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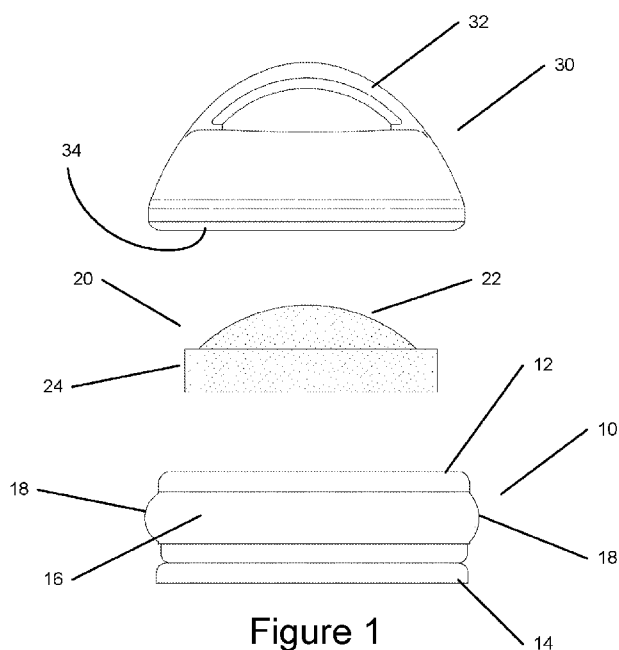


Figure 1

(57) **Abstract:** The present invention relates to a device for delivering liquids or gels, for example to the body, particularly sensitive areas such as eyes, areas of skin damage, breasts, nipples, and to young children and babies. A device for delivering the liquid or gel is provided, comprising a base into which a flexible absorbent pad is located. The pad is preferably a flexible absorbent pad that absorbs liquid or gel placed into the base. The base comprises a reservoir to contain the liquid or gel when the device is not in use. This prevents the liquid or gel seeping out of the device when it is stored, or in between applications of the liquid or gel.

## **Device for delivering a liquid or gel**

### **FIELD OF THE INVENTION**

The present invention relates to a device for delivering liquids or gels, for example to the body, particularly sensitive areas such as eyes, areas of skin damage, breasts, nipples and to young children and babies.

### **BACKGROUND OF THE INVENTION**

There are many types of liquids and gels that may be applied to the body. For example, liquids or gels can be applied to areas such as eyes to moisturise, reduce swelling, provide cooling or apply medicaments (for example antihistamines for hayfever sufferers) or saline for rehydration. Liquids and gels can also be applied to the body in the case of irritation, damaged skin, wounds or burns to aid with healing or cleaning the area. Some liquids and gels are useful when applied to the breasts and nipples of women who breast feed their children, for example when the nipples become damaged due to a bad latch of the infant or when the infant has a tongue-tie. Liquids and gels may also be applied to acne for treatment of the condition. Often, the areas of the body to which liquids or gels may be applied may be sensitive or be suffering some form of damage.

As such, the methods of application of the liquids or gels must not be harsh otherwise it may cause further irritation or cause damage. Existing methods and mechanisms to apply liquids and gels to the body include: roll-on, impregnated wipes spray and aerosol and by-hand application.

However, roll-ons applicators require a high pressure per unit surface area to operate the mechanism and so are unsuitable for application to sensitive areas of the body. With spray or aerosol applicators, it may prove difficult to deliver the correct amount of liquid or gel to the desired area, and there still may be a need to rub the liquid or gel into the desired area. Furthermore, there may be overspray of the spray or aerosol, so the liquid or gel either ends up on unwanted areas of the body or areas surrounding the body. By-hand application also has its disadvantages, as there is no guarantee that the application of the liquid or gel will be sterile.

## SUMMARY OF THE INVENTION

We have therefore appreciated the need for a device for delivering a liquid or gel, for example to the body.

The present invention provides a device for delivering a liquid or gel to a surface, comprising: a base for receiving a liquid or gel for delivering to a surface, the base comprising a closed lower portion and a partially open upper portion; and an flexible absorbent pad for absorbing and releasing a liquid or gel, the absorbent pad being held in releasable engagement by the base and having an upper surface for contacting a surface to which the liquid or gel is to be delivered, wherein the base comprises a reservoir for containing liquid or gel when not in use.

By providing a reservoir, a volume of liquid or gel may be contained such that the pad is kept in a saturated state to enable consistent delivering of a liquid or gel to a desired surface (for example a skin surface). The reservoir may also store excess or released liquid or gel as the pad is compressed (for example during use when a pressure is applied to the pad when delivering liquid or gel to the desired surface) or when the device is stored.

The device may also comprise a removable lid for closing the partially open end of the base, the removable lid comprising an inner surface that contacts and compresses the flexible absorbent pad when the removable lid closes the partially open end of the base. When compressed, at least a portion of the liquid or gel absorbed by the flexible absorbent pad is released from the pad into the reservoir. By compressing the pad, liquid or gel absorbed by the pad is released into the reservoir such that the pad remains saturated in the liquid or gel in the compressed form to prevent the pad from drying out between uses.

The closed lower portion of the base is preferably shaped to receive the removable lid in a frictional engagement. The removable lid may comprise a handle. As such, the lid may be mounted to the closed lower portion to enable the user to grip and manipulate the device during use.

The removable lid may comprise a generally concave inner surface for contacting and compressing the flexible absorbent pad when the removable lid closes the partially open end of the base. The flexible absorbent pad may comprise a generally convex upper surface having a shape that corresponds with the shape of the inner surface of the removable lid. At least a portion of the generally convex upper surface of the flexible absorbent pad may protrude through the partially open upper portion of the base when the removable lid is disengaged from the base.

Alternatively, the removable lid may comprise a generally convex inner surface for contacting and compressing the flexible absorbent pad when the removable lid closes the partially open end of the base. The flexible absorbent pad may thus comprise a generally concave upper surface having a shape that corresponds with the shape of the inner surface of the removable lid.

Alternatively, the removable lid may comprise a generally flat inner surface for contacting and compressing the flexible absorbent pad when the removable lid closes the partially open end of the base. The flexible absorbent pad may comprise a generally flat upper surface having a shape that corresponds with the shape of the inner surface of the removable lid. At least a portion of the generally flat upper surface of the flexible absorbent pad may protrude through the partially open upper portion of the base when the removable lid is disengaged from the base.

In the above lid and pad combinations, the upper surface of the flexible absorbent pad may comprise a recess shaped for receiving at least a portion of a surface to which the liquid or gel is to be delivered. The inner surface of the removable lid may also comprise a protrusion having a shape that corresponds with the recess in the upper surface of the flexible absorbent pad such that the protrusion is received into the recess when the removable lid is engaged with and closes the base.

The flexible absorbent pad is preferably a PVA (Polyvinyl Alcohol) sponge. Preferably, the flexible absorbent pad is a biostatic pad or is biostatic in combination with the formulation (i.e. a pad that limits or inhibits the growth of bacteria), so that the risk of passing bacteria to sensitive or damaged skin is reduced. This is particularly advantageous when the pad is required for multiple-use applications. PVA is the preferable material for the pad since it exhibits very good mechanical strength and

abrasion resistance. Furthermore, pore size and shape can be varied to meet specific applications. Wet PVA sponge may withstand temperatures to 90°C without plastic deformation. Furthermore, PVA sponges are open cell structures providing high levels of fluid containment and in general have good chemical stability.

The device may comprise a removable shield disposed between the flexible absorbent pad and the inner surface of the removable lid. The shield may be shaped to conform to the shape of one or both of the inner surface of the removable lid and the upper surface of the flexible absorbent pad. Such a shield enables second liquid or gels, different to the first liquid or gels, to be applied to the desired surface without the upper surface of the pad being contaminated.

The device may also comprise a dispenser for dispensing a second liquid or gel for applying to the surface. The dispenser may dispense the second liquid or gel to the upper contact surface of the flexible absorbent pad.

When the device comprises a removable shield disposed between the flexible absorbent pad and the inner surface of the removable lid, the removable shield may comprise an upper contact surface for contacting the surface to which liquid or gel or second liquid or gel is to be delivered, and wherein the dispenser dispenses the second liquid or gel to the upper contact surface of the removable shield. The shield may be shaped to conform to the shape of one or both of the inner surface of the removable lid and the upper surface of the flexible absorbent pad.

The dispenser may comprise a nozzle in the inner surface of the removable lid for dispensing the second liquid or gel. The nozzle may be connected to a channel in the removable lid, the channel being shaped to receive the second liquid or gel, or shaped to receive a vessel containing the second liquid or gel.

Alternatively, the removable lid may comprise a reservoir for containing the second liquid or gel, and wherein the nozzle is connected to the reservoir for dispensing the second liquid or gel. The removable lid may comprise a flexible portion coupled to the reservoir such that flexing of the flexible portion applies a force on the reservoir to dispense the second liquid or gel through the nozzle.

The sidewall of the base between the upper and lower portions may comprise one or more resiliently deformable portions. The one or more resiliently deformable portions may be configured such that an external pressure applied to the resiliently deformable portions causes the resiliently deformable portion to deform to contact and partially deform the flexible absorbent pad, thereby releasing a portion of absorbed liquid or gel from the pad.

Pressure applied to the resiliently deformable portions from the outside of the device will cause the deformable material to deform inwardly into the device. This inward deformation enables pressure to be applied to the flexible absorbent pad in the base from outside of the device, which causes a portion of liquid or gel to be released from the pad. Advantageously, the user is therefore able to compress the pad (and thereby release more liquid or gel) by applying pressure to the side of the pad, rather than from pressure of the device being pressed onto the surface being treated. As such, less pressure may be used to deliver the required volume of liquid or gel to the desired surface (for example sensitive or damaged skin).

Furthermore, the device may comprise an agitator for agitating the flexible absorbent pad or base. Such an agitator or vibrating feature enables the device to provide a massaging effect to the desired surface.

At least one of the liquid or gel and the flexible absorbent pad may comprise a dye configured to change its colour or shade after a first period of time. Such a dye enables the user to determine when a pad needs to be replaced.

The device may also comprise a counter to indicate a number of uses of the pad, a number of uses of the pad remaining, or a level of liquid or gel in the reservoir.

The device may also comprise at least one of a heating and a cooling means for heating or cooling the liquid or gel to be delivered. In one embodiment, the heating or cooling means is an electrothermal heating or cooling means. In alternative embodiments, the heating or cooling means is provided by an exothermic or endothermic reaction.

## LIST OF FIGURES

The present invention will now be described, by way of example only, and with reference to the accompanying figures, in which:

Figure 1 shows a device for delivering a liquid or gel;

Figure 2 shows the pad located in the base of the device;

Figure 3 shows the removable lid engaged with the base to close the base;

Figure 4 shows the removable lid engaged with the base in a second configuration

Figure 5 shows a cross section view of the device with the removable lid open;

Figure 6 shows a cross section view of the device with the removable lid engaged with the base;

Figure 7 shows a second embodiment of the device;

Figure 8 shows the pad located in the base of the second embodiment of the device;

Figure 9 shows a third embodiment of the device;

Figure 10 shows a pad and lid engaged with the base of the third embodiment of the base;

Figure 11 shows the third embodiment of the device;

Figure 12 shows the third embodiment of the device with an alternative engagement between the lid and base;

Figure 13 shows the third embodiment of the device with a dispenser;

Figure 14 shows the third embodiment of the device with a dispenser; and

Figure 15 shows the third embodiment of the device with a dispenser.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

In brief, the present invention provides a device for delivering the liquid or gel. The device comprises a base into which a flexible absorbent pad is located. The pad is preferably a flexible absorbent pad that absorbs liquid or gel placed into the base. The base comprises a reservoir to contain the liquid or gel when the device is not in use. This prevents the liquid or gel seeping out of the device when it is stored, or in between applications of the liquid or gel.

Figure 1 shows the device for delivering a liquid or gel. The device comprises a base 10, which is resistant to permeation of a liquid or gel placed in the base 10. The base has a closed lower portion and a partially open upper portion, with side walls between. The base 10 shown is cylindrical with an open upper end.

The closed lower portion and walls of the base 10 define a reservoir 16 for containing fluid or gel to be dispensed. The base also comprises ullage areas 18 to contain excess liquid or gel, as will be described below.

The device further comprises an absorbent pad 20, which is placed within the base 10. The pad 20 comprises an upper surface 22 for contacting a surface to which the liquid or gel is to be delivered. In this embodiment, the upper surface 22 is shown as a convex or dome portion. However, the upper surface 22 may instead be flat or concave. The absorbent pad 20 also comprises an extended radial portion 24 along the opposite surface. The pad 20 is preferably resiliently deformable (that is the pad will return to an initial shape or form from a compressed or deformed form). The pad 20 is placed in the base via the partially open upper end of the base 10 (the pad 20 may need to be compressed or deformed to fit through the partially open upper end of the base 10), with the upper surface 22 extending through the partially open upper portion of the base 10 (when the upper surface is convex). The pad 20 is preferably a flexible absorbent PVA (Polyvinyl Alcohol) sponge that absorbs liquid or gel placed into the base 10. Preferably, the flexible absorbent pad is a biostatic pad or is biostatic in combination with the formulation (i.e. a pad that limits or inhibits the growth of bacteria),

so that the risk of passing bacteria to sensitive or damaged skin is reduced. This is particularly advantageous when the pad 20 is required for multiple-use applications.

PVA is the preferable material for the pad 20 since it exhibits very good mechanical strength and abrasion resistance. Furthermore, pore size and shape can be varied to meet specific applications. Wet PVA sponge may withstand temperatures to 90°C without plastic deformation. Furthermore, PVA sponges are open cell structures providing high levels of fluid containment and in general have good chemical stability.

Both the base 10 and pad 20 are shaped so as to provide a snug fit so that the pad 20 is retained out when the base 10 is inverted, or when pressure is applied to the pad during use. Preferably the extended radial portion engages the underneath of a lip or ledge of the base 10 that forms part of the partial open upper portion, which prevents the pad 20 from falling out when the device is inverted (but still permits the pad 20 to be removed when necessary if the pad is compressed or deformed to overcome the reduced dimension of the lip or ledge).

Figure 2 shows the pad 20 located in the base 10 ready for use. As can be seen, the dome or convex portion of the pad 20 protrudes from the partially open portion of the base 10.

The device further comprises a removable lid 30, which comprises a handle 32 for ease of carrying the device or for manipulation of the device. The removable lid 30 also comprises an open end 34, which is shaped to engage with the partially open upper end of the base 10 to close the open end of the base 10. The open end 34 of the removable lid 30 is also shaped to engage with the closed lower portion of the base 10 for use as described below. Both upper and lower portions of the base 10 comprise a surface 12, 14 to provide a frictional engagement between the base 10 and the lid 30. The surface 12, 14 may also provide a fluid-tight seal to prevent excess liquid or gel leaking from the base 10 when the lid 30 is coupled thereto. In some embodiments, the surface 12, 14 on the upper and lower portions of the base 10 is a soft silicon surface or cushion.

Figure 3 shows the removable lid 30 engaged with the upper portion of the base 10 to close the base.

Figure 4 shows the removable lid 30 engaged with the lower portion of the base 10 in a second configuration. As can be seen, the dome or convex portion 22 of the pad 20 is exposed and protrudes from the open end of the base 10. In this configuration, the handle 32 of the removable lid 30 may be used to manipulate the device during use.

We shall now describe the device in use with reference to figures 1 to 6.

Prior to insertion of the absorbent pad 20 into the base 10, a volume of liquid or gel 26 is poured into the base 10. Once the pad 20 is inserted into the base 10 (with the dome or convex portion 22 extending beyond the open end of the base 10), the liquid or gel is absorbed by the pad 20 for delivering to a surface. To prime the pad 20 (i.e. ensure that the pad 20 is saturated with the liquid or gel), the user may place the removable lid 30 onto the open end of the base 10 (figure 3 and 6), which compresses the pad 20 to release any absorbed liquid or gel 26 into the ullage 18 and reservoir 16, and then removed (figure 5). Upon removal of the lid 30, the pad 20, which is resiliently deformable, regains its original form, during which it absorbs the liquid or gel to the point of saturation. Any excess liquid or gel will be retained in the base 10 in the reservoir 16 and ullage 18 areas.

The user then may place the lid 30 securely on the lower portion of the base 10 (figure 4) and apply the dome or convex portion 22 of the pad 20 to the desired area (for example eyes, sore skin, wound etc). Contact with the desired surface causes the liquid or gel to be transferred from the pad 20 to the desired area.

Once finished, the user may remove the removable lid 30 from the lower portion of the base 10 and place the removable lid 30 on the partially open upper portion of the base 10 (figures 3 and 6), which securely stores the pad 20 for its next use. As described above, placing the removable lid 30 on the base 10 compresses the pad 20 so that liquid or gel is squeezed out of the pad 20 into the reservoir 16 and ullage area 18. This ensures that the pad 20 remains saturated during storage, preventing the pad 20 from drying out. Furthermore the upper surface 12, in conjunction with a portion of the removable lid 30 engaged with the surface 12, prevents the liquid or gel leaking out when stored, and prevents evaporation of the liquid or gel.

Whilst we have described adding liquid or gel to the base 10 prior to inserting the pad 20, we also envisage embodiments in which the pad 20 is purchased separately and that the pad 20 is pre-soaked with the desired liquid or gel. In this embodiment, the pad 20 is placed in the base 10 already pre-soaked, and released liquid or gel when compressed during storage (i.e. when the removable lid 30 is engaged with the upper open end of the base 10), and again soaks up the released liquid or gel when the removable lid 30 is removed from the upper open end of the base 10.

The pad 20 may be a single-use pad, where the pad is discarded after a particular use (for example after applying the liquid or gel to a user's eyes). Alternatively the pad may be a multiple-use pad, where the user discards the pad and replaces it for a fresh pad after a defined number of uses. Furthermore, the pad 20 may be supplied dry, in which case the pad 20 takes up and absorbs the liquid or gel in the reservoir 16. Alternatively, the pad 20 may be supplied pre-impregnated with the liquid or gel. If the pad is pre-impregnated, the reservoir catches any liquid or gel released from the pad, or the reservoir may be topped up with additional liquid or gel where needed, to keep the pad saturated.

In order to inform the user that the pad needs changing for a fresh pad, the device may also comprise an indicator in the form of a dye that changes colour or shade. The dye may be placed in the liquid or gel, or the dye may be integral with the structure of the pad 20. As the pad is used, the dye changes its colour or shade from a first colour or shade (e.g. blue), to a second colour or shade (e.g. white or the colour of the pad). The dye may change its colour or shade after a period of time (for example one or more days, or one or more weeks or one or more months). This change may be due to exposure to ambient air (for example by reaction with one or more elements in the air), or due to exposure to elements or oils often found in the areas to which the liquids or gels are being delivered.

Other indicating means may be provided to indicate to the user the number of times that the pad 20 has been used or how many more times the pad 20 may be used before replacement is required. Other indicating means, for example, include a counting mechanism that displays a count of the number of uses of the pad 20 or the number of uses remaining. This may be indicated on a surface of the body 10. The counter may be actuated manually by the user (by actuation of a counter button or wheel), via

application of the pad to the desired skin surface (e.g. by detecting a force mechanically or electrically to drive a counter mechanism) or via removal of the lid 30 from the base (e.g. by detecting the removal mechanically or electrically to drive a counter mechanism). Alternatively, the indicator means may be provided by a capillary indicator, which may indicate a level of the liquid or gel in the reservoir.

The device may also comprise a form of heating or cooling to heat or cool the liquid or gel prior to application by the user. The heating or cooling may be provided by an electrothermal device located in the body or integral with the device. Such a device may enable the user to control the amount of heating or cooling. Alternatively, the heating or cooling may be provided chemically (i.e. an endothermic or exothermic reaction between chemicals within the base of the device)

Furthermore, the device may also comprise a vibrator or agitator to agitate the base or pad or both base and pad. Such a device may provide a massaging effect, further stimulating the affected area. In such an embodiment, a motor may be provided with a power source. There may also be an activation switch or button to allow the user to turn the agitation on or off as required. This may be an exposed button or switch, or may be achieved through a twisting action with a component of the base or lid. In some embodiments, a controller may permit the user to control the speed of the motor (i.e. to provide adjustable control of the amount of vibration or agitation). The power source may be portable or plugged and may be rechargeable or disposable

The device may also provide a mirrored surface, for example on the rear of the lower portion of the base 10, to enable the user to examine the surface to which the liquid or gel is to be delivered prior to delivery (for example skin surrounding the eyes). The mirrored surface may utilise a lensing effects to provide a magnified view to allow the user to better assess the region being treated.

Figures 7 and 8 show a second embodiment of the device. In this second embodiment, the flexible absorbent pad 120 and removable lid 130 are substantially the same as that shown in the embodiment described above with reference to figures 1 to 6. However, in the second embodiment, the base 110 is modified to incorporate one or more resiliently deformable portions 111 in the sidewall of the base 110 between the partially open upper end and the closed lower end.

Each resiliently deformable portion 111 is provided by a hole formed in the sidewall of the base 110, over which a soft, pliable and deformable material is placed (for example a soft flexible plastic or silicon). Pressure applied to the resiliently deformable portions from the outside of the device will cause the deformable material to deform inwardly into the device. This inward deformation enables pressure to be applied to the flexible absorbent pad 120 in the base 110 from outside of the device, which causes a portion of liquid or gel to be released from the pad 120. Advantageously, the user is therefore able to compress the pad 120 (and thereby release more liquid or gel) by applying pressure to the side of the pad 120, rather than from pressure of the device being pressed onto the surface being treated. As such, less pressure may be used to deliver the required volume of liquid or gel to the desired surface (for example sensitive or damaged skin).

By virtue of the portions 111 being resiliently deformable, they regain their original form and position (and therefore pressure is released from the side of the flexible absorbent pad 120) when pressure is released from the portions 111.

Figures 9 to 15 show a third embodiment of the device for delivering a liquid or gel to a surface. This embodiment is particularly useful for the application of liquids and gels to womens' breasts and nipples, due to the shape of the absorbent pad. As with the first and second embodiments, the device comprises a base 210, which is resistant to permeation of a liquid or gel placed in the base 210. The base has a closed lower portion and a partially open upper portion, with side walls between. The base 310 shown is concave with an open upper end.

The closed lower portion and walls of the base 210 define a reservoir 216 for containing fluid or gel to be dispensed.

The device further comprises an absorbent pad 220, which is placed within the base 210. The pad 220 comprises an upper surface 222 for contacting a surface to which the liquid or gel is to be delivered (for example a woman's breast or nipples). In the embodiment shown in the figures, the upper surface 222 is concave to conform generally to the shape of a woman's breast. Additionally, the pad 220 comprises a recess 226 for receiving a woman's nipple therein. It is not necessary for the pad's

inner surface 222 to comprise the recess 226. The pad's inner surface 222 may in this instance be generally concave.

The pad 220 has a reduced radius portion 224. The pad 220 is preferably resiliently deformable (that is the pad will return to an initial shape or form from a compressed or deformed form). The pad 220 is placed in the base via the partially open upper end of the base 210 (the pad 220 may need to be compressed or deformed to fit through the partially open upper end of the base 210). The pad 220 is preferably a flexible absorbent PVA (Polyvinyl Alcohol) sponge that absorbs liquid or gel placed into the base 210. Preferably, the flexible absorbent pad is a biostatic pad or is biostatic in combination with the formulation (i.e. a pad that limits or inhibits the growth of bacteria), so that the risk of passing bacteria to sensitive or damaged skin is reduced. This is particularly advantageous when the pad 220 is required for multiple-use applications.

As with the first and second embodiments, PVA is the preferable material for the pad 220, for the reasons given above with reference to those embodiments.

Both the base 210 and pad 220 are shaped so as to provide a snug fit so that the pad 220 is retained out when the base 210 is inverted, or when pressure is applied to the pad during use. Preferably the reduced radius portion 224 engages with a correspondingly shaped increased radius portion on the upper open end of the base 210. This engagement prevents the pad 220 from falling out when the device is inverted (but still permits the pad 220 to be removed when necessary if the pad is compressed or deformed to overcome the reduced dimension of the lip or ledge).

The device further comprises a removable lid 230, which may comprise a handle for ease of carrying the device or for manipulation of the device. The removable lid 230 also comprises an open end 234, which is shaped to engage with the partially open upper end of the base 210 to close the open end of the base 210. The open end 234 of the removable lid 230, in some embodiments, may also be shaped to engage with the closed lower portion of the base 210. The upper portion of the base 210 comprises a surface 212 to provide a frictional engagement between the base 210 and the lid 230. The surface 212, may also provide a fluid-tight seal to prevent excess liquid or gel leaking from the base 210 when the lid 230 is coupled thereto. In some embodiments,

the surface 212 on the upper portion of the base 210 is a soft silicon surface or cushion.

The removable lid 230 also comprises an inner surface 236 having a generally convex shape. The inner surface 236 of the removable lid is shaped to conform with the upper surface 222 of the pad 220. As such, the inner surface 236 of the removable lid may comprise a protrusion 238, which is received in the recess 226 of the pad 220 when the lid 230 is engaged with the base 210.

Figures 9 and 10 show the removable lid 230 engaged with the upper portion of the base 210 to close the base. In this configuration, the inner surface 236 of the removable lid compresses the pad 220 located in the base 210.

Figure 12 shows the device comprising an engagement means 250 that engages with, or is integral with, the base 210, and engages with the lid 230 to form the engagement. The engagement between the engagement means 250 and the lid 230 may be frictional or a screw thread. The engagement may also be fluid tight when engaged.

We shall now describe the device in use with reference to figures 9 to 12.

Prior to insertion of the absorbent pad 220 into the base 210, a volume of liquid or gel is poured into the base 210. Once the pad 220 is inserted into the base 210, the liquid or gel is absorbed by the pad 220 for delivering to a surface. To prime the pad 220 (i.e. ensure that the pad 220 is saturated with the liquid or gel), the user may place the removable lid 230 onto the open end of the base 210 (figures 9 and 10), which compresses the pad 220 to release any absorbed liquid or gel into the reservoir 216, and then removed. Upon removal of the lid 230, the pad 220, which is resiliently deformable, regains its original form, during which it absorbs the liquid or gel to the point of saturation. Any excess liquid or gel will be retained in the base 210 in the reservoir 216.

The user then holds the base 210 (or removable lid 230 if the lid 230 and base 210 are configured such that the lid is engageable with the closed lower end of the base, as in the first and second embodiments) and applies the upper surface 222 of the pad 220 to the desired area (for example breasts and nipples). Contact with the desired surface

causes the liquid or gel to be transferred from the pad 220 to the desired area. Furthermore, the application of liquid and gel in this manner provides an opportunity for a massaging force to be applied to the breasts and nipples via the device. This may be useful if promoting let-down in breast-feeding women, or to help alleviate symptoms of mastitis.

Once finished, the user may replace the removable lid 230 on the partially open upper portion of the base 210 (figures 9 and 10), which securely stores the pad 220 for its next use. As described above, placing the removable lid 230 on the base 210 compresses the pad 220 so that liquid or gel is squeezed out of the pad 220 into the reservoir 216. This ensures that the pad 220 remains saturated during storage, preventing the pad 220 from drying out. Furthermore the upper surface 212, in conjunction with a portion of the removable lid 230 engaged with the surface 212, prevents the liquid or gel leaking out when stored, and prevents evaporation of the liquid or gel.

Whilst we have described adding liquid or gel to the base 210 prior to inserting the pad 220, we also envisage embodiments in which the pad 220 is purchased separately and that the pad 220 is pre-soaked with the desired liquid or gel. In this embodiment, the pad 220 is placed in the base 210 already pre-soaked, and released liquid or gel when compressed during storage (i.e. when the removable lid 230 is engaged with the upper open end of the base 210), and again soaks up the released liquid or gel when the removable lid 230 is removed from the upper open end of the base 210.

As with the first and second embodiments, the pad 220 may be a single-use pad, where the pad is discarded after a particular use (for example after applying the liquid or gel to a user's breasts). Alternatively the pad may be a multiple-use pad, where the user discards the pad and replaces it for a fresh pad after a defined number of uses. Furthermore, the pad 220 may be supplied dry, in which case the pad 220 takes up and absorbs the liquid or gel in the reservoir 216. Alternatively, the pad 220 may be supplied pre-impregnated with the liquid or gel. If the pad is pre-impregnated, the reservoir catches any liquid or gel released from the pad, or the reservoir may be topped up with additional liquid or gel where needed, to keep the pad saturated.

As with the above embodiments, in order to inform the user that the pad needs changing for a fresh pad, the device may also comprise an indicator in the form of a dye that changes colour or shade. The dye may be placed in the liquid or gel, or the dye may be integral with the structure of the pad 220. As the pad is used, the dye changes its colour or shade from a first colour or shade (e.g. blue), to a second colour or shade (e.g. white or the colour of the pad). The dye may change its colour or shade after a period of time (for example one or more days, or one or more weeks or one or more months). This change may be due to exposure to ambient air (for example by reaction with one or more elements in the air), or due to exposure to elements or oils often found in the areas to which the liquids or gels are being delivered.

Other indicating means may be provided, for example the counting means described with reference to the first and second embodiments.

The device may be used with liquids or gels that are heated (for example in a microwave prior to placement in the base 210) or cooled (for example chilled liquids or gels). The device may also comprise a form of heating or cooling to heat or cool the liquid or gel prior to application by the user. The heating or cooling may be provided by an electrothermal device located in the body or integral with the device. Such a device may enable the user to control the amount of heating or cooling. Alternatively, the heating or cooling may be provided chemically (i.e. an endothermic or exothermic reaction between chemicals within the base of the device)

Furthermore, the device may also comprise a vibrator or agitator to agitate the base or pad or both base and pad. Such a device may provide a massaging effect, further stimulating the affected area. In such an embodiment, a motor may be provided with a power source. There may also be an activation switch or button to allow the user to turn the agitation on or off as required. This may be an exposed button or switch, or may be achieved through a twisting action with a component of the base or lid. In some embodiments, a controller may permit the user to control the speed of the motor (i.e. to provide adjustable control of the amount of vibration or agitation). The power source may be portable or plugged and may be rechargeable or disposable

Furthermore, the third embodiment of the device may comprise a removable shield 240, which is placed between the upper surface 222 of the pad 220 and inner surface

236 of the lid 230. The shield 240 generally conform to the shape of the upper surface 222 and the inner surface 236 and may comprise materials such as silicon. The shield may be used to protect the pad 220 from contamination. The shield 240 may also be used as an additional or alternative contact surface that contacts the surface to which the liquid or gel is to be applied. For example, the shield 240 may be used as a surface for the application of a second liquid or gel that is different to the first liquid or gel. The second liquid or gel may be an alternative liquid or gel to the liquid or gel retained by the pad 220.

For example, the second liquid or gel may comprise a medicament or ointment for the treatment of damaged skin (breasts and/or nipples). In which case, the second liquid or gel may be applied directly to an upper surface of the shield 240 and, with the shield in place in contact with the pad 220 in the base 210, the shield may be brought into contact with the affected area of the breasts or nipples to apply the second liquid or gel.

The shield may be disposable or reusable a number of times before being discarded.

Figures 13, 14 and 15 show a version of the third embodiment in which the device comprises a dispenser for the second liquid or gel. In this version, the base 210, pad 220, shield 240 and engagement means 250 (if present) are as described above. However, in these figures, the lid 330 comprises a dispenser for dispensing the second liquid or gel either to the upper surface 222 of the pad 220, or to the shield 240.

This dispenser comprises a nozzle 364 for the dispensing of the second liquid or gel. The nozzle 364 may comprise one or more holes in fluid communication with a channel 362. In the embodiments shown in these figures, the channel 362 is configured to receive a vessel 360, which contains the second liquid or gel. In use, the user inserts the vessel 360 into the channel 362, and then applies a pressure on the vessel 360 to release the second liquid or gel into the channel and thus into the nozzle and onto the shield (or upper surface of the pad). Once the second liquid or gel has been dispensed onto the desired component of the device, the device may be used to apply this second liquid or gel to the desired bodily surface.

An alternative to the arrangements shown in figures 13 to 15 are that the nozzle 364 with holes is in fluid communication with a reservoir housed within, or forming part of,

the lid 330. In such an embodiment, the upper outer surface of the lid 330 may be deformable or flexible such that deforming of such outer surface may apply a pressure to the reservoir to dispense the second liquid or gel onto the desired component before using the device to apply the second liquid or gel to the desired bodily surface.

In the third embodiment, the lower surface of the pad 230 may have a flattened or recessed portion, which creates a cavity between the pad 230 and the base 210. The cavity may act as an enlarged reservoir 216.

In any of the above described embodiments, the upper surface 22, 122, 222 of the pad 20, 120, 220 may be generally convex, concave or flat (other shapes are also envisaged). In each of these versions, the inner surface of the removable lid 30, 130, 230, 330 may be shaped to conform to the shape of the respective upper surface of the pad. In each of these versions, the upper surface of the pad may comprise a recess as described above.

In all of the above described embodiments, the base 10, 110, 210 and removable lid 30, 130, 230, 330 are preferably constructed from polypropylene. The base 10, 110, 210 may be overmoulded in a material such as silicon.

The embodiments discussed are illustrative of one example of the present invention. As these embodiments are described with reference to illustrative applications, various modifications or adaptations of the methods and/or specific structures may become apparent. One such modification is the sizes of the absorbent pads and mechanical arrangements which may be varied in relation to the application, use or area of the body to be applied.

**CLAIMS:**

1. A device for delivering a liquid or gel to a surface, comprising:  
a base for receiving a liquid or gel for delivering to a surface, the base comprising a closed lower portion and a partially open upper portion; and  
a flexible absorbent pad for absorbing and releasing a liquid or gel, the absorbent pad being held in releasable engagement by the base and having an upper surface for contacting a surface to which the liquid or gel is to be delivered, wherein the base comprises a reservoir for containing liquid or gel when not in use.
2. A device according to claim 1, comprising a removable lid for closing the partially open end of the base, the removable lid comprising an inner surface that contacts and compresses the flexible absorbent pad when the removable lid closes the partially open end of the base.
3. A device according to claim 2, wherein, when compressed, at least a portion of the liquid or gel absorbed by the flexible absorbent pad is released from the pad into the reservoir.
4. A device according to claim 2 or 3, wherein the closed lower portion of the base is shaped to receive the removable lid in a frictional engagement.
5. A device according to claim 2, 3 or 4, wherein the removable lid comprises a handle.
6. A device according to any one of claims 2 to 5, wherein the removable lid comprises a generally concave inner surface for contacting and compressing the flexible absorbent pad when the removable lid closes the partially open end of the base.
7. A device according to claim 6, wherein the flexible absorbent pad comprises a generally convex upper surface having a shape that corresponds with the shape of the inner surface of the removable lid.

8. A device according to claim 7, wherein at least a portion of the generally convex upper surface of the flexible absorbent pad protrudes through the partially open upper portion of the base when the removable lid is disengaged from the base.
9. A device according to any one of claims 2 to 5, wherein the removable lid comprises a generally convex inner surface for contacting and compressing the flexible absorbent pad when the removable lid closes the partially open end of the base.
10. A device according to claim 9, wherein the flexible absorbent pad comprises a generally concave upper surface having a shape that corresponds with the shape of the inner surface of the removable lid.
11. A device according to any one of claims 2 to 5, wherein the removable lid comprises a generally flat inner surface for contacting and compressing the flexible absorbent pad when the removable lid closes the partially open end of the base.
12. A device according to claim 11, wherein the flexible absorbent pad comprises a generally flat upper surface having a shape that corresponds with the shape of the inner surface of the removable lid.
13. A device according to claim 12, wherein at least a portion of the generally flat upper surface of the flexible absorbent pad protrudes through the partially open upper portion of the base when the removable lid is disengaged from the base.
14. A device according to any one of claims 6 to 13, wherein the upper surface of the flexible absorbent pad comprises a recess shaped for receiving at least a portion of a surface to which the liquid or gel is to be delivered.
15. A device according to claim 14, wherein the inner surface of the removable lid comprises a protrusion having a shape that corresponds with the recess in the upper surface of the flexible absorbent pad such that the protrusion is received into the recess when the removable lid is engaged with and closes the base.
16. A device according to any preceding claim, wherein the flexible absorbent pad is a PVA pad or sponge.

17. A device according to any one of claims 2 to 16, comprising a removable shield disposed between the flexible absorbent pad and the inner surface of the removable lid.

18. A device according to claim 17, wherein the shield is shaped to conform to the shape of one or both of the inner surface of the removable lid and the upper surface of the flexible absorbent pad.

19. A device according to any one of claims 2 to 16, comprising a dispenser for dispensing a second liquid or gel for applying to the surface.

20. A device according to claim 19, wherein the dispenser dispenses the second liquid or gel to the upper contact surface of the flexible absorbent pad.

21. A device according to claim 19, comprising a removable shield disposed between the flexible absorbent pad and the inner surface of the removable lid, the removable shield comprising an upper contact surface for contacting the surface to which liquid or gel or second liquid or gel is to be delivered, and wherein the dispenser dispenses the second liquid or gel to the upper contact surface of the removable shield.

22. A device according to claim 21, wherein the shield is shaped to conform to the shape of one or both of the inner surface of the removable lid and the upper surface of the flexible absorbent pad.

23. A device according to any one of claims 19 to 22, wherein the dispenser comprises a nozzle in the inner surface of the removable lid for dispensing the second liquid or gel.

24. A device according to claim 23, wherein the nozzle is connected to a channel in the removable lid, the channel being shaped to receive the second liquid or gel, or shaped to receive a vessel containing the second liquid or gel.

25. A device according to claim 23, wherein the removable lid comprises a reservoir for containing the second liquid or gel, and wherein the nozzle is connected to the reservoir for dispensing the second liquid or gel.

26. A device according to claim 25, wherein the removable lid comprises a flexible portion coupled to the reservoir such that flexing of the flexible portion applies a force on the reservoir to dispense the second liquid or gel through the nozzle.

27. A device according to any preceding claim, wherein a sidewall of the base between the upper and lower portions comprises one or more resiliently deformable portions.

28. A device according to claim 27, wherein the one or more resiliently deformable portions are configured such that an external pressure applied to the resiliently deformable portions causes the resiliently deformable portion to deform to contact and partially deform the flexible absorbent pad, thereby releasing a portion of absorbed liquid or gel from the pad.

29. A device according to any preceding claim, comprising an agitator for agitating the flexible absorbent pad or base.

30. A device according to any preceding claim, where at least one of the liquid or gel and the flexible absorbent pad comprises a dye configured to change its colour or shade after a first period of time

31. A device according to any preceding claim, comprising a counter to indicate a number of uses of the pad, a number of uses of the pad remaining, or a level of liquid or gel in the reservoir.

32. A device according to any preceding claim, comprising at least one of a heating and a cooling means for heating or cooling the liquid or gel to be delivered.

33. A device according claim 32, wherein the heating or cooling means is an electrothermal heating or cooling means.

34. A device according to claim 32, wherein the heating or cooling means is provided by an exothermic or endothermic reaction.

35. A device according to any preceding claim, wherein the surface to which the liquid or gel is to be delivered is a skin surface of a user.

36. A device for delivering a liquid or gel to a surface substantially as herein described with reference to the accompanying figures.

1/9

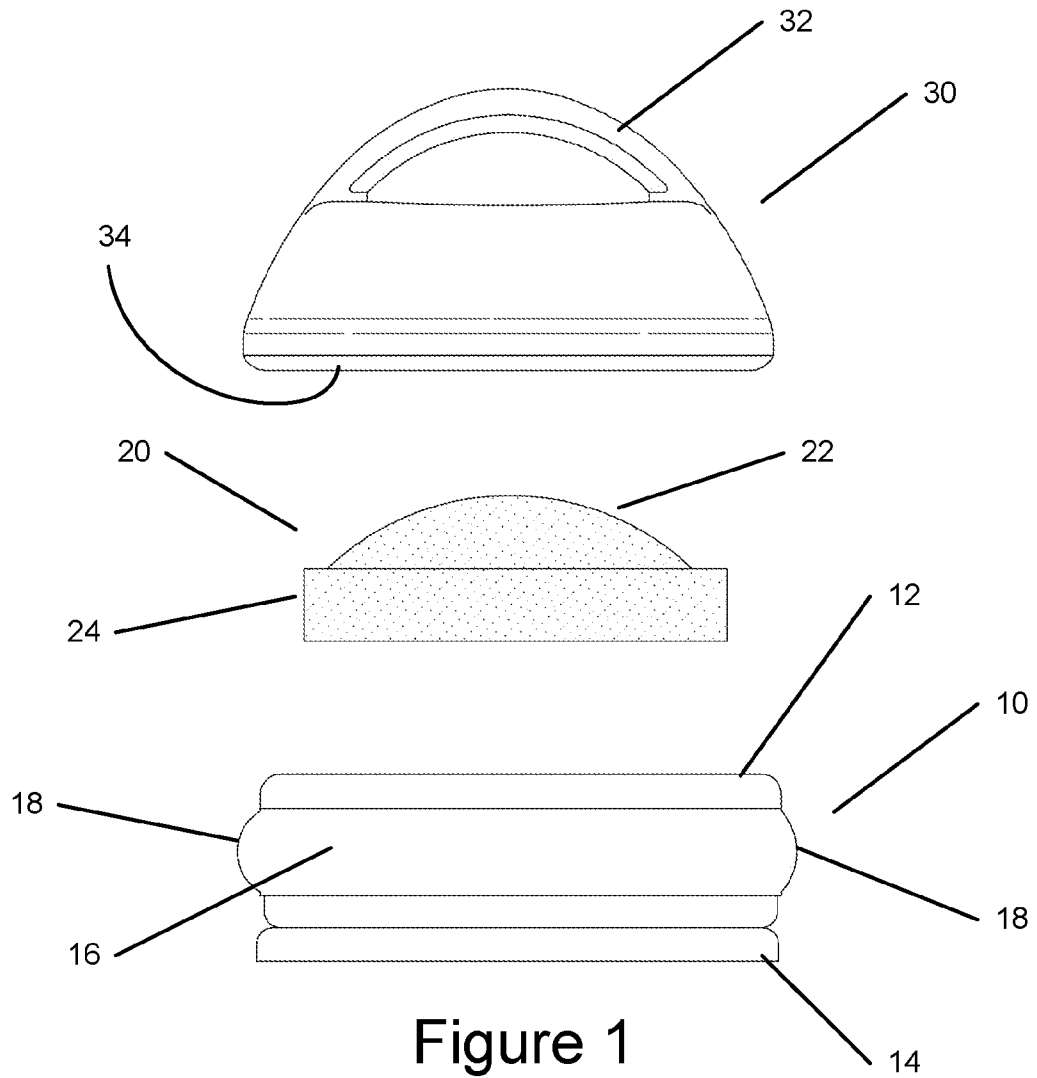


Figure 1

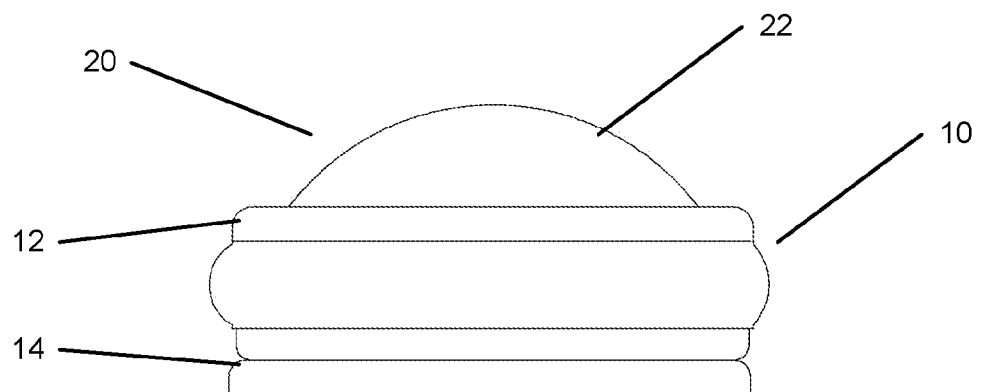


Figure 2

2/9

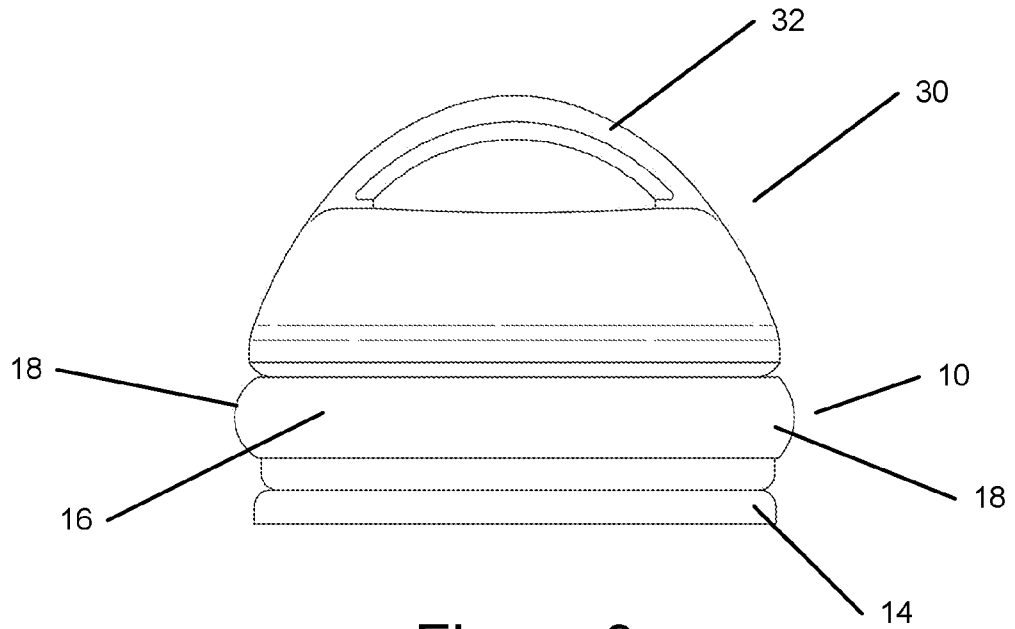


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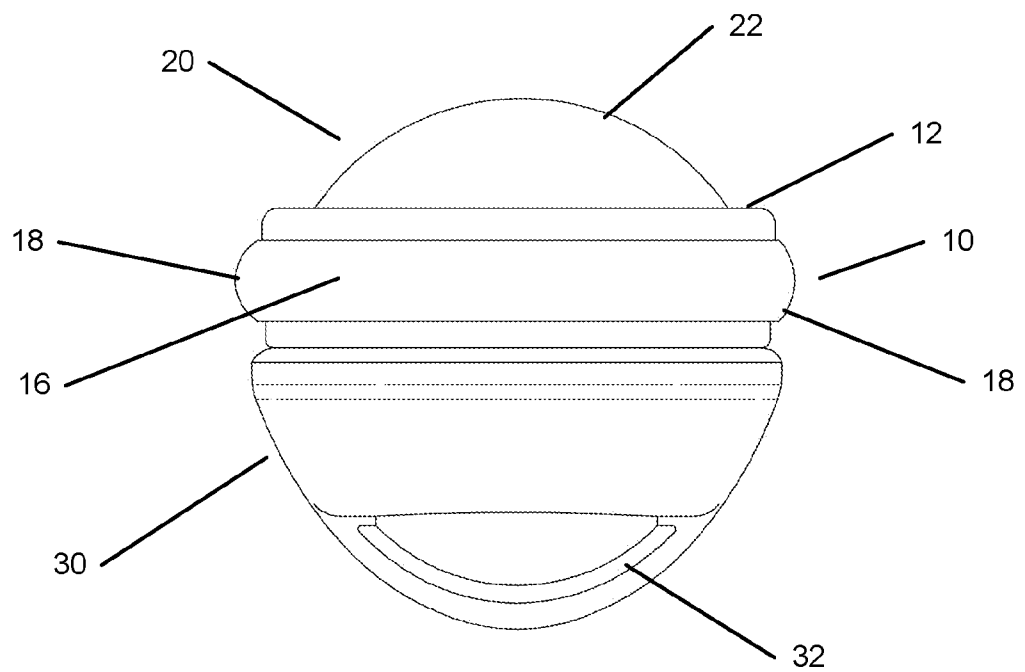


Figure 4

3/9

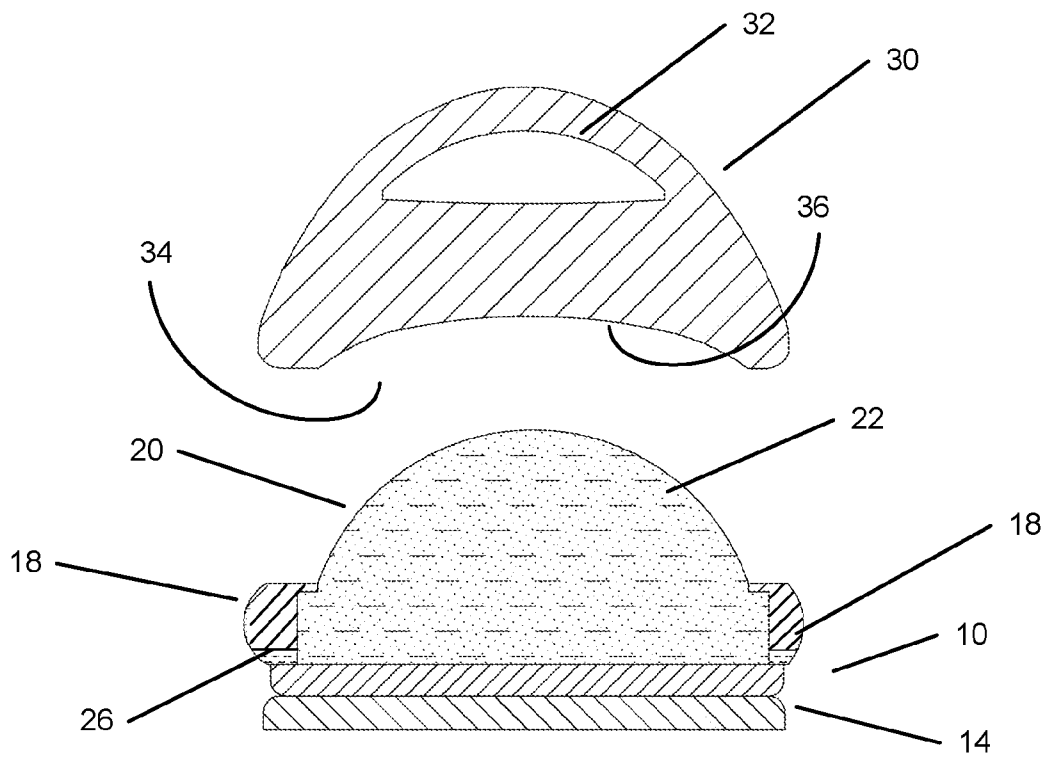


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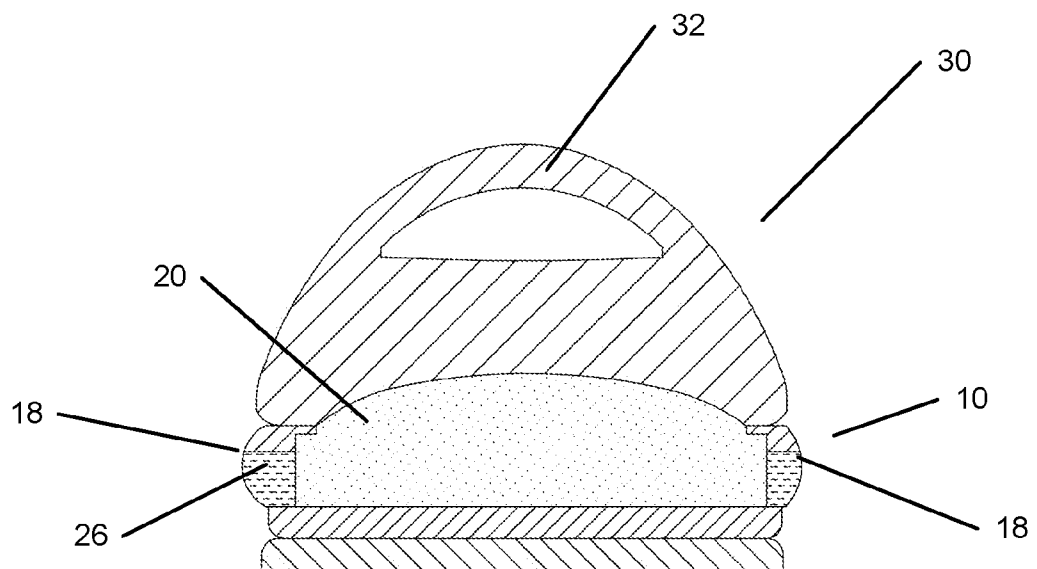


Figure 6

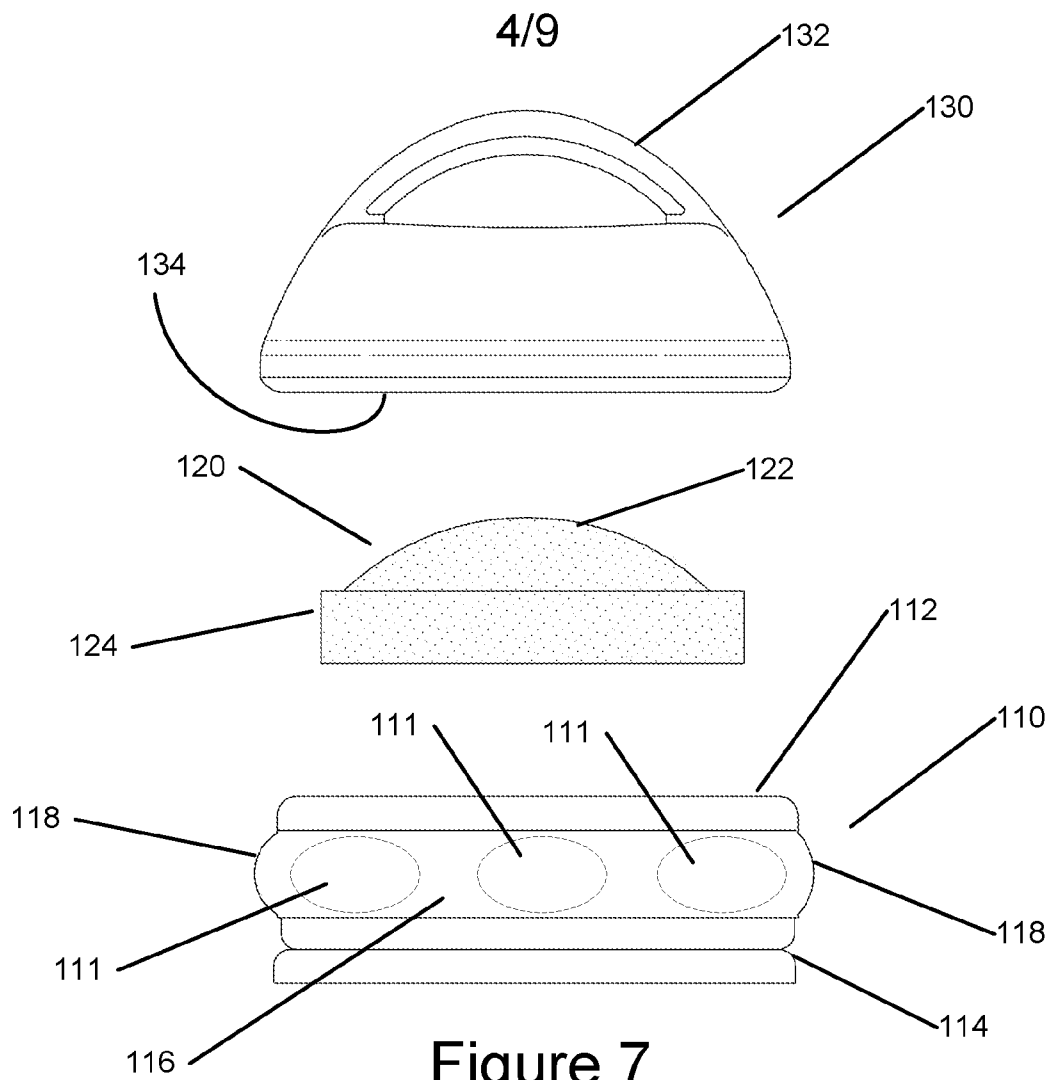


Figure 7

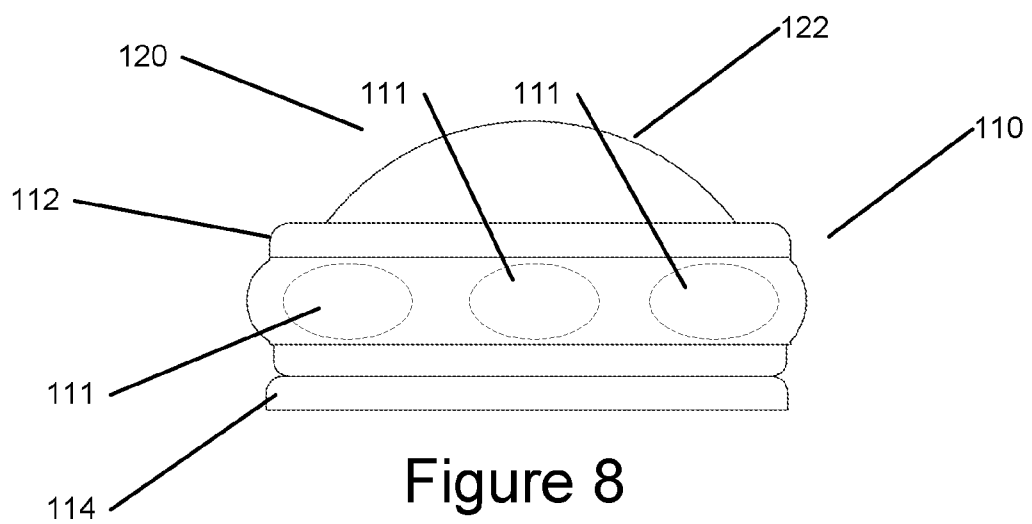


Figure 8

5/9

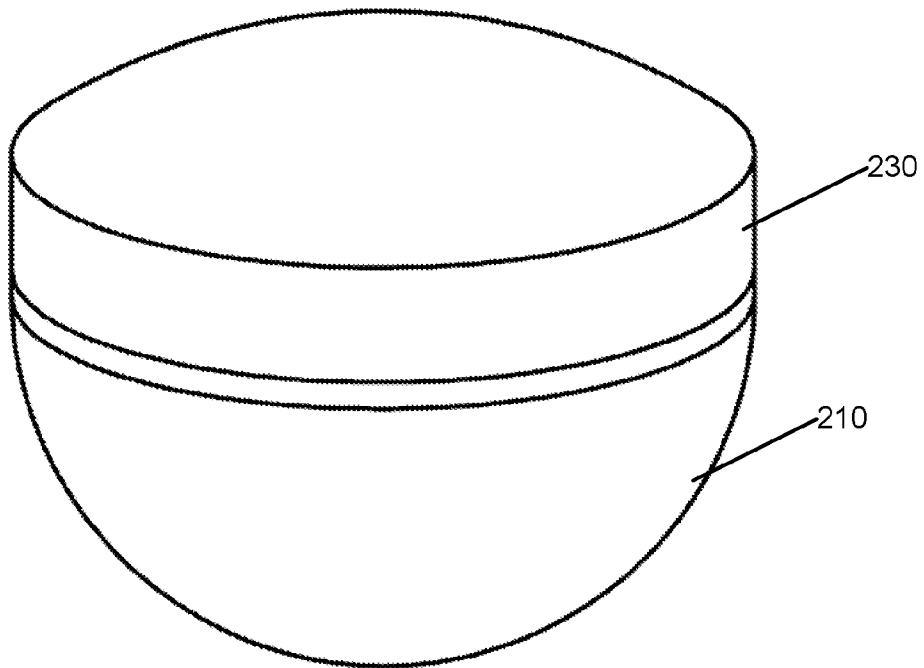


Figure 9

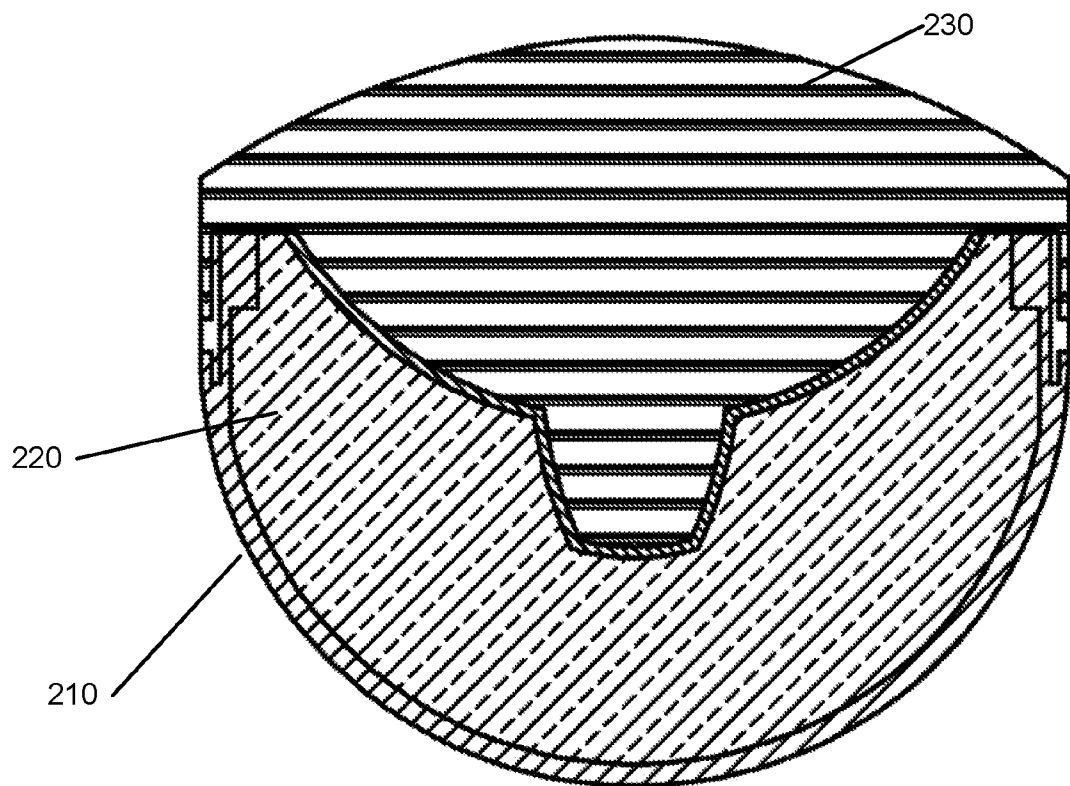


Figure 10

6/9

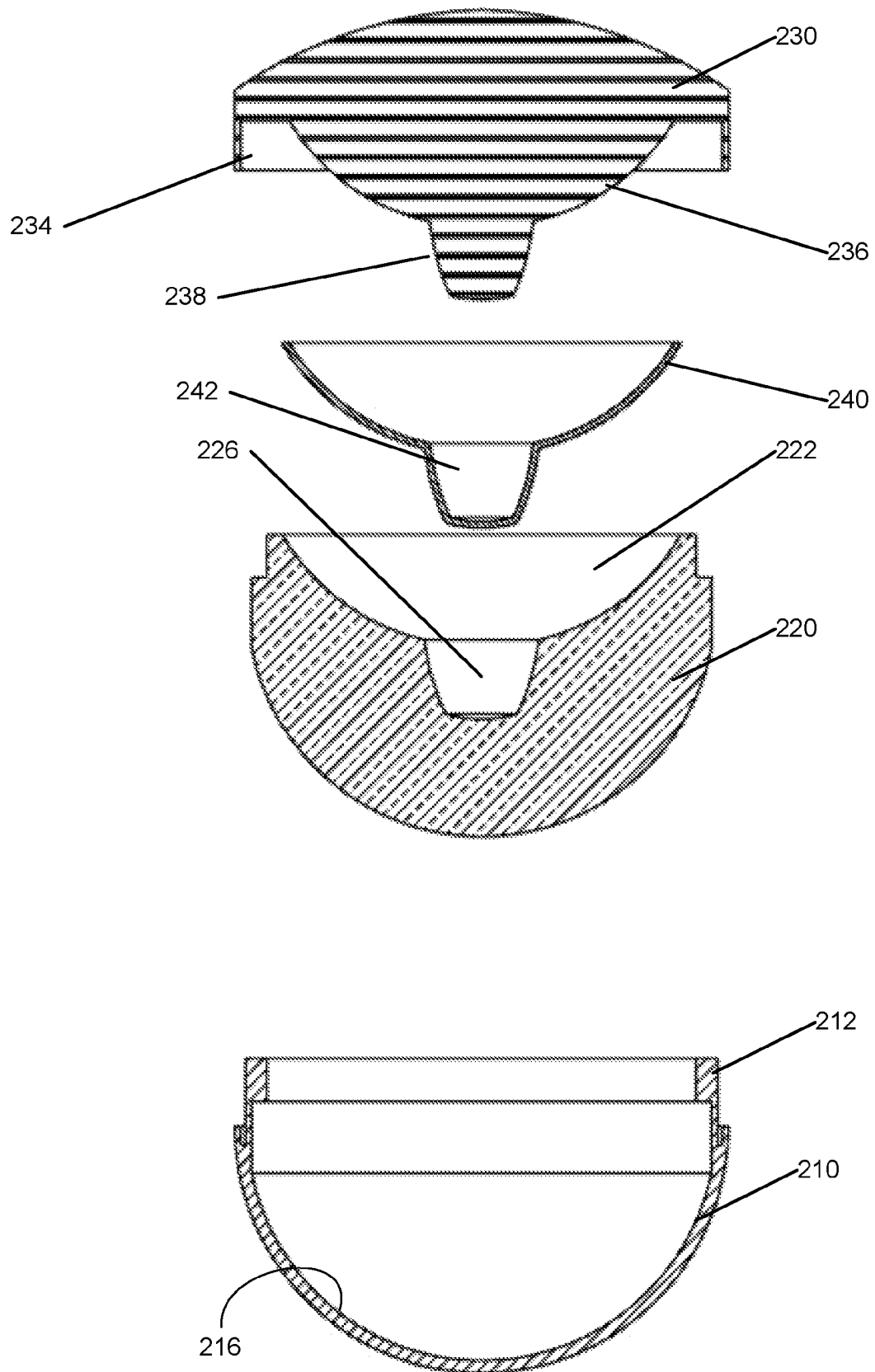


Figure 11

7/9

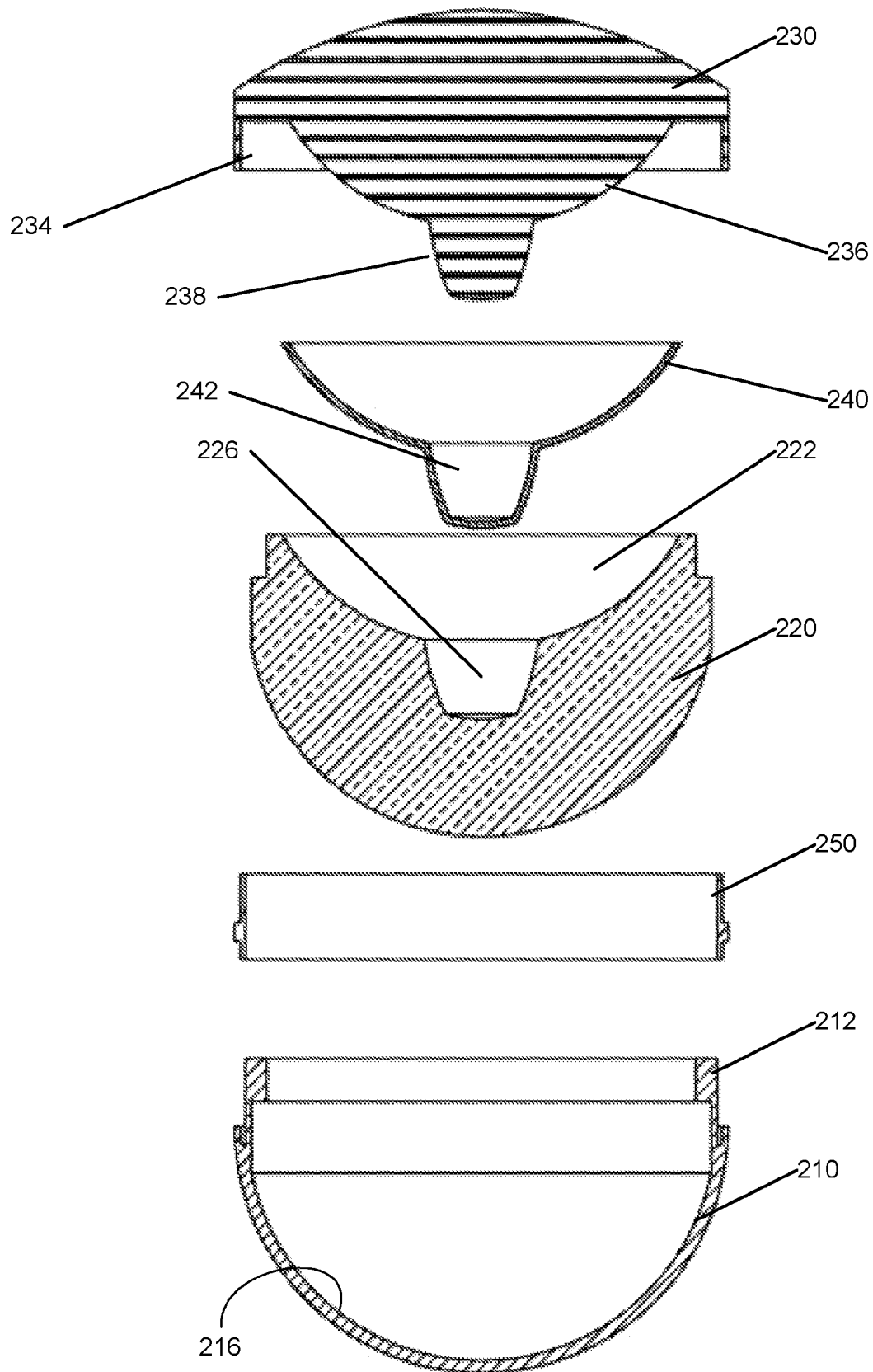


Figure 12

8/9

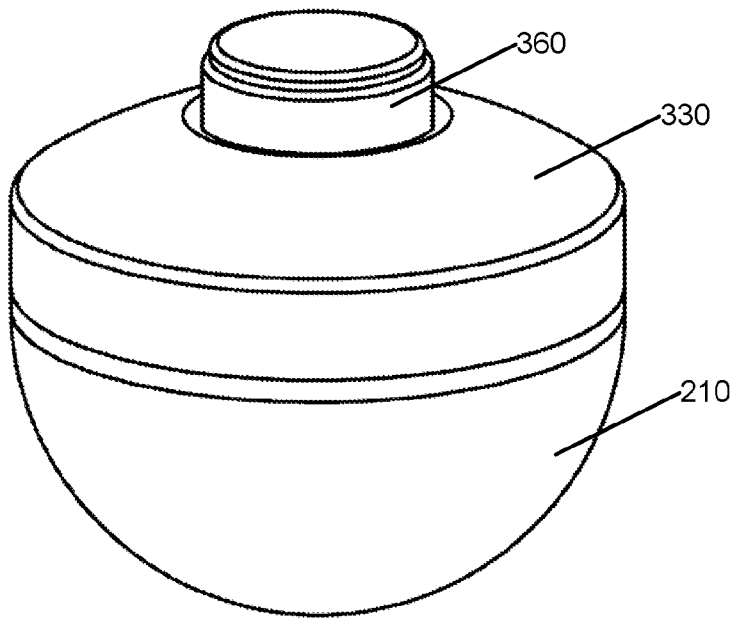


Figure 13

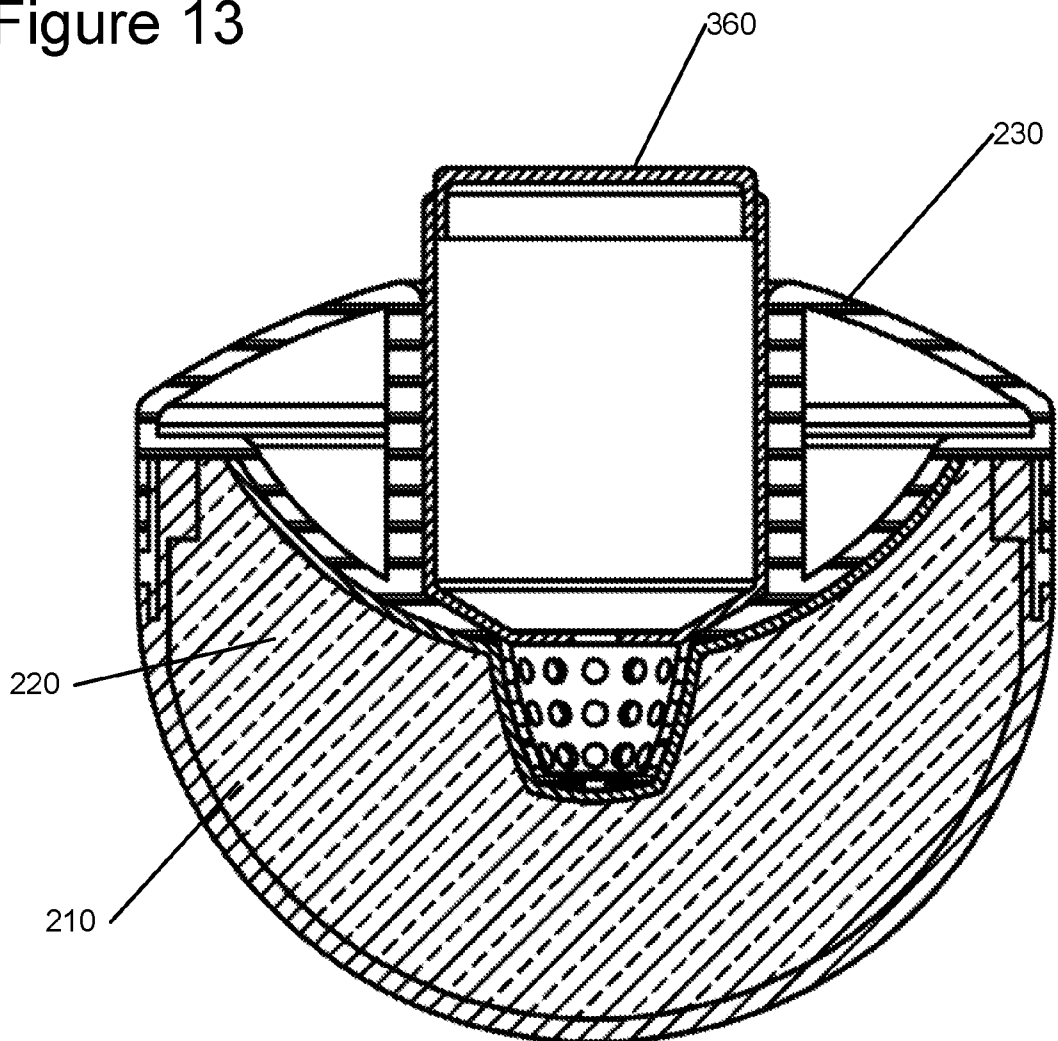


Figure 14

9/9

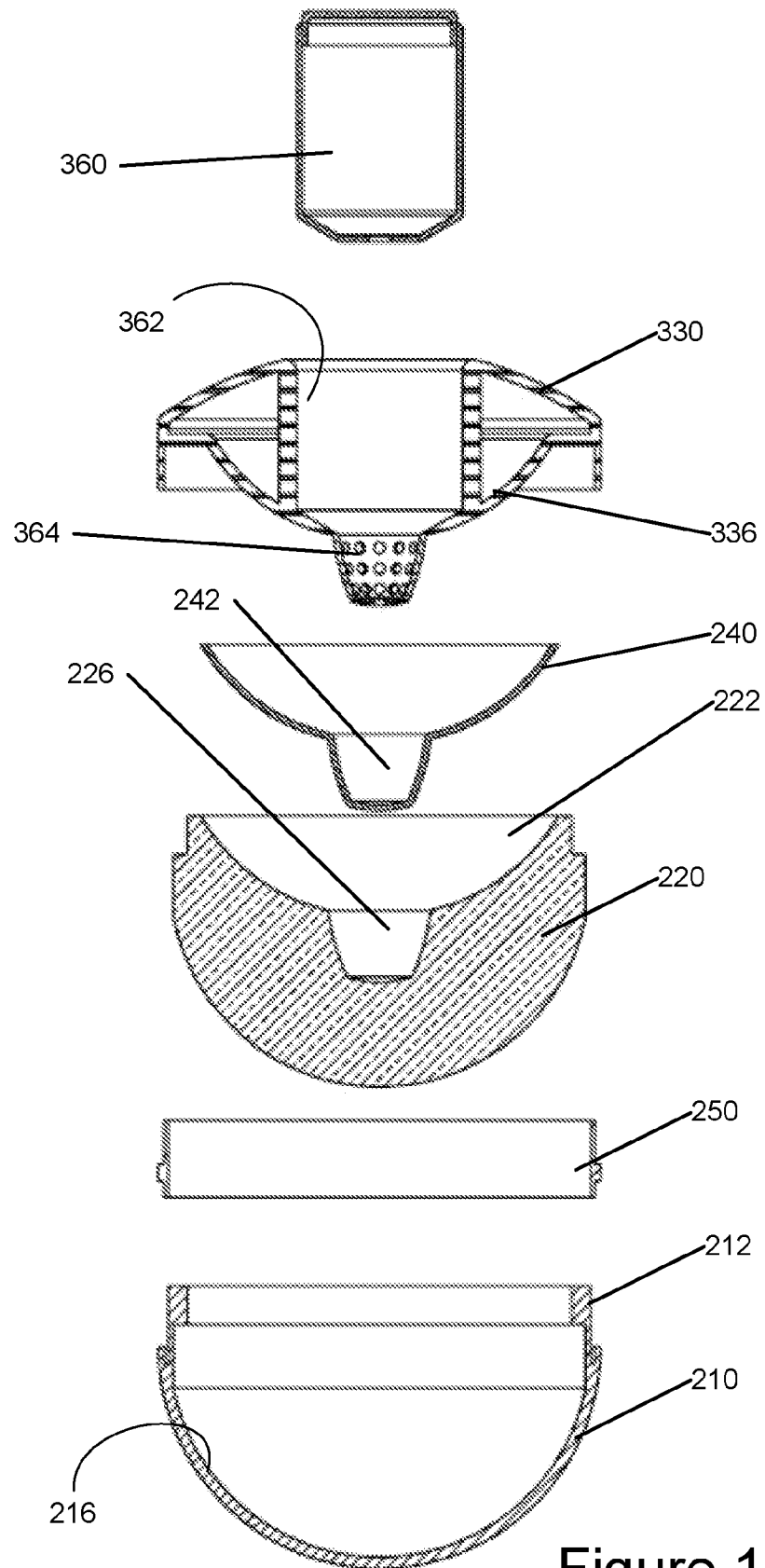


Figure 15

## INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2014/053701

## A. CLASSIFICATION OF SUBJECT MATTER

INV. A45D34/04 B65D47/42  
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A45D A61M B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Further documents are listed in the continuation of Box C.



See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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"&amp;" document member of the same patent family

Date of the actual completion of the international search

21 August 2015

Date of mailing of the international search report

01/09/2015

Name and mailing address of the ISA/

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Authorized officer

Berndorfer, Urs

## INTERNATIONAL SEARCH REPORT

International application No

PCT/GB2014/053701

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

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