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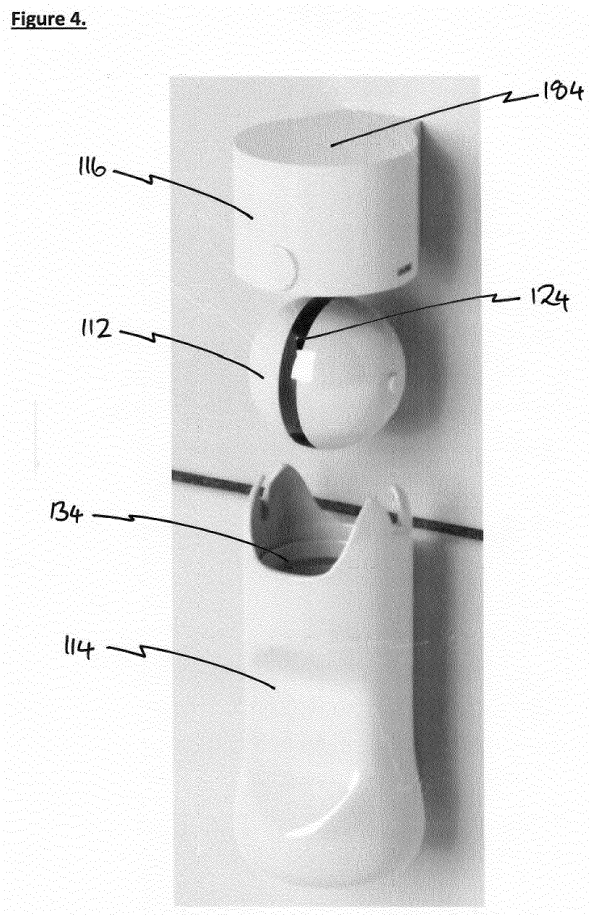
(54) **REFILLABLE ROLLERBALL**

(57) A device for applying a liquid to a surface is disclosed. The roller ball device is primarily for applying liquid cleansing gel to toilet papers for use in personal cleaning. The device has a ball and a bottle which contains the liquid. A cage forms part of the bottle with a first opening to expose the ball to the liquid gel. There is also a second opening for exposing the ball to the surface onto which the liquid gel is to be applied. An edge of this second opening has a first pair of portions which are located on one side of a meridian of the ball and a second pair of portions of the edge are located on the other side of the meridian. The undulating edge makes it easy to remove the ball to replenish the bottle with cleansing liquid.

Figure 4.



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Description

[0001] The present invention relates to a device for applying a liquid to a surface and relates particularly, but not exclusively, to a refillable device for applying a cleansing gel to toilet paper for personal cleaning.

[0002] Replenishable permanent domestic rollerball units are a viable way to replace the multi-consumer purchase of low density polyester (LDPE) wrapped packs of resealable viscose wet wipes for personal cleansing as described in UK patent number GB2582389, which is hereby incorporated by reference in its entirety. LDPE packs are not easily recyclable and the viscose is not 'biodegradable' in normal UK weather conditions. Sadly, such wipes are claimed to be 'flushable' because they are 'plant based'. Viscose is made by reconstituting cellulose fibres after swelling by Sodium Hydroxide and Xanthating with Carbon Disulphide followed by bathing and spinning in Sulphuric Acid and Zinc and other Sulphates. Although the origin of the cellulose that forms the viscose is plant based, the fibre cannot be described as 'natural' due to the extensive chemical processing required to make it. Viscose is not made in the UK because the process contravenes UK Health and Safety Law. Furthermore, unlike the cellulose in toilet tissue it does not fully disperse nor disappear quickly in water. Toilet tissue for the UK Market is entirely made in the UK whereas Viscose is primarily made in East Asian countries. Although described as 'flushable' Viscose based wet wipes still contribute to the formation of fatbergs in sewerage systems and water companies are looking for environmentally friendlier alternatives. Viscose takes a long time to degrade and therefore litters rivers and beaches when inevitably sewage systems discharge untreated sewage especially in bad weather.

[0003] UK patent number GB2582389 discloses a device for applying a cleansing liquid gel to a toilet tissue in a thin strip so as to enable effective cleaning without overloading the delicate tissue structure with liquid thereby risking the integrity of paper fibres and causing ripping of the tissue. Roller ball applicators generally suffer from the environmental problem of being a single use plastic which is disposed of once empty and refilling techniques of the prior art, such as screw fit cages, are not effectively used. As a result, the majority of roller-on or roller ball applicators are disposed of once exhausted and are not even effectively or easily recycled.

[0004] Preferred embodiments of the present invention seek to overcome or alleviate the above described disadvantages of the prior art.

[0005] According to an aspect of the present invention there is provided a device for applying a liquid to a surface, the device comprising:

a ball comprising a thermoplastic shell and a ferromagnetic material;

a vessel for containing a liquid to be applied to a surface;

a cage for retaining while allowing rotation of said ball, the cage comprising a first opening for exposing a first portion of said ball to said liquid inside said vessel and a second opening for exposing the ball to a surface onto which the liquid is to be applied; and

a cap for enclosing the ball, cage and a portion of the vessel, wherein the cap comprises a magnet for attracting the ferromagnetic material in the ball.

[0006] In a preferred embodiment the ball is formed in two halves.

[0007] In another preferred embodiment the ferromagnetic material comprises a washer.

[0008] In a further preferred embodiment the ball halves are identical and each comprise a plurality of retainers for cooperating with said washer to close against each other to form said ball.

[0009] According to another aspect of the present invention there is provided a device for applying a liquid to a surface, the device comprising:

a ball;

a vessel for containing a liquid to be applied to a surface;

a cage for retaining while allowing rotation of said ball, the cage comprising a first opening for exposing a first portion of said ball to said liquid inside said vessel and a second opening for exposing the ball to a surface onto which the liquid is to be applied, said second opening having an edge, wherein a first plurality of portions of said edge are located on one side of a meridian of said ball and a second plurality of portions of said edge are located on another side of said meridian.

[0010] By providing a cage which has an edge which extends below the meridian or centre line of the ball, the advantage is provided that the ball can be easily removed from the cage allowing direct access to the vessel for refilling. this is achieved by allowing pressure to be applied to the ball below the point at which it is retained in the cage. Furthermore, the vessel and cage can be formed as a single item reducing the cost and complexity of manufacture and improving the recyclability of the whole device. When considered in the context of reducing the use of wet wipes, 400ml of gel is sufficient to replace 25 packs of wipes.

[0011] In replacing a screw on separate cage with a blow moulded vessel and cage combined, the advantage is provided that the manufacturing costs have reduced by removing a component and reducing the injection moulding required. Furthermore, the removable ball can be easily cleaned compared to a screw fitted refillable

roller ball device in which the ball remains in the cage. Also, the removal of the screw fitting means that the hole between the cage and the part of the vessel containing the liquid can be larger resulting in a wider stripe of gel being applied to the paper surface as well as making the replenishing process easier.

[0012] In a preferred embodiment the ball further comprises a strip extending around another meridian having a less slippery surface than the remainder of the ball.

[0013] The inclusion of a strip of less slippery surface improves the grip which can be applied to the ball to facilitate easy removal.

[0014] In another preferred embodiment the less slippery surface comprises an ink or paint.

[0015] The ball may be formed in two halves.

[0016] In a preferred embodiment the ink or paint is applied to an edge of each said ball half.

[0017] By forming the ball into halves and applying an ink or paint to the edges of each half, the advantage is provided that the strip of less slippery surface is easily created as part of the formation of the ball. Furthermore, the ball can be made by injection moulding which provides much more control for forming the ball accurately, to any desired weight and with surface textures.

[0018] The device may further comprise a cap for enclosing the ball, cage and a portion of the vessel, wherein said ball further comprises a thermoplastic shell and a ferromagnetic material and wherein the cap comprises a magnet for attracting the ferromagnetic material in the ball.

[0019] In a preferred embodiment the ferromagnetic material comprises a washer.

[0020] By including a ferromagnetic material, most preferably in the form of a washer, the advantage is provided that the device can be attracted into its cap very easily to seal the device and protect the ball. This is particularly advantageous where the cap is attached to a wall adjacent a toilet so that the device can be easily removed for single handed use. That is, the vessel and ball can be remove from engagement with the cap by a simple pulling action without the need for rotation, as required by threaded closures, or some form of push button release. Furthermore, the use of a washer, which necessarily extends around a circumference of the ball, is particularly effective when the rotation of the ball is limited to rotation around an axis, that is, end over end rotation because the plane of the washer can be simply arranged so as to be perpendicular to the axis of rotation meaning that the washer is a consistent distance from the uppermost edge of the ball at all times. As a result, the washer in the ball is easily attracted to the magnet were they consistent retaining force to maintain engagement of the device with the cap.

[0021] In another preferred embodiment the ball halves are identical and each comprise a plurality of retainers for cooperating with said washer to close against each other to form said ball.

[0022] In another preferred embodiment the majority of an external surface of said ball is spherical except a part of said surface portion, contained within said cage, and which has a differently shaped surface for engaging a mutually shaped surface of said cage.

[0023] In a further preferred embodiment the mutually shaped surface is planar.

[0024] By providing mutually engaging planar surfaces the advantage is provided that the ball is forced to rotate around a single axis and this helps to ensure that the liquid gel is applied to the surface, toilet paper, in an even thickness of strip. By ensuring that the correct volume per unit surface area of liquid is applied to the toilet tissue, the advantage is provided that the integrity of the fibrous structure of the paper is maintained when the paper, to which gel has been applied, is used for personal cleansing.

[0025] Preferably the ball comprises a pair of stub axles.

[0026] The use of stub axles helps to ensure the correct orientation when the ball is removed for refilling the device and also prevents users from applying unnecessary force when applying the liquid to paper which might engage the upper cage rim and impede flow of the liquid.

[0027] The vessel and cage are preferably formed as a single component.

[0028] Preferably the ball comprises a pair of stub axles.

[0029] Preferred embodiments of the present invention will now be described, by way of example only, and not in any limitative sense with reference to the accompanying drawings in which:-

Figure 1 is a perspective exploded view of a device of the present invention;

Figure 2 is perspective view of a portion of the device of figure 1;

Figure 3 is a close up of a portion of the image of figure 1;

Figure 4 is an exploded view of an alternative embodiment of the present invention;

Figure 5a and 5b are a perspective and exploded view of the device of Figure 4;

Figure 6 is a sectional view of a ball of an embodiment of the present invention;

Figure 7 and 8 are perspective views in an assembled and none assembled condition of a ball used in the device of Figure 4;

Figure 9 is a perspective view of a refill device used in conjunction with the present invention; and

Figure 10 a perspective view of the refill device of

Figure 9 in use.

[0030] Referring initially to figures 1 to 3, a purpose of the present invention is to provide a roller ball which can be easily refilled and therefore reused. The roller ball device 10 includes a ball 12, a vessel, in the form of bottle 14, and a lid 16. The ball 12 is substantially spherical although it has a pair of flat surfaces 18 on opposing sides, one of these is highlighted with a dotted line in figure 3. The ball is formed from two halves 20 and 22 with a line of ink or paint 24 which indicates the location of the joint between the two halves.

[0031] The bottle 14 is provided to contain a gel liquid (not shown) which is for application to a surface. Throughout this application the term liquid should be taken to include any liquid or liquid like substance including, but not limited to, gels, lotions and oils. The bottle 14 is formed as a single component but has three sections. Firstly, at one end there is the handle 26 which is provided for easy holding of the roller ball device 10. Located in the middle is a main body 28 providing the main volume of the bottle 14 in which the gel is contained. A cage 30 contains and retains the ball 20 while allowing it to rotate and is located on the other side of the main body 28 from the handle.

[0032] The cage 30 has two openings. The first opening is located at the junction between the cage and the main body 28 and exposes the ball to the liquid contained in the main body of the bottle 14. This first opening is not visible in the figures. The second opening, indicated at 34, exposes the ball to the outside of the device as the ball rotates and therefore to the surface onto which the liquid is to be transferred. Both openings are sized to prevent the ball from passing through them easily. The first opening is circular and has a diameter which is less than the diameter of the ball. For example, the ball has a 38mm diameter and the diameter of the aperture that is the first opening is 36.5mm. The shape of the second opening is not circular. An edge 36 of the second opening 34 has a shape which is based on a circle (indicated by the dotted line 38) but which includes a pair of cutaways 40. The diameter (indicated at 42) for the circle 38 is 35mm. Because both the first opening and the circular portion of the second opening have a diameter smaller than the diameter of the ball 12, the ball generally remains trapped within the cage between the first and second openings.

[0033] The space within the cage 38 is shaped to match the substantially spherical shape of the ball 12. That is, an internal surface 44 of the cage 30 is a corresponding shape which matches and is slightly larger than the 38mm diameter of the ball thereby allowing the ball to rotate within the cage. As well as matching the substantially spherical shape of the ball, the internal surface 44 has corresponding planar portions, the location of which is indicated at 46. The diameter of the flat spot 18 on the ball 12 is 10mm and the gap of 0.5mm between the internal surface 44 and the ball means that a 15mm planar portion is required on that internal surface 44. The interaction of the planar surfaces on the balls with the planar surfaces in the cage encourage the ball to rotate about an axis 48 which extends through the planar surfaces 18 on the ball 12. The axis 48 is perpendicular to the ink line 24 and therefore as the ball rotates the ink line 24 remains in line.

[0034] Because the ball 12 is trapped in the cage 30 between the first and second openings, the majority of a meridian of the ball is contained within the cage. An example of this meridian is indicated by the dotted line 50 in figure 2. This line can be imagined as the widest part of the ball 12 if the device 10 were being held and hanging down by the handle 26. The majority of the edge 36 of the second opening 34 is located on one side (below in the orientation described above and indicated at 52 in figure 2) of the meridian line 50. A smaller portion of the edge 36 is located on the other side (above and indicated at 54) the meridian 50. The portion 54 of edge 36 that is above the meridian line 50 is mirrored on opposing sides of the cage and there are therefore two such portions 54 (and two portions 52 below the meridian). As a result, a majority of the meridian 50 is contained within the cage 30, although a small portion of the ball above the meridian is exposed. The edge 36 of the second opening 34 is therefore undulating and passing from one side of the meridian 50 to the other.

[0035] The final component of the device 10 is the lid or plinth 16 which is used to cover the ball 12 when the device is not in use. The plinth 16 has a base 58, wall 60 and a recess 62 into which the ball 12 and cage 30 are received. A ridge 64 which is between the main body 28 and the cage 30 on the external surface of the bottle 14 engages and upper edge 66 between the wall 60 and the recess 62 of the plinth. Within the recess 62 a ball engager (not shown) abuts the ball when the bottle 14 engages the plinth 16 so that the ridge 64 and upper edge 66 are in contact with each other. By contacting the ball 12, the ball engager pushes the ball into engagement with the first opening so as to seal the first opening and preventing the liquid from escaping through the first opening, around the ball 12 and into the recess 62 of the plinth.

[0036] Manufacture of the device 10 will now be described. The device 10 is formed from three components, namely the bottle 14 and the plinth 16 as well as the ball 12 which is formed in two halves 20 and 22. All four component are formed from PET with the ball halves 20 and 22 and the plinth formed by injection moulding and the bottle formed by blow moulding. The two ball halves are joined together to form the ball but prior to this action being taken they are partially dipped into an ink or paint so as to create a thin strip around the bottom edge of each ball half extending a short way up the out wall of the ball half. Because the ball is made in two halves using injection moulding, the texture of the ball surface can be easily controlled and indeed varied across the ball. For example, the edges that will be joined together to form

the central strip can be roughened to assist in the receipt of the ink and to enhance the grip that is applied to the ball. The two ball halves are then fixed together by a friction or force fit which may be enhanced by the use of an adhesive. The ink line 24 is then present on the ball 12. The non-slip ink used creates a surface that is less slippery, even when wetted with a cleaning gel liquid, than the smoother outer surface of the ball 12.

[0037] The device can be sold as the three separate components of the ball, bottle and plinth with the cleansing liquid sold in a different container. In order to complete the creation of the roller ball device 10, which is used to apply cleansing liquid gel to sheets of toilet paper, by filling the bottle with the liquid gel and pushing the ball into the cage 30 through the second opening 34. To do this correctly, the ink line 24 must be aligned with the cutaways 40 of the edge 36 of the second opening 34 so that, once inserted, the planar portions 18 of the ball 12 are aligned with the planar portions 46 of the cage 30. Alternatively, the gel can be added to the device during manufacture and subsequent replenishment bottles purchased separately.

[0038] The bottle 14 is then placed into the plinth 16. This causes the gel to contact the portion of the ball that extends through the first opening and ensures that the device is always ready for use. When required, the user picks the device up by the handle 24 and rolls the ball 12 over the surface of a sheet of toilet paper so that a line of gel is painted onto that surface. Preferably, three of four stripes of gel are applied to a single sheet in the manner described in UK patent number GB2582389, which is hereby incorporated by reference in its entirety. The bottle is then returned to the plinth ready for its next use.

[0039] When the bottle becomes empty, it can be refilled easily by removing the ball 12 from the cage 30. This is achieved by gripping the ball 12 on the ink line 24 in the cutaways 40 which are closer to the bottle 14 than the meridian line 50. The additional grip provided by the ink line 24 makes it easy to remove the ball by squeezing with a finger and thumb. The bottle 14 can then be replenished with gel, the ball 12 returned into the cage 30 and then placed into the plinth 16 ready for use.

[0040] With further reference to figure 4, an alternative embodiment of the present invention will now be described in which components in common with those of figures 1 to 3 will be identified with like reference numerals increased by 100. A device 110 has a ball 112, a bottle 114 and a cap 116, which is equivalent to the lid or plinth 16 in the previous embodiment. With additional reference to figures 6 to 8, the ball 112 is also formed in two shells or ball halves 120 and 122 which are made by injection moulding of a thermoplastic material. As well as the flat surfaces 118 on opposing sides of the ball 112, there are also provided, extending from the flat surfaces, a pair of stub axles 170. From the sectional view in figure 6 and the open view in Figure 8, it is clear that the balls shown therein are slightly different embodiments. The ball in figure 6 has a washer 172 which extends around a meridian of the ball 112. That meridian of the washer 172 is not the same as the meridian 50 described above and is in fact perpendicular to that line. Furthermore, the plane of the washer 172 is perpendicular to the axis 148 which extends through the stub axles 170. The two ball halves 120 and 122 in figure 6 are formed by injection moulding and are identical in shape as a substantially hemispherical form. As a result, a single tool is able to produce the whole ball and the two halves are locked in place using the washer 172 as a structure on which to grip the two ball halves. In order to achieve this each ball half is divided into segments, in this example six segments, and each segment has a retaining tab 174 extending slightly past the meridian line of the washer 172. As a result, each ball half attaches itself to the washer 172 and they together form the ball 112. The paint line 124, not shown in figure 6, can then be used to seal the two ball halves together. The paint line 124 therefore serves three purposes of providing a better surface for the application of liquid to the paper, sealing the joint between the two ball halves and reassuring the user that the ball is rolling about a single axis thereby applying even layers of liquid to the paper.

[0041] The ball 112 is retained in engagement with the bottle 114 using a combination of the principle set out above and additionally using the stub axles 170. The cage 130 part of the bottle 114 has two pairs of retaining fingers 176 which extend above the meridian line 150. These fingers 176 act to keep the ball 112 within the cage 130. The stub axles 170 engage a recess 178 located between the fingers 176. The recess accepts and retains the stub axles during normal use of the device 110. Edges 180 of the fingers 176 direct the stub axles 170 towards the recess 178. The gap between the edges 180 narrows as they approach the recess 178 to the point where that gap is slightly smaller than the diameter of the stub axle before widening on entry into the recess which has a diameter slightly larger than the diameter of the stub axle. As a result, the stub axle is retained within the recess 178 and the slightly larger diameter of the recess means that there is slight play between the stub axle and the recess allowing slight movement of the ball within the cage, in particular up and down (as viewed in figure 5a) . The above mechanism has been described as a recess because a thin wall of plastic covers the recess 178 which helps prevent any contact with the stub axles which might interfere with the smooth rolling of the ball 112. However, this wall is not essential and can be replaced with an open recess.

[0042] In figures 5a and 5b a wall mounted bracket 182 is provided which fulfils a similar function to the cap 116 which is shown, in figure 4, as wall mounted. The cap 116 and bracket 182 both contain a magnet whose location is indicated a 184, although it is obscure from view as it is covered. The purpose of the magnet 184 is to attract the ferromagnetic washer 172 and to retain the device in engagement with the cap 116. The washer 172

extends around the ball slightly below the surface adjacent to the painted line 124. Because the ball is only able to rotate around a single axis, a portion of the washer 172 is always close to the top of the device 110 when it is being brought into engagement with the cap 116. As a result, when the device 110 is brought towards the cap 116 the magnet 184 will attract the washer 172. The magnet 184 is preferably a neodymium magnet which is easily sufficiently strong to retain the device 110 including the contents of the bottle 114 in engagement with the cap 116 when the cap is attached to the wall, as shown in Figure 4, and therefore allows single handed easy access to the device whenever required.

[0043] Turning to figures 9 and 10, a refill bottle 186 is provided for use in conjunction with the device 110. The refill bottle 186 has a main body 188 which contains a replenishment supply of the liquid, gel or lotion used in the device 110. There is also a bottle engaging portion 190 which is shaped to work cooperatively with the cage of the bottle 114 to allow easy refill. A cap receiver 192 is also provided to enable closure of the refill bottle 186. The main body 188 of the refill bottle 186 has opposing planar sides 194 which are sized and separated to allow multiple refill bottles to be packaged together into a postage pack which is able to pass through a standard sized letter box. The bottle engaging portion is formed partially from the planar sides 194 but the connecting size 196 of the bottle engaging portion 190 are shaped to match the shape of the ball 112 so as to facilitate easy engagement of the bottle engaging portion 190 into the cage 130 of the device 110 when refilling the device. All of the components of the device 110, excluding the washer 172 and magnet 184, are formed from Polyethylene terephthalate (PET) using blow moulding to form the bottle 114 and injection moulding to form the injection call halves 120 and 122 and the cap 116. PET can be easily cleaned, reused and recycled by remoulding into other products.

[0044] Operation of the device 110 will now be described. The cap 116 is fixed to a wall. This fixing can be achieved by any suitable means but a strip of a suitably strong adhesive is generally sufficient. A new device 110 is provided with the bottle 114 filled and the ball 112 in place, as shown in figure 5A. When the ball 112 is in engagement with the cap 116 the magnet 184 attracts the washer 172 with a sufficiently strong magnetic force to hold the ball 112, bottle 114 and its contents and engagement with the lid 116. The device 110 is now ready for use.

[0045] When required, a user can remove the device from engagement with the cap 116 by a simple downwards pulling action of sufficient force to release the washer 172 from the magnet 184. When the device 110 is inverted the contents of the bottle 114 will come into engagement with the ball 112 through the opening 134. The user brings the ball 112 into engagement with a sheet of toilet paper and rolls the device 110 across the sheet of paper in a direction perpendicular to the perforations on the paper. As a result, a strip of the liquid, gel or lotion contents of the bottle 114 is evenly placed onto the toilet paper. Two further stripes of the contents of the bottle 114 can be applied to substantially completely cover the sheet of toilet paper. The layer of liquid, gel or lotion is sufficiently thin so as to not risk significantly weakening the structure of the paper but is sufficient to provide excellent cleaning action. The moistened toilet paper is now ready for use and can then be disposed of into the toilet and flushed away. After use, the bottle 114 and ball 112 are returned into engagement with the cap 116. With the ball 112 oriented upwards the device is brought into engagement with the cap 116 and because the washer 172 extends around the painted line 124, just below its surface inside the ball 114, a portion of the washer will be attracted towards the magnet 184 and the ball will be pulled towards the cap and then held in place until next required.

[0046] Once the bottle 114 is empty a refill can be used to replenish the supply of liquid, gel or lotion. The first stage is to enable access into the bottle 114 by removal of the ball 112. To do this, the ball 112 is gripped between finger and thumb in the cut away portions 140 below the meridian line 150. A gentle squeezing or lifting action of the ball 112 below the meridian line 150 releases the stub axels 170 from engagement with the recesses 178 and at the same time slightly pushes apart the retaining fingers 176. With the ball removed, the bottle 114 is now open allowing it to be refilled.

[0047] In order to achieve this, ideally a refill bottle 186 is taken and the cap removed from the cap receiver 192. The empty bottle 114 is inverted and brought into engagement with the refill bottle 186 so that the bottle engaging portion 190 enters the cage 130. Because the connecting sides 196 of the refill bottle 186 are shaped to match the ball 112, they engage the cage 130 and the bottle 114 and refill bottle 186 are held together. The pair of bottles can then be inverted and the contents of the refill bottle passes through the cap receiver 192, which extends through the second opening 134, and into the bottle 114. The ball 112 can now be replaced onto the bottle 114. Typical wet-wipe use of 600 wipes per person per annum, which equates to around 15 packets of wipes, can be achieved with two 200ml bottles of the device of the present invention.

[0048] It will be appreciated by persons skilled in the art that the above embodiments have been described by way of example only and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the protection which is defined by the appended claims. For example, the mutually engaging planar surfaces do not necessarily have to be flat, as seen in the first described embodiment. For example, if the shapes are sufficiently different to the spherical shape of the ball to prevent the ball from free spinning instead forcing rotation of the ball around a single axis. Examples include small indentations which may follow other mutually engaging shapes. However, the planar surfaces are advantageous because they do not in-

terfere with the movement of the ball into and out of the cage when replenishing the bottle. Although two pairs of mutually engaging planar surfaces are on each side of the ball are described above, this is not essential and a single pair of planar surfaces on one side is sufficient to maintain the rotation of the ball around a single axis.

Claims

1. A device for applying a liquid to a surface, the device comprising:

   a ball (112) comprising a thermoplastic shell (120, 122) and a ferromagnetic material (172);
   a vessel (114) for containing a liquid to be applied to a surface;
   a cage (130) for retaining while allowing rotation of said ball, the cage comprising a first opening for exposing a first portion of said ball to said liquid inside said vessel and a second opening (134) for exposing the ball to a surface onto which the liquid is to be applied; and
   a cap (116) for enclosing the ball, cage and a portion of the vessel, wherein the cap comprises a magnet (184) for attracting the ferromagnetic material in the ball.

2. A device according to claim 1, wherein said ball is formed in two halves.

3. A device according to claim 1 or 2, wherein said ferromagnetic material comprises a washer.

4. A device according to claim 3, wherein said ball halves are identical and each comprise a plurality of retainers for cooperating with said washer to close against each other to form said ball.

5. A device according to any preceding claim, wherein said ball comprises a pair of stub axles.

6. A device for applying a liquid to a surface, the device comprising:

   a ball (12);
   a vessel (14) for containing a liquid to be applied to a surface;
   a cage (30) for retaining while allowing rotation of said ball, the cage comprising a first opening for exposing a first portion of said ball to said liquid inside said vessel and a second opening (34) for exposing the ball to a surface onto which the liquid is to be applied, said second opening having an edge (36), wherein a first plurality of portions of said edge are located on one side of a meridian (50) of said ball and a second plurality of portions of said edge are located on another side of said meridian.

7. A device according to claim 6, wherein said ball further comprises a strip extending around another meridian having a less slippery surface than the remainder of the ball.

8. A device according to claim 7, wherein said less slippery surface comprises an ink or paint.

9. A device according to any of claims 6 to 8, wherein said ball is formed in two halves.

10. A device according to claim 9, further comprising a cap for enclosing the ball, cage and a portion of the vessel, wherein said ball further comprises a thermoplastic shell and a ferromagnetic material and wherein the cap comprises a magnet for attracting the ferromagnetic material in the ball.

11. A device according to claim 10, wherein said ferromagnetic material comprises a washer.

12. A device according to claim 11, wherein said ball halves are identical and each comprise a plurality of retainers for cooperating with said washer to close against each other to form said ball.

13. A device according to any of claims 6 to 12, wherein the majority of an external surface of said ball is spherical except a part of said surface portion, contained with said cage, and which has a differently shaped surface for engaging a mutually shaped surface of said cage.

14. A device according to claim 6, wherein said mutually shaped surface is planar.

15. A device according to any of claims 6 to 14, wherein said ball comprises a pair of stub axles.

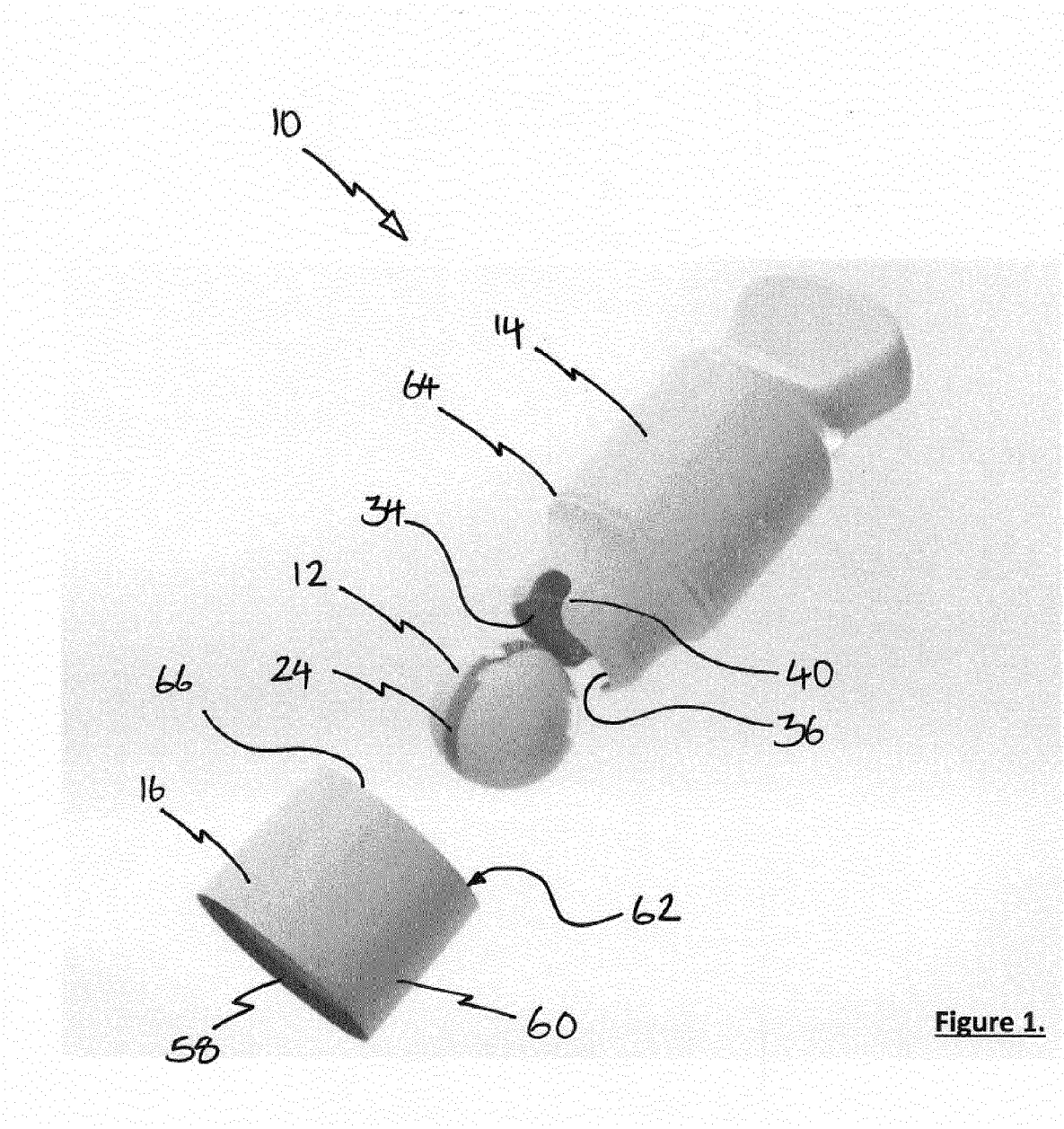


Figure 1.

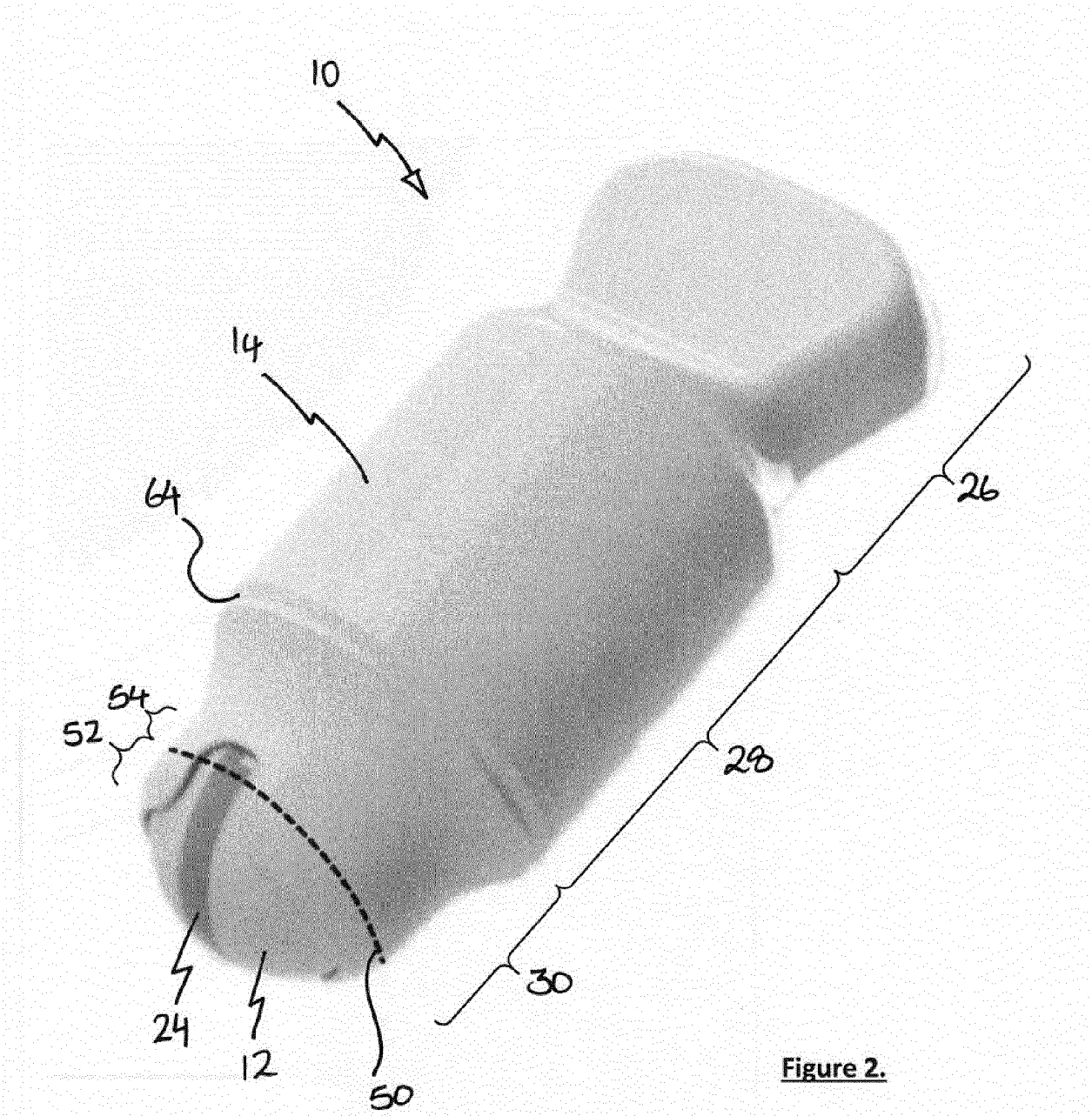


Figure 2.

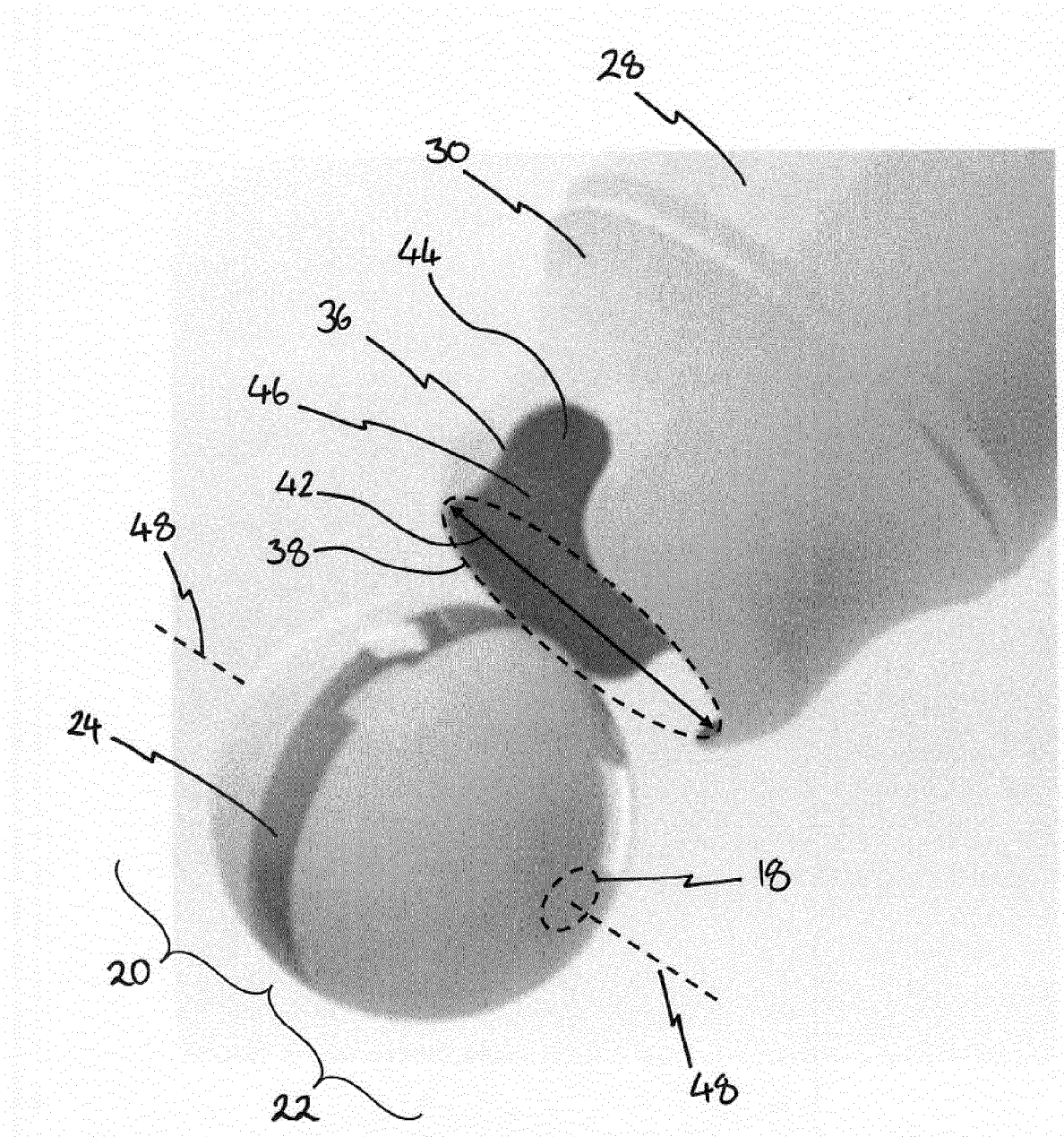
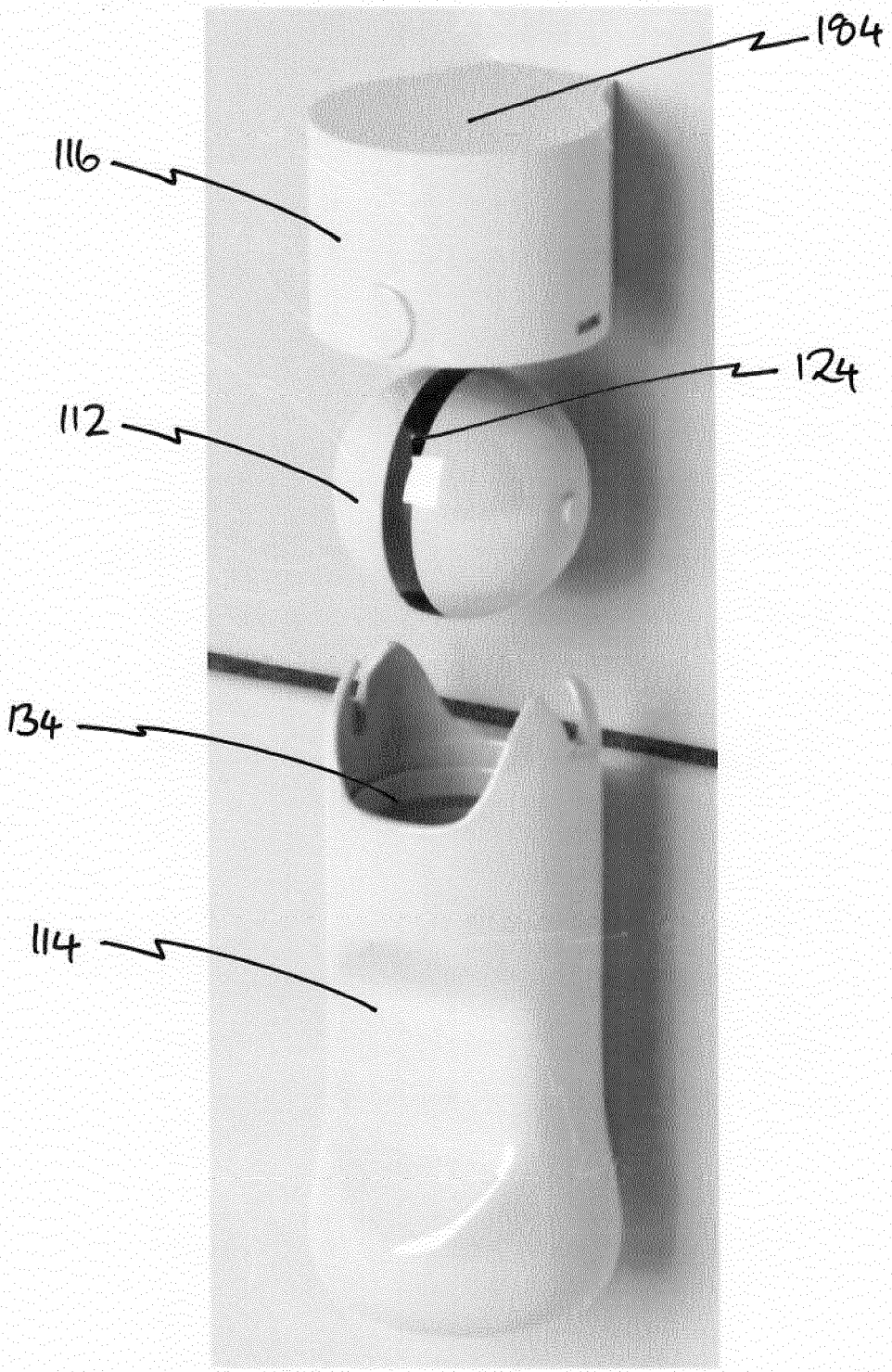


Figure 3.

Figure 4.



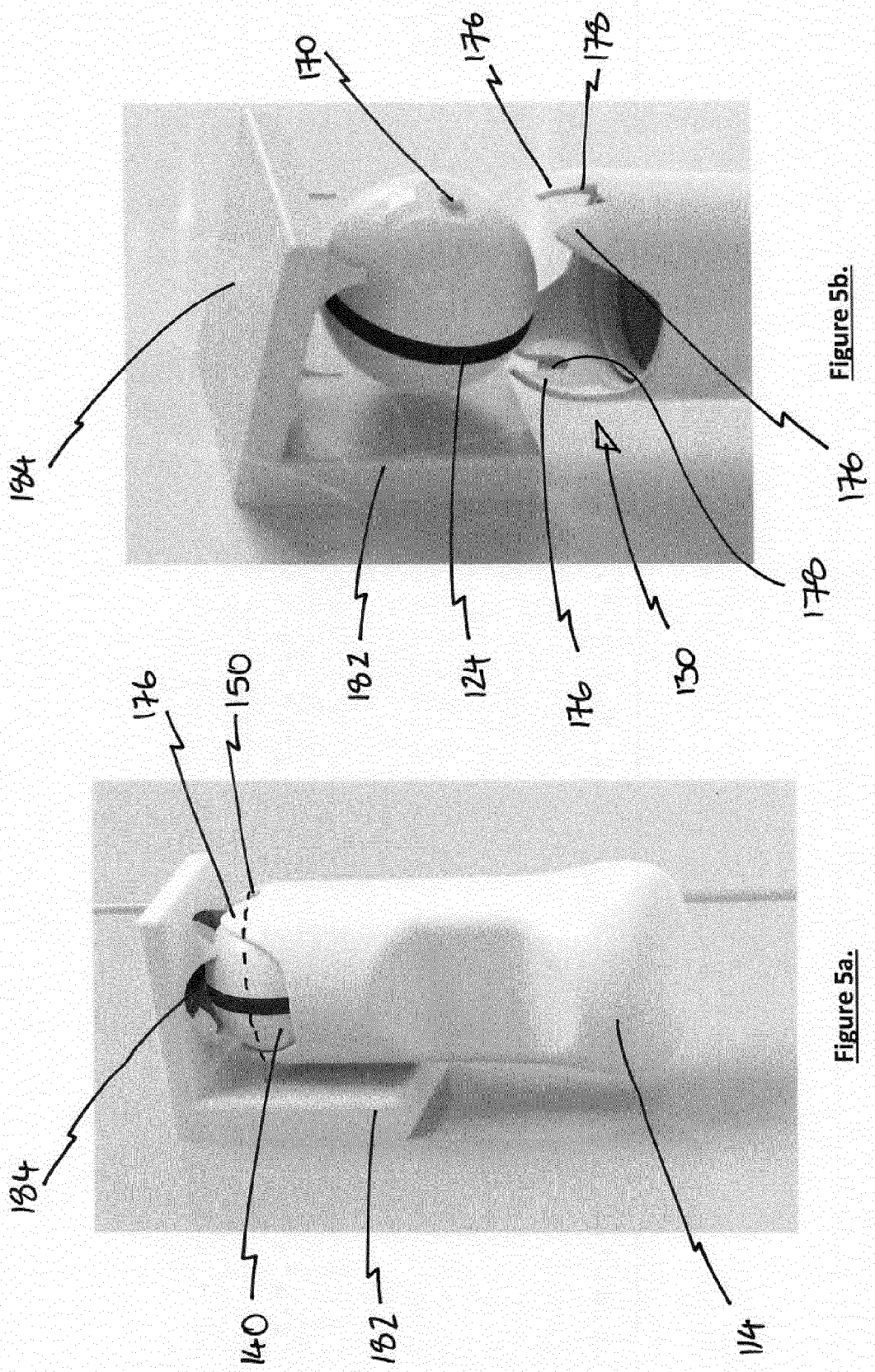


Figure 5b.

Figure 5a.

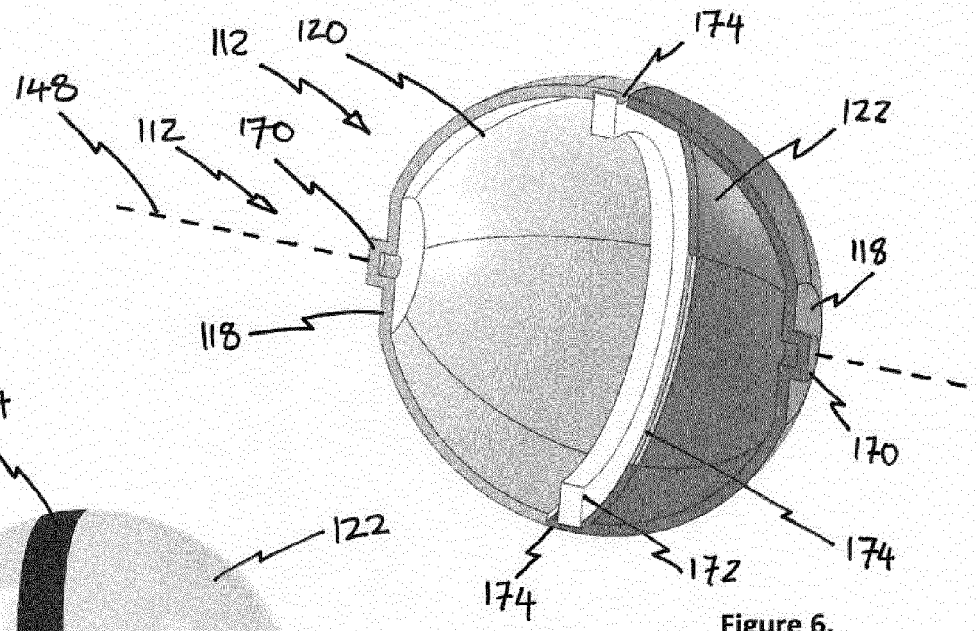
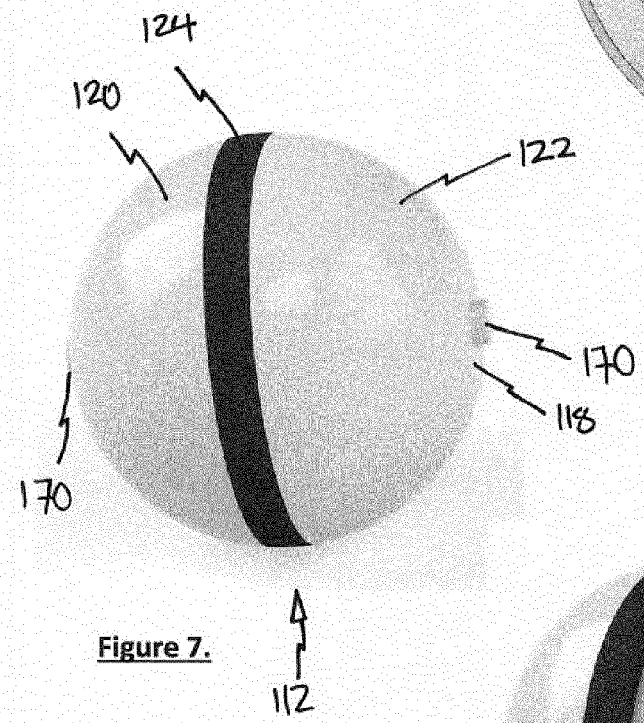


Figure 6.



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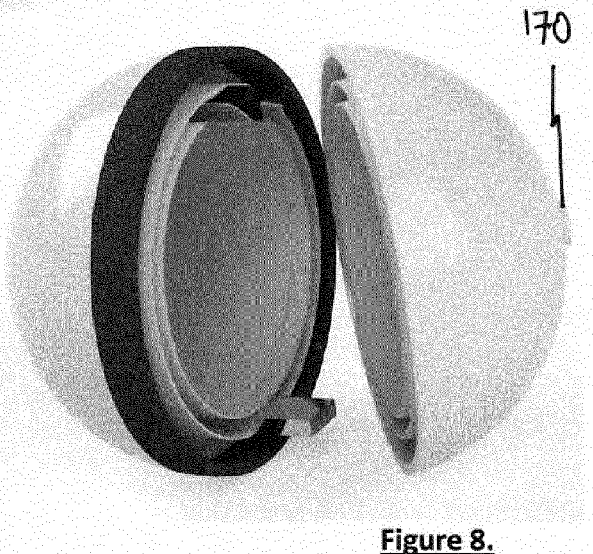

Figure 8.

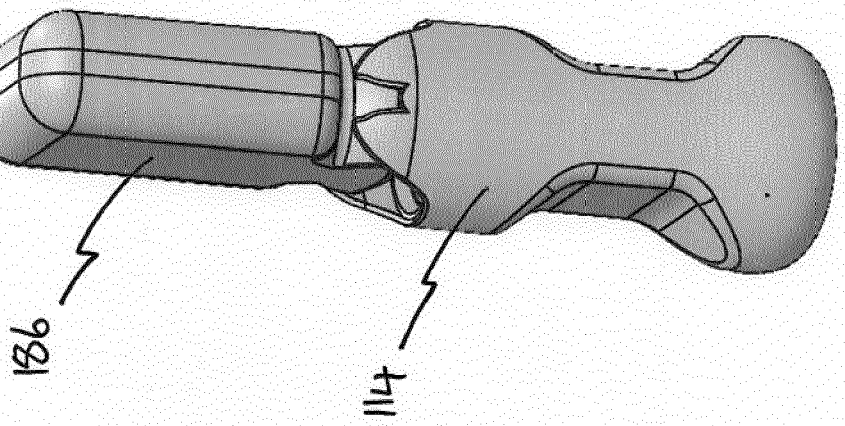

Figure 10.

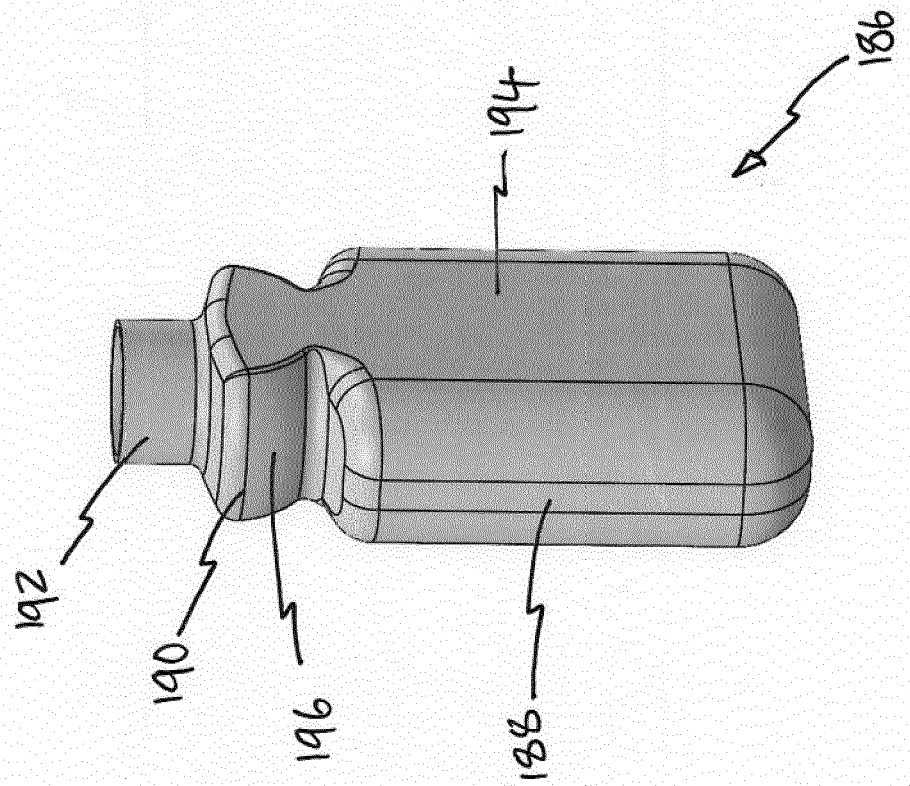

Figure 9.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 2582389 A **[0002] [0003] [0038]**