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WATSON(10) **Pub. No.: US 2009/0151065 A1**(43) **Pub. Date: Jun. 18, 2009**(54) **COVERED POOL STRUCTURE**(76) Inventor: **TERRENCE JOHN WATSON,**
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TORONTO, ON M5H 3Y2 (CA)(21) Appl. No.: **12/331,988**(22) Filed: **Dec. 10, 2008****Related U.S. Application Data**

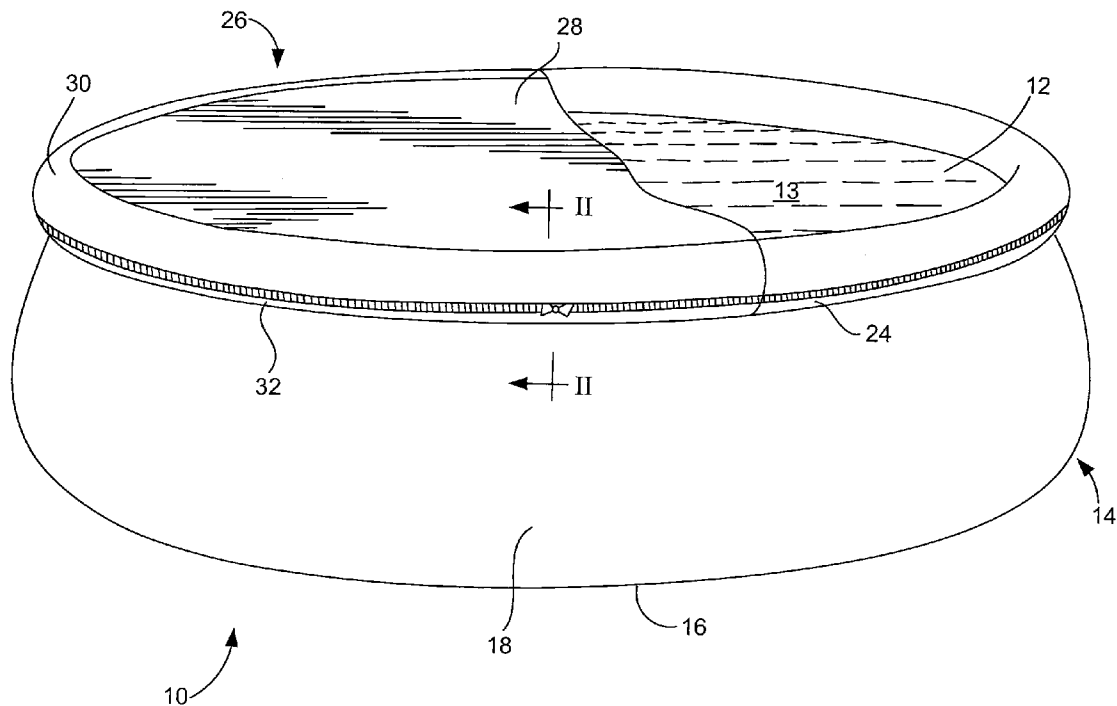
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Publication Classification(51) **Int. Cl.**
E04H 4/00 (2006.01)(52) **U.S. Cl.** **4/503**(57) **ABSTRACT**

According to some examples, a coverable pool structure having a membrane for containing a liquid, the membrane having a bottom wall, a peripheral wall extending from the bottom wall, and a top edge on the peripheral wall, a rim connected to the peripheral wall proximate the top edge, a flexible covering member being positionable so as to extend between the peripheral wall to inhibit access to the liquid, an attachment apparatus for securing the flexible covering member to the rim, and a support member positionable between a top surface of the liquid and the flexible covering member and configured to bias at least a portion of the flexible covering member away from the liquid.



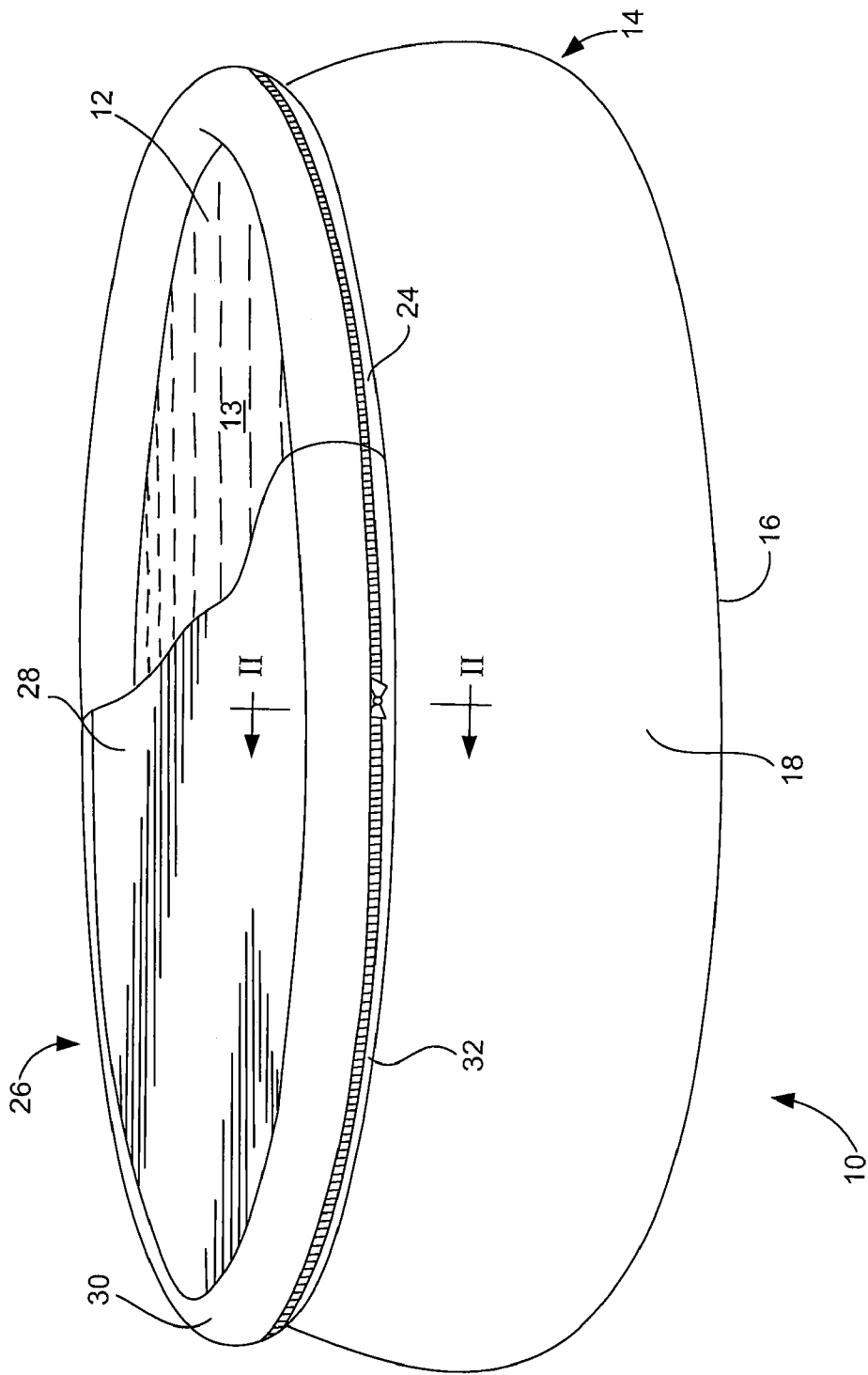


FIG. 1

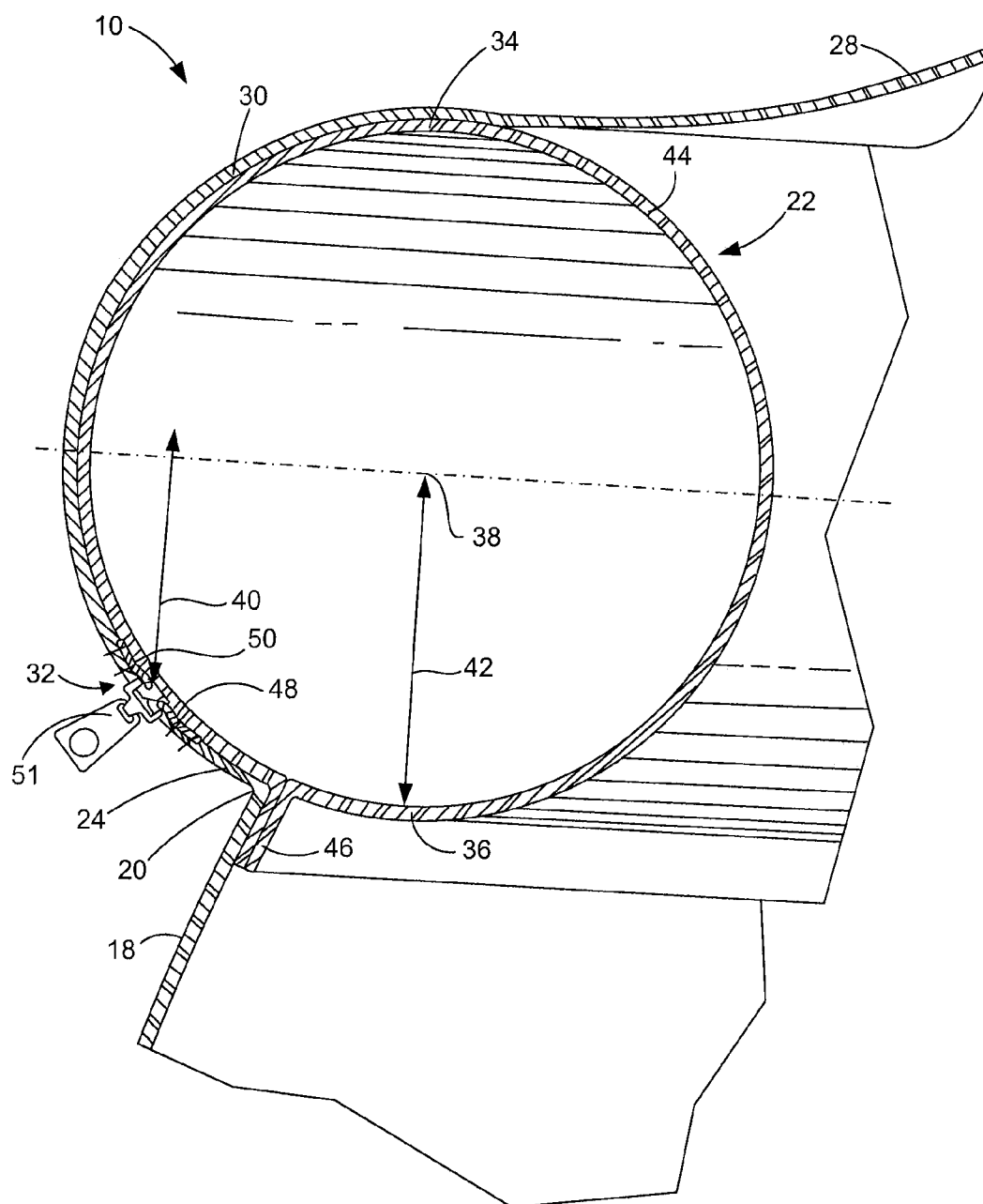


FIG. 2

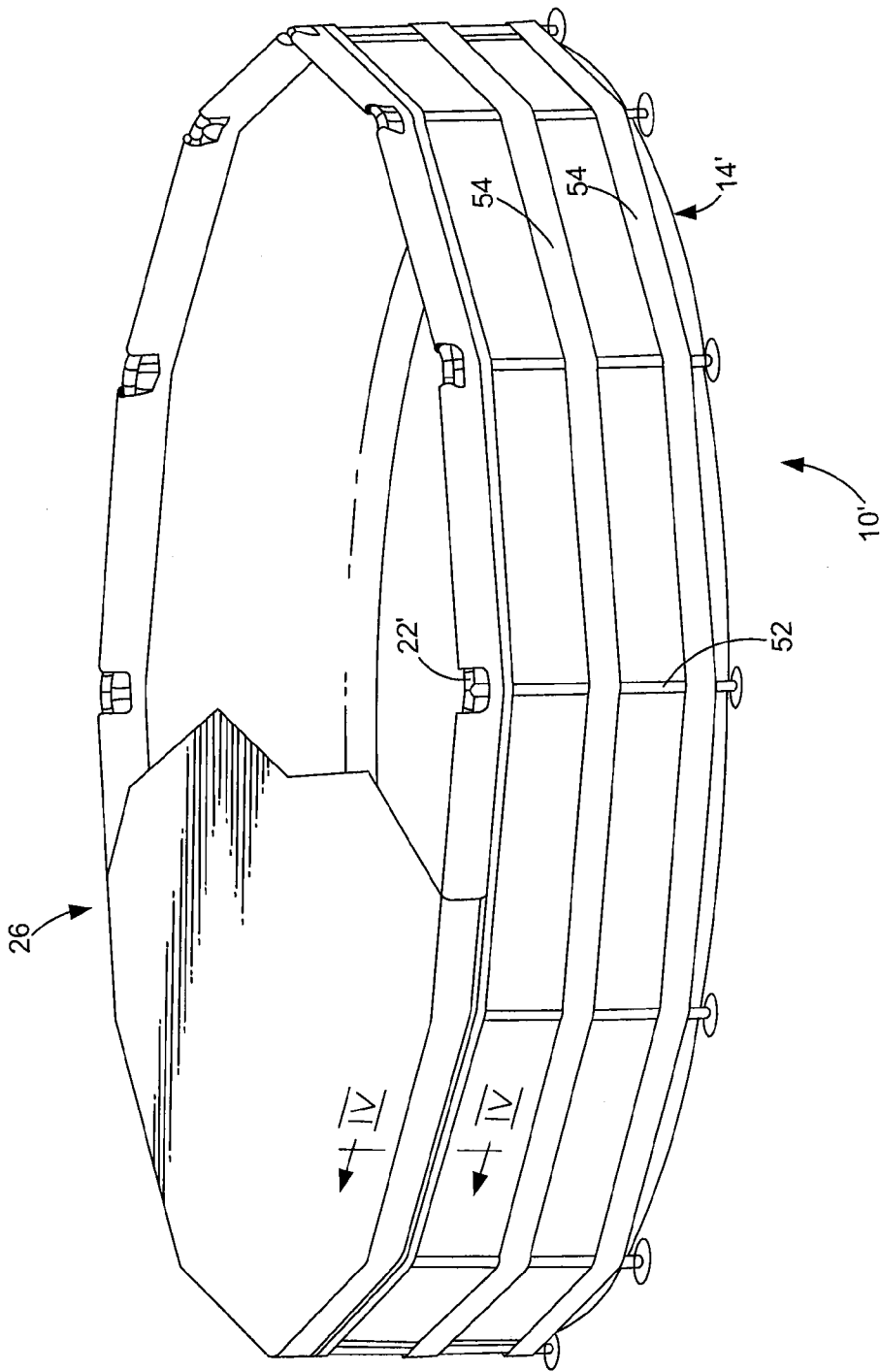


FIG. 3

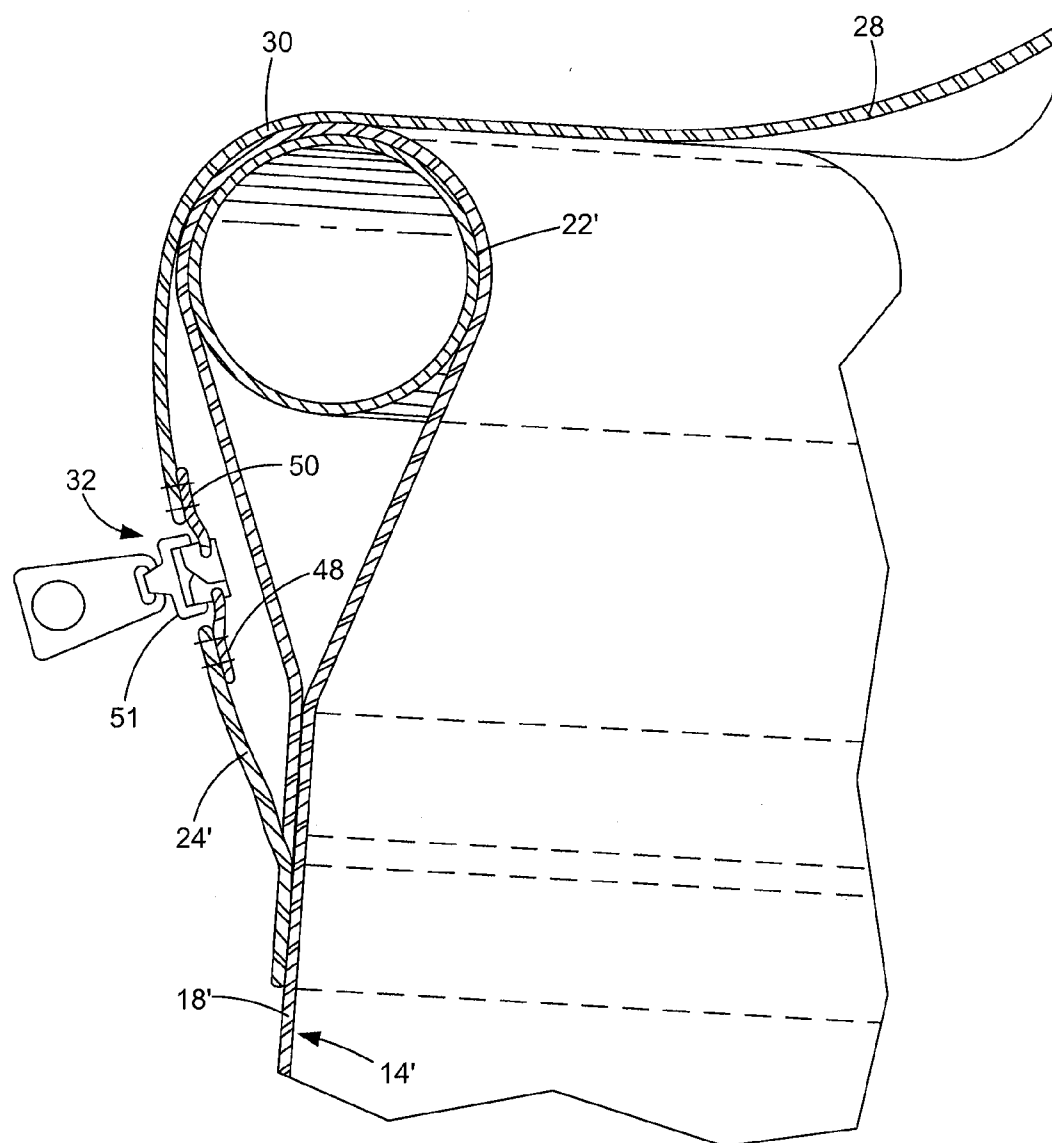


FIG. 4

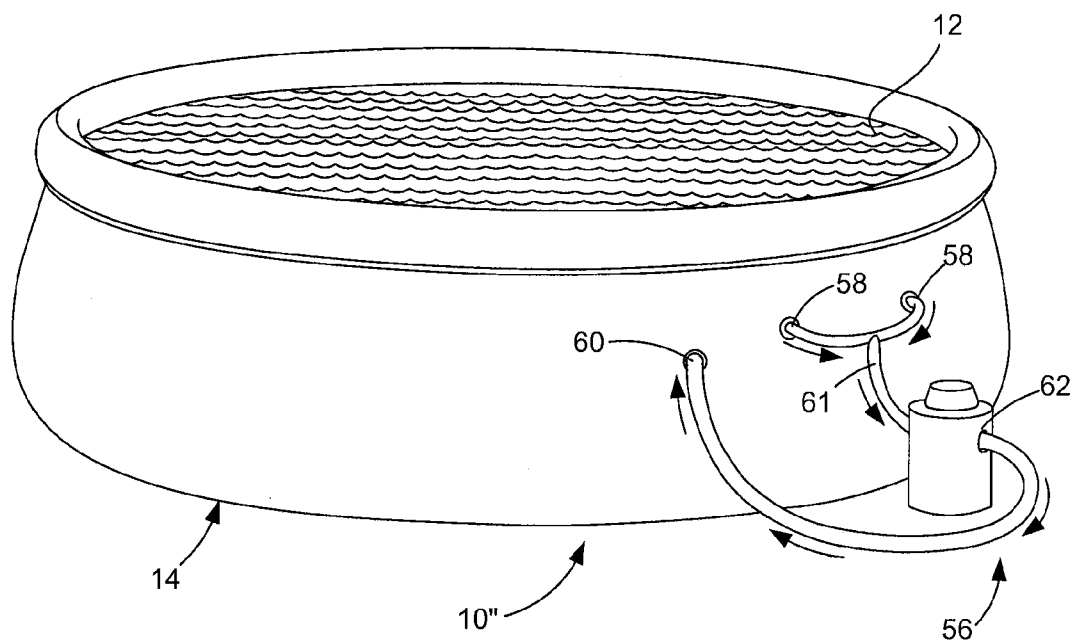


FIG. 5

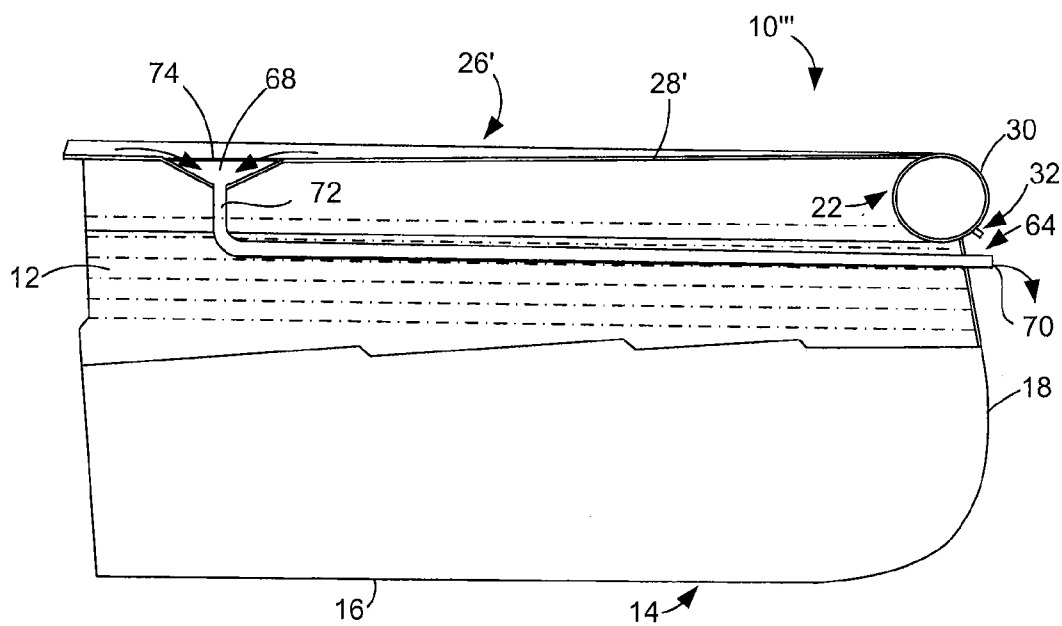


FIG. 6

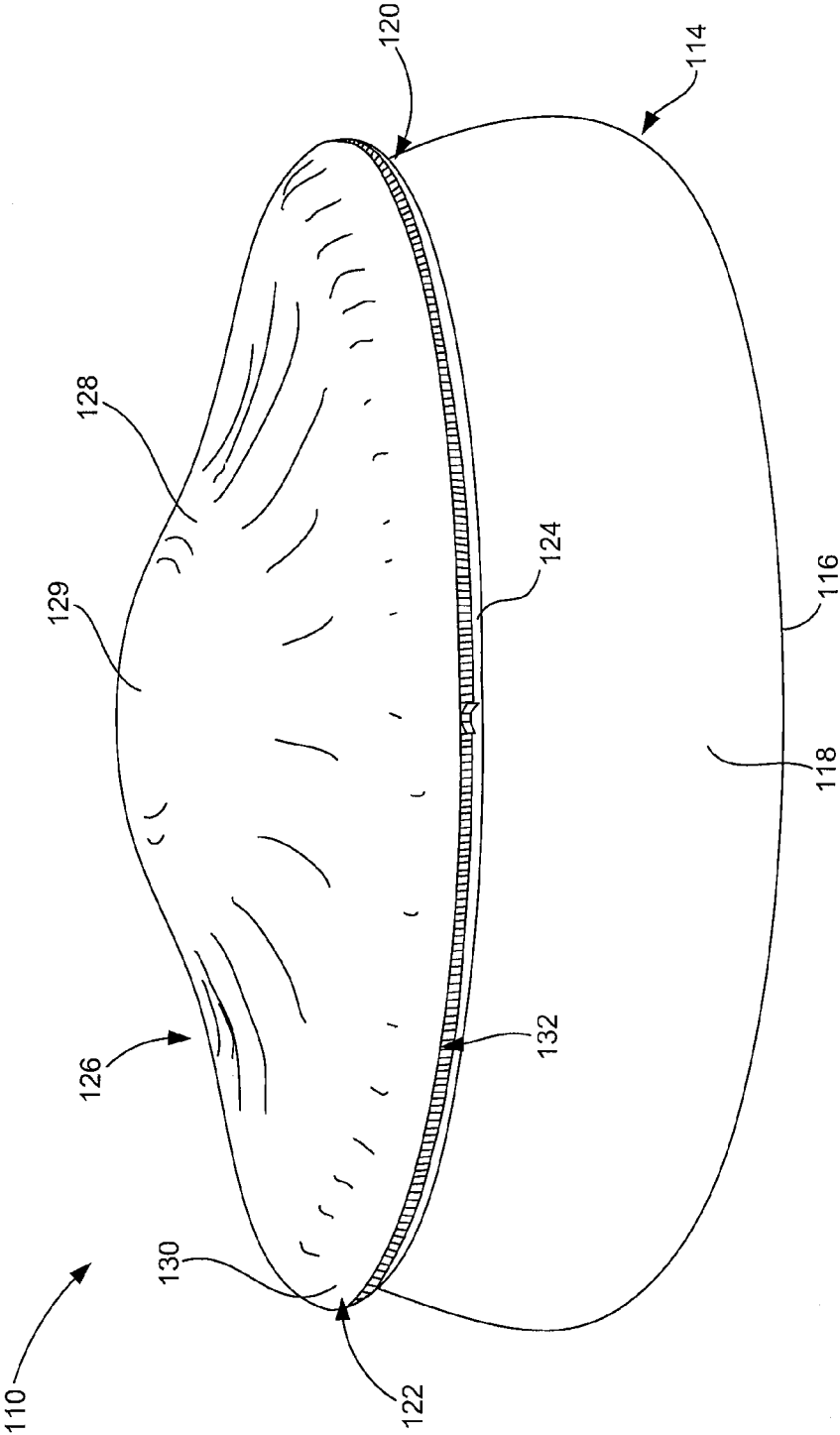


FIG. 7

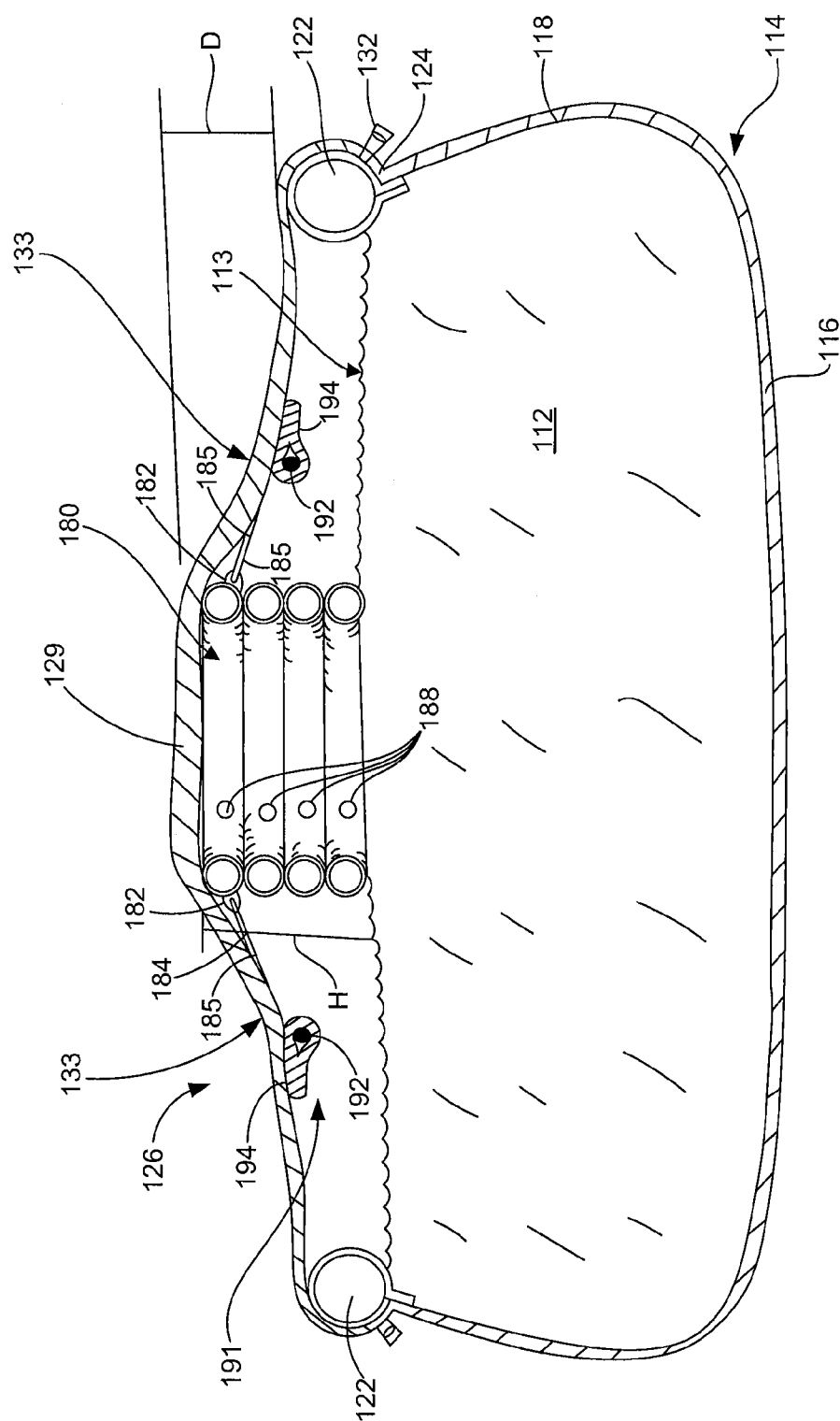


FIG. 8

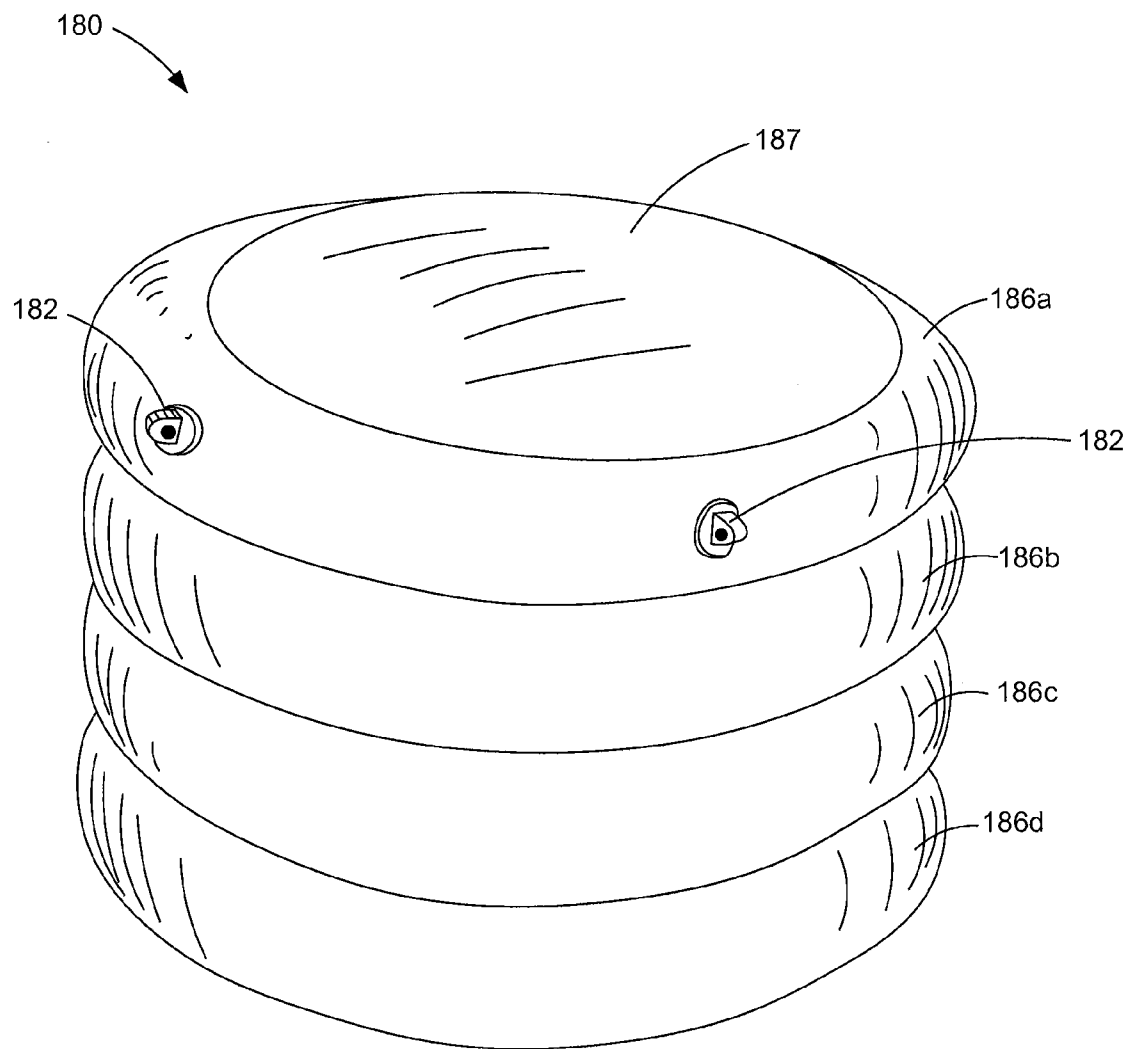
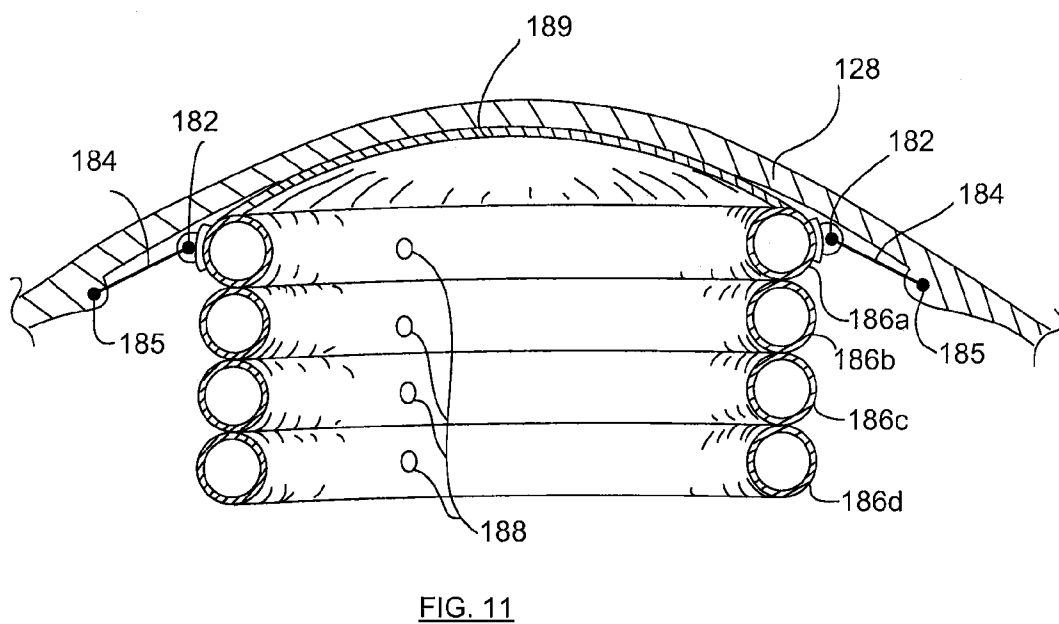
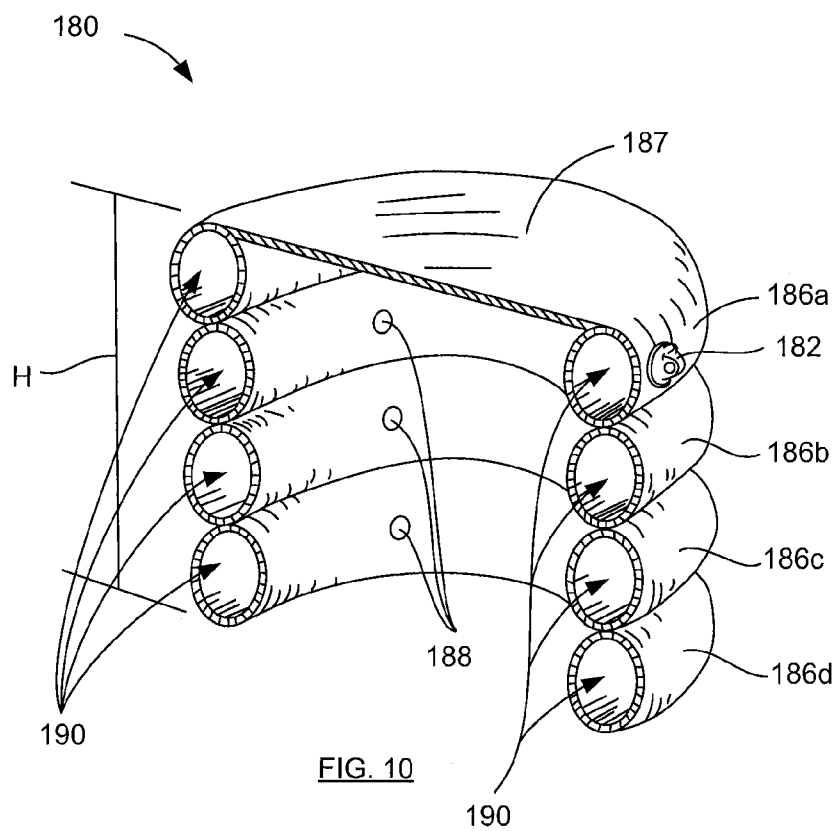


FIG. 9



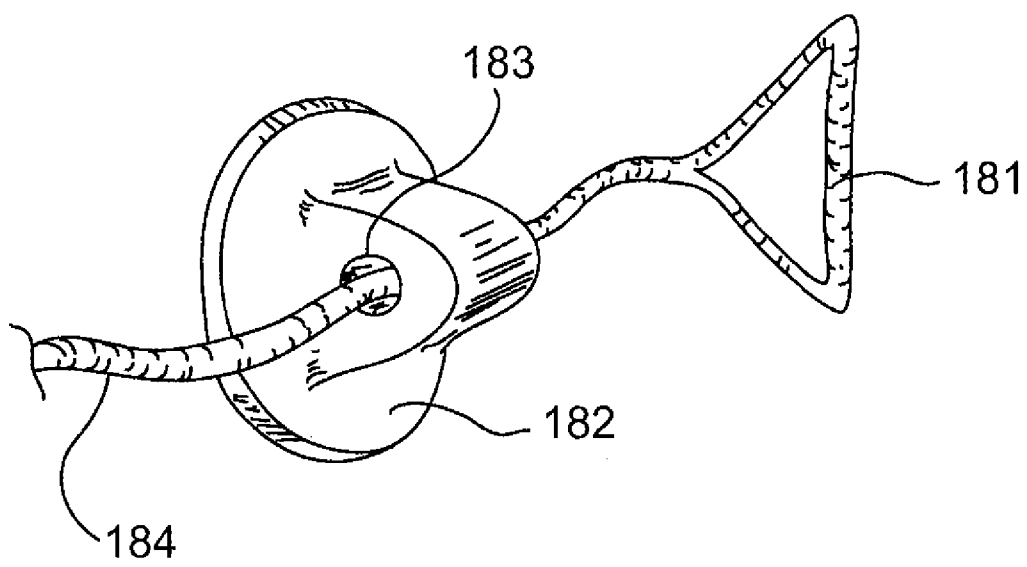


FIG. 12

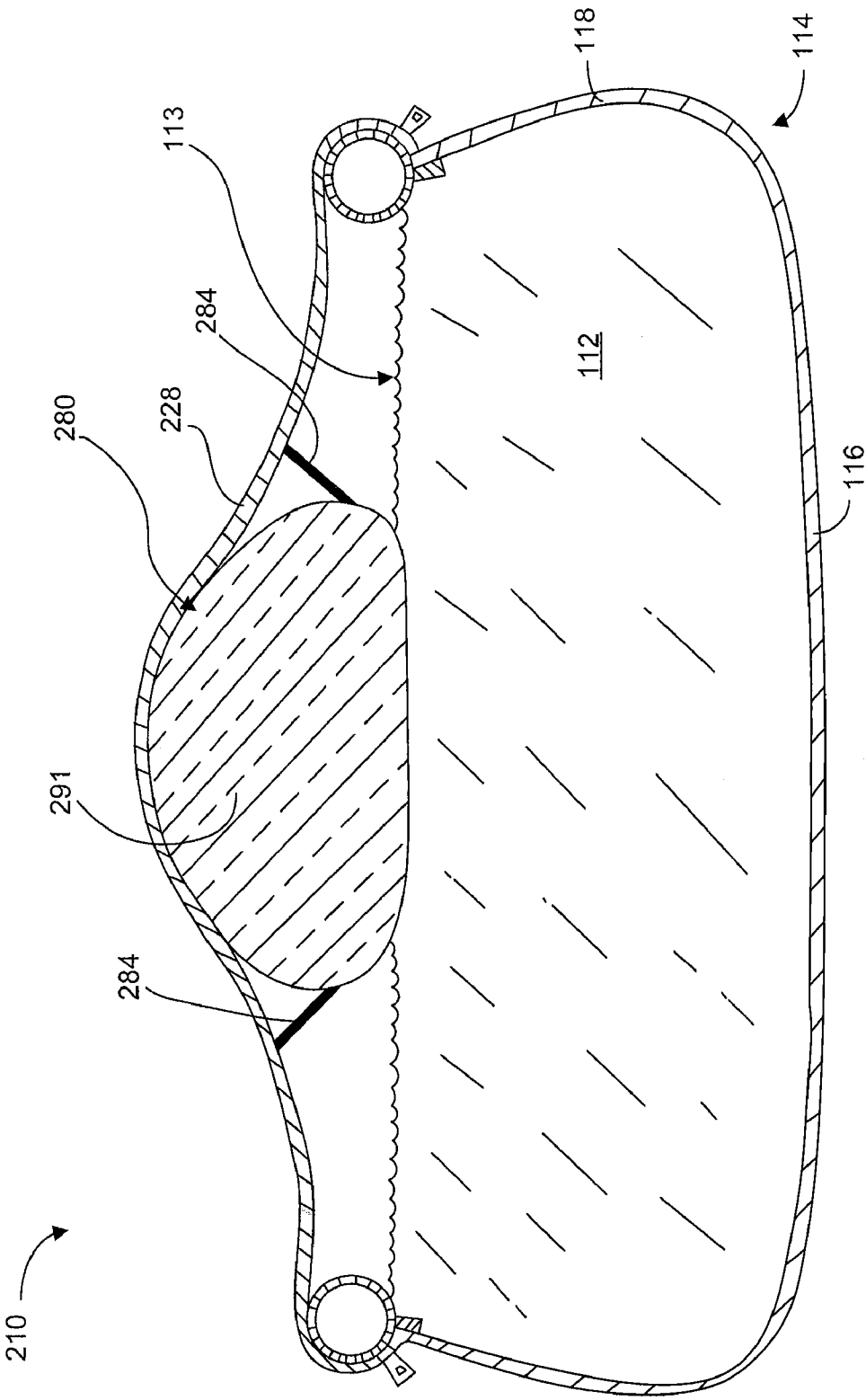


FIG. 13

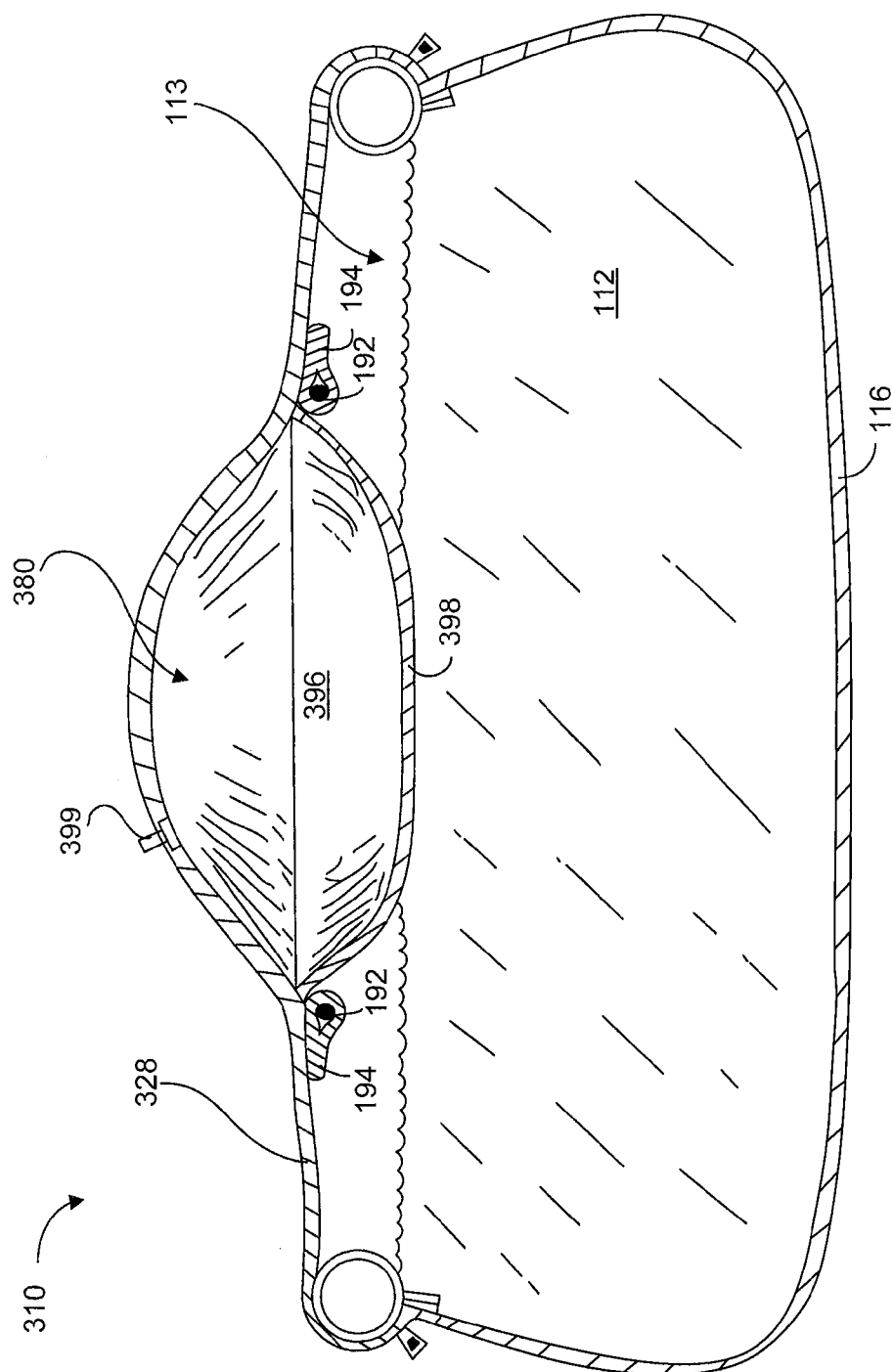


FIG. 14

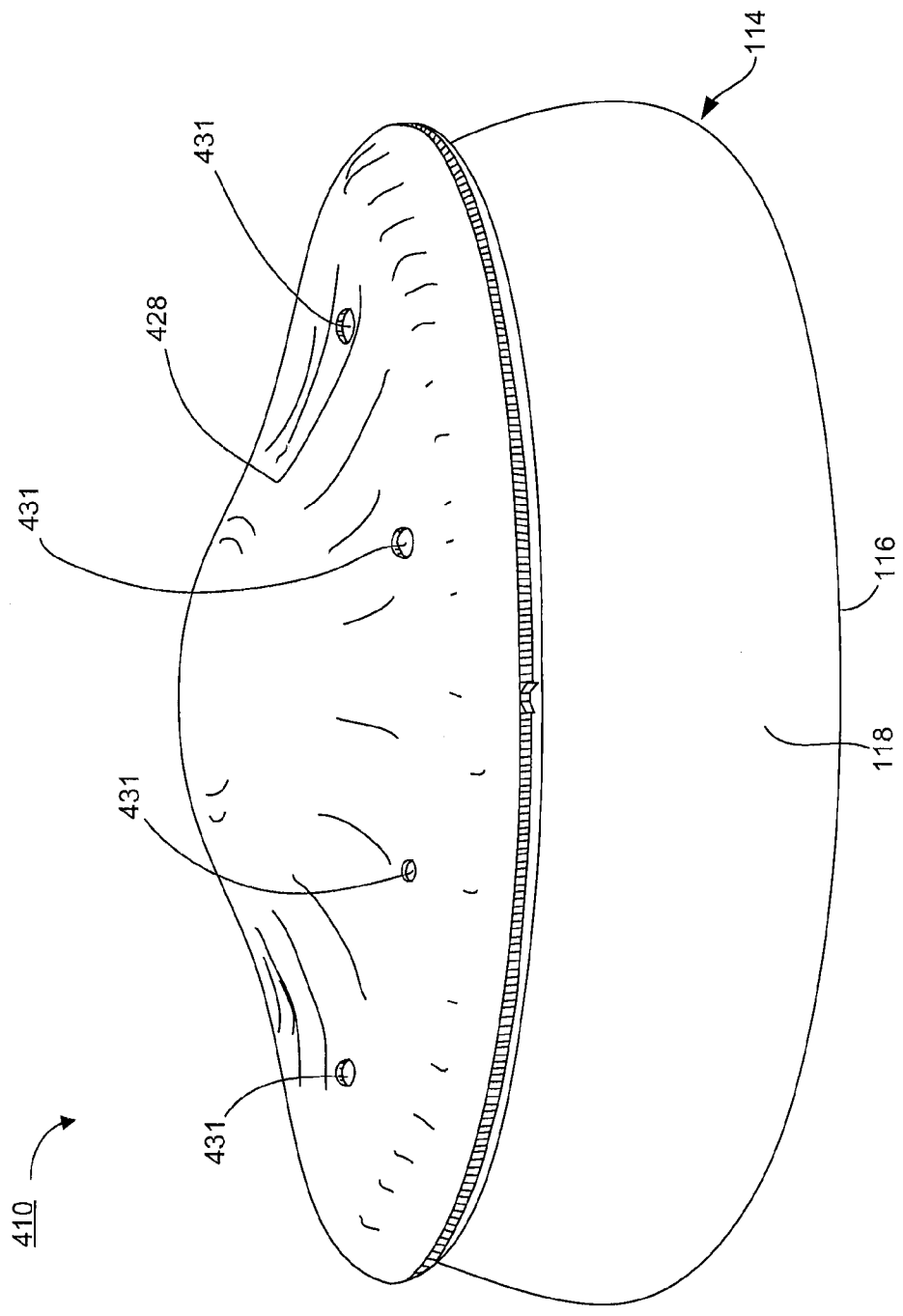


FIG. 15

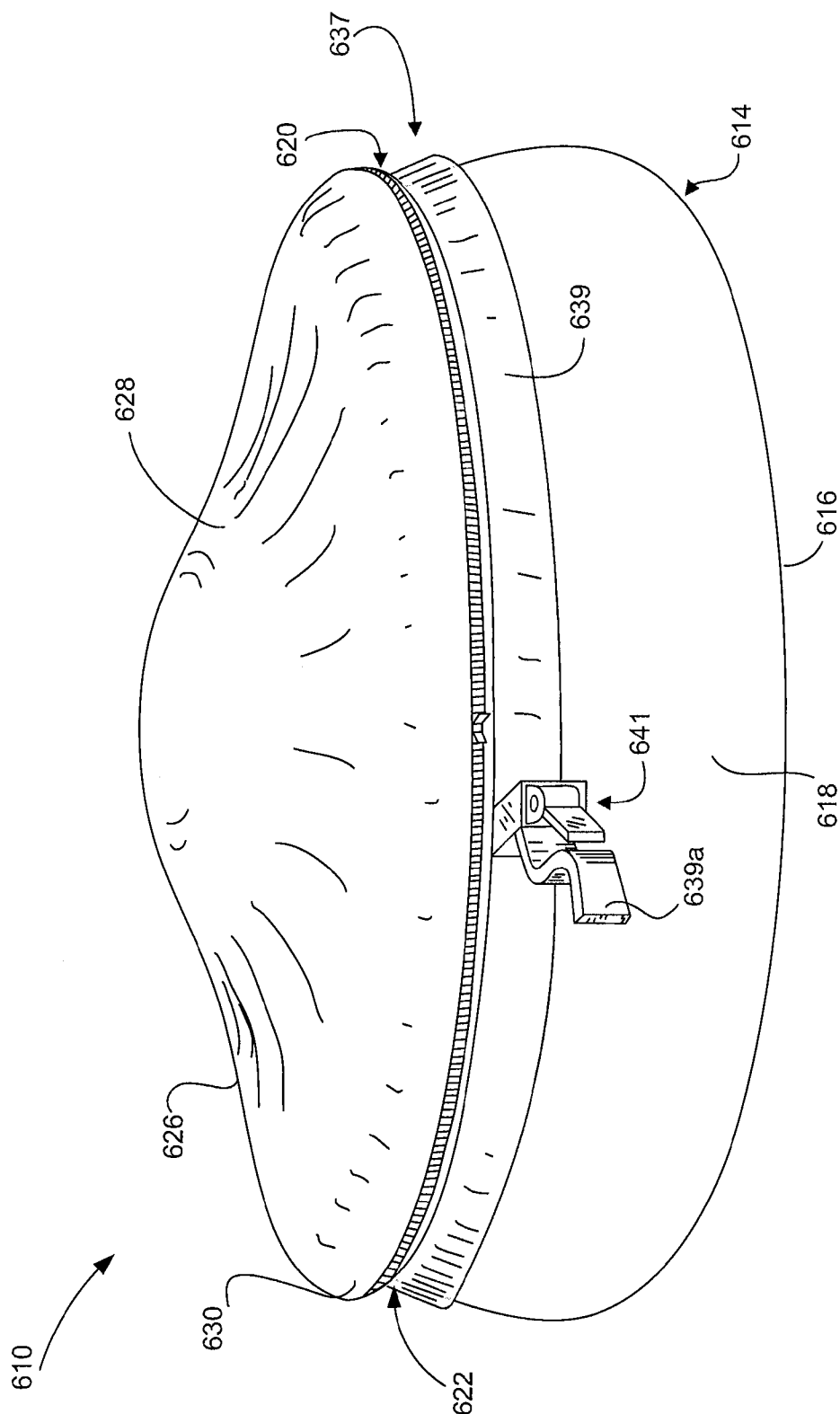


FIG. 16

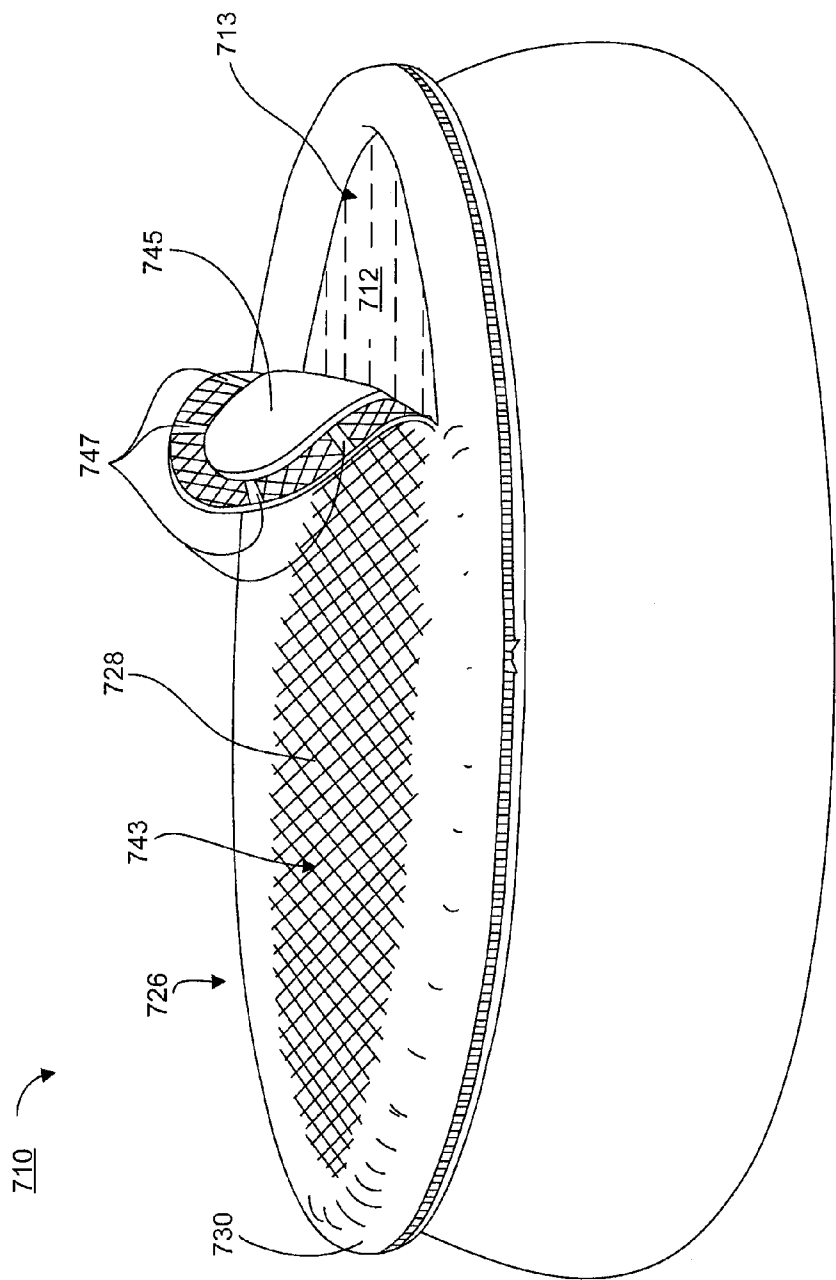


FIG. 17

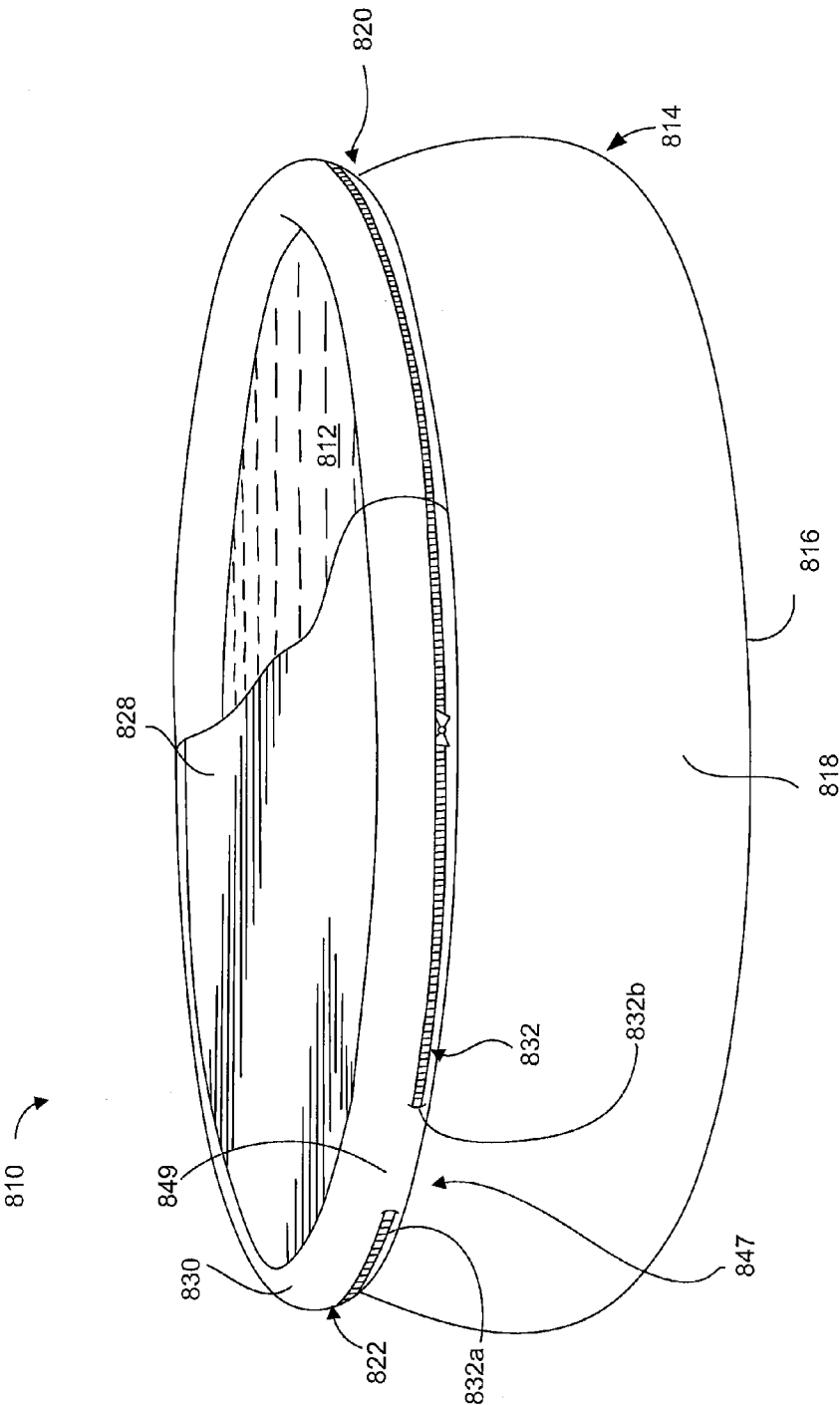


FIG. 18

COVERED POOL STRUCTURE

[0001] This application claims the benefit under 35 USC 119(e) of U.S. application Ser. No. 61/013,413, filed Dec. 13, 2007, which is incorporated herein in its entirety by this reference to it.

FIELD

[0002] Disclosed herein are apparatus related to the general field of pools and is more particularly to apparatus related to covered pool structures.

BACKGROUND

[0003] Covering structures for swimming pools are well known in the art. In addition to improving the safety of the pool by inhibiting accidental falls thereinto, covering structures tend to preserve water quality by reducing chlorine evaporation and reducing water contamination from external contaminants, such as bird droppings, that may fall into an uncovered pool.

[0004] Some known covering structures for swimming pools are conceived for use with rigid swimming pools. However, non-rigid swimming pools, either of the self-supporting type or of a type in which a membrane is supported by a light structure made out of posts, have increasingly become popular in recent years. Because of their flexibility, such swimming pools are typically not usable with commonly used covering structures. Indeed, it can be relatively difficult to attach such covering structures to a relatively flexible structure. Notably, attaching a covering structure to a flexible structure may lead to the creation of shear stresses in the attachment used to attach the covering structure. For example, in the case in which the attachment is a zipper-type attachment, such shear forces may lead to damages to the attachment.

[0005] Another problem encountered in existing covering structures resides in that relatively waterproof covering structures may accumulate water, such as rain water, on their top surface. In relatively rigid swimming pools, this typically does not cause great problems, as the quantity of water that may be accumulated can be kept relatively small due to the tension applied to the covering structure when it is attached to the rigid structure of the swimming pool. However, in a flexible swimming pool, there exists a risk that a relatively large quantity of water may accumulate on the top surface of the covering structure as the swimming pool may deform in response to the accumulation of water and, therefore, allow a relatively deep puddle to form.

[0006] In turn, these puddles lead to increased risks that children, babies or other animals could drown in puddles formed on the top surface of the covering. Furthermore, the weight exerted by a child, baby or other animal on the top surface of the covering structure may increase to the deformation of the covering structure, thereby increasing the depth of any pools of water formed thereon.

[0007] Another problem encountered in such flexible swimming pools, and more typically in self-supporting swimming pools, is caused by the fact that by their relatively small size and inexpensive nature, such swimming pools, when they include a pump and a filter for filtering the water contained therein, only include a single underwater inlet for drawing the water to filter out of the swimming pool. There

have been many accidents in which hairs of a child have been drawn into the inlet by the pump and in which the child has been unable to remove the hairs from the inlet, which resulted in drowning of the child.

[0008] Accordingly, there exists a need for an improved covered pool structure.

SUMMARY

[0009] According to one example, there is provided a covered pool structure for containing a liquid. The liquid defines a liquid top surface. The covered pool structure includes a membrane for containing the liquid, the membrane defining a bottom wall and a peripheral wall extending therefrom. The peripheral wall defines a top edge. A rim extends from the peripheral wall substantially adjacent the top edge. The rim has a substantially toroidal configuration. An attachment flange extends from the peripheral wall substantially adjacent the rim. The attachment flange is located peripherally relatively to the peripheral wall. A covering structure defines a substantially flexible covering section positional so as to extend across the liquid top surface and an attachment section extending substantially peripherally and outwardly from the covering section. An attachment flange-to-attachment section releasable attachment extends between the attachment flange and the attachment section for releasably attaching the attachment flange and the attachment section to each other. The attachment flange and the attachment section are both substantially resiliently deformable and have substantially similar elasticity moduli.

[0010] For the purpose of the present description, the terminology covered pool structure refers to any covered pool, such as, for example, covered swimming pools, covered spas and any other suitable covered structure that may contain a liquid. For example, the covered pool structure is either of the self-supporting type, or of the type supported by a relatively light structure including a rigid rim, posts supporting the rim, and reinforcing members extending between the posts, but which does not include rigid walls.

[0011] Having the attachment flange and the attachment section with substantially similar elasticity moduli causes the attachment flange and the attachment section to deform substantially similarly when external forces are exerted onto the covered pool structure. This reduces shear stresses in the attachment flange-to-attachment section releasable attachment, which in turn increases the reliability and durability of many types of usable attachment flange-to-attachment section releasable attachments, such as attachments of the zip-type.

[0012] For example, the external forces exerted onto the attachment flange may be forces due to the hydrostatic pressure of the liquid contained within the membrane, forces exerted by an intended user when attaching to and detaching from the covering structure the remaining portion of the covered pool structure, or forces exerted when the intended user of the covered pool structure enters or leaves the liquid.

[0013] In some examples, the covered pool structure includes a drain positioned so as to be able to remove water accumulating onto the covering section. This drain reduces the risk of a small child drowning in puddles of water accumulating on top of the covering section. Such drains also reduce the risk that the covering structure, or the membrane, becomes damaged due to forces exerted thereonto by such accumulated water.

[0014] The proposed covered pool structure is relatively easily manufacturable at relatively low costs using currently known materials and techniques. Furthermore, the proposed covering structure is relatively easily attachable to and detachable from the membrane using a relatively small number of quick and ergonomic steps.

[0015] In some examples, the covered pool structure includes a pump in fluid communication with two inlets formed into the membrane, for example into the peripheral wall. In these examples, if an object or a part of a body of an intended user of the covered pool structure becomes stuck into one of the pump inlets, the pump may continue circulating the liquid by drawing the liquid through the other pump inlet, which reduces the suction force exerted by the pump onto the object or part of the body of the intended user and facilitates removal of the object or part of the body of the intended user from the blocked pump inlet.

[0016] In some examples, a coverable pool structure comprises a membrane for containing a liquid, the membrane having a bottom wall, a peripheral wall extending from the bottom wall, and a top edge on the peripheral wall, a rim connected to the peripheral wall proximate the top edge, a flexible covering member being positionable so as to extend between the peripheral wall to inhibit access to the liquid, an attachment apparatus for securing the flexible covering member to the rim, and a support member positionable between a top surface of the liquid and the flexible covering member and configured to bias at least a portion of the flexible covering member away from the liquid.

[0017] The support member may be configured to dispose the portion of the flexible covering member above the rim. The support member may be positionable generally concentric to the rim of the pool and away from the rim of the pool. The support member may be releasably securable to the flexible covering member.

[0018] The support member may comprise at least one inflatable member, and may comprise a plurality toroidal inflatable members configured in an ordered arrangement. The inflatable member may comprise an air bladder. The support member may comprise a foam portion.

[0019] In some examples, the support member may be configured to dispose the portion of the flexible covering member at least 5 cm above the rim, or alternatively at least 15 cm above the rim.

[0020] The support member may be configured to bias the flexible covering member away from the top surface of the liquid while supporting a predetermined weight on the flexible covering member. The predetermined weight may be at least 100 lbs, or alternatively at least 500 lbs.

[0021] The coverable pool structure may further comprise at least one aperture defined in the flexible covering structure to allow fluid communication between an outer surface of the flexible covering member and the liquid within the pool. The at least one aperture may be positioned intermediate the rim of the pool and the support member.

[0022] According to another example, there is provided a covering structure for a pool, the pool having a peripheral wall and a bottom wall for receiving a liquid in the pool, the covering structure comprising a flexible covering member being positionable so as to extend between the peripheral wall to inhibit access to the liquid in the pool, an attachment apparatus for securing the flexible covering member to the pool, and a support member positionable between a top surface of the liquid in the pool and the flexible covering member

and configured to bias at least a portion of the flexible covering member away from the liquid.

[0023] According to another example, there is provided a covering structure for a pool, the pool having a peripheral wall and a bottom wall for receiving a liquid in the pool, the covering structure comprising a flexible covering member having a light-transmitting portion, and being positionable so as to extend between the peripheral wall to inhibit access to the liquid in the pool, an attachment apparatus for securing the flexible covering member to the pool, and a heating member positionable below the flexible covering member, and configured for using light passing through the light-transmitting portion to heat the liquid.

[0024] The light-transmitting portion may comprise an open mesh material, and the solar heating member may comprise a solar blanket positionable proximate a top surface of the liquid.

[0025] According to another example, there is provided coverable pool structure comprising a membrane for containing a liquid, the membrane having a bottom wall, a peripheral wall extending from the bottom wall, and a top edge on the peripheral wall, a rim connected to the peripheral wall proximate the top edge, a flexible covering member, and an attachment apparatus for securing the flexible covering member to the membrane, the attachment apparatus having a releasable portion secured to the rim and configured to allow the flexible covering member to move between a closed position wherein the flexible covering member extends between the peripheral wall to inhibit access to the liquid and an open position wherein access to the liquid is uninhibited, and a connecting member securing the flexible covering member to the membrane to inhibit the flexible covering from being moved a predetermined distance away from the membrane.

[0026] The attachment apparatus may comprise a zipper member extending only partially around the peripheral wall of the pool, and the connecting member comprises a flexible member provided between first and second ends of the zipper member. The connecting member may comprise a tether connected to the flexible covering member and at least one of the membrane and the rim.

[0027] According to another example, there is provided a covering structure for a pool, the pool having a peripheral wall and a bottom wall for receiving a liquid in the pool, the covering structure comprising a flexible covering member being positionable so as to extend between the peripheral wall to inhibit access to the liquid in the pool, an attachment apparatus for securing the flexible covering member, and a securing apparatus positionable on an exterior surface of the peripheral wall and configured to releasably secure the attachment apparatus to the pool to secure the flexible covering member to the pool.

[0028] The pool may comprise a membrane defining the peripheral wall and the bottom wall and further includes a rim connected to the peripheral wall proximate a top edge thereof, and the securing apparatus may comprise a belt member positionable below the rim of the pool and a locking member for locking the belt in a position below the rim.

[0029] According to another example, a coverable pool structure may be provided incorporating any two or more features listed above.

[0030] According to yet another example, there is provided a covering structure for a pool incorporating any two or more features listed above.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] Examples will now be disclosed in particular reference to the following drawings, in which:

[0032] FIG. 1, in a perspective view, illustrates a covered pool structure in accordance with one example;

[0033] FIG. 2, in a side cross-sectional view with portions removed taken along the line II-II shown in FIG. 1, illustrates a portion of the covered pool structure shown in FIG. 1;

[0034] FIG. 3, in a perspective view, illustrates a covered pool structure in accordance with an alternative example;

[0035] FIG. 4, in a side cross-sectional view with portions removed taken along the line IV-IV of FIG. 3, illustrates the covered pool structure shown in FIG. 3;

[0036] FIG. 5, in a perspective view, illustrates a covered pool structure in accordance with yet another example;

[0037] FIG. 6, in a side cross-sectional view with portions removed, illustrates a covered pool structure in accordance with yet another example.

[0038] FIG. 7 is a perspective view of a covered pool structure according to yet another example;

[0039] FIG. 8 is a cross-sectional elevation view of the covered pool structure of FIG. 7;

[0040] FIG. 9 is a perspective view of a support member for use with the covered pool structure of FIG. 7;

[0041] FIG. 10 is cross-sectional perspective view of the support member of FIG. 9;

[0042] FIG. 11 is close-up cross-sectional view of the support member of FIG. 9;

[0043] FIG. 12 is a perspective view of a securing member for use with the support member of FIG. 9;

[0044] FIG. 13 is a cross-sectional elevation view of a covered pool structure according to another example having a foam support member;

[0045] FIG. 14 is a cross-sectional elevation view of a covered pool structure according to another example having an air bladder support member;

[0046] FIG. 15 is perspective view of a covered pool structure according to another example having drainage holes therein;

[0047] FIG. 16 is perspective view of a covered pool structure according to another example having a securing member;

[0048] FIG. 17 is perspective view of a covered pool structure according to another example having a cover with a light-transmitting portion; and

[0049] FIG. 18 is perspective view of a covered pool structure according to another example having a connecting member for securing the cover to the pool.

DETAILED DESCRIPTION

[0050] FIGS. 1 and 2 illustrate a covered pool structure 10 in accordance with one example. Referring more specifically to FIG. 1, the covered pool structure 10 is provided for containing a liquid 12, the liquid 12 defining a liquid top surface 13.

[0051] The covered pool structure 10 includes a membrane 14 for containing the liquid 12. The membrane 14 defines a bottom wall 16 generally configured for resting on a ground surface, and a peripheral wall 18 extending therefrom generally away from the ground surface. The peripheral wall 18 defines a top edge 20, better seen in FIG. 2.

[0052] Still referring to FIG. 2, a rim 22 extends from the peripheral wall 18 adjacent the top edge 20. The rim 22 may have a substantially toroidal configuration with a substantially circular cross-sectional configuration, as shown, or any other suitable cross-sectional configuration. The rim 22 shown in FIG. 2 is an inflatable rim-part of a self-supporting swimming pool. However, in alternative examples, the rim 22 is any suitable rim, for example the rim of a rigid above-ground pool or an in-ground pool.

[0053] An attachment flange 24 extends from the peripheral wall 18 adjacent the rim 22. The attachment flange 24 is located peripherally relatively to the peripheral wall 18, on an outer surface of the peripheral wall 18.

[0054] As seen in FIG. 1, a covering member or structure 26 is also provided. The covering structure 26 includes a substantially flexible covering section 28 positional so as to extend across the liquid top surface 13 so as to inhibit access the liquid 12. The covering structure 26 also defines an attachment section 30 extending substantially peripherally and outwardly from the covering section 28.

[0055] In some examples, as shown, for example, in FIG. 1, the covering section 28 has a substantially disc-shaped configuration and the attachment section 30 forms a generally annular structure extending peripherally relatively to the covering section 28 and has an arcuate cross-sectional configuration in a plane perpendicular to the covering section 30, as illustrated in FIG. 2. However, in alternative examples, the covering structure 26 has any other suitable shape.

[0056] An attachment flange-to-attachment section releasable attachment 32 extends between the attachment flange 24 and the attachment section 30. The attachment flange-to-attachment section releasable attachment 32 is provided for attaching the attachment flange 24 and the attachment section 30 to each other.

[0057] In some examples, the releasable attachment 32 comprises a zipper or another zip-type fastener.

[0058] In some examples, the attachment flange 24 and the attachment section 30 are both substantially resiliently deformable and have substantially similar elasticity moduli, and the attachment flange 24 and the attachment section 30 can deform substantially similarly when external forces are exerted onto the covered pool structure 10. In turn, this tends to reduce shear stresses in the attachment flange-to-attachment section releasable attachment 32. Many typically used releasable attachments are sensitive to such shear stresses, which may damage these releasable attachments. Because of the relatively large labour involved in replacing such releasable attachments, it advantageous that the attachment flange-to-attachment section releasable attachment 32 used in the proposed covered pool structure 10 does not easily become damaged during normal use.

[0059] Deformation of the covered pool structure 10 may occur for many reasons. For example, when the covered pool structure 10 is first filled with the liquid 12, the hydrostatic pressure exerted by the liquid 12 onto the covered pool structure 10, particularly the peripheral wall 18, tends to extend radially the covered pool structure 10. Since the attachment flange 24 and the attachment section 30 have substantially similar elasticity moduli, these two elements extend substantially similarly under the action of the hydrostatic pressure of the liquid 12, which tends to reduce the possibility that large shear stresses are induced into the attachment flange-to-attachment section releasable attachment 32.

[0060] Furthermore, since the covered pool structure shown in FIGS. 1 and 2 is of the self-supporting type, the intended user of the covered pool structure may relatively easily deform the covered pool structure 10 either during maintenance of the pool structure 10, during normal use of the covered pool structure 10, or when attaching to or detaching the covering structure 26 from the attachment flange 24. All these operations may create forces that may damage the attachment flange-to-attachment section releasable attachment 32. Indeed, if the attachment flange 24 and the attach-

ment section 30 deform differently under the action of external forces, the attachment flange 24 and the attachment section 30 will create shear forces into the attachment flange-to-attachment section releasable attachment 32, which may result in permanent damages to the attachment flange-to-attachment section releasable attachment 32.

[0061] Referring to FIG. 2, in some examples, the rim 22 defines a rim apex 34, a rim nadir 36 and a rim midplane 38 extending substantially mid-way between the rim apex 34 and the rim nadir 36. For example, as shown the rim midplane 38 is located between the attachment flange-to-attachment section releasable attachment 32 and the rim apex 34. Because of the substantially toroidal configuration of the rim 22, in these examples, the attachment section 30 is at least partially wrapped around the rim 22. This positioning of the releasable attachment 32 further helps in maintaining the structural integrity of the covered pool structure 10. For example, in this configuration, forces exerted onto the covering section 28 towards the liquid 12 tend to be at least partially transmitted to the rim 22 instead of being transmitted directly to the releasable attachment 32. Also, this configuration tends to facilitate the attachment flange-to-attachment section releasable attachment 32 operating mainly in tension when such external forces are exerted onto the covered pool structure 10.

[0062] In a more specific example, the attachment flange-to-attachment section releasable attachment 32 is located between the rim nadir 36 and the rim midplane 38. This configuration ensures that the attachment flange 24 and the attachment section 30 together wrap around the rim 22.

[0063] In some examples, typical values for an attachment-to-midplane distance 40 between the attachment flange-to-attachment section releasable attachment 32 and the rim midplane 38 are from about 50% to about 95% of an attachment-to-nadir distance 42 between the rim nadir 36 and the rim midplane 38. Indeed, these values have been found to lead to covering structures 26 that are relatively well secured to the attachment flange 24, while remaining relatively easily attached to and removed from the remainder of the covered pool structure 10. However, other relationships between the relative values of the attachment-to-midplane distance 40 and attachment-to-nadir distance 42 are within the scope of some examples.

[0064] As best shown in FIG. 2, the rim 22 may include a rim body 44 having a substantially toroidal configuration and a rim flange 46 extending substantially radially outwardly from the rim body 44. For example, the rim flange 46 may be attached to the peripheral wall 18 substantially adjacent the top edge 20 through a sonic weld. In some examples the rim 22 may be formed by folding over itself a membrane and attaching end sections of this membrane to each other to form the rim body 44 and the rim flange 46.

[0065] In some examples, the attachment flange 24 and the attachment section 30 are typically made out of the same material. It may be desirable that this material be waterproof, have high tear strength, have high tensile strength, have high stretching resistance, and be resistant to deterioration when exposed to elements such as chlorine, iodine and UV. For example, one material such as the make 'Denier 210' sold by Datong Inc. could be used. It has been found that this material is particularly well-suited, as it allows for the creation of relatively small deformations into both the attachment flange 24 and the attachment section 30 under external loads exerted onto the covered pool structure 10 during normal use. How-

ever, it is within the scope of some examples to include any other suitable materials in the attachment flange 24 and/or the attachment section 30.

[0066] Referring to FIG. 2, in some examples, the attachment flange 24 extends integrally from the membrane 14. For example, the attachment flange 24 may be a prolongation of the membrane 14 and extend generally upwardly from the top edge 20. In other examples, as seen, for example, in FIG. 3, the attachment flange 24' may be attached to the membrane 14 through a sonic weld.

[0067] A type of attachment flange-to-attachment section releasable attachment 32 particularly well suited to the some examples is a zip-type fastener. For example, the zip-type fastener includes two zip bands 48 and 50 stitched respectively to the attachment flange 24 and the attachment section 30 and a slider 51 extending between the two zip bands 48 and 50 for selectively attaching and detaching the zip bands 48 and 50 upon being slid relatively thereto. Such zip-type fasteners are well-known in the art to be relatively resistant to tension in a direction lateral to their longitudinal axis. Therefore, such a zip-type fastener is well-suited to the proposed covered pool structure as forces exerted vertically onto the covering structure 26 tend to be unlikely to lead to permanent damages of the zip-type fastener.

[0068] Since in some examples the covering structure 26 is intended to protect children from drowning into the liquid 12, the relatively large resistance of the zip-type fastener to forces exerted onto the covering structure 26 tends to ensure that even if a child climbs onto the covering structure 26, it is relatively unlikely that the attachment flange-to-attachment section releasable attachment 32 will fail and lead to the child falling completely into the liquid 12. This unlikelihood of failure may be further enhanced by the equality of the elasticity moduli of the attachment flange 24 and of the attachment section 30, as shear stresses that could be induced into the zip-type fastener upon deformation of the covered pool structure 10 will then tend to be relatively small, which will contribute to the ruggedness of the proposed covered pool structure 10.

[0069] Referring now specifically to FIGS. 3 and 4, there is shown a covered pool structure 10' in accordance with another example. The covered pool structure 10' is substantially similar in many aspects to the previously described covered pool structure 10 and reference numerals used in describing the covered pool structure 10 will also be used when similar structures are present in the covered pool structure 10'.

[0070] A difference between the covered pool structure 10' and the covered pool structure 10 resides in that the covered pool structure 10' is not of the self-supporting type. Instead, a substantially rigid rim 22' of the covered pool structure 10' is supported in a spaced apart relationship relatively to a ground surface unto which the covered pool structure 10' is disposed by support members, such as posts 52. The posts 52 are typically circumferentially spaced apart from each other and provide a surface against which a membrane 14' of the covered pool structure 10' abuts against. To prevent the posts 52 from being pushed radially outwardly by the hydrostatic pressure created by the liquid 12 (not shown in FIGS. 3 and 4), reinforcing members 54 extend substantially circumferentially around the covered pool structure 10 and link the posts 52 to each other.

[0071] As seen in FIG. 4, in this example, the membrane 14' is suspended from the rim 22', for example by looping the

membrane 14' around the rim 22' and attaching the membrane 14' to itself so as to enclose the rim 22'. Also, the attachment flange 24' extends from the peripheral wall 18' and is sonically welded thereto.

[0072] FIG. 5 illustrates another covered pool structure 10". The covered pool structure 10" is similar to the covered pool structure 10, except that it includes a filtration system 56 for circulating the liquid 12 present in the covered pool structure 10" through a conventional filter (not shown in the drawings) and reintroducing the filtered liquid 12 into the covered pool structure 10".

[0073] More specifically, in this example, the membrane 14 defines at least two pump inlets 58 therein extending through the membrane 14. Also, a pump outlet 60 extends through the membrane 14. The covered pool structure 10" includes a pump 62 in fluid communication with each of the at least two pump inlets 58 and with the pump outlet 60 for circulating the liquid 12 by drawing the liquid 12 through the at least two pump inlets 58 and pushing the liquid through the pump outlet 60. For example, two pump inlets 58 may be adjacent to each other and connected to the pump 62 through a generally Y-shaped tube 61. For example, the two pump inlets may be spaced apart from each other by a secured distance of about 1.5 meter.

[0074] The presence of at least two pump inlets 58 in the covered pool structure 10" tends to reduce the vacuum force exerted by the pump 62 onto objects that may become engaged into one of the pump inlets 58 and block, either partially or totally, this pump inlet 58. This feature tends to increase the safety of the covered pool structure 10", as it tends to ensure that if a small child has body parts such as their hair engaged into the pump inlet 58, the other pump inlet 58 will allow water to be drawn by the pump 62 without creating a relatively large vacuum force, and thus will allow the child to remove himself from the pump inlet 58, thereby inhibit drowning of the child.

[0075] FIG. 6 illustrates a covered pool structure 10''' in accordance with yet another example. The covered pool structure 10''' is substantially similar to the covered pool structure 10, except that it includes an alternative covering structure 26'. Also, the covered pool structure 10''' includes a drain 64.

[0076] As shown, the drain 64 extends from the covering section 28' of the covering structure 26'. The drain 64 defines a drain inlet 68 located substantially adjacent to the covering section 28, a drain outlet 70 located peripherally relatively to the peripheral wall 18 when the covering section 28' extends across the liquid top surface 13 and a drain passageway 72 extending therebetween.

[0077] The covering structure 28' defines a draining aperture 74 leading to the drain inlet 68. Typically, the drain 64 is substantially funnel-shaped substantially adjacent to the covering section 28' and tapers to a section of substantially constant diameter extending towards the drain outlet 70. The drain 64 allows water accumulating on the top of the covering structure 26' to be evacuated therefrom. Therefore, when rain falls onto the covered pool structure 10, or when water becomes present on the covering structure 26' for any other reason, the water may drain from the covering structure 26' through the drain 64, which tends to reduce forces exerted onto the covering structure 26' and onto the attachment flange-to-attachment section releasable attachment 32, and

tends to help in preventing small children from drowning in puddles of water that could have formed on top of the covering structure 26'.

[0078] As shown, the drain 64 extends through the peripheral wall 18 and the drain outlet 70 is located closer to the bottom wall 16 than the drain inlet 68. This allows water to flow under the action of gravity through the drain 64 and facilitates evacuation of the water from the top of the covered pool structure 10.

[0079] To help in maintaining this relationship between the drain 64 and the remaining portions of the covered pool structure 10'', in some examples, the drain 64 is made out of a drain material that is buoyant in the liquid 12. For example, the drain material may be substantially buoyant in water. However, in alternative examples, the drain 64 is made out of any other suitable material.

[0080] Turning now to FIG. 7, illustrated therein is a covered pool structure 110 for containing a liquid according to another example. Elements of the covered pool structure 110 are similar to elements of the covered pool structure 10, and where possible, like features have been identified by like reference characters, incremented by 100.

[0081] As shown, the covered pool structure 110 includes a membrane 114 having a bottom wall 116, a peripheral wall 118 extending therefrom, and a top edge 120 on the peripheral wall 118.

[0082] A rim 122 extends from the peripheral wall 118 proximate the top edge 120. As shown, the rim 122 is inflatable and has a generally toroidal configuration with a circular cross-sectional configuration, although any other suitable cross-sectional configuration could be provided.

[0083] The covered pool structure 110 also includes a covering structure 126. The covering structure 126 includes a flexible covering member 128, and is generally positionable so as to extend across the pool and between the peripheral wall to prevent access to liquid 112 within the pool. The covering member 126 also includes an attachment section 130 extending substantially peripherally and outwardly from the covering section 128 and being configured for securing the flexible covering member 128 to the rim 122, such as by an attachment flange 124 secured to a releasable attachment 132, for example a zipper.

[0084] As will be described in greater detail below, the coverable pool structure 110 also includes a support member 180 (shown in FIG. 8) that is positionable between a top surface 113 of the liquid 112 and the flexible covering member 128 and is configured to bias at least a portion of the flexible covering member 128 away from the liquid 112.

[0085] As shown in FIGS. 7 and 8, the support member 180 provides the covering structure 126 with a generally convex shape (away from the top surface 113 of the liquid 112) with a center portion 129 of the flexible covering 128 being positioned above the rim 122 by a distance D.

[0086] The flexible covering member 128 slopes generally downwards from the center portion 129 towards the rim 122. As such, rainwater and other objects that would otherwise tend to collect on the top surface of the covering structure 126 will tend to move outwards towards the rim 122 and, in some examples, completely off of the covering structure 126. This tends to decrease the risk that puddles or other pools will form on the top surface of the flexible covering member 128, and decrease the associated risks of drowning.

[0087] As best shown in FIG. 8, the support member 180 can be positioned generally concentric to the rim 122 of the

pool, away from the rim **122**. For example, when the rim **122** presents a generally toroidal configuration, the support member **180** can be positioned in the center of the pool below the center portion **129**. This tends to provide the flexible covering member **128** with a homogenous surface profile, which encourages uniform movement of water over the covering structure **126**, and inhibit pools of water from forming. [0088] Alternatively, the support member **180** can be provided at different locations relative to the rim **122**. In particular, where the rim **122** of the pool has a non-toroidal configuration, it may be advantageous to place the support member **180** at various locations relative to the rim **122**. Furthermore, where the pool is particularly large or of a different configuration or shape, more than one support member **180** could be used.

[0089] In some examples, the support member **180** is configured to be releasably securable to one or more of the flexible covering member **128**, the rim **122** or the membrane **114**. For example, as shown in FIGS. 8 to 10, the support member **180** can include mounting members **182** secured thereto. The mounting members **182** can be used to secure the support member **180** to the flexible covering member **128** via ropes **184** securable to mounting points **185** on the flexible covering member **128**. As shown in FIG. 12, the ropes **184** may include foldable locking members **181** on the ends thereof suitable for passing through apertures **183** in the mounting members **182** when folded, but configured to resist passing through the apertures **183** when unfolded.

[0090] In other examples, the support member **180** can be permanently secured to the flexible covering member **128**.

[0091] In some examples, the support member **180** includes at least one inflatable member. For example, as best shown in FIGS. 9 and 10, the support member **180** includes four inflatable members **186a**, **186b**, **186c**, **186d** stacked in a vertical ordered arrangement. As shown, the inflatable members **186a**, **186b**, **186c**, **186d** are generally toroidal in shape and are secured together to provide a desired height **H** for the support member **180**.

[0092] The uppermost inflatable member **186a** can include an end member **187** secured thereto that closes the upper end of the support member **180**.

[0093] The inner chambers **190** of the inflatable members **186a**, **186b**, **186c**, **186d** can be inflated for use with the flexible covering member **128** via safety valves **188** positioned in the sidewalls of the inflatable members **186a**, **186b**, **186c**, **186d** and facing the interior of the support member **180**. Safety valves **188** could include any suitable valve apparatus known in the art allowing the inflatable members **186a**, **186b**, **186c**, **186d** to be independently inflated and the sealed to prevent leaking of the air therein.

[0094] As discussed above, the support member **180** is positionable between the top surface **113** of the liquid **112** and the flexible covering member **128**, and operates to bias the flexible covering member **128** away from the liquid **112**. As shown in FIG. 8, during use in the covered pool structure **110**, at least the lowermost inflatable member **186d** of the support member **180** float in the liquid **112** proximate the top surface **113**, while the uppermost inflatable member **186a** and/or in some examples the end member **187** engage the bottom surface of the flexible covering member **128**.

[0095] As shown, the height **H** of the support member **180** is selected such that, during use, the support member **180** biases the flexible covering member **128** away from the liquid **112**. In some examples, the height **H** is selected such that the

center portion **129** of the flexible covering member **128** is above the rim **122** by the distance **D**.

[0096] In one example, the height **H** could be selected such that the distance **D** is at least 5 cm. In another example, the height **H** could be selected such that the distance **D** is at least 15 cm. It will be understood that, for the same support member **180** height **H**, the distance **D** may vary according to the water level of the top surface **113** of the liquid **112** in the covered pool structure **110**. Accordingly, it may be desirable to select **H** such that the distance **D** remains positive for a predetermined range of water levels of the liquid. It may further be desirable to specify minimum and maximum operating water levels for use with the support member **180**.

[0097] In some examples, the support member **180** may be configured support a predetermined weight, such as the weight of a child or other animal that climbs onto the flexible covering member **128**, without the flexible covering member **128** collapsing into the liquid. This will tend to further decrease the risks of a child or other animal falling into the liquid. Furthermore, if the support member **180** supports a sufficient amount of weight, this can tend to further decrease the risks of pools of water forming on the covering structure **126** even when a child or animal is present thereon, further reducing the risks of drowning.

[0098] For example, the support member **180** could be configured to support at least 100 lbs, adequate to support the weight of a small child. In another example, the support member could be configured to support at least 500 lbs, such that multiple children could be on the flexible covering member **128** without the flexible covering member **128** collapsing into the liquid.

[0099] The inflatable members **186a**, **186b**, **186c**, **186d** can be made of any suitable airtight material, such as a vinyl or rubber, such that the inner chambers **190** will not leak or otherwise deflate during normal operating conditions. In some examples, the inflatable members **186a**, **186b**, **186c**, **186d** may be permanently secured together, such as by sonic welding or adhesives, or alternatively they may be releasably secured together via fasteners such as hook and loop fasteners (e.g. Velcro™) or otherwise.

[0100] In some examples, a different number of inflatable members could be secured together to form support members having different heights, for example, for use with pools of different sizes. Furthermore, inflatable members of different shapes and sizes could be used to provide support members with different configurations. For example, oval-shaped inflatable members could be used for an oval-shaped pool having an oval-shaped covering member.

[0101] In some examples, as shown in FIG. 10, the end member **187** of the support member **180** can comprise a generally flexible member provided between the perimeter of the uppermost inflatable member **186a** and having a generally planar configuration. The end member **187** may operate to more evenly distribute weight from the flexible covering member **128** acting on the support member **180** to reduce the risk that the support member **180** will collapse. In other examples, as shown in FIG. 11, the support member **180** may include an end cap **189** that has a convex curved profile tending to further bias the flexible covering member away from the support member **180**. This convex profile tends to further inhibit the formation of pools of water, particularly in the center portion **129** of the flexible covering member **128**. In one example, the end cap may **189** itself be an inflatable

member. Alternatively, the end cap **189** may include one or more rigid or resilient curved members therein to provide the desired convex profile.

[0102] As shown in FIG. 8, in some examples, the flexible covering member **128** may include a tensioning apparatus **191** for assisting in shaping the flexible covering member **128**. For example, the tensioning apparatus **191** may include an elastic rope **192** or other member secured to the flexible covering member **128** via rope sleeves **194**, for example fabric sleeves. The elastic rope **192** can be provided in a generally continuous circular and concentric relationship intermediate the support member **180** and the rim **122**.

[0103] During use, the elastic rope **192** can be tightened to draw an intermediate portion **133** of the flexible covering member **128** inwardly. This tends to further ensure that the flexible covering member adopts the desired profile, and tends to ensure constant tension on the flexible covering member **128** to inhibit the formation of pools.

[0104] Turning now to FIG. 13, a covered pool structure **210** according to another example is shown, having a support member **280** securable to a flexible covering member **228** via securing members **284**. The support member **280** comprises a foam portion **291**, such as a polystyrene foam, shaped for positioning between the flexible covering member **228** and the top surface **113** of the liquid **112**.

[0105] In some examples, the foam portion **291** can be made of a rigid foam. In other examples, the foam portion **291** can be made of a resilient foam. Being made of a foam material as opposed to having inflatable air members tends to make the support member **280** less susceptible to leaks and other damage when compared with the support member **180**. However, it tends to be bulkier and more difficult to store and transport since it may not be collapsible into a flat profile.

[0106] In yet another example, as shown in FIG. 14, a covered pool structure **310** can include a flexible covering member **328** supported by a support member **380**, the support member **280** included an inflatable air bladder **396**. The air bladder **396** may be defined between the lower surface of the flexible covering member **328** and an upper surface of a lower flexible member **398**, as shown, and may be inflatable via a valve **399** positioned in the flexible covering member **328**. In such an example, the support member **380** may not be removable. In other examples, the air bladder **396** could be defined by upper and lower flexible members independent of the flexible covering member **328**, and thus the support member **380** could be removable from the flexible covering member **328**.

[0107] Turning now to FIG. 15, a covered pool structure **410** is shown having a flexible covering member **428** supported away from the liquid therein by a support member (not shown). For example, one of support members **180**, **280** **380** could be used. The flexible covering member **428** includes a plurality of spaced apertures **431** defined therein.

[0108] In some examples, the apertures **431** may be positioned intermediate the rim **122** of the pool and the support member beneath the flexible covering member **428**. In other examples, the apertures **431** could be provided at different locations in the flexible covering member **428**, such as in a random pattern.

[0109] While the use of a support member (e.g. support members **180**, **280** and **380**) with the flexible covering members described above (e.g. flexible covering members **128**, **228**, **328**) tends to inhibit the formation of pools, it can be difficult to obtain an entirely smooth surface of the flexible

covering member and to ensure that the flexible covering member is continuously angled downwards from the center portion towards the rim. In fact, the curvature of the flexible covering members may still result in small depressions or other irregular formations forming intermediate the center portions of the flexible covering members and the rim. These depressions or irregular formation can form small pools of water, which are generally undesirable as even small pools of water can present a drowning risk to children.

[0110] Flexible covering member **428** tends to reduce the occurrence of such pools of water by allowing fluid communication between the outer surface of the flexible covering member **428** and the liquid **112** within the pool via the apertures **431**. Any water that does collect in irregularities or depressions in the surface may tend to flow towards the apertures **431**, thus draining into the pool and reducing the risks that small pools of water will be formed.

[0111] Turning now to FIG. 16, a covering structure **626** for a coverable pool structure **610** is shown according to another example. The pool structure **610** has a membrane **614** with a bottom wall **616** and a peripheral wall **618**, and is shaped for receiving a liquid. The covering structure **626** includes a flexible covering member **628**, an attachment apparatus **630** for securing the flexible covering member **628** to the pool structure **610**, and a securing apparatus **637** connected to the attachment apparatus **630**.

[0112] The securing apparatus **637** is generally positionable on an exterior surface of the peripheral wall **618** and is configured to releasably secure the attachment apparatus **630** to pools such that the flexible covering member **628** can be used to retrofit existing pools, or alternatively be used without permanently affixing the attachment apparatus **630** to the pool structure **610**.

[0113] In the example shown, the pool structure comprises a rim **622** connected to the peripheral wall **618** proximate a top edge **620**. The securing apparatus **637** comprises a belt member **639** positionable below the rim **622**, and a locking member **641** for tightening the belt member **639** to the peripheral wall **618** in a locked position below the rim **622**. At least a portion of the belt member **639** is secured to the attachment apparatus **630**.

[0114] When provided in the locked position by the locking member **641**, the belt member **639** has a sufficiently small diameter such that it cannot pass upwardly over the rim **622**. In some examples, the belt member **639** is sufficiently long that it can be partially loosened by the locking member **641** and can pass over the rim **622** without the belt member **639** being completely removed from the locking member **641**. In other examples, one end **639a** of the belt member **639** must be entirely removed from the locking member **641** to allow the belt member **639** can pass over the rim **622**.

[0115] Turning now to FIG. 17, a covering structure **726** for a covered pool structure **710** is shown according to another example. The covering structure **726** includes a flexible covering member **728** having a light-transmitting portion therein **743**, and an attachment apparatus **730** for securing the flexible covering member **728** to the pool. The covering structure **726** also includes a heating member **745** positionable below the flexible covering member **728**.

[0116] The heating member **745** is configured to use light passing through the light-transmitting portion **743** to heat liquid **713** in the pool.

[0117] In some examples, the light-transmitting portion **743** comprises an open mesh material sufficiently strong to

support the weight of a child or other animal positioned on the flexible covering member **728**, but which allows a sufficient quantity of light to pass therethrough to be used by the heating member **745** in heating the liquid **712**. In another example, the light-transmitting portion **743** could be a translucent or transparent material, such as a continuous sheet of clear plastic.

[0118] In some examples, the heating member **745** could be a solar blanket positionable on or near a top surface **713** of the liquid **712**. In some examples, the heating member **745** can be secured to the flexible covering member **728** via support straps **747** to ensure that the heating member **745** is properly positioned beneath the light-transmitting portion **743** of the flexible covering member **728**.

[0119] Turning now to FIG. **18**, there is shown a coverable pool structure **810** having a membrane **814** for containing a liquid, the membrane having a bottom wall **816**, a peripheral wall **818** extending from the bottom wall, and a top edge **820** on the peripheral wall **818**. A rim **822** is connected to the peripheral wall **818** near the top edge **820**. A flexible covering member **828** is attached to the rim **822** via an attachment apparatus **830**.

[0120] The attachment apparatus **830** includes a releasable portion **832** secured to the rim **822** and configured to allow the flexible covering member **828** to be moved between a closed position (wherein the flexible covering member **828** extends between the peripheral wall **818** to inhibit access to the liquid **812**) and an open position wherein flexible covering member **828** can be positioned such that access to the liquid **812** is uninhibited. For example, in the open position the flexible covering member **828** can be flipped over outwardly from the pool. The attachment apparatus also includes a permanent connecting member **847** securing the flexible covering member **828** to the membrane **814**. The permanent connecting member **847** is configured such that the flexible covering member **828** cannot be entirely removed from the pool structure **810**. Thus, persons who are using the flexible covering member **828** will be unable to move the flexible covering member **828** away from the pool (for example, by storing the flexible covering member **828** in a shed or garage). As a result, persons tend to be more likely to close the flexible covering member **828** over the pool to inhibit access to the liquid, rather than leaving it open. This tends to make the covered pool structure **810** safer, as persons are more likely to apply the flexible covering member **828** when it is nearby, and not stored in a shed or garage, for example.

[0121] In some examples, the attachment apparatus **830** includes a zipper member **832** extending only partially around the peripheral wall **818** of the pool structure **810**, and the connecting member **847** comprises a flexible member **849** made of vinyl or another suitable material, and being provided between a first end **832a** and a second end **832b** of the zipper member **832**. The flexible member **849** allows the flexible covering member **828** to be flipped over, for example, away from the pool and into the open position.

[0122] What has been described is merely illustrative of the application of some embodiments of the invention. Other systems, apparatuses and methods may be implemented by those skilled in the art without departing from the present invention, the scope of which is defined by the following claims. In particular, various apparatus described above provide an example of one or more embodiment of any claimed inventions. No embodiment described limits any claimed invention and any claimed invention may cover systems, apparatus or methods that are not described above. The

claimed inventions are not limited to systems, apparatus or methods having all of the features of any one apparatus or process described above or to features common to multiple or all of the systems, apparatus or methods described above. It is possible that systems, apparatus or methods described above are not an embodiment of any claimed invention. The applicants, inventors or owners reserve all rights that they may have in any invention disclosed in systems, apparatus or methods described above that is not claimed in this document, for example the right to claim such an invention in a continuing or divisional application and do not intend to abandon, disclaim or dedicate to the public any such invention by its disclosure in this document.

What is claimed is:

1. A coverable pool structure comprising:

- a. a membrane for containing a liquid, the membrane having a bottom wall, a peripheral wall extending from the bottom wall, and a top edge on the peripheral wall;
- b. a rim connected to the peripheral wall proximate the top edge;
- c. a flexible covering member being positionable so as to extend between the peripheral wall to inhibit access to the liquid;
- d. an attachment apparatus for securing the flexible covering member to the rim; and
- e. a support member positionable between a top surface of the liquid and the flexible covering member and configured to bias at least a portion of the flexible covering member away from the liquid.

2. The coverable pool structure of claim 1, wherein the support member is configured to dispose the portion of the flexible covering member above the rim.

3. The coverable pool structure of claim 1, wherein the support member is positionable generally concentric to the rim of the pool and away from the rim of the pool.

4. The coverable pool structure of claim 1, wherein the support member is releasably securable to the flexible covering member.

5. The coverable pool structure of claim 1, wherein the support member comprises at least one inflatable member.

6. The coverable pool structure of claim 5, wherein the at least one inflatable member comprises a plurality toroidal inflatable members configured in an ordered arrangement.

7. The coverable pool structure of claim 5, wherein the inflatable member comprises an air bladder.

8. The coverable pool structure of claim 1, wherein the support member comprises a foam portion.

9. The coverable pool structure of claim 1, wherein the support member is configured to dispose the portion of the flexible covering member at least 5 cm above the rim.

10. The coverable pool structure of claim 1, wherein the support member is configured to dispose the portion of the flexible covering member at least 15 cm above the rim.

11. The coverable pool structure of claim 1, wherein the support member is configured to bias the flexible covering member away from the top surface of the liquid while supporting a predetermined weight on the flexible covering member of at least 100 lbs.

12. The coverable pool structure of claim 11, wherein the predetermined weight is at least 500 lbs.

13. The coverable pool structure of claim 1, further comprising at least one aperture defined in the flexible covering

structure to allow fluid communication between an outer surface of the flexible covering member and the liquid within the pool.

14. The coverable pool structure of claim **13**, wherein the at least one aperture is positioned intermediate the rim of the pool and the support member.

15. A covering structure for a pool, the pool having a peripheral wall and a bottom wall for receiving a liquid in the pool, the covering structure comprising:

- a. a flexible covering member being positionable so as to extend between the peripheral wall to inhibit access to the liquid in the pool;
- b. an attachment apparatus for securing the flexible covering member to the pool; and
- c. a support member positionable between a top surface of the liquid in the pool and the flexible covering member and configured to bias at least a portion of the flexible covering member away from the liquid.

16. A covering structure for a pool, the pool having a peripheral wall and a bottom wall for receiving a liquid in the pool, the covering structure comprising:

- a. a flexible covering member having a light-transmitting portion, and being positionable so as to extend between the peripheral wall to inhibit access to the liquid in the pool;
- b. an attachment apparatus for securing the flexible covering member to the pool; and
- c. a heating member positionable below the flexible covering member, and configured for using light passing through the light-transmitting portion to heat the liquid.

17. The coverable pool structure of claim **16**, wherein the light-transmitting portion comprises an open mesh material, and the solar heating member comprises a solar blanket positionable proximate a top surface of the liquid.

18. A coverable pool structure comprising:

- a. a membrane for containing a liquid, the membrane having a bottom wall, a peripheral wall extending from the bottom wall, and a top edge on the peripheral wall;
- b. a rim connected to the peripheral wall proximate the top edge;
- c. a flexible covering member; and
- d. an attachment apparatus for securing the flexible covering member to the membrane, the attachment apparatus having a releasable portion secured to the rim and configured to allow the flexible covering member to move between a closed position wherein the flexible covering member extends between the peripheral wall to inhibit access to the liquid and an open position wherein access to the liquid is uninhibited, and a connecting member securing the flexible covering member to the membrane to inhibit the flexible covering from being moved a predetermined distance away from the membrane.

19. A covering structure for a pool, the pool having a peripheral wall and a bottom wall for receiving a liquid in the pool, the covering structure comprising:

- a. a flexible covering member being positionable so as to extend between the peripheral wall to inhibit access to the liquid in the pool;
- b. an attachment apparatus for securing the flexible covering member; and
- c. a securing apparatus positionable on an exterior surface of the peripheral wall and configured to releasably secure the attachment apparatus to the pool to secure the flexible covering member to the pool.

20. The covering structure of claim **19**, wherein the pool comprises a membrane defining the peripheral wall and the bottom wall and further includes a rim connected to the peripheral wall proximate a top edge thereof, and the securing apparatus comprises a belt member positionable below the rim of the pool and a locking member for locking the belt in a position below the rim.

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