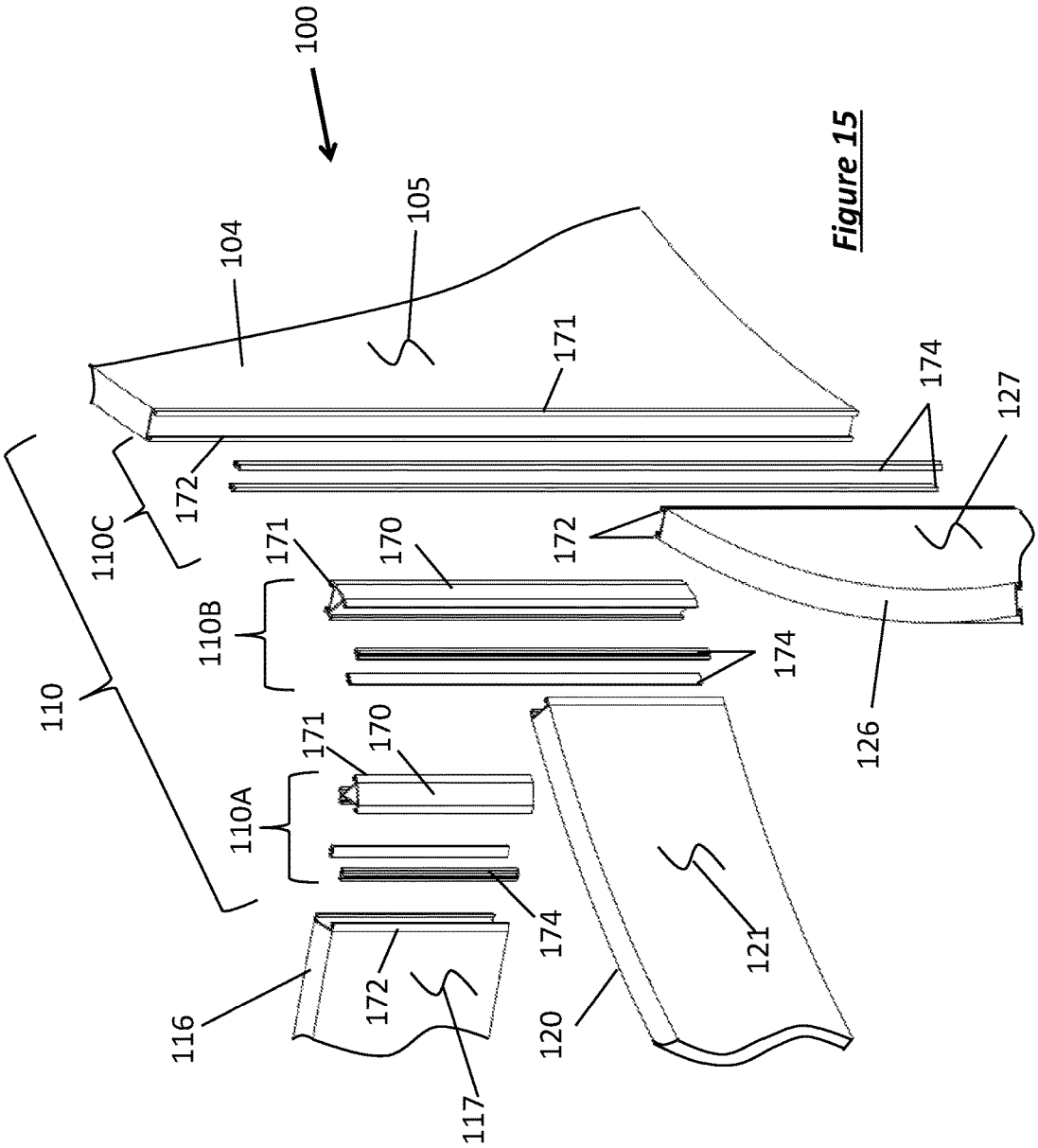

100
104
105
171
174
127
172
110C
171
170
172
110B
174
110
126
171
170
110A
174
121
116
172
120
117

Figure 15

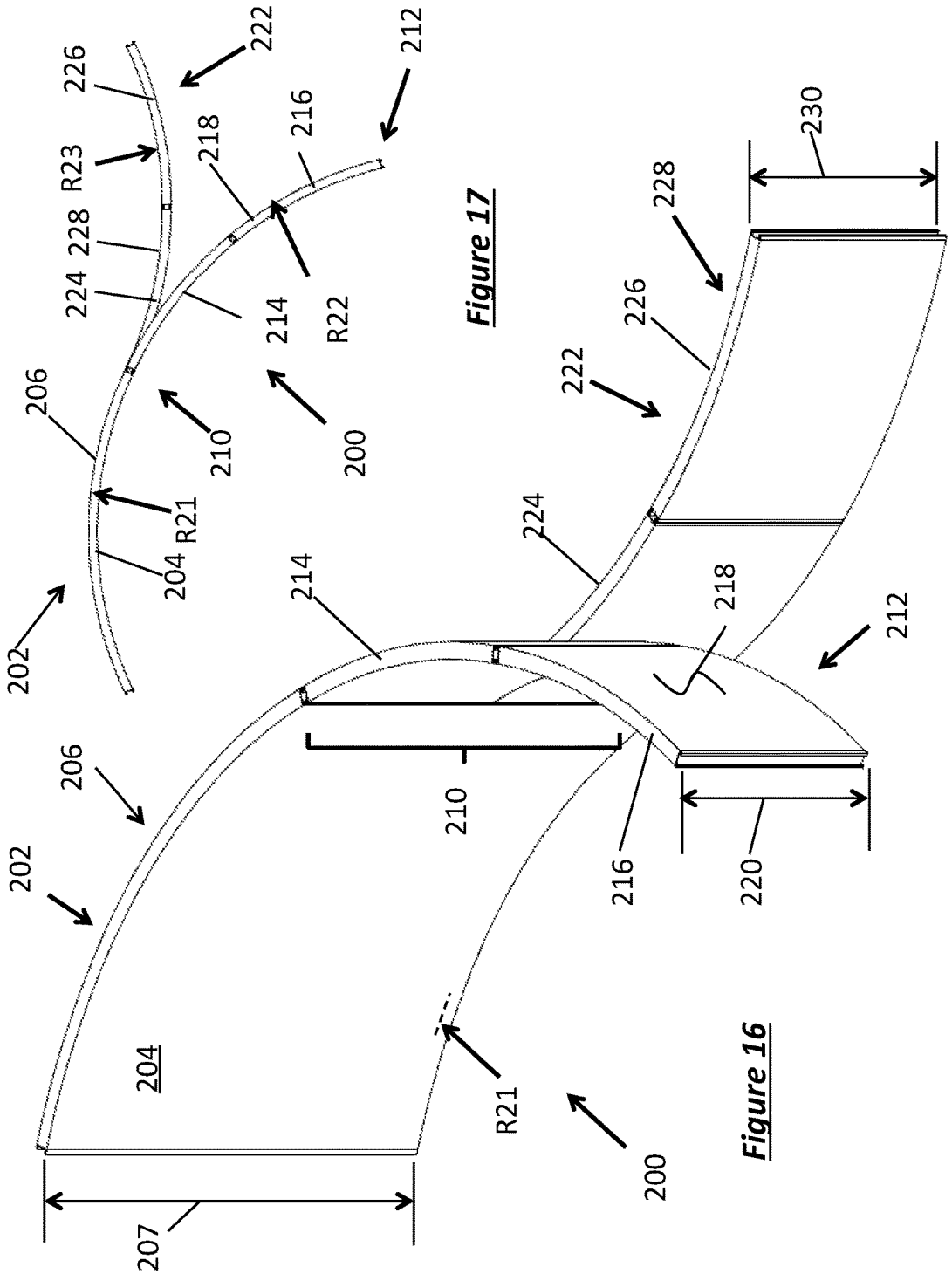


Figure 17

Figure 16

POOL, METHOD OF FABRICATING A POOL, AND A POOL PANEL JUNCTION

BACKGROUND OF THE INVENTION

Technical Field

Embodiments of the present invention generally relate to pool construction, for example, swimming pool construction. More particularly, embodiments of the present invention relate to methods and devices for fabricating pool walls or surfaces using specially designed junctions and support members that are uniquely adapted to accommodate variations in the depth of the pool.

Description of Related Art

Inground and above-ground swimming pool design and construction continuously improve to accommodate customer desires for new and unique pool constructions and aesthetic appearance. Contemporary pool designs are highly engineered to accommodate the needs of the customer and to address market and economic trends for enhanced functionality and appearance while reducing costs of fabrication, servicing, and maintenance, while enhancing the overall bathing experience.

The use of insulated pool panels in the construction of inground and above-ground pools and related structures is one such advancement in the field. Insulated pool panels are specially designed to retain heat within the pool and reduce pool water heating costs, among other advantages. Unlike poured concrete or gunite pools, insulated panel pool design facilitates pool construction and minimizes servicing and maintenance by the user. In addition, insulated panel pool design provides unique opportunities for pool construction and appearance that would otherwise not be possible.

One of the current trends in pool construction is the preference for "wading pools" contiguous with the main pool. These wading pools are typically shallow portions of the pool where the bather can sit or lounge in the shallow water, for example, in a lounge chair. However, these shallow wading areas can provide a challenge to pool designers, for example, to provide structurally sufficient and atheistically pleasing junctions in the pool construction between the main portion of the pool and the shallower wadding portion.

Aspects of the present invention further enhance the benefits and advantages of insulated panel pool construction by, among other things, accommodating pool designs having wading sections without detracting from the construction and over-all appearance of the pool.

SUMMARY OF THE INVENTION

Embodiments of the present invention, in their many aspects, provide improved pool construction and opportunities for unique pool design. Though aspects of the present invention may be applicable to any form of pool construction, for example, pools having a concrete and/or metallic substructure, other aspects of the invention are uniquely adapted for use with pools fabricated with pool panels.

One embodiment of the invention is a pool comprising or including: a first internal surface having a first radius; a second internal surface having a second radius; a third internal surface having a third radius, different from the second radius; and a junction where the first internal surface transitions to the second internal surface at a first elevation and the first internal surface transitions to the third internal surface at a second elevation, different from the first elevation. The second internal surfaced may be the internal surface of a wading pool. In one aspect, at least one of the first internal surface, the second internal surface, and the third internal surface comprises an internal surface of a pool panel.

In one aspect, the junction may include at least one elongated structural member adapted to operatively engage the first pool panel, and the second pool panel. The elongated structural member may have a length substantially equal to a depth of the second pool panel, for example, the depth of the contiguous wading pool. In one aspect, the elongated structural member comprises a pair of opposing sides defining planes that converge at an apex; for example, the elongated structural member may be triangular in cross section. In another aspect, the opposing sides of the triangular member may include a mechanical fastener, for example, a pair of opposing recesses, each of the recesses adapted to receive a projection from a connector, for example, an elongated spline having a pair of opposing projections.

Another embodiment of the invention is a method of fabricating a pool, the method comprising or including: forming a first internal surface having a first radius; mating a second internal surface having a second radius with the first internal at a junction at a first elevation; and mating a third internal surface having a third radius, different from the second radius, with the first internal surface at the junction at a second elevation different from the first elevation. In one aspect, forming the first internal surface having the first radius may be practiced by providing a first pool panel having the first radius; and wherein mating the second internal surface having the second radius with the first internal surface at the junction comprises providing a second pool panel having the second radius and mating the second pool panel with the first pool panel at the junction.

In another aspect of the invention, mating the second pool panel with the first pool panel at the junction may be practiced by inserting at least one elongated member having a pair of opposing sides defining planes that converge at an apex between the first pool panel and the second pool panel a the junction. In another aspect, mating the second pool panel with the first pool panel at the junction may be further practiced by operatively connecting the at least one elongated member with the first pool panel and the second pool panel. For example, operatively connecting the at least one elongated member with the first pool panel and the second pool panel may be practiced by slidably engaging a first elongated connector between the first pool panel and the at least one elongated connector and slidably engaging a second elongated connector between the second pool panel and the at least one elongated connector.

A further embodiment of the invention is a pool panel junction comprising or including at least one elongated member having a pair of opposing sides defining planes that converge at an apex, and wherein each of the opposing sides is adapted to engage an adjacent connector operatively mounted to a pool panel. In one aspect, the cross section of the at least one elongated member is triangular. In another aspect, each of the opposing sides adapted to engage the adjacent connector may include a pair of opposing recesses, wherein each of the pair of opposing recesses is adapted to slidably receive a projection from an elongated connector, for example, as spline. In another aspect, the pair of opposing sides defines an apex angle from 30 degrees to 60 degrees.

A further embodiment of the invention is an elongated pool panel structural member comprising or having a pair of opposing sides defining planes that converge at an apex; wherein each of the opposing sides adapted to engage an adjacent connector. In one aspect, the cross section of the member is triangular. In another aspect, each of the opposing sides adapted to engage the adjacent connector comprises a pair of opposing recesses, wherein each of the pair of opposing recesses is adapted to slidably receive a projection from an elongated connector, for example, a spline.

These and other aspects, features, and advantages of this invention will become apparent from the following detailed description of the various aspects of the invention taken in conjunction with the accompanying drawings

BRIEF DESCRIPTION OF THE DRAWINGS

The subject matter, which is regarded as the invention, is particularly pointed out and distinctly claimed in the claims at the conclusion of the specification. The foregoing and other objects, features, and advantages of the invention will be readily understood from the following detailed description of aspects of the invention taken in conjunction with the accompanying drawings in which:

FIG. **1** is a perspective view of a pool assembly having an aspect of the present invention.

FIG. **2** is a perspective view of a portion of a pool having a surface junction according to the prior art.

FIG. **3** is a partial top plan view of the prior art junction shown in FIG. **2**.

FIG. **4** is a perspective view of a portion of a pool having a surface junction according to one aspect of the present invention.

FIG. **5** is a top plan view of the portion of the pool shown in FIG. **4** according to one aspect of the invention.

FIG. **6** is a detailed perspective view of junction shown in FIG. **4** as identified by Detail **6** in FIG. **4** according to one aspect of the invention.

FIG. **7** is an exploded perspective view of the junction shown in FIG. **4** according to one aspect of the invention.

FIG. **8** is a detailed top plan view of the junction shown in FIG. **5** as identified by Detail **8** in FIG. **5** according to one aspect of the invention.

FIG. **9** is a detailed top plan view, similar to FIG. **8** and partially in cross section, of a lower portion of the junction shown in FIG. **5** according to one aspect of the invention.

FIG. **10** is a detailed top plan view, similar to FIG. **8**, of the junction shown in FIG. **5** according to another aspect of the invention.

FIG. **11** is a detailed top plan view, similar to FIG. **10**, of the junction shown in FIG. **5** according to a further aspect of the invention.

FIG. **12** is a perspective view, similar to FIG. **4**, of a portion of a pool having a surface junction according to another aspect of the present invention.

FIG. **13** is a top plan view of the portion of the pool shown in FIG. **12** according to one aspect of the invention.

FIG. **14** is a detailed top plan view of junction shown in FIG. **13** as identified by Detail **14** in FIG. **13** according to one aspect of the invention.

FIG. **15** is a partial exploded perspective view of the junction shown in FIGS. **12**, **13**, and **14** according to one aspect of the invention.

FIG. **16** is a perspective view of a portion of a pool having a surface junction according to another aspect of the present invention.

FIG. **17** is a top plan view of the portion of the pool shown in FIG. **16**.

DETAILED DESCRIPTION OF THE INVENTION

FIG. **1** is a schematic perspective view of a pool assembly **10** having an aspect of the present invention. Though aspects of the invention may be used in any type of pool assembly, for example, and in-ground pool, an above-ground pool, or a semi-above ground pool, for ease of illustration, the aspect shown in FIG. **1** illustrates a typical above-ground pool. For the pool assembly **1***o*, which is representative only and no way limiting to the various embodiments and aspects of the invention disclosed herein, includes a circular main pool portion or section **12** having a depth **13** and a shallower portion or section **14**, for example, a "wading pool" or "wading section," having a shallower depth **15**, though one or more shallower portions **14** may be provided. According to aspects of the invention, the wading pool or shallower portion **14** may contain pool water (not shown), for example, be contiguous with or in fluid communication with pool water (not shown) in main pool portion **12**, or have little or no pool water, for example, having an elevation above the level of the pool water in section **12**.

According to aspects of the invention, main pool portion **12** may comprise any conventional shaped pool, including generally circular (as shown), oval, rectangular, square, or polygonal, among the broad range of pool shapes known in the art. Also shallower portion **14** may also be generally circular (as shown), but may also be oval, rectangular, square, or polygonal in shape, among the broad range of pool shapes known in the art. Pool sections **12** and **14** may typically include a pool liner **16**, for example, a conventional "vinyl" liner, shaped and dimensioned to conform to the shapes of pool portions **12** and/or **14** as is known in the art. However, in one aspect, no liner **16** may be provided, for example, pool **10** may comprise a concrete or gunite structure or surface directly contacted by the water in pool **10**. As shown, pool portion **12** may typically include a base or floor **17** (for example, covered by liner **16**) at depth **13**, and shallower pool portion **14** may typically have a base or floor **18** (which may be covered by a liner **16**) at depth **15**, where base or floor **18** is positioned at an elevation above base or floor **17**. In one aspect, floors **17** and **18**, and other floors discloses herein, may be defined by a surface (for example, a sand surface, a gunite surface, or a concrete surface) covered by liner **16**. In another aspect, floors **17** and **18** may not be covered by liner **16**, but may comprise a concrete or gunite structure or surface directly contacted by the water in pool **10**. As is conventional in the art, floors **17** and **18** may not have a uniform elevation or depths **13** and **15**, respectively, or depths **13** and **15** may vary. In one aspect, floor **18** may be substantially level, that is, not vary substantially in depth. However, in other aspects, floor **17** may vary from a "shallow end" adjacent portion **14** to a "deep end" distal portion **14**. Though in one aspect of the invention, the walls of sections **12** and **14** may preferably be defined by panels, as disclosed herein, in other aspects, sections **12** and **14**, and other sections and surfaces disclosed herein, may be provided by concrete (for example, reinforced concrete), fiberglass (for example, molded fiberglass), metal for example, steel or aluminum), or combinations thereof.

According to aspects of the invention, pool assembly **10** includes at least one transition or junction **20** between portion **12** and portion **14** where depth **13** of portion **12** changes, for example, abruptly changes, from a first depth

13 of portion 12 to a second, shallower depth 15 of portion 14. In one aspect, this variation in depth may not be abrupt, but may vary from depth 13 to depth 15, for example, in a uniform linear or curvilinear fashion. According to aspects of the invention, a method and apparatus are provided for providing a structural support or junction 21 that accommodates the variation in depth of pool assembly 10 that facilitates construction, servicing, and maintenance of pool assembly 10.

FIG. 2 is a perspective view of a portion 30 of a pool having a junction 32 similar to junction 20 shown in FIG. 1 according to the prior art. For the sake of illustration, portion 30 is shown comprising a pool panel or pool support panel 33 defining a depth 34, for example, comparable to depth 13 shown in FIG. 1, and a pool panel or pool support panel 35 defining a similar depth 34. The typical pool liner and pool wall coping are omitted from FIG. 2 to facilitate illustration. According to the existing art, when a junction 32 is provided, panel 35 is typically positioned where an edge of panel 35 contacts or abuts a surface of panel 33, typically an external surface, and the panels are connected by mechanical fasteners, for example, plates and bolts.

FIG. 3 is a partial top plan view of the prior art junction 32 shown in FIG. 2. As shown, as is typical in the art, panel 35 is abutted with panel 33 and the panels are connected by means of one or more plates or gussets 37 and fasteners 38. For example, plate 37 may be an L-shaped structure having through holes positioned to receive screws 38 that penetrate and engage panels 33 and 35 as shown.

Though the junction 32 shown in FIGS. 2 and 3 can be an effective means of mounting panel 35 to panel 33, the need for one or more plates 37 and numerous fasteners 38 can be cumbersome during handling, installation, service, and maintenance. Moreover, the junction 32 shown can be especially cumbersome and inconvenient when constructing a junction between pool panels defining varying pool depths, for example, as shown in FIG. 1. Aspects of the present invention overcome these and other disadvantages of the prior art.

FIG. 4 is a perspective view of a portion 40 of the pool 10 having a junction 20 as shown in FIG. 1 according to one aspect of the present invention. FIG. 5 is a top plan view of the portion 40 shown in FIG. 4. Again, the pool liner typically mounted over portion 40 and the pool wall coping mounted on the top of portion 40 are omitted from FIGS. 4 and 5 to facilitate illustration of aspects of the invention. Though not shown in FIGS. 4 and 5, portion 40, and other portions disclosed herein, may typically include bases or floors, such as, a floor 17 and a floor 18, as shown in FIG. 1. In a fashion similar to the pool construction shown in FIG. 1, aspects of the invention may be used in any type of pool assembly, for example, and in-ground pool, an aboveground pool, or a semi-above ground pool. The aspect shown in FIGS. 4 and 5 is illustrated as a typical above-ground pool portion 40 having a main pool portion or section 42, typically radiused, defined by one or more panels 44 defining a surface 45 having a depth 46 and a radius R1, which meets or transitions at junction 20 to a shallower portion or section 48, typically radiused, defined by panels 50 and 52 defining a surface 51 having a radius R2 and a shallower depth 54. One or more shallower portions 48 may be provided in a pool. As shown in FIGS. 4 and 5, the internal surface 45 of main portion 42 may typically meet, transition, or continue beyond junction 20 with a section 56 defined by panels 58 and 60 defining a surface 59 having a depth 62, for example, shallower than depth 46, and a radius R3.

The radii R1, R2, and R3 may vary broadly depending upon the size of the pool 10. In one aspect, radius R1 may range from about 2 feet to about 15 feet, for example, between about 5 feet and about 6 feet; radius R2 may range from about 2 feet to about 15 feet, for example, between about 6 feet and about 8 feet; and radius R3 may range from about 2 feet to about 15 feet, for example, between about 5 feet and about 6 feet. Though radius R1 defines a concave surface 45, radius R2 defines a concave surface 51, and radius R3 defines a concave surface 59 in FIGS. 4 and 5, any one or more of these surfaces may be concave or convex. In one aspect, one or more of surfaces 45, 51, and 59 may be substantially planar, for example, having a substantially infinite radius.

As illustrated most clearly in FIG. 1, according to aspects of the invention, shallower portion 48 shown in FIG. 4 of pool portion 40 may contain pool water (not shown), for example, shallower portion 48 may be in fluid communication with pool water in main pool portion 42 in FIGS. 4 and 5, or shallower portion 48 may have little or no pool water, for example, define an elevation above the level of the pool water in portions 42 and 56, for instance, having an elevation above elevation 62.

According to one embodiment of the invention, a pool 10 is provided having or comprising a first internal surface 45 having a first radius R1; a second internal surface 51 having a second radius R2; a third internal surface 59 having a third radius R3, different from the second radius; and a junction 20 where the first internal surface 44 transitions to the second internal surface 52 at a first elevation 62 and the first internal surface 45 transitions to the third internal surface 59 at a second elevation below elevation 62, different from the first elevation 62. In one aspect, at least one of the first internal surface 45, the second internal surface 51, and the third internal surface 59 may comprise an internal surface of a pool panel. In another aspect of the invention, at least one of the first internal surface 45, the second internal surface 51, and the third internal surface 59 may comprise an internal surface of any pool support structure, for example, a poured concrete or gunite foundation or a metal, plastic, or wooden frame or substructure, among other structures known in the art. As known in the art, a "vinyl" liner may cover surfaces 45, 51, and 59, though, in one aspect, no liner may be present.

According to one aspect of the invention, pool support panels 44, 50, 52, 58, 60, and any other pool enclosure disclosed herein may comprise composite panels, for example, pool panels having an insulating foam core captured by external sheets of metal or plastic. For example, in one aspect, pool support panels 44, 50, 52, 58, and 60 may be pool panels provided by Radiant Pools of Albany, N.Y., or their equivalent. For instance, pool support panels 44, 50, 52, 58, and 60 may be similar or substantially identical to the panels disclosed in U.S. Patent Publication 2008/0104745, which is incorporated by reference herein. Panel connectors 64 and 66 may interconnect pool support panels 44, 50, 52, 58, and 60. In one aspect panel connectors 64 and 66 may be any conventional connecting system or hardware, for example, mechanical fasters. In one aspect, panel connectors 64 and 66 may comprise panel connectors provided by Radiant Pools, for example, elongated connectors and cooperating connectors or "splines," as disclosed, for example, in Radiant Pool's "Inground Pool Installation Manual" (April 2014), which is incorporated by reference herein, though other types of panel connectors may be used.

According to aspects of the invention, pool portion 40 shown in FIGS. 4 and 5 of pool assembly 10 (in FIG. 1)

includes at least one transition or junction **20** between portion **42** and portions **48** and **56** where the depth **46** of portion **42** changes, for example, abruptly changes, from a first depth **46** of portion **42** to a second, shallower depth **54** of portion **48**. In one aspect, this variation in depth may not be abrupt, but may vary from depth **13** to depth **15**, for example, in a uniform linear or curvilinear fashion. According to aspects of the invention, a method and apparatus are provided which accommodate the geometric transition and provide structural support to junction **20** that accommodates the variation in depth of pool portion **40** (and pool assembly **10**) and facilitates construction, servicing, and maintenance of pool assembly **10**.

FIG. **6** is a detailed perspective view of junction **20** shown in FIG. **4** as identified by Detail **6** in FIG. **4** according to one aspect of the invention. FIG. **7** is an exploded perspective view, partially in cross section, of junction **20** shown in FIG. **4** according to one aspect of the invention. FIG. **8** is a detailed top plan view of junction **20** shown in FIG. **5** as identified by Detail **8** in FIG. **5** according to one aspect of the invention.

As shown in FIGS. **6**, **7**, and **8**, according to one aspect of the invention, junction **20** comprises at least one, but typically, a plurality of, elongated structural members **70** having a generally triangular cross section. The number of elongated members **70** may vary depending upon the deviation in the direction of the path of panel **52** from the direction of the path of panel **44** and/or vary depending upon the width of panels **44** and **52**. Though the cross sections of members **70** are shown generally triangular in shape, for example, isosceles triangular in shape, it is envisioned that the cross sectional shape of members **70** may also comprise truncated triangular shapes, for example, a trapezoidal shape, such as, an isosceles trapezoidal shape, or may comprises, in some aspects, a square or a rectangular cross section in shape.

According to aspects of the invention, structural members **70** are adapted to engage adjacent panels **44** and **52** and provide a geometric transition between the surface **45** of panel **44** and the surface **51** of panel **52**, for example, to provide an appropriate generally continuous support for the liner (not shown) which is typically mounted to panels **44** and **52**. As shown in FIG. **8**, member **70** may have an apex angle α ranging from about 15 degrees to about 75 degrees, but may typically range from about 30 degrees to about 60 degrees, for example, about 45 degrees. In one aspect, as shown, a side of the triangular cross section of member **70** may have a length substantially the same as the width of the adjacent panels **44** and **52**. In one aspect, the side of the triangular cross section of member **70** may range from about 0.5 inches to about 12 inches, but is typically between about 1 inch and about 5 inches, for example, about 2 inches.

In one aspect of the invention, structural members **70** may extend along the entire depth **46** (see FIG. **4**) of panel **44**, for example, when the depth **54** of panel **52** extends substantially to the depth **46** of panel **44**. However, in the aspect shown in FIGS. **6**, **7**, and **8**, the length of members **70** may extend substantially along the depth **54** of panel **52**. In one aspect, the length of member **70** may range from about 4 inches to about 6 feet, but is typically between about 1 foot and about 3 feet, for example, about 2 feet.

Members **70** may be hollow as shown, for example, having one or longitudinal through holes or may be substantially solid, with little or no longitudinal holes.

Members **70** may be metallic or non-metallic, for example, member **70** may be made from iron, steel, stainless steel, aluminum, titanium, or any other structural metal. Members **70** may also be made of plastic, For example, a polyamide (PA), for example, nylon; a polyethylene (PE), both high-density polyethylene (HDPE) and low-density polyethylene (LDPE); a polyethylene terephthalate (PET); a polypropylene (PP); a polyester (PE); a polytetrafluoroethylene (PTFE); a polystyrene (PS); an acrylonitrile butadiene styrene (ABS); a polycarbonate (PC); or a polyvinylchloride (PVC); among other plastics. Members **70** may also be made of wood.

As shown most clearly in FIG. **8**, members **70** typically engage adjacent panels **44** and **52** by conventional means, for example, with appropriate hardware, such as, mechanical fasteners. In the aspect of the invention shown in FIGS. **6**, **7**, and **8**, members **70** engage adjacent panels **44** and **52** and adjacent members **70** by means of elongated connectors or splines **74**, for example, the elongated connectors or splines similar or substantially identical to the elongated "splines" disclosed, for example, in Radiant Pool's "Inground Pool Installation Manual" (April 2014), which is incorporated by reference herein, though other types of elongated connectors may be used.

In one aspect of the invention, as shown most clearly in FIGS. **7** and **8**, elongated splines **74** are adapted to engage elongated, complementary shaped connectors **71** and **72** mounted to panels **44** and **52** and to other members **70**. For example, elongated splines **74** may typically include projections adapted to be received by, for example, slidably received by, and engaged with elongated recesses in connectors **71** and **72**. Elongated connectors **72** may typically be mounted to panels **44** and **52** by conventional means. For example, when panels **44** and **52** comprise panels having metallic external metallic sheets, or "skins," connectors **72** may be mounted to panels **44** and **52** by rolling, for example, by deformation of the metallic sheets into structural engagement with connectors **72**, thought other methods or fasteners may be used.

As also shown in FIGS. **7** and **8**, triangular members **70** may also include elongated connectors **71**, for example, substantially identical to elongated connectors **72**, and also be adapted to receive and engage splines **74**. In one aspect, elongated connectors **71** may be mounted to the sides of members **70**, for example, by mechanical fasteners or welding. In another aspect, connectors **71** may be integral with members **70**, for example, integrally formed during an extrusion process, to provide a generally triangular (or trapezoidal) shape and one or more connectors **71**.

FIG. **9** is a detailed top plan view, similar to FIG. **8** and partially in cross section, of a lower portion of the junction **20** shown in FIG. **5** according to one aspect of the invention. This lower portion of junction **20** illustrates one connection between panels **44** of pool portion **42** with panel **58** of pool portion **56**. As shown, panel **44** may engage panel **58** in a fashion similar to the engagement of panel **44** with panel **52** shown in FIG. **8**, though other methods may be used. Though junction **20** shown in FIG. **9** may include one or more triangular members **70** as shown in FIG. **8** (for example, when the orientation or direction of panel **58** deviates from the orientation or direction of panel **44**), in the aspect shown in FIG. **8**, no triangular members **70** are present. Specifically, in this aspect, an elongated connector **72** mounted to panel **44**, for example, by rolling, may be mounted to elongated connector **72** mounted to panel **58**, for example, by rolling, by means of elongated splines **74**. In one aspect, elongated splines **74** and the elongated connector **72** mounted to panel **44** in the lower portion of junction **20** shown in FIG. **9** may be the same elongated splines **74** and elongated connector **72** shown in the upper portion of

junction **20** shown in FIG. **8**. However, in other aspects, these splines **74** and connector **72** may be separate, distinct elements.

FIG. **10** is a detailed top plan view, similar to FIG. **8**, of a junction **80** shown that may be used for junction **20** shown in FIG. **5** according to another aspect of the invention. In this aspect, junction **80** includes a single triangular elongated member **82**. Member **82** may have all the properties of elongated member **70** described above. For example, member **82** may be trapezoidal, hollow, metallic, and have one or more elongated connectors adapted to engage elongated splines, as disclosed herein.

FIG. **11** is a detailed top plan view, similar to FIG. **10**, of a junction **90** according to a further aspect of the invention. In this aspect, junction **90** includes a single triangular elongated member **92**, though two or more members **92** may be provided, having a radiused surface **94**. The radius of radiused surface **94** may vary depending upon the size and orientation of pool **10** and size and orientation of panels **44** and **52**, among other factors. Member **92** may have all the properties of elongated member **70** described above. For example, member **92** may be trapezoidal, hollow, metallic, and have one or more elongated connectors adapted to engage elongated splines, as disclosed herein.

FIG. **12** is a perspective view, similar to FIG. **4**, of a portion **100** of a pool having a surface junction **110** according to another aspect of the present invention. FIG. **13** is a top plan view of portion **100** of the pool shown in FIG. **12** according to one aspect of the invention. Again, the pool liner typically mounted over portion **100** and the pool wall coping mounted on the top of portion **100** are omitted from FIGS. **12** and **13** to facilitate illustration of aspects of the invention. In a fashion similar to the pool construction shown in FIG. **1**, aspects of the invention may be used in any type of pool assembly, for example, and in-ground pool, an aboveground pool, or a semi-above ground pool. The aspect shown in FIGS. **12** and **13** is illustrated as a typical aboveground pool portion **100** having a main pool portion or section **102**, typically radiused, defined by one or more panels **104** defining a surface **105** having a depth **106** and a radius R**11**, which meets or transitions at junction **110** to two or more shallower portions or sections **112** and/or **113**, typically radiused. Section **112** is defined by one or more panels **115** and **116** defining a surface **117** and a depth **118**, shallower than depth **106**, and a radius R**12**. Section **113** is defined by one or more panels **120** and **122** defining a surface **121** and a depth **124** and a radius R**13**. One or more shallower sets of portions **112** and/or **113** may be provided in a pool. Though two shallower portions **112** and **113** may be provided as shown FIGS. **12** and **13**, in one aspect, 3 or more portions **112** and **113** or, 4 or more portions **112** and **113** may be provided, for example, in a fashion providing numerous changes in depth or elevation, for example, providing steps, or a stair assembly, or multiple seats or seating surfaces, among other structures.

As shown in FIGS. **12** and **13**, the internal surface **105** of main portion **102** may typically meet, transition, or continue beyond junction **110** with a section **114** defined by panels **126** and **128** defining a surface **127** having a depth **130**, for example, shallower than depth **106**, and a radius R**14**. In one aspect, radius R**14** may be substantially the same as radius R**11** of section **102**.

According to aspects of the invention, junction **110** shown in FIGS. **12** and **13** may comprise multiple different junctions or transitions having varying lengths and inclusive angles, for example, as shown in FIGS. **6** through **11**. For example, in one aspect, junction **110** may include first junction **110**A transitioning from surface **105** to surface **117**; a second junction **110**B transitioning between surface **105** to surface **121**; and at least one third junction **110**C transitioning between surface **105** to surface **127**. FIG. **14** is a detailed top plan view junction **110** shown in FIGS. **12** and **13** as identified by Detail **14** in FIG. **13** according to one aspect of the invention. In one aspect, junctions **110**A, **110**B, and at least **110**C may comprise a single component, for example, a single component accommodating the variations in orientation and/or direction exemplified by the aspect shown in FIGS. **12**, **13**, and **14**. However, in other aspects of the invention, junctions **110**A, **110**B, and at least **110**C may comprise individual distinct components, for example, comprising one or more triangular spacers **170** having connectors **171** designed to engage splines **174**, for example, similar in design and construction to spacers **70**, connectors **71**, and splines **74** disclosed herein, as shown in FIGS. **6** through **11**. For example, in one aspect, junction **110**A may comprise one or more triangular spacers **170** having a first length and a first angle α (see FIG. **8**); junction **110**B may comprise one or more triangular spacers **170** having a second length and a second angle α; and junction **110**C may comprise one or more triangular spacers **170** having a third length and a third angle α. The first, second, and third lengths of spacers **170** of junctions **110**A, **110**B, and **110**C may be substantially the same or they may vary, for example, within the ranges of length of spacer **70** disclosed above. The first, second, and third angle α of spacer **170** of junctions **110**A, **110**B, and **110**C may be substantially the same or they may vary, for example, within the ranges of angle α of spacer **70** disclosed above.

The radii R**11**, R**12**, R**13**, and R**14** may vary broadly depending upon the size of the pool **10**, for example, have similar ranges of dimension as radii R**1**, R**2**, and R**3**, disclosed above. Though radius R**11** defines a concave surface **105**, radius R**12** defines a concave surface **117**, radius R**13** defines a concave surface **121**, and radius R**14** defines a concave surface **127** in FIGS. **12** and **13**, any one or more of these surfaces may be concave or convex. In one aspect, one or more of surfaces **105**, **117**, **121**, and/or **137** may be substantially planar, for example, having a substantially infinite radius.

As illustrated most clearly in FIG. **1**, according to aspects of the invention, shallower portions **112** and/or **113** shown in FIGS. **12** and **13** of pool portion **100** may contain pool water (not shown), for example, shallower portions **112** and/or **113** may be in fluid communication with pool water in main pool portion **102**, or shallower portion **112** or **113** may have little or no pool water, for example, defining an elevation above the level of the pool water in portion **102**.

According to one embodiment of the invention, a pool **10** is provided having or comprising or consisting of a first internal surface **105** having a first radius R**11**; a second internal surface **117** having a second radius R**12**; a third internal surface **121** or **127** having a third radius R**13** or R**14**, different from the second radius R**12**; and a junction **110** where the first internal surface **105** transitions to the second internal surface **116** at a first elevation **118** and the first internal surface **105** transitions to the third internal surface **121** or **127** at a second elevation **124** or **130**, below elevation **106**. In one aspect, at least one of the first internal surface **105**, the second internal surface **117**, and the third internal surface **121** or **127** may comprise an internal surface of a pool panel, as disclosed herein. In another aspect of the invention, at least one of the first internal surface **105**, the second internal surface **117**, and the third internal surface **121** or **127** may comprise an internal surface of any pool

support structure, for example, a poured concrete or gunite foundation or a metal, plastic, fiberglass, or wooden frame or substructure, among other structures known in the art. As known in the art, a "vinyl" liner may cover surfaces **105**, **117**, **121** and **127**, though, in one aspect, no liner may be present.

FIG. **15** is a partial exploded perspective view of the junction **110** shown in FIGS. **12**, **13**, and **14** according to one aspect of the invention. As shown in FIG. **15**, according to one aspect of the invention, junction **110** comprises at least one, but typically, a plurality of, elongated structural members **170** having a generally triangular cross section. The number and apex angle (a, see FIG. **8**) of elongated members **170** may vary depending upon the deviation in the direction of the path of panel **104** from the direction of the path of panels **116** and/or panel **120** and/or pane **126**, and/or vary depending upon the width of panels **116** and/or **120** and/or **126**. Though the cross sections of members **170** are shown generally triangular in shape in FIGS. **14** and **15**, for example, isosceles triangular in shape, it is envisioned that the cross sectional shape of members **170** may also comprise truncated triangular shapes, for example, a trapezoidal shape, such as, an isosceles trapezoidal shape, or may comprises, in some aspects, a square or a rectangular cross section in shape.

According to aspects of the invention, structural members **170** are adapted to engage adjacent panels **116**, **120**, and **126** and provide a geometric transition between the surface **105** of panel **104** and the surface **117** of panel **116**, between the surface **105** of panel **104** and the surface **121** of panel **120**, and/or between the surface **105** of panel **104** and the surface **127** of panel **126** to provide an appropriate generally continuous support for the surfaces and/or the liner (not shown) which is typically mounted to panels **104**. **116**, **120**, and **127**, among others. Members **170** may have an apex angle α, as shown in FIG. **8**, ranging from about 15 degrees to about 75 degrees, but may typically range from about 30 degrees to about 60 degrees, for example, about 45 degrees. Members **170** may also be sized and shaped in a manner similar to member **70** disclosed herein, for example, having a triangular cross section having a with substantially the same as the width of the adjacent panels **104**, **116**, **10**, and **126**, for instance, about 2 inches.

In one aspect of the invention, structural members **170** may extend along the entire depth **106** (see FIG. **12**) of panel **104**. However, in the aspect shown in FIGS. **12**, **13**, **14**, and **15**, the length of members **170** may extend substantially along the depth **118** of panel **116** and/or depth **124** of panel **120**. In one aspect, the length of member **170** may range in a fashion similar to member **70** disclosed herein, for example, about 2 feet.

Members **170** may be hollow as shown, for example, having one or longitudinal through holes or may be substantially solid, with little or no longitudinal holes.

Members **170** may made from any one or more of the materials from which member **70** may be made, for example, members **170** may be metallic or non-metallic.

As shown most clearly in FIGS. **14** and **15**, members **170** typically engage adjacent panels **104**, **116**, **120**, and **126** by conventional means, for example, with appropriate hardware, such as, mechanical fasteners. In the aspect of the invention shown in FIGS. **12** through **15**, members **170** engage adjacent panels **104**, **116**, **120**, and **126** and adjacent members **170** by means of elongated connectors or splines **174**, for example, the elongated connectors or splines similar or substantially identical to the elongated "splines" disclosed, for example, in Radiant Pool's "Inground Pool Installation Manual" (April 2014), which is incorporated by reference herein, though other types of elongated connectors may be used.

In one aspect of the invention, as shown most clearly in FIGS. **14** and **15**, elongated splines **174** are adapted to engage elongated, complementary shaped connectors **171** and **172** mounted to panels **104**, **116**, **120**, and **126** and to other members **170**. For example, elongated splines **174** may typically include projections adapted to be received by, for example, slidably received by, and engaged with elongated recesses in connectors **171** and **172**. Elongated connectors **172** may typically be mounted to panels **104**, **116**, **120**, and **126** by conventional means. For example, when panels **104**, **116**, **120**, and **126** comprise panels having metallic external metallic sheets, or "skins," connectors **172** may be mounted to panels **104**, **116**, **120**, and **126** by rolling, for example, by deformation of the metallic sheets into structural engagement with connectors **172**, thought other methods or fasteners may be used.

As also shown in FIGS. **14** and **15**, triangular members **170** may also include elongated connectors **171**, for example, substantially identical to elongated connectors **172**, and also be adapted to receive and engage splines **174**. In one aspect, elongated connectors **171**, in a fashion similar to connectors **71**, may be mounted to the sides of members **170**, for example, by mechanical fasteners or welding. In another aspect, connectors **171** may be integral with members **170**, for example, integrally formed during an extrusion process or related process, to provide a generally triangular (or trapezoidal) shape and one or more connectors **171**.

FIG. **16** is a perspective view of a portion **200** of a pool **10** (see FIG. **1**) having a surface junction **210** according to another aspect of the present invention. FIG. **17** is a top plan view of portion **200** of the pool shown in FIG. **16**. Again, the pool liner typically mounted over portion **200** and the pool wall coping mounted on the top of portion **200** are omitted from FIGS. **16** and **17** to facilitate illustration of aspects of the invention. Though not shown in FIGS. **16** and **17**, portion **200**, and other portions disclosed herein, may typically include bases or floors, such as, a floor **17** and a floor **18**, as shown in FIG. **1**. In a fashion similar to the pool construction shown in FIG. **1**, aspects of the invention shown in FIGS. **16** and **17** may be used in any type of pool assembly, for example, and in-ground pool, an aboveground pool, or a semi-above ground pool. The aspect shown in FIGS. **16** and **17** is illustrated as a typical above-ground pool portion **200** having a main pool portion or section **202**, typically radiused, defined by one or more panels **204** defining a surface **206** having a depth **207** and a radius R**21**, which meets or transitions at junction **210** to a shallower portion or section **212**, typically radiused, defined by one or more panels **214** and **216** defining a surface **218** having a radius R**22** and a depth **220**, shallower than depth **207**. One or more shallower portions **212** may be provided in a pool **10**.

As shown in FIGS. **16** and **17**, the internal surface **206** of main portion **202** may typically meet, transition, or continue beyond junction **210** with a section **222** defined by one or more panels **224** and **226** defining a surface **228** having a depth **230**, for example, shallower than depth **207**, and a radius R**23**.

The radii R**21**, R**22**, and R**23** may vary broadly depending upon the size of the pool **10**, for example, having range of length disclosed for radii R**1**, R**2**, and R**3**, disclosed herein. Though radius R**21** defines a convex surface **206**, radius R**22** defines a convex surface **218**, and radius R**23** defines a concave surface **228** in FIGS. **16** and **17**, any one or more of

these surfaces may be concave or convex. In one aspect, one or more of surfaces **206**, **218**, and **228** may be substantially planar, for example, having a substantially infinite radius.

As illustrated most clearly in FIG. **16**, according to aspects of the invention, shallower portion **212** shown in FIGS. **16** and **17** of pool portion **200** may contain pool water (not shown), for example, shallower portion **212** may be in fluid communication with pool water in main pool portion **202** in FIGS. **16** and **7**, or shallower portion **212** may have little or no pool water, for example, define an elevation above the level of the pool water in portions **212** and **222**, for instance, having an elevation above elevation **230**.

According to one embodiment of the invention, a pool **10** having a pool portion **200** is provided having or comprising or consisting of a first internal surface **206** having a first radius R**21**; at least one second internal surface **218** having a second radius R**22**; a third internal surface **228** having a third radius R**23**, different from the second radius R**22**; and a junction **210** where the first internal surface **206** transitions to one or more of the second internal surface **218** at a first depth or elevation **220** and the first internal surface **206** transitions to the third internal surface **228** at a second depth or elevation **230** below depth or elevation **220**, different from a first depth or elevation **207**. In one aspect, at least one of the first internal surface **206**, the second internal surface **218**, and the third internal surface **228** may comprise an internal surface of a pool panel, for example, an insulated panel provided by Radiant Pools, as disclosed herein. In another aspect of the invention, at least one of the first internal surface **204**, the one or more second internal surface **218**, and the third internal surface **228** may comprise an internal surface of any pool support structure, for example, a poured concrete or gunite foundation or a metal, plastic, fiberglass, or wooden frame or substructure, among other structures known in the art. As known, in the art, a "vinyl" liner may cover surfaces **206**, **218**, and **228**, though, in one aspect, no liner may be present.

According to aspects of the invention, pool portion **200** shown in FIGS. **16** and **17** of pool assembly **10** (in FIG. **1**) includes at least one transition or junction **210** between portion **202** and one or more portions **212** and portion **222** where the depth **207** of portion **202** changes, for example, abruptly changes, from a first depth **205** of portion **202** to a second, shallower depth **220** of portion **212**. In one aspect, this variation in depth may not be abrupt, but may vary from depth **207** to depth **220**, for example, in a uniform linear or curvilinear fashion.

According to aspects of the invention, a method and apparatus are provided which accommodate the geometric transition and provide structural support to junction **210** that accommodates the variation in depth of pool portion **200** (and pool assembly **10**) and facilitates construction, servicing, and maintenance of pool assembly **10**.

According to one aspect of the invention, pool support panels **204**, **214**, and **224** of junction **210** of pool portion **200** in FIGS. **16** and **17** may comprise composite panels, for example, pool panels having an insulating foam core captured by external sheets of metal or plastic. For example, in one aspect, pool support panels **204**, **214**, and **224** may be pool panels provided by Radiant Pools of Albany, N.Y., or their equivalent, as disclosed herein. In one aspect panels **204**, **214**, and **224** of junction **210** may be engaged or connected by any conventional connecting system or hardware, for example, mechanical fasters. However, in one aspect, panel panels **204**, **214**, and **224** of junction **210** may be engaged with panel connectors similar to those disclosed in FIGS. **6** and **7** and **14** and **15**, with or without triangular connectors **70** and **71**. In one aspect, panel panels **204**, **214**, and **224** of junction **210** may be engaged or connected by elongated connectors and cooperating connectors or "splines," as disclosed, for example, in Radiant Pool's "Inground Pool Installation Manual" (April 2014), which is incorporated by reference herein, though other types of panel connectors may be used.

It will be apparent from the foregoing that the invention, in its many aspects, provides devices, systems, and methods for pools, pool construction, pool wall junctions, and construction members. Where prior art methods and devices for pool construction may be adequate, aspects of the present invention facilitate pool installation, servicing, and maintenance, while providing pool geometries and designs, in particular, wading pools, that heretofore were not possible.

In addition to pools, for example, backyard swimming pools, aspects of the invention may also be employed in spas, exercise pools, physical therapy pools, tubs, or any water-containing enclosure that may benefit from the function, ease of installation, and aesthetic appearance of aspects of the present invention. Other aspects of the invention may be used along shorelines, for example, along the shore of a lake, pond, river, or even along an ocean shore or beach.

The terminology used herein is for the purpose of describing particular embodiments only and is not intended to be limiting of the disclosure. As used herein, the singular forms "a," "an," and "the" are intended to include the plural forms as well, unless the context clearly indicates otherwise. It will be further understood that the terms "comprises," "comprising," "including," and/or "having" when used in this specification, specify the presence of stated features, integers, steps, operations, elements, and/or components, but do not preclude the presence or addition of one or more other features, integers, steps, operations, elements, components, and/or groups thereof.

The corresponding structures, materials, acts, and equivalents of all means or step plus function elements in the claims below are intended to include any structure, material, or act for performing the function in combination with other claimed elements as specifically claimed.

The description of the present disclosure has been presented for purposes of illustration and description, but is not intended to be exhaustive or limited to the disclosure in the form disclosed. Many modifications and variations will be apparent to those of ordinary skill in the art without departing from the scope and spirit of the disclosure. The embodiments were chosen and described in order to best explain the principles of the disclosure and the practical applications, and to enable others of ordinary skill in the art to understand the disclosure for various embodiments with various modifications as are suited to the particular use contemplated.

This written description uses examples to disclose the invention, including the best mode envisioned, and also to enable any person skilled in the art to practice the invention, including making and using any devices or systems and performing any incorporated methods. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal language of the claims.

The invention claimed is:

1. A pool comprising:

an internal surface of a first panel having a first radius;

an internal surface of a second panel having a second radius;

an internal surface of a third panel having a third radius, different from the second radius; and

a junction comprising at least one elongated structural member adapted to operatively engage the first panel and the second panel at a first elevation, and wherein the internal surface of the first panel transitions to the internal surface of the third panel at a second elevation, less than the first elevation.

2. The pool as recited in claim **1**, wherein the elongated structural member comprises a length substantially equal to a depth of the second panel.

3. The pool as recited in claim **1**, wherein the elongated structural member comprises a pair of opposing sides defining planes that converge at an apex.

4. The pool as recited in claim **3**, wherein the elongated structural member comprises a triangular cross section.

5. The pool as recited in claim **3**, wherein the pair of opposing sides each includes a mechanical fastener.

6. The pool as recited in claim **5**, wherein the mechanical fastener comprises a pair of opposing recesses, each of the recesses adapted to receive a projection from a connector.

7. The pool as recited in claim **6**, wherein the connector comprises an elongated spline having a pair of opposing projections.

8. The pool as recited in claim **1**, wherein each of the first panel, the second panel, and the third panel comprises a panel having an insulating foam core and external sheets.

9. The pool as recited in claim **1**, wherein the at least one elongated structural B member operatively engages only the first panel and the second panel.

10. The pool as recited in claim **1**, wherein the at least one elongated structural member is further adapted to operatively engage the first panel and the third panel.

11. A method of fabricating a pool, the method comprising:

providing a first panel having an internal surface having a first radius;

mating a second panel having an internal surface having a second radius with the internal surface of the first panel at a junction at a first elevation with at least one elongated structural member; and

mating a third panel having an internal surface having a third radius, different from the second radius, with the internal surface of the first panel at the junction at a second elevation less than the first elevation with the at least one elongated structural member.

12. The method as recited in claim **11**, wherein mating the second panel with the first panel at the junction comprises engaging the first panel and the second panel with a pair of opposing sides of the elongated member, the opposing sides defining planes that converge at an apex between the first panel and the second panel.

13. The method as recited in claim **12**, wherein engaging the first panel and the second panel comprises slidably engaging a first elongated connector between the first panel and the at least one elongated structural member and slidably engaging a second elongated connector between the second panel and the at least one elongated structural member.

14. The method as recited in claim **11**, wherein each of the first panel, the second panel, and the third panel comprises a pool panel having an insulating foam core and external sheets.

15. A pool comprising:

a first insulated panel having a first internal surface having a first radius;

a second insulated panel having a second internal surface having a second radius;

a third insulated panel having a third internal surface having a third radius, different from the second radius; and

a junction where the first internal surface of the first insulated panel transitions to the second internal surface of the second insulated panel at a first elevation and the first internal surface of the first insulated transitions to the third internal surface of the third insulated panel at a second elevation, less than the first elevation;

wherein the junction comprises at least one elongated structural member having sides adapted to operatively engage the first insulated panel and the second insulted panel; and

wherein the sides of the at least one elongated structural member define planes that converge at an apex.

16. The pool as recited in claim **15**, wherein the at least one elongated structural member comprises a triangular cross section.

17. The pool as recited in claim **15**, wherein the sides the at least one elongated structural member each include a mechanical fastener.

18. The pool as recited in claim **17**, wherein the mechanical fastener comprises a pair of opposing recesses, each of the opposing recesses adapted to receive a projection from a connector.

19. The pool as recited in claim **18**, wherein the connector comprises an elongated spline having a pair of opposing projections.

20. The pool as recited in claim **15**, wherein the sides of the at least one elongated structural member define planes that converge at an apex angle from 30 to 60 degrees.

21. The pool as recited in claim **15**, wherein the at least one elongated structural member comprises a trapezoidal cross section.

22. The pool as recited in claim **15**, wherein the at least one elongated structural member further comprises a radiused surface adapted to conform the first internal surface to the second internal surface.

23. The pool as recited in claim **15**, wherein each of the first insulated panel, the second insulated panel, and the third insulated panel comprises a panel having an insulating foam core and external sheets.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 10,167,646 B1
APPLICATION NO. : 15/169392
DATED : January 1, 2019
INVENTOR(S) : Sirco et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In the Claims

Column 15, Claim 9, Line 31: Delete "B"

Column 16, Claim 15, Line 20: Insert --panel-- after "insulated"

Column 16, Claim 15, Line 26: Replace "insulted" with "insulated"

Signed and Sealed this
Fourth Day of June, 2019

Andrei Iancu
Director of the United States Patent and Trademark Office