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(54) Collapsible throwing toy having timed release mechanism

(57) The toy assembly has a body (12) that can be selectively configured between an expanded shape and a compressed shape. The body (12) is comprised of a plurality of arcuate sections (14). At least one biasing element (42) is provided for biasing the arcuate sections into their expanded shape. A suction cup (40) is disposed in the body at a first end of the body. A flat surface (44) is disposed in the body at a second opposite end. The suction cup (40) engages the flat surface (44) only when the body is collapsed into its compressed shape. A vent valve assembly (50) is provided for venting air between the flat surface (44) and the suction cup (40). The suction cup (40) releases the flat surface (44) when enough air flows into the suction cup (40) to equalize pressure. Accordingly, a person can selectively control the length of time that the body remains in its compressed shape.

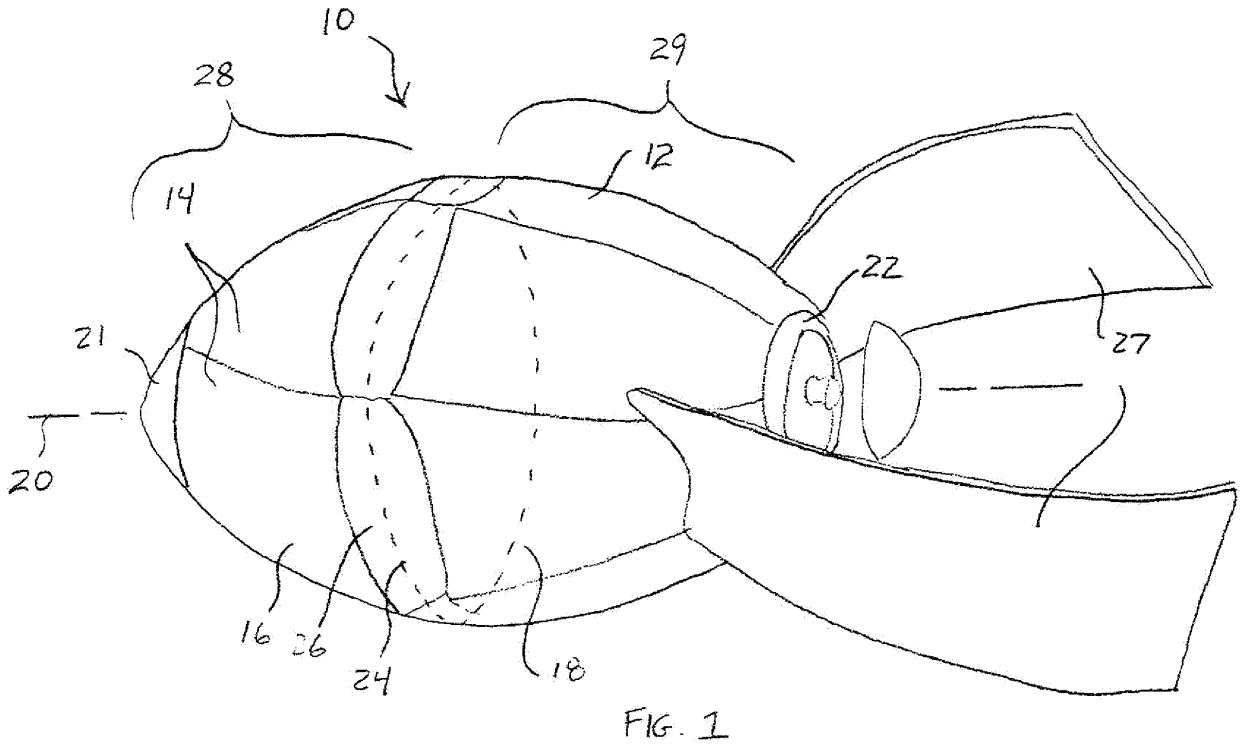

FIG. 1

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Description

BACKGROUND OF THE INVENTION

1. Field Of The Invention

[0001] In general, the present invention relates to toy objects that are spring biased in an expanded configuration, yet can be temporarily configured into a collapsed configuration. More particularly, the present Invention relates to thrown toy objects, such as balls, that can be temporarily pressed into a collapsed configuration, wherein the thrown toy pops back into an expanded configuration a short time later. The present invention also relates to the method of manufacturing such toy ,objects.

2. Description Of The Prior Art

[0002] The prior art is replete with various types of toys that are intended to be thrown. Prominent among such toys are balls and discs. It, therefore, is not surprising that toy manufacturers eventually combined the features of a ball and a disc into a single throwing toy. It is for this reason that collapsible throwing toys were first introduced into the toy market. Collapsible throwing toys are balls, or similar spherically shaped objects, that are comprised of an upper hemisphere and a lower hemisphere. The upper hemisphere and the lower hemisphere are joined together with hinged connections along a common equatorial joint. Due to the hinged connections between the upper hemisphere and the lower hemisphere, the upper and lower hemispheres of the ball can be collapsed flat against each other. When the upper and the lower hemispheres of the toy are collapsed against each other, the toy has the general configuration of a disc. Accordingly, the collapsible throwing toy can be configured as either a ball or as a disc, depending upon whether or not the toy is compressed.

[0003] As the upper and lower hemispheres of the toy are collapsed into a flat configuration, the diameters of the hemispheres expand. To accommodate this expansion, the upper and lower hemispheres of the toy are slotted. When the toy is fully expanded into its ball shape, the slots are closed and the toy has a continuous external surface. Conversely, when the toy is flattened into a disc, the slots open and expand, giving the disc a daisy configuration. A typical daisy configuration of a collapsible throwing toy can be seen by referencing U.S. Patent No. Des 434,457 to Goldman, entitled Collapsible Toy.

[0004] In the prior art, collapsible throwing toys typically have some sort of biasing element that biases the collapsible throwing toy into its expanded, ball-like configuration. For example, in U.S. Patent No. 5,797,815 to Goldman, entitled Pop-Open Throwing Toy With Controllable Opening Delay And Method Of Operating Same, a collapsible throwing toy is shown that has an internal coil spring. The coil spring biases apart the upper and lower hemispheres of the toy. The collapsible throwing toy can be temporarily configured like a disc by compressing the internal coil spring and resisting the bias of the coil spring with a momentary suction cup connection between the upper and lower hemispheres. As soon as the momentary suction cup connection fails, the internal coil spring pops the collapsible throwing toy back into its expanded ball-like configuration.

[0005] Reliance upon a suction cup to trigger the expansion of a collapsed toy has certain inherent problems. Depending upon the game being played with a collapsed toy, the desired period before it pops back into its expanding shape may vary. If a group of people are playing "hot potato" with the toy, a delay of a few minutes may be desirable. If the collapsed toy is being used to play catch, it is usually desirable for a collapsed ball toy to expand back into its ball shape after being thrown and before it is caught. This is a window of only a few seconds. Using a standard suction cup triggering mechanism, it is very difficult to get the toy to activate within the desired time window. If a suction cup is wet or is heavily compressed, it may not release until several seconds, or even minutes, have elapsed. If a suction cup is dirty, bent or under compressed, it may release in only one or two seconds.

[0006] A need therefore exists for a means to actively control the release mechanism of a collapsed ball so that the time period for activation can be selected in a reliable and accurate manner. This need is met by the present invention as described and claimed below.

SUMMARY OF THE INVENTION

[0007] The present invention is a toy assembly and its method of operation. The toy assembly is an oblong ball, spherical ball or similar object that can be temporarily compressed into a disc-shaped object. A short time after compression, the toy pops back into its original ball-like shape.

[0008] The toy assembly has a body that can be selectively configured between an expanded shape and a compressed shape. The body is comprised of a plurality of arcuate sections that are symmetrically disposed around a center axis. At least one biasing element is provided for biasing the arcuate sections into their expanded shape. A suction cup is disposed in the body at a first end of the body. Additionally, a flat surface is disposed in the body at a second end, opposite the first end. The suction cup engages the flat surface only when the body is collapsed into its compressed shape.

[0009] A vent valve assembly is provided through the flat surface for venting air in between the flat surface and the suction cup. The vent valve assembly is manually adjustable. Consequently, a user can control the flow of air between the suction cup and the flat surface. The suction cup releases the flat surface when enough air flows into the suction cup to equalize pressure. It will therefore be understood that by controlling the rate that air flows in between the suction cup and the flat surface,

a person can selectively control the length of time that the suction cup sticks to the flat surface. The vent valve assembly, therefore, enables a user to adjust how long the body remains in its compressed shape before it pops back into its expanded shape.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] For a better understanding of the present invention, reference is made to the following description of an exemplary embodiment thereof, considered in conjunction with the accompanying drawings, in which:

Fig. 1 is a perspective view of an exemplary embodiment of the present invention shown in its expanded condition;

FIG. 2 is a perspective view of the embodiment of Fig. 1 shown in its compressed condition;

FIG. 3 is a cross-sectional view of the embodiment of Fig. 1;

FIG. 4 is a cross-sectional view of the embodiment of Fig. 2; and

FIG. 5 shows the flight path of the invention as it changes from the configuration of Fig. 2 into the configuration of Fig. 1, while in flight.

DETAILED DESCRIPTION OF THE DRAWINGS

[0011] Although the present invention collapsible throwing toy can be made round, it also can be made oblong to mimic the shape of a football. In the exemplary embodiment of the present invention, the collapsible throwing toy is configured into the shape of a football. Such a shape is exemplary and it will be understood that "balls" of geometric shapes other than spherical are intended to be included within the scope of the invention.

[0012] Referring to Fig. 1, an exemplary embodiment of a collapsible throwing toy 10 is shown. The collapsible throwing toy 10 has an oblong body 12 that is made from a variety of arcuate sections 14. The different arcuate sections 14 that comprise the spherical body 12 are symmetrically disposed around a central axis 20.

[0013] Two end hub assemblies 21, 22 are provided. The end hub assemblies 21, 22 are disposed at opposite ends of the oblong body 12. Both end hub assemblies 21, 22 are positioned along the central axis 20 of the collapsible throwing toy 10. The plurality of collapsible arcuate sections 14 extend between the two end hub assemblies 21, 22. In the shown embodiment, six collapsible arcuate sections 14 are shown. However, such a configuration is merely exemplary and it should be understood that any plurality of collapsible arcuate sections 14 can be used.

[0014] Each of the collapsible arcuate sections 14 contains an upper panel 16, a lower panel 18 and a joint element 26. If the end hub assemblies 21, 22 are considered to be positioned along the same central axis 20 at different pole ends of the oblong body 12, an imaginary mid-plane 24 exists between the end hub assemblies 21, 22. The mid-plane 24 bisects the oblong body 12, dividing the oblong body 12 into an upper half 28 and a lower half 29. The joint elements 26 of each of the collapsible arcuate sections 14 are disposed along the mid-plane 24. The upper panel 16 of each collapsible arcuate section 14 extends in the upper half 28 of the oblong body 12, above the mid-plane 24. Conversely, the lower panel 18 of each collapsible arcuate section 14 extends in the lower half 29 of the oblong body 12, below the mid-plane 24.

[0015] As will later be more fully described, a suction cup is disposed inside the spherical body 12 of the collapsible throwing toy 10 behind the upper end hub assembly 21. A surface that can be temporarily engaged by the suction cup is disposed inside the spherical body 12 of the collapsible throwing toy 10 behind the opposite lower end hub assembly 22.

[0016] The arcuate sections 14 that form the oblong body 12 of the collapsible throwing toy 10 are made to fold at the joint elements 26 along the mid-plane plane 24. However, as will be further explained, the various arcuate sections 14 are engaged by an elastic band that causes the arcuate sections 14 not to bend unless forced to do so. This maintains the collapsible throwing toy 10 in its expanded shape, as is illustrated in Fig. 1.

[0017] Stabilizing fins 27 are present on the exterior of the elongated body 12. The stabilizing fins 27 help the oblong body 12 fly in a straight spiral when the collapsible throwing toy 10 is in flight in its expanded shape.

[0018] Referring to Fig. 2 in conjunction with Fig. 1, it can be seen that the oblong body 12 of the collapsible throwing toy 10 can be altered into a disc shape by pressing the two end hub assemblies 21, 22 toward each other. The two end hub assemblies 21, 22 meet at the imaginary mid-plane 24 of the oblong body 12. As the two end hub assemblies 21, 22 approach each other, the upper end hub assembly 21 temporarily engages the opposing lower end hub assembly 22, As the upper and lower halves 28, 29 of the oblong body 12 are compressed, the collapsible arcuate sections 14 fold at the joint elements 26. The oblong shape of Fig. 1, therefore transforms into the disc shape of Fig. 2.

[0019] When in the disc shape, the stabilizing fins 27 fold down flat against the compressed arcuate sections 14. In this manner, the stabilizing fins 27 do not adversely affect the ability of the collapsible throwing toy 10 to be thrown like a disc while in its collapsed shape.

[0020] As the various collapsible arcuate sections 14 fold, they each resist the folding deformation with a spring bias. The combined bias of all the collapsible arcuate sections 14 creates a force that opposes the compression. This bias causes the collapsible arcuate sections 14 to immediately pop back into an expanded shape the instant the compression force is released or the two end

hub assemblies 21, 22 release their interconnection.

[0021] Referring to Fig. 3, it can be seen that an elastic band 42 is joined to all of the arcuate sections 14 inside the oblong body 12. The elastic band 42 travels in the same plane as the mid-plane 24 and connects to the inside of each joint element 26. This biases each joint element 26 toward the central axis 20. This bias direction causes the oblong body 12 to stand in its expanded shape. When the elongated body 12 is compressed, the diameter around the mid-plane 24 expands. This causes the elastic band 42, to stretch and store energy. Due to the pull of the elastic band 42, the oblong body 12 would immediately snap back into its expanded shape should the compression forces be removed. The bias of the elastic band 42 is resisted by the engagement of the upper end hub assembly 21 and the lower end hub assembly 22 when the oblong body 12 is fully collapsed.

[0022] The use of an elastic band 42 to bias the oblong body 12 into its expanded shape is only exemplary. Other bias systems exist that can be adapted for use in the present invention. Another such bias system is described in U.S. Patent No. 6,896,577 to Feng, entitled Configuration For A Collapsible Throwing Toy And Its Associated Method Of Manufacture, the disclosure of which is incorporated into this specification by reference.

[0023] Returning to Fig. 3, the structure of the upper end hub assembly 21 and the lower end hub assembly 22 are also shown. The upper end hub assembly 21 has an external plate 30 that lay on the exterior apex of the upper half 28 of the oblong body 12. The upper end hub assembly 21 also has an internal plate 32 that lay on the interior. A weight compartment is provided that holds a weight 36. The weight 36 is used to improve the flight characteristics of the collapsible throwing toy 10, as will later be explained. A suction cup 40 extends below the weight 36. The suction cup 40 faces inwardly toward the mid-plane 24. Furthermore, the suction cup 40 is aligned with the central axis 20 of the collapsible throwing toy 10.

[0024] An end cap 38 attaches to the external plate 30 of the upper end hub assembly 21. The end cap 38 has a curved exterior that complements the curvature of the exterior of the oblong body 12.

[0025] The lower end hub assembly 22 includes a flat attachment plate 44. The attachment plate 44 has a flat surface 45 that the suction cup 40 attaches to when the collapsible throwing toy 10 is collapsed. A vent hole 46 is disposed through the attachment plate 44. The vent hole 46 enables air to flow in between the suction cup 40 and the attachment plate 44 when the suction cup 40 is connected to the flat surface 45 of the attachment plate 44. If the vent hole 46 were left open, no suction could develop between the suction cup 40 and the attachment plate 44. The suction cup 40 would, therefore, only remain attached to the attachment plate 44 for a moment. In order to control the flow of air through the vent hole 46, a vent valve assembly 50 is provided.

[0026] The vent valve assembly 50 includes a valve needle 52 that extends into the vent hole 46. The valve needle 52 has the ability to completely seal the vent hole 46 or selectively allow controlled volumes of air to flow through the vent hole 46. The degree by which the valve needle 52 blocks the vent hole 46 depends upon the distance that the valve needle 52 is inserted into the valve hole 46.

[0027] The valve needle 52 is connected to a threaded rod 54. The threaded rod 54 is connected to a manual control knob 56. The threaded rod 54 engages the attachment plate 44. Accordingly, it will be understood that as the manual control knob 56 is turned, the threaded rod 54 will move up or down in relation to the attachment plate 44. The depth at which the valve needle 52 is positioned in the vent hole 46 can therefore be selectively controlled by turning the manual control knob 56.

[0028] The suction cup 40 of the upper end hub assembly 21 will only remain attached to the attachment plate 44 of the lower end hub assembly 22 for as long as the air pressure inside the suction cup 40 is lower than ambient pressure. Since the valve assembly 50 enables the amount of air that flows through the vent hole 46 to be controlled, the amount of time that the suction cup 40 engages the attachment plate 44 can be selectively controlled. If the valve assembly 50 is used to close the vent hole 46, the suction cup 40 may remain engaged with the attachment plate 44 for a few minutes. However, if the valve assembly 50 is opened, air is permitted to flow between the suction cup 40 and the attachment plate 44. This quickly eliminates any pressure differential that may exist inside the suction cup 40 and the suction cup 40 may only adhere to the attachment plate 44 for a second or two. Attachment time between the suction cup 40 and the attachment plate 44 can therefore be altered as desired from as short as a few seconds to as long as a few minutes. As soon as the suction cup 40 releases, the force of the elastic band 42 causes the upper end hub assembly 21 and the lower end hub assembly 22 to separate as the oblong body 12 returns to its expanded shape.

[0029] Referring to Fig. 4, it will now be understood that when the upper and lower end hub assemblies 21, 22 are pressed toward each other, the collapsible arcuate sections 14 fold and the suction cup 40 contacts and engages the attachment plate 44. The connection between the suction cup 40 and the attachment plate 44 is temporary as air seeps into the suction cup 40. The upper and lower end hub assemblies 21, 22 are biased apart by the action of the elastic band 42 on the collapsible arcuate sections 14. As soon as the suction cup 40 releases, the collapsible throwing toy 10 instantly pops back into its ball-like shape. The rate that air seeps into the suction cup 40 is largely determined by the manual setting made for the valve assembly 50, via the control knob 56. A person can therefore adjust the valve assembly 50 to either allow for the quick seepage of air or the slow seepage of air. This directly translates into the time that the suction cup 40 remains engaged with the attachment plate 44. A person can therefore adjust the collaps-

ible throwing toy 10 so that it remains collapsed for anywhere from a few seconds to a few minutes.

[0030] In the present invention, an oblong shaped ball, like a football, is illustrated. Referring to Fig. 5, it can be seen that the method of play for such a toy is that the collapsible throwing toy 10 is collapsed and thrown as a disc. The collapsible throwing toy 10 is adjusted so that it pops into its football shape during flight. In order for the collapsible throwing toy 10 to fly in a stable manner when collapsed, it must fly while spinning with its central axis 20 oriented generally in the vertical. However, when the collapsible throwing toy 10 pops back into its expanded shape, it only experiences stable flight if it is spinning with its central axis 20 generally oriented in the horizontal.

[0031] The tilting of the central axis 20 from the vertical to the horizontal when the collapsed body pops is accomplished in two ways. First, the stabilizing fins 27 on the oblong body 12 extend when the collapsible throwing toy 10 pops into its expanded shape. The stabilizing fins 27 catch air and cause the orientation of the collapsible throwing toy 10 to change. Furthermore, the stabilizing fins 27 are preferably curved so that they add spin to the collapsible throwing toy 10 as the collapsible throwing toy 10 flies through the air.

[0032] The second feature that helps the collapsible throwing toy 10 reorient in flight is the internal weights 36 in the upper end hub assembly 21. When the collapsible throwing toy 10 is collapsed, the weights 36 are very near the geometric center of the collapsible throwing toy 10. As such, the collapsible throwing toy 10 has a center of gravity that is very close to its geometric center. This enables the collapsible throwing toy 10 to remain stable in flight. However, once the collapsible throwing toy 10 pops back to its expanded shape, the weights 36 are located at the upper end of the oblong body 12, far away from the geometric center of the collapsible throwing toy 10. This causes the center of gravity to be offset from the path of flight. Wind resistance will therefore act to reorient the collapsible throwing toy 10 so that both the center of gravity and the geometric center of the collapsible throwing toy 10 are both aligned along the path of flight.

[0033] It will be understood that the embodiment of the present invention collapsible throwing toy that is described and illustrated herein are merely exemplary and a person skilled in the art can make many variations to the embodiment shown without departing from the scope of the present invention. All such variations, modifications and alternate embodiments are intended to be included within the scope of the present invention as defined by the appended claims.

Claims

1. A time release suction cup connection assembly, comprising:

   a suction cup;

   a flat surface, wherein said suction cup connects said flat surface when presses against said flat surface;

   a vent hole communicating with said flat surface that enables air to flow between said flat surface and said suction cup when said suction cup is connected to said flat surface;

   a valve for selectively restricting said vent hole, wherein said valve controls airflow through said vent hole.

2. The assembly according to Claim 1, further including at least one biasing element that biases said suction cup away from said flat surface.

3. The assembly according to Claim 1, wherein said suction cup and said flat surface are disposed at opposite sides of a collapsible ball.

4. A collapsible throwing toy assembly, comprising:

   a body that can be selectively configured between an expanded shape and a compressed shape, said body being comprised of a plurality of arcuate sections symmetrically disposed around a central axis;

   at least one biasing element for biasing said arcuate sections into said expanded shape;

   a suction cup disposed in said body at a first end of said body;

   a flat surface disposed in said body at a second end opposite said first end, wherein said suction cup engages said flat surface only when said body is in said compressed shape;

   a vent valve for venting air through said flat surface between said flat surface and said suction cup when said suction cup engages said flat surface.

5. The assembly according to Claim 4, wherein said vent valve is adjustable and selectively controls air flow between said flat surface and said suction cup.

6. The assembly according to Claim 5, wherein said vent valve is selectively adjusted by a knob control that is manually accessible on said body.

7. The assembly according to Claim 4, wherein said body is oblong in shape.

8. The assembly according to Claim 4, further including weights disposed in said body proximate said first end.

9. The assembly according to Claim 8, further including stabilizing fins attached to some of said arcuate sections proximate said second end.

10. The assembly according to Claim 9, wherein said stabilizing fins are curved and cause said body to rotate when said body is flying in said expanded shape.

11. The assembly according to Claim 4, wherein an imaginary mid-plane bisects said body, said mid-plane being perpendicular to said central axis and intersecting each of said arcuate sections.

12. The assembly according to Claim 11, wherein said biasing element includes at least one elastic band that interconnects with each of said arcuate sections proximate said mid-plane.

13. The assembly according to Claim 12, wherein each of said arcuate sections includes an upper panel and a lower panel that are joined with a hinged connection along said mid-plane.

14. A method of forming a collapsible toy that coverts between an expanded shape and a collapsed shape, said method comprising the steps of:

providing a plurality of arcuate sections;
joining said arcuate sections to form a body that has a central axis and a mid-plane perpendicular to said central axis;
providing at least one biasing element that biases said plurality of arcuate sections into said expanded shape;
providing a suction cup and an attachment plate to opposing internal areas inside said body, wherein said suction cup temporarily affixes to said attachment plate when said body is compressed into said collapsed shape and said suction cup and said attachment plate are brought into abutment;
providing a vent valve that vents air between said suction cup and said body at a controlled rate.

15. The method according to Claim 14, wherein said body is oblong when in said expanded shape.

16. The method according to Claim 14, further including the step of providing weights in said body at a first end.

17. The assembly according to Claim 14, further including attaching stabilizing fins to some of said arcuate sections.

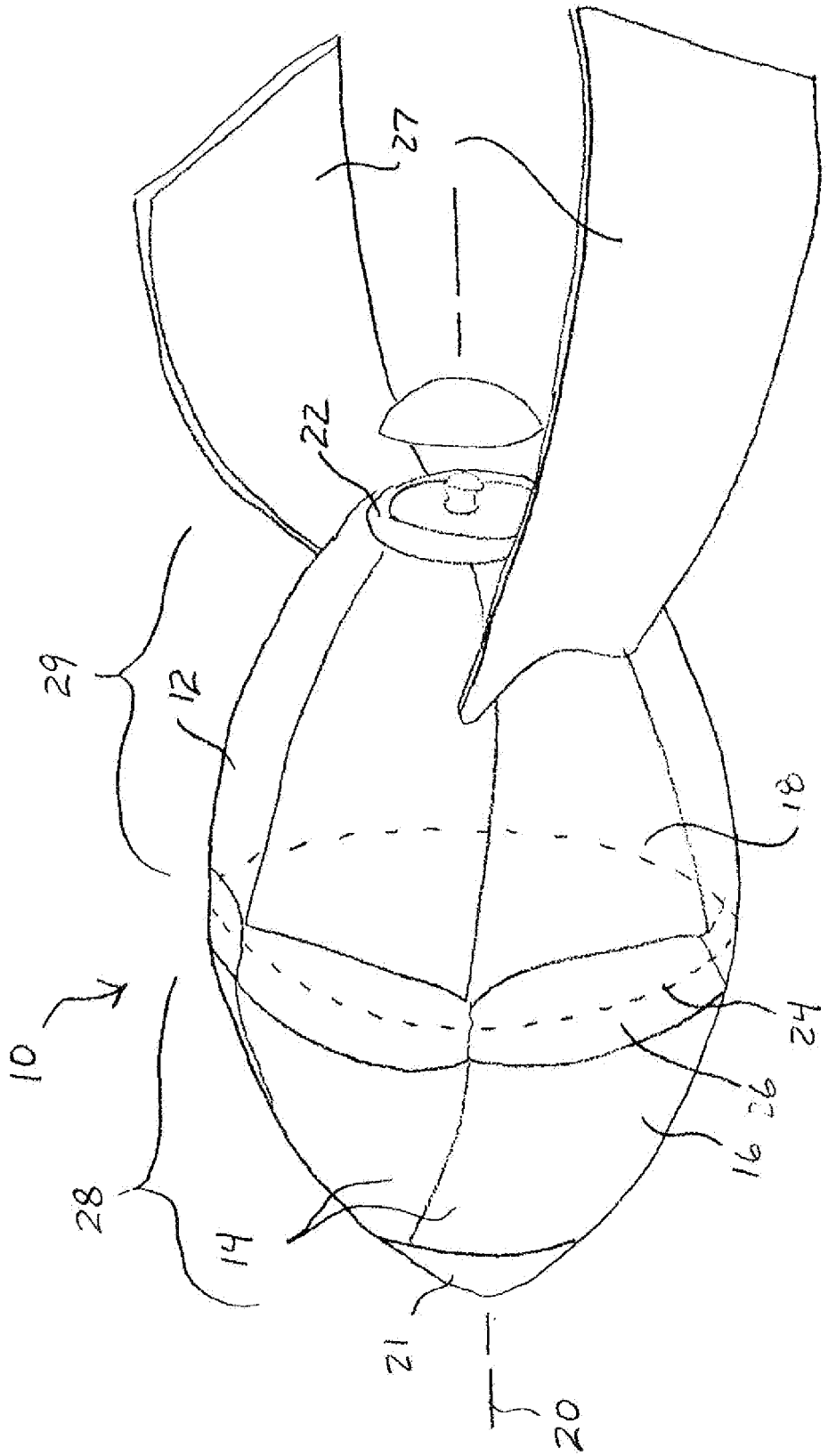

FIG. 1

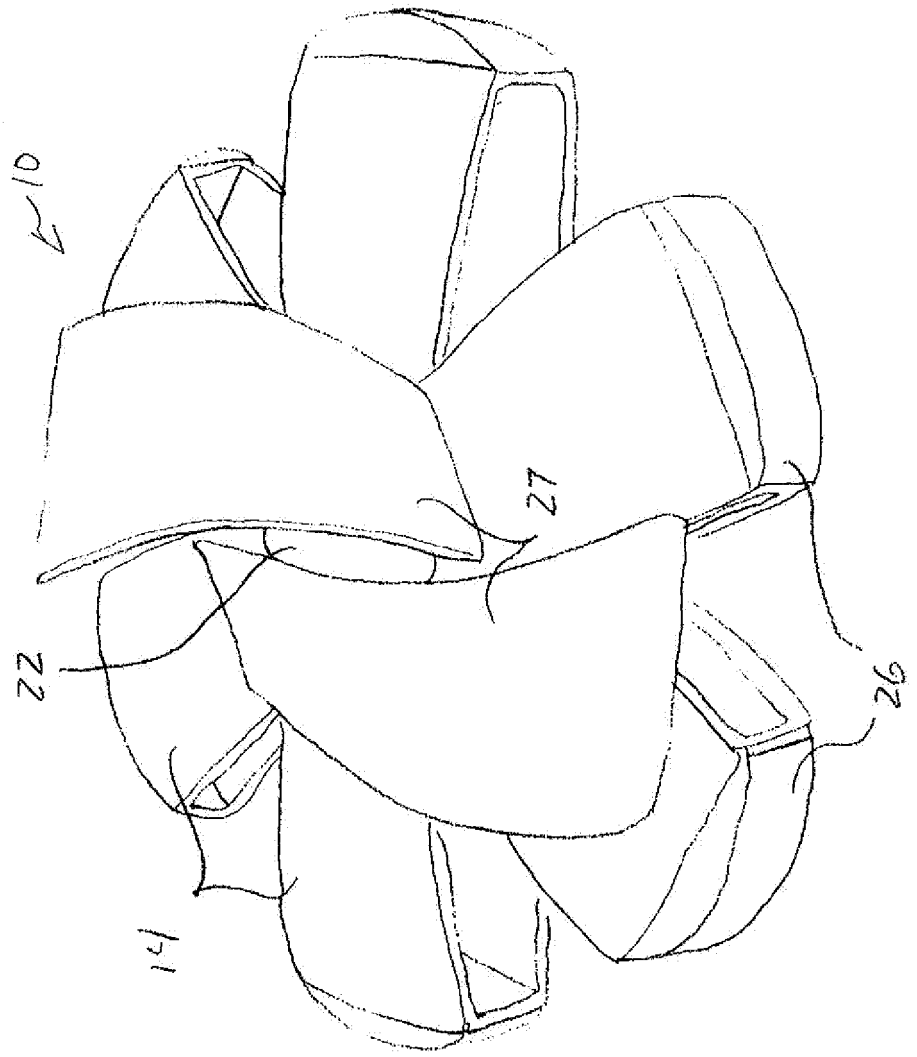

FIG. 2

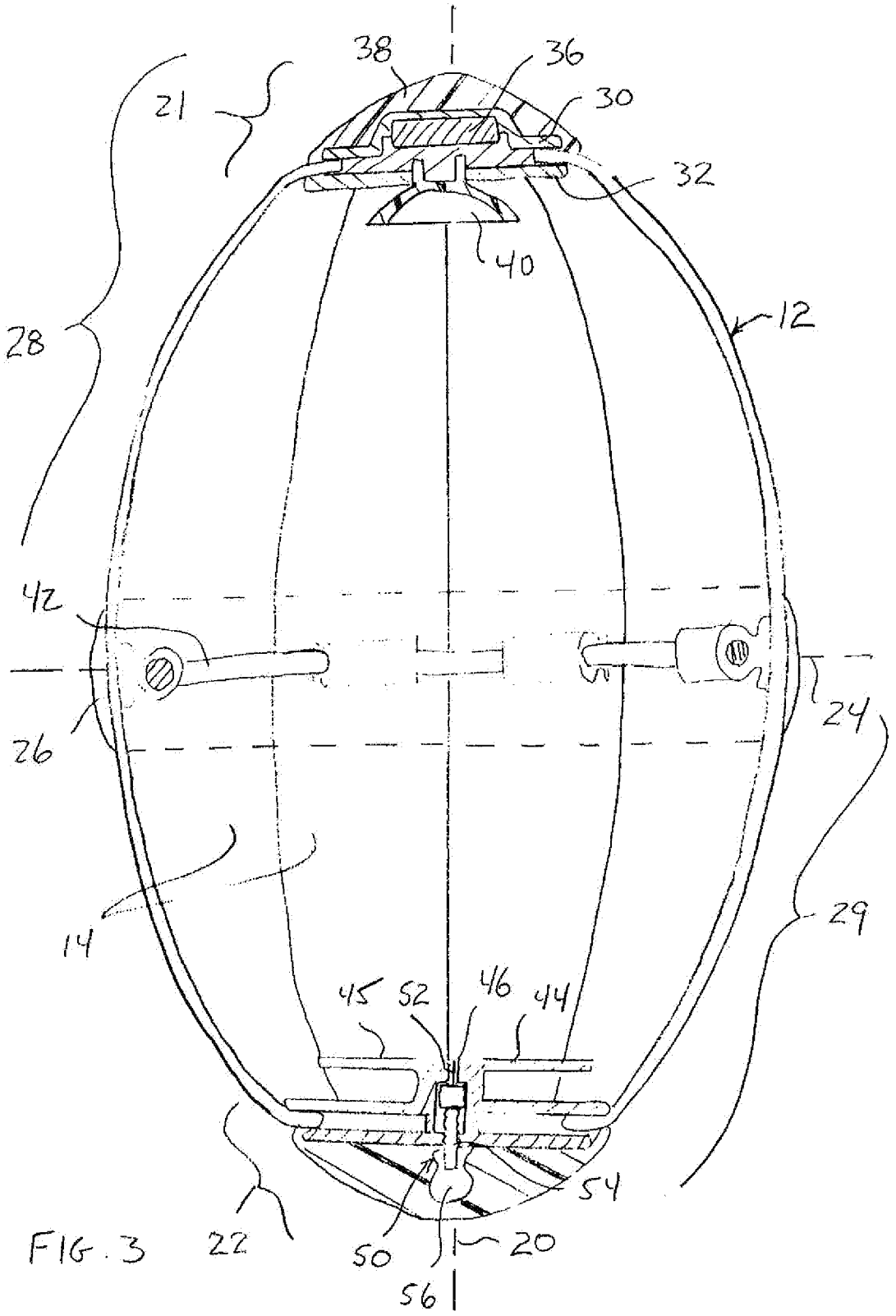

FIG. 3

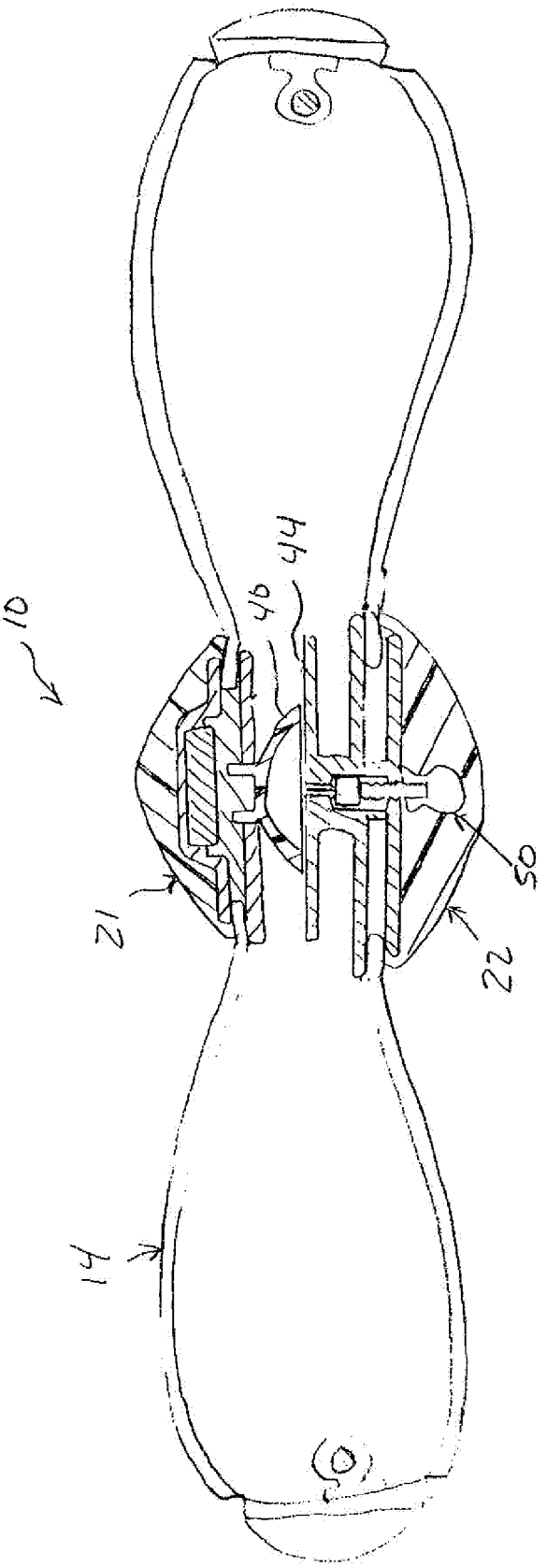

FIG. 4

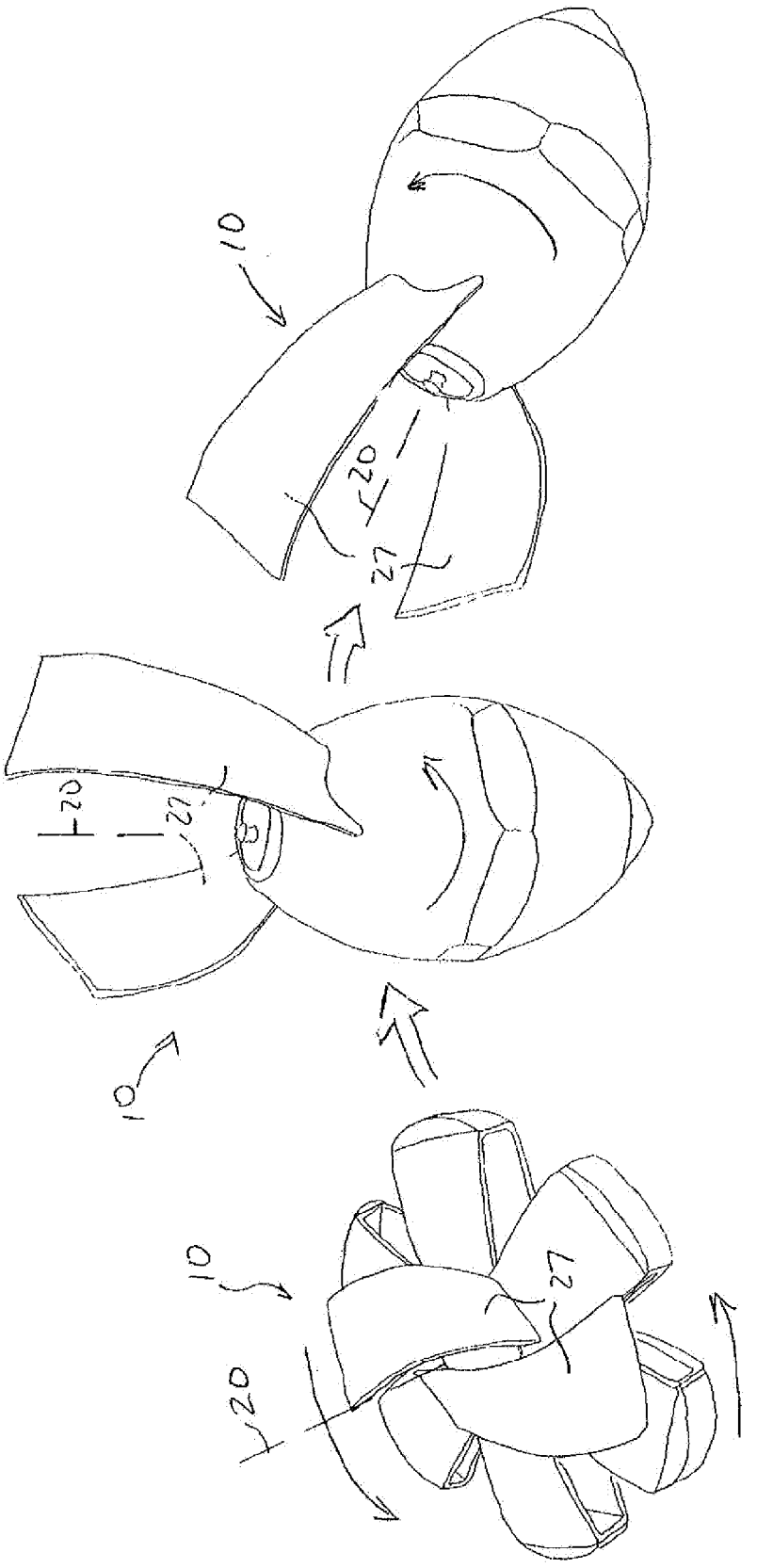

FIG. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 08 15 4301

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
D,X	US 5 797 815 A (GOLDMAN MICHAEL J [US] ET AL) 25 August 1998 (1998-08-25) * column 3, line 28 - line 56 * * column 8, line 59 - line 63; figures *	1-17	INV. A63H33/18 F16B47/00
X	US 5 511 752 A (TRETHEWEY BRIG E A [US]) 30 April 1996 (1996-04-30) * column 3, line 24 - column 4, line 12; figures *	1	
X	US 4 196 882 A (ROGNON ROBERT Y [US]) 8 April 1980 (1980-04-08) * column 1, line 63 - column 2, line 24; figures *	1	
A,D	US 6 896 577 B1 (FENG JUNG CHUNG [CN]) 24 May 2005 (2005-05-24) * column 3, line 28 - column 4, line 48; figures 1-3 *	1-17	
A	US 4 955 841 A (PASTRANO ANTHONY [US]) 11 September 1990 (1990-09-11) * column 2, line 61 - column 3, line 57; figures *	1-17	TECHNICAL FIELDS SEARCHED (IPC) A63H F16B
A	US 6 863 588 B1 (CHU KWONG WING [CN]) 8 March 2005 (2005-03-08) * column 5, line 31 - column 6, line 4; figures *	1-17	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	1 August 2008	Lucas, Peter

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

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EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 08 15 4301

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☒ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☐ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

European Patent Office

LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 08 15 4301

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-3

A time release suction cup. Solving the problem of releaseing a suction cup after a predetermined time.

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2. claims: 4-17

A collapsible throwing toy that can be selectively configured between an expanded shape and a compressed shape. Solving the problem of changing shape.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 08 15 4301

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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01-08-2008

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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- US 6896577 B, Feng **[0022]**