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DESCRIPTION

Technical Field

[0001] The invention relates to syringe carrier.

Background of the Invention

[0002] In a conventional medicament delivery device (e.g., an autoinjector), a pre-filled syringe is housed in a carrier which is axially movable to achieve needle penetration in an injection site and, optionally, needle withdrawal. A conventional carrier provides shoulders that are adapted to engage a neck on the syringe and prevent the syringe from disengaging the carrier. Because syringes are generally supplied with rigid needle shields covering the needle and those needle shields have a diameter greater than a diameter between the shoulders, a separate assembly step is required - inserting the syringe in the carrier and then attaching the rigid needle shield to the needle. Accordingly, there is a need for a syringe carrier which does not require this separate assembly step.

[0003] US 4,931,040 A discloses a safety syringe, such as a dental syringe, comprising a hollow cylinder, a disposable, prefilled fluid medication carpule received within the interior of the cylinder, and a needle carrying hub supporting a needle cannula so that the cannula extends axially from the carpule and outwardly of the cylinder, whereby to administer an injection. A piston assembly is movable axially through the carpule to first expulse the medication therefrom and to then engage and retract the needle hub and its associated needle cannula into the carpule, so that the needle will be completely surrounded and shielded by said carpule. A slide lock is connected around one end of the medication carpule and interfaced with the needle carrying hub to control the relocation of the hub and corresponding retraction of the cannula through the carpule. The slide lock is selectively moved relative to the carpule between needle retaining and needle releasing positions to either anchor the needle carrying hub with the needle extending axially from the carpule for administering an injection or release the needle carrying hub for retracting the cannula into its carpule to permit a safe disposal of the needle while avoiding an accidental and potentially life threatening needle strike.

[0004] US 3,144,178 A discloses a medical holder comprising: a body portion having a bore therethrough, a plunger having normally divergent arms slidable in said bore, the bore being of a diameter to snugly embrace the arms when they are parallel to one another and functioning to draw the arms together when they are drawn into said bore, said plunger having coupling means at the free ends of the arms for coupling with a piston located within one end of a cartridge and which cartridge at its other end has a hub portion, said body portion having spaced apart resilient legs extending therefrom, each leg terminating in a jaw directed toward the jaw on the other leg, each jaw having a bevelled outer face, said bevelled faces facilitating

the positioning of the cartridge in the holder between the legs and engaging the hub portion of the cartridge when the resilient legs are brought together, and a sleeve slidable along the legs adapted when moved toward the jaws to cause the jaws to firmly engage the hub portion of the cartridge, the plunger coupling means automatically coupling with the piston.

[0005] WO 2011/001161 A1 discloses an apparatus for removing a sheath from a syringe. The sheath provides a sterile cover for a needle of the syringe. The apparatus comprises a substantially cylindrical housing defining an opening for receiving a sheath attached to a syringe, and a driver mounted on the housing and being slideable along the housing between first and second axially displaced positions. The apparatus further comprises a plurality of radially deflectable fingers mounted within said housing and being coupled to said driver for movement therewith. The fingers are configured such that movement of said driver from said first to said second position causes said fingers to slide over said sheath and engage with a formation on said sheath. Movement of the driver from said second position towards said first position causes said fingers to push the sheath off the syringe. Also provided is an injection device comprising the apparatus.

[0006] WO 2010/147553 A1 discloses a medicament container holder arrangement comprising a medicament container holder and a medicament container, wherein the medicament container holder is provided with distally arranged support surfaces for flanges arranged on a distal part of the medicament container to be placed in said medicament container holder. The medicament container is arranged with a needle shield to the proximal end thereof, wherein said needle shield has a diameter generally equal or larger than the diameter of said medicament container. The medicament container holder arrangement further comprises holders arranged on the container holder for holding said medicament container around a proximal shoulder portion thereof and a resilient support element arranged between the flanges and the support surfaces. Thereby the holders and the resilient support element absorb and spread forces between the medicament container and the container holder.

[0007] WO 2007/083115 A1 discloses an autoinjector comprising a housing, in which can be mounted a syringe comprising a barrel for holding a volume of medicament, a needle at one end of the barrel in fluid communication with the medicament and a plunger axially-moveable in the barrel to a forwardmost position. The autoinjector further comprises a syringe support means for supporting the barrel at an axial location at or forward of the forwardmost position of the plunger and having a reaction surface for the syringe. In use, said reaction surface provides an axial compressive force on said barrel when a forward axial force is applied to the plunger.

Summary of the Invention

[0008] It is an object of the present invention to provide an improved syringe carrier.

[0009] The present invention provides a syringe carrier according to the appended

independent claim 1 and a method for assembling a syringe according to the appended independent claim 13.

[0010] The syringe carrier according to the present invention comprises a body adapted to receive a barrel of a syringe. The body includes two sections having distal ends with shoulder sections adapted to engage a circumferential gap between the barrel of the syringe and a needle shield covering a needle of the syringe.

[0011] In an illustrative example, the sections are resiliently coupled to a collar on a proximal end of the body. The shoulder sections deflect when engaged by the needle shield and return to a non-deflected position when disengaged by the needle shield to engage the circumferential gap between the barrel of the syringe and the needle shield.

[0012] In the invention, the sections are resiliently coupled to a collar on a distal end of the body. In an exemplary embodiment, the sections deflect when engaged by the needle shield and return to a non-deflected position when disengaged by the needle shield to engage a finger flange of the syringe. The body includes resilient arms having additional shoulder sections adapted to engage the circumferential gap between the barrel of the syringe and a needle shield covering a needle of the syringe. The arms deflect when engaged by the needle shield and return to a non-deflected position when disengaged by the needle shield to engage the circumferential gap between the barrel of the syringe and a needle shield.

[0013] In an illustrative example, the sections are coupled via at least one hinge and are movable between an open position and a closed position. A first section includes a pin adapted to engage a hole on a second section to secure the sections in the closed position.

[0014] In an illustrative example, the sections are coupled via at least one clip and are movable between an open position and a closed position. The at least one clip includes a hook on a first section adapted to engage an eye on a second section to secure the sections in the closed position.

[0015] In an illustrative example, the sections include doors hingedly coupled to the body and additional shoulder sections are formed on distal ends of the doors.

[0016] In an exemplary embodiment, the shoulder sections include proximally-facing contoured surfaces to accommodate a proximal portion of a neck of the syringe and distally-facing planar surfaces to abut the needle shield.

[0017] In an exemplary embodiment, the body includes one or more viewing windows.

[0018] In an exemplary embodiment, the body includes a retainer element adapted to provide an abutment surface to prevent the syringe from disengaging the syringe carrier in a proximal direction.

[0019] Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the scope of the invention will become apparent to those skilled in the art from this detailed description.

Brief Description of the Drawings

[0020] The present invention will become more fully understood from the detailed description given hereinbelow and the accompanying drawings which are given by way of illustration only, and thus, are not limitive of the present invention, and wherein:

Figure 1
is a top view of an illustrative example of a syringe carrier,
Figure 2
is a lateral view of the syringe carrier of figure 1,
Figure 3
is a longitudinal section of the syringe carrier of figure 1 in the section plane A-A,
Figure 4
is a perspective view of the syringe carrier of figure 1,
Figure 5
is a top view of an exemplary embodiment of a syringe carrier according to the present invention,
Figure 6
is a lateral view of the syringe carrier of figure 5,
Figure 7
is a longitudinal section of the syringe carrier of figure 5 in the section plane A-A,
Figure 8
is a perspective view of the syringe carrier of figure 5,
Figure 9
is a top view of another illustrative example of a syringe carrier,
Figure 10
is a lateral view of the syringe carrier of figure 9,
Figure 11
is a longitudinal section of the syringe carrier of figure 9 in the section plane A-A,
Figure 12
is a perspective view of the syringe carrier of figure 9,
Figure 13
is another perspective view of the syringe carrier of figure 9 with a syringe inserted,
Figure 14
is a top view of yet another illustrative example of a syringe carrier,
Figure 15
is a lateral view of the syringe carrier of figure 14,

Figure 16
is a longitudinal section of the syringe carrier of figure 14 in the section plane A-A,
Figure 17
is a perspective view of the syringe carrier of figure 14,
Figure 18
is another perspective view of the syringe carrier of figure 14 with a syringe inserted,
Figure 19
is a top view of yet another illustrative example of a syringe carrier,
Figure 20
is a lateral view of the syringe carrier of figure 19,
Figure 21
is a longitudinal section of the syringe carrier of figure 19 in the section plane A-A,
Figure 22
is a perspective view of the syringe carrier of figure 19,
Figure 23
is another perspective view of the syringe carrier of figure 19 with a syringe inserted,
Figure 24
is a top view of yet another illustrative example of a syringe carrier,
Figure 25
is a lateral view of the syringe carrier of figure 24,
Figure 26
is a longitudinal section of the syringe carrier of figure 24 in the section plane A-A,
Figure 27
is a perspective view of the syringe carrier of figure 24,
Figure 28
is another perspective view of the syringe carrier of figure 24 with a syringe inserted,
Figure 29
is a top view of yet another illustrative example of a syringe carrier,
Figure 30
is a lateral view of the syringe carrier of figure 29,
Figure 31
is a longitudinal section of the syringe carrier of figure 29 in the section plane A-A,
Figure 32
is a perspective view of the syringe carrier of figure 29,
Figure 33
is another perspective view of the syringe carrier of figure 29 with a syringe inserted,
Figure 34
is a top view of yet another illustrative example of a syringe carrier,
Figure 35
is a lateral view of the syringe carrier of figure 34,
Figure 36
is a longitudinal section of the syringe carrier of figure 34 in the section plane A-A,
Figure 37
is a perspective view of the syringe carrier of figure 34,

Figure 38
is another perspective view of the syringe carrier of figure 34 with a syringe inserted,
Figure 39
is a top view of yet another illustrative example of a syringe carrier,
Figure 40
is a lateral view of the syringe carrier of figure 39,
Figure 41
is a longitudinal section of the syringe carrier of figure 39 in the section plane B-B,
Figure 42
is a perspective view of the syringe carrier of figure 39,
Figure 43
is another perspective view of the syringe carrier of figure 39 with a syringe inserted,
Figure 44
is a top view of yet another illustrative example of a syringe carrier,
Figure 45
is a lateral view of the syringe carrier of figure 44,
Figure 46
is a longitudinal section of the syringe carrier of figure 44 in the section plane B-B,
Figure 47
is a perspective view of the syringe carrier of figure 44, and
Figure 48
is another perspective view of the syringe carrier of figure 44 with a syringe inserted.

[0021] Corresponding parts are marked with the same reference symbols in all figures.

Detailed Description

[0022] Generally, and applicable to all examples and embodiments of the present invention, the syringe 2 comprises a barrel 2.1 and a neck 2.2 which has a smaller diameter than the barrel 2.1. A needle 3 is mounted to the neck 2.2 and a rigid needle shield (RNS) 4 is removably arranged on the needle 3. When coupled to the needle 3, a portion of the RNS may cover a portion of the neck 2.2, leaving a circumferential gap between the barrel 2.1 and the RNS 4. The RNS 4 has a diameter substantially equal to the diameter of the barrel 2.1.

[0023] Figures 1-4 show an illustrative example of a syringe carrier 1. Figure 1 is a top view of the syringe carrier 1 for supporting a syringe 2. Figure 2 is a lateral view of the syringe carrier of figure 1. Figure 3 is a longitudinal section of the syringe carrier of figure 1 in the section plane A-A. Figure 4 is a perspective view of the syringe carrier of figure 1 without the syringe 2.

[0024] As shown in Figures 1-4, the syringe carrier 1 comprises an elongate body 1.1 arranged to receive the barrel 2.1. In this example, the body 1.1 has a cylindrical shape with an

internal diameter corresponding to the diameter of the barrel 2.1. The body 1.1 comprises a collar 1.2 at a proximal end dimensioned to allow axial insertion of the syringe 2 into the syringe carrier 1 in a distal direction D. Resilient sections 1.1.1 extend distally from the collar 1.2. Distal ends of the sections 1.1.1 include shoulder sections 1.4 shaped as portions of a circle arranged in a transverse plane with respect to a longitudinal axis of the carrier 1. The shoulder sections include facing surfaces 6. When the sections 1.1.1 are in a non-deflected position, the facing surfaces 6 may abut each other, and the shoulder sections 1.4 form a circular shoulder (because the facing surfaces 6 abut each other) adapted to engage the circumferential gap between the barrel 2.1 and the RNS 4.

[0025] The syringe 2, with RNS 4 attached to the needle 3, may be loaded into the syringe carrier 1 by sliding the syringe 2 in the distal direction D into the syringe carrier 1. When the RNS 4 abuts the shoulder sections 1.4, additional axial force may be applied to cause the arms 1.3 to deflect radially. When the RNS 4 has bypassed the shoulder sections 1.4, the sections 1.1.1 may return to the non-deflected position, and the shoulder sections 1.4 may engage the circumferential gap between the barrel 2.1 and the RNS 4 and prevent the syringe 2 from moving in the distal direction D relative to the syringe carrier 1.

[0026] In an embodiment, the proximal end 1.5 of the body 1.1 may be arranged to receive a finger flange 2.3 of the syringe 2.

[0027] In an embodiment, the shoulder sections 1.4 may include proximally-facing contoured surfaces to accommodate a proximal portion of the neck 2.2 of the syringe 2 and distally-facing planar surfaces to abut the RNS 4.

[0028] In an embodiment, viewing windows 5 may be arranged in the body 1.1 for allowing visual access to the barrel 2.1 of the syringe 2 when the syringe 2 is in the syringe carrier 2. In an exemplary embodiment, the windows 5 are formed when cut-outs in the arms 1.3 are substantially contiguous when the arms 1.3 are in the non-deflected position (as shown in Figure 1). A projection 1.6 may be formed around each cut-out, and when the sections 1.1.1 are in the non-deflected position, the projections 1.6 may form an outline for the window 5. In another exemplary embodiment, the windows 5 may be formed in the sections 1.1.1.

[0029] Figures 5-8 show an exemplary embodiment of a syringe carrier 1 according to the present invention. Figure 6 is a lateral view of the syringe carrier 1 of figure 5. Figure 7 is a longitudinal section of the syringe carrier 1 of figure 5 in the section plane A-A. Figure 8 is a perspective view of the syringe carrier of figure 5 without the syringe 2.

[0030] As shown in Figures 5-8, the syringe carrier 1 comprises an elongate body 1.1 arranged to receive the barrel 2.1. In this exemplary embodiment, the body 1.1 is comprised of two resilient sections 1.1.1 which, when together, have a cylindrical shape with an internal diameter corresponding to the diameter of the barrel 2.1. Distal ends of the sections 1.1.1 of the body 1.1 comprise part of a collar 1.2 dimensioned to allow axial insertion of the syringe 2 into the syringe carrier 1. Resilient arms 1.3 are formed in the body 1.1. Distal ends of the

arms 1.3 include shoulder sections 1.4 shaped as portions of a circle arranged in a transverse plane with respect to a longitudinal axis of the carrier 1. The shoulder sections include facing surfaces 6. When the arms 1.3 are in a non-deflected position, the facing surfaces 6 may abut the distal ends of the sections 1.1.1 of the body 1.1 to form a circular shoulder adapted to engage the circumferential gap between the barrel 2.1 and the RNS 4.

[0031] The syringe 2, with RNS 4 attached to the needle 3, may be loaded into the syringe carrier 1 by sliding the syringe 2 in the distal direction D into the syringe carrier 2. When the RNS 4 abuts proximal ends of the sections 1.1.1, the sections 1.1.1 may deflect radially. When the RNS 4 has bypassed the proximal ends of the section 1.1.1, the sections 1.1.1 may return to the non-deflected position. When the RNS 4 abuts the shoulder sections 1.4, the arms 1.3 may deflect until the RNS 4 bypasses the shoulder sections 1.4. Then, the arms 1.3 may return to the non-deflected position, and the shoulder sections 1.4 and the collar 1.2 may engage the circumferential gap between the barrel 2.1 and the RNS 4 and prevent the syringe 2 from moving in the distal direction D relative to the syringe carrier 1.

[0032] In an exemplary embodiment, the proximal end 1.5 of the body 1.1 may be arranged to receive a finger flange 2.3 of the syringe 2. The proximal end 1.5 may also include a retainer element 1.7 which is adapted to provide an abutment surface to prevent the syringe 2 from disengaging the syringe carrier 1 in the proximal direction D.

[0033] In an exemplary embodiment, the shoulder sections 1.4 may include proximally-facing contoured surfaces to accommodate a proximal portion of the neck 2.2 of the syringe 2 and distally-facing planar surfaces to abut the RNS 4.

[0034] In an exemplary embodiment, viewing windows 5 may be arranged in the body 1.1 for allowing visual access to the barrel 2.1 of the syringe 2 when the syringe 2 is in the syringe carrier 2. In an exemplary embodiment, the windows 5 are formed when cut-outs in the sections 1.1.1 are substantially contiguous when the sections 1.1.1 are in the non-deflected position (as shown in Figure 5). A projection 1.6 may be formed around each cut-out, and when the sections 1.1.1 are in the non-deflected position, the projections 1.6 may form an outline for the window 5.

[0035] Figures 9-13 show another illustrative example of a syringe carrier 1. Figure 9 is a top view of an example of a syringe carrier 1 for supporting a syringe 2. Figure 10 is a lateral view of the syringe carrier 1 of figure 9. Figure 11 is a longitudinal section of the syringe carrier 1 of figure 9 in the section plane A-A. Figure 12 is a perspective view of the syringe carrier of figure 9 without the syringe 2. Figure 13 is another perspective view of the syringe carrier of figure 9.

[0036] As shown in Figures 9-13, the syringe carrier 1 comprises an elongate body 1.1 arranged to receive the barrel 2.1. In this example, the body 1.1 is comprised of two sections 1.1.1 which, when together, have a cylindrical shape with an internal diameter corresponding to the diameter of the barrel 2.1. The sections 1.1.1 may be coupled by a side hinge which allows the section 1.1.1 to rotate relative to each other sufficient to receive the syringe 2.

Proximal and distal ends of the sections 1.1.1 include shoulder sections 1.4 shaped as portions of a circle arranged in a transverse plane with respect to a longitudinal axis of the carrier 1. The shoulder sections include facing surfaces 6.

[0037] When the sections 1.1.1 are in a closed position, the facing surfaces 6 may abut each other so that the shoulder sections 1.4 form circular shoulders adapted to proximally abut a finger flange 2.3 on the syringe 2 and to distally engage the circumferential gap between the barrel 2.1 and the RNS 4. The facing surfaces 6 of one section 1.1.1 may include holes 1.10 and the facing surfaces 6 of the other section 1.1.1 may include pins 1.11 adapted to engage (e.g., frictionally, snap-fit, etc.) the holes 1.10 to secure the sections 1.1.1 in the closed position.

[0038] The syringe 2, with RNS 4 attached to the needle 3, may be loaded into the syringe carrier 1 by opening the sections 1.1.1 about the hinge and placing the syringe 2 in the syringe carrier 2. When the sections 1.1.1 are closed, the pins 1.11 engage the holes 1.10, and the proximal shoulder sections 1.4 form circular shoulders adapted to proximally abut a finger flange 2.3 on the syringe 2 and the distal shoulder sections 1.4 to distally engage the circumferential gap between the barrel 2.1 and the RNS 4. Thus, the syringe 2 is prevented from moving axially relative to the syringe carrier 1.

[0039] In an embodiment, the proximal end 1.5 may include a retainer element 1.7 which is adapted to provide an abutment surface to prevent the syringe 2 from disengaging the syringe carrier 1 in the proximal direction D.

[0040] In an embodiment, the shoulder sections 1.4 may include proximally-facing contoured surfaces to accommodate a proximal portion of the neck 2.2 of the syringe 2 and distally-facing planar surfaces to abut the RNS 4.

[0041] In an embodiment, viewing windows 5 may be arranged in the body 1.1 for allowing visual access to the barrel 2.1 of the syringe 2 when the syringe 2 is in the syringe carrier 2. In an exemplary embodiment, the windows 5 are formed when cut-outs in the sections 1.1.1 are substantially contiguous when the sections 1.1.1 are in the closed position. A projection 1.6 may be formed around each cut-out, and when the sections 1.1.1 are in the non-deflected position, the projections 1.6 may form an outline for the window 5.

[0042] Figures 14-18 show another illustrative example of a syringe carrier 1. Figure 14 is a top view of an example of a syringe carrier 1 for supporting a syringe 2. Figure 15 is a lateral view of the syringe carrier 1 of figure 14. Figure 16 is a longitudinal section of the syringe carrier 1 of figure 14 in the section plane A-A. Figure 17 is a perspective view of the syringe carrier of figure 14 without the syringe 2. Figure 18 is another perspective view of the syringe carrier of figure 14.

[0043] As shown in Figures 14-18, the syringe carrier 1 comprises an elongate body 1.1 arranged to receive the barrel 2.1. In this example, the body 1.1 has a cylindrical shape with an

internal diameter corresponding to the diameter of the barrel 2.1. A distal end of the body 1.1 includes a shoulder section 1.4 shaped as a portion of a circle arranged in a transverse plane with respect to a longitudinal axis of the carrier 1, and at least one door 1.12 hingedly coupled to the body 1.1 and including a shoulder section 1.4. A hinge 1.9 coupling the door 1.12 to the body 1.1 may be provided on an axis parallel to the longitudinal axis of the syringe carrier 1 or on an axis transverse to the longitudinal axis of the syringe carrier 1. The shoulder section 1.4 includes facing surfaces 6 which abut facing surfaces 6 of the door 1.12 when the door 1.12 is in a closed position (as shown in Figure 14). When the door 1.12 is in the closed position, the facing surfaces 6 may abut each other so that the shoulder sections 1.4 on the body 1.1 and the door 1.12 to form a circular shoulder adapted to engage the circumferential gap between the barrel 2.1 and the RNS 4. The facing surfaces 6 of the door 1.12 may include holes 1.10 and the facing surfaces 6 of the body 1.1 may include pins 1.11 (or vice-versa) adapted to engage (e.g., frictionally, snap-fit, etc.) the holes 1.10 to secure the door 1.12 in the closed position.

[0044] The syringe 2, with RNS 4 attached to the needle 3, may be loaded into the syringe carrier 1 by opening the door 1.12 and sliding the syringe 2 into the syringe carrier 1. When the circumferential gap between the barrel 2.1 and the RNS 4 engages the shoulder section 1.4 on the body 1.1, the door 1.12 may be closed to engage the gap and prevent the syringe 2 from moving axially relative to the syringe carrier 1.

[0045] In an embodiment, the shoulder sections 1.4 may include proximally-facing contoured surfaces to accommodate a proximal portion of the neck 2.2 of the syringe 2 and distally-facing planar surfaces to abut the RNS 4.

[0046] In an embodiment, viewing windows (not shown) may be arranged in the body 1.1 for allowing visual access to the barrel 2.1 of the syringe 2 when the syringe 2 is in the syringe carrier 2. In an exemplary embodiment, the windows are formed as cut-outs.

[0047] Figures 19-23 show another illustrative example of a syringe carrier 1. Figure 19 is a top view of an example of a syringe carrier 1 for supporting a syringe 2. Figure 20 is a lateral view of the syringe carrier 1 of figure 19. Figure 21 is a longitudinal section of the syringe carrier 1 of figure 19 in the section plane A-A. Figure 22 is a perspective view of the syringe carrier of figure 19 without the syringe 2. Figure 23 is another perspective view of the syringe carrier of figure 19.

[0048] As shown in Figures 19-23, the syringe carrier 1 comprises an elongate body 1.1 arranged to receive the barrel 2.1. In this example, the body 1.1 is comprised of two sections 1.1.1 which, when together, have a cylindrical shape with an internal diameter corresponding to the diameter of the barrel 2.1. The sections 1.1.1 may be coupled together by clips. In an exemplary embodiment, a clip may comprise an eye 1.14 on a first section adapted to engage a hook 1.13 on a second section. The eye 1.14 may have a cross-section substantially equal to the cross-section of the hook 1.13 such that the eye 1.14 and hook 1.13 engage in a snap-fit. Distal ends of the sections 1.1.1 include shoulder sections 1.4 shaped as portions of a circle

arranged in a transverse plane with respect to a longitudinal axis of the carrier 1. The shoulder sections include facing surfaces 6. When the sections 1.1.1 are in a closed position, the facing surfaces 6 may abut each other so that the shoulder sections 1.4 form circular shoulders adapted engage the circumferential gap between the barrel 2.1 and the RNS 4. Those of skill in the art will understand that the sections 1.1.1 may be hingedly connected.

[0049] The syringe 2, with RNS 4 attached to the needle 3, may be loaded into the syringe carrier 1 by opening the sections 1.1.1 and placing the syringe 2 in the syringe carrier 2. When the sections 1.1.1 are closed, the eyes 1.14 engage the hooks 1.13 and the shoulder sections 1.4 engage the circumferential gap between the barrel 2.1 and the RNS 4. Thus, the syringe 2 is prevented from moving axially relative to the syringe carrier 1.

[0050] In an embodiment, the proximal end may include a retainer element which is adapted to provide an abutment surface to prevent the syringe 2 from disengaging the syringe carrier 1 in the proximal direction D.

[0051] In an embodiment, the shoulder sections 1.4 may include proximally-facing contoured surfaces to accommodate a proximal portion of the neck 2.2 of the syringe 2 and distally-facing planar surfaces to abut the RNS 4.

[0052] In an embodiment, viewing windows may be arranged in the body 1.1 for allowing visual access to the barrel 2.1 of the syringe 2 when the syringe 2 is in the syringe carrier 2.

[0053] Figures 24-28 show another illustrative example of a syringe carrier 1. Figure 24 is a top view of an example of a syringe carrier 1 for supporting a syringe 2. Figure 25 is a lateral view of the syringe carrier 1 of figure 24. Figure 26 is a longitudinal section of the syringe carrier 1 of figure 24 in the section plane A-A. Figure 27 is a perspective view of the syringe carrier of figure 24 without the syringe 2. Figure 28 is another perspective view of the syringe carrier of figure 24.

[0054] As shown in Figures 24-28, the syringe carrier 1 comprises an elongate body 1.1 arranged to receive the barrel 2.1. In this example, the body 1.1 has a partially cylindrical shape with an internal diameter corresponding to the diameter of the barrel 2.1. The body 1.1 may include a longitudinal slot (e.g., a cut-out) which is adapted to snap over the barrel 2.1 of the syringe 2. Proximal and distal ends of the body 1.1 include clamps 1.15, 1.16 which are adapted to retain the syringe 2 when in the syringe carrier 1. The distal end of the body 1 further includes shoulder sections 1.4 shaped as a portion of a circle arranged in a transverse plane with respect to a longitudinal axis of the carrier 1. The shoulder sections 1.4 form circular shoulders adapted to engage the circumferential gap between the barrel 2.1 and the RNS 4.

[0055] The syringe 2, with RNS 4 attached to the needle 3, may be loaded into the syringe carrier 1 by pressing the barrel 2.1 against the clamps 1.15, 1.16, causing the clamps 1.15, 1.16 to deflect and widen the longitudinal slot in the body 1.1. When the barrel 2.1 bypasses the clamps 1.15, 1.16, the clamps 1.15, 1.16 return to their non-deflected position and retain

the syringe 2 in the syringe carrier 1. The shoulder sections 1.4 engage the circumferential gap between the barrel 2.1 and the RNS 4. Thus, the syringe 2 is prevented from moving axially relative to the syringe carrier 1.

[0056] In an embodiment, the proximal end may include a retainer element which is adapted to provide an abutment surface to prevent the syringe 2 from disengaging the syringe carrier 1 in the proximal direction D.

[0057] In an embodiment, the shoulder sections 1.4 may include proximally-facing contoured surfaces to accommodate a proximal portion of the neck 2.2 of the syringe 2 and distally-facing planar surfaces to abut the RNS 4.

[0058] In an embodiment, a viewing window may be arranged in the body 1.1 for allowing visual access to the barrel 2.1 of the syringe 2 when the syringe 2 is in the syringe carrier 2.

[0059] Figures 29-33 show another illustrative example of a syringe carrier 1. Figure 29 is a top view of an example of a syringe carrier 1 for supporting a syringe 2. Figure 30 is a lateral view of the syringe carrier 1 of figure 29. Figure 31 is a longitudinal section of the syringe carrier 1 of figure 29 in the section plane A-A. Figure 32 is a perspective view of the syringe carrier of figure 29 without the syringe 2. Figure 33 is another perspective view of the syringe carrier of figure 29.

[0060] As shown in Figures 29-33, the syringe carrier 1 comprises an elongate body 1.1 arranged to receive the barrel 2.1. In this example, the body 1.1 has a partially cylindrical shape with an internal diameter corresponding to the diameter of the barrel 2.1. The body 1.1 includes a collar 1.2 at its proximal end and may include a longitudinal slot (e.g., a cut-out) formed in the body 1.1 distally of the collar 1.2 which is adapted to snap over the barrel 2.1 of the syringe 2. A pair of groove hinges 1.17 may be formed in the body 1.1 adjacent a proximal end of the slot. The distal end of the body 1 includes shoulder sections 1.4 shaped as a portion of a circle arranged in a transverse plane with respect to a longitudinal axis of the carrier 1. The shoulder sections 1.4 form circular shoulders adapted to engage the circumferential gap between the barrel 2.1 and the RNS 4.

[0061] The syringe 2, with RNS 4 attached to the needle 3, may be loaded into the syringe carrier 1 by sliding the syringe 2 through the collar 1.2 in the distal direction D. When the RNS 4 abuts the shoulder sections 1.4, the body 1.1 may radially deflect (e.g., rotate) about the groove hinges 1.17. When the RNS 4 bypasses the shoulder sections 1.4, the body 1.1 may return to its non-deflected position and retain the syringe 2 in the syringe carrier 1. The shoulder sections 1.4 engage the circumferential gap between the barrel 2.1 and the RNS 4. Thus, the syringe 2 is prevented from moving axially relative to the syringe carrier 1.

[0062] In an embodiment, the proximal end may include a retainer element which is adapted to provide an abutment surface to prevent the syringe 2 from disengaging the syringe carrier 1 in the proximal direction D.

[0063] In an embodiment, the shoulder sections 1.4 may include proximally-facing contoured surfaces to accommodate a proximal portion of the neck 2.2 of the syringe 2 and distally-facing planar surfaces to abut the RNS 4.

[0064] In an embodiment, a viewing window may be arranged in the body 1.1 for allowing visual access to the barrel 2.1 of the syringe 2 when the syringe 2 is in the syringe carrier 2.

[0065] Figures 34-38 show another illustrative example of a syringe carrier 1. Figure 34 is a top view of an example of a syringe carrier 1 for supporting a syringe 2. Figure 35 is a lateral view of the syringe carrier 1 of figure 34. Figure 36 is a longitudinal section of the syringe carrier 1 of figure 34 in the section plane A-A. Figure 37 is a perspective view of the syringe carrier of figure 34 without the syringe 2. Figure 38 is another perspective view of the syringe carrier of figure 34.

[0066] As shown in Figures 34-38, the syringe carrier 1 comprises an elongate body 1.1 arranged to receive the barrel 2.1. In this example, the body 1.1 has a cylindrical shape with an annular groove 1.19 adjacent its distal end which is adapted to engage a circlip 8. The circlip 8 may engage the circumferential gap between the barrel 1.2 and the RNS 4.

[0067] The syringe 2, with RNS 4 attached to the needle 3 and the circlip 8 attached to the syringe 2, may be loaded into the syringe carrier 1 by sliding the syringe 2 into the syringe carrier 1 in the distal direction D. In a non-deflected position, an outer diameter of the circlip 8 may be substantially equal to a diameter of the body 1.1. Thus, when the syringe 2 with the circlip 8 is inserted into the syringe carrier 1, the circlip 8 may deflect radially until the circlip 8 reaches the annular groove 1.19. The circlip 8 may then expand to the non-deflected position and retain the syringe 2 in an axial position relative to the syringe carrier 1. That is, the circlip 8 may engage the annular groove 1.19 and the circumferential gap between the barrel 2.1 and the RNS 4. Thus, the syringe 2 is prevented from moving axially relative to the syringe carrier 1.

[0068] In an embodiment, the proximal end may include a retainer element which is adapted to provide an abutment surface to prevent the syringe 2 from disengaging the syringe carrier 1 in the proximal direction D.

[0069] In an embodiment, the shoulder sections 1.4 may include proximally-facing contoured surfaces to accommodate a proximal portion of the neck 2.2 of the syringe 2 and distally-facing planar surfaces to abut the RNS 4.

[0070] In an embodiment, a viewing window may be arranged in the body 1.1 for allowing visual access to the barrel 2.1 of the syringe 2 when the syringe 2 is in the syringe carrier 2.

[0071] Figures 39-43 show another illustrative example of a syringe carrier 1. Figure 39 is a top view of an example of a syringe carrier 1 for supporting a syringe 2. Figure 40 is a lateral

view of the syringe carrier 1 of figure 39. Figure 41 is a longitudinal section of the syringe carrier 1 of figure 39 in the section plane A-A. Figure 42 is a perspective view of the syringe carrier of figure 39 without the syringe 2. Figure 43 is another perspective view of the syringe carrier of figure 39.

[0072] As shown in Figures 39-43, the syringe carrier 1 comprises an elongate body 1.1 arranged to receive the barrel 2.1. In this example, the body 1.1 has a cylindrical shape with an annular groove 1.19 having at least one aperture 1.20 adjacent its distal end which is adapted to engage a circlip 8.

[0073] The syringe 2, with RNS 4 attached to the needle 3, may be loaded into the syringe carrier 1 by sliding the syringe 2 into the syringe carrier 1 in the distal direction D. When the circumferential gap between the barrel 2.1 and the RNS 4 is aligned with the annular groove 1.19, the circlip 8 may be coupled to the body 1.1 and engage the apertures 1.20. By extending inwardly through the apertures, the circlip 8 may be coupled to the outside of the body 1.1 but engage the circumferential gap between the barrel 2.1 and the RNS 4. The engagement between the circlip 8 and the apertures 1.20 prevents the circlip 8 from translating relative to the body 1.1, and the engagement between the circlip 8 and the circumferential gap prevents the syringe 2 from moving axially relative to the syringe carrier 1.

[0074] In an embodiment, the proximal end may include a retainer element which is adapted to provide an abutment surface to prevent the syringe 2 from disengaging the syringe carrier 1 in the proximal direction D.

[0075] In an embodiment, the shoulder sections 1.4 may include proximally-facing contoured surfaces to accommodate a proximal portion of the neck 2.2 of the syringe 2 and distally-facing planar surfaces to abut the RNS 4.

[0076] In an embodiment, a viewing window may be arranged in the body 1.1 for allowing visual access to the barrel 2.1 of the syringe 2 when the syringe 2 is in the syringe carrier 2.

[0077] Figures 44-48 show another illustrative example of a syringe carrier 1 and a tool 9 for inserting a syringe 2 into the syringe carrier 1.

[0078] As shown in Figures 39-43, the syringe carrier 1 comprises an elongate body 1.1 arranged to receive the barrel 2.1. In this example, the body 1.1 has an enlarged portion 1.21 on its distal end. The body 1.1 has cylindrical shape with a first diameter and the enlarged portion 1.21 has a second diameter, larger than the first diameter. The enlarged portion 1.21 has one or more resilient barbs 1.22 extending toward a longitudinal axis of the body 1.1 and angled toward a proximal end of the body 1.1.

[0079] The syringe 2, with RNS 4 attached to the needle 3, may be loaded into the syringe carrier 1 by inserting the tool 9 into the enlarged portion 1.21 of the syringe carrier 1. The tool 9 may be a cylinder having an open end adapted to receive the RNS 4. The tool 9 may have a

third diameter substantially equal to the second diameter. As the tool 9 is inserted into the enlarged portion 1.21, the tool 9 engages and deflects the resilient barbs 1.22. When the barbs 1.22 are deflected, the RNS 4 can pass the barbs 1.22 in the distal direction D and extend from a distal opening of the body 1.1. When a finger flange 2.3 of the syringe 2 abuts a proximal end of the body 1.1, the tool 9 may be removed and the barbs 1.22 may engage the circumferential gap between the barrel 2.1 and the RNS 4 to prevent the syringe 2 from moving axially relative to the syringe carrier 1.

[0080] In an embodiment, the proximal end may include a retainer element which is adapted to provide an abutment surface to prevent the syringe 2 from disengaging the syringe carrier 1 in the proximal direction D.

[0081] In an embodiment, the barbs 1.22 may include proximally-facing contoured surfaces to accommodate a proximal portion of the neck 2.2 of the syringe 2 and distally-facing planar surfaces to abut the RNS 4.

[0082] In an embodiment, a viewing window may be arranged in the body 1.1 for allowing visual access to the barrel 2.1 of the syringe 2 when the syringe 2 is in the syringe carrier 2.

[0083] It is apparent to those skilled in the art that the number of deflectable arms 1.3, shoulder sections 1.4, clips 8 may be varied without departing from the scope of the invention. Likewise, all the illustrated embodiments may be implemented with or without viewing windows 5, projections 1.6, restraining features retainer elements 1.7 and clips. Different kinds of clips may likewise be applied.

REFERENCES CITED IN THE DESCRIPTION

Cited references

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Patent documents cited in the description

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- US3144178A **[0004]**

- WO2011001161A1 **[0005]**
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Patentkrav

1. Sprøjteholder (1), som omfatter:
en sprøjte (2), der har en cylinder (2.1), og en kanyleafskærmning (4), der dækker en kanyle (3), der er anbragt på en distal ende af sprøjten (2), hvor der er tilvejebragt et omkredsende mellemrum mellem cylinderen (2.1) på sprøjten (2) og kanyleafskærmningen (4), og
et legeme (1.1), hvor cylinderen (2.1) modtages i legemet (1.1), hvilket legeme (1.1) indbefatter mindst to sektioner (1.1.1), der har distale ender med skuldersektioner (1.4) formet som dele af en cirkel anbragt i et tværgående plan i forhold til en længdeakse på sprøjteholderen (1), hvor sektionerne (1.1.1) er elastisk koblet til en krave (1.2) på en distal ende af legemet (1.1), og hvor skuldersektionerne (1.4) er tilpasset til at gå i indgreb med det omkredsende mellemrum til forhindring af, at sprøjten (2) bevæges i en distal retning (D) i forhold til sprøjteholderen (1).

2. Sprøjteholder (1) ifølge krav 1, hvor sektionerne (1.1.1) afbøjes, når de går i indgreb med kanyleafskærmningen (4), og vender tilbage til en ikke-afbøjet position, når de går ud af indgreb med kanyleafskærmningen (4), til indgreb med en fingerkrave (2.3) på sprøjten (2).

3. Sprøjteholder (1) ifølge et hvilket som helst af ovennævnte krav, hvor skuldersektionerne (1.4) indbefatter proksimalt vendende konturerede overflader til at rumme en proksimal del af en hals (2.2) på sprøjten (2) og distalt vendende plane overflader til at støde mod kanyleafskærmningen (4).

4. Sprøjteholder (1) ifølge et hvilket som helst af ovennævnte krav, hvor legemet (1.1) indbefatter et eller flere betragtningsvinduer (5).

5. Sprøjteholder (1) ifølge krav 4, hvor betragtningsvinduerne (5) dannes, når udskæringer i

sektionerne (1.1.1) er i det væsentlige fortløbende, når sektionerne (1.1.1) er i den ikke-afbøjede position.

6. Sprøjteholder (1) ifølge krav 4, hvor der er dannet et fremspring (1.6) omkring hver udskæring, og fremspringene (1.6), når sektionerne (1.1.1) er i den ikke-afbøjede position, danner et omrids af betragtningsvinduet (5).

7. Sprøjteholder (1) ifølge et hvilket som helst af ovennævnte krav, hvor legemet (1.1) indbefatter et fastholdelseselement (1.7), der er tilpasset til at tilvejebringe en tilstødningsflade til at forhindre, at sprøjten (2) går ud af indgreb med sprøjteholderen (1) i en proksimal retning (P).

8. Sprøjteholder (1) ifølge et hvilket som helst af ovennævnte krav, hvor de to elastiske sektioner (1.1.1), når de er samlet, har en cylindrisk form med en indvendig diameter, der svarer til diameteren af cylinderen (2.1).

9. Sprøjteholder (1) ifølge et hvilket som helst af ovennævnte krav, hvor kraven (1.2) er delvist formet af distale ender af sektionerne (1.1.1) af legemet (1.1), idet kraven (1.2) er dimensioneret, så den muliggør aksial indsættelse af sprøjten (2) i sprøjteholderen (1).

10. Medikamentadministrationsanordning, som omfatter sprøjteholderen (1) ifølge et hvilket som helst af ovennævnte krav.

11. Medikamentadministrationsanordning ifølge krav 10, hvor kanylen er kanylen (3) på sprøjten (2), og hvor skuldersektionerne (1.4) går i indgreb med det omkredsende mellemrum.

12. Medikamentadministrationsanordning ifølge krav 11, hvor sprøjten (2) er fyldt med et medikament.

13. Fremgangsmåde til montering af en sprøjte (2), som har en cylinder (2.1) og en kanyleafskærmning (4), der dækker en kanyle (3) på sprøjten (2), i en sprøjteholder (1) ifølge et hvilket som helst af kravene 1 til 9, der er kendetegnet ved, at fremgangsmåden omfatter: at sprøjten (2) glides i den distale retning (D) ind i sprøjteholderen (1), hvor sektionerne (1.1.1), når kanyleafskærmningen (4) støder mod proksimale ender af sektionerne (1.1.1), afbøjes radialt, og sektionerne, når kanyleafskærmningen (4) har passeret de proksimale ender af sektionerne (1.1.1), vender tilbage til en ikke-afbøjet position, hvor, når kanyleafskærmningen (4) støder mod skuldersektionerne (1.4), arme (1.3) dannet i legemet (1.1), hvilke arme (1.3) har distale ender, der indbefatter skuldersektionerne (1.4), der er formet som dele af en cirkel, der er anbragt i et tværgående plan i forhold til en længdeakse af holderen (1), afbøjes, indtil kanyleafskærmningen (4) passerer skuldersektionerne (1.4), og kraven (1.2) går i indgreb med det omkredsende mellemrum til forhindring af, at sprøjten (2) bevæger sig i den distale retning (D) i forhold til sprøjteholderen (1).