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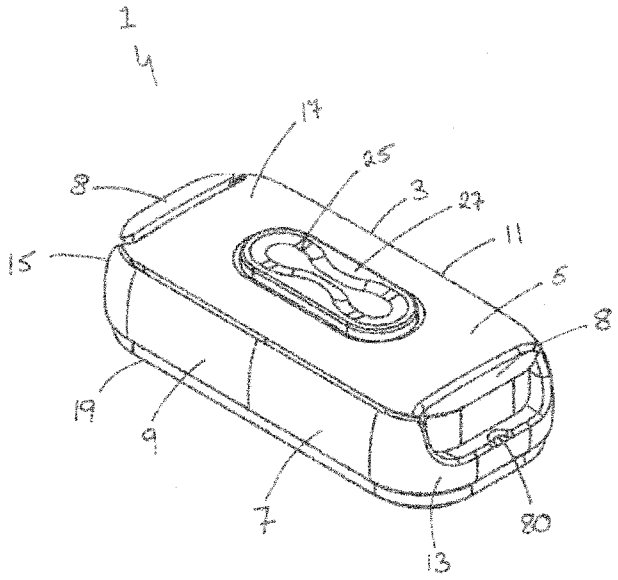


Figure 1

(57) Abstract: An apparatus for administering liquid to an individual's skin, the apparatus comprises at least one pod comprising, a pod body which has, in a storage state, a liquid-tight chamber which contains a liquid to be administered. The chamber has a pod outlet that is covered by a rupturable membrane and a lancet which is coupled to the pod body and which is movable to rupture the membrane. The at least one pod is activatable from the storage state to a dispensing state in which the membrane is ruptured by the lancet to dispense the liquid through the outlet. A housing shaped and dimensioned to receive the at least one pod, the housing has at least one housing outlet, the at least one pod is locatable in the housing such that the at least one pod outlet is in register with the, or a respective, housing outlet and an actuation mechanism that is operable to engage the, or each, pod in the housing to activate the, or each, pod from the storage state to the dispensing state.

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# APPARATUS FOR ADMINISTERING LIQUID INTO SKIN

## Field of the Invention

This invention relates to apparatus for administering liquid to an individual's skin. The invention relates particularly to allergy testing apparatus.

## Background to the Invention

There are various known methods currently employed by health organisations to test an individual's immune response to common allergens such as grass pollen, dust mites etc. The most common of these is Skin Prick testing, which is usually performed by manually drawing a grid on the patient's skin (usually forearm or back) using a marker or pen before applying a drop of the allergen extract(s) to be tested in corresponding grids on the user's skin. Upon this grid a positive control (histamine) and a negative control (saline) are also applied. The skin is pricked through the drop of allergen using a lancet to allow for the introduction of the allergen into the skin. Typically after about 15 to 20 minutes the test is read by a suitable individual. The positive control typically elicits an immune response in the form a wheal of at least 3mm, while the negative control should not cause a wheal. The response to each of the allergen extracts is then measured. If the patient is not allergic to a particular extract there should be no immune response. However, if they are allergic to any particular extract, a wheal of at least 3mm would be expected. The advantages of this test are that it is cheap and relatively easy to perform. The disadvantages are that it is relatively time consuming, the size of the drops are not standardised with the volume varying depending on the method of application. As well as this 'runoff' is a common issue and the force/ pressure applied over each test is not standardised which can potentially result in the lancet drawing blood from the individual and cause unnecessary pain which is unpleasant for individual, particularly so when the test is being performed on a child.

Another test which is currently used is the Unitest®, Lincoln Diagnostics This again involves the use of a grid which is manually drawn on the skin. The lancets are typically dipped in the allergen extract and then the skin is subsequently pricked. Again positive and negative controls are also used. The advantages of this test are that it is relatively inexpensive, easy to perform and the dose of allergen extract/control used is standardised due to this being accommodated within the body of the lancet itself after dipping. However this test is time consuming as it requires multiple 'pricks' performed consecutively and also the force/ pressure applied is not standardised over all tests so again there is the risk of causing minor tissue trauma to the chosen area. Another known test is the Multitest®, Lincoln Diagnostics. This allows eight tests, typically comprising two controls and six allergen extracts, to be performed simultaneously. The multipronged device is dipped into the wells containing the controls/ allergens and then applied to the skin. The advantages of this system are that it is reliable, quick, easy to use, standardised, more reliable and reproducible. The device is also disposable. However whilst it does provide a number of advantages over the tests described previously there are still a number of disadvantages such as the fact the wells in which the device is dipped have to be filled manually, which can lead to spillages or incorrect allergens being placed in

the wrong wells. Furthermore this test is limited to a set number meaning that only a small number of allergens can be tested at any one time. Accordingly there exists a need to provide an improved allergen testing apparatus.

Summary of the invention

Accordingly, a first aspect of the invention provides an apparatus for administering liquid to an individual's skin, the apparatus comprising, at least one pod comprising, a pod body having, in a storage state, a liquid-tight chamber containing a liquid to be administered, said chamber having a pod outlet that is covered by a rupturable membrane; and a lancet coupled to said pod body and being movable to rupture said membrane, said at least one pod being activatable from said storage state to a dispensing state in which said membrane is ruptured by said lancet to dispense said liquid through said outlet; a housing shaped and dimensioned to receive said at least one pod, said housing having at least one housing outlet, said at least one pod being locatable in said housing such that said at least one pod outlet is in register with the, or a respective, housing outlet; and an actuation mechanism operable to engage the, or each, pod in said housing to activate the, or each, pod from the storage state to the dispensing state.

Ideally, said pod body is deformable. Preferably, said lancet is carried by the deformable pod body. Ideally, said lancet is integrally formed with said deformable body. Preferably, said lancet is located within said liquid-tight chamber. Ideally, said lancet projects through said housing outlet in said dispensing state. Preferably, said housing has a respective outlet for each pod. Ideally, said housing has one or more outlets accommodating multiple pods. Preferably, said pod(s) are seated in said housing outlet(s). Ideally, said lancet projects out of said housing in said dispensing state.

Preferably, said actuation mechanism is variable between an unfired and fired state. Ideally, said actuation mechanism comprises at least one controller which is coupled to an abutment means. Preferably, said actuation mechanism is configured to vary between the unfired and fired states upon actuation of the controller. Ideally, the controller comprises a button which incorporates a resilient biasing means such as a spring. Preferably, upon actuation of the controller said abutment means is configured to reciprocally displace downwardly such as to extend within the cavity of said housing. Ideally, said abutment means comprises one or more substantially planar members having dimensions substantially corresponding to the cross sectional area of the cavity defined by the housing.

Preferably, said actuation mechanism incorporates a restricting means which is configured to restrict the displacement of the abutment means beyond a predetermined position within the housing, such that in-use the lancet of the one or more pod(s) which may be located within the housing does not extend from the housing beyond a predetermined distance. Ideally, said restricting means is configured to restrict the compressive force applied to the pod(s) via the actuating mechanism in-use. Ideally, said actuation mechanism comprises a release mechanism which is configured to release the restricting means such that it does not engage with the abutment means in-use in at

least one position. Preferably, said restricting means comprises a releasable coupling between the controller and the abutment means, said releasable coupling being configured to release said abutment means from said controller in response to said abutment means being subject to a force above a threshold level in a direction against the movement of said abutment means towards said at least one housing outlet.

Ideally, said releasable coupling comprises a friction fit coupling between respective portions of said controller and said abutment means. Preferably, said friction fit coupling is provided by respective inter-engageable chamfered surfaces on said respective portions of said controller and said abutment means. Ideally, said respective portion of said abutment means is provided on one or more apertures formed in the abutment means and said respective portion of said controller passes through said one or more aperture when said coupling is released. Preferably, said housing comprises an upper portion and base portion which are releasably coupled together.

A second aspect of the invention provides a pod comprising a pod body having, in a storage state, a liquid-tight chamber containing a liquid to be administered, said chamber having a pod outlet that is covered by a rupturable membrane; and a lancet coupled to said pod body and being movable to rupture said membrane, said at least one pod being activatable from said storage state to a dispensing state in which said membrane is ruptured by said lancet to dispense said liquid through said outlet;

Ideally, the rupturable membrane comprises a metal foil. Preferably, said metal foil comprises an aluminium foil.

It will be understood that the term “lancet” as used herein is intended to embrace any sharp device, such as a needle, spike, pin, prong or knife, that is capable of pricking or piercing a subject’s (in particular a human subject’s) skin.

Brief description of the drawings

The invention will now be described by way of example with reference to the accompanying drawings in which like numerals are used to denote like parts and in which:

Figure 1 is a perspective view of an allergy testing apparatus embodying one aspect of the invention;

Figure 2 is a top plan view of the allergy testing apparatus of Figure 1;

Figure 3 is a side view of the allergy testing apparatus in an unfired state;

Figure 4 is an end view of the allergy testing apparatus in the unfired state;

Figure 5 is a bottom plan view of the allergy testing apparatus in the unfired state;

Figure 6 is a bottom perspective view of the allergy testing apparatus in the unfired state;

Figure 7 is a side sectional view of the allergy testing apparatus in the unfired state;

Figure 8 is an end sectional view of the allergy testing apparatus in the unfired state;

Figure 9 is a side sectional view of the allergy testing apparatus in the unfired state with a plurality of pods provided therein;

Figure 10 is an end sectional view of the allergy testing apparatus in the unfired state with a plurality of pods provided therein;

Figure 11 is a side perspective sectional view of the allergy testing apparatus in the unfired state with a plurality of pods provided therein;

Figure 12 is a end perspective sectional view of the allergy testing apparatus in the unfired state with a plurality of pods provided therein;

Figure 13 is a top plan view of the allergy testing apparatus in a fired state;

Figure 14 is a side sectional view of the allergy testing apparatus in the fired state;

Figure 15 is an end sectional view of the allergy testing apparatus in the fired state;

Figure 16 is an end sectional view of the allergy testing apparatus in the fired state having the plurality of pods provided therein;

Figure 17 is a side perspective view of the allergy testing apparatus in the fired state having the plurality of pods provided therein;

Figure 18 is a side perspective view of a first embodiment of the pod in a storage state;

Figure 19 is a front perspective view of the first embodiment of the pod in the storage state;

Figure 20 is a sectional view of the first embodiment of the pod in the storage state;

Figure 21 is a top plan view of the first embodiment of the pod in the storage state;

Figure 22 is a bottom plan view of the first embodiment of the pod in the storage state;

Figure 23 is a side perspective view of the first embodiment of the pod in the dispensing state;

Figure 24 is a front perspective view of the first embodiment of the pod in a dispensing state;

Figure 25 is a sectional view of the first embodiment of the pod in the dispensing state;

Figure 26 is a bottom perspective view of the first embodiment of the pod in the dispensing state;

Figure 27 is a top perspective of the first embodiment of the pod in the dispensing state;

Figure 28 is a side perspective view of a second embodiment of the pod in a storage state;

Figure 29 is a front perspective view of the second embodiment of the pod in the storage state;

Figure 30 is a sectional view of the second embodiment of the pod in the storage state;

Figure 31 is a top plan view of the second embodiment of the pod in the storage state;

Figure 32 is a bottom plan view of the second embodiment of the pod in the storage state;

Figure 33 is a top perspective of the second embodiment of the pod in the storage state;

Figure 34 is a bottom perspective view of the second embodiment of the pod in the storage state;

Figure 35 is a side perspective view of the second embodiment of the pod in a dispensing state;

Figure 36 is a front perspective view of the second embodiment of the pod in the dispensing state;

Figure 37 is a sectional view of the second embodiment of the pod in the dispensing state;

Figure 38 is a top plan view of the second embodiment of the pod in the dispensing state;

Figure 39 is a bottom plan view of the second embodiment of the pod in the dispensing state;

Figure 40 is a bottom perspective view of the second embodiment of the pod in the dispensing state;

Figure 41 is a top perspective view of the second embodiment of the pod in the dispensing state.

Detailed description of the drawings

Referring now to the drawings and in particular to Figures 1 to 6, there is shown, generally indicated by the reference numeral 1 an apparatus for administering liquid to an individual's skin embodying a

first aspect of the invention. In preferred embodiments, including the illustrated embodiment, the apparatus 1 is an allergy testing apparatus. Alternatively, apparatus embodying the invention may be used for administering other liquids, for example vaccines or medications. The apparatus 1 comprises a housing 3 which is shaped and dimensioned to provide a cavity therein. The housing 3 typically comprises an upper portion 5 and a base portion 7 which are releasably coupled together. To this end, the base portion 7 is typically shaped and dimensioned such as to incorporate the upper portion 5 therein. The upper portion and base portion 5, 7 are typically releasably coupled via one or more engagement means 8. To this end, the engagement means 8 typically comprises one or more clips which are provided on the upper portion 5 and which are configured to abut at least part of the base portion 7 in-use such as to releasably couple the upper portion 5 and base portion 7 together. Alternatively the engagement means 8 may be provided upon the base portion 7 and configured to abut at least part of the upper portion 5 in-use. In a preferred embodiment the engagement means 8 comprises first and second clasps which are provided upon opposing ends of the upper portion 5 and which are configured to abut respective portions of the base portion 7 in-use. Alternatively the engagement means 8 may comprise one or more magnets or screws or any other suitable engagement means.

The housing 3 typically comprises first and second side walls 9, 11 which extend substantially parallel to each, and first and second end walls 13, 15 which extend substantially parallel to each other, with the first, second side walls 9, 11 typically extending substantially perpendicular to the first and second end walls 13, 15 with a top and bottom wall 17, 19 joining both pairs of walls at opposing ends, such that the housing has a substantially cuboidal shape. In a preferred embodiment the upper portion 5 comprises the top wall 17 and at least part of the first and second end walls 13, 15. The base portion 7 typically comprises the bottom wall 19, first and second side walls 9, 11 and at least part of the first and second end walls 13, 15. Typically the exterior corners of the housing 3 are chamfered or rounded such as to provide a desirable aesthetic appearance. The base portion 7 incorporates at least one housing outlet 21 which extends into the interior cavity of the housing 3, is typically provided upon the bottom wall 19 of the housing 3. In a preferred embodiment the base portion 7 incorporates a plurality of housing outlets 21 which are provided upon the bottom wall 19 of the housing 3.

At least one pod 30 embodying a second aspect of the invention is provided comprising a pod body 31 which typically has, in a storage state, a liquid-tight chamber 32 which may contain a liquid to be administered. The chamber 32 typically has a pod outlet 33 that is covered by a rupturable membrane 34 and a lancet 35 which is coupled to the pod body 31 which is movable to rupture the membrane 34. The at least one pod 30 is activatable from the storage state (shown in figures 18 to 22) to a dispensing state (as shown in Figures 23 to 27) in which the membrane 34 is ruptured by the lancet 35 to dispense the liquid through the pod outlet 33. The rupturable membrane 34 typically comprises a metal foil such as an aluminium foil however it may alternatively comprise any other suitable rupturable membrane 34 such as one comprising a polymeric material. Additionally it is envisaged that the rupturable membrane 34 may comprise a combination of metal and polymeric

materials, for example the rupturable membrane 34 may comprise a polymeric material having a layer of metal foil overlaid thereon, wherein the metal foil is removable from the polymeric material such as immediately prior to the use of the pod 30, in this arrangement the metal foil is provided for aseptic purpose to maintain the integrity of the liquid contained within the pod 30. . Advantageously, the liquid tight chamber 32 is dimensioned such as to carry a specific volume of liquid such that where the apparatus 1 is used for allergen testing or vaccinations the dosage of the liquid contained within the chamber 32 may be standardised. Further advantageously the liquid tight chamber 32 prevents any run-off of the applied liquid in-use.

The pod body 31 is typically deformable such that upon deformation the pod is configured to vary from the storage state to the dispensing state. The pod 30 typically being arranged to return to its original state after deformation. The lancet 35 may be carried by the deformable pod body 31. In a preferred embodiment the lancet 35 is integrally formed with the deformable pod body 31. The lancet 35 is typically located within the liquid tight chamber 32 and is configured to project through the pod outlet 33 in the dispensing state. Advantageously, in the dispensing state the lancet 35 may in-use, contact the surface of a persons skin such as to cause a slight abrasion, thereby allowing the liquid contained within the pod 30 to breach the barrier of the skin such as when testing a persons immune response to a plurality of allergens. In the dispensing state the lancet 35 typically only extends in part from the pod outlet 33. Advantageously this prevents the lancet 35 from extending from the pod body 33 to such an extent that it pierces through a user's skin in-use. In an alternative embodiment the pod 30 and more specifically the lancet 35 may be shaped such that when the pod 30 is in the dispensing state the lancet 35 may extend substantially therefrom such as to pierce the users skin, such as for applying a vaccination. The at least one pod 30 may be insertable into the apparatus 1, typically within the housing 3. The housing 3 typically has a respective housing outlet 21 for each pod 30. Typically said housing 3 has one or more outlets 21 which accommodate multiple pods 30. In a preferred embodiment the one or more pods 30 are typically seated within the housing outlet(s) 21.

Alternatively, the at least one pod 30 may be permanently incorporated within the housing 3. The liquid to be administered may comprise a saline or histamine or allergen or vaccine solution or any other suitable liquid. In a preferred embodiment a plurality of the pods 30 may be insertable within the housing 3 with at least one pod comprising a histamine solution and at least one pod comprising a saline solution with the remaining plurality of pods comprising a plurality of allergen solutions such that the apparatus 1 is suitable for testing a users immune response to the plurality of allergens.

Referring to figures 16 to 25 there is shown a first embodiment of the deformable pod 30. In this embodiment the pod 30 has a pod body 31 which typically comprises an integral member comprising an upper portion 36 and a lower portion 37 which are joined via a central portion 38, the upper portion and lower portion 36, 37 extend along the same vertical axis. The pod body 31 typically comprises an annular member, with the central portion 38 typically having a smaller diameter than both the upper and lower portions 36, 37 such that the pod 30 is substantially cylindrical shaped.

Typically the upper portion 36 may also incorporate a depression on its upper face. In a preferred embodiment the lower portion 37 typically incorporates a flange 39 which is shaped to correspond with one more indentations typically provided upon the interior of the bottom wall 19 of the base portion 7 upon which the housing outlets 21 may be provided. Advantageously, the flange 39 in combination with the indentations aligns the pod outlet 33 with the housing outlets 21 such that they are in register in-use. The pod outlet 33 is typically provided upon the lower portion 45, typically upon the base of the lower portion 45. The pod body 31 is substantially hollow, is shaped such that the lancet 35 extends downwardly from the top interior wall of the upper portion 36 towards the lower portion 37 within the interior of the pod body 31, with the chamber 32 being defined as the remaining space within the pod body 31. Typically the pod 30 comprises a deformable material such as a plastics or polymer of any combination thereof. In a preferred embodiment the pod 30 comprises polyurethane however it may alternatively comprise any other suitable material.

Referring to figures 26 to 39 there is shown generally indicated by the reference numeral 40 a second embodiment of the deformable pod 40. The pod body 41 is typically an integral member which comprises upper and lower portions 46, 47. The upper and lower portions 46, 47 comprise annular portions which are typically arranged co-axially in concentric circles with respect to one another. The lower portion 47 is arranged around and radially outward from the upper portion 46, with the upper portion 46 being provided substantially above the lower portion 47 such that upon deformation of the pod 40 (as shown in figures 33 to 39) the upper portion 46 is configured to displace downwardly relative to the lower portion 47. In a preferred embodiment the lower portion 47 typically incorporates a flange 49 which is shaped to correspond with one more indentations typically provided upon the interior of the bottom wall 19 of the base portion 7 upon which the housing outlets 21 may be provided. Advantageously, the flange 49 in combination with the indentations aligns the pod(s) 40 with the housing outlet(s) 21 such that they are in register in-use. The pod outlet 43 is typically provided upon the lower portion 47, typically upon the base of the lower portion 47. The pod body 41 is substantially hollow, is shaped such that the lancet 45 extends downwardly from the top interior wall of the upper portion 46 towards the lower portion 47 within the interior of the pod body 41, with the liquid tight chamber 42 being defined as the remaining space within the pod body 41. Typically the pod 40 comprises a deformable material such as a plastics or polymer of any combination thereof. In a preferred embodiment the pod 40 comprises polyurethane however it may alternatively comprise any other suitable material.

The housing 3 incorporates at least one actuation mechanism 25. The actuation mechanism 25 is operable to engage the, or each, pod 30 in the housing 3 to activate the, or each, pod 30 from the storage state to the dispensing state. The actuation mechanism 25 is variable between one or more states, typically between an unfired and fired state. In the fired state the actuation mechanism 25 is configured to extend, at least in part, within the cavity of the housing 3 such that it engages with the, or each, pod 30 located therein, whereupon engagement the abutment means is configured to apply a compressive force to the pod(s) 30. Advantageously, the actuation mechanism 25 is configured to apply a uniform compressive force to each pod 30 simultaneously. The actuation mechanism 25

typically comprises at least one controller 27 which is coupled to an abutment means 29. The actuation mechanism 25 is configured to vary between the unfired and fired states upon actuation of the controller 27. The controller 27 typically comprises a button which incorporates a resilient biasing means such as a spring. Upon actuation of the controller 27 the abutment means 29 is configured to reciprocally displace downwardly such as to extend within the cavity of the housing 3. The abutment means 29 typically comprises one or more substantially planar members. In a preferred embodiment the abutment means 29 comprises a single planar member having dimensions substantially corresponding to the cross sectional area of the cavity defined by the housing 3. Advantageously, the abutment means 29 is arranged to contact and compress each pod 30 contained within the housing 3 simultaneously with a uniform compressive force, thereby ensuring that the application of liquids contained within the pods 30 is applied reliably and consistently. In an alternative embodiment (not shown) the abutment means 29 may comprise a plurality of individual members which are coupled to the controller 27, located within the housing 3 such that upon actuation of the controller 27 each individual member is configured to displace simultaneously. The housing 3 typically incorporates at least one securing member 28 which is configured to secure the actuation mechanism 25 within the housing 3 such as to prevent any dirt or debris from entering therein. In a preferred embodiment the securing member 28 comprises a substantially planar member which is coupled to the housing 3, typically upon the base of the upper portion 5 of the housing 3. The actuation mechanism 25 may extend, at least in part, through the securing member 28. The actuation mechanism 25 is configured to reliably apply a predetermined force to the one or more pods 30 located within the apparatus 1 in-use. Advantageously, where the apparatus 1 is used for allergen testing this facilitates accurate and reliable testing as each pod 30 has the substantially same predetermined force there applied.

The controller 27 typically comprises a resiliently biased button, which is biased towards the unfired state and which has at least one engaging member 60 extending therefrom within the housing 3. In the unfired state the engaging member 60 is spaced apart from the abutment means 29. Typically the abutment means 29 is slidably coupled to the housing 3. Upon actuation of the controller 27 the engaging member 60 is configured to push down upon the abutment means 29 such as to displace the abutment means 29 in a downward direction within the housing 3, wherein one or more pod(s) 30 may be located such that the abutment means 29 engages with the one or more pod(s) 30.

In a preferred embodiment the actuation mechanism 25 may incorporate a restricting means 61 which is configured to restrict the displacement of the abutment means 29 beyond a predetermined position within the housing 3, such that in-use the lancet 35 of the one or more pod(s) 30 which may be located within the housing 3 does not extend from the housing 3 beyond a predetermined distance. To this end the restricting means is movable between restricting and non restricting states as shown in figures 16 and 15 respectively.. The restricting means 61 typically comprises a releasable coupling between the controller 27 and the abutment means 29, the releasable coupling is configured to release the abutment means 29 from the controller 27 in response to the abutment means 29 being subject to a force above a threshold level in a direction against the movement of the

abutment means 29 towards the at least one housing outlet 21. The releasable coupling typically comprises a friction fit coupling between respective portions of the controller 27 and the abutment means 29. The friction fit coupling is typically provided by respective inter-engageable chamfered surfaces on the respective portions of the controller 27 and the abutment means 29. The respective portion of the abutment means 29 is typically provided on one or more apertures 64 formed in the abutment means 29 and the respective portion of the controller 27 passes through the one or more apertures 61 when the coupling is released. The controller 27 is typically releasably coupled to the abutment means 26 via the restricting means 61. Typically the restricting means 61 may comprise part of the controller 27. In a preferred embodiment the restricting means 61 typically comprises at least first and second legs 62, 63 which are coupled to the controller 27 and which are chamfered at the opposing respective ends. The abutment means 29 typically comprises first and second apertures 64 having at least one inclined side wall such that in the unfired state the chamfered ends of the first and second legs 53, 63 may rest substantially flush there against, corresponding to the , restricting means 61 adopting the non restricting state. Upon actuation of the controller 27 the restricting means 61 is configured to extend simultaneously with the engaging member 60 and abutment means 29, whereupon engagement of the abutment means 29 with the one or more pod(s) located within the housing 3 the restricting means 61 may slidably extend through the abutment means 29 whereupon the tapered end(s) of the restricting means 61 may engage with the lower surface of the abutment means 29 (i.e. the restricting means 61 adopts the restricting state) such as to retain the controller 27 in a fired state. The restricting means 61 is configured to restrict the compressive force applied to the pod(s) 30 via the actuating mechanism 25 in-use. Advantageously the restricting means 61 prevents the pods 30 located within the housing 3 from extending from the housing 3 by more than a predetermined distance. The restricting means 61 is configured to restrict the force that can be applied via the actuating mechanism 25 in-use. Advantageously, by restricting the compressive force applied to the pods, the pods are not deformed to such an extent that they cannot return to their original shape and the lancet does not extend from the apparatus body to such an extent that it is readily visible.

The restricting means 61 typically incorporates a release mechanism 65 which is configured to release the restricting means 61 such that it does not engage with the abutment means 29. The release mechanism 65 typically comprises one or more protruding members which typically extend from the interior of the side walls of the housing 3. The release mechanism 65 may be displaced between a first and second position such that in the second position it abuts the restricting means 61 in-use. In a preferred embodiment the release mechanism comprises first and second protruding portions 66 and 67 which extend substantially perpendicular relative to the restricting means 61, typically from opposing side walls of the housing 3. Typically the first and second protruding portions incorporate a resilient biasing means which is configured to bias the portions 66, 67 towards the first position. In the first position the first and second protruding portions 66 and 67 extend towards or rest against the first and second legs 62, 63. In the second position the first and second protruding portions 66, 67 abut the respective legs 62, 63 such as to displace the legs 62, 63 in a substantially lateral direction whereupon if the actuation mechanism 25 is in a fired state the legs 62, 63 will

displace such as to release the engagement between the tapered ends of the legs 62, 63 and the abutment means 29. The release mechanism 65 may be varied between the first and second position via an actuator (not shown) provided upon the housing 3. In a preferable embodiment the release mechanism 65 is varied between the first and second positions via the application of a compressive force upon either side of the housing 3. In a preferred embodiment the release mechanism 65 is provided upon opposing sides of the upper portion 5 of the housing 3 such that when the apparatus 1 is in the fired state the upper portion 5 may be removed from the base portion 7, whereupon a compressive force may be applied upon either side of the upper portion 5 such as to release the restricting means 61 from engagement with the abutment means 29 in-use.

A particularly advantageous aspect of the apparatus 1 is that where the pod(s) 30 are in the storage state the lancet 35 contained therein is hidden from view within the chamber 32, this improves an individual's perception of the apparatus 1, particularly if the apparatus 1 is being used by children, as when in the unfired state there are no visible lancet(s) 35 protruding from the apparatus 1. Advantageously, this prevents any unintended injury being caused by exposed lancet(s) 35.Typically the housing 3 may comprise plastics or polymer material such as polypropylene or polyurethane or acrylic or any combination thereof or any other suitable material. Optionally when the apparatus 1 is being used for allergen testing the housing 3 may incorporate an indicator 80 provided upon an exterior portion thereof such as to indicate the arrangement of the pods 30 therein. In a preferred embodiment the indicator may comprise an indentation which is typically provided upon upper portion 5 of the housing 3. The indicator may incorporate a coloured tab (not shown) comprising a plurality of colours, optionally the plurality of colours may correspond to a plurality of allergens. Advantageously, for allergen testing the apparatus 1 will incorporate in the pod(s) 30 positive and negative control solutions as well as a plurality of allergens, to this end the negative and positive controls may be provided at opposing ends of the housing 3, the indicator 80 may be used to indicate the respective end at which either the positive or negative controls may be positioned.

Optionally, the apparatus 1 may be used in conjunction with a computer program typically provided on a computing device (not shown). The computing device is typically configured to obtain data regarding the apparatus 1 and is operable to transmit the data via wired or wireless transmission means. Where the apparatus 1 is used for allergen testing the computing device is operable to determine the plurality of allergens being tested, typically via capturing one or more images of the plurality of pod(s) containing a plurality of allergens, additionally it may also capture one or more images of an individuals reaction to the plurality of allergens, the computing means is then operable to transmit the images to a remote location using the wired or wireless transmission means. Typically the computing device comprises a handheld computing device such as a smartphone however it may alternatively comprises any other suitable computing device. Typically the computing device is configured to transmit the data obtained for recording purposes.

The invention is not limited to the embodiment(s) described herein but can be amended or modified without departing from the scope of the present invention.

Claims

1. An apparatus for administering liquid to an individual's skin, the apparatus comprising,

   a. at least one pod comprising:
      i. a pod body having, in a storage state, a liquid-tight chamber containing a liquid to be administered, said chamber having a pod outlet that is covered by a rupturable membrane; and
      ii. a lancet coupled to said pod body and being movable to rupture said membrane,
      iii. said at least one pod being activatable from said storage state to a dispensing state in which said membrane is ruptured by said lancet to dispense said liquid through said outlet;
   b. a housing shaped and dimensioned to receive said at least one pod, said housing having at least one housing outlet, said at least one pod being locatable in said housing such that said at least one pod outlet is in register with the, or a respective, housing outlet; and
   c. an actuation mechanism operable to engage the, or each, pod in said housing to activate the, or each, pod from the storage state to the dispensing state.

2. The apparatus as claimed in claim 1, wherein said pod body is deformable.

3. The apparatus as claimed in claim 2, wherein said lancet is carried by the deformable pod body.

4. The apparatus as claimed in claim 2 or 3, wherein said lancet is integrally formed with said deformable body.

5. The apparatus as claimed in any preceding claim, wherein said lancet is located within said liquid-tight chamber.

6. The apparatus as claimed in any preceding claim, wherein said lancet projects through said housing outlet in said dispensing state.

7. The apparatus as claimed in any preceding claim, wherein said housing has a respective outlet for each pod.

8. The apparatus as claimed in claims 1 to 6, wherein said housing has one or more outlets accommodating multiple pods.

9. The apparatus as claimed in any preceding claim, wherein said pod(s) are seated in said housing outlet(s).

10. The apparatus as claimed in any preceding claim, wherein said lancet projects out of said housing in said dispensing state.

11. The apparatus as claimed in claim 1, wherein said actuation mechanism is operable between an unfired state and fired state in which it engages with the or each pod in the housing to activate the, or each, pod from the storage state to the dispensing state.

12. The apparatus as claimed in claim 11, wherein said actuation mechanism comprises at least one controller coupled to an abutment means, the controller being operable to move said abutment means into engagement with the or each pod in the housing.

13. The apparatus as claimed in claim 12, wherein said actuation mechanism is configured to transition between the unfired and fired states upon actuation of the controller.

14. The apparatus as claimed in claim 13, wherein said controller comprises a button, or other manual operating device such as a lever, preferably coupled to resilient biasing means such as a spring, the resilient biasing means being arranged to urge said manual operating device towards a non-activated state.

15. The apparatus as claimed in claims 11 to 14, wherein upon actuation of the controller said abutment means is configured to move towards said at least one housing outlet.

16. The apparatus as claimed in claims 12 and 15 wherein said abutment means comprises one or more substantially planar members having dimensions substantially corresponding to the cross sectional area of an internal cavity defined by the housing.

17. The apparatus as claimed in any preceding claim, wherein the actuation mechanism incorporates a restricting means which is configured to restrict the displacement of the abutment means beyond a predetermined position within the housing, such that in-use the lancet of the one or more pod(s) which are located within the housing does not extend from the housing beyond a predetermined distance.

18. The apparatus as claimed in claim 17, wherein said restricting means is configured to restrict the compressive force applied to the pod(s) via the actuating mechanism in-use

19. The apparatus as claimed in claim 17 and 18, wherein the actuation mechanism comprises a release mechanism which is configured to release the restricting means such that it does not engage with the abutment means in-use in at least one position.

20. The apparatus of claim 17 to 19, wherein said restricting means comprises a releasable coupling between the controller and the abutment means, said releasable coupling being configured to release said abutment means from said controller in response to said abutment means being subject to a force above a threshold level in a direction against the movement of said abutment means towards said at least one housing outlet.

21. The apparatus of claim 20, wherein said releasable coupling comprises a friction fit coupling between respective portions of said controller and said abutment means.

22. The apparatus of claim 21, wherein said friction fit coupling is provided by respective inter-engageable chamfered surfaces on said respective portions of said controller and said abutment means.

23. The apparatus of claim 21 or 22, wherein said respective portion of said abutment means is provided on one or more apertures formed in the abutment means and said respective portion of said controller passes through said one or more aperture when said coupling is released.

24. The apparatus as claimed in any preceding claim, wherein said housing comprises an upper portion and base portion which are releasably coupled together.

25. A pod comprising:

i. a pod body having, in a storage state, a liquid-tight chamber containing a liquid to be administered, said chamber having a pod outlet that is covered by a rupturable membrane; and

ii. a lancet coupled to said pod body and being movable to rupture said membrane,

iii. said at least one pod being activatable from said storage state to a dispensing state in which said membrane is ruptured by said lancet to dispense said liquid through said outlet;

26. The pod as claimed in claim 25, wherein the rupturable membrane comprises a metal foil.

27. The pod as claimed in claim 26, wherein the metal foil comprises an aluminium foil.

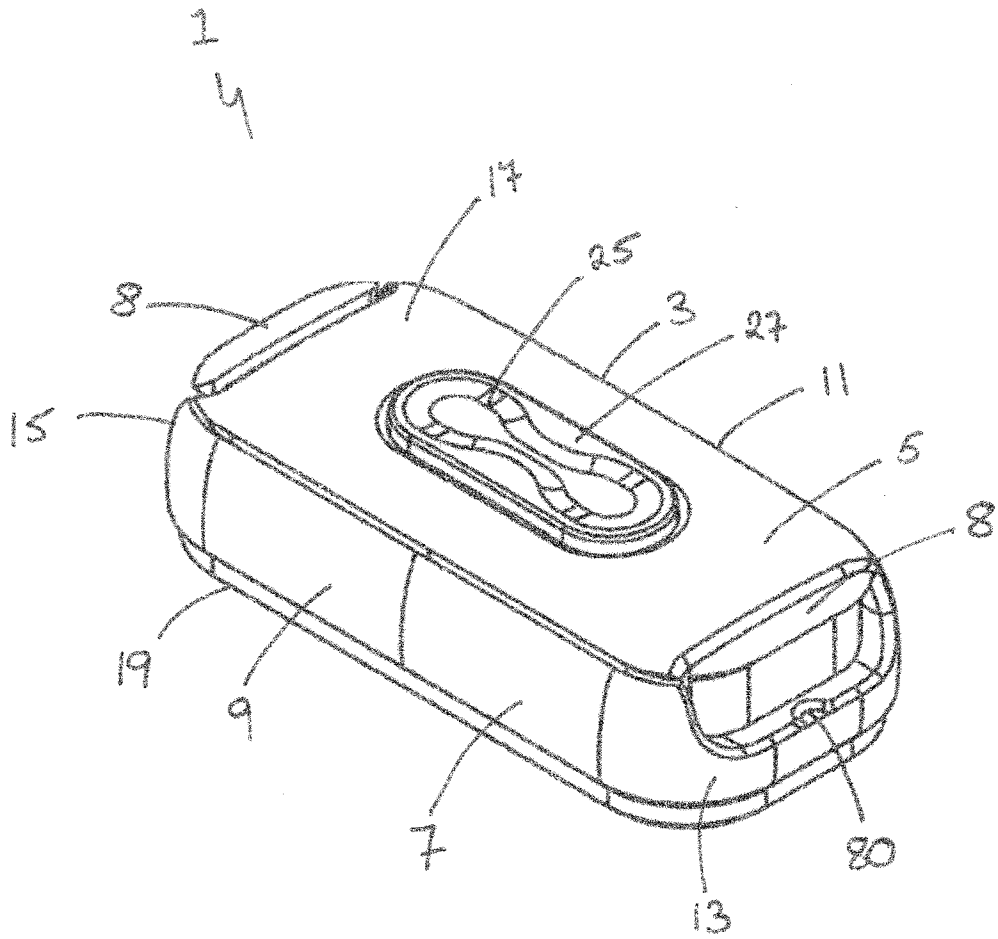



Figure 1

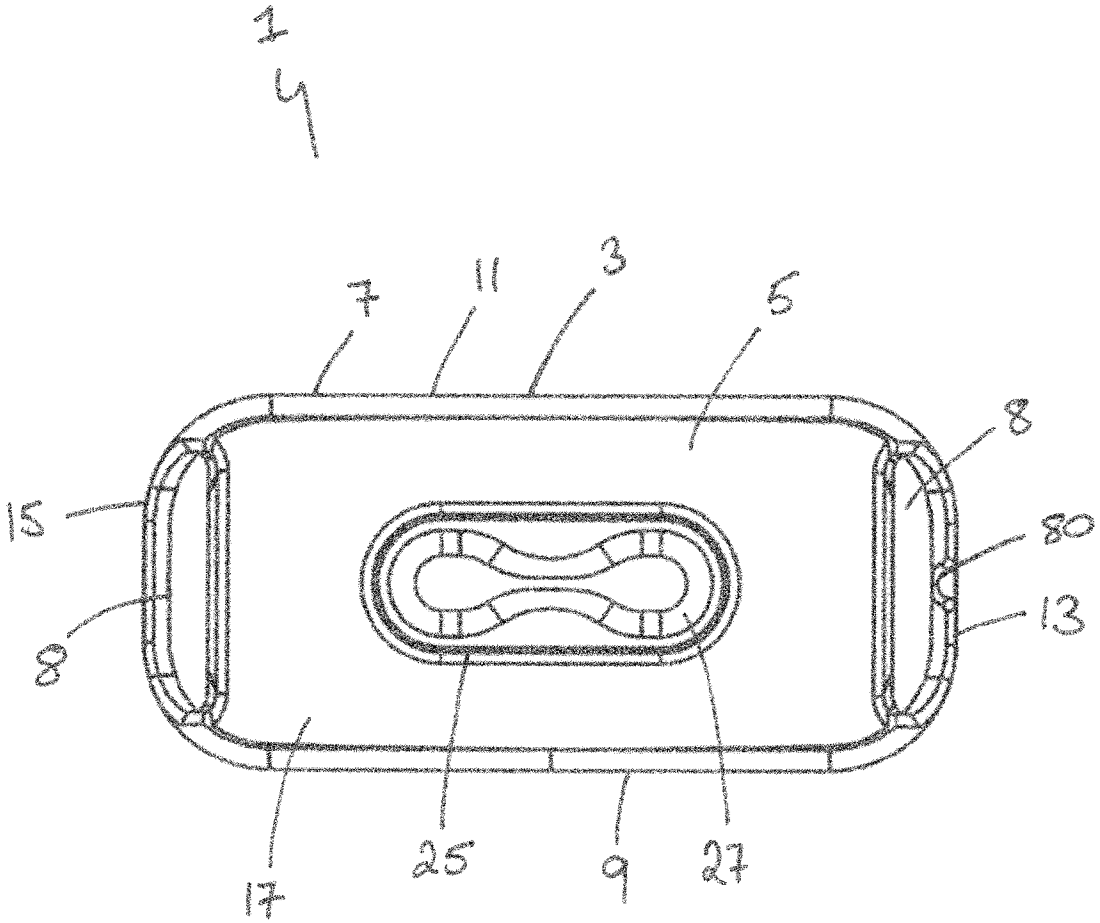



Figure 2

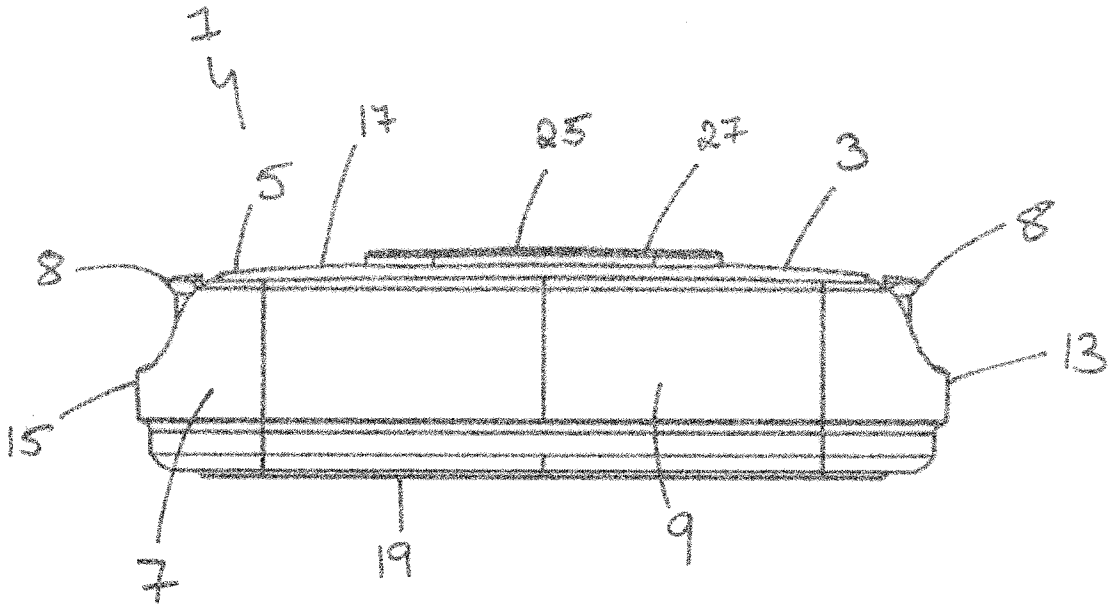
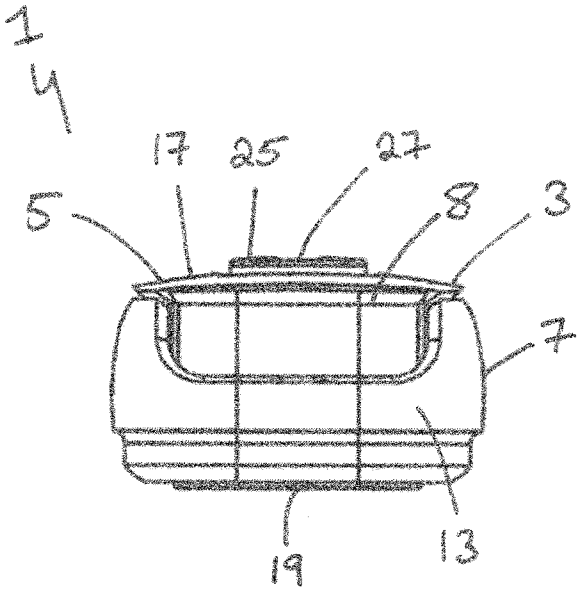



Figure 3

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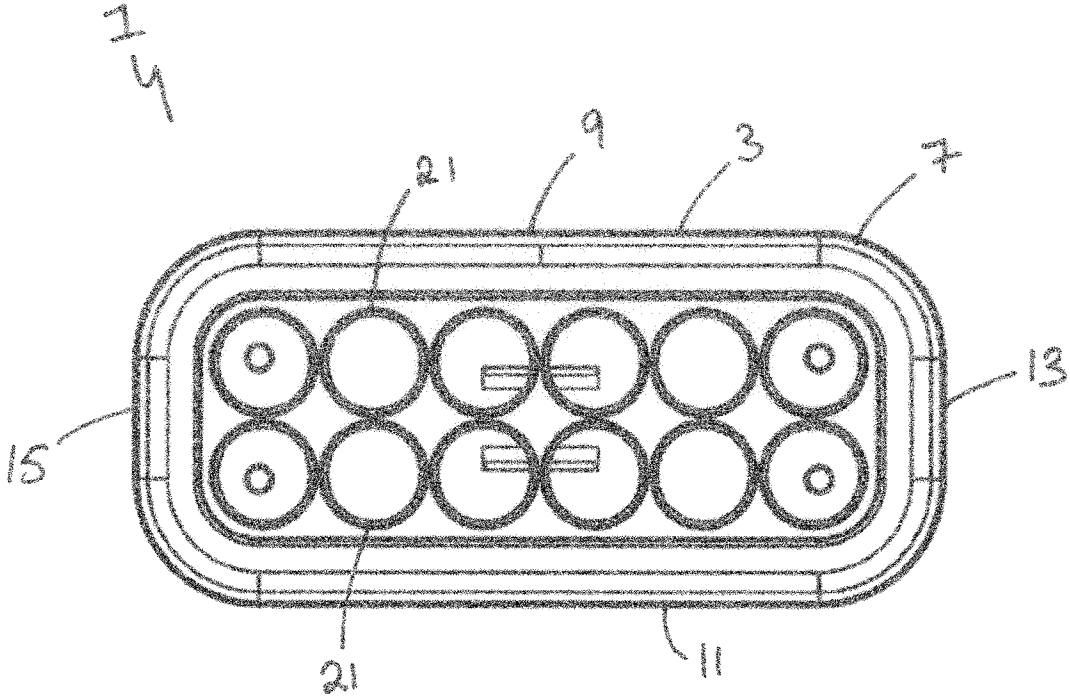



Figure 5

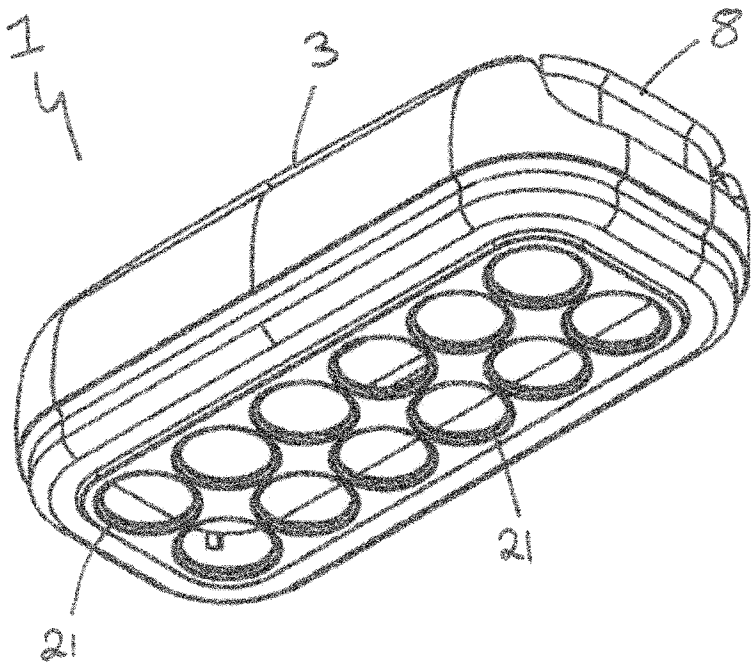



Figure 6

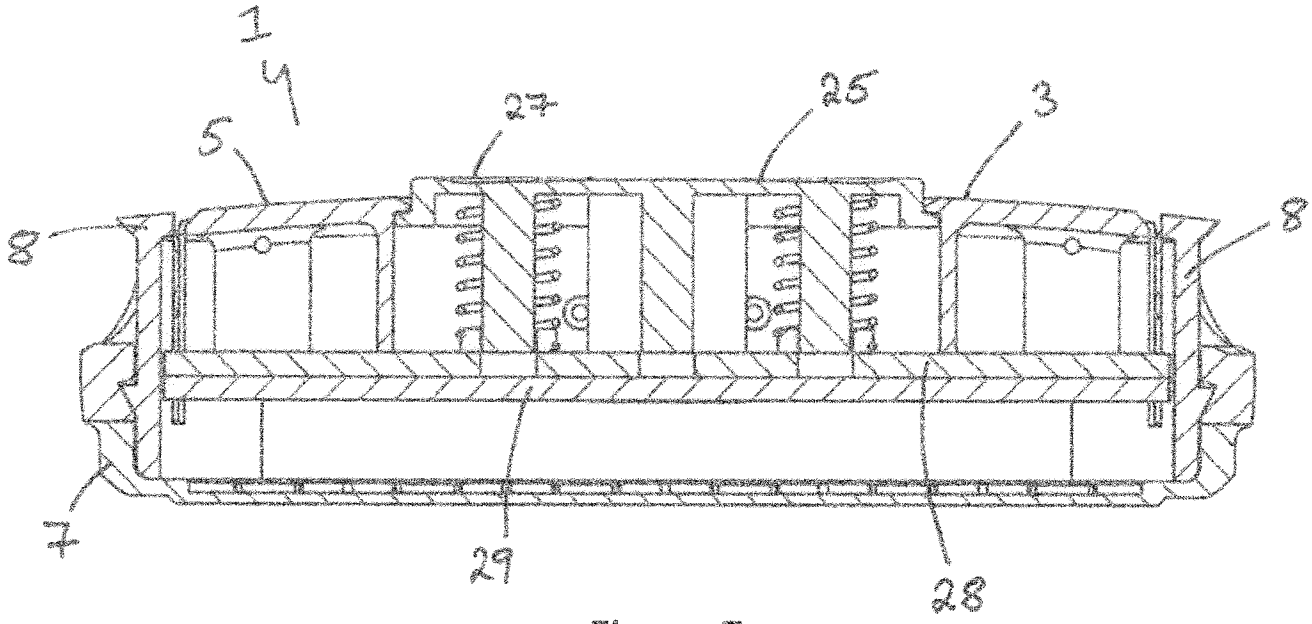



Figure 7

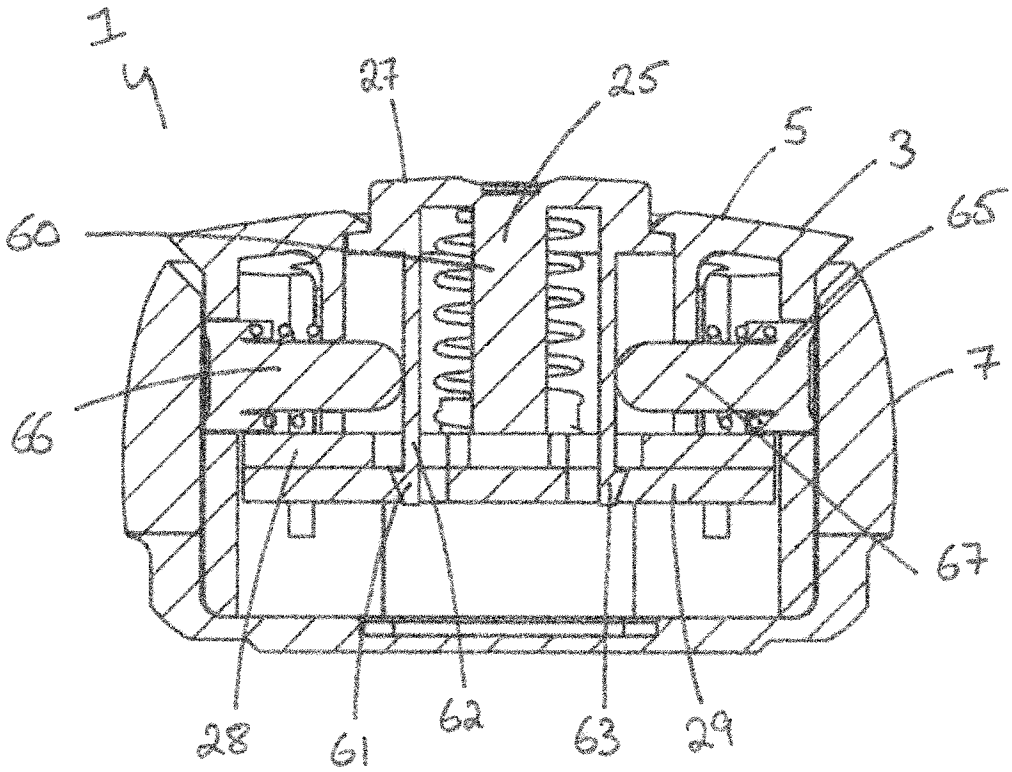
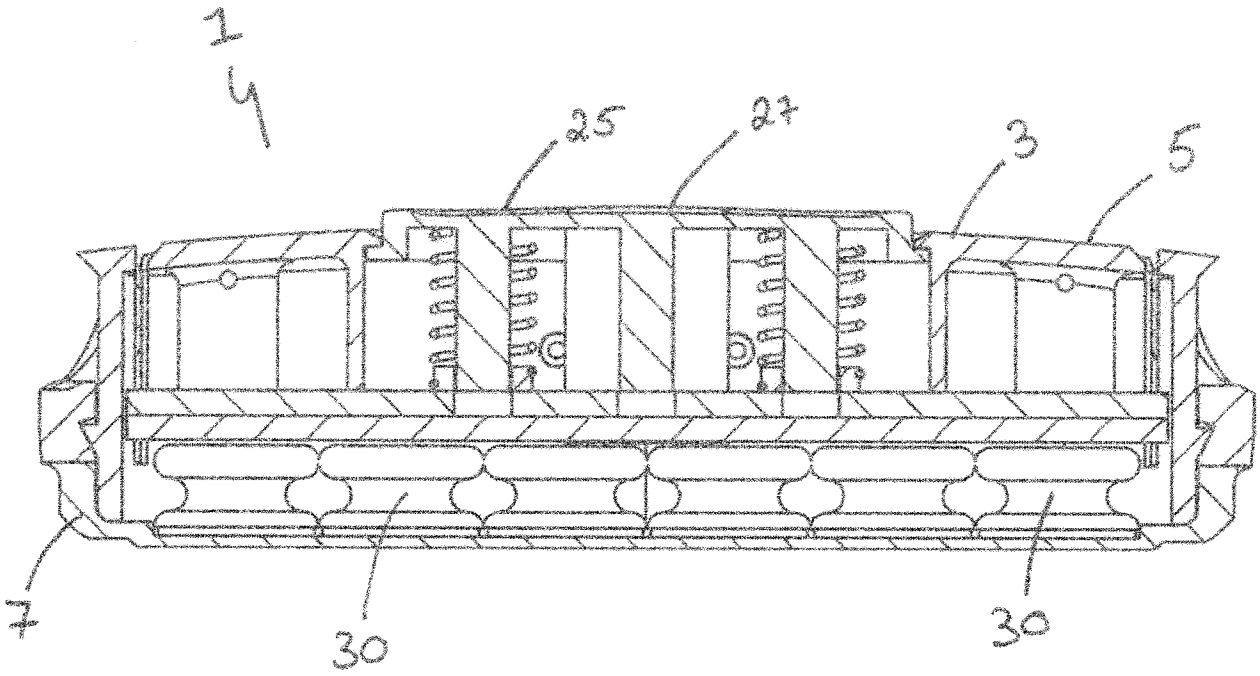



Figure 8

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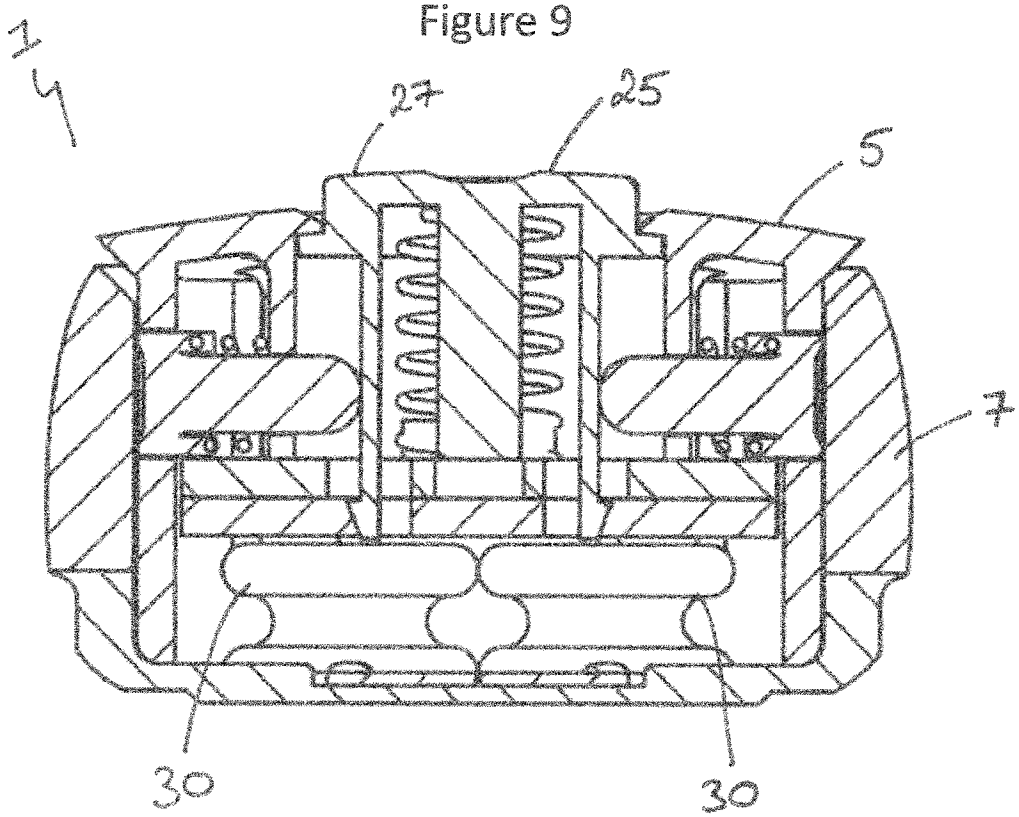



Figure 10

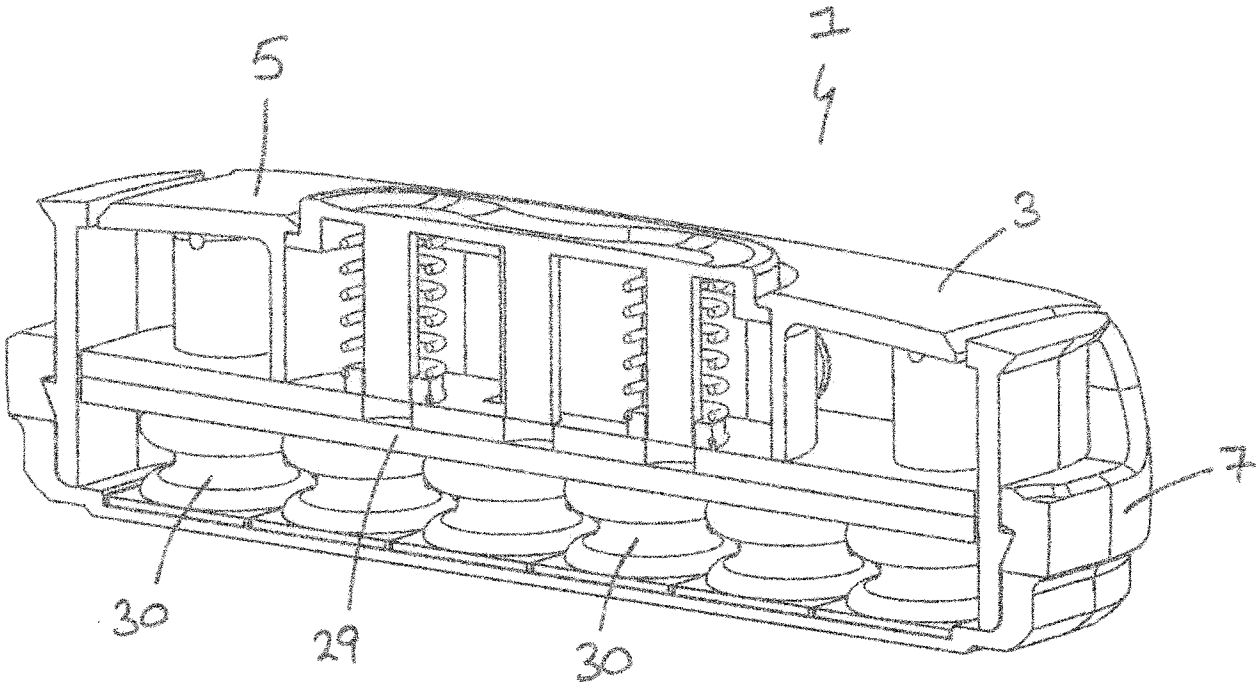



Figure 11

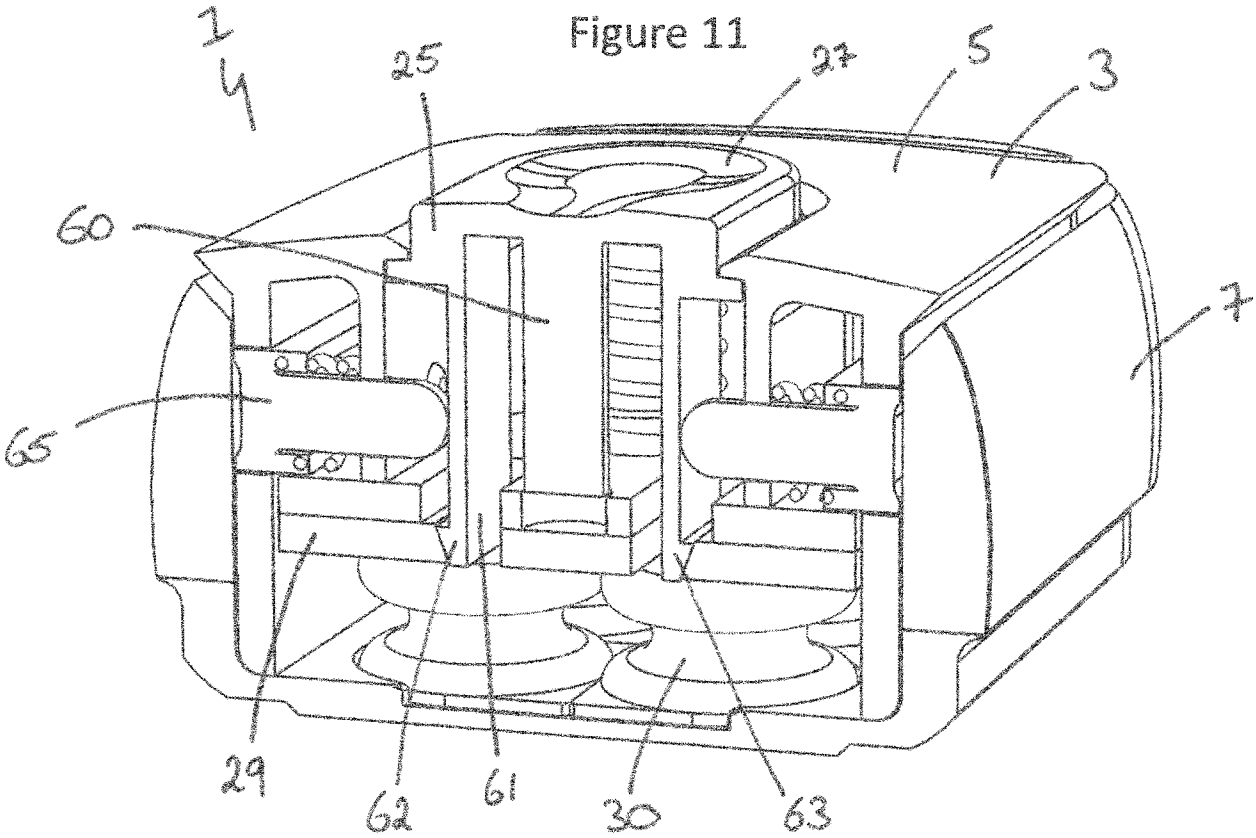



Figure 12

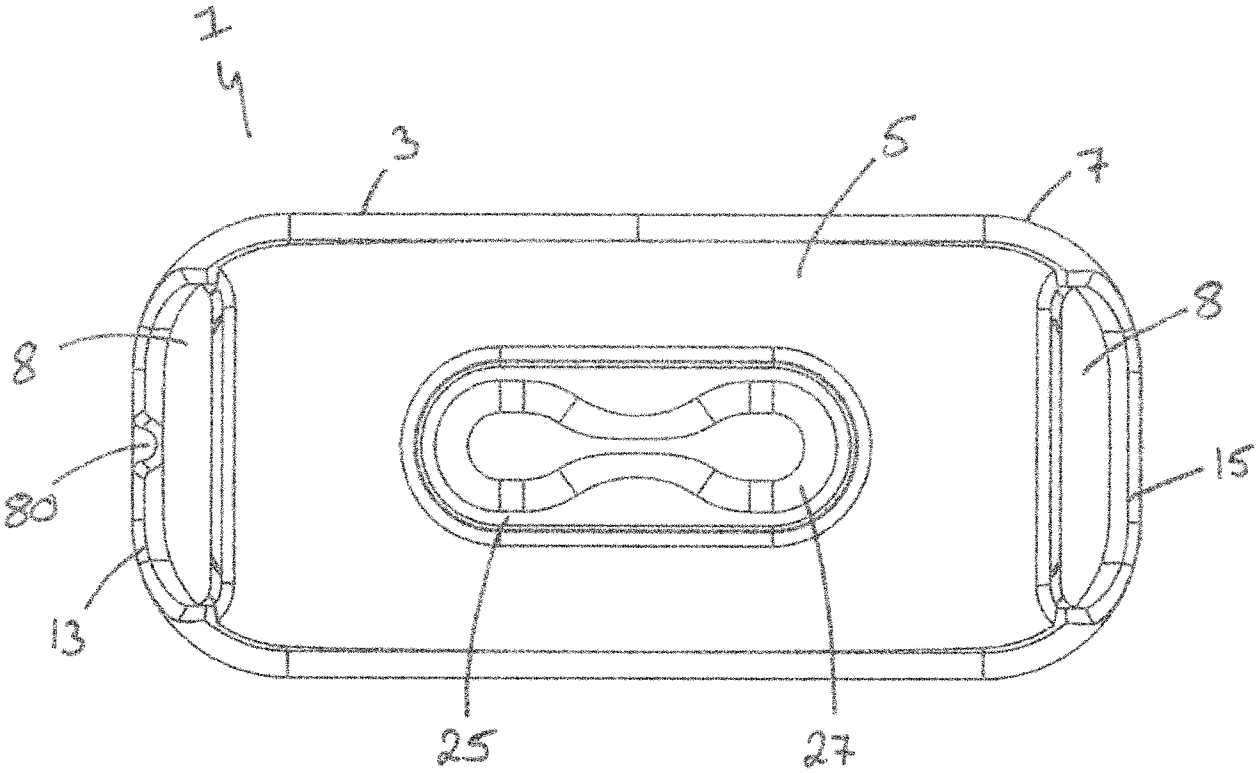



Figure 13

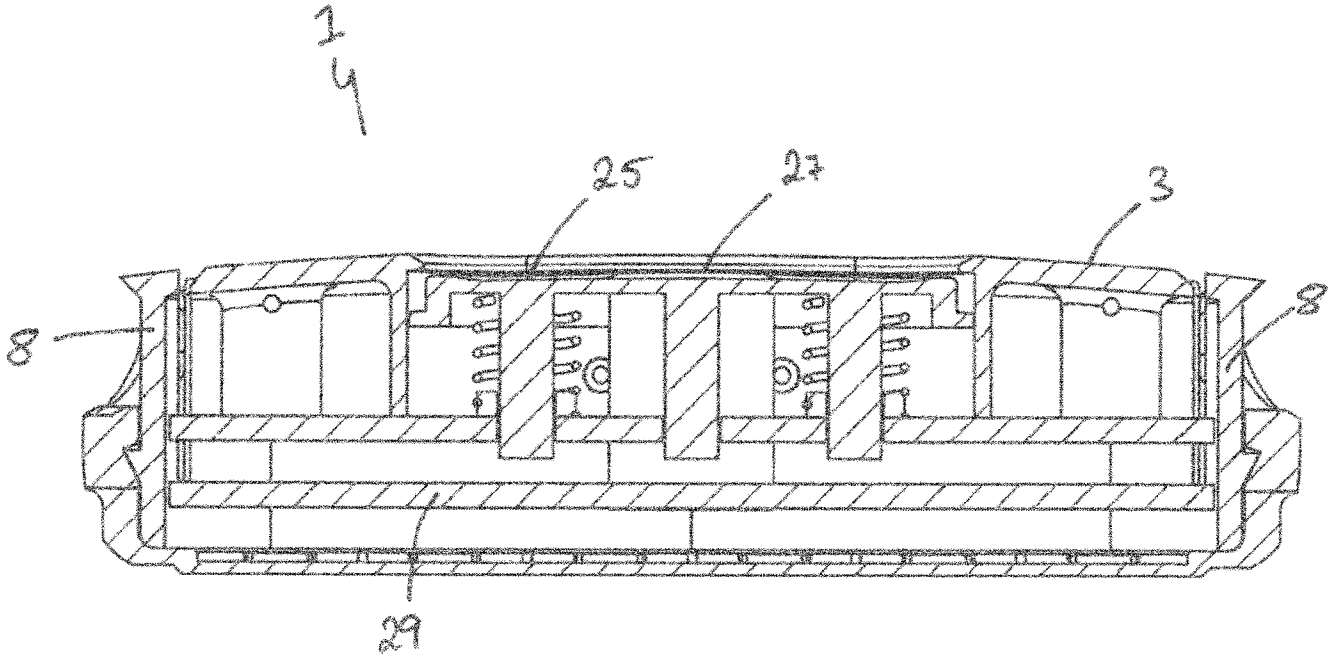



Figure 14

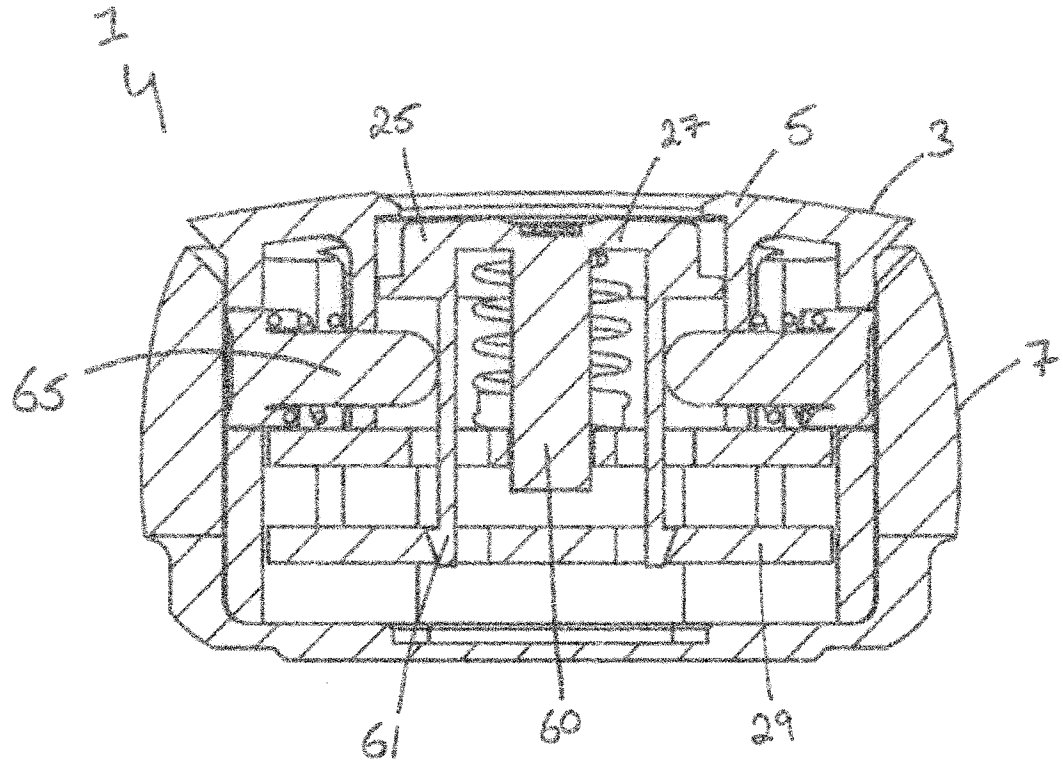
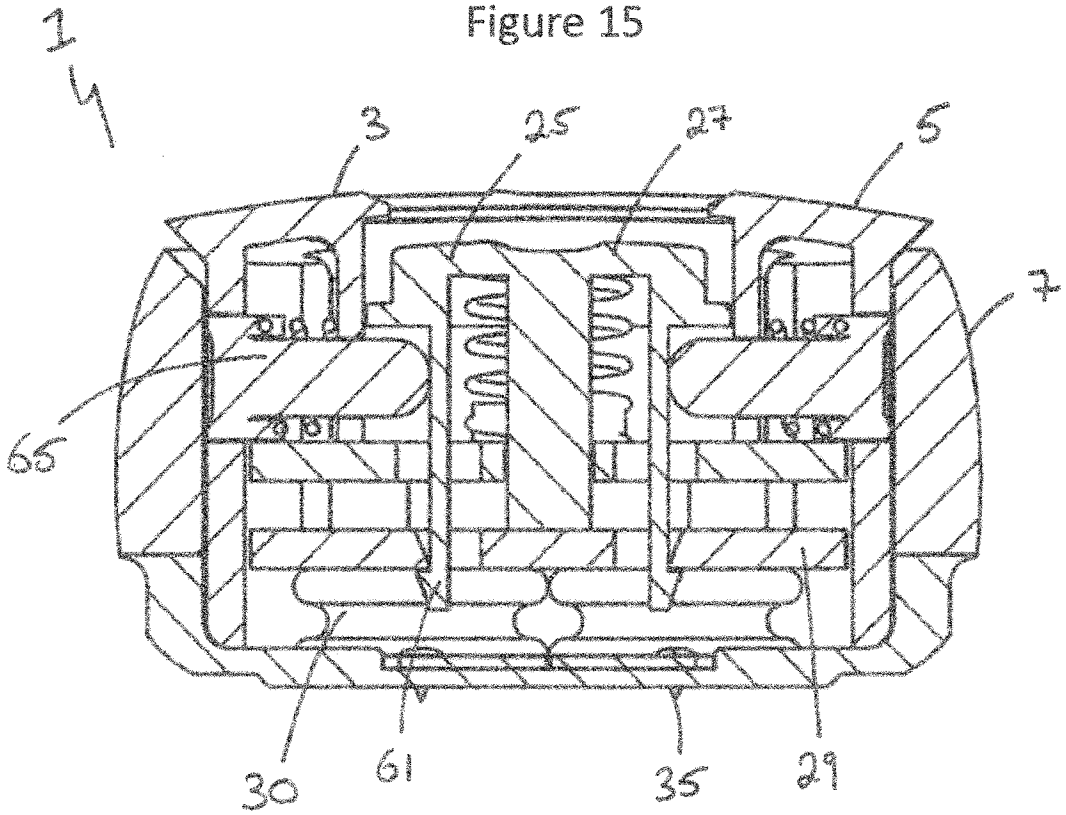



Figure 15

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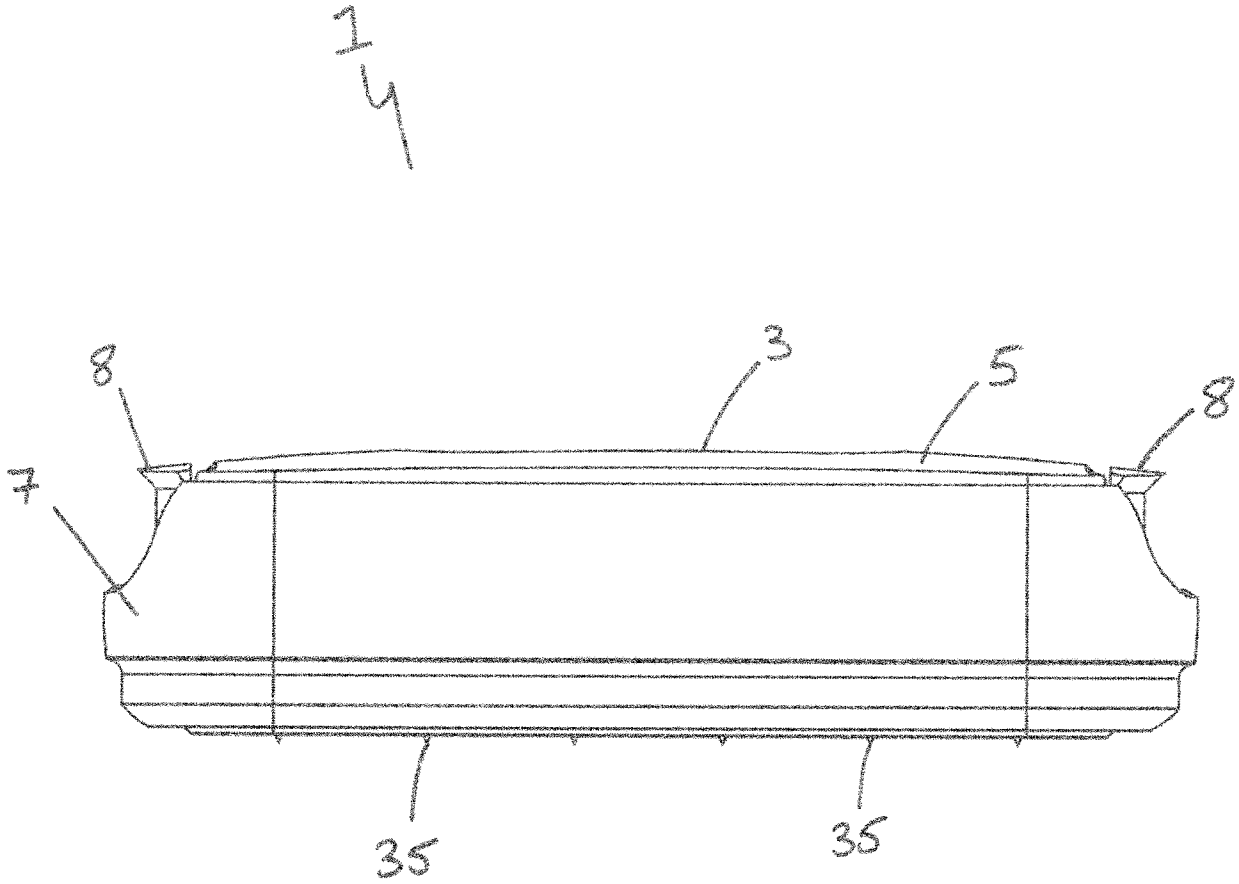



Figure 17

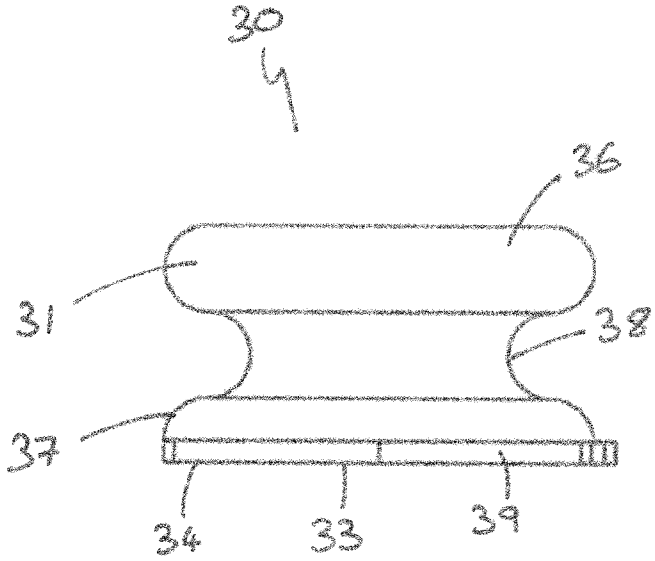



Figure 18

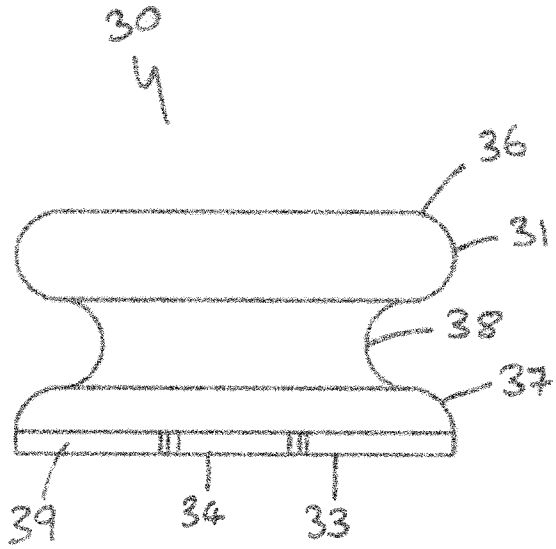



Figure 19

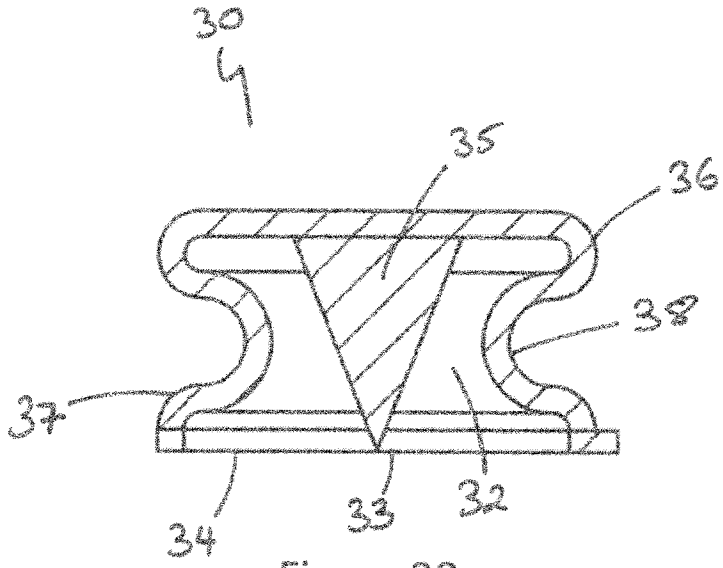



Figure 20

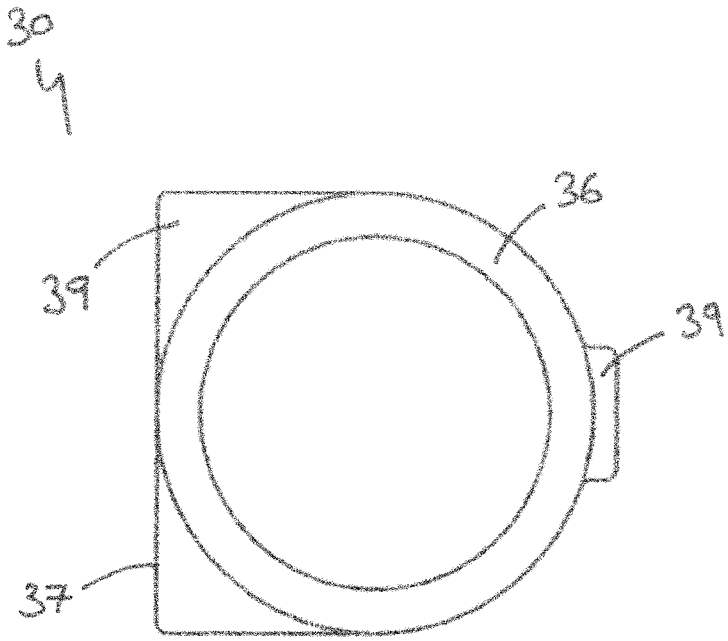



Figure 21

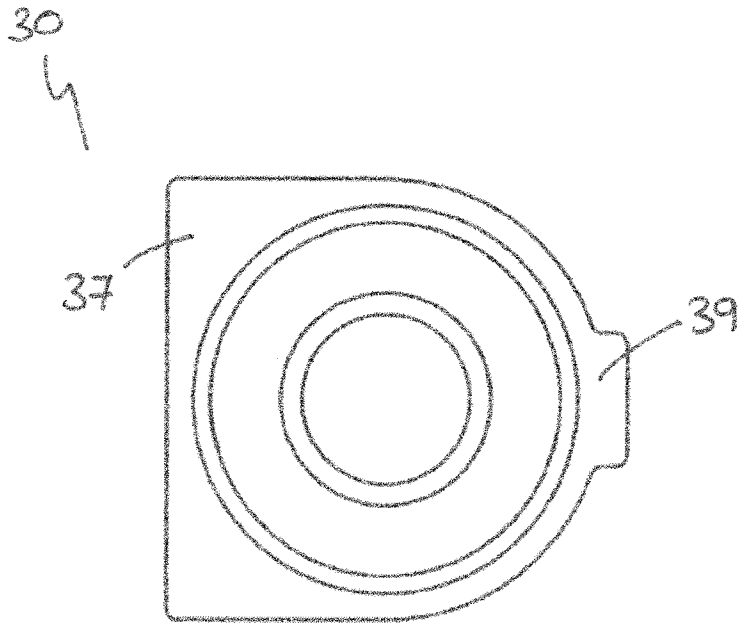



Figure 22

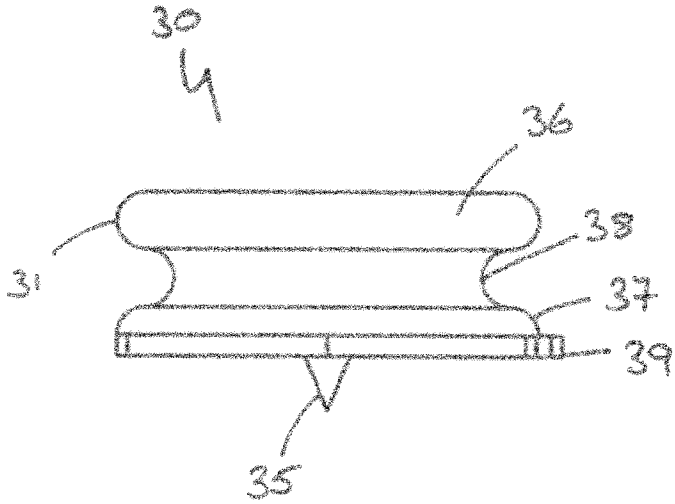



Figure 23

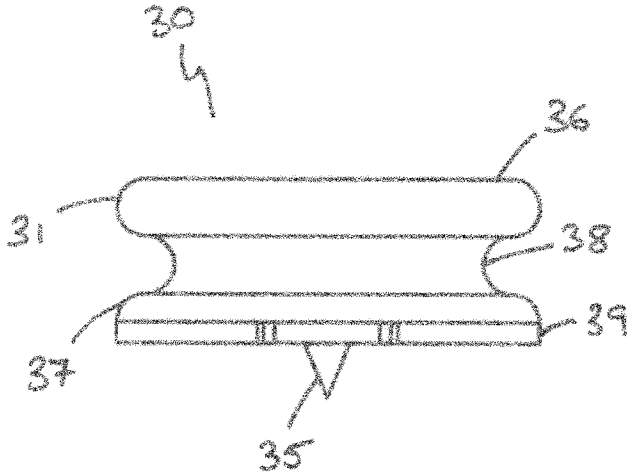



Figure 24

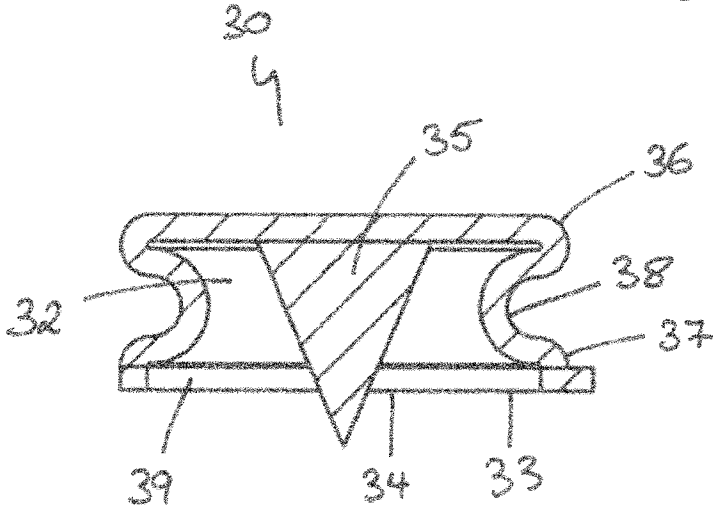



Figure 25

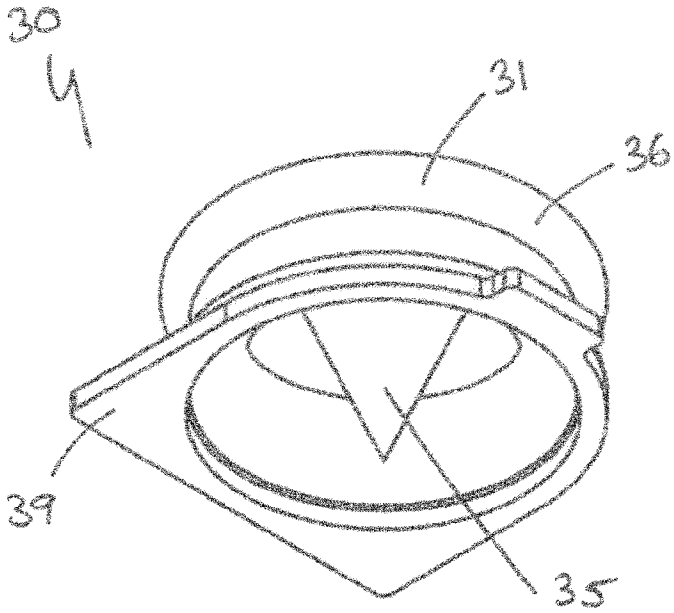



Figure 26

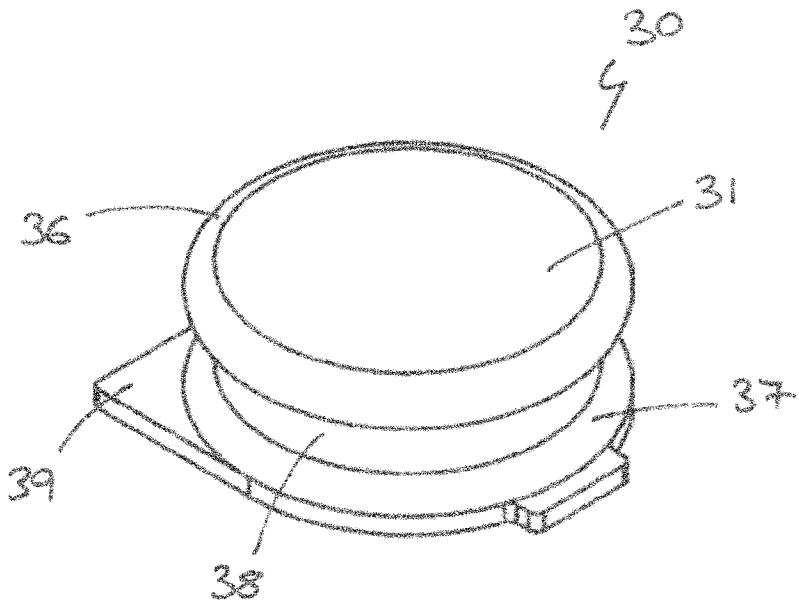
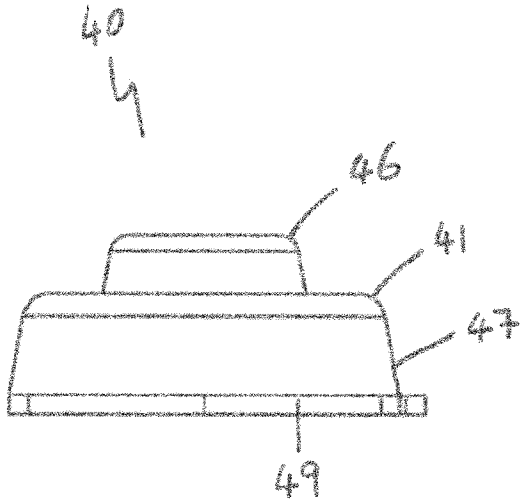



Figure 27

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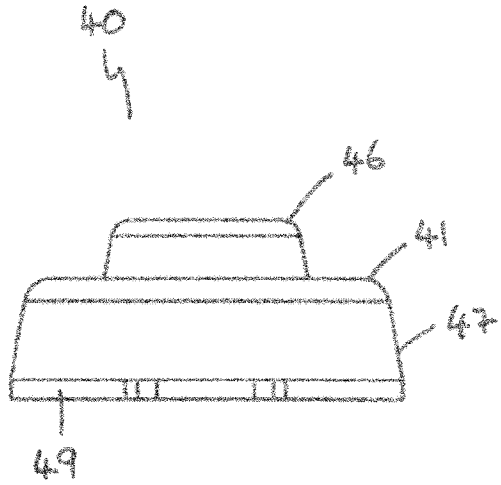


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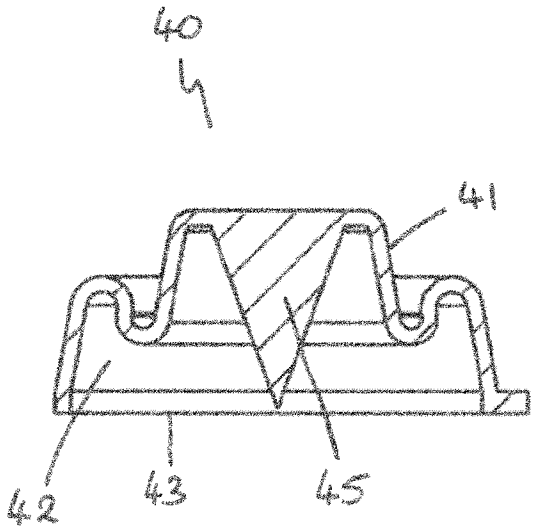
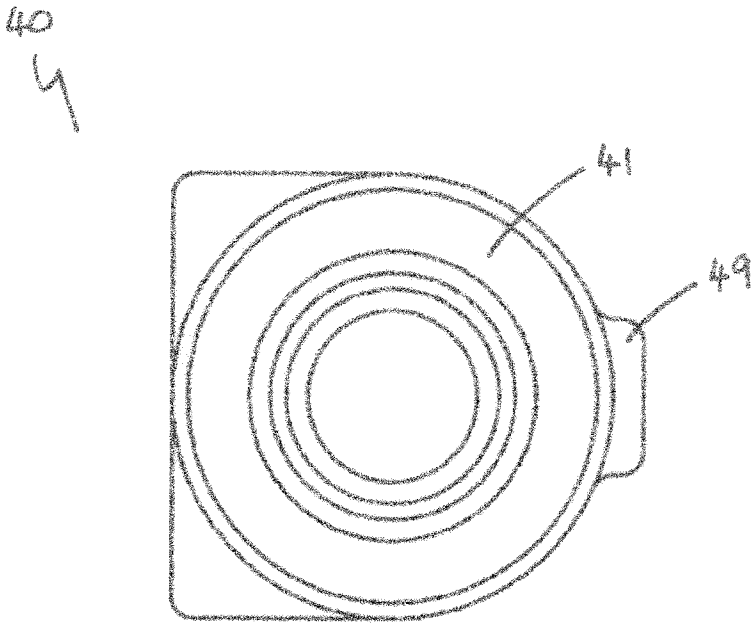



Figure 30

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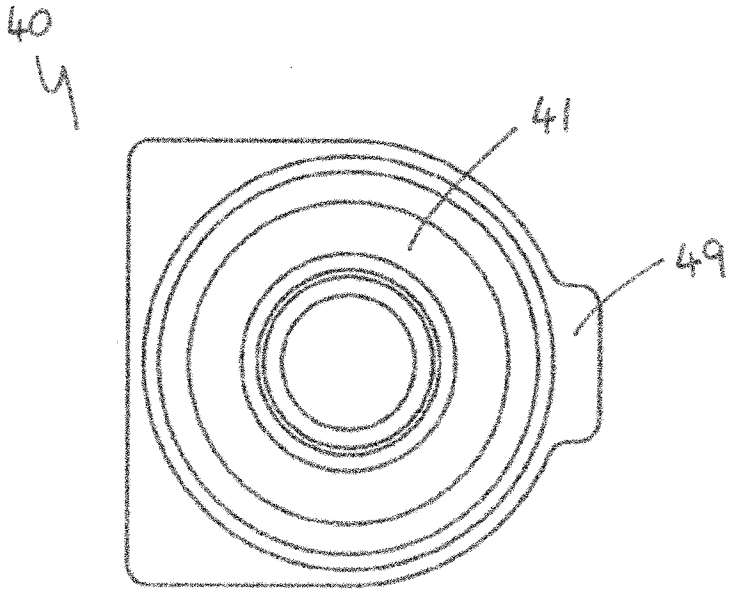


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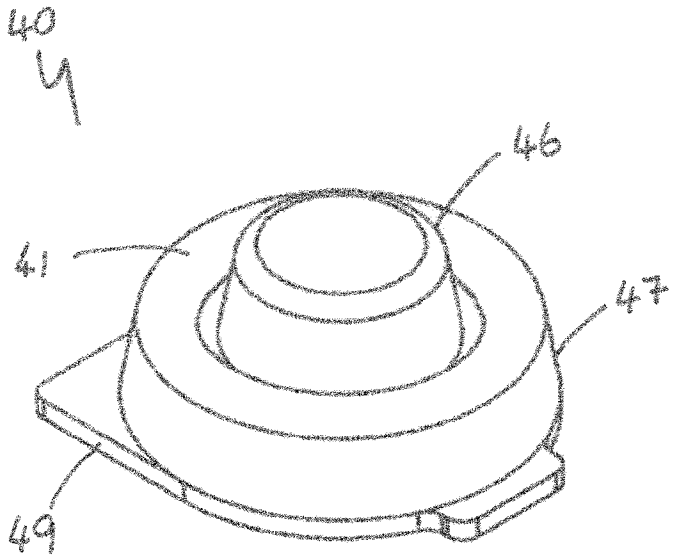


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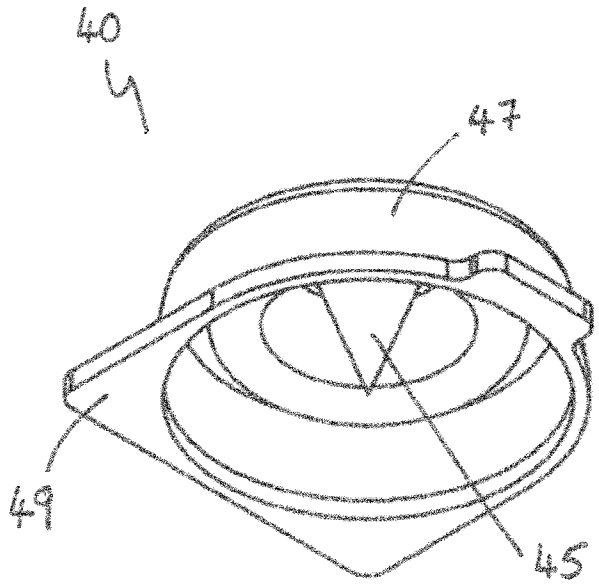


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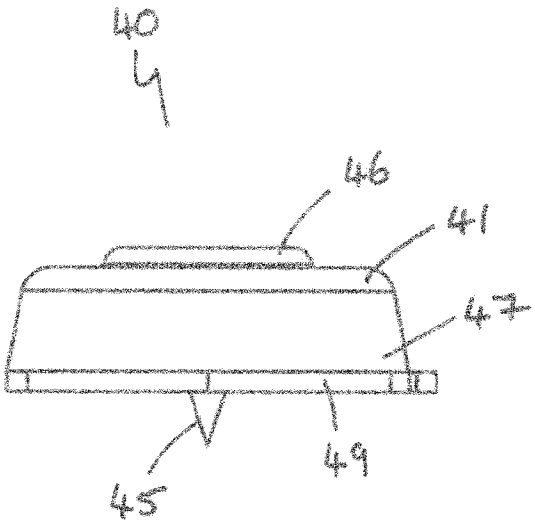


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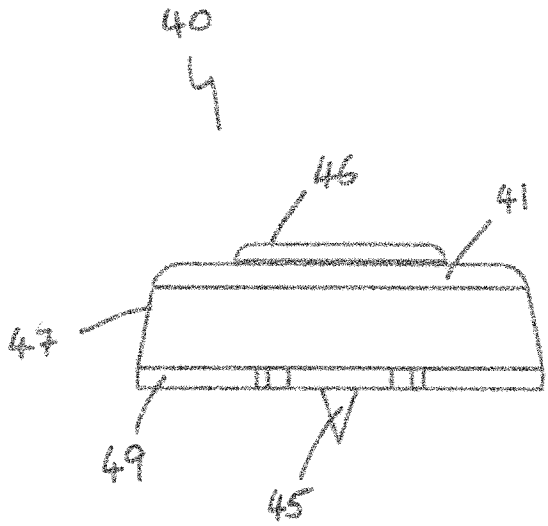


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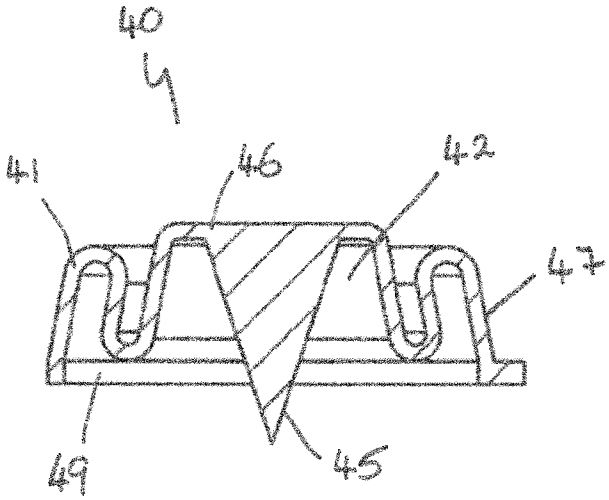


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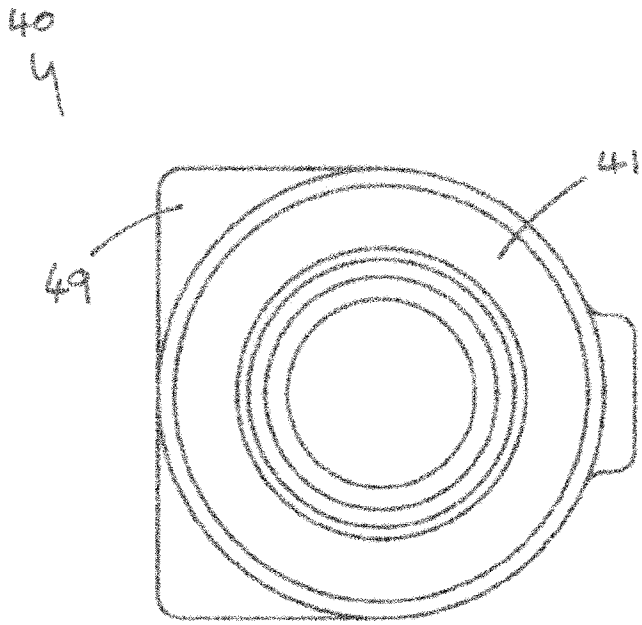



Figure 38

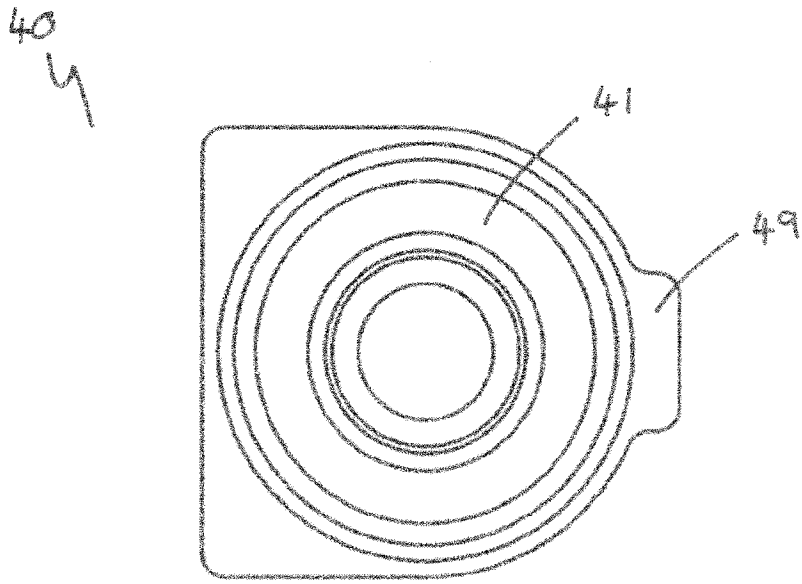
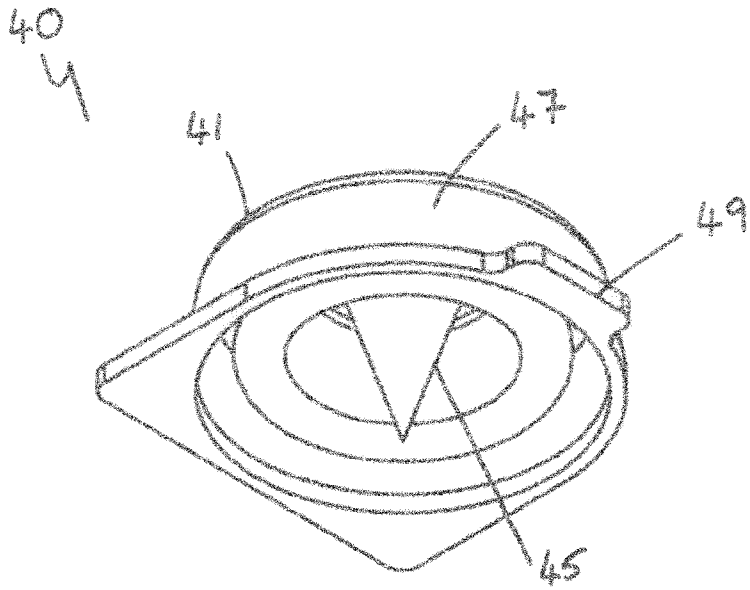



Figure 39

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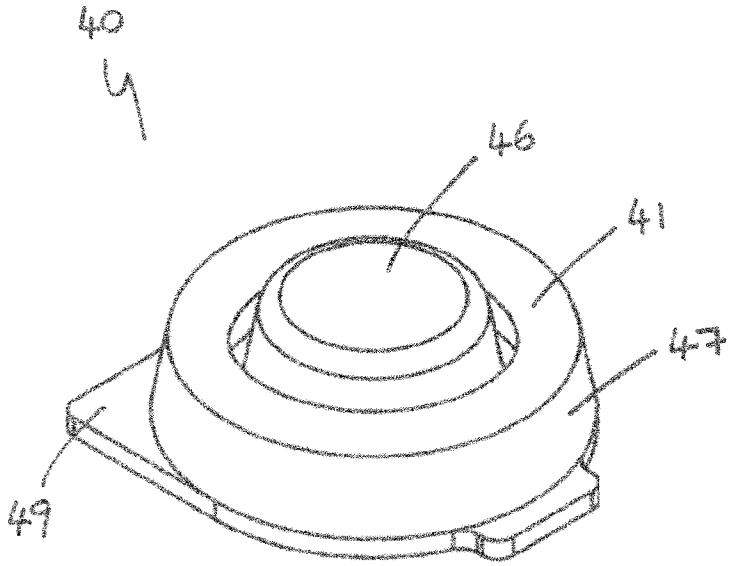


Figure 41

# INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/059304

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61M5/28
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)
A61M A61B

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. |
|---|---|---|
| X | US 5 320 600 A (LAMBERT WM S [US])<br>14 June 1994 (1994-06-14) | 1-25 |
| A | column 1, line 33 - column 3, line 30;<br>figures 1-2D<br>column 4, line 41 - column 5, line 7 | 26,27 |
| | ----- | |
| X | US 2014/276196 A1 (NIEDERAUER MARK Q [US]<br>ET AL) 18 September 2014 (2014-09-18)<br>paragraph [0051] - paragraph [0053];<br>figures 1-13 | 1-24,26,<br>27 |
| | ----- | |
| A | WO 2008/009985 A1 (OWEN MUMFORD LTD [GB];<br>NICHOLLS CLIVE [GB])<br>24 January 2008 (2008-01-24)<br>figures 2-4 | 1-27 |
| | ----- | |
| | -/-- | |

[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

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