Description

This invention relates to syringes and, in particular, to a syringe having a retractable needle guard primarily for the purpose of preventing accidental needle sticks.

Background of the Invention

Most syringes used today for medical or laboratory purposes are sold as disposable items intended to be used only once. Disposal of such syringes poses a potential safety hazard for the individuals who use the syringes as well as for those who dispose of them. With the onset of AIDS, the concern for infection due to accidental needle sticks from used syringes has increased and a number of different devices have been proposed to minimize the possibility of spreading infectious disease due to accidents of this type.

One approach to this problem is to provide a retractable shield which, after the syringe has been used, can be pulled to an extended position where it covers the needle, making it difficult for an individual to accidentally contact the needle. A common feature of such constructions is that when the shield is pulled to its extended position, it is locked so that it cannot be retracted (thus exposing the needle) except by the application of extraordinary force to the shield.

A number of such constructions have been proposed to satisfy the general requirement that the needle be permanently covered after the syringe has been used. Some of these constructions involve twist-to-lock mechanisms and, in others, locking occurs automatically when the shield is fully extended. These known devices satisfy many of the functional requirements of a needle shield but require, in many cases, modification of the standard syringe construction. This is highly undesirable for many syringe manufacturers because of the sizable investment they may have already made in their existing molding equipment for producing the syringes.

Moreover, certain operational problems arise when a shield is incorporated into a syringe. For example, since the shield, when it is retracted, essentially covers the barrel of the syringe, it is desirable to be able to insert and remove a needle while holding onto the shield alone. This involves twisting and pushing (or pulling) the needle to place it on (or remove it from) the liner and can be awkward with some known constructions.

Further, constructions have been proposed which include an opening or slot in the side of the shield. This is undesirable because the needle can extend through the opening if the shield is deflected in the extended position.

Those devices which lock in response to axial movement to the extended position, (i.e., without any rotation) also have certain inherent drawbacks. The major drawback to this type of device is that the incidence of unintentional and irreversible locking is greater with such devices than with those devices which require rotation to lock.

Other proposed devices have included open ended shields which may not block access to the needle point by small fingers.

US-A-4631057 discloses a needle guard for a hypodermic syringe, the guard being extendable to shield a needle of the syringe and being permanently lockable in the extended condition by relative axial movement between the guard and the syringe barrel.

US-A-4702738 discloses a needle guard for a hypodermic syringe, the guard being extendable to cover a needle of the syringe and being both temporarily lockable and permanently lockable in the extended condition by relative axial movement between the guard and the syringe barrel.

Both of the above-mentioned devices rely on relative axial movement to both extend the guard, and to permanently lock the guard in the extended condition; both are thus susceptible of inadvertently being locked as mentioned above.

Accordingly, it is an object of this invention to provide a protective shield of the type described which can be added at minimal expense to standard syringes.

Another object of the invention is to provide a relatively inexpensive protective shield which satisfies the functional requirements of a needle shield and includes none of the drawbacks mentioned above.

Another object is to provide an extendable needle shield for a syringe which performs all of the necessary functions of such a shield and which is particularly well suited to an automated process of manufacture.

A further object of the invention is to provide an extendable needle shield for a standard syringe which is improved both from the points of view of functional utility and cost of manufacture.

A still further object is to provide an inexpensive method of assembling a protective shield and syringe.

According to the invention there is provided a needle shielding device for use with a medical or scientific device incorporating a barrel having a proximal end and a distal end to which a needle may be attached in use, the device comprising:

a collar for said barrel and including a first locking member on the outer surface thereof, and

a cylindrical needle shield adapted to be mounted co-axially about a said barrel and axially movable in use over said barrel and collar between

a retracted position in which a needle would be in use exposed and an extended position in which the shield would cover the needle, said shield including on its interior surface a second locking member adapted to slide in a path outside said first locking member, characterised in that said second locking member is rotatable into engagement with said first locking member when said shield is in its extended position thereby to lock the shield against retraction.

In one embodiment, the shield has an opening along its side wall near its distal end. A trigger member is positioned within this side wall opening and pivotally connected to the shield by a flexible hinge. The trigger member is movable from an outward position to an inward position and is shaped so that when it is in the inward position it substantially covers the distal end opening. A locking means is provided for locking the trigger member in the inward position. The locking means is provided for selectively covering the side wall opening so that the needle becomes completely surrounded and protected.

The invention also provides a method of assembling a needle shielding device according to the invention with a barrel, in particular a syringe barrel.

Other aspects of the invention will be apparent from the Claims appended hereto.

Other benefits and embodiments of the present invention are set forth below in the detailed description which follows:

In the Drawings

Fig. 1 is a side elevational view, partly in section, showing a needle shield and collar in accordance with a preferred embodiment of the invention secured to a conventional syringe with the shield in its retracted position;

Fig. 2 is an enlarged sectional view with the shield in cross-section in its extended position;

Fig. 3 is a further enlarged partial side sectional view showing details of the collar and shield;

Fig. 4 is a sectional view along the line 4-4 of Fig. 2 with the shield pulled to its extended position but before rotation;

Fig. 5 is a sectional view along the line 4-4 of Fig. 2 showing the shield rotated into its locked position;

Fig. 6 is a perspective view of a preferred embodiment of the collar;

Fig. 7 is a perspective view of an alternative embodiment of the collar;

Fig. 9 is a side sectional view showing the shield in its extended position;

Fig. 8 is a top sectional view showing a collar construction for use with a large diameter barrel;

Fig. 10 is a perspective view showing a needle shield and a collar according to a second embodiment of the invention secured to a conventional syringe with the shield in its retracted position;

Fig. 11 is a sectional view of the shield according to a further embodiment of the invention with the shield in its extended position;

Fig. 12 is a partial perspective view of the shield of the embodiment illustrated in Fig. 11;

Fig. 13 is a side view, partly in section, showing the needle shield and collar according to the embodiment illustrated in Fig. 11 with the shield in its retracted position;

Fig. 14 is a perspective view showing the details of the collar of the embodiment illustrated in Fig. 11, with part of a shield, shown in phantom, in its retracted position and without the locking tab;

Fig. 15 is a perspective view of the collar according to the embodiment illustrated in Fig. 11 with part of the shield, shown in phantom in its extended, but unlocked, position;

Fig. 16 is a perspective view of the collar according to the embodiment illustrated in Fig. 11 showing part of the shield (in phantom), in its extended and locked position;

Fig. 17 is a sectional view of the embodiment illustrated in Fig. 11 taken generally along line 17-17 of Fig. 13 with the shield pulled to its extended position but before rotation in accordance with the third embodiment;

Fig. 18 is a sectional view of the embodiment illustrated in Fig. 11 taken generally along the line 18-18 of Fig. 13 showing the shield rotated into its locked position in accordance with the third embodiment;

Fig. 19 is an enlarged partial perspective sectional view showing the details of a locking mechanism and a shield according to a further embodiment of the invention;

Figs. 20a, 20b and 20c are sectional views of the shield according to a further embodiment of the invention illustrated in Fig. 19 showing the sequence for locking the shield in its extended position;

Fig. 21 is an enlarged partial side sectional view along the line 21-21 of Fig. 20c showing the shield in its locked position according to the embodiment of the invention illustrated in Fig. 19;

Fig. 22 is an enlarged partial top sectional view showing the details of a locking mechanism of a shield according to a further embodiment of the invention;

Fig. 23 is a sectional view taken generally along the line 23-23 of Fig. 22;

Fig. 24 is an enlarged partial side sectional view showing the details of the locking mechanism

and a collar according to the embodiment of the invention illustrated in Fig. 22 with the shield in its extended but unlocked position; and
Fig. 25 is an enlarged partial side sectional view showing the details of the locking mechanism and the collar according to the embodiment of the invention illustrated in Fig. 22 with the shield in its extended and locked position.

Detailed Description of the Invention

In its preferred embodiment, the invention is intended to be used in conjunction with a conventional syringe; however, a protective shield in accordance with the invention may be modified for use with nearly any medical or laboratory device having a needle, such as a blood collection tube holder with a double ended needle without departing from the contemplated scope of the present invention. Accordingly, the invention is applicable to any medical or scientific device including a barrel and a needle wherein it is desired to protect a user from accidental needle sticks.

In describing the invention, the "distal end" or "forward end" of a part refers to the end of the part closest to the needle point. The "proximal end" of a part refers to the end of the part furthest from the needle point.

Figs. 1-6 show a conventional syringe comprising a tubular barrel 10 having a finger flange 11, a plunger 12 slidable within the barrel 10, and a needle assembly through which the contents of the barrel are dispensed when the plunger 12 is depressed. The barrel 10 may be tapered very slightly (not shown) from a larger diameter proximal end to a smaller diameter distal end for primarily molding purposes. The needle assembly comprises a needle 14 and a hub 16 at the proximal end of the needle. As is standard, a conically shaped luer tip 17 and luer lock skirt 18 are integrally formed at the distal end of the barrel 10 with the luer lock skirt 18 encircling the luer tip 17. The interior surface of the luer lock skirt 18 may include an internal thread 18A adapted to threadably engage complementary locking ears 16A on the needle hub 16. The exterior surface of luer lock skirt 18 may include a multiplicity of ribs 19 parallel to the central axis of the barrel 10.

A needle sheath 20 covers the needle 14 as a protective device. The needle sheath 20 frictionally engages the hub 16 and can be used to disconnect the needle assembly from the luer lock skirt 18 in a conventional fashion.

The construction as so far described is that of a standard disposable syringe and forms no part of the invention.

The collar employed in accordance with the preferred embodiment of the invention is shown generally at 22 (Figs. 2 and 6). As mentioned above, although collar 22 is shown as a separate piece made of differing materials, it is anticipated that the collar (or its functional equivalent) may be integrally formed as a part of the barrel 10 without substantial modification of the present invention. In this embodiment, the collar 22 includes six equally spaced and integrally formed identical triangular protrusions 24, with the apex of each protrusion extending away from the needle. Keyways 25 are formed between each adjacent pair of protrusions 24.

The triangular protrusions 24 each include angled surfaces 24A and 24B, side surfaces 25C, a slot 26 and a stop surface 27 which is generally circumferential and functions as a stop for the keys as further described below. The slot 26 includes an inwardly sloped distal surface 26A. It is not absolutely necessary that the protrusions 24 be triangular in shape and it is anticipated that other configurations may be used to guide the keys into the keyways during the assembly process as described below. The slot 26 is formed in protrusion 24 for retaining the detent 50 therein when the shield 40 is in the retracted position, as explained below. At the distal end of each protrusion 24, two walls 28 and 30 extend toward the needle. A rectangular locking slot 31 is formed between each pair of walls 28 and 30, which are ramp shaped in cross section as shown most clearly in Figs. 4 and 5. As shown in Figs. 3, 4 and 5, the surface of locking slot 31 is slightly elevated relative to the level of the keyways, i.e., the barrel diameter at the locking slots 31 is slightly greater than the barrel diameter at the keyways. The slight increase in the collar diameter at the locking slots removes some of the slack between the needle shield (described below) and the collar 22 resulting from the slight lengthwise taper of the barrel 10 in the preferred embodiment. This prevents or at least minimizes wobble or play of the shield when it is locked in the extended position. A spherical detent 32 is positioned between each pair of triangular protrusions 24 with the distal edge of the detents 32 lying just in front of the bases of triangular projections 24.

As shown most clearly in Fig. 3, the proximal end of collar 22 includes a peripheral rigid internal tooth 34 adapted to engage the ribs 19 in the luer lock skirt 18 and retain the collar 22 on the syringe. Collar 22 is molded of a rigid plastic material such as polycarbonate resin so that when the collar is pushed over the luer lock skirt 18, the angled surface of the rigid tooth 34 allows the tooth to move over the ribs 19 until the proximal end of the collar is seated adjacent to the distal end of the barrel with the rigid tooth 34 deforming the ribs 19 of the luer lock skirt 18 to permanently retain the collar in place on the syringe barrel 10. As an

alternative, a circumferential groove may be formed in the outer surface of the luer lock skirt 18 to receive the peripheral tooth 34 of the collar 22 therein. This is unnecessary in the preferred embodiment in which the yieldable ribs 19 cold flow into the configuration shown in Fig. 3 but may be desirable in the case of syringes which do not include ribs molded on the exterior surface of the luer lock skirt. Instead of mechanically interlocking the collar 22 and barrel 10, other fastening means such as ultrasonic welding or adhesives may be used within the scope of the invention, although such techniques are generally disadvantageous because of the additional steps involved and other problems which may arise with the preferred assembly techniques. The diameter of collar 22 as measured in the area of the keyways 25 is greater than the outer diameter of the syringe barrel 10 adjacent to the collar 22.

The rigid tooth 34 will bite sufficiently into the outer surface of the luer skirt 18 to prevent axial movement of collar 22 but in some cases slight rotation of the collar may occur. To prevent this, the tooth 34 may be formed with gaps (not shown) so that not all of the ribs 19 on the outside of the luer lock skirt 18 will be deformed. The non-deformed ribs 19 will fall into the gaps of the tooth 34 resist rotation of the collar 22 relative to barrel 10. Alternatively, as shown in Figs. 7 and 8, the inner surface of collar 22 may be provided with lugs 35 molded on the inside of the collar and adapted to fit between the ribs 19 on the outside of the luer lock skirt 18 to prevent any rotational movement with the meshed ribs 19.

The needle shield 40 comprises an elongated plastic cylinder (e.g., made of polypropylene) having three keys 42 integrally formed on its interior surface. An end rim 44 is formed at the proximal end of shield 40. As shown in Fig. 2, the end rim 44 is adapted to abut against the proximal end of collar 22 to limit the distal movement of the shield 40. Each of the keys 42 includes a distal triangular point 46 and extends from the distal end of the shield to a location just short of the distal point of the triangular protrusions 24 on collar 22 when the shield is in the extended position as shown in Fig. 2. The end rim 44 includes three cutout sections 45 which align with each of the keys 42. The cutout sections 45 facilitate the process for molding keys 42 but serve no functional purpose after the device has been assembled. At their proximal ends, the keys 42 terminate in flat end surfaces 48. With the three keys 42 in the keyways 25 in the retracted position (Fig. 1), rotational movement of the shield 40 is prevented by contact between the edges of keys 42 against the side surfaces 24C of protrusions 24; therefore, torque can be applied to the needle while holding shield 40 to thread (or unthread) needles onto (or from) the syringe without having to grasp the barrel 10. This cannot be done with constructions in which a shield rotates freely with respect to the syringe.

Three detents 50 are also formed on the inner surface of the shield 40 toward its distal end. These detents 50 may be equally spaced and are adapted to be received within the slots 26 in the triangular protrusions 24 to releasably retain the shield 40 in its retracted position (Fig. 1). In the preferred embodiment, as shown in the drawings, the detents 50 are preferably spaced approximately thirty degrees from an adjacent key 42. Each of the detents 50 includes a sloped distal surface 50A and a proximal surface 50B more gradually sloped than distal surface 50A.

In the retracted position, the distal end of shield 40 terminates at the same point as the distal end of collar 22. An end cap 52 (see Fig. 2) is placed on the distal end of the shield 40. Cap 52 is molded from a resilient plastic material (such as polyallomer) and includes a side wall 53 and an end wall 54 which is adapted to be positioned between the distal end of collar 22 and the proximal end of the needle sheath 20 (Fig. 1) for substantially closing the distal end of shield 40. Side wall 53 is shaped as shown so that end cap 52 can be retained on shield 40 by the interlocking mechanical engagement of the side wall 53 and a complementary projection 55 at the distal end of shield 40.

The end wall 54 includes a central needle aperture which is made small enough that the end of shield 40 is closed to the maximum extent while allowing the locking ears 16A of needle hub 16 to be extended through the aperture to permit needles to be mounted and removed while the shield 40 is in its retracted position. The aperture is not, however, large enough to allow the proximal end of the needle sheath 20 to pass through it. The use of the smaller sized needle aperture reduces the likelihood that a child or person with small fingers may accidentally contact the needle point. The end cap 52 also makes the distal end of shield 40 more rigid and resistive to deformation when dropped or otherwise impacted upon a hard surface.

In addition, the rim 54 and its position between the proximal end of needle sheath 20 and the distal end of barrel 10 serves a functional purpose when removing or installing needles on the luer tip 17, for example, in a situation where the filling and injection needles are different. When a needle is to be mounted on the syringe, the syringe is held by shield 40 with the shield 40 in the retracted position. Needle hub 16, which projects from the proximal end of the protective sheath 20, is inserted through the aperture in the end wall 54 and the needle hub 16 is telescoped onto the luer tip 17.

Using the conventional cooperative wrenching tabs (not numbered) of the sheath and needle, the needle hub 16 is rotated by twisting and pushing with the sheath to thread the locking tabs 16A within the internal threads 18A in the luer skirt 18 until needle 14 is mounted on the syringe. As hub 16 is threaded onto the luer tip 17, the needle moves axially relative to sheath 20. The shield 40 is prevented from rotating by the abutment of keys 42 against the side surfaces 24C of protrusions 24, while the rim 54 provides a surface against which the needle sheath 20 can be forced. Without this feature, the user could not grasp the shield alone when installing and removing the needle since the force exerted by the needle hub 16 on the syringe luer tip would push the syringe out of the shield. This would mean that the user would have to remember to grasp the barrel 10 and not the shield 40 when removing or attaching the needle 15.

The end wall 54 is particularly important when the invention is used in conjunction with large diameter syringe barrels. The preferred type of construction for the larger diameter syringe barrels is shown in Figs. 8 and 9 wherein like numerals are used to identify parts similar to those shown in the embodiment of Figs. 1-6. In Figs. 8 and 9 the needle 15 and hub 16 are the same as in Fig. 1 as is the luer tip 17 and the luer lock skirt 18. In this embodiment, however, the collar 122 includes two concentric sleeves 124 and 126 supported by an annular strut 128 forming an I-beam in cross-section as shown in Fig. 9. The end cap 152 includes side wall 153 and end wall 154 which, as shown, covers a substantial portion of the barrel opening and thus greatly reduces the risk of accidental needle stick when the shield is in its extended position.

The device is preferably assembled as follows. Shield 40 is inserted on the distal end of the barrel 10 of an assembled syringe and moved to the retracted position shown in Fig. 1 (with the needle 14 and sheath 20 removed). With the shield 40 held in the retracted position, the collar 22 is placed over the luer lock skirt 18 and inside of the shield 40. As the triangular protrusions 24 on collar 22 contact the triangular points 46 at the end of keys 42 on shield 40, the collar 22 is pushed onto the luer lock skirt 18 causing the shield 40 to rotate until the keys 46 are positioned in the keyways over the detents 32 located between the adjacent triangular protrusions 24. The collar 22 is then pushed inwardly until the proximal end of the collar 22 butts up against the distal face 36 on the syringe barrel. In this position, as shown in Fig. 3, the three detents 50 are seated in the slots 26 of three of the protrusions 24. After the shield 40 and collar 22 have been assembled on the syringe, the end cap 52 is placed on the shield 40. Finally, the needle 14 with its sheath 20 may then be attached to the luer tip 17 to complete the assembly of the present invention.

Alternatively, the collar 22 may initially be positioned within shield 40 with the keys 42 positioned in the appropriate keyways 25. The shield 40 and collar 22 may then be telescoped together over the syringe barrel 10 with the collar 22 being forced onto the luer lock skirt 18 as the shield 40 is moved to the retracted position wherein the proximal end of the collar 22 abuts against the distal face 36 of the syringe barrel 10. Additionally, it is anticipated the alternative assembly method may be used with an open shield wherein the end cap 52 may be placed on the shield after assembly.

The syringe of the present invention may be used in a conventional manner. The needle sheath 20 is removed from the needle 14 and the medication is drawn into barrel 10 by withdrawing the plunger 12 from the distal end of the syringe while the shield is in its retracted position as shown in Fig. 1. After the contents of the syringe have been injected into the patient, the shield 40 is pulled distally into the extended position as shown in Fig. 2. When this happens, the keys 42 slide in the keyways 25 over the spherical detents 32 between the adjacent protrusions 24 on collar 22 (Fig. 4) and the distal surfaces 50A of the detents 50 on the shield 40 slide onto the surfaces 26A of slots 26. The user can feel the end surfaces 48 of keys 42 clearing the spherical detents 32, which signals that the shield 40 is fully extended.

To lock the shield irreversibly in the extended position, the user rotates the shield 40 to cause the keys 42 to move over the adjacent ramp surfaces 28 (or 30) until the keys fall into the locking slots 31 formed between each pair of ramps 28 and 30 (see Fig. 5). Because of the arrangement of the ramps 28 and 30, the shield can be locked by rotating it either clockwise or counterclockwise. When the keys 42 are positioned in the locking slots 31, the proximal edge 48 of each key abuts against the squared off stop surface 27 of one of the triangular protrusions 24 so that the shield 40 cannot be returned to its retracted position without the application of excessive force to the shield 40. Because of the interlocking relationship between the square key 42 and the locking slots 31, the shield 40 can no longer be rotated and, accordingly, the shield is permanently locked in the extended position.

In certain situations, it may be desirable to extend the shield 40 to the position shown in Fig. 2 without locking it in place. For example, if a syringe is to be filled at a location remote from the patient, rather than replacing the sheath 20 after the syringe is filled, it is preferable to extend shield 40 so that it functions as a temporary protective element

while the syringe is carried to the patient. The use of the protective shield 40 in this fashion is facilitated by the spherical detents 32 on the collar 22. These spherical detents 32 are positioned in each of the keyways 25 between the triangular protrusions 24 so that when the shield 40 is pulled to its extended position (Fig. 2), the flat end surface 48 of each of the keys 42 abut against one of the spherical detents 32. This prevents the shield 40, when it is in its extended position, from being retracted unless sufficient force is applied to move the keys 42 over the spherical detents 32. Hence, in this situation, the shield 40 is first extended as a temporary sheath for the needle and then returned to its retracted position for administration of the patient's injection. Once the injection has been administered, the shield may again be extended and then locked by rotation so that the shield cannot be retracted. If it is desired to return the shield 40 to its retracted position rather than locking the shield in its extended position, the gradual slope of surface 50B of detent 50 allows the detent to be pushed over the squared off stop surface 27 prior to returning the shield to its fully retracted position.

A further embodiment of the present invention is shown in Figs. 10 through 18. In this embodiment, an L-shaped trigger member 56 is incorporated on the distal or needle end of the shield 40. The longitudinal portion 58 of the L-shape formed by the trigger member 56 is preferably curved to follow the contours of the shield 40. The trigger member 56 is attached to the shield 40 by a hinge web 60 so that a transverse portion 62 of the L-shape formed by the trigger member 56 extends perpendicularly outward from shield 40. The trigger member 56 is preferably incorporated with the mold of shield 40 and preferably includes a hinge web 60 which is essentially a smaller width extension of the longitudinal portion 58 of the trigger member 56. The material used to make shield 40 is resilient so that the trigger member 56 can be moved following an arc centered around the hinge web 60, without damage, from an initial rest position where the longitudinal portion 58 of the trigger member 56 aligns with the walls of shield 40, to either an inner position or an outer position by rotating the trigger member 56 in an inward or an outward direction, with respect to the shield 40. An inward direction is the direction defined when the longitudinal portion 58 of the trigger member 56 is moved around the hinge web 60 into the interior of the shield 40. An outward direction is defined when the longitudinal portion 58 of trigger member 56 is moved around the hinge web 60 outside of the shield 40. Fig. 11 shows the relative position of the trigger member 56 and shield 40 with the trigger member 56 in the outward position after the latch 70 has released the collar retaining ridge 72.

An end flange 64 projects radially outward around the perimeter of the shield 40 at its distal end. An extension 63 of this end flange 64 projects further from the surface of the shield 40 just below and preferably parallel to the transverse portion 62 of the trigger member 56 in its rest position so that a stop point is established to limit the outward movement of the trigger member 56. A pair of recesses (detents) 66 are disposed along the inside wall of shield 40 across from the hinge web 60. The recesses 66 limit the inward movement of the trigger member 56, as further described below. A pair of locking ears 68 are located at the top of the longitudinal portion 58 of the trigger member 56 and are aligned with the recesses 66. The overall length of the longitudinal portion 58 of trigger member 56, including the locking ears 68, is slightly longer than the inner diameter of the shield 40 measured from the hinge web 60 to the recesses 66. When the longitudinal portion 58 of the trigger member 56 moves inwardly to a horizontal (completely inward) position and extends across the needle end of shield 40, the locking ears 68 of the longitudinal portion 58 engage the recesses 66 on the inner surface of the shield 40. The locking ears 68 and the recesses 66 are shaped so that engagement of the ears 68 with the recesses 66 provides an irreversibly locked arrangement which prevents any outward or further inward movement of the trigger member 56.

The trigger member 56 is locked in an extreme inward position so that the normally open needle end of the shield 40 is covered by the locked longitudinal portion 58 of trigger member 56. This locked portion covers the normally open needle end of the shield 40 to prevent accidental or intentional contact with the needle tip through the open end of the shield. An opening 69 is created in the side of the shield 40 after the longitudinal portion 58 of the trigger member 56 has been moved inwardly to its locked extreme. This opening 69 is then blocked by the transverse portion 62 of the trigger member 56 when it is moved to an axial position and lies within the opening 69 in the shield 40. The now axial transverse portion 62 aligns with the contours of shield 40 and substantially protects and prevents the user from contacting the needle tip through the opening 69 which is temporarily uncovered by the relocated longitudinal portion 58.

When trigger member 56 is in its initial position with the longitudinal portion 58 following the contours of shield 40 and shield 40 is in its fully retracted position as shown in Fig. 10, latch 70 engages with a collar retaining ridge 72 shown in Fig. 13 to prevent movement of the shield 40 with respect to the syringe barrel 10. It is readily anticipated that the trigger member 56 of the present

embodiment is readily adaptable for use with any of the preferred shield locking mechanisms described herein and represents an additional means for protecting the open end of the shield.

The shield 40 can be slid to its extended position once the latch 70 is released from engagement with the collar retaining ridge 72. Outward movement by the trigger member 56 disengages the latch 70 from the retaining ridge 72 of the collar 22 and allows the shield 40 to be slid into its extended position, as shown in Fig. 11. Outward movement of the trigger member 58 is achieved by pressing the transverse portion 62 down until it is stopped by the extension 63 of the end flange 64. If the shield 40 is to be kept in its fully extended position after the injection has been given, the trigger member 58 can than be moved inwardly to its extreme inward position so that the locking ears 68 engages the recesses 66, as described above. The syringe 10 can now be discarded in a conventional manner with the contaminated needle fully protected by the locked shield 40 and the locked trigger member 56.

Fig. 12 generally illustrates the preferred form of the shield 40 which may be used individually or with the trigger member 56 wherein the shield 40 may be locked in the extended position and the trigger member 56 will be spaced apart from the distal end of the needle to prevent access to the needle through the open end of the shield 40.

Figs. 14 through 18 further illustrate the shield locking arrangement located on the collar 22 in accordance with the present invention. Formed onto the surface of the collar 22 are several operational members which are described in detail below. Along the inside wall of the shield 40 lies a key 42, a locking tab 82, and a securing block 76. The key 42 follows a longitudinal path parallel to the needle along the inside wall of the shield and guides the shield 40 as it slides along the collar 22. The key 42 prevents rotation of the shield 40 relative to the syringe barrel 10 (including the collar) until the shield 40 is in its fully extended position. The key 42 slides in a key channel 74 provided in the surface of the collar 22 which is preferably located near the proximal end of the collar 22. A key block 73 lies adjacent to the key channel 74 near the proximal end of the collar 22 and supports the shield 40 as it is slid past the collar 22 and also forms a stop point for the key 42 to prevent proximal movement of the shield 40 when the shield is locked in the extended position as described further below (the term "locked" is used herein with respect to the shield 40 to describe the prevention of further linear or rotational movement between the shield 40 and the collar 22).

In this embodiment, the shield 40 cannot be rotated during its travel to the fully extended position along the collar until the shield 40 has reached the fully extended position due to sliding contact between the key 42 and the key channel 74 of the collar 22. The length of the key 42 is shorter than the length of the shield 40 so that the proximal end of the key exits the key channel 74 only when the shield 40 is fully extended. When this occurs, the shield 40 is no longer guided by the key 42 engagement with the key channel 74 and is free to rotate with respect to the collar 22 and the syringe barrel 10.

A locking recess 78 is located adjacent to the key channel 74 and a ramp 80 and an entry channel 84 are located near the proximal end of the collar 22. The relative positions of the key 42, the locking tab 82 and the securing block 76 along the inside wall of the shield 40 and the positions of the key channel 74, the key block 73 and the locking recess 78 dictate the locking sequence for locking the shield 40 to the collar 22. The locking tab 82 is positioned along the inner wall of the shield 40 so that an inwardly extending projection 83 on the locking tab 82 aligns with the entry channel 84 and will engage the entry channel 84 at the point when the shield 40 is fully extended. The entry channel 84 is shaped so that the engaged inward projection 83, and therefore the shield 40, cannot be extended further. The entry channel 84 does not, however, prevent the inward projection 83 and the shield 40 from returning to the retracted direction (re-exposing the needle) while the locking tab 82 is positioned in the entry channel 84 (Fig. 15). The entry channel 84 is preferably wider than the width of the locking tab 82 as measured circumferentially along the collar 22 and the shield 40, respectively.

To irreversibly lock the shield 40 in its extended position, the shield is rotated counter-clockwise until the inward projection 83 of the locking tab 82 leaves the entry channel 84, travels up the inclined ramp 80 and drops into the locking recess 78. At this point, the end of the key has become misaligned with the key channel 74 and is now positioned adjacent to the distal side of the key block 73 and the securing block 76 is positioned adjacent to the proximal side of the key block 73 to prevent longitudinal movement of the shield 40 about the collar 22. The shield, which must be rotated clockwise to realign the key with the key channel 74 in order for it to be retracted, is prevented from any rotation due to the inward projection 83 of the locking tab 82 being securely engaged in the locking recess 78. The shield 40 is now locked in its extended position and cannot be returned to the retracted position without applying excessive force to the shield 40.

In Fig. 15, a key alignment taper 88 and a locking tab insertion ramp 90 are illustrated along the lower edge of the collar 22 to assist in the assembly of the present invention by aligning the key into the key channel 74 and to initially insert the locking tab 82 over the collar 22 and into the entry channel 84. As described above, the securing block 76 is oriented above and slightly offset from the end of the key 42. The securing block 76 operates in combination with the locking tab 82 to prevent the shield 40 from being removed from the collar 22 when the shield 40 has been rotated into the locked position. When the shield 40 is rotated to the locked position, rotation of the shield about the barrel will move the locking tab 82 into the locking recess 78 and, simultaneously move the securing block 76 counter clockwise against the key block 73 on its proximal side so that the key block 73 interferes with the securing block 76.

A further embodiment of the present invention is shown in Figs. 19-21. A key block 100 is fixed to either a collar which is attached to the distal end of the syringe barrel 10 or to the syringe barrel directly (shown in phantom in Fig.19). A key block channel 102 is disposed along the inside wall of the shield 104 and accepts the key block 100. The shield 104 can be slid along the syringe barrel 10 and guided by the key block 100 from a retracted position (the needle exposed) to an extended position (the needle protected). A locking channel 106 is provided adjacent to the key block channel 102. The locking channel 106 accepts the key block 100 only when the key block 100 is located in a lockable position, as shown in Fig. 20B. When the key block 100 is in the lockable position, the shield 104 can be rotated so that the key block 100 moves into the locking channel 106. The locking channel 106, as shown in Fig. 20A, preferably begins abruptly at the lockable position defined, in part, by a stop wall 108 against which the key block 100 abuts when it enters the locking channel 106 from the lockable position.

A pair of spring biased stop ramps 110, 112 are positioned in the key block channel 102. Both are formed preferably within the wall of the shield 104 and, are both, spring biased inwardly as shown in Fig. 19. Locking ramp 110 has two inclined surfaces (as shown in Fig. 19), a distal surface 114, and a proximal surface 116, both of which are connected at a single cusp ridge 118 extending inwardly from the wall of the shield 104 and upwardly from the normally flat surface of the key block channel 102. The key block 100 can be slid along either inclined surface 114 or 116 of the locking ramp 110 when the shield 104 is appropriately moved. The stop ramp 112 is positioned adjacent to the locking ramp 110 and provides only one ramp surface (proximal) and a distal edge 120, thereby allowing movement in a single direction with respect to the key block 100 as further described below. The stop ramp 112 is positioned adjacent to the locking ramp 110 so that the key block 100 will be prevented from passing the lockable position as the shield 104 is extended. There exists just enough room for the key block 100 to slide sideways into the locking channel 106 between the stop wall 108 and the distal edge 120 of the stop ramp 112 when the shield 104 is rotated with respect to the syringe.

The proximal surface 116 of the stop ramp 112 is useful primarily during assembly of the present invention to assist in connecting the shield 104 to the barrel of the syringe. The proximal surface 116 of the stop ramp 112 allows the key block 100 to pass the locking ramp 110 during the assembly of the syringe. Otherwise, the locking ramp 110 would act as a one way ramp and resist the passage of the key block 100 over the locking ramp 110 and therefore prevent the shield 104 from passing over the cusp ridge 118. The key block 100 when first inserted, travels along both the proximal surface 116 of the locking ramp 110 and the stop ramp 112, depressing them both. Once past the cusp ridge 118 defined by the transition point of the distal and proximal surfaces, 114 and 116, and also the distal edge 120 of the stop ramp 112, the key block 100 cannot return and the shield 104 cannot be removed from the syringe barrel without the use of excessive force.

If the syringe is being filled and transported prior to use, it may be desirable to temporarily protect the needle, during its transport. To provide such temporary protection, the shield 104 is slid forwardly from its retracted position to its fully extended position. The key block 100 slides proximally in the key block channel 102 to the distal surface 114 of the locking ramp 110 and slightly depresses the distal surface 114 of the locking ramp 110 until the key block 100 contacts the distal edge 120 of the stop ramp 112. At this point the key block 100 and shield 40 are in a lockable extended position and the needle is protected by the surrounding shield 104 which is freely sliable to the retracted position.

If, however, the syringe is to be permanently locked, the shield 104 is rotated about the syringe barrel 10 so that the key block 100 moves from the lockable position to the locked position within the locking channel 106. When the key block 100 enters the locking channel 106 (Fig. 20C), it leaves the distal surface 114 of the locking ramp 110 which, owing to its resilient nature springs upwardly. (towards the barrel). The key block 100 then becomes locked on all four sides, by the side edge of the distal surface 114; the stop wall 108; the shield body 104; and the distal edge of the stop

ramp 112. The side edge of the distal surface 114 prevents the key block 100 from re-entering the key block channel 102 and therefore, prevents the shield from returning to its retracted position.

Yet another shield locking arrangement of the present invention is shown in Figs. 22-25. A collar 140 is provided and attached to the distal end of a syringe barrel 10. The shield 144 includes a channel 146 incorporated along its side wall. The channel 146 is defined by an outer surface 148 and two supporting walls 150. The outer surface 148 is substantially parallel to the surface of the syringe barrel 10. A depressible locking tab 152 is formed in the outer surface 148 of the shield, above the channel 146. The locking tab 152 is secured to the shield 144 by a first hinge web 154. A second hinge web 156 is provided adjacent and parallel to the first hinge web 154 on the proximal end of the locking tab 152. These two hinge webs, 154 and 156, are preferably created when the shield 124 is formed and consist of thinned-out regions of the same resilient material used to make the shield 144. The locking tab 152 includes a locking edge 153 which is parallel to the hinge webs (154, 156) and is positioned on the proximal end of the locking tab 152. The locking tab 152 normally follows the contours of the outer surface 148 of the channel 146 until it is pushed into its locked position which is further described below. A rib 151 projects outwardly from the locking tab 152 to provide a leverage point for pushing the tab 152 into its locked position, as shown in Fig. 24.

A guide key 164 extends outwardly from the collar 140 and is attached directly to the distal end of the syringe barrel. The guide key 164 is a block-like projection extending outwardly from the surface of the collar 140 and is shaped so that it can slide longitudinally within the channel 146 without excessive radial movement while controlling the sliding movement of the shield along the syringe barrel. The guide key 164 includes a locking flange 166 along its distal (closest to the needle) upper edge. The locking flange 166 lies parallel to and inwardly from the inner surface of the channel 146 to define a locking space 168 between the collar 140 and the underside (side closest to the collar) of the projecting locking flange 166, adjacent to the distal surface of the guide key 164 (Fig. 24).

Disposed within the supporting walls 150 of the channel 146 are a pair of opposing retaining hooks 170 which project inwardly towards each other into the channel 146. The hooks 170 are preferably located near the proximal end of the shield 144. When the shield 144 is first positioned onto the syringe barrel, the guide key 164 slides within the channel 146 and past the retaining hooks 170. The hooks 170 are spring biased into the channel 146 and are shaped so that shield 144 can pass the guide key 164 in only one direction, the shield 144 cannot be removed from the syringe barrel after the guide key 164 of the collar 140 is initially slid past the retaining hooks 170. The shield 144 is moveable from a retracted position (needle exposed) to an extended position (needle covered) and will remain in the extended position when it is locked as further described below.

The retaining hooks 170 are positioned along the shield 144 so that when the shield 144 is fully extended, the retaining hooks 170 will contact the proximal surface of the guide key 164 and prevent further extending movement of the shield 144. At this point the shield is in a lockable position.

The locking edge 153 of the locking tab 152 is located above the channel 146 in the shield 144 so that when the shield 144 is in the lockable position the locking edge 153 remains in an overlapping position with respect to the locking flange 166 of the guide key 164.

The locking tab 152 may then be depressed inwardly towards the syringe barrel 10, tearing any frangible points which kept the locking tab 152 aligned with the contours of the shield 144. The proximal overlapping locking edge 153 is supported by the locking flange 166 and directs the inward force against the locking tab 152 distally to bend the locking tab 152 at both hinge web points 154 and 156. The bending of the locking tab 152 at the hinge webs 154 and 156 forces the locking edge 153 to move distally. The locking edge 153 will eventually slide off the locking flange 166 and snap inwardly to contact the inner surface of the locking flange 166 on the collar 140. The resilient nature of the shield material springs the hinge webs proximally to move the locking edge 153 into the locking space 168 to lock the shield 144 in the extended position adjacent to the collar 140.

If the shield is moved proximally, to the retracted position to expose the needle, the locking edge 153 of the locking tab 152 will contact the locking space 168 of the guide key 164 to prevent further proximal movement of the shield about the barrel. Movement to retract the shield will force the distal part of the locking tab 152 inwardly, against the action of the hinge webs 154 and 156, the locking flange 166 will retain the locking edge 153 therein and prevent it from moving from the locked position. The hinge webs 154 and 156 will move the distal part of the locking tab 152 inwardly until contact is made between the surfaces of the collar 140 and the underside of the locking tab 152. The locking tab 152 is illustrated in the lockable position in Fig. 24 and the locked position in Fig. 25.

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Claims

1. A needle shielding device for use with a medical or scientific device incorporating a barrel (10) having a proximal end and a distal end to which a needle (14) may be attached in use, the device comprising:

   a collar (22) for said barrel (10) and including a first locking member (28,30,31) on the outer surface thereof, and

   a cylindrical needle shield (40) adapted to be mounted co-axially about a said barrel (10) and axially movable in use over said barrel (10) and collar (22) between a retracted position in which a needle would be in use exposed and an extended position in which the shield would cover the needle, said shield including on its interior surface a second locking member (42) adapted to slide in a path outside said first locking member (28,30,31), characterised in that said second locking member (42) is rotatable into engagement with said first locking member (28,30,31) when said shield is in its extended position thereby to lock the shield against retraction.

2. A device according to Claim 1 wherein said second locking member (42) is integral with said shield (40) and fixed for rotation therewith.

3. A device according to Claim 2 wherein said first locking member comprises a slot (31) and said second locking member comprises a longitudinally extending key (42) of the shield (40), the key (42) being adapted to slide in a keyway (25) of the collar (22).

4. A device according to Claim 3 wherein said slot (31) comprises two opposing walls (28,30) at least one of which comprises a ramp structure over which said key (42) can ride when said shield (40) is rotated, and further including a stop (27) at the proximal end of said slot (31) for preventing retraction of the shield after engagement of said key (42) in said slot (31).

5. A device according to Claim 4, wherein each of said opposing walls (28,30) comprises a ramp structure so that in use said shield can be rotated in either direction to engage said key (42) into said slot (31).

6. A device according to any of Claims 3-5 and including a plurality of said slots (31) equispaced around the outer surface of said collar (22) and a corresponding plurality of keys (42).

7. A device according to any preceding Claim, and further including first protrusions (24) on the exterior surface of said collar (22) which slidably contact corresponding second protrusions (42) on the interior of said shield (40) to prevent relative rotation of the shield in any position other than the extended position.

8. A device according to Claim 7 when appendant to Claim 5 wherein said second protrusions are said keys (42).

9. A device according to any of Claims 3-8 wherein at least one key (42) is longer than a corresponding keyway (25).

10. A device according to any of Claims 3-9 wherein at least one key (42) and keyway (25) are aligned with the respective longitudinal axis of said shield (40) and collar (22).

11. A device according to any preceding Claim wherein said needle shield (40) includes a side opening near the distal end thereof, and

    a trigger member (56) substantially covering said side opening and being at least partially positioned therewithin, the trigger member (56) being attached to the wall of said shield (40) by a hinge (60) and adapted to pivot from a rest position where said trigger member lies flush with the wall to an inward position where the trigger member lies within the shield (40), said trigger member (56) being shaped so that when in the inward position it at least partially covers the distal axial opening of said shield.

12. A device according to Claim 11, wherein said shield (40) includes means (66,68) for locking said trigger member (56) in said inward position.

13. A device according to Claim 11 or Claim 12 wherein said trigger member (56) includes an extension (62) thereon for covering said side opening when said trigger member is in the inward position.

14. A device according to any preceding Claim and further including detent means (32) adapted to retain the shield in the extended position prior to relative rotation.

15. A device according to Claim 1 wherein said first locking member comprises a projection (100) of the collar (22) and said shield (104) includes a channel (102) disposed on the inner surface thereof and adapted for sliding contact

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with said projection (100), said second locking member comprising a locking tab (112) engageable with said projection (100).

16. A device according to Claim 15 wherein said locking tab (112) engages said projection (100) on the distal face thereof.

17. A device according to Claim 15 or Claim 16 and further including retaining means (114) for retaining said locking tab (112) and projection (100) in substantially irreversible engagement.

18. A device according to Claim 16 wherein said retaining means include means for resiliently biassing said tab (112) and projection (100) into interlocking engagement.

19. A device according to any of Claims 15-18 wherein said projection (100) slides in said channel (102) and said tab comprises a hinged flap integral with said shield.

20. A device according to any preceding Claim, wherein said shield (40) includes a detent (50) on its interior surface and said collar (22) includes a stop (26,27) adapted to abut against said detent (50) to releasably retain said shield (40) in the retracted position in use.

21. A device according to Claim 20, wherein said detent (50) is provided with a sloping proximal surface (50B) so that said detent (50) can be pushed over said stop (27) to return the shield (40) in use from an extended unrotated position to the retracted position.

22. A device according to any preceding Claim wherein said shield (40) includes an inwardly extending rim (44) adapted to abut against the proximal end of said collar (22) in use to limit the forward movement of said shield (40).

23. A hypodermic syringe barrel assembly comprising a syringe barrel (40) and a shielding device according to any preceding Claim.

24. A hypodermic syringe barrel assembly comprising a syringe barrel, a needle and a shielding device according to any of Claims 1-22.

25. A barrel assembly according to Claim 24 wherein the collar (22) is attachable to said barrel (10), interlocking means being provided on said collar and said barrel for preventing relative rotation of said collar (22) about said barrel (10).

26. A barrel assembly according to Claim 25 wherein said interlocking means comprises one or more teeth (35) on the inner surface of said collar (22).

27. A barrel assembly according to any of Claims 24-26 and further including a hypodermic needle (14) wherein said needle includes a hub (16) at the proximal end thereof and a protective needle sheath (20) therefor, the shield (40) including at its distal end an end wall (54) having an aperture large enough to permit the hub (16) of the needle (14) to pass therethrough for mounting and removing the needle on said barrel but not large enough to permit the proximal end of the sheath to pass therethrough.

28. A method of assembling a needle shielding device according to any of Claims 1-22 and a barrel, the method comprising placing the shield (40) over the collar (22), positioning the shield (40) relative to the collar (22) so that the second locking member (42) is adapted to slide in a path outside the first locking member (28,30,31) and securing the collar (22) to the barrel.

29. A method according to Claim 28, wherein the second locking member (42) is caused to fall into said path by moving the shield (40) in an axial direction relative to the collar (22).

30. A method according to Claim 28 or Claim 29, wherein the shield (40) is first placed over the forward end of the barrel (10) and the collar (22) thereafter inserted between the shield (40) and said barrel (10).

31. A method according to Claim 28 or Claim 29, wherein the shield (40) is aligned with respect to the collar (22) and the shield (40) and collar (22) are together pushed onto said barrel (10).

Patentansprüche

1. Nadelabschirmvorrichtung zur Anwendung für eine medizinische oder wissenschaftliche Vorrichtung mit einem Spritzenzylinder (10), der ein proximales Ende und ein distales Ende aufweist, an dem im Gebrauch eine Nadel (14) befestigt werden kann, wobei die Vorrichtung aufweist:

einen Bund (22) für den Spritzenzylinder (10), der ein erstes Blockierelement (28, 30,31) auf seiner Außenseite aufweist, und

eine zylindrische Nadelabschirmung (40), die geeignet ist, koaxial um den Spritzenzylin-

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der (10) montiert zu werden, und die im Gebrauch zum Spritzenzylinder (10) und zum Bund (22) zwischen einer zurückgezogenen Stellung, bei der die Nadel im Gebrauch exponiert wäre, und einer herausgezogenen Stellung, in der die Abschirmung die Nadel abdekken würde, axial beweglich ist, wobei die Abschirmung auf ihrer Innenfläche ein zweites Blockierelement (42) aufweist, das geeignet ist, in einem Weg außerhalb des ersten Blockierelements (28, 30, 31) zu gleiten,
dadurch gekennzeichnet, daß das zweite Blockierelement (42) in Eingriff mit dem ersten Blockierelement (28, 30, 31) drehbar ist, wenn die Abschirmung sich in ihrer herausgezogenen Stellung befindet, um dadurch die Abschirmung gegen ein Zurückziehen zu blockieren.

2. Vorrichtung nach Anspruch 1, bei der das zweite Blockierelement (42) einstückig mit der Abschirmung (40) und drehfest mit diesem ist.

3. Vorrichtung nach Anspruch 2, bei der das erste Blockierelement einen Schlitz (31) aufweist und das zweite Blockierelement einen sich in Längsrichtung erstreckenden Keil (42) der Abschirmung (40) aufweist, wobei der Keil (42) geeignet ist, um in einer Keilnut (25) des Bunds (22) zu gleiten.

4. Vorrichtung nach Anspruch 3, bei der der Schlitz (31) zwei gegenüberliegende Wände (28, 30) aufweist, von denen zumindest eine eine Rampenstruktur aufweist, über die der Keil (42) laufen kann, wenn die Abschirmung (40) gedreht wird, und des weiteren einen Anschlag (27) am proximalen Ende des Schlitzes (31) zur Verhinderung des Zurückziehens der Abschirmung nach einem Eingriff des Keils (42) in den Schlitz (31) aufweist.

5. Vorrichtung nach Anspruch 4, bei der jede der einander gegenüberliegenden Wände (28, 30) eine Rampenstruktur aufweist, so daß im Gebrauch die Abschirmung in jede Richtung gedreht werden kann, um den Keil (42) in Eingriff mit dem Schlitz (31) zu bringen.

6. Vorrichtung nach einem der Ansprüche 3 bis 5, die eine Vielzahl Schlitze (31) aufweist, die im gleichen Abstand um die Außenfläche des Bunds (22) angeordnet sind, und die eine entsprechende Anzahl Keile (42) aufweist.

7. Vorrichtung nach einem der vorangehenden Ansprüche, die erste Vorsprünge (24) auf der Außenfläche des Bunds (22) aufweist, die in Gleitkontakt mit entsprechenden zweiten Vorsprüngen (42) auf der Innenfläche der Abschirmung (40) geraten, um eine Relativdrehung der Abschirmung in jeder außer der herausgezogenen Stellung zu verhindern.

8. Vorrichtung nach Anspruch 7, sofern auf Anspruch 5 zurückbezogen, bei der die zweiten Vorsprünge die Keile (42) sind.

9. Vorrichtung nach einem der Ansprüche 3 bis 8, bei der zumindest ein Keil (42) länger als eine entsprechende Keilnut (25) ist.

10. Vorrichtung nach einem der Ansprüche 3 bis 9, bei der zumindest ein Keil (42) und eine Keilnut (25) mit der entsprechenden Längsachse der Abschirmung (40) und des Bunds (22) fluchten.

11. Vorrichtung nach einem der vorhergehenden Ansprüche, bei der die Nadelabschirmung (40) nahe ihrem distalen Ende eine Seitenöffnung aufweist, und ein Triggerglied (56) die Seitenöffnung im wesentlichen abdeckt und zumindest teilweise in ihr angeordnet ist, wobei das Triggerglied (56) mittels eines Gelenks (60) an der Wand der Abschirmung befestigt und geeignet ist, aus einer Ruhestellung, in der das Triggerglied mit der Wand fluchtet, in eine einwärtige Stellung zu schwenken, in der das Triggerglied innerhalb der Abschirmung (40) liegt, wobei das Triggerglied (56) so geformt ist, daß, falls es in der einwärtigen Stellung ist, es zumindest teilweise die distale axiale Öffnung der Abschirmung schließt.

12. Vorrichtung nach Anspruch 11, bei der die Abschirmung (40) Mittel (66, 68) zur Blockierung des Triggerglieds (56) in der einwärtigen Stellung aufweist.

13. Vorrichtung nach Anspruch 11 oder 12, bei der das Triggerglied (56) eine Ausdehnung (62) aufweist, um die Seitenöffnung zu schließen, wenn das Triggerglied in der einwärtigen Stellung ist.

14. Vorrichtung nach einem der vorangehenden Ansprüche, die des weiteren ein Arretierungsmittel (32) aufweist, welches geeignet ist, die Abschirmung in der herausgezogenen Stellung vor einer Relativdrehung zu halten.

15. Vorrichtung nach Anspruch 1, bei der das erste Blockierelement einen Vorsprung (100) des Bunds (22) aufweist und die Abschirmung (104) einen Kanal (102) aufweist, der auf ihrer Innenfläche angeordnet und geeignet ist, mit

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dem Vorsprung (100) Gleitkontakt zu haben, wobei das zweite Blockierelement einen Blokkiervorsprung (112) aufweist, der mit dem Vorsprung (100) in Eingriff bringbar ist.

16. Vorrichtung nach Anspruch 15, bei der der Blockiervorsprung (112) den Vorsprung (100) an dessen distaler Fläche kontaktiert.

17. Vorrichtung nach Anspruch 15 oder 16, die ein Rückhaltemittel (114) zum Zurückhalten des Blockiervorsprungs (112) und des Vorsprungs (100) in einem im wesentlichen nicht mehr lösbaren Eingriff aufweist.

18. Vorrichtung nach Anspruch 16, bei der das Rückhaltemittel ein Mittel zur elastischen Vorspannung des Vorsprungs (112) und des Vorsprungs (100) in Verbindungseingriff aufweist.

19. Vorrichtung nach einem der Ansprüche 15 bis 18, bei der der Vorsprung (100) in dem Kanal (102) gleitet und der Blockiervorsprung eine mit der Abschirmung einstückige angelenkte Klappe aufweist.

20. Vorrichtung nach einem der vorangehenden Ansprüche, bei der die Abschirmung (40) auf ihrer Innenfläche eine Arretierung (50) und der Bund (22) einen Anschlag (26, 27) aufweist, der geeignet ist, gegen die Arretierung (50) anzuschlagen, um die Abschirmung (40) im Gebrauch lösbar in der zurückgezogenen Stellung zurückzuhalten.

21. Vorrichtung nach Anspruch 20, bei der die Arretierung (50) mit einer geneigten proximalen Fläche (50B) versehen ist, so daß die Arretierung (50) über den Anschlag (27) geschoben werden kann, um die Abschirmung (40) im Gebrauch aus einer herausgezogenen nicht verdrehten Stellung in die zurückgezogene Stellung zurückzubringen.

22. Vorrichtung nach einem der vorangehenden Ansprüche, bei der die Abschirmung (40) eine sich einwärts erstreckende Krempe (44) aufweist, die geeignet ist, im Gebrauch gegen das proximale Ende des Bunds (22) anzuschlagen, um die Vorwärtsbewegung der Abschirmung (40) zu begrenzen.

23. Hypodermische Spritzenzylinderanordnung mit einem Spritzenzylinder (40) und einer Abschirmvorrichtung gemäß einem der vorangehenden Ansprüche.

24. Hypodermische Spritzenzylinderanordnung mit einem Spritzenzylinder, einer Nadel und einer Abschirmvorrichtung gemäß einem der Ansprüche 1 bis 22.

25. Spritzenzylinderanordnung nach Anspruch 24, bei der der Bund (22) am Spritzenzylinder (10) anbringbar ist, wobei Verbindungsmittel am Bund und am Spritzenzylinder vorgesehen sind, um eine Relativdrehung des Bunds (22) in bezug auf den Spritzenzylinder (10) zu verhindern.

26. Spritzenzylinderanordnung nach Anspruch 25, bei der das Verbindungsmittel einen oder mehr Zähne (35) auf der Innenfläche des Bunds (22) aufweist.

27. Spritzenzylinderanordnung nach einem der Ansprüche 24 bis 26, die des weiteren eine hypodermische Nadel (14) aufweist, wobei die Nadel eine Nabe (16) an ihrem proximalen Ende hat, und wobei die Anordnung des weiteren eine Nadelschutzhülle (20) für die Nadel hat, wobei die Abschirmung (40) an ihrem distalen Ende eine Stirnwand (54) mit einer Öffnung aufweist, die groß genug ist, um der Nabe (16) der Nadel (14) einen Durchgang zwecks Montage und Demontage der Nadel am Spritzenzylinder zu erlauben, der jedoch nicht groß genug ist, um dem proximalen Ende der Hülle einen Durchgang zu erlauben.

28. Verfahren zur Montage einer Nadelschutzvorrichtung gemäß einem der Ansprüche 1 bis 22, und eines Spritzenzylinders, wobei zum Verfahren die Plazierung der Abschirmung (40) über den Bund (22), die Positionierung der Abschirmung (40) in bezug auf den Bund (22) in der Weise, daß das zweite Blockierelement (42) geeignet ist, in einem Weg außerhalb des ersten Blockierelements (28, 30, 31) zu gleiten, und die Befestigung des Bunds (22) am Spritzenzylinder aufweist.

29. Verfahren nach Anspruch 28, bei dem das zweite Blockierelement (42) dazu gebracht wird, in den Weg zu geraten, in dem die Abschirmung (40) in Axialrichtung in bezug auf den Bund (22) bewegt wird.

30. Verfahren nach Anspruch 28 oder 29, bei dem die Abschirmung (40) zunächst über das vordere Ende des Spritzenzylinders (10) plaziert wird und der Bund (22) danach zwischen die Abschirmung (40) und den Spritzenzylinder (10) eingesetzt wird.

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31. Verfahren nach Anspruch 28 oder 29, bei dem die Abschirmung (40) in bezug auf den Bund ausgerichtet wird und die Abschirmung (40) und der Bund (22) zusammen auf den Spritzenzylinder (10) geschoben werden.

Revendications

1. Dispositif de protection d'aiguille utilisable avec un dispositif médical ou scientifique comportant un corps (10) ayant une extrémité proximale et une extrémité distale à laquelle, en fonctionnement, une aiguille peut être fixée, le dispositif comportant:

une bague (22) pour ledit corps (10) et comprenant un premier élément de verrouillage (28, 30, 31) sur sa surface extérieure, et

un manchon cylindrique (40) de protection d'aiguille, conçu pour être monté coaxialement autour dudit corps (10) et étant axialement mobile, au moment de son utilisation sur ledit corps (10) et ladite bague (22) entre une position reculée dans laquelle une aiguille, en position d'utilisation, serait découverte, et une position avancée dans laquelle le manchon recouvrirait l'aiguille, ledit manchon comportant sur sa surface intérieure un second élément de verrouillage (42) conçu pour coulisser sur un parcours extérieur audit premier élément de verrouillage (28, 30, 31), caractérisé en ce que ledit second élément de verrouillage (42) peut être amené par rotation au contact dudit premier élément de verrouillage (28, 30, 31) lorsque ledit manchon est dans sa position avancée, afin de verrouiller le manchon pour l'empêcher de reculer.

2. Dispositif selon la revendication 1, dans lequel ledit second élément de verrouillage (42) est formé d'une seule pièce avec ledit manchon (40) et est fixé afin de tourner avec celui-ci.

3. Dispositif selon la revendication 2, dans lequel ledit premier élément de verrouillage comporte une fente (31) et ledit second élément de verrouillage comporte une clavette (42) qui s'étend dans le sens longitudinal du manchon (40), la clavette (42) étant conçue pour coulisser dans une rainure de clavetage (25) de la bague (22).

4. Dispositif selon la revendication 3, dans lequel ladite fente (31) comprend deux parois opposées (28, 30) dont au moins une comporte une structure formant rampe sur laquelle ladite clavette (42) peut se déplacer lorsqu'on fait tourner ledit manchon (40), et comportant en outre une butée (27) à l'extrémité proximale de ladite fente (31) pour empêcher le manchon de reculer après que ladite clavette (42) s'est engagée dans ladite fente (31).

5. Dispositif selon la revendication 4, dans lequel chacune desdites parois opposées (28,30) comprend une structure formant rampe de façon que, en fonctionnement, on puisse faire tourner ledit manchon dans un sens ou dans l'autre afin d'engager ladite clavette (42) dans ladite fente (31).

6. Dispositif selon l'une quelconque des revendications 3 à 5 et comportant une pluralité desdites fentes (31) ménagées à équidistance sur le pourtour de la surface extérieure de ladite bague (22) et une pluralité correspondante de clavettes (42).

7. Dispositif selon l'une quelconque des revendications précédentes, comportant en outre sur la surface extérieure de ladite bague (22) des premières saillies (24) qui viennent d'une manière coulissante au contact de secondes saillies correspondantes (42) situées à l'intérieur dudit manchon (40) afin d'empêcher la rotation relative du manchon dans n'importe quelle position autre que la position avancée.

8. Dispositif selon la revendication 7 rattachée à la revendication 5, dans lequel lesdites secondes saillies sont lesdites clavettes (42).

9. Dispositif selon l'une quelconque des revendications 3 à 8, dans lequel au moins une clavette (42) est plus longue qu'une rainure de clavetage correspondante (25).

10. Dispositif selon l'une quelconque des revendications 3 à 9, dans lequel au moins une clavette (42) et une rainure de clavetage (25) sont alignées avec l'axe longitudinal respectif dudit manchon (40) et de ladite bague (22).

11. Dispositif selon l'une quelconque des revendications précédentes, dans lequel ledit manchon protecteur (40) d'aiguille comporte une ouverture latérale près de son extrémité distale, et

un élément d'actionnement (56) qui couvre sensiblement ladite ouverture latérale et se trouve au moins partiellement à l'intérieur de celle-ci, l'élément d'actionnement (56) étant fixé à la paroi dudit manchon (40) par une articulation (60) et étant conçu pour pivoter depuis une position de repos où ledit élément d'actionnement se trouve au ras de la paroi jusqu'à une position vers l'intérieur où l'élé-

ment d'actionnement se trouve à l'intérieur du manchon (40), la forme dudit élément d'actionnement (56) étant telle que, lorsqu'il est dans la position intérieure, il couvre au moins partiellement l'ouverture axiale distale dudit manchon.

12. Dispositif selon la revendication 11, dans lequel ledit manchon (40) comporte un moyen (66, 68) pour verrouiller ledit élément d'actionnement (56) dans ladite position vers l'intérieur.

13. Dispositif selon la revendication 11 ou la revendication 12, dans lequel ledit élément d'actionnement (56) comporte un prolongement (62) servant à couvrir ladite ouverture latérale lorsque ledit élément d'actionnement est dans la position vers l'intérieur.

14. Dispositif selon l'une quelconque des revendications précédentes, comportant en outre un moyen formant organe de positionnement (32), servant à retenir le manchon dans la position avancée avant la rotation relative.

15. Dispositif selon la revendication 1, dans lequel ledit premier élément de verrouillage comporte une saillie (100) de la bague (22) et ledit manchon (104) comporte un canal (102) disposé sur sa surface intérieure et conçu pour réaliser un contact glissant avec ladite saillie (100), ledit second élément de verrouillage comportant un ergot de verrouillage (112) pouvant venir coopérer avec ladite saillie (100).

16. Dispositif selon la revendication 15, dans lequel ledit ergot de verrouillage (112) vient contre ladite saillie (100) sur sa face distale.

17. Dispositif selon la revendication 15 ou la revendication 16, comportant en outre un moyen de retenue (114) pour retenir ledit ergot de verrouillage (112) et ladite saillie (100) dans une position d'enclenchement sensiblement irréversible.

18. Dispositif selon la revendication 16, dans lequel ledit moyen de retenue comporte un moyen pour solliciter d'une façon élastique ledit ergot (112) et ladite saillie (100) de façon qu'ils soient mutuellement enclenchés.

19. Dispositif selon l'une quelconque des revendications 15 à 18, dans lequel ladite saillie (100) coulisse dans ledit canal (102) et ledit ergot comporte une bande articulée qui est formée d'une seule pièce avec ledit manchon.

20. Dispositif selon l'une quelconque des revendications précédentes, dans lequel ledit manchon (40) comporte sur sa surface intérieure un organe de positionnement (50) et ladite bague (22) comporte une butée (26, 27) conçue pour buter contre ledit organe de positionnement (50) afin de retenir d'une manière libérable ledit manchon (40) dans la position reculée pendant l'utilisation.

21. Dispositif selon la revendication 20, dans lequel ledit organe de positionnement (50) est pourvu d'une surface proximale inclinée (50B) de façon que ledit organe de positionnement puisse être poussé par dessus ladite butée (27) afin, en fonctionnement, de ramener le manchon (40) depuis une position avancée sans rotation jusqu'à la position reculée.

22. Dispositif selon l'une quelconque des revendications précédentes, dans lequel ledit manchon (40) comporte un bord (44) s'étendant vers l'intérieur et conçu pour buter contre l'extrémité proximale de ladite bague (22) pour limiter, en fonctionnement, le mouvement dudit manchon (40) vers l'avant.

23. Agencement de corps de seringue hypodermique comportant un corps (40) de seringue et un dispositif de protection selon l'une quelconque des revendications précédentes.

24. Agencement de corps de seringue hypodermique comportant un corps de seringue, une aiguille et un dispositif de protection selon l'une quelconque des revendications 1 à 22.

25. Agencement de corps selon la revendication 24, dans lequel la bague (22) peut être fixée audit corps (10), un moyen d'enclenchement étant présent sur ladite bague et ledit corps pour empêcher la rotation relative de ladite bague (22) autour dudit corps (10).

26. Agencement de corps selon la revendication 25, dans lequel ledit moyen d'enclenchement comporte une ou plusieurs dents (35) sur la surface intérieure de ladite bague (22).

27. Agencement de corps selon l'une quelconque des revendications 24 à 26, comportant en outre une aiguille hypodermique (14), dans lequel ladite aiguille comporte une embase (26) à son extrémité proximale et un fourreau (20) protecteur de l'aiguille, le manchon (40) comportant à son extrémité distale une paroi (54) d'extrémité ayant un orifice suffisamment grand pour permettre à l'embase (16) de l'ai-

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guille (14) de passer à travers celui-ci pour le montage et le démontage de l'aiguille sur le corps, mais pas assez grand pour permettre à l'extrémité proximale du fourreau de passer à travers celui-ci.

28. Procédé d'assemblage d'un dispositif de protection d'aiguille selon l'une quelconque des revendications 1 à 22 et d'un corps, le procédé comportant la mise en place du manchon (40) sur la bague (22), l'installation du manchon (40) par rapport à la bague (22) de façon que le second élément de verrouillage (42) puisse coulisser sur un parcours extérieur au premier élément de verrouillage (28, 30, 31) et la fixation de la bague (22) au corps.

29. Procédé selon la revendication 28, dans lequel le second élément de verrouillage (42) est amené à se retrouver dans ledit parcours par un déplacement axial du manchon (40) par rapport à la bague (22).

30. Procédé selon la revendication 28 ou la revendication 29, dans lequel le manchon (40) est d'abord placé sur l'extrémité antérieure du corps (10), puis la bague (22) est insérée entre le manchon (40) et ledit corps (10).

31. Procédé selon la revendication 28 ou la revendication 29, dans lequel le manchon (40) est aligné par rapport à la bague (22), et le manchon (40) et la bague (22) sont poussés ensemble sur ledit corps (10).