Description

This invention relates to syringes having a retractable needle mount.

Preventing accidental injury and infection from used hypodermic needles has attracted considerable interest in recent years, however previous proposals to produce syringes which retract the needle into the barrel of the syringe have required inconvenient locking or disengagement steps to release the needle from its injecting position so as to allow it to be withdrawn into the barrel.

Of interest is US Patent No. 4026287 which describes an arrangement in which the plunger has a screw fitting on its forward face. When the plunger reaches its fully depressed position, it is rotated to allow the screw fitting on the plunger to engage a corresponding thread on a forward portion of the syringe barrel in which the needle is seated. After securing the needle in this fashion, the plunger is withdrawn thus severing a weakening between the barrel and the forward needle portion to allow retraction of the needle. The requirement to screw engage the plunger and needle necessitates additional hand movements while the potentially dangerous needle is still exposed and further, severing the forward needle portion from the barrel requires significant force.

Some previous proposals, for instance as shown in US Patent Nos. 4692156, 4507117 and 4804370 or PCT Publication Nos. WO89/04681 and WO89/09075 have utilized a snap connection between a fitting on the forward end of the plunger and a formation associated with the needle or its mounting. These arrangements allow engagement of the plunger and needle (mount) without a distinct locking or screwing step. However, in these arrangements the needle (mount) is adhered or force fit into sealing engagement with the barrel and force must be applied during retraction of the plunger to break this adhesive or other connection between the needle (mount) and the barrel. This is disadvantageous as not only does this rearward force need to be applied while the needle is exposed, but the engagement between the plunger and the needle (mount) must be robust enough to prevent unlocking of the needle (mount) during application of this force.

The syringes depicted in US Patent No. 4838869 and Australian Patent Application No. 28334/89 provide a more active release of the needle or its mount from the remainder of the barrel. In these syringes, the plunger, in its fully depressed position engages the forward wall of the barrel, adjacent the needle, thus breaking the adhesive or seal between the needle or its mount and the barrel allowing the needle (mount) to be retracted without applying a significant rearward force. These arrangements, however, are not amenable to easy production techniques and furthermore do not appear to be well adapted for syringes in which a removable needle is located on a needle seat of the needle mount.

The arrangement depicted in PCT Publication No. WO89/00435 also uses the downward motion of the plunger to disengage the needle from the barrel, in this case allowing it to be spring biased into a recess in the plunger. As with the syringes discussed in the immediately preceding paragraph, the arrangement shown in WO89/00435 is not amenable to easy mass production and furthermore is incapable of being used with a replaceable needle as is required, for instance, when a syringe is filled from an ampoule using a first needle but injected into a patient using a fresh sterile needle. A further disadvantage of the WO89/00435 syringe is the comparatively fragile nature of the seating of the needle in the barrel before retraction which is likely to prematurely retract the needle if the syringe is inadvertently inserted into unyielding material such as callous or muscle.

It is an object of the present invention to ameliorate some of the shortcomings evident in these previous proposals by providing a syringe in which the needle mount is automatically disengaged from the barrel and engaged by the plunger for safe retraction into the barrel. To this aim the present invention especially relates to a syringe (hereinafter referred to as "of the type described") comprising a barrel having an opening therethrough at one end, a plunger operable within the barrel and a needle mount in the opening which is prevented from displacement outwardly through the opening and has a securing portion comprising a first element of snap lock engaging means which engages a second element of the snap lock engaging means on an interior wall of the barrel to prevent withdrawal of the needle mount through the opening into the barrel, the syringe further comprising means on the plunger to disengage the snap lock engagement of the needle mount securing portion with the barrel as the plunger approaches the needle mount and cooperable means on the plunger and on the needle mount whereby the plunger is capable of engaging the disengaged needle mount for withdrawal of the needle mount into the barrel when the plunger or a portion thereof engaged with the needle mount is displaced away from said one end of the barrel.

A syringe of the type described is proposed amongst many other embodiments in Figures 7 and 8 of EP-A-321903. In this proposal the needle mount 24 is externally loaded and has an annular projection 93 which during loading must be forced over a projection 94 and a radially inwardly extending flange 95 on the interior surface 92 of a collar 8

of the barrel 4. Abutment of the projection 93 with the flange 95 is said to prevent subsequent displacement of the needle outwardly from the collar. Inwards displacement of the needle mount is prevented by detents 96 which engage ledges 104 on respective deformable detents 102 on the interior surface of the barrel, tapered surfaces 100 of the detents 96 riding over the flange 95 as the needle mount is loaded into the collar so that the detents 96 are apparently snap locked between the flange 95 and the ledges 104.

Disengagement of the needle mount detents from the ledges 104 is caused by detents 108 on the plunger 16 which deform the barrel detents 102 as the plunger is advanced in the barrel and free the detents 96 for withdrawal of the needle mount into the barrel. As the plunger is advanced further, ledges 112 on the plunger detents 108 engage ledges 98 on the needle mount detents 96 so that retraction of the plunger also acts to retract the needle mount into the barrel.

However, there are numerous obstacles to the retraction of the needle mount in the arrangement of Figures 7 and 8 of EP-A-321903. Thus, as the needle mount is retracted the annular projection 93 will catch the ledges 104 of the barrel detents 102. Furthermore, a flange 90 on the needle mount which is provided to axially locate the needle mount in the collar 8 must sequentially ride over each of the projection 94, the flange 95 and the ledges 104 before the needle can be fully retracted into the barrel. If there is any resistance by the needle mount to its retraction into the barrel, there is considerable likelihood of the detents 96 and 108 deforming, resulting in the disengagement of the ledges 98 and 112 or in the detents breaking.

It is also not possible with the arrangement of Figures 7 and 8 of EP-A-321903 to replace the needle prior to retraction of the needle mount.

In accordance with the present invention there is provided a syringe of the type described characterized in that the second element of the snap lock engaging means comprises a fixed shoulder on the interior wall of the barrel and the securing portion comprises a plurality of resilient angularly spaced arms projecting into the barrel from said one end, each arm having a respective first snap lock element on a radially outward surface thereof and being deformed by the means on the plunger to perform said disengagement, and in that a needle seat is defined on a surface of the needle mount which projects outwardly from the barrel opening whereby a needle can be engaged with and disengaged from the needle mount while the needle mount is secured within the opening.

The automatic disengagement of the needle mount securing portion from the barrel by the plunger deforming the securing portion as the syringe is emptied is particularly convenient as no additional operations need be performed to ensure such disengagement of the needle mount.

The snap lock engagement between the needle mount securing means and the barrel is advantageously configured to avoid the needle mount becoming inadvertently disengaged from the barrel even when the needle is inserted into comparatively unyielding objects. Most advantageously the first and second elements of the snap lock engaging means have cooperating surfaces oriented to prevent disengagement unless the securing means is actively deformed by the plunger. Conveniently the cooperating surfaces extend perpendicularly to the axis of the syringe.

Disengagement of the snap lock relationship between the securing portion and the interior wall of the barrel involves the deformation of the resilient angularly spaced arms of the securing portion, radially inward away from the interior wall of the barrel as the plunger descends. In one arrangement, the deforming means on the plunger is in the form of an inclined radially inwardly facing surface which bears on a projection on the securing portion during descent of the plunger thus displacing the securing portion radially inward. Alternatively, an upper surface of the securing portion engages a forward projection on the plunger defining the deforming means, the said upper surface being in the form of an inclined radially outwardly facing surface which is displaced radially inward by the projection during descent of the plunger. Conveniently the engagement surfaces on both the deforming means of the plunger and the securing portion having corresponding inclined surfaces (i.e. in the arrangements discussed immediately above the respective projections both have suitably inclined engagement surfaces).

The cooperable means on the needle mount for engaging the plunger is conveniently in the form of a catch on one or more of the arms.

The needle mount has a seat to detachably receive the needle. This may allow the same syringe to be used with more than one needle before the needle mount is withdrawn, as may occur if separate needles are used to respectively fill and discharge the syringe. Particularly where the needle mount is intended to receive a detachable needle, the engagement of the needle mount in the end of the barrel preferably resists rotation of the needle mount relative to the barrel, as could occur when locating the needle on the needle mount. This restraint could take the form of a boss projecting from one portion of the needle mount engaging a cooperating groove extending axially in an interior wall of the barrel so as to prevent rotation of the needle mount. In this arrangement, the groove allows the boss to be displaced axially during with-

drawal of the needle mount. Alternatively a projection could be disposed on the interior wall of the barrel to cooperate with a suitably shaped detent in the needle mount.

The syringe will preferably have means to prevent the plunger being entirely withdrawn from the barrel after disengagement and capture of the needle mount. Such withdrawal prevention can be provided by making the body of the plunger remote from its head of smaller cross-section than the head, and further providing a projection extending into the barrel at the handle end of the barrel to engage the wider head portion of the plunger as it approaches the handle end of the barrel.

In a preferred embodiment of the invention, the cooperation between the plunger and the needle mount is such that the needle mount, when no longer retained within said one end of the barrel is permitted to cant over whereby the tip of a needle associated with the withdrawn needle mount is capable of engaging an inwardly projecting surface of the barrel to prevent the needle re-extending through said one end of the barrel. This can be achieved by providing catch means on the securing means at the forward end of the plunger to capture the released needle mount, the respective catch means being disposed asymmetrically with respect to the axis of the syringe. Conveniently means are provided on the needle mount to assist in spring biasing the needle mount in the direction of canting.

In an alternative embodiment withdrawal of the needle mount (and an associated needle) is performed by the portion of the plunger which cooperates with the needle mount being released from a main body portion of the plunger whereupon the needle mount is retracted into the barrel by means such as a spring or vacuum within the plunger.

Additionally, or alternatively in a further embodiment, the plunger, after it has captured the needle mount and been withdrawn at least sufficiently to ensure that the syringe needle no longer projects from the exterior of the syringe, is prevented from further travel in a direction towards the forward end of the barrel. This can be achieved by providing a one-way ratchet mechanism between the plunger and barrel or a snap lock facility between the rearward end of the barrel and the shaft of the plunger adjacent its head. Such a facility may double as the above mentioned means to prevent removal of the plunger from the barrel.

Three embodiments of syringes in accordance with the invention will now be described by way of example only with reference to the accompanying not to scale, schematic drawings in which:

Figure 1 is a sectional side view of a first embodiment prior to assembly;

Figure 2 is a side view of the needle mount of Figure 1 but rotated 90°;

Figure 3 is a partial sectional side view of the assembled first embodiment as the plunger approaches the needle mount;

Figure 4 is a partial sectional view of the assembled first embodiment with the needle mount disengaged from the end of the barrel and withdrawn into the barrel;

Figure 5 is a partial sectional side view of a second embodiment having a spring loaded mechanism for withdrawing the needle mount into the body of the plunger;

Figure 6 is a partial sectional side view of the third embodiment, as the plunger approaches its fully withdrawn position;

Figure 7 is a similar view to Figure 6 but with the plunger fully withdrawn and restrained from further movement; and

Figure 8 is a sectional plan view through line A-A of Figure 7.

Referring initially to Figures 1 to 4, the first embodiment 10 of the syringe comprises a barrel 12, a plunger 14 operable within the barrel and a needle mount 16 disengageably securable within an aperture 18 at one end 20 of the barrel. As seen in Figure 3, when the needle mount is in its engaged position at the said one end 20 of the barrel, a frustoconical needle seat portion 22 extends through the aperture 18, the remainder of the needle mount being restrained from emerging out through the aperture by an annular restraining flange 24 extending inwardly from the interior of the barrel at the said one end 20 to define the rim 26 of the aperture 18. The restraining flange 24 abuts a cooperating annular shoulder 28 extending around the needle mount when the needle mount is in place within the said one end 20 of the barrel whereupon the rim 26 is in fluid tight relationship with the adjacent exterior wall 30 of the needle mount. As best seen in Figure 2, a boss 32 extends outwardly from a portion of the exterior wall 30 of the needle mount adjacent the shoulder 28 thereof. The boss 32 engages a cooperating axially extending groove 34 in the rim 26 of the aperture 18 to prevent the rotation of the needle mount relative to the barrel when in position at the said one end of the barrel.

To assemble the syringe the needle mount is inserted into the barrel from an aperture at a second end 36 of the barrel and snap locked into position at the said one end 20 of the barrel to partially extend through the aperture 18. The head 38 of the plunger is then inserted into the barrel whereupon its sealing means, in this case an O-ring seal 40, allow the plunger to be operable to expel fluid through the aperture 18. After insertion of the head of the plunger, a pair of cover plates 42

and 44 each having a respective semi-circular cutaway 46 are secured across the said second end 36 of the barrel, for instance by ultrasonic welding such that the cutaways cooperate to define an aperture of smaller diameter than the barrel with the body of the plunger extending therethrough (not depicted). Thus the cover plates prevent complete withdrawal of the plunger from the barrel as the wider head 38 of the plunger will strike the rim of the aperture defined by the cutaways 46 as the head approaches the said second end of the barrel.

The needle mount and its snap lock engagement within the barrel will now be described in greater detail. The frustoconical projection 22 which projects through the aperture 18 at the end 20 of the barrel can receive the plastic seat 47 of a hypodermic needle 48 (not depicted in Figure 1). The needle communicates with the barrel through a conduit 49 in the needle mount. The needle mount is disengageably locked within the said one end 20 of the barrel by snap lock fittings 50 and 52 each disposed on a respective resilient arm 54 or 56 integrally extending axially along the interior surface of the barrel. The snap lock fittings 50 and 52 each engage a groove 58 extending annularly around the internal surface of the barrel to lock the needle mount within the said one end 18 of the barrel. A cooperating surface 60 of each snap lock fitting is defined perpendicular to the axis of the barrel as does its cooperating shoulder 62 on the groove 58 thereby to prevent displacement of the needle mount unless the arms 54 or 56 are intentionally displaced away from the interior wall of the barrel. An opposed surface 64 of each snap lock fitting is inclined thereby to assist in inserting the needle mount into engagement at the said one end of the barrel during assembly of the syringe.

Each of the arms 54 and 56 extends beyond its respective snap lock fitting, remote from the needle mount, to define a respective inclined surface 66 or 68 each of about 40° relative to the axial direction of the barrel and facing generally towards the adjacent portion of the interior wall of the barrel.

In use, as the plunger is depressed and approaches the needle mount, an annular web 70 extending axially from the fluid contacting face of the plunger engages each inclined surface 66 and 68 of the arms 54 and 56 of the needle mount and thereby displaces the arms 54, 56 towards the interior of the barrel. This causes the snap lock fittings 50 and 52 to disengage from the groove 58, as best seen in Figure 3. The annular web 70 of the plunger has an inclined internal surface portion 74 of about 30° relative to the axial direction of the barrel to cooperate with the respective inclined surfaces 66 and 68 in displacing the arms 54 and 56.

In order to be able to retract the needle mount 16 with its attached hypodermic 48, an outward facing catch 72 is provided adjacent the free end of one of the arms extending from the needle mount. The catch 72 is gripped by a cooperating catch 75 defined by a radially extending flange 76 extending inwardly from the free end of the annular web 70 after the inclined surface portion 74 which in this embodiment is borne by the radially extending flange 76 has displaced the arms extending from the needle mount sufficiently to unlock their snap lock fittings. When the plunger is subsequently withdrawn into the barrel, the grip of the catches causes the now disengaged needle mount to also be withdrawn into the barrel.

In this embodiment 10 only a single catch 75 is provided on the needle mount, on arm 54, and therefore as the retracted needle mount clears the rim 26 of the aperture in the barrel, the needle mount cants over as shown in Figure 4, in part assisted by the spring bias of the other arm 56 which does not have a catch. When the hypodermic 48 has been entirely withdrawn into the barrel of the syringe, its sharp tip 78 will lie against the interior wall of the barrel and will thus be unable to reissue through the aperture 18 in the barrel if the plunger is re-depressed as its sharp tip is held against the barrel wall by the spring bias of arm 56.

A portion of the second embodiment 100 of the syringe is depicted in Figure 5. This embodiment employs a spring 102 disposed within the body 103 of the plunger 104 to retract the needle mount 106 and attached needle into the body of the plunger when the snap lock fittings 108, 110 of the needle mount are disengaged analogously to the embodiment of Figures 1 to 3. The only difference in the needle mount relative to the first embodiment is that a catch 112 or 114 is provided on both arms extending from the needle mount to grip a catch 116 defined by a flange 118 extending inwardly from an annular web 119 which itself extends axially from a central portion 122 of the fluid contacting surface 120 of the plunger.

Prior to retraction of the needle mount, the spring 102 is under tension and extends between a rim 121 behind the fluid contacting surface 120 of the plunger and the rear end (not shown) of the central portion 122 of the plunger. The axially extending annular web 119 to displace the arms of the needle mount is borne on the central portion 122 of the plunger. The central portion 122 is disengageably secured to the fluid contacting end 120 of the plunger by a pair of catches 124, 126 each extending from a respective axially extending arm 128 or 130 disposed on the fluid contacting surface of the plunger outwardly of the central portion 122. The catches 124, 126 each engage a respective detent on a radially outward surface of

the annular web 119.

To disengage the catches 124, 126 and allow the spring to withdraw the needle mount into the body of the plunger, an annular inclined projection 132 extends axially towards the plunger from a constricted portion 136 of the barrel adjacent its aperture end.

As the plunger approaches the needle mount, the inclined surface or projection 132 serves to displace a respective cooperating inclined surface 138 or 140 disposed at the free end of each of the arms 128, 130 which secure the central portion 122 of the plunger. As the arms 128, 130 are displaced outwardly, the catches 124, 126 disengage and the needle mount is spring retracted into the body of the plunger, after its snap lock fittings are disengaged by the action of the plunger as described for the embodiment of Figures 1 to 3, is spring retracted into the body of the plunger.

Referring now to Figures 6 to 8, a third embodiment is depicted in which the plunger, after it has captured and withdrawn the needle mount into the barrel, is locked into position in its fully withdrawn position. Locking of the plunger in this manner prevents the plunger being re-depressed to reissue the captured needle and needle mount through the forward end of the barrel. As the needle mount (and associated needle) are effectively locked at the rearward end of the syringe, it is not essential to employ the arrangement described in Figures 1 to 4 to cant the needle over after retraction. Thus the asymmetric needle mount 16 depicted in Figures 1 to 4 or the biaxially symmetric needle mount of the embodiment of Figure 5 may each be used with the plunger locking facility depicted in Figures 6 to 8.

As shown in Figures 6 to 8, the plunger may be locked in the fully withdrawn position by providing a plurality of resilient fingers 152 extending into the barrel 154 at the rearward end 156 of the barrel. In this embodiment, the shaft 158 of the plunger has a conventional X shaped profile and, as best seen in Figure 7, the fingers 152 each project between the ribs 160 defining the X profile. Each finger 152 has a securing portion 162 adhered to a respective finger tab 164 of the syringe and a snap lock portion 166 extending towards the plunger head 168 closely adjacent a respective intersection of adjacent ribs 160. Each snap lock portion 166 terminates in a snap lock head 170.

To cooperate with the snap lock fingers, the plunger adjacent its head 172 is provided with laterally extending flanges 178 each provided between adjacent ribs 160 of the shaft 158. Upon withdrawal of the plunger, the snap lock portion 166 of each finger 152 deforms around and locks a respective flange 178 to prevent redeployment of the plunger and reissue of the needle through the aperture from which it is withdrawn.

Although the syringe has been described by reference to embodiments having two arms integrally extending from the needle mount it will be readily apparent that other configurations of the securing means for the needle mount, its seating within the end of the barrel and the engagement of the plunger with the needle mount are within the scope of the invention, as defined in the claims.

Claims

1. A syringe comprising a barrel (12) having an opening (18) therethrough at one end (20), a plunger (14) operable within the barrel and a needle mount (16) in the opening which is prevented from displacement outwardly through the opening and has a securing portion (50, 52, 54, 56) comprising a first element (50, 52) of snap lock engaging means which engages a second element (58) of the snap lock engaging means on an interior wall of the barrel to prevent withdrawal of the needle mount through the opening into the barrel, the syringe further comprising means (74) on the plunger to disengage the snap lock engagement of the needle mount securing portion with the barrel as the plunger approaches the needle mount and cooperable means (75, 72) on the plunger and on the needle mount whereby the plunger is capable of engaging the disengaged needle mount for withdrawal of the needle mount into the barrel when the plunger or a portion (120) thereof engaged with the needle mount is displaced away from said one end of the barrel, characterised in that the second element (58) of the snap lock engaging means comprises a fixed shoulder (62) on the interior wall of the barrel and the securing portion comprises a plurality of resilient angularly spaced arms (54, 56) projecting into the barrel from said one end, each arm having a respective first snap lock element (50, 52) on a radially outward surface thereof and being deformed by the means (74) on the plunger to perform said disengagement, and in that a needle seat (22) is defined on a surface of the needle mount which projects outwardly from the barrel opening whereby a needle (47, 48) can be engaged with and disengaged from the needle mount while the needle mount is secured within the opening.

2. A syringe according to claim 1 wherein the deforming means (74) on the plunger is defined by a radially inwardly facing inclined surface which is adapted to cooperate with a cooperating surface (66, 68) of the securing

the annular web 119.

To disengage the catches 124, 126 and allow the spring to withdraw the needle mount into the body of the plunger, an annular inclined projection 132 extends axially towards the plunger from a constricted portion 136 of the barrel adjacent its aperture end.

As the plunger approaches the needle mount, the inclined surface or projection 132 serves to displace a respective cooperating inclined surface 138 or 140 disposed at the free end of each of the arms 128, 130 which secure the central portion 122 of the plunger. As the arms 128, 130 are displaced outwardly, the catches 124, 126 disengage and the needle mount is spring retracted into the body of the plunger, after its snap lock fittings are disengaged by the action of the plunger as described for the embodiment of Figures 1 to 3, is spring retracted into the body of the plunger.

Referring now to Figures 6 to 8, a third embodiment is depicted in which the plunger, after it has captured and withdrawn the needle mount into the barrel, is locked into position in its fully withdrawn position. Locking of the plunger in this manner prevents the plunger being re-depressed to reissue the captured needle and needle mount through the forward end of the barrel. As the needle mount (and associated needle) are effectively locked at the rearward end of the syringe, it is not essential to employ the arrangement described in Figures 1 to 4 to cant the needle over after retraction. Thus the asymmetric needle mount 16 depicted in Figures 1 to 4 or the biaxially symmetric needle mount of the embodiment of Figure 5 may each be used with the plunger locking facility depicted in Figures 6 to 8.

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To cooperate with the snap lock fingers, the plunger adjacent its head 172 is provided with laterally extending flanges 178 each provided between adjacent ribs 160 of the shaft 158. Upon withdrawal of the plunger, the snap lock portion 166 of each finger 152 deforms around and locks a respective flange 178 to prevent redeployment of the plunger and reissue of the needle through the aperture from which it is withdrawn.

Although the syringe has been described by reference to embodiments having two arms integrally extending from the needle mount it will be readily apparent that other configurations of the securing means for the needle mount, its seating within the end of the barrel and the engagement of the plunger with the needle mount are within the scope of the invention, as defined in the claims.

Claims

1. A syringe comprising a barrel (12) having an opening (18) therethrough at one end (20), a plunger (14) operable within the barrel and a needle mount (16) in the opening which is prevented from displacement outwardly through the opening and has a securing portion (50, 52, 54, 56) comprising a first element (50, 52) of snap lock engaging means which engages a second element (58) of the snap lock engaging means on an interior wall of the barrel to prevent withdrawal of the needle mount through the opening into the barrel, the syringe further comprising means (74) on the plunger to disengage the snap lock engagement of the needle mount securing portion with the barrel as the plunger approaches the needle mount and cooperable means (75, 72) on the plunger and on the needle mount whereby the plunger is capable of engaging the disengaged needle mount for withdrawal of the needle mount into the barrel when the plunger or a portion (120) thereof engaged with the needle mount is displaced away from said one end of the barrel, characterised in that the second element (58) of the snap lock engaging means comprises a fixed shoulder (62) on the interior wall of the barrel and the securing portion comprises a plurality of resilient angularly spaced arms (54, 56) projecting into the barrel from said one end, each arm having a respective first snap lock element (50, 52) on a radially outward surface thereof and being deformed by the means (74) on the plunger to perform said disengagement, and in that a needle seat (22) is defined on a surface of the needle mount which projects outwardly from the barrel opening whereby a needle (47, 48) can be engaged with and disengaged from the needle mount while the needle mount is secured within the opening.

2. A syringe according to claim 1 wherein the deforming means (74) on the plunger is defined by a radially inwardly facing inclined surface which is adapted to cooperate with a cooperating surface (66, 68) of the securing

portion to deform the securing portion radially inwardly away from the interior surface of the barrel thereby to disengage the snap lock engagement of the needle mount with the barrel.

3. A syringe according to claim 1 wherein the securing portion comprises a radially outwardly facing inclined end face which is adapted to cooperate with the deforming means on the plunger to disengage the snap lock engagement of the needle mount with the barrel.

4. A syringe according to claim 1 wherein the first and second snap lock elements (50, 52, 58) each have respective cooperating surfaces (60, 62) oriented perpendicular to the axis of the barrel.

5. A syringe according to claim 1 wherein the cooperable means (75, 72) comprises catch means (72) disposed on the securing portion to engage cooperating catch means (75) disposed on the plunger.

6. A syringe according to claim 5 wherein the catch means (75, 72) on the securing portion and/or the plunger are asymmetrically arranged relative to the axis of the barrel thereby to allow the needle mount (16) to cant within the barrel following withdrawal thereof.

7. A syringe according to claim 6 wherein the securing portion is adapted to bias the needle mount in the direction of canting.

8. A syringe according to claim 1 wherein one of the needle mount (16) and the interior surface of the barrel (12) has a projection (32) extending radially therefrom and received within an axially extending groove (34) disposed in the other of the needle mount and interior surface thereby to prevent relative rotation between the needle mount and the barrel when the needle mount is secured at said one end of the barrel.

9. A syringe according to claim 1 wherein the plunger (14) defines an axially extending cavity (122, 103) therein to receive the needle mount after its disengagement and withdrawal from the said one end of the barrel.

10. A syringe according to claim 9 wherein the portion (122) of the plunger having the cooperable means (116, 118) thereon is adapted to be disengaged from the remainder of the plunger (104) and to be withdrawn into the cavity (103) with the needle mount (106).

11. A syringe according to claim 10 wherein said portion (122) of the plunger is spring biased (102) into the cavity (103).

12. A syringe according to claim 10 wherein the said portion (122) of the plunger is snap engaged (124, 126) to the said remainder of the plunger (104) and wherein approach of the plunger towards said one end of the barrel laterally displaces a portion (128, 130) of said remainder of the plunger to disengage the snap engagement of the said portion (122).

13. A syringe according to claim 12 wherein during approach of the plunger (104) towards the said one end of the barrel the said portion of said remainder of the plunger is displaced radially outward by a radially inwardly inclined forward surface thereof (138, 140) and/or a radially outwardly inclined surface (132) disposed at the said one end and spaced from the interior wall of the barrel.

14. A syringe according to claim 1 wherein the plunger (14) after it has engaged and withdrawn the needle mount (16) into the barrel (12), is prevented from further travel in a direction towards said one end of the barrel.

15. A syringe according to claim 13 wherein means to prevent said further travel comprises a first snap lock component (166) on the barrel (154) at an opposite end (156) to said one end and a second snap lock component (178) on the plunger, said first and second snap lock components of the preventing means cooperating when the plunger (158) has withdrawn the needle mount into the barrel.

Patentansprüche

1. Spritze mit einem eine Öffnung (18) an einem Ende (20) aufweisenden Zylinder (12), einem innerhalb des Zylinders betätigbaren Kolben (14) und einer an einer Versetzung durch die Öffnung hindurch nach außen gerichtet gehinderten Nadelaufnahme (16) in der Öffnung, die einen Sicherungsabschnitt (50, 52, 54, 56) aufweist mit einem ersten Element (50, 52) eines Schnappverschluß - Eingriffsmittels, das sich im Eingriff befindet mit einem zweiten Element (58) des Schnappverschluß - Eingriffsmittels an einer inneren Wand des Zylinders zur Verhinderung des Zurückziehens der Nadelaufnahme durch die Öffnung in den Zylinder, wobei die Spritze weiterhin eine Einrichtung (74) an dem Kolben aufweist, um den Schnappverschlußeingriff des Sicherungsabschnittes der Nadelauf-

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nahme mit dem Zylinders außer Eingriff zu bringen, wenn sich der Kolben der Nadelaufnahme nähert und mit einer mitwirkenden Einrichtung (75, 72) an dem Kolben und an der Nadelaufnahme, wobei der Kolben dazu in der Lage ist, mit der sich außer Eingriff befindenden Nadelaufnahme zum Zurückziehen der Nadelaufnahme in den Zylinder in Eingriff zu kommen, wenn der Kolben oder ein Abschnitt (120) davon, der mit der Nadelaufnahme im Eingriff steht, von dem einen Ende des Zylinders weg versetzt ist, dadurch gekennzeichnet, daß das zweite Element (58) des Schnappverschluß - Eingriffsmittels eine feststehende Schulter (62) an der inneren Wand des Zylinders aufweist und der Sicherungsabschnitt eine Vielzahl von nachgiebigen winkelig beabstandeten Armen (54, 56) aufweist, die von dem einen Ende in den Zylinder hinein hervorspringen, wobei jeder Arm jeweils ein erstes Schnappverschlußelement (50, 52) an einer radial äußeren Fläche davon aufweist, das durch die Einrichtung (74) am Kolben zum Außer-Eingriff-Kommen verformt ist und daß ein Nadelsitz (22) an einer Fläche der Nadelaufnahme ausgebildet ist, der von der Öffnung des Zylinders nach außen gerichtet hervorspringt, wodurch eine Nadel (47, 48) mit der Nadelaufnahme in Eingriff und von der Nadelaufnahme außer Eingriff bringbar ist, während die Nadelaufnahme innerhalb der Öffnung festgelegt ist.

2. Spritze nach Anspruch 1, dadurch gekennzeichnet, daß die verformende Einrichtung (74) von einer radial nach innen gerichteten geneigten Fläche begrenzt ist, die ausgebildet ist zum Zusammenwirken mit einer mitwirkenden Fläche (66, 68) des Sicherungsabschnittes zur Verformung des Sicherungsabschnittes nach radial innen gerichtet, weg von der inneren Fläche des Zylinders, um dadurch den Schnappverschlußeingriff der Nadelaufnahme mit dem Zylinder außer Eingriff zu bringen.

3. Spritze nach Anspruch 1, dadurch gekennzeichnet, daß der Sicherungsabschnitt eine nach radial außen gerichtete geneigte Endfläche aufweist, die zum Zusammenwirken mit der verformenden Einrichtung an dem Kolben ausgebildet ist, um den Schnappverschlußeingriff der Nadelaufnahme mit dem Zylinder außer Eingriff zu bringen.

4. Spritze nach Anspruch 1, dadurch gekennzeichnet, daß jedes der ersten und zweiten Schnappverschlußelemente (50, 52, 58) rechtwinklig zur Achse des Zylinders ausgerichtet ist.

5. Spritze nach Anspruch 1, dadurch gekennzeichnet, daß die mitwirkende Einrichtung (75, 72) eine Fangeinrichtung (72) aufweist, die an dem Sicherungsabschnitt angeordnet ist zum Eingriff mit einer mitwirkenden Fangeinrichtung (75), die an dem Kolben angeordnet ist.

6. Spritze nach Anspruch 5, dadurch gekennzeichnet, daß die Fangeinrichtungen (75, 72) an dem Sicherungsabschnitt und/oder an dem Kolben asymmetrisch relativ zur Achse des Zylinders angeordnet sind, damit die Nadelaufnahme (16) ihrem Zurückziehen folgend innerhalb des Zylinders kippbar ist.

7. Spritze nach Anspruch 6, dadurch gekennzeichnet, daß der Sicherungsabschnitt zum Vorspannen der Nadelaufnahme in die Kipprichtung ausgebildet ist.

8. Spritze nach Anspruch 1, dadurch gekennzeichnet, daß eine der Nadelaufnahme (16) und der inneren Fläche des Zylinders (12) einen sich radial davon erstreckenden Vorsprung (32) aufweist und der innerhalb einer sich axial erstreckenden Nut (34) aufgenommen ist, die in der anderen der Nadelaufnahme und der inneren Fläche angeordnet ist, um dadurch eine relative Drehung zwischen der Nadelaufnahme und dem Zylinder zu verhindern, wenn die Nadelaufnahme an dem einen Ende des Zylinders festgelegt ist.

9. Spritze nach Anspruch 1, dadurch gekennzeichnet, daß der Kolben (14) einen sich darin axial erstreckenden Hohlraum (122, 103) begrenzt zur Aufnahme der Nadelaufnahme nach ihrem Außer-Eingriff-Kommen und ihrem Zurückziehen von dem einen Ende des Zylinders.

10. Spritze nach Anspruch 9, dadurch gekennzeichnet, daß der Abschnitt (122) des Kolbens mit der mitwirkenden Einrichtung (116, 118) darauf ausgebildet ist, vom Rest des Kolbens außer Eingriff zu kommen und mit der Nadelaufnahme (106) in den Hohlraum (103) zurückgezogen zu werden.

11. Spritze nach Anspruch 10, dadurch gekennzeichnet, daß der Abschnitt (122) des Kolbens von einer Feder in den Hohlraum (103) vorgespannt ist.

12. Spritze nach Anspruch 10, dadurch gekennzeichnet, daß der Abschnitt (122) des Kolbens im Schnappverschlußeingriff (124, 126) mit dem Rest des Kolbens (104) steht und wobei eine Annäherung des Kolbens zu dem einen

Ende des Zylinders hin einen Abschnitt (128, 130) des Restes des Kolbens seitlich versetzt, um den Schnappverschlußeingriff des Abschnitts (122) außer Eingriff zu bringen.

13. Spritze nach Anspruch 12, dadurch gekennzeichnet, daß während der Annäherung des Kolbens (104) zu dem einen Ende des Zylinders hin der Abschnitt des Restes des Kolbens von einer radial nach innen gerichtet geneigten vorderen Fläche (138, 140) und/oder einer radial nach außen gerichtet geneigten Fläche (132) radial nach außen gerichtet versetzt wird, wobei diese an dem einen Ende angeordnet und von der inneren Wand des Zylinders beabstandet ist.

14. Spritze nach Anspruch 1, dadurch gekennzeichnet, daß der Kolben (14) an einer weiteren Bewegung in eine Richtung zu dem einen Ende des Zylinders hin gehindert ist, nachdem er mit der Nadelaufnahme (16) in Eingriff gekommen ist und sie in den Zylinder (12) zurückgezogen hat.

15. Spritze nach Anspruch 13, dadurch gekennzeichnet, daß die Einrichtung zur Verhinderung der weiteren Bewegung ein erstes Schnappverschluß - Bauteil (166) an dem Zylinder (154) an einem dem einen Ende gegenüberliegenden Ende (156) aufweist und ein zweites Schnappverschluß - Bauteil (178) an dem Kolben, wobei die ersten und zweiten Schnappverschluß - Bauteile der Einrichtung zur Verhinderung zusammenwirken, wenn der Kolben (158) die Nadelaufnahme in den Zylinder zurückgezogen hat.

Revendications

1. Seringue comprenant un cylindre (12) ayant une ouverture (18) qui le traverse à une première extrémité (20), un plongeur (14) qui travaille dans le cylindre, et une monture (16) d'aiguille placée dans l'ouverture et qui ne peut pas se déplacer vers l'extérieur, par l'ouverture, et possède une partie de fixation (50, 52, 54, 56) qui comporte un premier élément (50, 52) d'un dispositif de coopération par blocage élastique qui est en coopération avec un second élément (58) du dispositif de coopération par blocage élastique sur une paroi interne du cylindre de manière que la monture d'aiguille ne puisse pas être retirée par l'ouverture formée dans le cylindre, la seringue comprenant en outre un dispositif (74) placé sur le plongeur et destiné à supprimer la coopération par blocage élastique de la partie de fixation de monture d'aiguille avec le cylindre lorsque le plongeur se rapproche de la monture d'aiguille et des dispositifs de coopération (75, 72) placés sur le plongeur et sur la monture d'aiguille de manière que le plongeur puisse coopérer avec la monture d'aiguille qui a été séparée et que celle-ci puisse être retirée dans le cylindre lorsque le plongeur ou une partie (120) de celui-ci qui est en coopération avec la monture d'aiguille est écarté de la première extrémité du cylindre, caractérisée en ce que le second élément (58) du dispositif de coopération par blocage élastique comporte un épaulement fixe (62) placé à la paroi interne du cylindre et la partie de fixation comprend plusieurs bras élastiques (54, 56) qui sont espacés angulairement et dépassent dans le cylindre depuis la première extrémité, chaque bras ayant un premier élément respectif (50, 52) de blocage élastique à une surface radialement externe et étant déformé par le dispositif (74) placé sur le plongeur pour assurer cette séparation, et en ce qu'un siège (22) d'aiguille est délimité sur une surface de la monture d'aiguille qui dépasse à l'extérieur de l'ouverture du cylindre, si bien qu'une aiguille (47, 48) peut être mise en coopération avec la monture d'aiguille et séparée de celle-ci lorsque la monture d'aiguille est fixée dans l'ouverture.

2. Seringue selon la revendication 1, dans laquelle le dispositif de déformation (74) placé sur le plongeur est délimité par une surface inclinée tournée radialement vers l'intérieur, destinée à coopérer avec une surface de coopération (66, 68) de la partie de fixation pour la déformation de cette partie de fixation radialement vers l'intérieur à distance de la surface interne du cylindre, si bien que la coopération par blocage élastique de la monture d'aiguille avec le cylindre est supprimée.

3. Seringue selon la revendication 1, dans laquelle la partie de fixation comporte une face d'extrémité inclinée, tournée radialement vers l'extérieur et qui est destinée à coopérer avec le dispositif de déformation formé sur le plongeur pour la suppression de la coopération par blocage élastique de la monture d'aiguille avec le cylindre.

4. Seringue selon la revendication 1, dans laquelle le premier et le second élément de blocage élastique (50, 52, 58) ont chacun des surfaces coopérantes respectives (60, 62) d'orientation perpendiculaire à l'axe du cylindre.

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5. Seringue selon la revendication 1, dans laquelle le dispositif de coopération (75, 72) comporte un dispositif à bec (72) placé sur la partie de fixation et destiné à coopérer avec un dispositif à bec coopérant (75) disposé sur le plongeur.

6. Seringue selon la revendication 5, dans laquelle les dispositifs à bec (75, 72) de la partie de fixation et/ou du plongeur sont disposés asymétriquement par rapport à l'axe du cylindre et permettent ainsi à la monture d'aiguille (16) de s'incliner à l'intérieur du cylindre après son extraction.

7. Seringue selon la revendication 6, dans laquelle la partie de fixation est destinée à rappeler la monture d'aiguille dans le sens de son inclinaison.

8. Seringue selon la revendication 1, dans laquelle la monture d'aiguille (16) ou la surface interne du cylindre (12) porte une saillie (32) dépassant radialement et logée dans une gorge axiale (34) disposée dans la surface interne ou la monture d'aiguille respectivement et empêchant ainsi la rotation relative de la monture d'aiguille et du cylindre lorsque la monture d'aiguille est fixée à la première extrémité du cylindre.

9. Seringue selon la revendication 1, dans laquelle le plongeur (14) délimite une cavité axiale (122, 103) pour le logement de la monture d'aiguille après sa séparation et son extraction de la première extrémité du cylindre.

10. Seringue selon la revendication 9, dans laquelle la partie (122) du plongeur ayant les dispositifs coopérants (116, 118) est destinée à se séparer du reste du plongeur (104) et a être retirée dans la cavité (103) avec la monture d'aiguille (106).

11. Seringue selon la revendication 10, dans laquelle ladite partie (122) du plongeur est rappelée élastiquement (102) dans la cavité (103).

12. Seringue selon la revendication 10, dans laquelle ladite partie (122) du plongeur coopère élastiquement (124, 126) avec le reste du plongeur (104), et dans laquelle le rapprochement du plongeur vers la première extrémité du cylindre provoque un déplacement latéral d'une partie (128, 130) de ce reste du plongeur afin que la coopération élastique de ladite partie (122) du plongeur soit supprimée.

13. Seringue selon la revendication 12, dans laquelle, lorsque le plongeur (104) se rapproche de la première extrémité du cylindre, ladite partie du reste du plongeur est déplacée radialement vers l'extérieur par une surface avant inclinée radialement vers l'intérieur (138, 140) et/ou une surface inclinée radialement vers l'extérieur (132) placée à la première extrémité et séparée de la paroi interne du cylindre.

14. Seringue selon la revendication 1, dans laquelle le plongeur (14), après sa mise en coopération avec la monture d'aiguille (16) et l'extraction de celle-ci dans le cylindre (12), ne peut pas présenter un déplacement supplémentaire vers la première extrémité du cylindre.

15. Seringue selon la revendication 13, dans laquelle le dispositif destiné à empêcher ce déplacement supplémentaire comporte un premier élément (166) de blocage élastique placé sur le cylindre (154) à une extrémité (156) opposée à la première extrémité, et un second élément (178) de blocage élastique placé sur le plongeur, le premier et le second élément de blocage élastique du dispositif destiné à empêcher le déplacement coopérant lorsque le plongeur (158) a retiré la monture d'aiguille à l'intérieur du cylindre.