"DISPOSABLE RETRACTABLE SYRINGE"

which is described in the accompanying complete specification.

DETAILS OF BASIC APPLICATION(S):-

Number of basic application(s):-
150,621 and 296,495

Name(s) of Convention Country(ies) in which Basic Application(s) was/were filed:-
United States of America

Date(s) of Basic applications(s):-
1st February, 1988 and 12th January, 1989

The address for service is:-
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DATED this 25th day of January, 1989.

JOSEPH W. BLAKE III and THOMAS E. SLOANE, JR.

By: 

Registered Patent Attorney

TO: THE COMMISSIONER OF PATENTS
AUSTRALIA.
COMMONWEALTH OF AUSTRALIA

Patents Act

DECLARATION FOR A PATENT APPLICATION

INSSTRUCTIONS

(a) Insert "Convention" if applicable
(b) Insert FULL name(s) of applicant(s)
(c) Insert "of addition" if applicable
(d) Insert TITLE of invention
(e) Insert FULL name(s) and address(es) of declarant(s)
(f) Insert FULL name(s) and address(es) of actual inventor(s)

In support of the (a) Convention application made by

(a) JOSEPH W. BLAKE III of 88 Main St., New Canaan, Connecticut 06840 United States of America

and THOMAS E. SLOANE, JR. of 8 Chalburn Road, West Reading, Connecticut 06896, United States of America

(hereinafter called "applicant(s)"

for a patent for an

invention entitled (d) Disposable Retractable Syringe

We (a) JOSEPH W. BLAKE III of 88 Main Street, New Canaan, Connecticut 06840, United States of America, and

THOMAS E. SLOANE, JR. of 8 Chalburn Road, West Reading, Connecticut 06896, United States of America
do solemnly and sincerely declare as follows:

1. We (a) are the applicant(s).

2. We (a) are the actual inventor(s) of the invention.

(Note: Paragraphs 3 and 4 apply only to Convention applications)

3. The basic application(s) for patent or similar protection on which the application is based is/are identified by country, filing date, and basic applicant(s) as follows:

(a) United States of America, 7 February, 1988

JOSEPH W. BLAKE III and THOMAS E. SLOANE, JR.

United States of America, 12 January, 1989

JOSEPH W. BLAKE III and THOMAS E. SLOANE, JR.

4. The basic application(s) referred to in paragraph 3 hereof was/were the first application(s) made in a Convention country in respect of the invention the subject of the application.

Declared at (a) 1 NEW CANAAN, CT USA

Dated 01 January 1989

(Joseph W. Blake III)

(Thomas E. Sloane, Jr.)

To: The Commissioner of Patents
1. A disposable retractable needle syringe comprising a hollow barrel, disposed about a longitudinal axis, comprising an open proximal end, a substantially closed distal end, with a retractable needle extending outwardly, from the barrel, therethrough and means for releasably coupling said needle, in its outwardly extended condition, with said barrel distal end; plunger means, axially and reciprocally movable within said barrel, comprising locking means, at its distal end, to engage said needle, decouple it from said, and withdraw it into, said barrel and piston means spaced proximally from said locking means and sealing means to prevent leakage from the barrel; said plunger means further comprising spring means, at its distal end, to cause said needle to be canted relative to said longitudinal axis to prevent reextension of the needle through the distal end of the barrel after the needle has been fully drawn into the barrel; wherein said spring means comprises a resilient
lever arm whose longitudinal axis is normally canted relative to the longitudinal axis of the barrel when said spring means and needle are not engaged.

the wall of the groove 66 comprises a threaded portion to cooperatively receive outwardly-directed projections 62 in the outer wall of the stem of the needle assembly.
The following statement is a full description of the invention including the best method of performing it known to us:

"DISPOSABLE RETRACTABLE SYRINGE"
DISPOSABLE HYPODERMIC SYRINGE

This is a continuation-in-part of my copending application serial number 150,621 filed February 8, 1988.

BACKGROUND OF THE INVENTION

This invention relates to hypodermic syringe and needle combinations. More particularly, it relates to a hypodermic syringe and needle combination wherein said needle can be permanently retracted into the syringe barrel, after use, to prevent accidents and abuse of the syringe by causing the needle to be angled relative to the longitudinal axis of the plunger.

Health care workers, such as nurses, and even housekeeping personnel are becoming more fearful of exposure to infectious diseases, such as hepatitis and, especially, AIDS, through transmission thereof by accidental impalement of such personnel on hypodermic needles used, e.g., on patients having such diseases.

It has, therefore, become an imperative to provide syringe and needle combinations which will reduce the possibility of such accidents.

Used needle and syringe combinations have also been implicated in drug abuse situations.

It is therefore, also desirable to provide such combinations which may not easily be reused for such purposes.

Disposable hypodermic needle and syringe
combinations, however, must be inexpensive to produce and easy to operate if they are to be widely utilized to avoid such possibilities.

U.S. Patent 4,592,744 describes such a combination wherein

(a) standard syringe and needle are mounted in a clear plastic sheath. The needle extends through a hole in the bottom of the sheath. The end of the needle is covered with a cap. To use, the cap is removed and the standard medical procedures are carried out in the usual way but with the syringe still inside of the clear plastic sheath. After use, the syringe and needle are drawn back into the sheath and the needle is completely within the confines of the plastic sheath. Flanges within the sheath catch behind the lip of the needle as the syringe is withdrawn, trapping the needle within the sheath. The needle is thus unable to protrude at either end. (Column 2 lines 16 to 28)

The above system suffers from the fact that it requires a separate sheath to contain the used needle. The cost of the combination, which can be reused is, therefore, increased by the requirement for the separate sheath.

Furthermore, if an abuser were to wish to reuse the needle and syringe it would only be necessary to cut away the sheath and reattach the needle to the syringe.

U.S. Patent 4,702,738 discloses a disposable needle and syringe combination comprising a retractable sheath to
cover the needle, after use, and lock in place thereby preventing accidental pricking by the exposed needle or reuse for drug abuse.

This system also suffers from the disadvantages noted above. Thus, if an abuser were to wish to reuse the combination for drug abuse it would only be necessary to cut through the sheath thereby exposing the needle for reuse.

U.S. Patent 4,747,829 discloses a "Prefilled syringe..." which suffers from the fact that it can only be used in "pre-filled" condition thus limiting its value. One would be required to have a large number of syringes if one would have many compositions to dispense. Furthermore, one could not use this syringe to withdraw fluids from a source such as a patient.

In addition, the preferred embodiment depends upon a pre-stressed needle which bows out of alignment with the plunger upon withdrawal from the barrel stem. This, of course, creates difficulties in positioning the needle within the syringe.

In U.S. Patent 4,747,830 there is disclosed a retractable syringe wherein the needle is prevented from redescending through the barrel stem, after withdrawal therefrom, by cooperating latching means in the upper portions of the barrel inner wall and the outer wall of the plunger which lock the needle assembly in an elevated position. The latching means are complex and would require
It has now been found that the above disadvantages may be avoided by use of the needle and syringe combination of the instant invention.

**SUMMARY OF THE INVENTION**

It is an object of the invention to provide a disposable hypodermic needle and syringe combination which reduces the possibility of infecting persons within its proximity by accidental pricking after use on patients suffering from said diseases.

It is another objection of the invention to provide a hypodermic needle and syringe combination which cannot, readily, be reused for drug abuse after its required use.

It is yet another object of the invention to provide a hypodermic needle and syringe combination, as described above, comprising a needle which can be retracted
into the barrel of said syringe.

According to another object of the invention there is provided a needle and syringe combination, as described above comprising a syringe assembly comprising a barrel comprising a hollow wall having at its proximal end a large opening to receive a plunger adapted to grip and retract a hypodermic needle and, at its distal end a relatively small opening from which descends a hollow stem adapted to removably receive a needle assembly comprising a hollow tube having a sharp distal end and a hub, adherently surrounding said needle, adapted to be gripped and turned by said plunger and withdrawn from said stem by upward movement of said plunger.

It is yet another object of the invention to provide a needle and syringe combination, as described above, wherein the axes of the gripping means on the plunger are skewed relative to the longitudinal axis of the plunger but straighten out upon engagement of said means with the complementary means on the needle assembly when said assembly is within the barrel stem but becomes reskewed upon retraction of the assembly from said stem whereby the needle assembly is caused to take an angular position relative to the barrel stem after withdrawal therefrom.

Another object of the invention is to provide a needle and syringe combination, as described above, further comprising stopping means to prevent complete withdrawal of
the plunger from the barrel after the needle assembly has been withdrawn from the barrel stem. Yet another object of the invention is to provide a needle and syringe combination, as described above, wherein said stopping means comprises projections extending into the barrel cavity from the barrel inner wall to engage with cooperating means on the plunger to prevent further outward movement of the plunger. Yet another object of the invention is to provide a needle and syringe combination, as described above, further comprising sealing means to prevent liquids contained in said barrel from passing between said barrel inner wall and the plunger outer wall.

Another object of the invention is to provide a hypodermic needle and syringe combination, as described above, which is inexpensive to produce, as it requires no more components than those of the prior art, while providing the extra measure of safety.

According to another object of the invention there is provided a needle and syringe combination, as described above, which is easy to operate and requires no additional actions, to perform the functions of a syringe, on the part of the user, in that it has no more components, compared to the currently available combinations which do not have its safety features.

Other objects will be in part apparent and in part specifically disclosed in connection with the following
detailed description and accompanying drawings wherein like numerals indicate like parts.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a vertical sectional view of the present invention prior to use.

Figure 2 is an exploded vertical sectional view of the present invention after expulsion of the contents thereof.

Figure 3 is a sectional view of the article of Figure 2 along line 2-2 thereof.

Figure 4 is a sectional view of the article of Figure 2 along line 3-3 thereof.

Figure 5 is a vertical sectional view of the upper portion of a second embodiment of the invention.

Figure 6 is a vertical sectional view of the upper portion of a third embodiment of the invention.

Figure 7 is an exploded elevational sectional side view of another embodiment of the invention.

Figure 7b is a 90° rotational sectional view of the portion of Figure 7 indicated by the numeral 3.

Figure 8 is an elevational side view of the portion of the above embodiment indicated by A in Figure 7.

Figure 9 is a 90° rotational view of the portion of Figure 8.

Figure 10 is a 180° rotational view of the portion of Figure 8.
Figure 11 is a sectional elevational view of the portion of Figure 8 along line 8-8 thereof.

Figure 12 is an elevational sectional side view of the embodiment of Figure 7 before expulsion of fluid therefrom.

Figure 13 is an elevational sectional side view of the embodiment of Figure 7 after expulsion of fluid therefrom.

Figure 14 is an elevational sectional side view of the embodiment of Figure 7 prior to disposal thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Figures 1-4 illustrate a disposable, retractable hypodermic needle and syringe apparatus generally indicated by the numeral 1. The syringe comprises a barrel comprising an elongated cavity 29 surrounded by a longitudinally extended wall 15 having a large opening 12 at its proximal end and a small opening at its distal end from which there descends vertically a hollow stem 25. Said wall is adapted to removably receive a hypodermic needle assembly.

The syringe further comprises a plunger 13, to be received by said cavity 29, comprising, at its distal end, means to grip and turn said needle assembly when retraction thereof is desired.

Said means comprises radially spaced triangular extensions 16, projecting from the distal end of said plunger, the upper portions of which comprise a notch
comprising lower surfaces 17a and upward directed sides 17b to engage complementary projections 18 of said needle assembly when retraction thereof is required.

The apparatus further comprises a hypodermic needle assembly comprising a hypodermic needle 23 comprising a hollow tube having a sharp distal end 30. Said tube is adherently surrounded by a hub 24 adapted to be received and removably held by the cavity of stem 25.

The hub 24 comprises means, such as threads 20a, spaced from its distal end, which is removably receivable by complementary threads 20b in the wall 15 of the barrel.

The proximal end of said hub comprises a circular wall 37 horizontally spaced from the upper opening 38 of needle 23.

Said wall comprises triangular projections 18 having walls 19a and 19b to engage the complementary walls 17a and 17b of the projections 16, of the plunger when retraction of said needle assembly is desired.

In a preferred aspect of the above embodiment said projections 18 also have tapered side walls reaching each other at points at their proximal ends while the projections 16 of the plunger have similar triangular shapes having their pointed junctures at their distal ends.

The above tapered configurations of the side walls direct the projections 16 of the plunger past the projections 18 of the needle assembly after which the plunger is turned
to engage the walls 17a and 17b and 19a and 19b of the plunger and hub assemblies, respectively, for retraction of the needle assembly.

The above embodiment, however, permits complete withdrawal of the plunger 13 and retracted needle assembly which may then be separated and the apparatus reassembled for possible use by a drug abuser.

Therefore, in a second embodiment of the invention, as shown in Figure 5 there is provided a disposable, retractable hypodermic needle and syringe apparatus wherein said barrel wall 15 further comprises inwardly-directed projections 27 extending from inner wall 31, near the proximal end, thereof and outwardly-directed projections 26 extending from the outer wall 32, and spaced from the distal end of said plunger 13 the projections being adapted to permit insertion of the plunger 13 into the cavity 29 but on retraction of the needle assembly said projections engage and prevent complete withdrawal of the plunger 13 and needle assembly from the cavity 29 thereby preventing accidental pricking of personnel or reuse by an abuser.

Other means known to the art, including cam extension and indentation systems may also be utilized to prevent such complete withdrawal of the plunger and needle assembly.

As the space between the barrel inner wall 31 and plunger outer wall 32 may be increased, by virtue of the
above projections thereon, leakage of the barrel contents therethrough may occur.

Therefore, in a third embodiment of the invention, illustrated in Figure 6, there are provided sealing means 28 to prevent such leakage. Said means may be permanently or removably affixed to the outer wall 32 of the plunger 13 between its distal end and projections 26. Such means, which are well known in the art, include O-rings inserted into circular grooves in the outer wall of plunger 13. The sealing means 28 may also comprise a separate circular flexible ring sealed to said outer wall or a flange molded into the wall.

The hypodermic needle assembly may be removably held by stem 25 by any means known in the art including complementary threads 20a and 20b, respectively, on the inner wall of stem 25 and the outer wall of hub 24 and Luer connections.

When retraction of the needle is desired the plunger 13 is pushed to the distal end of the barrel whence the upper walls 17 of the projections 16 of the plunger 13 are made to engage the lower surfaces 19 of the projections 18 of the hub 24. The plunger 13 is then turned until the hub 24 is completely disengaged from the stem 25 and drawn back until the hypodermic needle assembly has been withdrawn from the stem 25 and is completely contained within the cavity 29.
In the above embodiments the needle assembly is angled, relative to the longitudinal axis of the plunger after retraction of the needle assembly from the stem 69, to assure that reinsertion thereof into stem 25 is prevented. For this purpose the surfaces 17 and 19 of the projections 16 and 18, respectively, may be skewed so that they are not normal to the axes of the barrel and plunger.

A most preferred embodiment of the invention, as illustrated in Figures 7 and 12-14, is generally indicated by the numeral 2. The syringe comprises a barrel comprising an elongated cavity 71 surrounded by a longitudinally extended wall 50 having a large opening 72 at its proximal end, to receive a needle assembly, and a plunger, and a bottom wall 68 at its distal end comprising a small opening 74 from which there descends vertically a hollow stem 69. The longitudinal wall 50 further comprises an annular protrusion 67 extending horizontally inward from the inner surface of wall 50 and spaced from the lower wall 68 of the barrel. The lower wall 68 and protrusion 67 define an annular groove 66 to removably receive cooperatively acting means on a needle assembly to removably lock the needle assembly into place in the barrel stem 69 prior to use of the syringe. The barrel further comprises a flange 49 extending horizontally outward from the upper end of wall 50 to permit gripping of the syringe by the user.

In the aspect of the invention illustrated herein
the wall of the groove 66 comprises a threaded portion to cooperatively receive outwardly-directed projections 62 in the outer wall of the stem of the needle assembly.

The inner surface of the upper portion of barrel wall 50 further comprises stopping projections 76 to prevent complete withdrawal of the plunger from the barrel by engaging cooperating means on the plunger.

The hypodermic needle assembly, indicated by the numeral 3, comprises a cavity 61 surrounded by a circular longitudinal elongated wall 70, a large opening 75 at its upper end to receive the distal end of a plunger and a bottom wall comprising a hub 63 adherently surrounding a hollow tube 64a having a sharp distal end 64b, and a proximal opening 64c spaced horizontally inward from wall 70.

The needle assembly 3 further comprises two projections 62 on opposite sides of, and extending normally outward, from the outer surface of the upper portion of hub 63, to be received in the threaded portion 66 of the barrel when the needle assembly is locked into the stem 69.

Wall 70 comprises, on its inner surface, triangular shaped projections 60a, each having a lower horizontal wall 60b and angular side walls 60c rising from the ends thereof to engage cooperating means on a plunger when locking of the needle assembly 3 into, or withdrawal of the assembly from, the stem 69 of the barrel is desired.

The plunger 51 comprises a longitudinally elongated
member 52a having a gripping means 48 at its upper end to permit manipulation, such as turning, of the plunger. At its other end the plunger comprises a plunger head 52b extending from, and of smaller diameter than, member 52a. Member 52a and plunger head 52b are separated from each other by a circular horizontal disc 58 whose outer diameter (OD) is slightly less than the inner diameter (ID) of the barrel cavity 71.

The distal end of the plunger comprises a plunger head 52b, indicated by A in Figure 7 and best discussed in conjunction with Figures 8-11, which comprises a notch 55 extending horizontally partially into the plunger head and a flexible portion 53 terminated by a thin arcuate projection 56, on the same side of the plunger head 52b as notch 55.

Notch 55 and tip portion 53 together form a spring which normally, i.e., when the notch is open, causes the flexible tip to be at an angle relative to the longitudinal axis of the plunger, i.e., when the tip and needle assembly are not engaged or when they are engaged in retraction mode and the needle assembly is not in the barrel stem.

The plunger head 52b further comprises a triangular shaped projection 54a having a horizontal upper wall 54 and first and second angular side walls 54d and 54e descending from the ends thereof said projection being situated on the side of the plunger head opposite the notch 55.

An upper portion of projection 54a is cut away
inward from side wall 54d to form a notch comprising an angular side wall 54c, approximately parallel to side wall 54d, and a horizontal wall 54b, said notch being adapted to lockingly receive a part of the lower portion of projection 60a of the needle assembly 3.

It has been found that the projection 54a is sometimes sheared off of plunger head 52b by the force applied thereto when the plunger is being twisted while in locking engagement with the needle assembly when said assembly is being withdrawn from the barrel stem 69.

Accordingly this embodiment further comprises a non-locking triangular projection 77a on the side of plunger head 52b opposite locking projection 54a and above notch 55. This projection distributes the force applied by the plunger head to the needle assembly thereby preventing shearing off of locking projection 54a.

The plunger head 52b, at its proximal end, is surrounded by a semi-flexible tube 57a terminated at its upper 57b and lower 57c ends by horizontal flanges whose ODs are equal to or slightly greater than the ID of the barrel. The upper flange 57b abuts the lower surface of disc 58.

Flanges 57b and 57c provide liquid tight sealing of the cavity 71 from the outside while flange 57c acts as a piston to expel fluid from, or draw fluid into, barrel cavity 71.

In the practice of using this embodiment of the
invention the syringe and needle assembly is used as any prior art assembly. It is only with respect to safe disposal that this assembly advantageously differs from the prior art articles.

Thus, the syringe may be obtained prefilled with material to dispensed or it may be filled by withdrawal of liquids from bodies or containers and the liquids then expelled for disposal or injection.

It is sometimes possible that the plunger, after expulsion of the syringe contents, but prior to retraction of the needle assembly, may not completely fill the space between the walls of the hub. The article of the invention may also, as is commonly done, be used to dispense less than all of the contents of the syringe.

Under those circumstances the barrel may, by known methods, be precalibrated.

After all use of the syringe has been completed and safe disposal thereof required the plunger is fully depressed until its tip enters the cavity of the needle assembly. The notch, of the plunger, closes and the tip is caused to align with the longitudinal axis of the plunger thereby causing the spring formed by the notch and tip to be under tension.

The plunger is then turned counter clockwise whereby a part of the lower portion of projection of the needle assembly enters the notch in plunger projection
causing a portion of the side 60c and bottom 60b walls of the needle assembly projection to make removably locking contact with side 54c and bottom 54b walls of the plunger projection notch.

Counterclockwise turning of the plunger is continued causing the needle assembly projections 62 to disengage from the threaded groove 66 of barrel stem 69.

The plunger is then withdrawn until further withdrawal thereof is prevented by engagement of barrel wall stopping projections 76 and the upper surface of plunger disc 58.

At that time the tip 64b of needle 64a will have been drawn past projection 67 on the barrel and completely into the barrel cavity 71. The tension in the spring formed by plunger notch 55 and tip 53 is relieved, notch 55 opens and the tip 53 is thrown out of alignment with the plunger longitudinal axis whereby the needle assembly 3 will assume the same angle, relative to said axis, as the tip 53.

Any attempt to cause the needle 64a to be reextended will be frustrated by engagement of the needle tip 64b with the upper portion surface 65 of barrel projection 67.

It is to be understood that the directions or turning of the plunger to achieve the desired results may be reversed upon changing the position of the notch in the plunger projection 54a and side 54c and bottom 54b walls.
Furthermore, other means, as known in the art, may be used to prevent complete withdrawal of the plunger from the barrel.

The articles of the invention may be constructed of any materials known to the art which are compatible with the proposed contents and use of the apparatus.

Preferably the barrel will be constructed of transparent materials, to permit viewing the contents thereof, including glass and plastics such as polyethylene, polypropylene poly(methylpentene), and the like. If desired, the barrel and plunger may be constructed of different materials. For instance, the barrel may be constructed of poly(methylpentene) and the plunger of polypropylene.

The invention has been described in detail, with respect to specific embodiments. Modifications and variations may be made therein within the scope of the invention as defined by the following claims.
THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A disposable retractable needle syringe comprising a hollow barrel, disposed about a longitudinal axis, comprising an open proximal end, a substantially closed distal end, with a retractable needle extending outwardly, from the barrel, therethrough and means for releasably coupling said needle, in its outwardly extended condition, with said barrel distal end; plunger means, axially and reciprocally movable within said barrel, comprising locking means, at its distal end, to engage said needle, decouple it from said, and withdraw it into, said barrel and piston means spaced proximally from said locking means and sealing means to prevent leakage from the barrel; said plunger means further comprising spring means, at its distal end, to cause said needle to be canted relative to said longitudinal axis to prevent reextension of the needle through the distal end of the barrel after the needle has been fully drawn into the barrel; wherein said spring means comprises a resilient lever arm whose longitudinal axis is normally canted relative to the longitudinal axis of the barrel when said spring means and needle are not engaged.

2. The syringe of claim 1 wherein said plunger means and lever arm comprise a unitary article.

3. The syringe of claim 1 further comprising support means for said needle the support means and needle comprising a needle assembly.

4. The syringe of claim 3 wherein said needle support means comprises a hub comprising, at the distal end of its outer wall, means to removably engage said hub with complementary
engaging means on the barrel prior to and during use, and near the proximal end of its inner wall engaging means to engage said hub with complementary engaging means on the plunger, to disengage said assembly from the barrel and retract the assembly into said cavity to prevent reextension of the needle through the barrel distal opening.

5. The syringe of claim 3 wherein said support means and needle comprise a unitary article.

6. The syringe of claim 1 wherein said spring means comprises a cantilever spring which causes said lever arm to be canted relative to the longitudinal axis of the barrel when said spring is not compressed.

7. The syringe of claim 6 wherein said cantilever spring comprises a normally open compressible notch which causes said lever arm to be canted relative to the longitudinal axis of the plunger arm when said notch is open.

8. The syringe of claim 7 wherein
a) said lever arm comprises said needle assembly engaging means and said needle assembly engaging means comprises a first, triangular, distally-directed triangular projection on the wall of said lever arm opposite and displaced proximally from said notch, to engage complementary engaging means on the inner wall of the cavity of the needle assembly wherein the upper portion of said first projection is partially removed to provide a transverse surface, or shelf, extending partially through said projection, and a side wall rising from said shelf to the proximal transverse surface of the projection;
21

and b) said cooperating projections on the inside wall of the needle assembly cavity comprise at least two triangular, proximally directed projections on opposite sides of the cavity wall. The distal, transverse wall of which projection can engage the transverse wall of the cutaway portion of the first, triangular projection on the plunger head and the angular wall of the needle-containing assembly can engage the angular wall of said cutaway portion when removal of the needle-containing assembly from the stem and retraction into the barrel cavity is desired.

9. The article of claim 8 further comprising a second, triangular projection on the wall of the plunger tip opposite to the side on which the first projection is situated and spaced proximally from the notch in said tip, whose angular side wall can non-lockingly engage an angular side wall of a triangular projection in the cavity of the hub of the needle assembly to facilitate turning and locking of the needle assembly in the syringe assembly stem.

10. The syringe of claim 8 further comprising a thin arcuate projection, extending distally from the lever arm which is canted relative to the longitudinal axis of the barrel when the notch is open and aligned with said axis when the notch is closed.

11. The syringe of claim 1 wherein said sealing and piston means comprise a single unit.

12. The syringe of claim 1 wherein said sealing and piston means comprise separate units.

13. The syringe of claim 1 further comprising complementary
stopping means on the plunger and barrel to prevent withdrawal of the needle assembly from the barrel.

14. The syringe of claim 13 wherein said stopping means comprises indentations extending inwardly from the proximal portion of the barrel inner wall and annular flange means, spaced proximally from said sealing means, on said plunger means whose outer diameter is sufficient to abut said indentations when the upper portion of said plunger means is withdrawn from said cylinder.

15. The syringe of claim 13 wherein said stopping means on the plunger and said piston means comprise a single unit.

16. A method for using and safely disposing of a retractable syringe comprising a hollow barrel, disposed about a longitudinal axis, comprising an open proximal end, a substantially closed distal end, with a retractable needle extending outwardly, from the barrel, therethrough and means for releasably coupling said needle, in its outwardly extended condition, with said barrel distal end; plunger means, axially and reciprocally movable within said barrel, comprising locking means, at its distal end, to engage said needle, decouple it from said, and withdraw it into, said barrel and piston means spaced proximally from said locking means; said plunger means further comprising spring means, at its distal end, to cause said needle to be canted relative to said longitudinal axis to prevent reextension of the needle through the distal end of the barrel after the needle has been fully drawn thereinto wherein said spring means comprises a resilient layer and whose longitudinal axis is normally canted relative to said
longitudinal axis, when the spring means and needle are not engaged, said method comprising the steps of:

a) engaging the complementary engaging means on the lever arm and needle;

b) turning the plunger to disengage the complementary engaging means on the needle and barrel;

c) drawing the plunger proximally until the tip of the needle is in the barrel whereby the lever arm and needle are canted relative to the longitudinal axis of the barrel and the needle cannot be reextended through the distal opening thereof.

17. The method of claim 16 wherein said plunger means and lever arm comprise a unitary article.

18. The method of claim 17 further comprising support means for said needle.

19. The method of claim 18 wherein said support means and needle comprise a unitary needle assembly.

20. The method of claim 16 wherein said lever arm comprises a cantilever spring which causes said lever arm to be canted relative to the longitudinal axis of the barrel when said spring is not compressed.

21. The method of claim 20 wherein said cantilever spring comprises a compressible notch approximately normal to the longitudinal axis of the lever arm which causes said lever arm to be canted relative to the longitudinal axis of the plunger arm when said notch is open.

DATED this 31st day of October 1991

THE MEDTECH GROUP INC.

By their Patent Attorneys

CULLEN & CO.