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Collapsible flotation device

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ABSTRACT

A device (10), comprising a spring (18) configured to form a closed loop, the spring being moveable between a coiled configuration when the spring is collapsed and an uncoiled configuration when the spring is expanded, the spring defining a circumference while in the uncoiled configuration; a first portion (12) of the device having a perimeter; a second portion of the device coupled to the first portion proximate the perimeter, the first portion and the second portion collectively defining an inflatable chamber (20), the entire spring being disposed between the first portion and the second portion, the spring defines an interior area, a portion of the inflatable chamber (20) being disposed entirely within the interior area; and a valve coupled to the inflatable chamber.

(FIG. 2)

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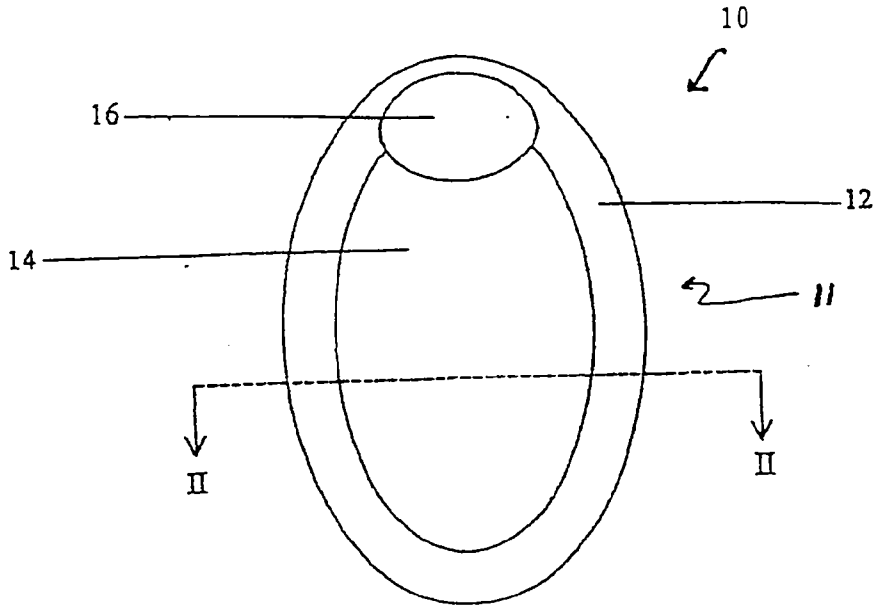


FIG. 1

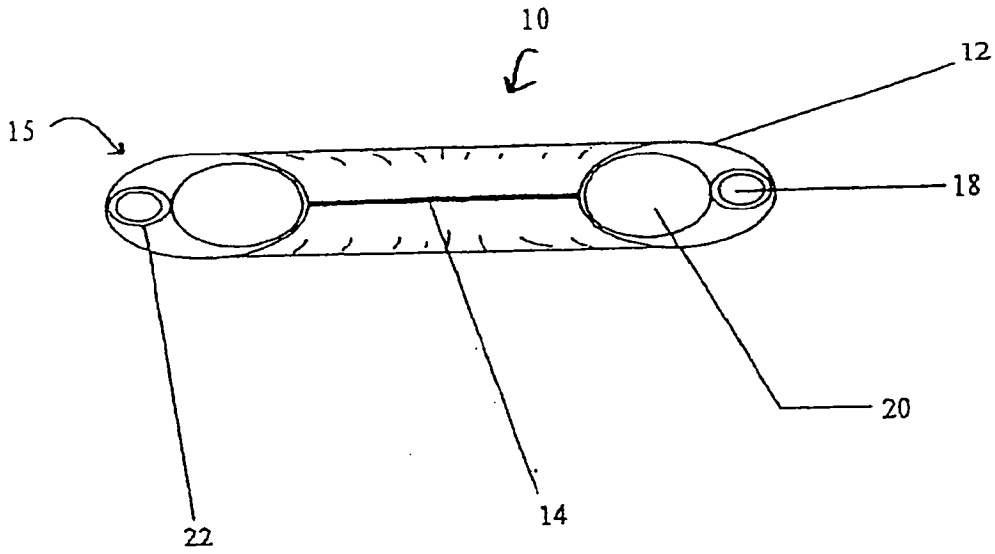


FIG. 2

COLLAPSIBLE FLOTATION DEVICE

BACKGROUND OF THE INVENTION

5 **1. Field of the Invention**

The present invention relates to inflatable devices. In particular, the present invention relates to inflatable devices that are collapsible through the use of a perimeter spring mechanism.

10 **2. Description of the Related Art**

Inflatable devices are well known in the form of floats, rafts, lifeboats, life preservers and similar devices. Previously known devices generally maintain their shape through air pressure alone and generally collapse when deflated. Also well known in the art are collapsible items that are collapsible through the use of a collapsible spring, made, for example, from metal, plastic, or fiberglass.

Collapsible springs are typically retained or held within fabric sleeves provided along the edges of a piece of fabric or other panel. The collapsible springs may be provided as one continuous loop, or may be a strip or strips of material connected at the ends to form a continuous loop. These collapsible springs are usually formed of flexible coilable steel, although other materials such as plastics and fiberglass are also described. The collapsible springs are usually made of a material that is relatively strong and yet is flexible to a sufficient degree to allow it to be coiled. Thus, each collapsible spring is capable of assuming two configurations, a normal uncoiled or expanded configuration, and a coiled or collapsed configuration in which the spring is collapsed into a size that is much smaller than its uncoiled (or expanded) configuration. The springs may be retained within the respective fabric sleeves without being connected thereto. Alternatively, the sleeves may be mechanically fastened, stitched, fused, or glued to the springs to retain them in position.

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The reference to any prior art in this specification is not, and should not be taken as an acknowledgement or any form of suggestion that the referenced prior art forms part of the common general knowledge in Australia.

SUMMARY

In one broad form of the invention there is provided a device, comprising:

5 a spring configured to form a closed loop, the spring being moveable between a coiled configuration when the spring is collapsed and an uncoiled configuration when the spring is expanded, the spring defining a circumference while in the uncoiled configuration;

a first portion of the device having a perimeter;

10 a second portion of the device coupled to the first portion proximate the perimeter, the first portion and the second portion collectively defining an inflatable chamber, the entire spring being disposed between the first portion and the second portion, the spring defines an interior area, a portion of the inflatable chamber being disposed entirely within the interior area; and

a valve coupled to the inflatable chamber.

15

In another form of the invention, there is provided a device, comprising:

20 a spring configured to form a closed loop, the spring being moveable between a coiled configuration when the spring is collapsed and an uncoiled configuration when the spring is expanded, the spring defining a circumference while in the uncoiled configuration;

an inflatable bladder defining an inflatable interior area, the entire spring being disposed within the inflatable interior area of the inflatable bladder; and

a valve coupled to the inflatable bladder.

25

In a yet another form of the invention there is provided a device, comprising:

a spring configured to form a closed loop, the spring being moveable between a coiled configuration when the spring is collapsed and an uncoiled configuration when the spring is expanded, the spring defining a circumference while in the uncoiled configuration, the spring having a first end and a second end;

30

a connector having a first end configured to matingly couple to the first end of the spring and a second end configured to matingly couple to the second end of the spring;

a first portion of the device having a perimeter;

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a second portion of the device coupled to the first portion proximate the perimeter, the first portion and the second portion collectively defining an inflatable chamber, the entire spring being disposed between the first portion and the second portion; and

5 a valve coupled to the inflatable chamber.

In a further form of the invention there is provided a device, comprising:

a spring configured to form a closed loop, the spring being moveable between a coiled configuration when the spring is collapsed and an uncoiled configuration when the spring is expanded, the spring defining a circumference while in the uncoiled configuration, the spring having a first end and a second end;

10 a connector defining an opening at a first end portion and an opening at a second end portion, the opening at the first end portion configured to receive the first end of the spring, the opening at the second end portion configured to receive the second end of the spring;

15 a first portion of the device having a perimeter;

a second portion of the device coupled to the first portion proximate the perimeter, the first portion of the device and the second portion of the device collectively defining an inflatable chamber, the entire spring being disposed between the first portion of the device and the second portion of the device; and

20 a valve coupled to the inflatable chamber.

In yet a further form of the invention there is provided an apparatus, comprising:

25 a spring configured to form a closed loop, the spring being moveable between a coiled configuration when the spring is collapsed and an uncoiled configuration when the spring is expanded, the spring defining a circumference while in the uncoiled configuration;

an inflatable bladder coupled to the spring along at least a portion of the circumference; and

30 an elongated inflatable chamber having a first end and a second end, the first end of the elongated inflatable chamber coupled to the inflatable bladder proximate a location along the circumference, the elongated inflatable chamber extending from its first end to its second end in a direction away from the location along the circumference.

In yet a further form of the invention there is provided an apparatus, comprising:
a spring configured to form a closed loop, the spring being moveable between a
coiled configuration when the spring is collapsed and an uncoiled configuration when the
spring is expanded, the spring defining a circumference while in the uncoiled
5 configuration;

a first flotation member fixedly attached to the spring, the first flotation member
disposed about at least a portion of the circumference of the spring; and

a second flotation member coupled to one of the first flotation member or the
spring, the second flotation member having a first end and a second end, the first end of
10 the second flotation member coupled to one of the first flotation member or the spring
proximate a location along the circumference, the second flotation member extending
from its first end to its second end in a direction away from the location along the
circumference

15 In yet a further form of the invention there is provided an apparatus, comprising:
a spring configured to form a closed loop, the spring being moveable between a
coiled configuration when the spring is collapsed and an uncoiled configuration when the
spring is expanded, the spring defining a circumference while in the uncoiled
configuration;

20 a first material;

a second material coupled to the first material, the first material and the second
material collectively defining a first inflatable chamber, at least a portion of the spring
being disposed between the first material and the second material; and

25 an elongated member coupled to at least one of the first material or the second
material, the elongated member defining a second inflatable chamber.

A collapsible flotation device in a still further form of the invention includes a
coilable spring and a flexible panel. Along the outer edge of the flexible panel of said
further form is a perimeter sleeve into which the coilable spring and at least one inflatable
30 bladder are placed. The coilable spring can be made from steel that has been treated such
that it is resistant to water damage or the coilable spring can be made from a waterproof
material. The flexible panel can be made from any material that is appropriate for use in
the water such as nylon. Alternatively, the flexible panel can be constructed from multiple
materials. For example, the perimeter sleeve can be made from nylon while the central

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5 portion can be made from mesh material. The inflatable bladders are made from any appropriate material and are, for example, puncture resistant. Each bladder includes a means for inflating and deflating the bladder such as a valve. The flotation device can also include a pillow section to provide buoyant support for a user's head. The pillow section includes an inflatable chamber to the pillow. The spring can be placed within the perimeter sleeve of the flexible panel, or can be mechanically attached to the outer edge of the flexiblepanel.

10 In the specification the term "comprising" shall be understood to have a broad meaningsimilar to the term "including" and will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps. This definition also applies to variations on the term "comprising" such as "comprise" and "comprises".

15 **BRIEF DESCRIPTION OF THE DRAWINGS**

Figure 1 is a top plan view of an embodiment of the collapsible floatation device of the present invention;

Figure 2 is a cross sectional view of the collapsible floatation device of Figure 1 taken along line of Figure 1;

20 Figure 3 is a view of a sleeve with joined ends of a coilable spring as used in one embodiment of the present invention;

Figure 4 is a top plan view of an alternative embodiment of the collapsible floatation device of the present invention;

25 Figure 5 is a top plan view of another alternative embodiment of the collapsible floatation device of the present invention;

Figure 6 is a cross sectional view of the alternative embodiment of the present invention across line VI-VI of Figure 5; and

Figure 7 is a top plan view of a further alternative embodiment of the collapsible floatation device of the present invention.

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DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

Figures 1-7 illustrate embodiments of a collapsible floatation device 10. Each of the embodiments of the collapsible floatation device includes a coilable metal or plastic spring 18. The coilable spring 18 can be made from other materials, for example, a

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material that is strong and flexible. The spring 18 can be coilable such that it folds on top of itself to become more compact. In its uncoiled state, the coilable spring 18 can be round or oval or any satisfactory shape. Because it is to be used in water, the coilable spring can be, for example, either manufactured from a waterproof material or coated to protect any material that is not waterproof. The coilable spring 18 can be a single continuous element or can include a joining means, such as a sleeve, for joining the ends of one or more spring elements together. The coilable spring 18 can be of any appropriate shape and dimension. The coilable spring 18 also has memory such that is biased to return to its uncoiled configuration when not held in the coiled configuration.

10

Stretched across the coilable spring 8 is a flexible panel 11. The flexible panel can be one continuous piece of material or can be made up of several different types of material. The panel 11 includes a central portion 14 and a perimeter portion 15. In one embodiment, the central portion of the flexible panel is mesh, or another material permeable or semi-permeable to a liquid, to allow water to flow through while the perimeter edges are impermeable to liquid, such as nylon or polyester. At the edges of the flotation device, the material is a double thickness, forming a sleeve 12 around the perimeter of the flotation device 10. One or more inflatable bladders 20 are disposed in the sleeve 12. One inflatable bladder 20 may surround the entire perimeter of the flotation device or it may be divided into two or more inflatable bladders 20 with each inflatable bladder 20 having a means for inflating and deflating the inflatable bladder 20. In the illustrated embodiment of the invention, one inflatable bladder 20 is specifically dimensioned and positioned to accommodate a user's head. In this embodiment, the sleeve 12 is wider along a small portion of the perimeter of the flotation device 10 to allow for a wider inflatable bladder 20. This will prevent the user's head from sinking below the rest of the user's body. The size of the inflatable bladder 20 can vary significantly and need only be as wide as necessary to support the body weight of a user disposed on the panel 11. The inflatable bladder 20 can be, for example, 3 inches (73.5 mm) in diameter when inflated. The inflatable bladder 20 can be made from any material and can be a material that is resistant to punctures. The coilable spring 18 may also be located within the perimeter sleeve 12. If one inflatable bladder 20 is selected, the coilable spring 18 can be placed inside or outside the inflatable bladder 20. If multiple inflatable bladders 20 are used, the coilable spring 18 can be outside the inflatable bladders 20 along the edge of the perimeter sleeve 12. Alternatively, the coilable spring 18 may be located outside the

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perimeter sleeve 12 along the outer edge of the flotation device 10. The coilable spring 18 may be attached to the flexible panel 11 through mechanical means such as fastening, stitching, fusing, or gluing.

5 An embodiment of the flotation device 10 is shown in Figures 1 and 2 in its expanded configuration. The perimeter sleeve of the flexible panel 11 can be nylon while the central portion the flexible panel can be made from a mesh material. Because the mesh material in the central portion 14 is permeable to liquid, when the device 10 is placed in the water with the bladders 20 in the inflated configuration, the majority of the user's body that is disposed on the central portion is located below the surface of the water. The buoyancy provided by the bladders 20 and the pillow 16 keep the remainder of the user's body above the surface of the water. The pillow 16 is part of the perimeter sleeve 12 and includes a double layer of fabric to accept an inflatable chamber 20 between the layers of fabric. In this particular embodiment, two inflatable chambers 20 are disposed in the perimeter sleeve of the flotation device and one is disposed in the pillow portion 16, each of which includes a means for inflating the inflatable chamber 20. The inflation means can be, for example, a valve (not shown) on the underside of the flotation device 10. The inflatable bladders 20 in the perimeter of the flotation device 10 expand to approximately diameter when inflated.

20 The coilable spring 18 is made from flexible, collapsible steel and is coated with a layer of PVC 22 to protect the coilable spring 18 from corroding and rusting due to contact with water during use of the flotation device 10. In an alternative embodiment, the coilable spring 18 can be made of plastic or fiberglass. The coilable spring 18 also can have memory such that it will open to its uncoiled configuration when not held in the coiled configuration. The coilable spring 18 can be a unitary element or can include sleeves for joining the ends of one or more elements as shown in Figure 3 in which the ends of the coilable spring 18 within the sleeve 24 are shown in dashed lines for clarification.

30 In a further embodiment of the invention illustrated in Figure 4, a collapsible floatation device 110 can include inflatable bladders 126 which cross the panel 111. In the illustrated embodiment, while the bladders 126 may keep a greater part of the user's body

above the surface of the water, a portion of the user's body that is disposed on the mesh central portion may be located below the surface of the water.

5 Figures 5 and 6 show a further alternative embodiment of the present invention in which a device 210 includes a coilable spring 218 that is attached externally to the perimeter of the sleeve 212 of the flexible panel 211 through the use of a mechanical coupling. In this particular embodiment, loops 228 can be used to attach the coilable spring 218 to the sleeve 212 of the flexible panel 211.

10 In a further embodiment of the invention illustrated in Figure 7, the collapsible floatation device a pillow portion 316 that is separated from the perimeter sleeve 312. The pillow portion 316 includes an inflatable bladder 322 that includes a valve (not shown) to inflate and deflate the bladder 322. In the illustrated embodiment, the inflatable bladder that is disposed in the perimeter sleeve 312 need not be a continuous loop. For example,
15 the inflatable bladder 320 in the perimeter sleeve 312 may extend substantially around the perimeter of the collapsible floatation device but not completely around the perimeter. In such an embodiment, the inflatable bladder 320 disposed in the sleeve 312 would be closed at both ends and could extend throughout the perimeter sleeve 312 around the central portion but need not surround the pillow portion 316. In this embodiment,
20 inflatable bladder 322 in the pillow portion 316 provides sufficient buoyancy to support at least the user's head and the inflatable bladder 320 in the perimeter sleeve 312 provides sufficient buoyancy to support the body weight of the user. In some embodiments, the inflatable bladder can provide sufficient buoyancy to support some of the weight of the user in addition to the user's head (e.g., the user's shoulders).

25 Note that the sufficient buoyancy to support the body weight of the user can differ for various embodiments depending on the desired effect. More specifically, by pre-selecting the size of the inflatable bladder pillow, the extent to which a user's body is in or out of the water can be controlled (depending, of course, on variations of user body
30 weights). In addition, the tautness or looseness of the panel, as well as its elasticity when in the expanded (or uncoiled) configuration can also control the extent to which a user's body is in or out of the water. In sum, the size of the inflatable bladder and pillow, the tautness/looseness of the panel, and the elasticity of the panel can be used alone or in combination to control the extent to which the user's body is in or out of the water.

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5 Moreover, in the embodiment of the collapsible floatation device illustrated in Figure 7, the central portion 314 may be constructed from multiple materials such that only a portion of the central portion is permeable to liquid. The mesh material that extends across the central portion 314 may either be taut or loose when the panel 11 is in the expanded configuration.

10 Additionally, a layer of mesh material can cover the pillow portion 316 to provide a matching ornamentation of the pillow portion 316 and center portion 314.

15 While the description above refers to particular embodiments of the present invention, it will be understood that many modifications may be made by persons of ordinary skill in the relevant art without departing from the spirit thereof. The accompanying claims are intended to cover such modifications as would fall within the true scope and spirit of the present invention.

The Claims Defining the Invention are as Follows:

1. An apparatus, comprising:
 - a first flexible material having an outer perimeter portion;
 - a second flexible material defining an interior volume and an inner perimeter portion, the inner perimeter portion of the second flexible material being coupled to the outer perimeter portion of the first flexible material;
 - a spring disposed within the interior volume of the second flexible material, the spring forming a closed loop and being moveable between a coiled configuration when the spring is collapsed and an uncoiled configuration when the spring is expanded; and
 - an inflatable bladder disposed within the interior volume of the second flexible material.
2. The apparatus of claim 1, wherein:
 - the second flexible material defines a substantially toroidal shape when the inflatable bladder is inflated and the spring is in the uncoiled configuration.
3. The apparatus of claim 2, further comprising:
 - an inflatable bladder valve accessible from outside of the second flexible material, the inflatable bladder valve configured to communicate air to at least a portion of the inflatable bladder.
4. The apparatus of claim 1, further comprising:
 - a first inflatable bladder valve accessible from outside of the second flexible material, the inflatable bladder valve configured to communicate air to a portion of the inflatable bladder; and
 - a second inflatable bladder valve accessible from outside of the second flexible material, the second inflatable bladder valve configured to communicate air to a portion of the inflatable bladder different from the portion of inflatable bladder associated with the first inflatable bladder valve.
5. The apparatus of claim 1, further comprising:
 - an inflatable pillow portion coupled to the first flexible material, the inflatable pillow portion disposed at least partially within the outer perimeter portion of the first flexible material.

6. The apparatus of claim 1, wherein the first flexible material includes a mesh central portion.
7. The apparatus of claim 1, wherein the first material is a mesh material and the second material is one of a nylon material or a polyester material.
8. An apparatus, comprising:
 - a panel having a central portion formed with a first material and a perimeter portion formed with a second material different than the first material, the perimeter portion of the panel defining an interior volume within which an inflatable chamber is defined;
 - a spring coupled to the perimeter portion of the panel and configured to form a closed loop, the spring being moveable between a coiled configuration when the spring is collapsed and an uncoiled configuration when the spring is expanded; and
 - a coating disposed on an outer surface of the spring.
9. The apparatus of claim 8, wherein the spring is disposed within the inflatable chamber.
10. The apparatus of claim 8, wherein the spring is coupled about an outer perimeter of the perimeter portion of the panel.
11. The apparatus of claim 8, wherein the first material is a mesh material and the second material is one of a nylon material or a polyester material.
12. The apparatus of claim 8, further comprising:
 - an inflatable bladder coupled to the central portion of the panel, the inflatable bladder defining a pillow portion.
13. The apparatus of claim 8, wherein:
 - the perimeter portion of the panel defines a substantially toroidal shape when the inflatable chamber is inflated and the spring is in the uncoiled configuration.

14. The apparatus of claim 8, further comprising:
 - an inflatable chamber valve accessible from outside of the second flexible material, the inflatable chamber valve configured to communicate air to at least a portion of the inflatable chamber.

15. An apparatus, comprising:
 - a first flexible material having an outer perimeter portion;
 - a second flexible material defining an inflatable chamber and an inner perimeter portion, the inner perimeter portion of the second flexible material being coupled to the outer perimeter portion of the first flexible material;
 - a plurality of fastening members; and
 - a spring coupled to an outer perimeter portion of the second flexible material by the plurality of fastening members, the spring forming a closed loop and being moveable between a coiled configuration when the spring is collapsed and an uncoiled configuration when the spring is expanded.

16. The apparatus of claim 15, wherein the plurality of fastening members includes at least a first loop and a second loop.

17. The apparatus of claim 15, the second flexible material defines a substantially toroidal shape when the inflatable chamber is inflated and the spring is in the uncoiled configuration.

18. The apparatus of claim 15, further comprising:
 - a coating disposed on an outer surface of the spring.

19. The apparatus of claim 15, further comprising:
 - an inflatable bladder coupled to at least one of the first flexible material of the panel or the second flexible material of the panel, the inflatable bladder defining a pillow portion.

20. The apparatus of claim 15, wherein the first flexible material includes a mesh material.

21. The apparatus of claim 15, further comprising:
an inflatable chamber valve accessible from outside of the second flexible material, the inflatable chamber valve configured to communicate air to the inflatable chamber.

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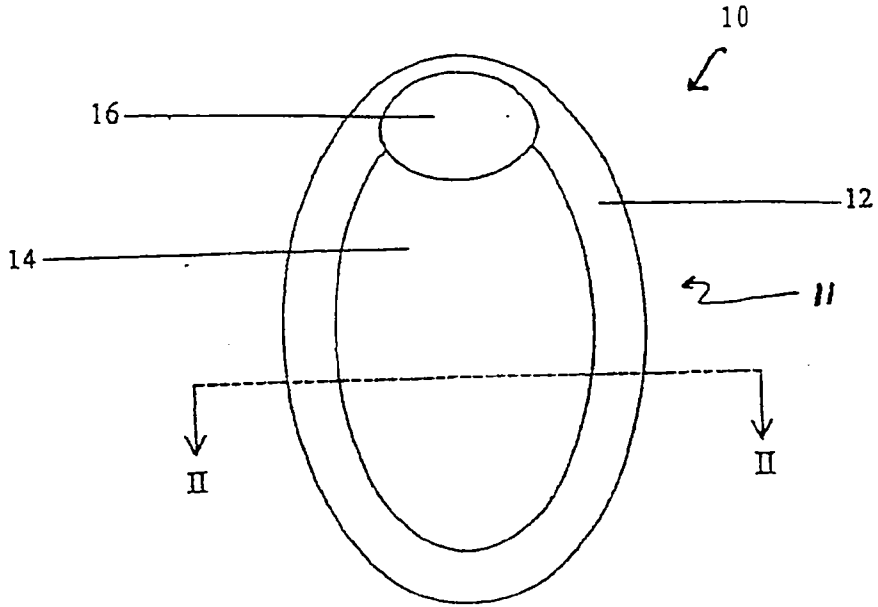


FIG. 1

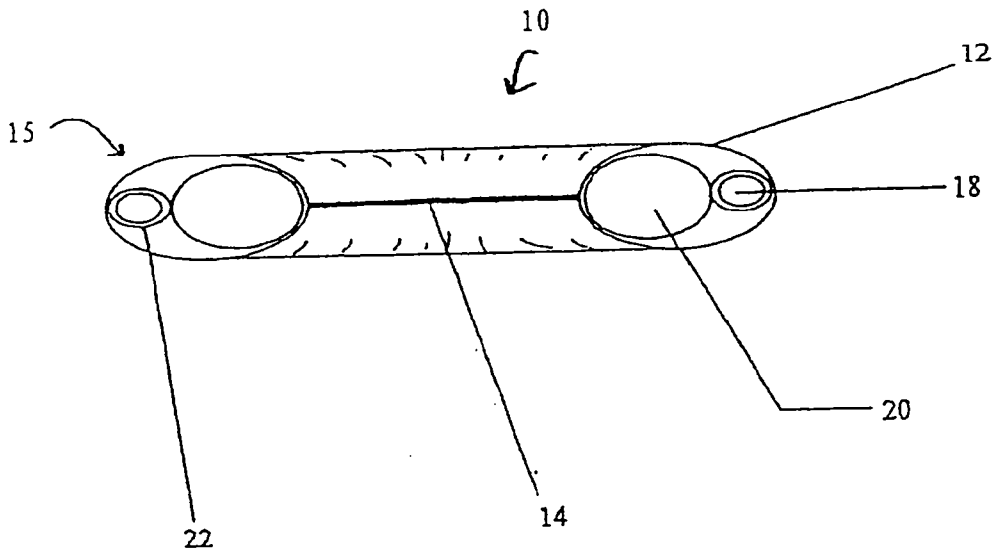


FIG. 2

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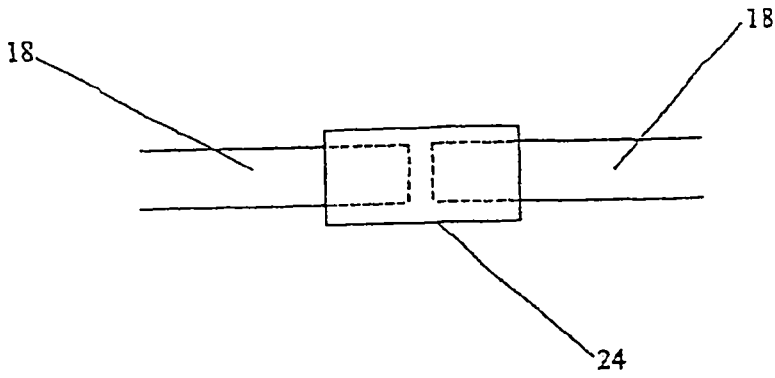


FIG. 3

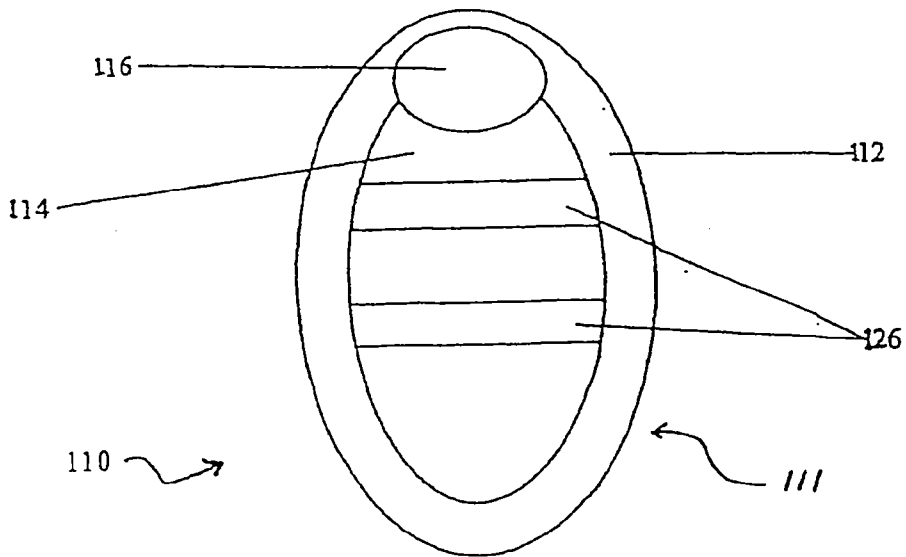


FIG. 4

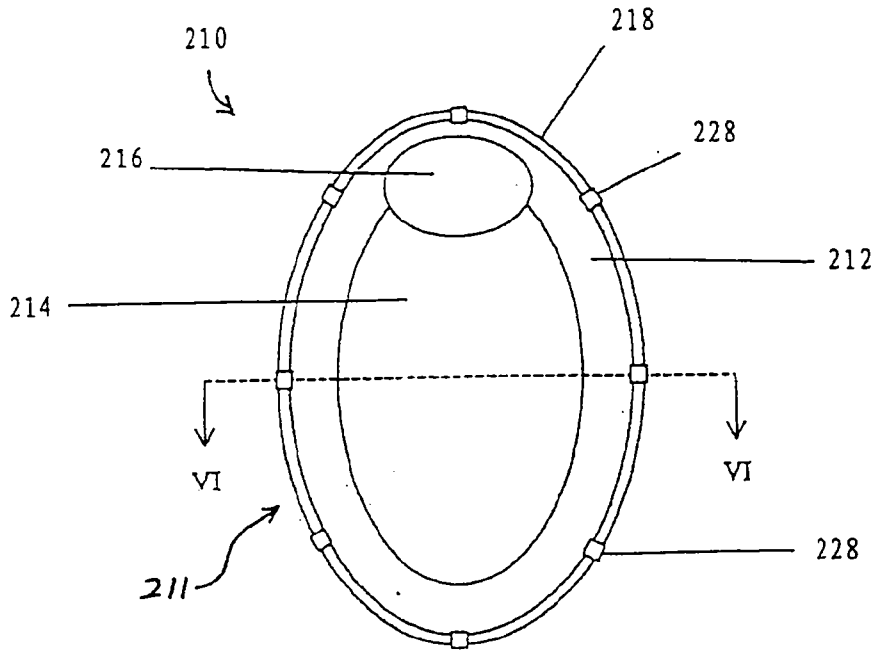


FIG. 5

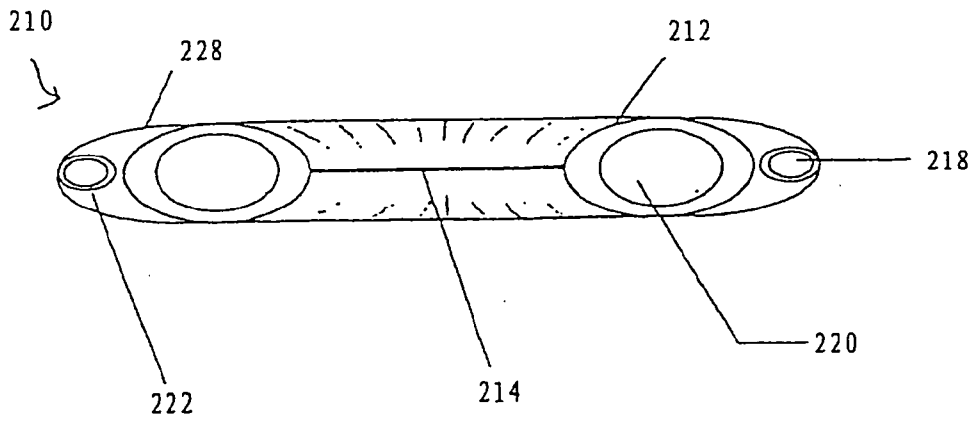


FIG. 6

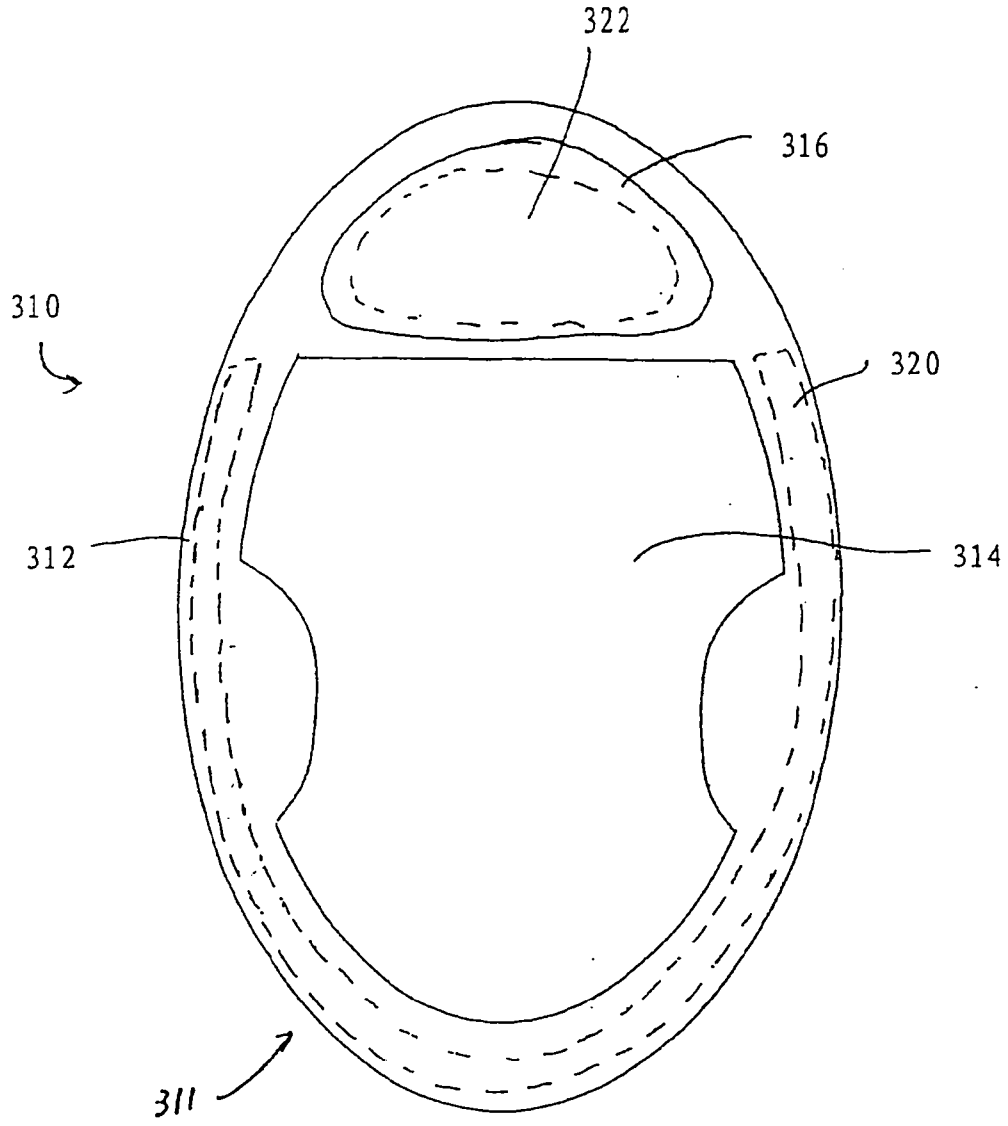


FIG. 7