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(71) Applicant: **CONSORT MEDICAL PLC** [GB/GB];
Ground Floor, Suite D, Breakspear Park, Breakspear Way,
Hemel Hempstead HP2 4TZ (GB).

(72) Inventors: **WILLOUGHBY, Alastair**; 108 Gilbert Road,
Cambridge Cambridgeshire CB4 3PD (GB). **SAVELL,
George**; 20 Scotland Road, Dry Drayton CB23 8BN (GB).

STEEL, Donald; 169C Amlhurst Road, London E8 2AW
(GB).

(74) Agent: **HGF LIMITED**; 4th Floor, Merchant Exchange,
17-19 Whitworth Street West, Manchester Greater Man-
chester M1 5WG (GB).

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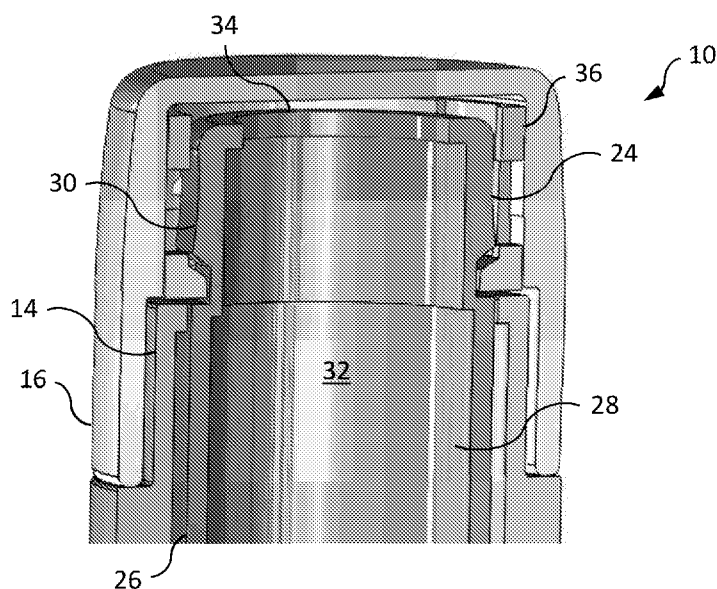


Figure 2

(57) Abstract: There is provided a medicament delivery device comprising a housing for receiving a syringe, the housing having first and second casing parts separably attachable to one another. The device further comprising a sleeve receivable within the housing and including a tubular wall having an inner surface delimiting a bore and an opposing outer surface. A locking member is receivable within the second casing part such that the locking member is axially movable between first and second axial positions relative to the second casing part. In the first axial position the locking member is engageable with the outer surface to inhibit an axial movement of the sleeve relative to the first casing part. In the second axial position the locking member is disengageable from the outer surface. The device may have application as an autoinjector.



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A MEDICAMENT DELIVERY DEVICE WITH A REMOVABLE CAP AND LOCKING MEMBER FOR PREVENTING ACCIDENTAL ACTIVATION

TECHNICAL FIELD

The invention relates to a medicament delivery device, particularly to an automatically
5 actuatable syringe.

BACKGROUND

Automatically actuatable syringes, sometimes referred to as autoinjectors, are well known. These devices include a power source, such as a compressed spring or a
10 container of propellant, to deliver a dose of medicament to a patient. Further components may include a needle shield for selectively covering a needle of the device during storage and various stages of delivery. As the skilled reader will understand, the needle shield may often serve to actuate the device by displacing internal components of the device rearwardly upon a user pressing the device against an
15 injection site in order to release a compressed spring or open a container of propellant. However, in the event that the device is dropped onto a hard surface, the internal components may be displaced rearwardly by inertia such that the device is unintentionally actuated. Clearly, there is a desire to inhibit unintentional actuation to maintain the efficacy of the device. It is an object of embodiments of the invention to
20 at least reduce a problem associated with one or more known arrangements.

SUMMARY OF THE INVENTION

According to an aspect of the invention, there is provided a medicament delivery device comprising: a housing for receiving a syringe, the housing having first and
25 second casing parts separably attachable to one another; a sleeve receivable within the housing and comprising a tubular wall having an inner surface delimiting a bore and an opposing outer surface; and a locking member receivable within the second casing part such that the locking member is axially movable between first and second axial positions relative to the second casing part, wherein in the first axial position the
30 locking member is engageable with the outer surface to inhibit an axial movement of the sleeve relative to the first casing part and in the second axial position the locking member is disengageable from the outer surface. As such, the locking member may selectively maintain a relative position of the housing to the sleeve. Of course, the locking member may be disengageable from the outer surface to permit the axial

movement of the sleeve. By engaging with the outer surface, the locking member may not obstruct, or not extend into, the bore of the device.

5 In certain embodiments, the medicament delivery device may be actuatable by, i.e. as a direct consequence of, the axial movement of the sleeve. As such, the locking member may reduce the likelihood of unintentional actuation of the device. The axial movement may be a rearward movement. The locking member may be moveable from the first axial position to the second axial position by separation of the first and second casing parts from one another.

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Optionally, the locking member may be engageable with the outer surface in that the locking member may comprise a body portion having one or more radially inward protrusions extending therefrom engageable with the outer surface. The body portion may be an annular body portion. The body portion may be circumferentially continuous or discontinuous. In certain embodiments, the body portion may delimit an opening through which the sleeve is receivable, either partially or wholly. As such, the locking member, or at least a portion thereof, may be receivable concentrically between the sleeve and the second casing part.

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20 The locking member may be engageable with the outer surface in that the outer surface may have a radially inward groove extending therealong, i.e. around a periphery of the sleeve, in which the one or more radially inward protrusions may be engageable. The radially inward groove may be circumferentially continuous or discontinuous. The groove may enable engagement of the one or more radially inward protrusions with the outer surface in any rotational orientation of the sleeve relative to the locking member.

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In certain embodiments, the body portion may have one or more first axially extending arms, proximate a free end of which a respective one of the one or more radially inward protrusions may be integral or coupled to. A plurality of the first axially extending arms may be equispaced about the body portion.

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The locking member may be disengageable from the outer surface by a radially outward movement of the one or more radially inward protrusions. The radially outward movement of the one or more radially inward protrusions may be by deformation, for

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example resilient deformation, of the locking ring. More specifically, the radially outward movement of the one or more radially inward protrusions may be by deformation, for example resilient deformation, of the one or more first axially extending arms.

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In certain embodiments, in the first axial position the radially outward movement of the one or more radially inward protrusions may be inhibited by abutment of the locking member against the second casing part. More specifically, the radially outward movement of the one or more radially inward protrusions may be inhibited by abutment
10 of the locking member against a first radially inwardly extending region of the second casing part. The first radially inwardly extending region may comprise one or more first bumps, ridges and/or ribs extending over a first portion of the second casing part.

In the first axial position the first radially inwardly extending region may be radially
15 aligned with the one or more radially inward protrusions and in the second axial position the first radially inwardly extending region may not be radially aligned with the one or more radially inward protrusions. As such, in the second axial position, a space may be provided to accommodate deflection of the locking member. The locking member may be disengageable from the outer surface by separation of the first and
20 second casing parts from one another.

Optionally, the body portion may have one or more radially outward protrusions extending therefrom engageable with the second casing part to retain the locking member within the second casing part. The body portion may have one or more
25 second axially extending arms, proximate a free end of which a respective one of the one or more radially outward protrusions is integral or coupled to. The one or more radially outward protrusions may be engageable with the second casing part by abutment of the one or more radially outward protrusions against a second radially inwardly extending region of the second casing part. The second radially inwardly
30 extending region may comprise one or more second bumps, ridges and/or ribs extending over a second portion of the second casing part.

In certain embodiments, the second casing part may comprise a cap separably attachable to the first casing part at an end of the medicament delivery device.
35 Additionally, or alternatively, the sleeve may comprise a needle guard to selectively

cover a needle of the medicament delivery device. The second casing part may comprise or is coupled to a needle sheath remover receivable within the bore. The first and second casing parts may be separably attachable to one another in that the first and second casing parts form one of a push fit, a snap fit and a screw fit with one another.

In certain embodiments, the medicament delivery device may further comprise a power source provided as a propellant. The propellant may be a liquefied gas propellant. The power source may comprise a propellant that includes a hydrofluoroalkane ("HFA"). Additionally, or alternatively, the power source may comprise a propellant that includes a hydrofluoroolefin ("HFO"). In certain embodiments, the medicament delivery device may comprise a power source provided as a compression spring.

According to a further aspect of the invention, there is provided a medicament delivery device comprising: a housing for receiving a syringe, the housing having first and second casing parts separably attachable to one another; an actuator member receivable within the housing and comprising a tubular wall having an inner surface delimiting a bore and an opposing outer surface, the medicament delivery device being actuable by an actuating movement of the actuator member relative to the first casing part; and a locking member receivable within the second casing part such that the locking member is axially movable between first and second axial positions relative to the second casing part, wherein in the first axial position the locking member is engageable with the outer surface to inhibit the actuating movement and in the second axial position the locking member is disengageable from the outer surface.

As the skilled reader will understand, features described above with reference to the first aspect of the invention may be combined with features of the further aspect of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

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

Figure 1 is a cross-sectional view of a medicament delivery device according to an embodiment of the invention;

Figure 2 is a perspective cross-sectional view of a proximal end of the medicament delivery device of Figure 1;

Figure 3 is a perspective view of a locking member of the medicament delivery device of Figure 1;

Figures 4A and 4B are partial cross-sectional views of the proximal end of the medicament delivery device of Figure 1, in which the locking member is in a first axial position;

Figures 5A and 5B are partial cross-sectional views of the proximal end of the medicament delivery device of Figure 1, in which the locking member is in a second axial position;

Figures 6A and 6B are partial cross-sectional views of the proximal end of the medicament delivery device of Figure 1, in which the locking member is in the second axial position and the locking ring is deformed; and

Figure 7 is a partial cross-sectional view of the proximal end of the medicament delivery device of Figure 1, in which first and second casing parts of the medicament delivery device are separated from one another.

DETAILED DESCRIPTION

Figure 1 shows a medicament delivery device 10 according to an embodiment of the invention. The device 10 has particular application as an autoinjector. The device 10 comprises a housing 12 having a first casing part 14 and a second casing part 16. The first and second casing parts 14, 16 are separably attachable to one another, for example by push fit engagement. As shown in the illustrated embodiment, the second casing part 16 may be an end cap separably attachable to the first casing part 14 at a proximal end 18 of the device 10. The housing 12 is configured to receive a syringe 20 having a needle 22. The syringe 20 may be movable within the housing 12 to deliver a dose of medicament to a patient. The device 10 further includes a sleeve 24 (best

shown in Figure 2) receivable within the housing 12 such that the sleeve 24 is axially moveable relative to the first casing part 14. The sleeve 24 comprises tubular wall 26 having an inner surface 28 and an outer surface 30. The inner surface 28 bounds, i.e. delimits, a bore 32, in which the needle 20 may be receivable. The bore 32 may have an open end 34, through which, in use, the needle 20 may selectively pass to deliver the dose of medicament. As such, the sleeve 24 may comprise, or serve as, a needle guard. Thus, the sleeve 24 may reduce the likelihood of needle-stick injuries and/or inhibit the undesirable re-use of the device 10. While the sleeve 24 is shown in the accompanying figures to be cylindrical, other shapes are contemplated, for example elliptical or rectangular. Moreover, the sleeve 24 may be circumferentially continuous or circumferentially discontinuous.

In certain embodiments, the sleeve 24 may be axially moveable relative to the first casing part 14 to actuate the device 10, i.e. to release a power source 48 to drive delivery of the dose of medicament. In certain embodiments, the power source 48 may comprise a compression spring (not shown). In certain embodiments, the power source 48 may comprise a container 50 of propellant. The propellant may comprise a liquefied gas propellant that vaporises to provide a vapour pressure. Prior to use, the propellant may be contained in the container 50 at a distal end 52 of the device 10. Axial movement of the sleeve 24 may compress the container 50 to vent the propellant and thus drive delivery of the dose of medicament. As the skilled reader will understand, the propellant may be or comprise any suitable propellant. However, in certain embodiments, the propellant may be or comprise a hydrofluoroalkane ("HFA"), e.g. HFA 341a, HFA227, HFA 422D, HFA 507, or HFA 410A. In certain embodiments, the propellant may be or contain a hydrofluoroolefin ("HFO"), e.g. HFO 1234yf or HFO 1234ze.

The device 10 further comprises a locking member 36 (best shown in Figure 3). As shown in the illustrated embodiment, the locking member 36 may comprise an annular body portion 38. Although, non-annular configurations are envisaged. The annular body portion 38 may be circumferentially continuous, at least over an axial length thereof. As such, the annular body portion 38 may delimit an opening 40 extending axially therethrough. The annular body portion 38 may have one or more radially inward protrusions 42 extending therefrom. In certain embodiments, the radially inward protrusions 42 may comprise a diametrically opposed pair of the radially inward

protrusions 42. Thus, the radially inward protrusions 42 may be equispaced about the annular body portion 38, although such equispacing may also be achieved with three or more of the radially inward protrusions 42. The annular body portion 38 may have one or more first axially ending arms 44, upon which a respective one of the radially inward protrusions 42 may be integral or coupled to. Each of the radially inward protrusions 42 may be proximate a free end of each of the first axially ending arms 44. Additionally, or alternatively, the annular body portion 38 may have one or more radially outward protrusions 54 extending therefrom. The annular body portion 38 may have one or more second axially ending arms 56, upon which a respective one of the radially outward protrusions 54 may be integral or coupled to. Each of the radially outward protrusions 54 may be proximate a free end of each of the second axially ending arms 56. The radially outward protrusions 54 may be equispaced about the annular body portion 38, although such equispacing may also be achieved with three or more of the radially outward protrusions 54.

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The locking member 36 is receivable within the second casing part 16 such that the locking member 36 is moveable between first and second axial positions, relative to the second casing part 16, i.e. the locking member is axially slidable within the second casing part 16. The first axial position is best shown in Figures 4A and 4B, which are offset by 90° from one another, to show different features of the device 10. The second axial position is best shown in Figures 5A, 5B, 6A and 6B, which are similarly offset by 90° to one another. Crucially, in the first axial position, the locking member 36 is engageable with the outer surface 30 of the sleeve 24 to inhibit an axial movement of the sleeve 24 relative to the first casing part 14. The axial movement may be a rearward movement. In the illustrated embodiment, engagement of the locking member 36 with the outer surface 30 is achieved by the radially inward protrusions 42 being receivable within a groove 46 of the outer surface 30. The groove 46 provides an abutment surface against which the locking member 36 may abut to interrupt an axial path of the sleeve 24. The groove 46 may extend radially inwardly along the outer surface 30 about a circumference of the sleeve 24, either partially or wholly. However, in certain embodiments, engagement of the locking member 36 with the outer surface 30 may be alternatively achieved, for example the outer surface 30 may comprise a radially outward ridge receivable within a groove of the locking member 36.

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The locking member 36 may be disengageable from the outer surface 30 by a radially outward movement of the radially inward protrusions 42. In certain embodiments, the radially outward movement may remove the radially inward protrusions 42 from the groove 46. The radially outward movement may be by deformation of the locking ring 36, for example resilient deformation of the locking ring 36. More specifically, the radially outward movement may be by deformation of the first axially extending arms 44, upon which the radially inward protrusions 42 may be integral or coupled to.

Prior to use of the device 10, the locking member 36 may be in the first axial position. In the first axial position, the locking member 36 may be substantially non-deformed, i.e. the locking member 36 may be in a free state, with the first and second casing parts 14, 16 attached to one another. As such, in the first axial position, the locking member 36 may be receivable concentrically between the second casing part 16 and the outer wall 30 of the sleeve 24, as shown in Figures 4A and 4B. In the first axial position, the locking member 36 cannot disengage from the outer surface 30. This is because the outward movement of the radially inward protrusions 42 may be inhibited by abutment of the locking member 36 against the second casing part 16 (i.e. in the first axial position, there is no space available radially outward of the locking member 36 to accommodate the radially outward movement). To this end, the second casing part 16 may comprise a first radially inwardly extending region 58, against which the locking member 36 may abut to inhibit the outward movement of the radially inward protrusions 42. As shown in the illustrated embodiment, the first radially inwardly extending region 58 may comprise one or more ribs. Additionally, or alternatively, the first radially inwardly extending region 58 may comprise an annular ridge, and/or one or more bumps.

In the event that the device 10 is dropped, or struck, on the distal end 52, inertia of the sleeve 24, and/or of other components of the device 10 to which the sleeve 24 may be coupled to, may urge the sleeve 24 to move axially rearwardly. The rearward axial movement of the sleeve 24 relative to the first casing part 14 may actuate the device 10. In certain embodiments, the rearward axial movement of the sleeve 24 may alternatively prime the device 10 or undesirably misalign various components of the device 10. However, the axial movement of the sleeve 24 relative to the first casing part 14 may be inhibited by axial abutment of the sleeve 24 against the locking member 36, as the radially inward protrusions 42 may interrupt, or block, the axial path of the

sleeve 24. Consequently, a load may be transferred from the sleeve 24 to the locking member 36, which may be subsequently transferred from the locking member 36 to the first casing part 14. In other words, the sleeve 24 may be axially supported by the locking member 36 and the locking member 36 may be supported by the first casing part 14. The first casing part 14 may be sufficiently stiff to absorb the impact of the device 10 being dropped, for example on the floor, or struck.

To ready the device 10 for use, a user may separate the second casing part 16 from the first casing part 14, for example by axially pulling the second casing part 16 away from the first casing part 14. In doing so, the locking member 36 may move axially relative to the second casing part 16, as the locking member 36 may remain engaged with the sleeve 24. Consequently, the locking member 36 may move to the second axial position. In the second axial position, the locking member 36 may be substantially non-deformed, as in the first axial position. In the second axial position, the locking member 36 may be receivable concentrically between the second casing part 16 and the outer wall 30, as shown in Figures 5A and 5B. As such, in the second axial position, the first and second casing parts 14, 16 may remain attached to one another, at least partially. In the second axial position, the locking member 36 may be disengageable from the outer surface 30. This is because, in the second axial position, the outward movement of the radially inward protrusions 42 may no longer be inhibited by abutment of the locking member 36 against the second casing part 16 (i.e. in the second axial position, there may be a space available radially outward of the locking member 36 to accommodate the radially outward movement of the radially outward protrusions 42). As such, in the second axial position, the first radially inwardly extending region 58 may have moved from an axial position in which the first radially inwardly extending region 58 is radially aligned with the radially inward protrusions 42 to an axial position in which the radially inwardly extending region 58 is not radially aligned with the radially inward protrusions 42.

Continued axial movement of the locking member 36 relative to the second casing part 16 may be inhibited, as the radially outward protrusions 54 may be engageable with the second casing part 16 to retain the locking member 36 within the second casing part 16. More specifically, in the second axial position, the radially outward protrusions 54 may abut a second radially inwardly extending region 60 of the second casing part 16 to retain the locking member 36 within the second casing part 16. As shown in the

illustrated embodiment, the second radially inwardly extending region 60 may be one or more ridges. Additionally, or alternatively, the second radially inwardly extending region 60 may comprise one or more ribs and/or one or more bumps. Continued axial movement may cause the radially inward protrusions to move radially outward, as shown in Figures 6A and 6B, which are offset by 90° to one another. This is because, in second axial position, the radially inward protrusions 42 may be deflected radially outward by abutment of the radially inward protrusions 42 against the outer surface 30. As shown in the illustrated embodiment, the radially inward protrusions 42 may be deflected radially outward by abutment against the groove 46, thus causing deformation of the first axially extending arms 44. As such, the locking member 36 may be disengageable from the outer surface 30 by separation of the first and second casing 14, 16 parts from one another. To facilitate deflection of the radially inward protrusions 42, either or both of the radially inward protrusions 42 and the outer surface 30 may comprise a chamfered surface.

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Figure 7 shows the first and second casing parts 14, 16 separated from one another and the locking member 36 retained in the second casing part 16. Figure 7 shows the device 10 ready for use.

In certain embodiments, a removable needle sheath 62 may cover the needle 22 prior to use of the device 10. As such, the second casing part 16 may comprise a needle sheath remover 64 engageable with the needle sheath 62 such that the needle sheath 62 is removable from the needle 22 by separation of the first and second casing parts 14, 16 from one another. As the needle 22 may be receivable within the bore 32, so too may the needle sheath remover 64 be receivable within the bore 32. The needle sheath remover 64 may be receivable within the bore 32 via the open end 34.

As used herein, the terms “axial” and “axially” refer to an axis extending between the proximal and distal ends 18, 52 of the device 10. The terms “radial” and “radially” refer to a direction at least substantially perpendicular to and extending away from the axis. Forward movement refers to a movement parallel to the axis and toward the proximal end 18 and rearward movement refers to a movement parallel to the axis and towards the distal end 52. As used herein, the term “proximal” refers to the end of the device 10 at which the needle 22 is located and/or attachable. As used herein, the term “distal” refers to the end of the device 10 furthest away from which the needle 22 is located

and/or attachable. As used herein, the terms “include” and “comprise” are used synonymously, which terms and variants thereof are to be construed as non-limiting.

5 All of the features disclosed in this specification (including any accompanying claims and drawings) and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

10 Each feature disclosed in this specification (including any accompanying claims and drawings), may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

15 The invention is not restricted to the details of any foregoing embodiments. The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims and drawings) or to any novel one, or any novel combination, of the steps of any method or process so disclosed. The claims should not be construed to cover merely the foregoing embodiments, but
20 also any embodiments which fall within the scope of the claims.

CLAIMS

1. A medicament delivery device comprising:
 - a housing for receiving a syringe, the housing having first and second casing parts separably attachable to one another;
 - 5 a sleeve receivable within the housing and comprising a tubular wall having an inner surface delimiting a bore and an opposing outer surface; and
 - a locking member receivable within the second casing part such that the locking member is axially movable between first and second axial positions relative to the second casing part, the locking member comprising a body portion having one or
 - 10 more radially inward protrusions extending therefrom such that in the first axial position the one or more radially inward protrusions is engageable with the outer surface to inhibit an axial movement of the sleeve relative to the first casing part and in the second axial position the one or more radially inward protrusions is disengageable from the outer surface.
- 15 2. A medicament delivery device according to claim 1, wherein the medicament delivery device is actuatable by the axial movement of the sleeve.
3. A medicament delivery device according to claim 1 or 2, wherein the locking
- 20 member is moveable from the first axial position to the second axial position by separation of the first and second casing parts from one another.
4. A medicament delivery device according to claim 1, 2 or 3, wherein the body
- 25 portion is annular.
5. A medicament delivery device according to any preceding claim, wherein the body portion is circumferentially continuous.
6. A medicament delivery device according to any preceding claim, wherein the
- 30 body portion delimits an opening through which the sleeve is receivable.
7. A medicament delivery device according to any preceding claim, wherein the locking member is engageable with the outer surface in that the outer surface has a radially inward groove extending therealong, in which the one or more radially inward
- 35 protrusions is engageable.

8. A medicament delivery device according to claim 7, wherein the radially inward groove is circumferentially continuous.
9. A medicament delivery device according to any preceding claim, wherein the
5 body portion has one or more first axially extending arms, proximate a free end of which a respective one of the one or more radially inward protrusions is integral or coupled to.
10. A medicament delivery device according to claim 9, wherein a plurality of the
10 first axially extending arms are equispaced about the body portion.
11. A medicament delivery device according to any preceding claim, wherein the locking member is disengageable from the outer surface by a radially outward movement of the one or more radially inward protrusions.
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12. A medicament delivery device according to claim 11, wherein the radially outward movement of the one or more radially inward protrusions is by deformation of the locking member.
- 20 13. A medicament delivery device according to claim 12, when dependent upon claim 8, wherein the radially outward movement of the one or more radially inward protrusions is by deformation of the one or more first axially extending arms.
- 25 14. A medicament delivery device according to claim 11, 12 or 13, wherein in the first axial position the radially outward movement of the one or more radially inward protrusions is inhibited by abutment of the locking member against the second casing part.
- 30 15. A medicament delivery device according to claim 14, wherein in the radially outward movement of the one or more radially inward protrusions is inhibited by abutment of the locking member against a first radially inwardly extending region of the second casing part.

16. A medicament delivery device according to claim 15, wherein the first radially inwardly extending region comprises one or more first bumps, ridges and/or ribs extending over a first portion of the second casing part.
- 5 17. A medicament delivery device according to claim 15 or 16, wherein in the first axial position the first radially inwardly extending region is radially aligned with the one or more radially inward protrusions and in the second axial position the first radially inwardly extending region is not radially aligned with the one or more radially inward protrusions.
- 10 18. A medicament delivery device according to any preceding claim, wherein the locking member is disengageable from the outer surface by separation of the first and second casing parts from one another.
- 15 19. A medicament delivery device according to any preceding claim, wherein the body portion has one or more radially outward protrusions extending therefrom engageable with the second casing part to retain the locking member within the second casing part.
- 20 20. A medicament delivery device according to claim 19, wherein the body portion has one or more second axially extending arms, proximate a free end of which a respective one of the one or more radially outward protrusions is integral or coupled to.
- 25 21. A medicament delivery device according to claim 19 or 20, wherein the one or more radially outward protrusions is engageable with the second casing part by abutment of the one or more radially outward protrusions against a second radially inwardly extending region of the second casing part.
- 30 22. A medicament delivery device according to claim 21, wherein the second radially inwardly extending region comprises one or more second bumps, ridges and/or ribs extending over a second portion of the second casing part.

23. A medicament delivery device according to any preceding claim, wherein the second casing part comprises a cap separably attachable to the first casing part at an end of the medicament delivery device.
- 5 24. A medicament delivery device according to any preceding claim, wherein the sleeve comprises a needle guard to selectively cover a needle of the medicament delivery device.
- 10 25. A medicament delivery device according to any preceding claim, wherein the second casing part comprises or is coupled to a needle sheath remover receivable within the bore.
- 15 26. A medicament delivery device according to any preceding claim, wherein the first and second casing parts are separably attachable to one another in that the first and second casing parts form one of a push fit, a snap fit and a screw fit with one another.
- 20 27. A medicament delivery device according to any preceding claim, comprising a power source provided as a propellant.
- 25 28. A medicament delivery device according to claim 27, wherein the power source comprises a propellant that includes a hydrofluoroalkane ("HFA").
29. A medicament delivery device according to claim 27 or 28, wherein the power source comprises a propellant that includes a hydrofluoroolefin ("HFO").
30. A medicament delivery device according to any of claims 1 to 26, comprising a power source provided as a compression spring.

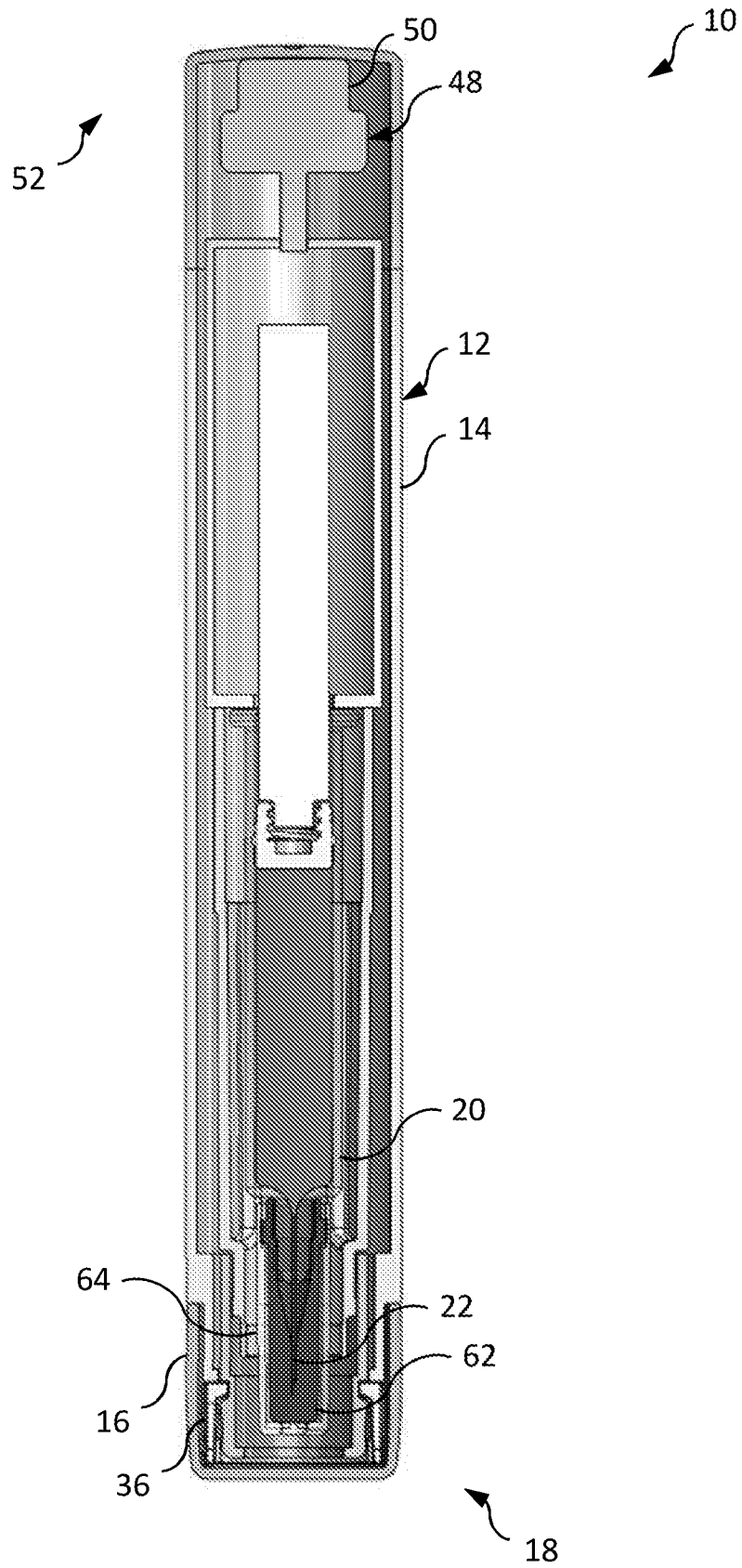


Figure 1

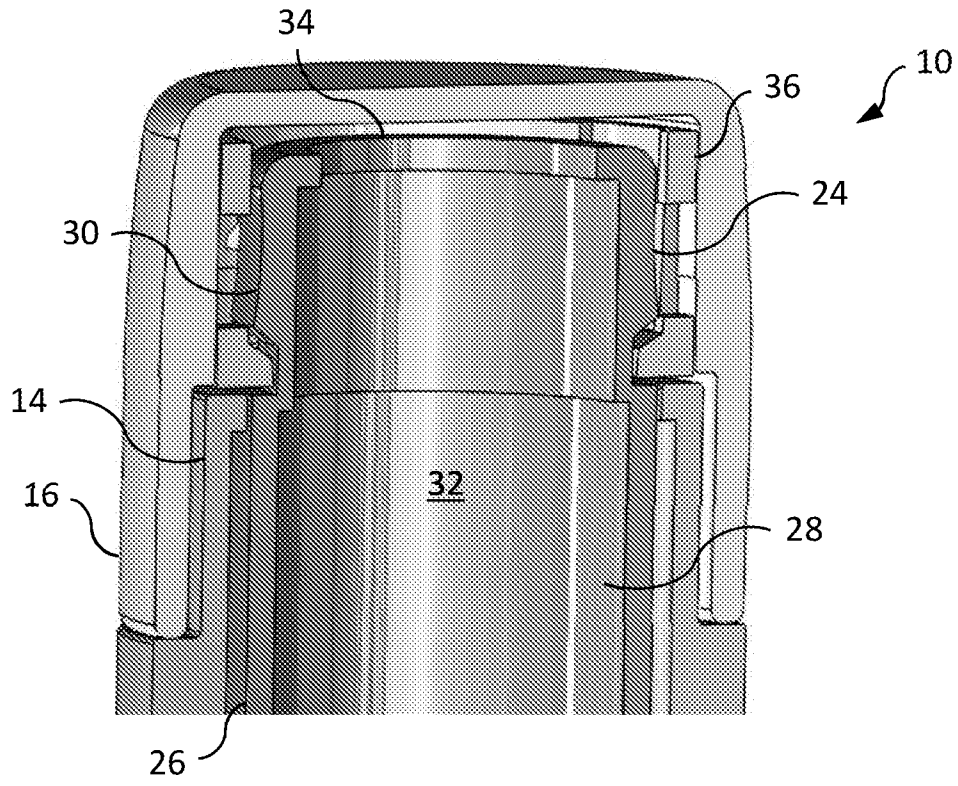


Figure 2

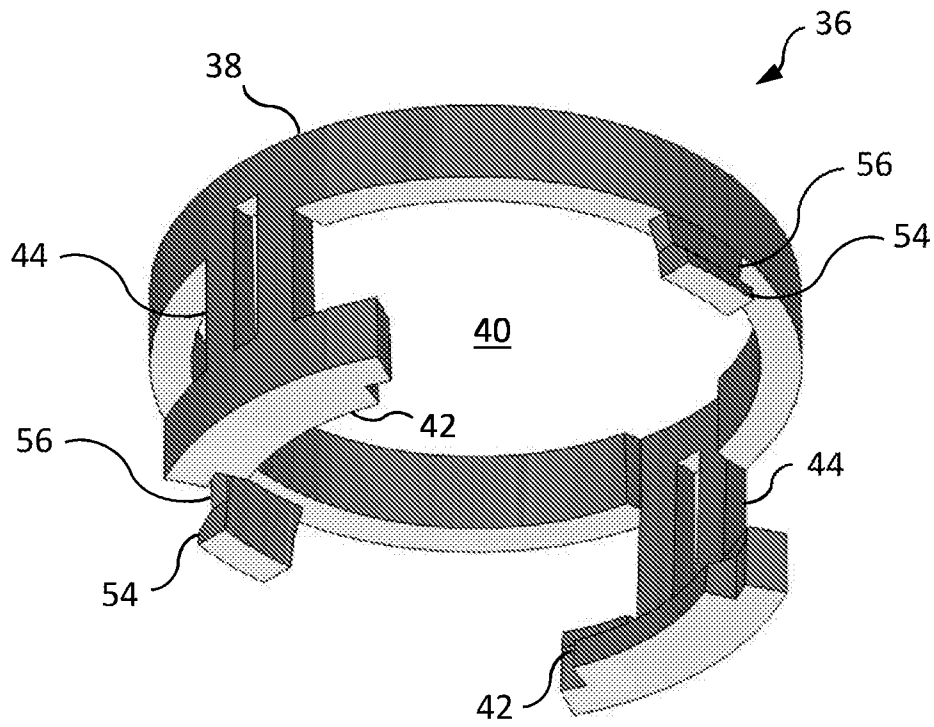


Figure 3

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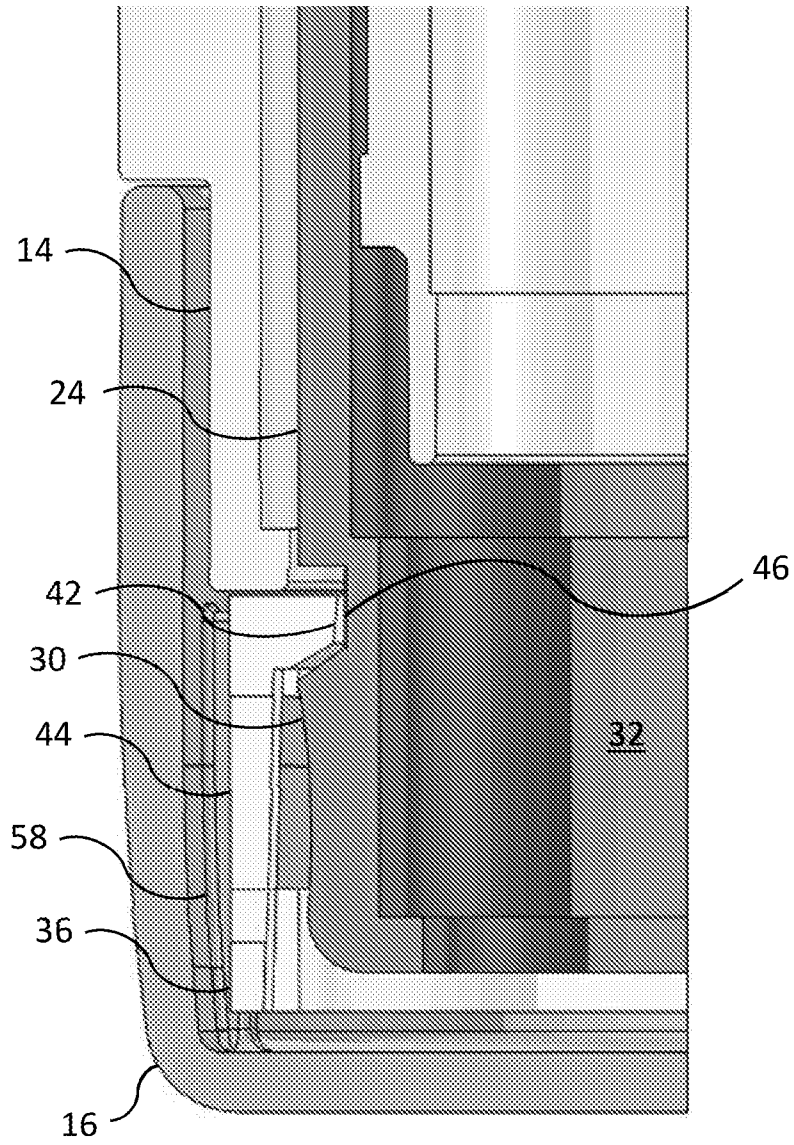


Figure 4a

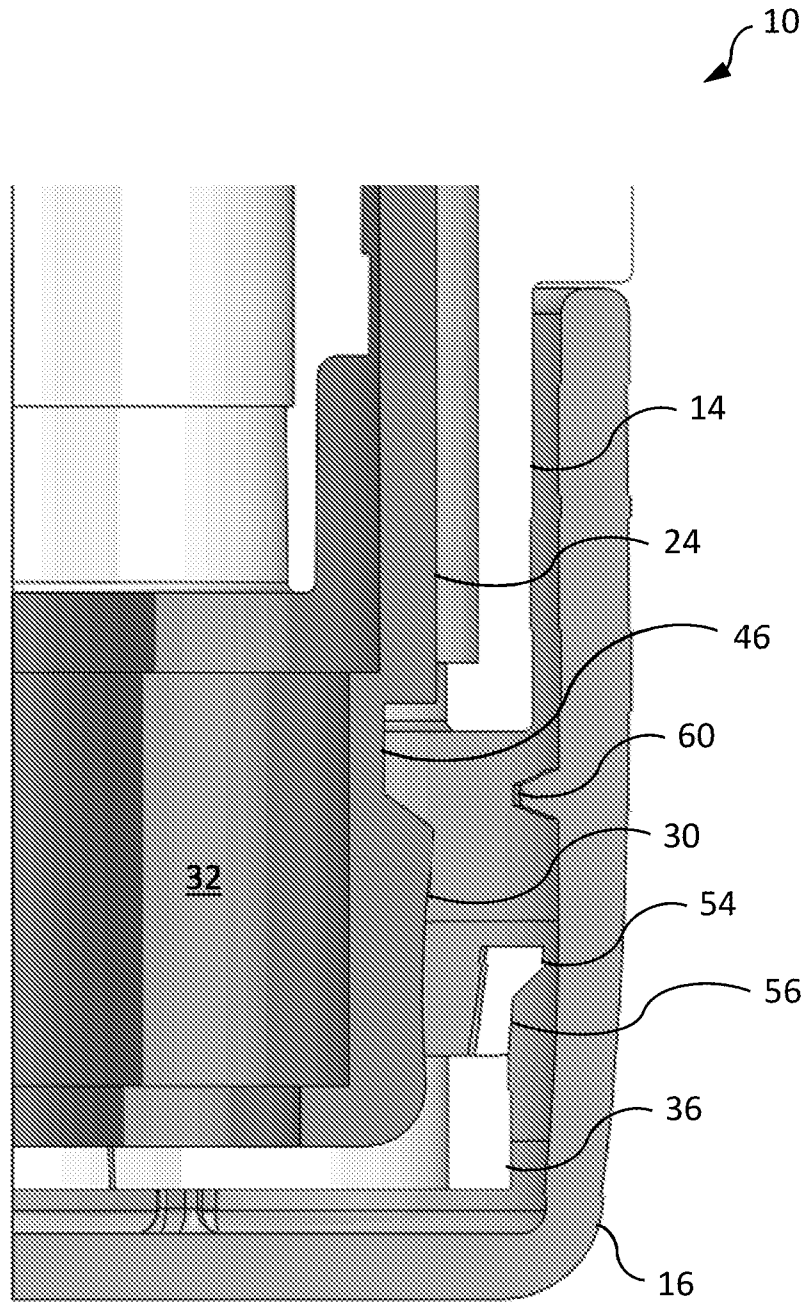


Figure 4b

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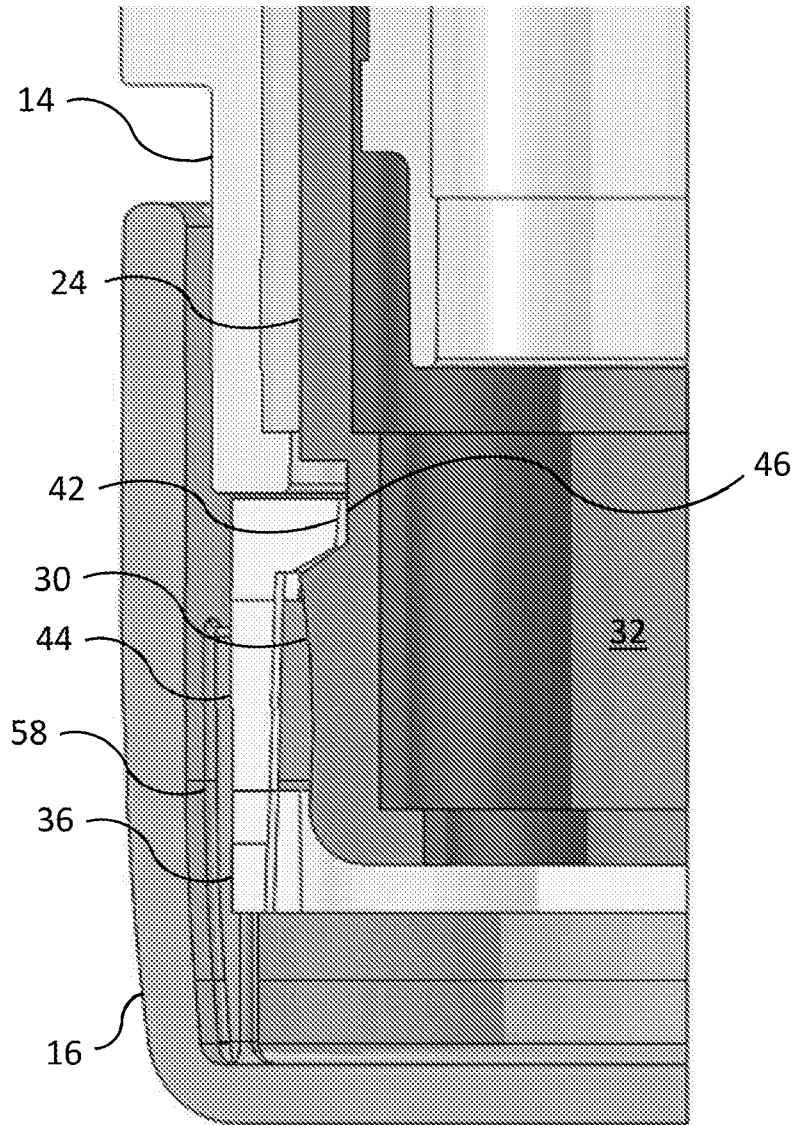


Figure 5a

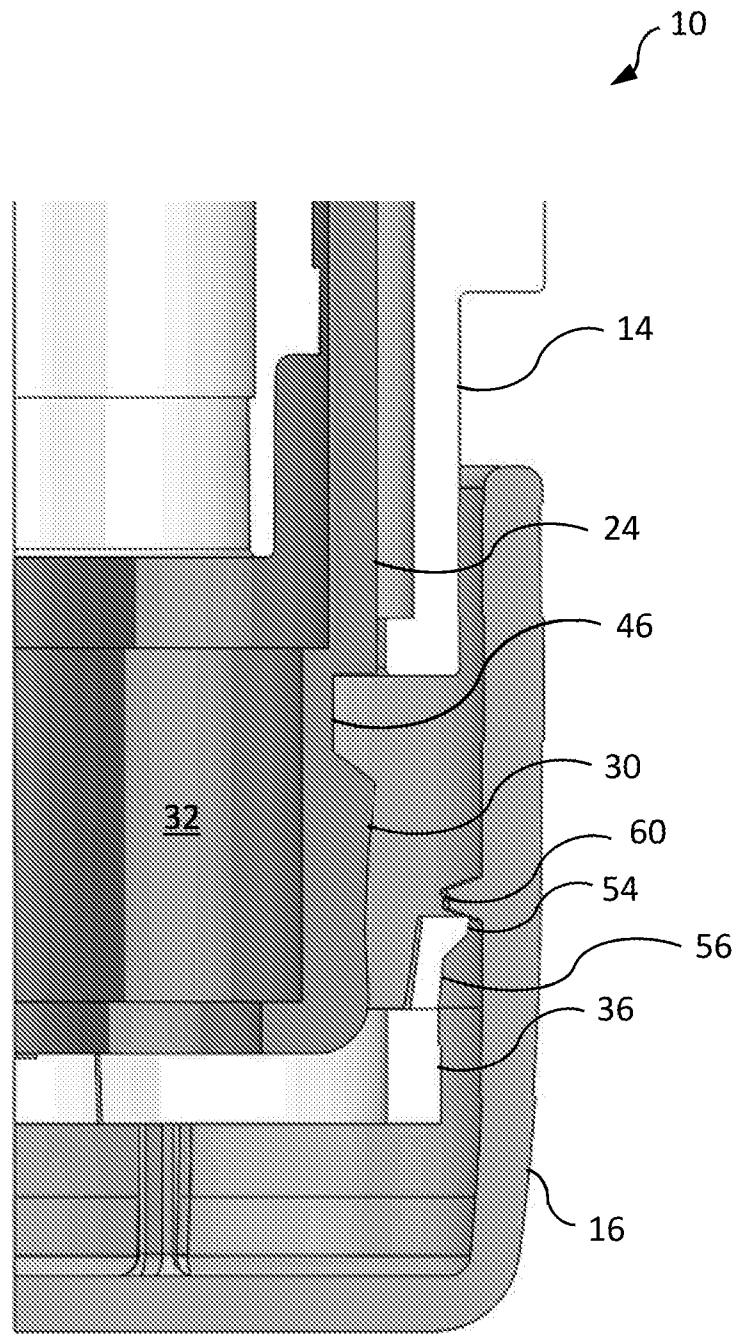


Figure 5b

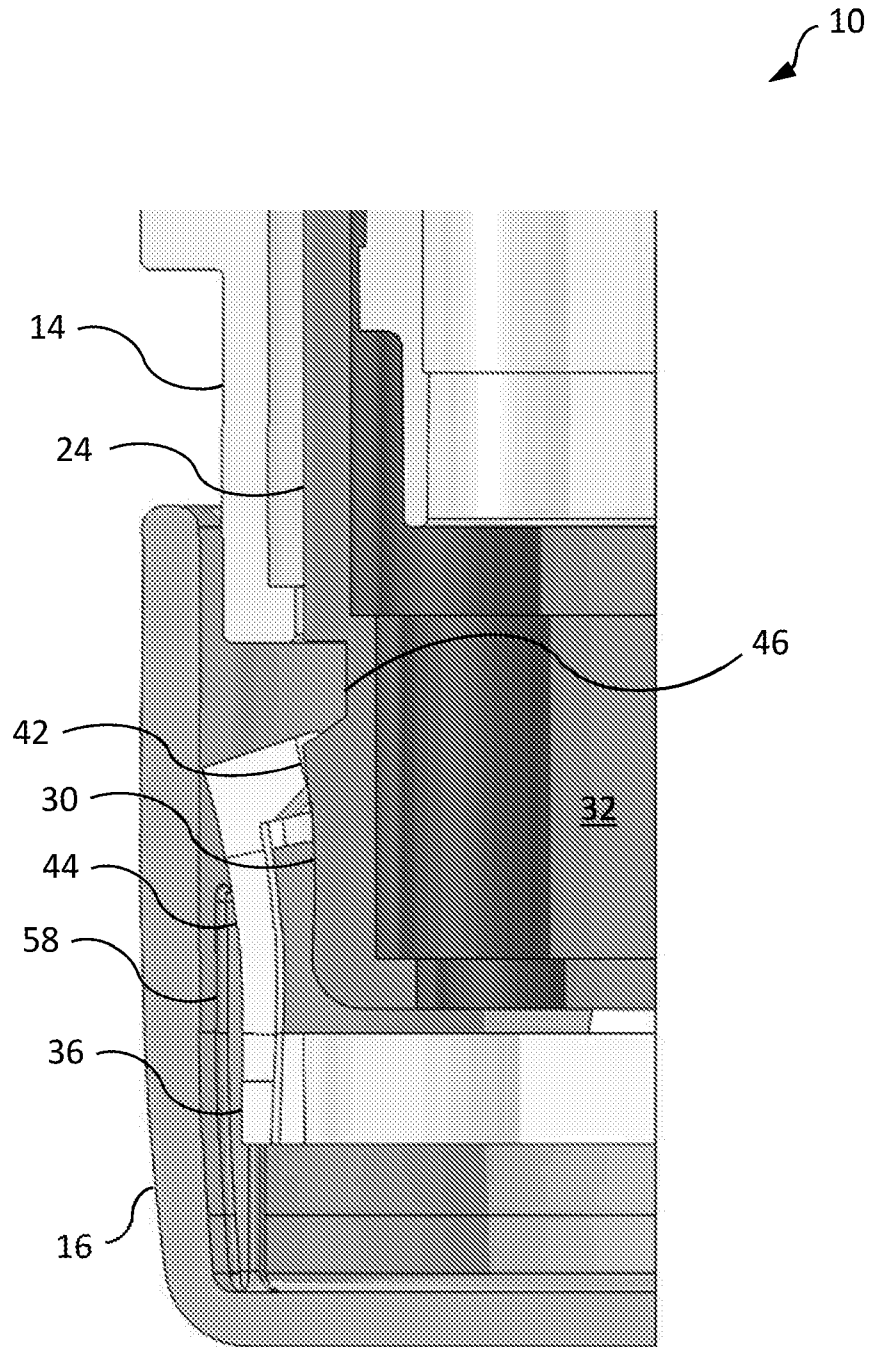


Figure 6a

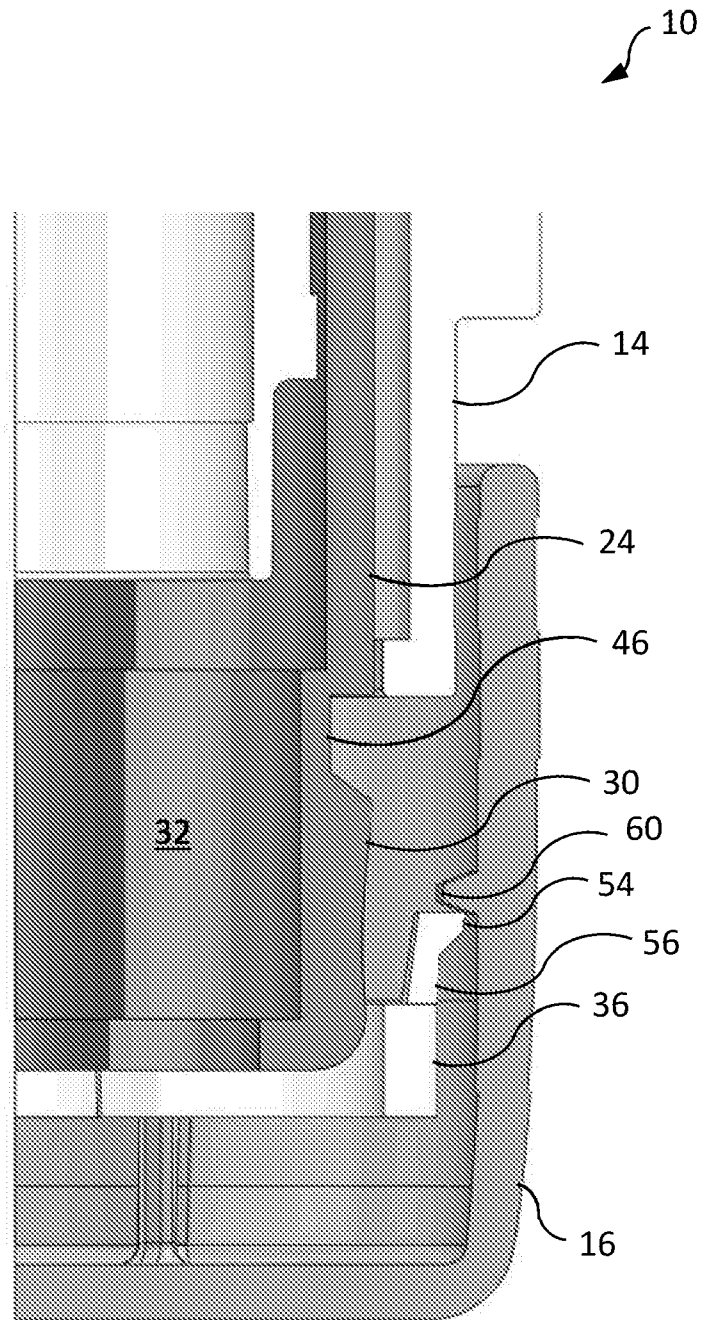


Figure 6b

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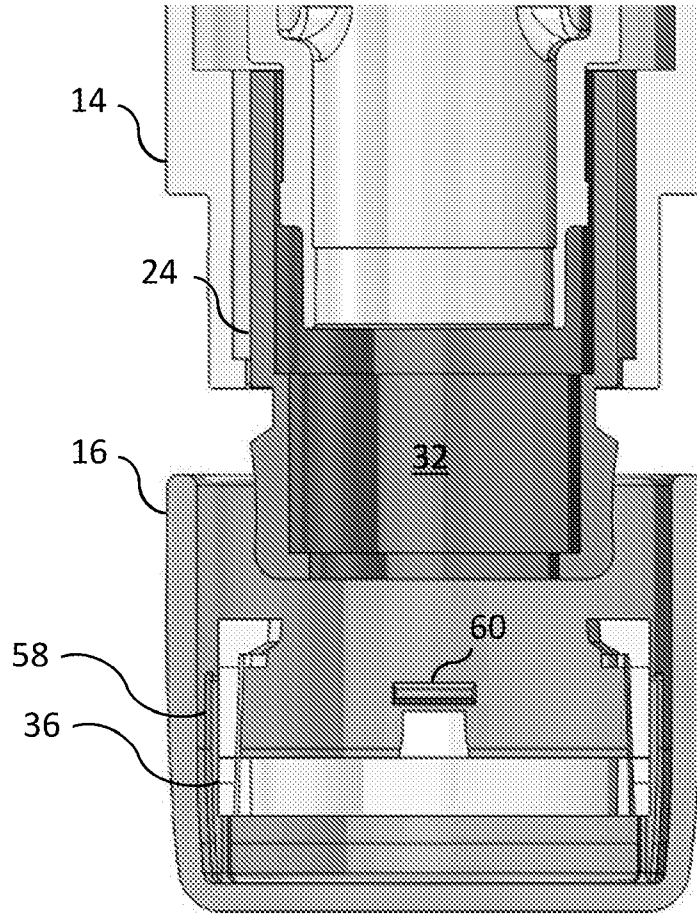


Figure 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2019/050120

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61M5/20 A61M5/315 A61M5/32
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
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, CHEM ABS Data, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 2017/144200 A1 (CAREBAY EUROPE LTD [MT]) 31 August 2017 (2017-08-31) page 2, line 12 - line 23 page 17, line 8 - page 18, line 13 figures 1a-6	1-30
A	US 2016/325044 A1 (TSCHIRREN MARKUS [CH] ET AL) 10 November 2016 (2016-11-10) paragraph [0002] paragraph [0010] paragraph [0044] - paragraph [0050] figures 1a-4b	1-30
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Further documents are listed in the continuation of Box C. See patent family annex.

* Special categories of cited documents :

<p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier application or patent but published on or after the international filing date</p> <p>"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)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p>	<p>"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</p> <p>"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</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art</p> <p>"&" document member of the same patent family</p>
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Date of the actual completion of the international search 21 March 2019	Date of mailing of the international search report 10/04/2019
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Authorized officer Koch, Kristian

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2019/050120

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>WO 2014/009705 A1 (OVAL MEDICAL TECHNOLOGIES LTD [GB]) 16 January 2014 (2014-01-16) page 1, line 5 - line 9 page 2, line 21 - line 29 page 11, line 33 - page 19, line 32 figures 1-44</p> <p style="text-align: center;">-----</p>	1-30
A,P	<p>EP 3 311 863 A1 (CAREBAY EUROPE LTD [MT]) 25 April 2018 (2018-04-25) paragraph [0001] paragraph [0013] paragraph [0016] paragraph [0020] paragraph [0025] - paragraph [0027] figures 1-12</p> <p style="text-align: center;">-----</p>	1-30

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/GB2019/050120

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