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(54) **APPARATUS COMPRISING THREE DIMENSIONAL SHAPES ROTATABLY SUPPORTED IN ONE ANOTHER**

VORRICHTUNG MIT DREHBAR INEINANDER GESTÜTZTEN DREIDIMENSIONALEN FORMEN
APPAREIL COMPRENANT TROIS FORMES TRIDIMENSIONNELLES SUPPORTÉES EN
ROTATION L'UNE DANS L'AUTRE

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US-A- 4 756 530

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Description

[0001] The present invention relates to an apparatus and in particular but not exclusively to an apparatus comprising a game or puzzler or to apparatus for use in playing a game. Such an apparatus is disclosed in the prior art document GB-A-2027597.

[0002] The present invention provides an apparatus comprising:

at least 3 three-dimensional shapes, a first one of said three-dimensional shapes being rotatably supported within a second one of said three-dimensional shapes, said second one of the three-dimensional shapes being rotatably supported within a third one of said three-dimensional shapes, at least one of said three-dimensional shapes comprising an opening capable of connecting at least one of said shapes to another and permitting movement of one or more balls from one shape to another, at least one of the three-dimensional shapes being supported in another of the three-dimensional shapes by a gimbal.

[0003] Preferably, means are provided for rotatably supporting one shape in another, said means comprising one of a projection and a cradle on an outer surface of said one shape and the other of a projection and a cradle on an inner surface of said another shape.

[0004] Preferably, said rotatably supported shape is supported by means arranged on diametrically opposed sides of said shape.

[0005] Preferably, an imaginary line connecting the means arranged on the opposed sides of said shape passes through a centre of said shape.

[0006] Preferably, said first and second shapes are supported by means contained in a common plane. Preferably, said common plane is arranged to extend through the middle of the apparatus. Preferably, said at three shapes are arranged such that one shape is supported within another with respective supporting means being angularly spaced apart on said plane. Preferably, said supporting means have an angularly regular spacing.

[0007] Preferably, said three dimensional shapes are the same three dimensional shape.

[0008] Preferably, at least one of said shapes comprises a sphere.

[0009] Preferably, at least one of the said shapes comprises a surface comprising a plurality of planar facets.

[0010] Preferably, said apparatus comprises between three and five three dimensional shapes.

[0011] Preferably, at least one of said shapes is substantially transparent.

[0012] Preferably, at least one of said shapes comprises a plurality of openings.

[0013] Preferably, each one of said shapes comprises an opening. Preferably, said openings are arranged to be aligned in one orientation of said apparatus. Preferably, said one orientation is such that said openings are

aligned such that the openings are on the uppermost surface of the apparatus relative to ground.

[0014] Preferably, at least one opening is provided with a projecting portion extending from an outer surface of said shape. Preferably, said projecting portion has a height which is substantially the same as a distance from the shape on which said projecting portion is provided and the shape containing said shape on which said projecting portion is provided.

[0015] Preferably, said apparatus comprises at least one ball, said at least one opening permitting movement of said at least one ball from one shape to another. Preferably, said at least one ball has a diameter substantially equal to or smaller than the diameter of the opening.

[0016] Preferably, said apparatus comprises a game or a toy.

[0017] Preferably, said apparatus comprises a mechanism, which can be operated to limit the rotation of any one or more of the shapes. Preferably, said mechanism can be operated to prevent the rotation of at least one of the shapes.

[0018] Preferably, the apparatus is arranged so that the one or more balls move to the innermost shape, under the influence of gravity, when the apparatus is shaken or otherwise agitated.

[0019] Preferably, at least one opening is an opening to an enclosure, which can hold a single ball.

[0020] Preferably, at least one of the shapes comprises a plurality of enclosures.

[0021] Preferably, the total number of enclosures is equal to the total number of balls and each of the enclosures is coded to match a respective one of said balls.

[0022] Preferably, a mechanism is provided, which can be operated to retain in their respective enclosures all balls captured in an enclosure.

[0023] For a better understanding of the present invention and as to how the same may be carried into effect reference will now be made by way of example only to the accompanying drawings in which:

Figure 1 shows an exploded view of an embodiment of the invention;

Figure 2 shows a cross-sectional view through the apparatus of Figure 1 when assembled with spheres in a first orientation;

Figure 3 shows a cross-sectional view through the apparatus of Figure 1, again when assembled but with the spheres in a second orientation;

Figure 4 shows an embodiment of the invention;

Figure 5 shows an exploded view of a part of an apparatus according to the invention; and

Figure 6 shows an exploded view of a part of an apparatus according to the invention.

[0024] Reference will now be made to Figures 1 to 3 which show an embodiment of the invention which comprises five spheres 2, 4, 6, 8, 10.

[0025] The first sphere 2 is supported in the second

sphere 4. The second sphere 4 is in turn supported in the third sphere 6. The third sphere 6 is supported in the fourth sphere 8 which in turn is supported in the fifth sphere 10. The five spheres are arranged so that the centres of the spheres are coincident at a common point.

[0026] In the preferred embodiment, the five spheres 2-10 are transparent or substantially transparent. However, in some embodiments on the invention, one or more of the spheres may be opaque or at least partially opaque. One or more of the spheres 2-10 may be clear, that is without colour. However, in some embodiments, one or more of the spheres may be coloured. Different spheres may be of different colours.

[0027] Each of the spheres 2 to 10 is provided with a respective opening 22 to 30. Each opening 22-30 comprises a open neck extending from the surface of the respective sphere. The respective opening protrudes from the surface of the respective sphere. The openings 22-28 of the first to fourth spheres have a height h which is approximately equal to the distance x provided between the outer wall of one sphere and the inner wall of the sphere containing that one sphere. In preferred embodiments, the distance x between the inner wall of one sphere and the outer wall of the sphere containing that one sphere is the same for all spheres. However in alternative embodiments, the distance x between spheres may be different for different ones of the spheres.

[0028] The distance x is preferably less than the diameter of a ball 32 the purpose of which will be described in more detail hereinafter. The diameter of openings 22 to 30 is larger than the diameter of the ball 32.

[0029] Each sphere 2 to 8 is supported in the next larger sphere 4 to 10 respectively by a respective support arrangement 12 to 18. The support arrangement 12 of the first sphere 2 within the second sphere 4 will be described. However it should be appreciated that support arrangements 14 to 18 for respectively supporting the second sphere in the third, the third sphere in the fourth and the fourth sphere in the fifth are the same. The support arrangement 12 effectively acts as gimbal. This means that the support arrangement defines an axis about which the sphere is able to rotate about. In preferred embodiments of the invention, full 360° rotation is provided.

[0030] The support arrangement comprises two projections 12a. The two projections 12a are provided on the outer surface of the sphere to be supported, that is the first sphere 2. The two projections 12a are arranged so as to be diametrically opposed to each other, on opposite sides of the first sphere 2. If an imaginary line was to be drawn between the two projections 12a on the opposite sides of the sphere, the line would pass through the centre point of the sphere.

[0031] The projections 12a are arranged to be supported by correspondingly positioned cradles 12b provided on the interior of the second sphere 4. The projections 12a are retained in place and supported by the respective cradles 12b. The projections 12a define an axis about

which the first sphere is able to rotate. The cradles 12b are also positioned such that an imaginary line drawn between the two cradles will pass through the centre of the second sphere 4.

[0032] In embodiments of the invention, each of the support arrangements 12 to 18 is provided on a common plane with that common plane passing through the centre of each of the five spheres. In preferred embodiments, the support arrangements are equally spaced in terms of angular spread around the centre of the spheres. In other words, if a line was drawn from the centre of the spheres to each of the support arrangements, these lines would in the case of a five sphere arrangement be spaced apart by the same angle, 45°.

[0033] In alternative embodiments of the invention, the support arrangements need not be contained in a common plane. However, this may result in the relative movement of one sphere to another being limited. This may be advantageous in some embodiments of the invention.

[0034] In alternative embodiments, where the support arrangements are contained in a common plane, the support arrangements may not be equally spaced. In an alternative, one or more of the support arrangements may be such that their axes are coincident.

[0035] Each of the spheres 2 to 10 is provided with a respective weighted portion 42-50. In the embodiment shown in the figures, this weighted portion is provided by opposite the opening of the respective sphere. The weighted portion 42-50 is such that under the influence of gravity, the weighted portion will tend to be lowermost.

[0036] The weighted portion may comprise a thicker region of the material forming the spheres or alternatively can be additional material injection moulded part of the sphere or additional material attached by any suitable material to the sphere.

[0037] The weighted portion may be of the same material or different material to that of the sphere. The weighted portion may be of the same general appearance as the rest of the sphere or may be of a different appearance, for example a different colour to the rest of the respective sphere.

[0038] The apparatus is arranged so that when all the openings are aligned, the ball 32 can be inserted/dropped through all the openings so that it is received in the innermost sphere, that is the first sphere 2. The openings are aligned when the apparatus is in a configuration when the plane containing all the support arrangements is parallel to the ground. The weighted portions 42 to 50 will be lower and the opening will be aligned along an axis vertical to the ground.

[0039] An opening on any sphere may be an opening to an enclosure (62), which can hold a single ball (63). An enclosure will have only one opening (see Figure 4).

[0040] Alternatively, an opening on any sphere may be an opening, which simply connects one sphere to another. Such an opening optionally may be an opening to a projection, where the projection connects one sphere to another. A projection thus has two openings.

[0041] In one use of the apparatus, it is an aim to remove the ball from the apparatus, that is to move it from the first sphere to the outer/last sphere, such that the ball exits the apparatus under the influence of gravity. Simply inverting the apparatus will not result in this because the weighted portions will not permit the spheres to be in a configuration such that the openings are aligned. In another use of the apparatus, it is an aim to move one or more balls from the innermost sphere via the openings/projections between the spheres to the enclosures.

[0042] In one embodiment, the apparatus is arranged so that the one or more balls naturally move to the innermost sphere, under the influence of gravity, when the apparatus is shaken or otherwise agitated. This can be regarded as a start position when the apparatus is used as a game, for example with the aim of moving the one or more balls from the innermost sphere via the openings/projections between the spheres to the enclosures.

[0043] In one embodiment of the invention, when the ball is moved into a projection, it acts as a weighted position. The ball in the projection will be heavier than the weighted portion 42 to 50 will cause the projection to be oriented in or maintain a downward orientation.

[0044] Referring to Figure 2, in the first orientation, each of the projections 22 to 30 are aligned coaxially, so as to enable the ball 32 to be inserted or dropped into the first sphere 2. Referring to Figure 3, in the second orientation, the first sphere 2 is rotated about the axis of the support arrangement 12 such that the opening 22 of the first sphere 2 is in a downward orientation. In this orientation, the ball 32 drops into the neck of the opening 22 under the influence of gravity. Accordingly, in the second orientation of Figure 3, the ball 32 is trapped against the inner surface of the second sphere 4.

[0045] By rotating the outside of the sphere in various direction, the interior spheres will be rotated and it is possible, using the ball as a weighting portion to cause the projecting portions to be aligned in a downward orientation such that the ball will drop out of the apparatus.

[0046] In the described embodiment of Figures 1 to 3, five spheres are provided. However in alternative embodiments of the invention, there may be less than five spheres for example three or four spheres. In other alternative embodiments of the invention, there may be more than five spheres. Three spheres has advantages in that the manufacturing cost may be reduced as compared to a five sphere arrangement. In principle, the simpler arrangements will require fewer spheres and therefore may be suitable for use by small children.

[0047] However, it should be appreciated that it is possible in some embodiments to implement features, such as additional weights which mean that the apparatus is made more complex, even if the number of spheres is reduced.

[0048] Preferred embodiments of the invention use spheres or substantially spheroid shapes. However, it should be appreciated that in alternative embodiments of the invention that it would be possible to have other

shapes which have a plurality of facets or planar surfaces. In preferred embodiments, the shape with a plurality of facets is able to move freely about the gimbal.

[0049] In some embodiments of the invention, one or more of the shapes may be limited in the movement possible about the gimbal which may make the apparatus harder or easier to use. A mechanism to restrict the movement of one or more of the shapes may be operated so that the device in its entirety becomes locked in a fixed position or so that the rotation of any one or more of the spheres is caused to be limited. Limitation of the rotation could be prevention of rotation i.e. so that the sphere becomes locked in a fixed position.

[0050] A preferred mechanism for limiting the rotation of a sphere comprises a lug (60) and a stop (65) (see Figure 6). The lug and stop are arranged so that the lug comes into contact with the stop when the sphere is rotated, typically using a turning knob (68), thus limiting the sphere's rotation. The lug may be positioned on the axle of the sphere,

[0051] In an alternative embodiment of the invention, the projection providing the opening in the fifth or outer sphere can be dispensed with. In other words the opening will be flush with the surface of the sphere.

[0052] In alternative embodiments of the invention, one or more of the five spheres may not have the projecting neck portion providing the opening but instead will have an opening flush with the surface of the sphere.

[0053] In one modification, the projections are provided on an inner surface of a sphere. Thus the projections would be provided on the inner surface of the second to fifth spheres. The outer surface of the fifth sphere would be smooth or an additional outwardly facing projection may be provided on the outside surface of the fifth sphere.

[0054] In one embodiment of the invention, the apparatus can be rolled on a surface. Depending on the complexity of the arrangement, this may cause one or more balls to be released and / or facets of a sphere to be exposed. This can be used for various purposes in for example a game or dice.

[0055] In another embodiment of the present invention, the apparatus can be mounted such that it is able to spin on base, in a similar manner to a mouse "roller ball". This may cause one or more balls to be released.

[0056] In the described embodiments, there is a single area in each sphere. It is possible in alternative embodiments of the invention to divide the spheres so that they comprise more than one compartment. Alternatively partition walls may be provided. The walls do not define separate compartments but interlinked regions.

[0057] In one modification, the opening provided on the fifth sphere may be provided with a cover which prevents the user from inserting a rod shaped item to cheat. The cover would allow the ball to be inserted into the spheres by guiding the ball along the outer surface of the sphere and then into the opening. In this alternative part of the neck portion would be removed to allow the ball to go into the apparatus.

[0058] In the described embodiment of Figures 1 to 3, each sphere has only a single opening. However in alternative embodiments of the invention, one or more of the spheres may be provided with one or more openings. One or more of the spheres may be provided with one or more enclosures.

[0059] Preferably, at least the outer sphere and one other sphere are each provided with more than one opening. Preferably at least the outer sphere and one other sphere are each provided with more than one enclosure.

[0060] Preferably, the total number of enclosures is equal to the number of balls. Each of the enclosures may be coded to match a respective one of said balls; the aim being to move a ball into the enclosure having the matching code. The coding may be by colour or number, for example.

[0061] When a ball has been captured in an enclosure, a mechanism may be operated to in order to retain the ball in the projection.

[0062] Preferably, a mechanism is provided, which can be operated to retain in their respective enclosures all balls captured in an enclosure. When the apparatus is used as a game with the aim of moving the one or more balls from the innermost sphere via the openings/projections between the spheres to the enclosures, this mechanism can be used to "save" a playing position reached so that the player can take a break from play.

[0063] A mechanism to retain a ball captured in an enclosure preferably comprises a (spherical) frame (70) located next to the inner surface of the sphere (see Figure 5). A turning knob (75) located on the outside of the apparatus may be used to rotate the (spherical) frame. The (spherical) frame is moveable between a first position where the one or more openings are open and a second position where the one or more openings are closed.

[0064] The described embodiment of Figures 1 to 3 uses a single ball. However it should be appreciated that alternative embodiments of the invention may have plurality of balls (see Figure 4). The balls can be the same or different. For example one or more of the balls may be of a different colour and/or size. A plurality of different types of balls may be provided. For example a plurality of different colours of ball may be provided.

Claims

1. Apparatus comprising:

at least three 3-dimensional shapes (2, 4, 6, 8, 10), a first one of the 3-dimensional shapes (2) being rotatably supported within a second one of the 3-dimensional shapes (4), the second one of the 3-dimensional shapes (4) being rotatably supported within a third one of the 3-dimensional shapes (6), at least one of the 3-dimensional shapes comprising an opening (22, 24, 26, 28) capable of connecting at least one of the shapes

to another, said at least one opening (22, 24, 26, 28) permitting movement of one or more balls (32) from one shape to another, and **characterised in that** at least one of the 3-dimensional shapes is supported in another of the 3-dimensional shapes by a gimbal (12a, 12b).

2. Apparatus according to Claim 1 wherein the means for rotatably supporting one shape in another comprise one of a projection and cradle on an outer surface of the inner shape and the other of a projection and cradle on an inner surface of the outer shape.
3. Apparatus according to Claim 1 or 2 wherein the first and second shapes are supported by means contained in a common plane arranged to extend through the middle of the apparatus, and wherein the at least three of the shapes are arranged such that one shape is supported within another with respective supporting means being angularly spaced apart on the plane.
4. Apparatus according to any one of the preceding Claims wherein the 3-dimensional shapes are spheres.
5. Apparatus according to any one of Claims 1 to 3 wherein at least one of the shapes comprises a surface comprising a plurality of planar facets.
6. Apparatus according to any one of the preceding Claims wherein at least one of the shapes is substantially transparent.
7. Apparatus according to any one of the preceding Claims wherein at least one of the shapes comprises a plurality of openings.
8. Apparatus according to any one of the preceding Claims wherein at least one opening is provided with a projecting portion (22, 24, 26, 28) extending from an outer surface of the shape.
9. Apparatus according to Claim 8 wherein the projecting portion has a height which is substantially the same as the distance from the shape on which the projecting portion is provided to the shape containing the shape on which the projecting portion is provided.
10. Apparatus according to any one of the preceding Claims wherein one or more shapes are limited in the movement possible about the gimbal.
11. Apparatus according to any one of the preceding Claims wherein the apparatus is arranged so that the one or more balls move to the innermost shape,

under the influence of gravity, when the apparatus is shaken or otherwise agitated.

12. Apparatus according to Claim 7 wherein at least one opening is an opening to an enclosure (62) which can hold a single ball.
13. Apparatus according to Claim 12 wherein at least one of the shapes comprises a plurality of enclosures (62).
14. Apparatus according to Claim 13 wherein the total number of enclosures is equal to the total number of balls and each of the enclosures is coded to match a respective one of the balls.
15. Apparatus according to Claim 13 or 14 wherein a mechanism (70, 75) is provided, which can be operated to retain in their respective enclosures all balls captured in an enclosure.

Patentansprüche

1. Vorrichtung, umfassend:

zumindest drei dreidimensionale Formen (2, 4, 6, 8, 10), wobei eine erste der dreidimensionalen Formen (2) drehbar in einer zweiten der dreidimensionalen Formen (4) gehalten wird, wobei die zweite der dreidimensionalen Formen (4) drehbar in einer dritten der dreidimensionalen Formen (6) gehalten wird, wobei zumindest eine der dreidimensionalen Formen eine Öffnung (22, 24, 26, 28) umfasst, die fähig ist, zumindest eine der Formen mit einer anderen zu verbinden, wobei zumindest eine Öffnung (22, 24, 26, 28) eine Bewegung einer oder mehrerer Kugeln (32) von einer Form zu einer anderen erlaubt, und **dadurch gekennzeichnet, dass** zumindest eine der dreidimensionalen Formen durch eine Aufhängung (12a, 12b) in einer anderen der dreidimensionalen Formen gehalten wird.

2. Vorrichtung gemäß Anspruch 1, wobei die Mittel zum drehbaren Halten einer Form in einer anderen eines aus einem Vorsprung und einer Mulde an einer Außenfläche der inneren Form und das andere aus einem Vorsprung und einer Mulde an einer Innenfläche der äußeren Form umfassen.
3. Vorrichtung gemäß Anspruch 1 oder 2, wobei die erste und die zweite Form durch Mittel gehalten werden, die in einer gemeinsamen Ebene enthalten sind und so angeordnet sind, dass sie sich durch die Mitte der Vorrichtung erstrecken, und wobei die zumindest drei Formen so angeordnet sind, dass eine Form mit

jeweiligen Halterungsmitteln, die auf der Ebene winkelmäßig voneinander beabstandet sind, in einer anderen gehalten wird.

4. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei die dreidimensionalen Formen Kugeln sind.
5. Vorrichtung gemäß einem der Ansprüche 1 bis 3, wobei zumindest eine der Formen eine Oberfläche umfasst, die mehrere flache Facetten umfasst.
6. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei zumindest eine der Formen im Wesentlichen durchsichtig ist.
7. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei zumindest eine der Formen mehrere Öffnungen umfasst.
8. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei zumindest eine Öffnung mit einem vorspringenden Teil (22, 24, 26, 28) versehen ist, der sich von einer äußeren Oberfläche der Form erstreckt.
9. Vorrichtung gemäß Anspruch 8, wobei der vorspringende Teil eine Höhe aufweist, die im Wesentlichen dem Abstand von der Form, an der der vorspringende Teil bereitgestellt ist, zu der Form, welche die Form, an der der vorspringende Teil bereitgestellt ist, enthält, gleich ist.
10. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei eine oder mehrere Formen in der Bewegung, die um die Aufhängung möglich ist, beschränkt sind.
11. Vorrichtung gemäß einem der vorhergehenden Ansprüche, wobei die Vorrichtung so eingerichtet ist, dass sich der eine oder die mehreren Kugeln unter dem Einfluss der Schwerkraft zur innersten Form bewegen, wenn die Vorrichtung geschüttelt oder anders bewegt wird.
12. Vorrichtung gemäß Anspruch 7, wobei zumindest eine Öffnung eine Öffnung zu einem Gehäuse (62) ist, das eine einzelne Kugel halten kann.
13. Vorrichtung gemäß Anspruch 12, wobei zumindest eine der Formen mehrere Gehäuse (62) umfasst.
14. Vorrichtung gemäß Anspruch 13, wobei die gesamte Anzahl der Gehäuse der gesamten Anzahl von Kugeln gleich ist und jedes der Gehäuse so codiert ist, dass es zu einer entsprechenden der Kugeln passt.
15. Vorrichtung gemäß Anspruch 13 oder 14, wobei ein

Mechanismus (70, 75) bereitgestellt ist, der betätigt werden kann, um alle Kugeln, die in einem Gehäuse gefangen wurden, in ihren jeweiligen Gehäusen zurückzuhalten.

Revendications

1. Dispositif comprenant:

au moins trois formes (2, 4, 6, 8, 10) tridimensionnelles, une première des formes tridimensionnelles (2) étant supportée à rotation dans une deuxième des formes tridimensionnelles (4), le deuxième des formes tridimensionnelles (4) étant supportée à rotation dans une troisième des formes tridimensionnelles (6), au moins d'une des formes tridimensionnelles comprenant une ouverture (22, 24, 26, 28) capable de connecter au moins l'une des formes les unes aux autres, ladite au moins une ouverture (22, 24, 26, 28) permettant un déplacement d'une ou plusieurs balles (32) d'une forme à une autre, et **caractérisé en ce qu'**au moins d'une des formes tridimensionnelles est supportée dans une autre des formes tridimensionnelles par un cardan (12a, 12b).

2. Dispositif selon la revendication 1, dans lequel les moyens pour supporter à rotation une forme dans une autre comprenant l'un d'une saillie et d'un berceau sur une surface extérieure de la forme intérieure et l'autre d'une saillie et d'un berceau sur une surface intérieure de la forme extérieure.

3. Dispositif selon la revendication 1 ou 2, dans lequel les première et deuxième formes sont supportées par des moyens contenus dans un plan commun agencé pour passer par le centre de le dispositif, et dans lequel au moins trois des formes sont agencées de manière qu'une forme soit supportée dans une autre, avec des moyens support respectifs espacés angulairement sur le plan.

4. Dispositif selon l'une quelconque des revendications précédentes, dans lequel les formes tridimensionnelles sont des sphères.

5. Dispositif selon l'une quelconque des revendications 1 à 3, dans lequel au moins l'une des formes comprend une surface comprenant une pluralité de facettes planes.

6. Dispositif selon l'une quelconque des revendications précédentes, dans lequel au moins l'une des formes est sensiblement transparente.

7. Dispositif selon l'une quelconque des revendications

précédentes, dans lequel au moins l'une des formes comprend une pluralité d'ouvertures.

8. Dispositif selon l'une quelconque des revendications précédentes, dans lequel au moins une ouverture est munie d'une partie en saillie (22, 24, 26, 28) s'étendant à partir d'une surface extérieure de la forme.

9. Dispositif selon la revendication 8, dans lequel la partie en saillie présente une hauteur sensiblement identique à la distance allant de la forme sur laquelle la partie en saillie est prévue à la forme contenant la forme sur laquelle la partie en saillie est prévue.

10. Dispositif selon l'une quelconque des revendications précédentes, dans lequel une ou plusieurs formes sont limitées en mouvement possible autour du cardan.

11. Dispositif selon l'une quelconque des revendications précédentes, dans lequel le dispositif est agencé de manière que les une ou plusieurs balles se déplacent vers la forme la plus intérieure, sous l'influence de la gravité, lorsque le dispositif est secoué ou agité d'une autre manière.

12. Dispositif selon la revendication 7, dans lequel au moins une ouverture est une ouverture vers une enceinte (62) pouvant contenir une balle unique.

13. Dispositif selon la revendication 12, dans lequel au moins l'une des formes contient une pluralité d'enceintes (62).

14. Dispositif selon la revendication 13, dans lequel le nombre total d'enceintes est égal au nombre total de balles et chacune des enceintes est codée pour coïncider avec une balle respective parmi les balles.

15. Dispositif selon la revendication 13 ou 14, dans lequel un mécanisme (70, 75) est prévu, pouvant être actionné pour retenir en leurs enceintes respectives toutes les balles capturées dans une enceinte.

Figure 1

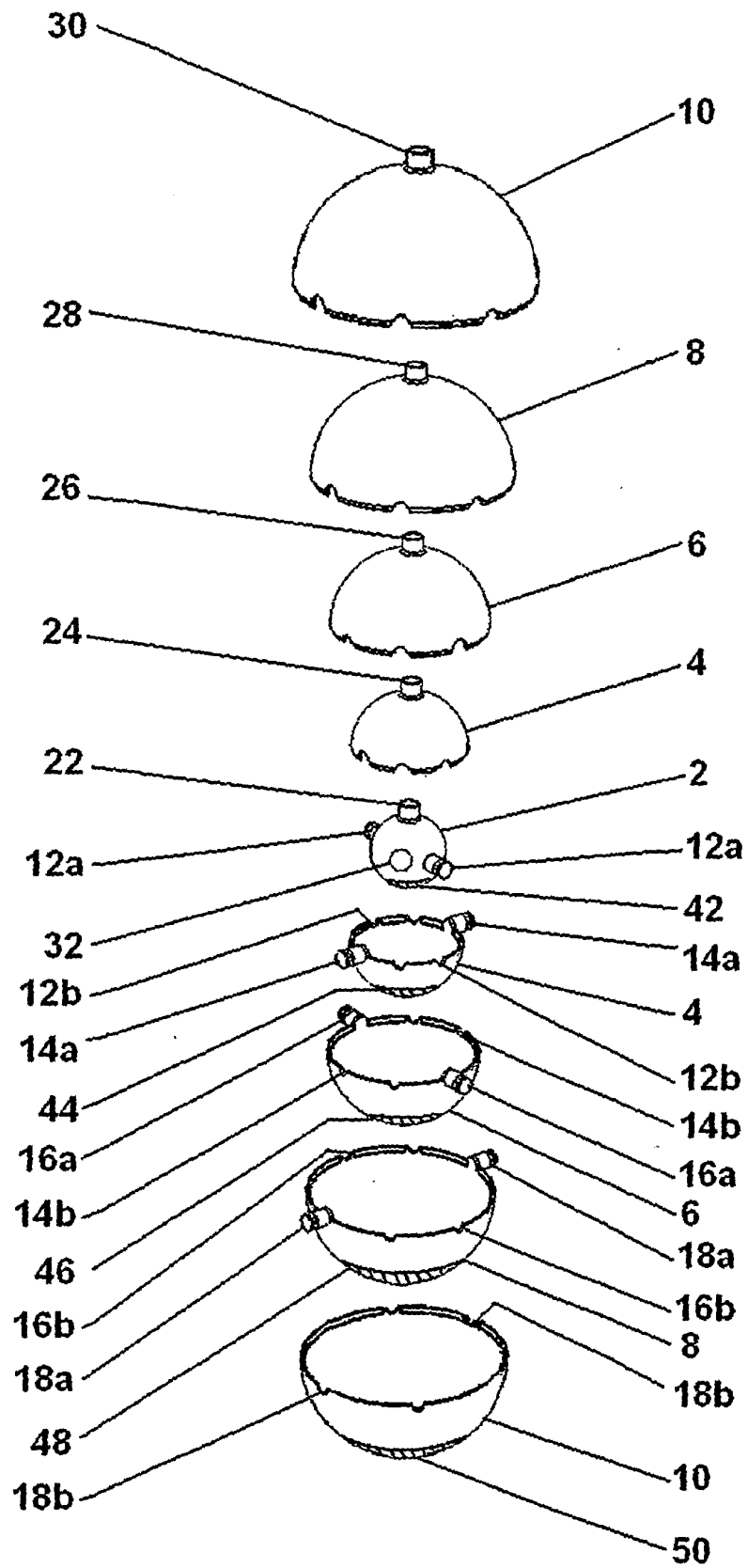


Figure 2

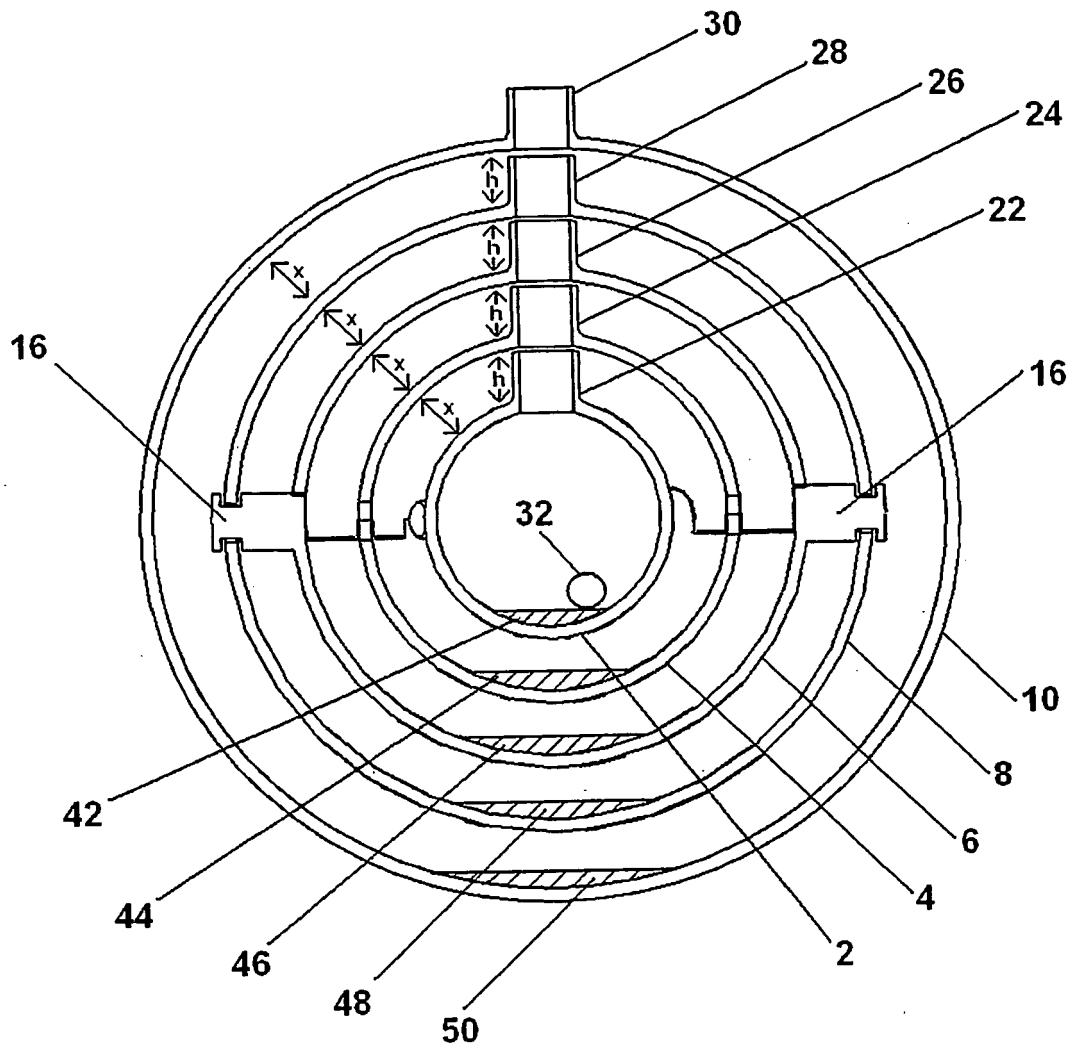
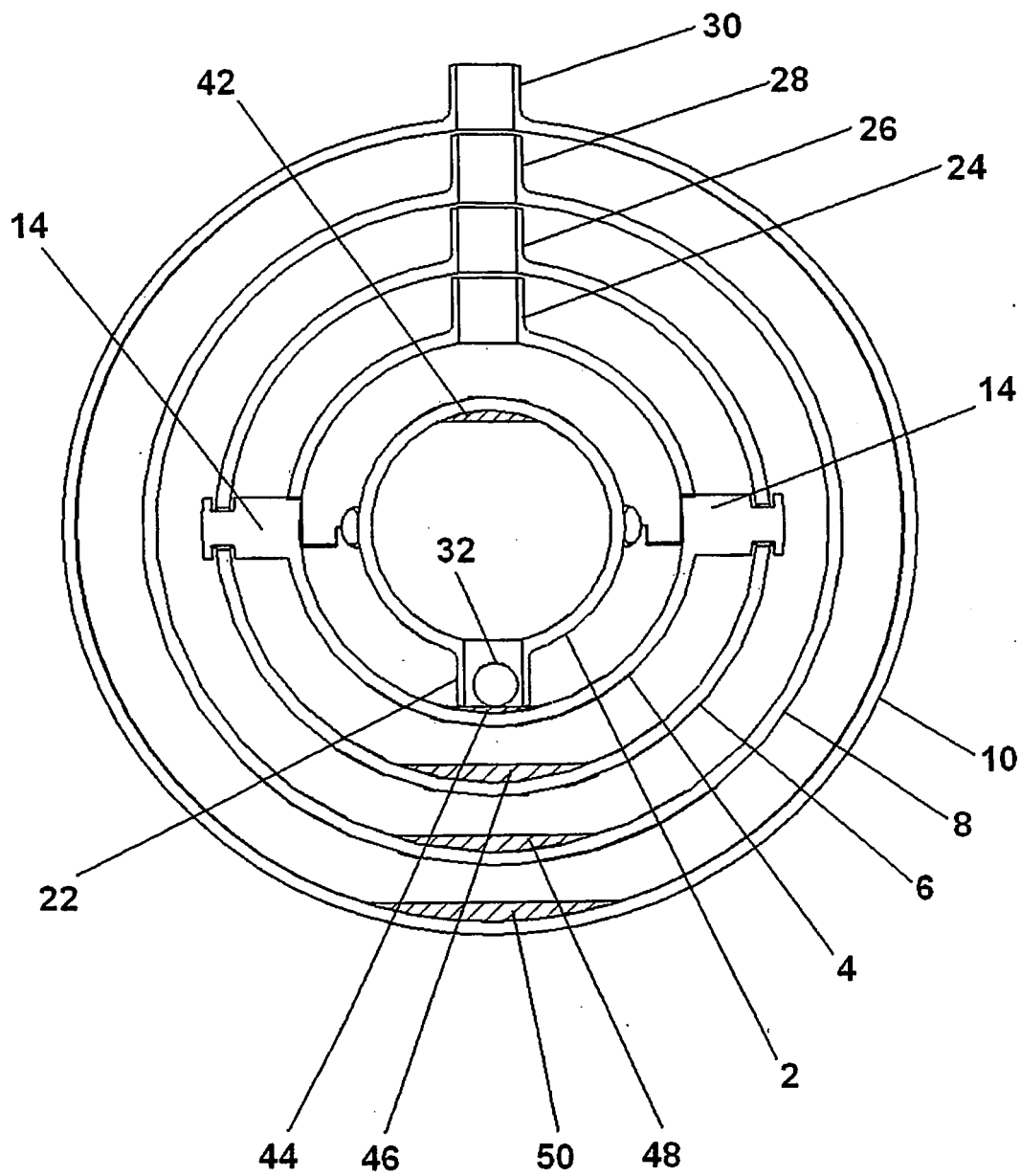


Figure 3



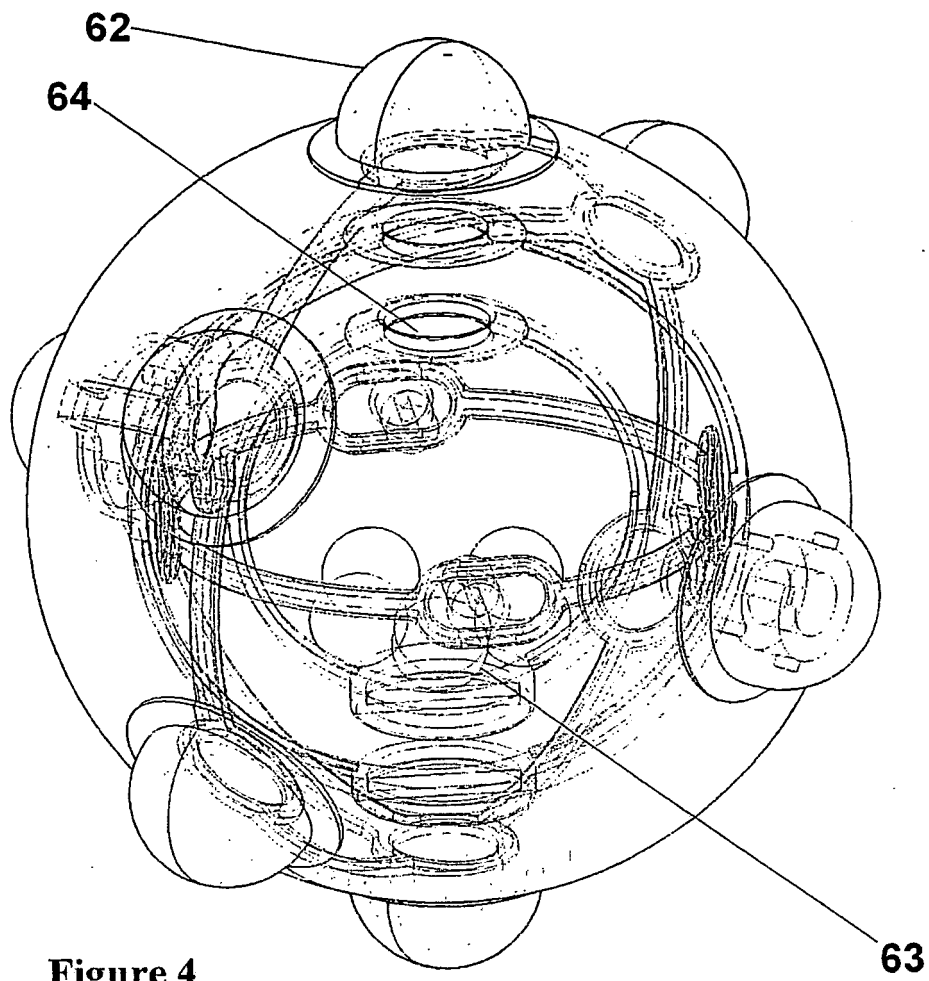


Figure 4

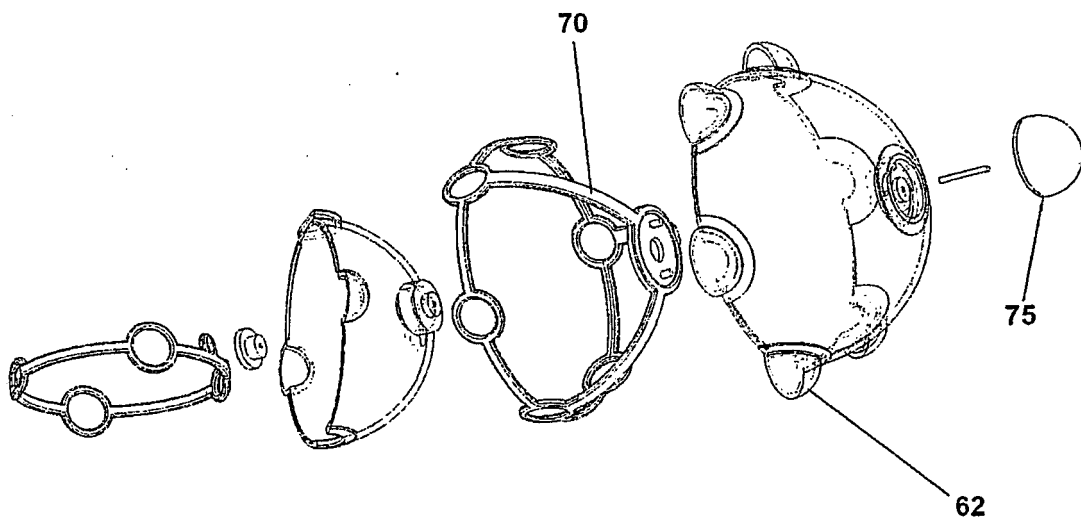


Figure 5

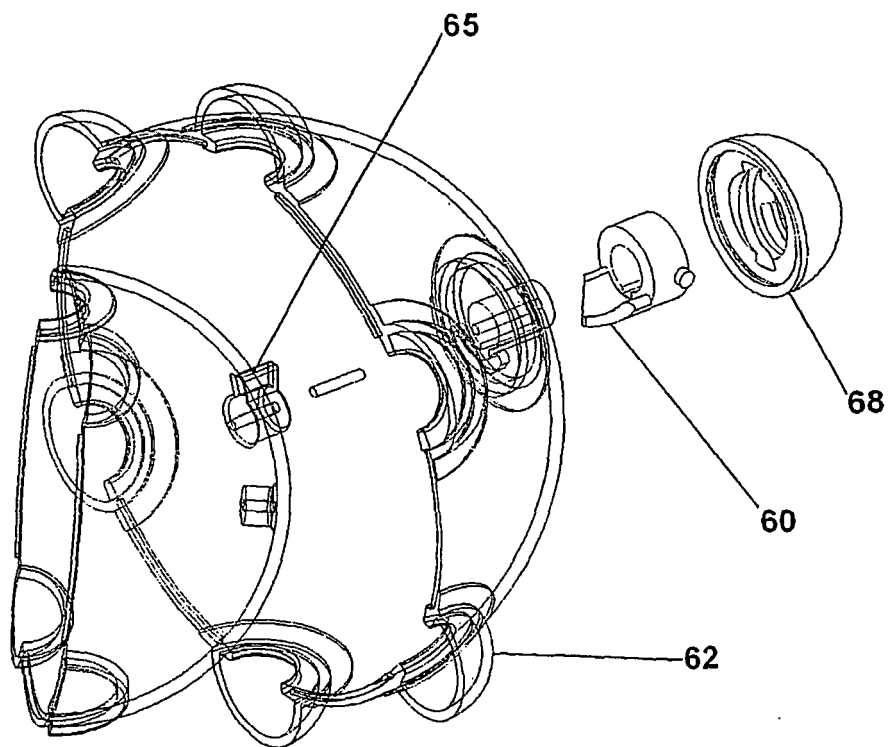


Figure 6

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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