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(71) Applicant: **Bestway Inflatables & Material Corp.**
Shanghai 201812 (CN)

(72) Inventor: **LIU, Feng**
201812 Shanghai (CN)

(74) Representative: **Rzazewska, Dorota**
JWP Rzecznicy Patentowi
Dorota Rzazewska sp.j.
Sienna Center
Ul. Zelazna 28/30
00-833 Warszawa (PL)

(54) FLEXIBLE FLOATING APPARATUS AND MANUFACTURING METHOD THEREOF

(57) A flexible floating apparatus has a flexible bone structure and a floating cover. The flexible bone structure has at least a first joint part and a second joint part. The first joint part and the second joint part are connected with a first resistance force to keep a relative position between the first joint part and the second joint part. A floating cover is made of buoyant material wrapping the flexible bone structure. The shape of the floating cover is changed when the relative position between the first joint part and the second joint part is changed.

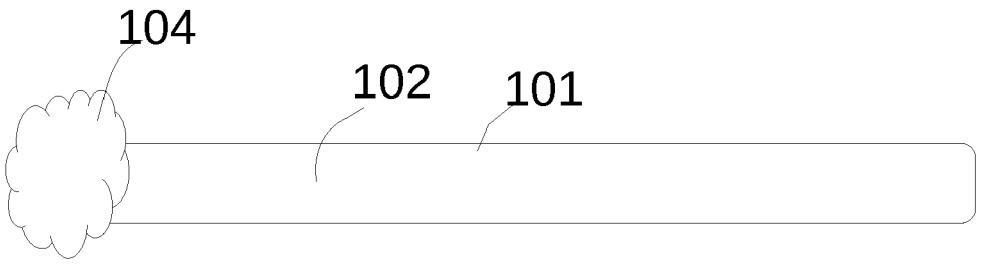

Fig. 1

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Description

Field of Invention

[0001] The present invention relates to floating apparatus and manufacturing method thereof and more particularly to flexible floating apparatus and manufacturing method thereof.

Background

[0002] Swimming is one of the most popular sports in the world. During holidays, especially in summer, a lot of people go to beaches or swimming pools with their friends for swimming. Very often, people don't take swimming very seriously and not treat it as a competition or serious exercise. Rather, a lot of people, especially for the children, would like to go swimming just for fun and enjoy entertainment with water. As a matter of fact, in the United States of America, a lot of people have their own swimming pool in their house for leisure.

[0003] Just because of this nature, a lot of accessories and equipment have been developed for use during swimming, especially for those basic learners, such as children, and for teenagers who treat swimming as a form of entertainment. Among them, the most notable equipment includes floats and swim rings. A conventional float comprises a floating panel that is made of floatable materials, such as foam or plastic, and is cut into a predetermined shape wherein a user of the float can be able to hold on the floating panel while swimming, so that the user is assisted with floating on the water.

[0004] Because people always look for new and more interesting accessories to enhance their life, it is beneficial to design innovative devices to be used in water activities.

Summary of Inventory

[0005] According to an objective of the present invention, a first embodiment is a flexible floating apparatus has a flexible bone structure and a floating cover. The flexible bone structure has at least a first joint part and a second joint part. The first joint part and the second joint part are connected with a first resistance force to keep a relative position between the first joint part and the second joint part. The relative position between the first joint part and the second joint part is changed when an external force larger than the first resistance force is applied on the first joint part and the second joint part.

[0006] A floating cover is made of buoyant material wrapping the flexible bone structure. The shape of the floating cover is changed when the relative position between the first joint part and the second joint part is changed.

[0007] In one embodiment, the floating cover has a second resistance force to keep the shape of the floating cover. The second resistance force may be smaller than the first resistance force.

[0008] In one embodiment, the buoyant material of the floating cover may have a smaller density than the first joint part and the second joint part.

[0009] The flexible floating apparatus may include joint parts of different structures connected to the second joint part. For example, the flexible floating apparatus may have an external connecting structure for connecting to another flexible floating apparatus. In addition, the connection to other flexible floating apparatus may be detachable.

[0010] In a preferred embodiment, the first joint part and the second joint part respectively have a tail portion and a head portion. The tail portion of the first joint part is connected to the head portion of the second joint part with the first resistance force. The head portion may have a ball portion and the tail portion may have a socket portion. The socket portion defines an inner space for holding the ball portion. The ball portion is movable with respect to the socket portion in the inner space when the external force larger than the first resistance force is applied to the flexible bone structure.

[0011] The ball portion of the second joint part may have a closed round shape heading to the socket portion of the first joint part.

[0012] The floating cover may be made of a closed-cell foam material that may contain material like Ethylene Vinyl Acetate (EVA) and Polyethylene(PE). The first joint part and the second joint part may be made of hardened plastic material containing material like Polypropylene (PP), Polyoxymethylene (POM), Polycarbonate (PC), and Acrylonitrile Butadiene Styrene (ABS).

[0013] According to a second embodiment of the present invention, in addition to the aforementioned element, a flexible floating apparatus may also include a decorative member connected to the floating cover. The decorative member may provide decorative function but may also provide physical function, e.g. for users to hold the flexible floating apparatus more easily. The decorative member may be designed with any desired shape under different design requirements.

[0014] According to a third embodiment, a method for manufacturing a flexible floating apparatus includes following steps. A flexible bone structure is provided or produced to have at least a first joint part and a second joint part. The first joint part and the second joint part are connected with a first resistance force to keep a relative position between the first joint part and the second joint part. The relative position between the first joint part and the second joint part is changed when an external force larger than the first resistance force is applied on the first joint part and the second joint part.

[0015] Also, a floating cover is provided or produced with buoyant material. Then, the flexible bone structure is placed into an inner tunnel of the floating cover. In one embodiment, the floating cover may be made of two parts and the two parts are affixed after the flexible bone structure is placed in inner channel of the floating cover. Al-

ternatively, the flexible bone structure may be inserted directly into the floating cover.

Brief Description of Drawings

[0016]

Fig. 1 is an embodiment of a flexible floating apparatus according to the present invention;
Fig. 2 illustrates two types of joint parts in an embodiment according to the present invention;
Fig. 3 illustrates a bendable floating rod as a preferred embodiment according to the present invention;
Fig. 4 illustrates the bendable floating rod being bent to a circular shape;
Fig. 5A and Fig. 5B illustrate two views of joint parts connected in series;
Fig. 6A and 6B illustrate two views of a single joint part;
Fig. 7A and 7B respectively illustrate a cross-sectional views of a single joint part and joint parts connected in series;
Fig. 7C illustrates a bent status of an exemplary flexible floating apparatus;
Fig. 8 illustrates a flexible floating apparatus with loop fasteners;
Fig. 9 illustrates a bent flexible floating apparatus in circular shape; and
Fig. 10 illustrates a pentagon shape that is formed by five connected flexible floating apparatuses.

Detailed Description

[0017] Please refer to Fig. 1. According to a first embodiment of the present invention, a flexible floating apparatus has a flexible bone structure 102 and a floating cover 101. The flexible bone structure 102 has at least a first joint part and a second joint part. The first joint part and the second joint part are connected with a first resistance force to keep a relative position between the first joint part and the second joint part. The relative position between the first joint part and the second joint part is changed when an external force larger than the first resistance force is applied on the first joint part and the second joint part. The floating cover 101 is made of buoyant material that wraps the flexible bone structure 102. The shape of the floating cover 101 is changed when the relative position between the first joint part and the second joint part is changed.

[0018] In some design, a decorative member 104 may be connected to the floating cover. For example, the decorative member 104 may be a dragon head, a cartoon logo or any desired shape.

[0019] In real design, more than two joint parts are connected in series, as illustrated in Fig. 1. These joint parts may have the same structure or have several different structures. When no force is applied to the joint parts, the floating cover keeps its shape. Users may hold the floating cover to assist them to float over water. When users want to change the shape of the floating cover, they bend the floating cover, and the force is applied to the joint structures of the flexible bone structure 102 to change relative positions among joint structures to change the floating cover to another desired shape.

[0020] Please refer to Fig. 2. A first joint part 21 is connected to a second joint part 22 and they have the same structure. Such structure has a head portion 211, 221 and a tail portion 212, 222. The head portion 211 of the first joint part 21 is connected to the tail portion 212 of the second joint part 22. The tail portion of the first joint part is connected to the head portion of the second joint part with the first resistance force. For example, the tail portion 222 defines a containing space that is close to the head portion 211 so that the tail portion 222 contacts with the head portion 211 closely. Unless an external force is applied on the tail portion 222 and the head portion 211, the head portion 211 and the tail portion 222 keeps the same status under friction force between the tail portion 222 and the head portion 211.

[0021] A third joint part 21 may also have a head part 231 and a tail part 232. The third joint part 21 is connected to the second joint part 22 like how the second joint part 22 is connected to the first joint part 21. By the same manner, more joint parts may be connected to form a larger structure.

[0022] In addition, when rotation and/or movement between two joint parts are confined within a maximum distance, such rotation and/or movement may be accumulated to achieve apparent shape change of the floating cover.

[0023] Besides, joint parts of other structures may be connected to the aforementioned joint parts. For example, a fourth joint part 24 of a bolt structure may be connected to the third joint part 23. With the fourth joint part 24, a tube, a plate or any desired structure may be connected to the flexible bone structure.

[0024] Moreover, the floating cover may have a second resistance force to keep the shape of the floating cover, and the second resistance force is smaller than the first resistance force of the flexible bone structure. The buoyant material of the floating cover has a smaller density than the first joint part and the second joint part.

[0025] Specifically, the floating cover may be made of a closed-cell foam material that may contain Ethylene Vinyl Acetate (EVA), Polyethylene (PE), any other material, or combination of more than two types of material. The joint parts may be made of hardened plastic material containing material like Polypropylene (PP), Polyoxymethylene (POM), Polycarbonate (PC), Acrylonitrile Butadiene Styrene (ABS), or any other material.

[0026] Please refer to Fig. 3, which illustrates a bendable floating rod as an exemplary example of a flexible floating apparatus. In this example, the bendable floating rod has a cover tube 201 as the floating cover. The cover tube 201 has a hollowed circular channel extending

through the center of the tubular body. In this example, a flexible bone structure has a series of joint parts 202, 204 and 206.

[0027] In Fig. 3, the shape of the floating cover 201 is supported by the flexible bone structure as an arch shape. Please refer to Fig. 4, the bendable floating rod is bent by applying external force of a user to change its shape to a circular shape. More shape may be obtained, just within accumulated rotation and/or movement limits of the flexible bone structure. For example, a triangular, a straight line or any desired shape may be configurable by users.

[0028] Any connecting structure, if it is flexible under certain external force, may be used in this invention as the flexible bone structure. Fig. 5A and Fig. 5B illustrate a joint structure that satisfies such need.

[0029] In the joint structure illustrated in Fig. 5A and Fig. 5B, each joint part has a head portion and a tail portion. The head portion has a ball portion and the tail portion has a socket portion. The socket portion defines an inner space for holding the ball portion. The ball portion is movable with respect to the socket portion in the inner space when the external force larger than the first resistance force is applied to the flexible bone structure.

[0030] Fig. 6A and Fig. 6B illustrate different views of such joint part. Fig. 7A and Fig. 7B illustrate a cross-sectional view of a single joint part and a series of connected joint parts.

[0031] Each joint part has a ball portion 71 and a socket portion 73. The ball portion includes a spherical exterior surface and a countersunk hole extending through the center thereof. The spherical outer surface and a circular countersunk hole are generally symmetrical about the central axis. The socket portion is a hollowed substantially frustoconic shaped structure having an outer surface and a generally spherical inner surface.

[0032] The tail portion 73 defines an inner space 72 for holding a head portion of another joint part. In this example, the exterior surface of the ball portion 71 contacts with the interior surface of the socket portion 73. The friction force between the contact surfaces of two connected joint parts forms a resistance force to keep relative position between the two connected joint parts.

[0033] Nevertheless, if a user applies an external force larger than the resistance force between the joint parts, the flexible bone structure may be changed to anther shape, like the bended status illustrated in Fig. 7C.

[0034] As mentioned above, the flexible bone structure may have joint parts of more than one type of structures under different design requirements.

[0035] For example, Fig. 8 illustrates a pair of loop fasteners 81, 82 are attached to two opposite ends of a series of joint parts. The pair of loop fasteners may be regarded as two different types of joint parts. For example, one loop fastener may include a loop member coupled to an insert. The loop member may include of a string of yarn, fabric, twine, wire, or chain that's affixed at both of its ends to a top portion of the insert. The insert may be constructed to any size or shape permitting the insert to be coupled, either by snap fit, interference fit, or threaded engagement, to the either end of the joint member (i.e., the insert being configured to fit within the countersunk hole of the ball portion or the socket of the socket portion of the joint member).

[0036] Another loop member may include a hook member connected to an insert. The hook member may be cast, machined, or injection molded from a stainless steel, hard plastic, or any other suitable material. The insert may be constructed to any size or shape permitting the insert to be coupled, either by snap fit, interference fit, or threaded engagement, to the either end of the joint member (i.e., the insert being configured to fit within the countersunk hole of the ball portion or the socket of the socket portion of the joint member).

[0037] When the flexible floating apparatus is bent to a circular shape, the pair of loop fasteners are hooked to provide a more stable status, in addition to rely on the resistance force among the joint parts.

[0038] With such fasteners or other hook structures, more than one flexible floating apparatuses may be connected to construct a larger structure, just like the pentagon-shaped structure as illustrated in Fig. 10. Please be noted that any other geometric shapes may also be achieved. For example, two or more than two flexible floating apparatuses may be connected to one end of another flexible floating apparatus. The flexible floating apparatus may have other shapes, in addition to the illustrated rod structure. In addition, more than two forks of connected or isolated flexible bone structures may be wrapped in one floating cover.

[0039] During manufacturing, a floating cover may be produced into two parts. When the flexible bone structure is placed on one part of the floating cover, the other part is affixed to the part to wrap the flexible bone structure with heat, high pressure or other affixing method, depending on the material of the floating cover. Alternatively, the floating cover is made of foam and a channel is prepared during producing the floating cover. The flexible bone structure is then placed into the channel.

[0040] Please be also noted that for prevent water to get inside the flexible floating apparatus, the ball portion of the joint part may be closed, unlike the structure illustrated in Fig. 7A and Fig. 7B.

[0041] In general, terms such as "coupled to," and "configured for coupling to," and "secured to," and "configured for securing to" and "in communication with" (for example, a first component is "coupled to" or "is configured for coupling to" or is "configured for securing to" or is "in communication with" a second component) are used herein to indicate a structural, functional, mechanical, electrical, signal, optical, magnetic, electromagnetic, ionic or fluidic relationship between two or more components or elements. As such, the fact that one component is said to be in communication with a second component is not intended to exclude the possibility that additional components may be present between, and/or operatively

associated or engaged with, the first and second components.

[0042] Although the previous description illustrates particular examples of various implementations, the present disclosure is not limited to the foregoing illustrative examples. A person skilled in the art is aware that the disclosure as defined by the appended claims and their equivalents can be applied in various further implementations and modifications. In particular, a combination of the various features of the described implementations is possible, as far as these features are not in contradiction with each other. Accordingly, the foregoing description of implementations has been presented for purposes of illustration and description. Modifications and variations are possible in light of the above description.

Claims

1. A flexible floating apparatus, comprising:

a flexible bone structure having at least a first joint part and a second joint part, the first joint part and the second joint part being connected with a first resistance force to keep a relative position between the first joint part and the second joint part, and the relative position between the first joint part and the second joint part being changed when an external force larger than the first resistance force being applied on the first joint part and the second joint part; and

a floating cover comprising buoyant material wrapping the flexible bone structure and a shape of the floating cover being changed when the relative position between the first joint part and the second joint part being changed.

2. The flexible floating apparatus of claim 1, wherein the floating cover has a second resistance force to keep the shape of the floating cover, and the second resistance force is smaller than the first resistance force.

3. The flexible floating apparatus of claim 1, wherein the buoyant material of the floating cover has a smaller density than the first joint part and the second joint part.

4. The flexible floating apparatus of claim 1, further comprising a third joint part connected to the second joint part, and the third joint part having a second joint structure different from a first joint structure of the first joint part and the second joint part.

5. The flexible floating apparatus of claim 4, wherein the third joint part has an external connecting structure for connecting to another flexible floating apparatus.

6. The flexible floating apparatus of claim 5, wherein the connection to said another flexible floating apparatus is detachable.

7. The flexible floating apparatus of claim 4, wherein the third joint part has an internal connecting structure for connecting to a fourth joint part, and the fourth joint part has a third joint structure different from the first joint structure and the second joint structure.

8. The flexible floating apparatus of claim 1, wherein the first joint part and the second joint part respectively have a tail portion and a head portion, and the tail portion of the first joint part is connected to the head portion of the second joint part with the first resistance force.

9. The flexible floating apparatus of claim 8, further comprising a fifth joint part having the first joint structure, and the tail portion of the fifth joint part is connected to the head portion of the first joint part.

10. The flexible floating apparatus of claim 9, wherein the head portion has a ball portion and the tail portion has a socket portion, the socket portion defines an inner space for holding the ball portion, the ball portion is movable with respect to the socket portion in the inner space when the external force larger than the first resistance force is applied to the flexible bone structure.

11. The flexible floating apparatus of claim 10, wherein the ball portion of the second joint part has a closed round shape heading to the socket portion of the first joint part.

12. The flexible floating apparatus of claim 1, wherein the floating cover is made of a closed-cell foam material.

13. The flexible floating apparatus of claim 12, wherein the closed-cell foam material is selected from at least one from Ethylene Vinyl Acetate (EVA) and Polyethylene (PE).

14. The flexible floating apparatus of claim 1, wherein the first joint part and the second joint part are made of hardened plastic material selected from at least one of Polypropylene (PP), Polyoxymethylene (POM), Polycarbonate (PC), and Acrylonitrile Butadiene Styrene (ABS).

15. A flexible floating apparatus for floating over water, comprising:

a flexible bone structure having at least a first

joint part and a second joint part, the first joint part and the second joint part being connected with a first resistance force to keep a relative position between the first joint part and the second joint part, and the relative position between the first joint part and the second joint part being changed when an external force larger than the first resistance force being applied on the first joint part and the second joint part;

a floating cover comprising buoyant material having an inner tunnel for containing the flexible bone structure and a shape of the floating cover being changed when the relative position between the first joint part and the second joint part being changed; and

a decorative member connected to the floating cover.

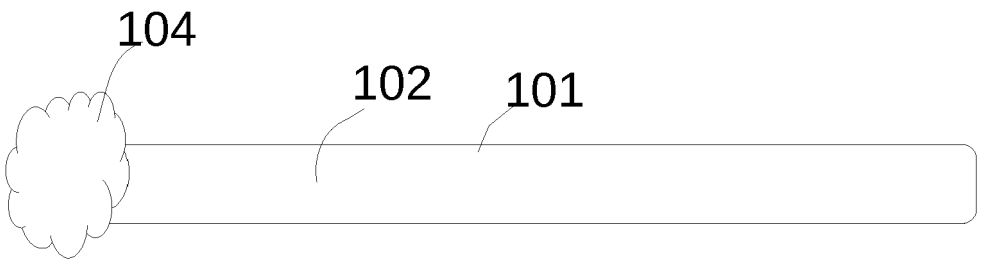

Fig. 1

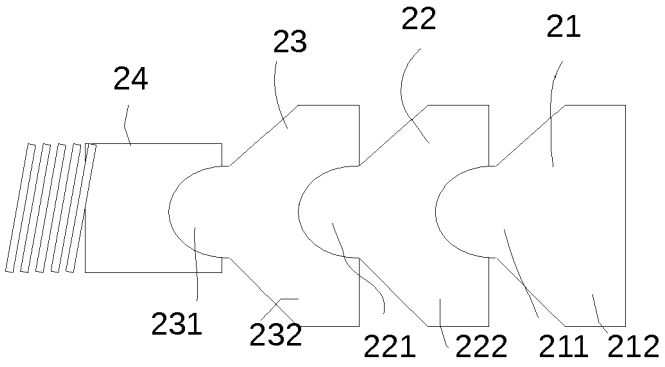

Fig. 2

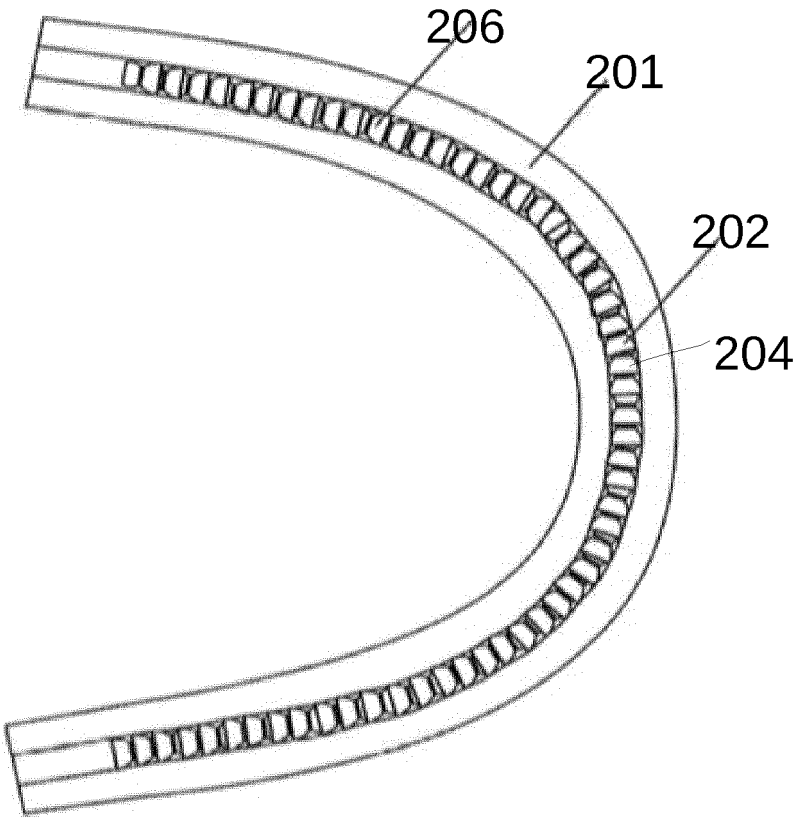

Fig. 3

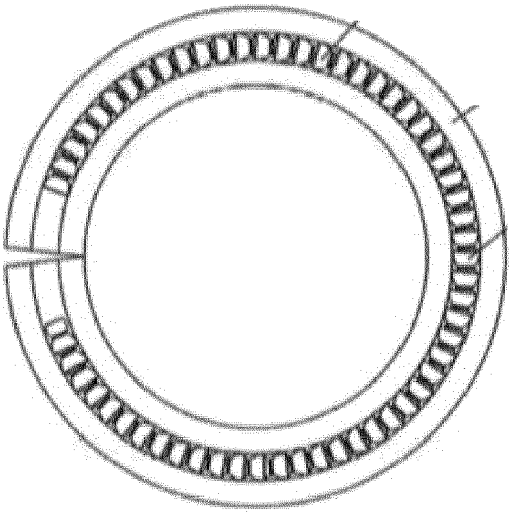

Fig. 4

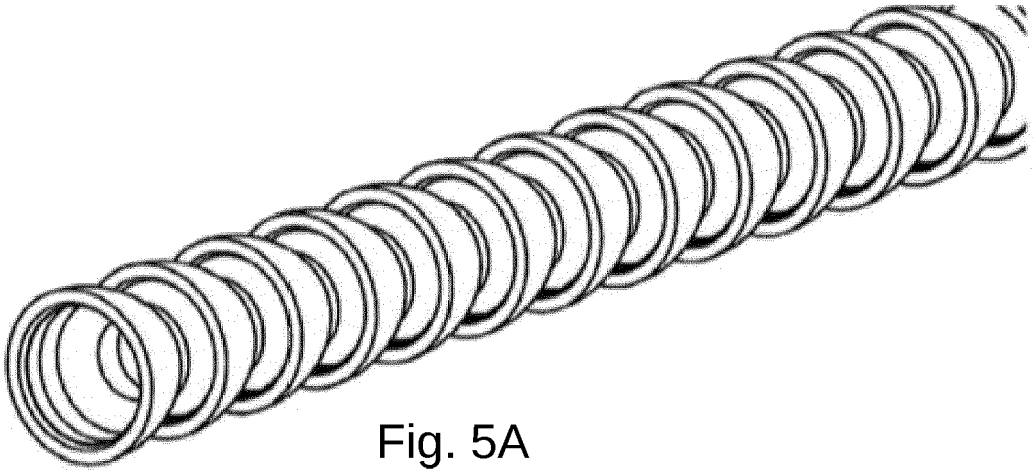

Fig. 5A

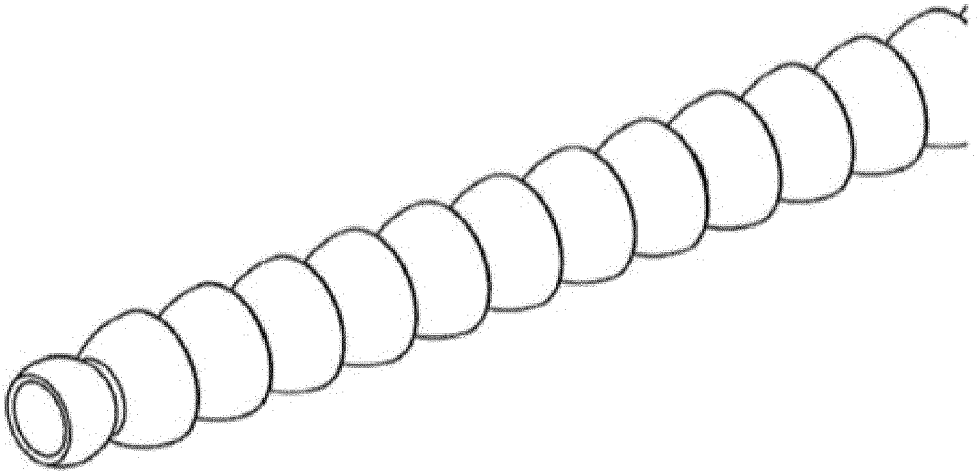

Fig. 5B

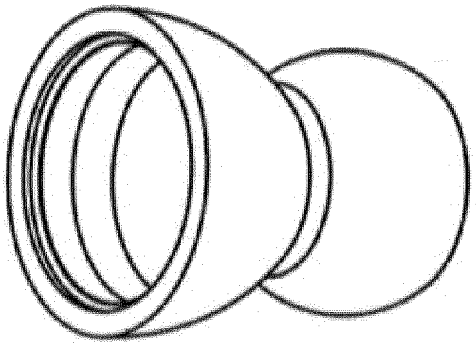

Fig.6A

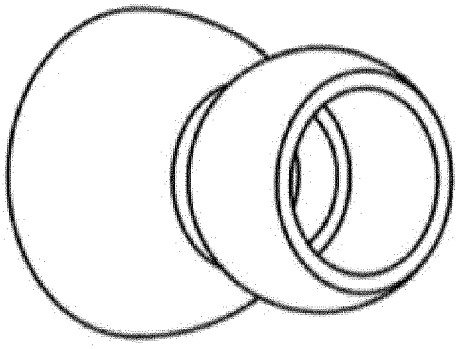

Fig. 6B

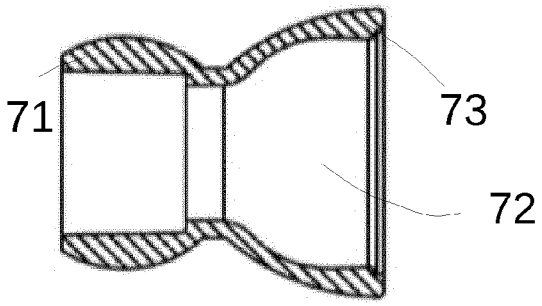

Fig. 7A

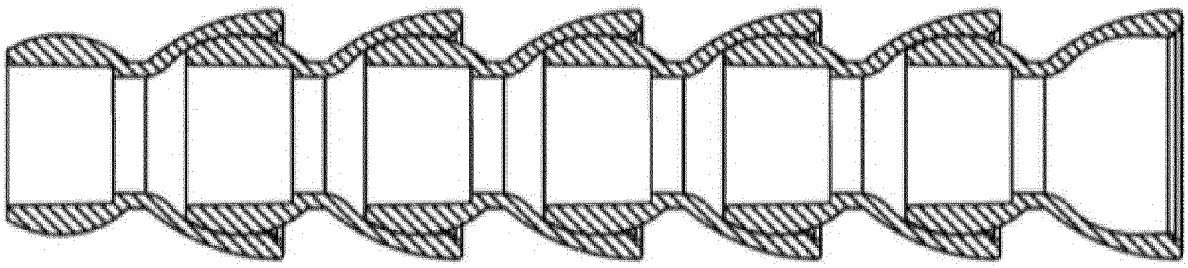

Fig. 7B

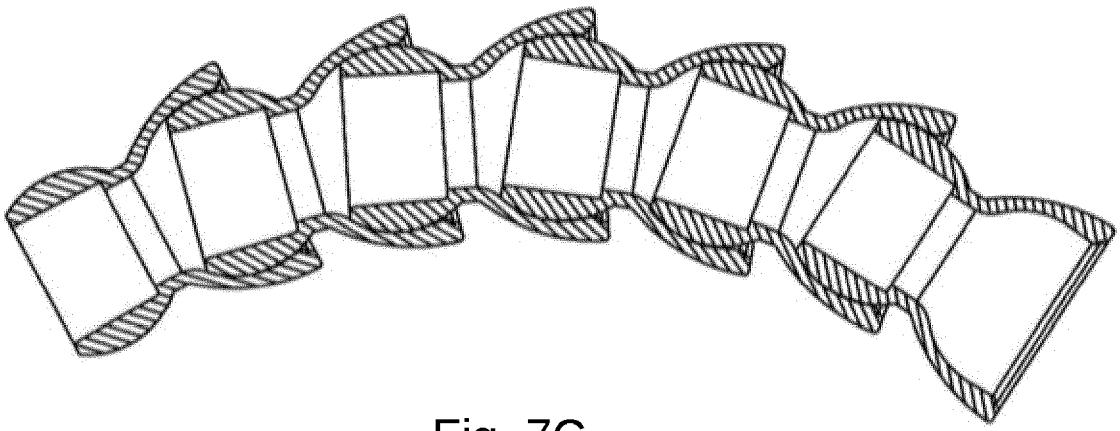

Fig. 7C

Fig. 8

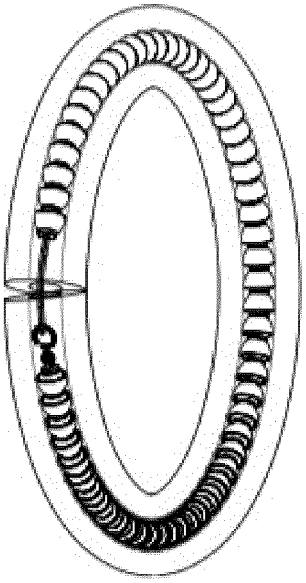

Fig. 9

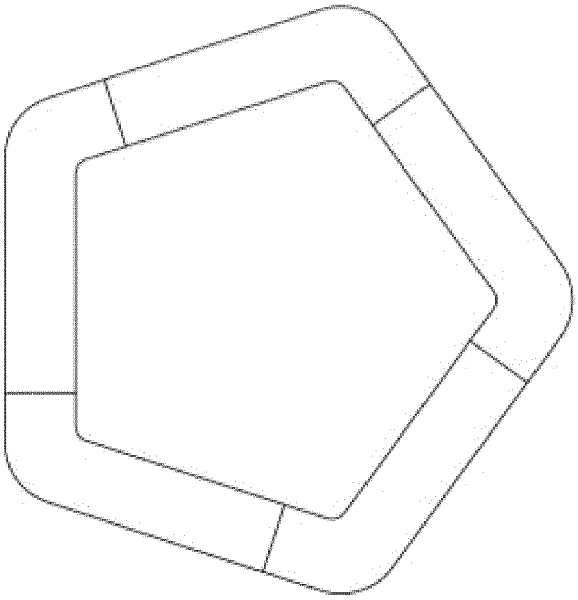

Fig. 10

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EUROPEAN SEARCH REPORT

Application Number
EP 16 17 1046

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X Y	CN 203 710 647 U (SHANGHAI BESTWAY INFLATABLES & MATERIAL CORP) 16 July 2014 (2014-07-16) * abstract; figures 3,4,5 *	1-3,8, 12-15 4-7,9-11	INV. A63B69/14 A61H37/00 A63B31/00
Y	FR 2 186 922 A5 (MACIOLEK LOUIS [FR]) 11 January 1974 (1974-01-11) * page 2, line 30 - page 4, line 21; claim 1; figures 1,2,3 *	4-7,9-11	
X A	US 6 607 684 B1 (LEE JAMES S W [US] ET AL) 19 August 2003 (2003-08-19) * column 6, line 46 - column 6, line 63; figure 7 *	1-8,11, 14,15 9,10,12, 13	
A	FR 2 903 960 A1 (MINAIRE JEAN MARC [FR]) 25 January 2008 (2008-01-25) * claim 1; figures 1,2,3 *	1-15	

TECHNICAL FIELDS SEARCHED (IPC)

A63B
A61H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	14 October 2016	Murer, Michael

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)

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14-10-2016

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