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Patent Application of

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For

AN AUTO SAFETY SYRINGE

1. TECHNICAL FIELD OF THE INVENTION

The present invention relates in general to a novel automatic safety syringe, which has medical and industrial application. More particularly, the present invention pertains to a syringe which after injecting medication into a patient, or withdrawing fluids from a patient in medical field, or transfer of toxic materials in industrial field, or the like, is useful for automatically retracting the spent needle into its barrel, thereby avoiding the users from needle stick injuries.

2: BACKGROUND OF THE INVENTION

This invention more relates to medical equipment, and more particularly to a safety syringe designed to prevent accidental needle stick injuries by medical personnel, for example during injection of medication or drawing of a blood specimen of a patient.

The ever increasing spread of diseases transmitted by blood and other bodily fluids, such as Acquired Immune Deficiency Syndrome and Hepatitis B creates a real threat to medical personnel of accidental, inadvertent puncturing of the skin by an injecting needle which has been in contact with an infected patient and of the transmittal of the often fatal disease to the unfortunate medical attendant. Despite educational programs carried by many hospitals, accidents continue to happen with an unfortunate effect of medical personnel being infected through coming in contact with bodily fluids of a patient.

Various attempts on design have been made to resolve this problem such as: by complicated parts integration to retract or cover the spent needle manually or

automatically by fitting with complicated springy mechanisms, etc. However, most of prior arts are only on technical theory but do not work in practical production, for example: most of them are to fix a loosen coiled spring enclosing with a nude needle without cap into the barrel via the barrel's proximal opening end is impossible for economic production and thus, the needle tip is easy contaminated or/and damaged as well upon either manual or robotic assembling even. Moreover, some of them are too complicated involving too many mechanisms to assemble together forming a "robot" look-like rather than a disposable syringe, resulting commercially not viable finally. Furthermore, majority of existing automatic safety syringe's designs in the market are associated with a fixed unique needle hub which cannot allow the user to change another fresh needle after drawing up medication from a vial, for injection. (This is important in medical injection practice, because the old needle tip may be contaminated or damaged after penetrating into the rubber stopper of the vial.)

Presently and conventionally, the professional users usually more prefer to use luer lock disposable syringe than that of slip tip, because they feel more safe on that, and prefer to change their own preferable needle to use. Most of prior arts do not have this feature especially for those automatic retracting ones. Furthermore, some of prior art's application ways differ from the traditional disposable syringe's, or difficult to use requiring several steps in preparation of the syringe device for utilization, so far, have not found wide acceptance in the medical profession.

A number of patents disclose syringes or the like having needle protecting features, such as:

U.S. Pat. No. 4,592,744, Jagger et al., June 3, 1986, illustrates a disposable medical needle apparatus with a self-sheathing safety needle assembly. The self sheathing safety needle has a case with a small closed end and a large open end. A needle assembly is located within the case with the needle projecting through

the small closed end. A hub is connected to the needle assembly inside the case. The connector on the hub cooperates with a receiver on the small end to hold the needle assembly in the case. A flange on the hub cooperates with an inward projection in the case based from the small end to prevent movement of the needle out of the case when the needle is withdrawn from the opening in the small end. The nozzle of a syringe pushed into the hub withdraws the needle when the syringe is withdrawn. A rubber stopper on a vacuum tube withdraws the needle after the rubber stopper turns the flange to release the connector from the receiver.

U.S. Pat. Nos. 4,542,749, Caselgrandi et al., and 3,306,290, Weltman, disclose syringes with protected needle designs.

U.S. Pat. No. 4,774,964 discloses a device which is designed to withdraw blood from a patient. It is not a syringe per se. It is not used for injecting fluids into a patient. However, the device has the capacity to withdraw the needle into the barrel housing.

U.S.Pat. No. 6,033,386 diclose a device which involves different alternative methods to screw or turn the plunger for retraction of the needle after use.

U.S. Pat. No. 6,869,415 disclose a device which needle to be retracted by a tension spring.

The present invention contemplates elimination of drawbacks associated with prior art and provision of an improved and economic automatic safety syringe which is fitted with an independent compressed coiled spring, characterized in that it is easier assembling than a loosen coiled spring enclosed with a nude needle on economic and practical view. Most particularly, it includes a rubber luer lock which material is specifically mixed with latex free rubber and medical plastic, which is adapted to strengthen its hardness close to plastic characteristic, so as to let the users can use the traditional needle hub to lock in exactly like the

existing luer lock disposable syringe does if the users wishes to change their preferable needle for injection, and also it remains its elastic characteristic like rubber in order to avoid using one more component of rubber o-ring to avoid leakage which will increase the production cost. (Note from the inventor: Successful R&D luer lock sample can be provided for evidence if required.)

In conclusion, the present invention is particularly adapted for non-reusable and preventing the user from needle stick injuries as well after injection of medication or drawing blood from a patient and which application way is exactly the same as traditional disposable syringe which the users most prefer, with simple improved structural designs to manufacture, thereby minimizing the production cost practically for commercially viable, resulting to achieve minimizing the spread of diseases finally.

3. SUMMARY OF THE INVENTION

Accordingly, it is a primary object of the present invention to provide an automatic safety syringe by adding one specific rubber luer lock (which can be change of needle before use) with some specific structural designs on the plunger, in addition with a compressed coiled spring and a hard rubber valve, all of which are simple to assemble, so it is economic that the users can budget to buy and are able to avoid from being injured by the needle during the process of injection or drawing blood.

According to the most general aspect of the present invention there is provided a safety syringe comprising:

(a) a hollow elongated barrel means with a smaller distal opening at one end and a bigger proximal opening at other end;

(b) a traditional hollow needle carrier ended with a sharp tip engaged with a hub which the users can select to use is adapted to detachably engage at distal end of

the barrel means enabling to penetrating into human body for collecting fluid (usually is blood), which can be automatically retracted into the hollow barrel means after use in order to prevent needle stick injuries;

(c) a plunger which is adapted to fit within and move axially in the hollow barrel means; particularly in the present invention, includes a plunger head extending forwardly a loosen means attached to a male interlocking means at distal end, proximally locked with a shaft which includes safety features connecting to a gapped fragile portion in the midst and ended with a polygonal push button at proximal end;

(d) a soft rubber element which is adapted to associate with the plunger head to act as a piston, having a smaller distal opening at one end and a bigger proximal opening at other end, with a plurality of seals in parallel manner lying separately and externally at the midst thereon;

(e) an adaptor made of harder but elastic rubber material which is adapted to engage internally at the distal opening end of the barrel means where the hollow needle is screwed detachably therein, which when after use, to be interlocked with the male interlocking means of the plunger and can carry the hollow needle in a declination manner into the interior of barrel means upon retraction of the plunger.

(f) a spring which is coiled tightly without loosen gaps in between with a stronger structural ring at both distal end and proximal end respectively;

(g) a valve which is made of same harder rubber materials as the adaptor, adapted to fix internally at the proximal opening end of the barrel means wherein it includes a plurality of safety catches at proximal opening end internally, and a spring mounting structure externally at distal opening end to engage with the proximal end of the coiled spring and the spring's distal end is mounted onto the plunger head, so as to generate the tension force when the plunger is sliding axially within the barrel means.

Preferably, the barrel means comprising: a smaller distal opening with a protruding nose at one end and a bigger proximal opening with a finger grip at other end, lying a plurality of abutting means internally adjacent to the proximal opening end of the barrel means which are to fix the valve steadily within the barrel means, and one luer catch means located internally at one end of the protruding nose where a several linear female protuberances are disposed at the midst in vertical and separated manner spread evenly within the protruding nose therein.

Preferably, the plunger head has a female threaded structure to lock with the plunger shaft's male threaded structure wherein the gapped fragile portion of the plunger allowed to break, when the piston is trapped by the valve within the barrel means, thereby ensuring the syringe cannot be reused again, and the male interlocking means of the plunger head is supported by the loosen means to be inserted into a female interlocking means of the adaptor through a central hole therein, characterized in that the interior room of the female interlocking means is provided bigger than the male interlocking means and the central hole's diameter is bigger than the loosen means of the plunger head also, whereby the adaptor will be loosen and declined at its distal end with the needle mounted therein leaning against the inner wall of the barrel means when the adaptor is withdrawn out of the protruding nose into the interior of the barrel means upon retraction of the plunger.

Preferably, the adaptor is fixed snugly against the luer catch means within the interior of the protruding nose of the barrel means, including a threaded portion within, whereby the projected flange of the traditional needle hub can be screwed snugly and detachably into the adaptor therein, and a several male protuberances are disposed at the midst in vertical and separated manner spread evenly on the external surface of the adaptor, adapted to be abutted by the female protuberances of the protruding nose therein, whereby the adaptor will not be slippery towards

either direction of clockwise or anticlockwise, so that it indirectly increases the strength of the adaptor to receive the needle hub when the hub flange is being screwed into the adaptor therein.

Further preferably, the plunger is a cross-shaped flanged shaft wherein, the north and south flanges are disposed with several male safety latches along the midst of both edges, and the edges of both east and west flanges are with a plurality of male trapping latches adjacent to the fragile portion. The male safety latches of the shaft in association with the safety catches of the valve is adapted to disallow the shaft moving backward accidentally during the injection process, but can be released by turning the push button of the plunger about 90 degrees clockwise or anti-clockwise when the users attempt to automatically retract the spent needle after injection. After turning the plunger as above-said and when the needle retraction is finished, the male trapping latches of the plunger will be trapped by the safety catches of the valve disallowing the piston to move forward or backward within, and simultaneously break the plunger at the fragile portion therein, thereby ensuring the syringe is absolutely non-reusable and the spent needle is safe-guarded within the barrel means for avoiding any possible needle stick injuries thereafter.

4. BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings which illustrate a specific embodiment of the invention, but which should not be construed as restricting the spirit or scope of the invention in any way:

FIGS. 1a – 1h are perspective views illustrating the dismantled parts of an embodiment of an auto safety syringe comprises a hollow cylindrical shaped barrel (FIG. 1a), a plunger head (FIG. 1b), a cross-shaped flanged shaft (FIG. 1c), a rubber gasket (FIG. 1d), a rubber luer lock (FIG. 1e), a needle carrier (FIG. 1f), a compressed coiled spring (FIG. 1g) and a rubber valve (FIG. 1h) respectively.

FIG. 2a is a cross-sectional view illustrating the hollow cylindrical shaped barrel of the embodiment of the safety syringe, which includes: a finger grip, a proximal opening, a primary circular rim-like catch, a secondary circular rim-like catch, a base of the body, a luer catch, a protruding nose, a female protuberances and a distal opening.

FIG. 2b is a top sectional view illustrating how the female protuberances look like within the protruding nose of the barrel.

FIG. 3a is a cross-sectional view illustrating the rubber luer lock of the embodiment of the safety syringe which includes: a supporting seal, a central hole, a female interlocking notch, a nozzle, a nozzle lumen, a threaded portion and a male protuberances.

FIG. 3b is a top sectional view illustrating how the male protuberances with the rubber luer lock look like.

FIG. 4 is a top sectional view illustrating how its look like when the rubber luer lock is fixed within the protruding nose of the barrel.

FIG. 5 is a cross-sectional view illustrating the needle carrier which includes a needle hub, a hub flange, a needle holder, a hollow needle cannula with a sharp tip at the end.

FIG. 6a is a cross-sectional view illustrating one side of the plunger head which includes a proximal opening end, a female threaded portion, a spring notch, a piston supporting flange, a first piston flange, a second piston flange, a third piston flange, a tip supporting flange, a male interlocking tip and a tip head with a tip gap enclosed by a rubber gasket.

FIG. 6b is a top-sectional view illustrating the male interlocking tip ended with the tip head wherein the tip gap is in between.

FIG. 6c is a cross-sectional view illustrating another side of the plunger head which has no tip gap therein.

FIG. 7 is a cross-sectional view illustrating the coiled spring which includes a distal ring and a proximal ring at both ends respectively.

FIG. 8a is a cross-sectional view illustrating the rubber valve which includes a primary seal, a secondary seal, a spring notch, a proximal central hole, a plurality of internal safety catches and a distal central hole.

FIG. 8b is a top-sectional view illustrating how the safety catches related to the rubber valve within and within the barrel means as well.

FIG. 9a is a cross-sectional view illustrating one side of the plunger shaft which includes: a polygonal push button, a cross-shaped flanged shaft, a plurality of male safety latches, a plurality of male trapping latches, a fragile supporting flange, a gapped fragile portion, a shaft flange, extending further a section of shaft ended with a male threaded portion therein.

FIG. 9b is a cross-sectional view illustrating another side of the plunger shaft.

FIG. 9c is a top-sectional view illustrating the cross-shaped flange shaft attached to the polygonal push button.

FIG. 10 is a cross-sectional view illustrating the assembled manner of the automatic safety syringe when the rubber luer lock is fixed snugly within the protruding nose of the barrel, and the piston engaged with the flange shaft in co-alignment with the coiled spring and the rubber valve assembled within the barrel means.

FIG. 11 is a cross-sectional view illustrating the needle carrier is screwed into the rubber luer lock within the distal opening of the assembled safety syringe, and the piston has been assembled stopping close to the central opening of the adaptor when preparing to use.

FIG. 12a is a cross-sectional view illustrating the operational manner when drawing fluid, the piston is withdrawn close to the rubber valve, wherein the male safety latches of the plunger shaft are passing through the safety catches within the rubber valve.

FIG. 12b is an enlarged partial cross-sectional view illustrating the manner how the male safety latches of the plunger shaft are passing through the safety catches within the rubber valve.

FIG. 13 is an enlarged partial cross-sectional view illustrating the operational manner when after fully injection of the fluid, the male interlocking tip of the plunger is inserted through the central hole into the female interlocking notch which room and its central hole's inner diameter are specific bigger than the male interlocking tip as well as the supporting tip respectively, whereby both parts can be interlocked but the rubber luer lock can swing within the barrel after retraction.

FIG. 14 is a cross-sectional view illustrating the initial retraction manner when the push button is manually rotated about 90 degrees, the male safety latches of the plunger shaft will be also the same rotated to another side where it will not be engaged by the safety catches within the rubber valve during automatic retraction.

FIG. 15 is a cross-sectional view illustrating the final operation manner when the plunger shaft is automatically withdrawn, it retracts the rubber luer lock carrying the spent needle together into interior of the barrel means, characterized in that the needle tip is declined leaning against the inner wall of the barrel due to the swing manner of the rubber luer lock as mentioned in FIG. 13, and simultaneously, the male trapping latches which adjacent to the fragile portion are trapped tightly by the safety catches of the rubber valve, whereby the plunger shaft is disallowed to return, allowing to break at the gapped fragile portion therein.

Reference Numerals In Drawings:

10 hollow cylindrical shaped barrel (body)

11 finger grip

12 proximal opening end

13 primary circular rim-like catch

14 secondary circular rim-like catch

15 base of body

151 luer catch

16 protruding nose

17 female protuberance

18 distal opening end

20 plunger

20A plunger head

201 piston

21 push button

22 proximal section of cross-shaped flanged shaft

22A distal section of cross-shaped flanged shaft

221 male safety latches

221A distal rim

221B proximal rim

222 male trapping latches

223 male threaded portion

23 fragile supporting flange

231 shaft flange

24 fragile portion

241 fragile portion gap

242 fragile connectors

25 piston supporting flange

251 1st piston flange

252 2nd piston flange

253 3rd piston flange

254 tip supporting flange (loosen means)

26 arrow-shaped male interlocking tip

26A tip head

27 tip gap

28 proximal central hole

281 female threaded portion

282 spring notch

283 notch rim

30 rubber gasket

31 proximal seal

32 distal seal

33 central hole

40 needle carrier

41 needle hub flange

41A needle hub

42 hollow needle

43 needle tip

44 needle holder

50 rubber luer lock

51 supporting seal

52 proximal central hole

521 distal central hole

53 female interlocking notch

54 nozzle

55 nozzle lumen

56 threaded portion

57 male protuberance

60 compressed coiled spring

61 distal ring

62 proximal ring

70 rubber valve

71 primary seal

72 secondary seal

73 spring mounting structure (notch)

74 notch rim

75 distal central hole

76 proximal central hole

77 safety catch

77A distal rim

77B proximal rim

5. DETAILED DESCRIPTION OF THE DRAWINGS

Referring to the drawings, FIGS. 1a – 1h illustrate the perspective views of all dismantled components which make up an embodiment of the novel automatic safety syringe comprising a hollow barrel 10, a plunger shaft 20, a plunger head 20A, a rubber gasket 30, a hollow needle carrier 40, a rubber luer lock 50, a compressed coiled spring 60 and a rubber valve 70.

Barrel 10 (FIG. 1a) is a hollow elongated cylindrical shaped body having a smaller distal opening hole 18 with a protruding nose 16 disposed at one end and a bigger proximal opening end 12 at other end adjacent to a projected finger grip 11 therein. In proximity of proximal opening end 12 lying internally a primary circular rim-like catch 13 and a secondary circular rim-like catch 14 separately and in parallel at a specific distance with each other. A body base 15 lying with a circular rim-like luer catch 151 in proximity at the interior of protruding nose 16 which includes a several female linear protuberances 17 in vertical and separate manner spread evenly along the inner wall of protruding nose 16 therein. Plunger head 20A (FIG. 1b) has a central hole 28 at proximal end disposed internally with a female threaded portion 281, and externally lying with a circumferential spring

notch 282 between an uplifted rim 283 which declines towards the edge of central hole 28, and a piston supporting flange 25 in co-alignment with a first piston flange 251, a second piston flange 252 and a third piston flange 253 respectively, which extends outwardly a smaller tip-supporting flange 254 engaging with a bigger male interlocking tip 26 in arrow-shaped ended with a smaller round shaped tip head 26A wherein a gap 27 is disposed in between within tip 26 and tip head 26A. Plunger 20 (FIG. 1c) having an elongated cross-shaped flanged shaft 22 with a polygonal push button 21 at proximal end, connecting to a fragile portion supporting flange 23 in the midst co-aligned with a fragile portion 24 which has a gap 241 in between wherein a couple of fragile connectors 242 connecting to a shaft supporting flange 231 which extends another section of cross-shaped flanged shaft 22A ended with a male threaded portion at distal end, characterized in that both edges of north and south wings of shaft 22 are disposed with a several male safety latches 221 in row manner evenly between fragile portion supporting flange 23 and push button 21 wherein another pair of opposite east and west wings' edges of shaft 22 are plain and slippery, and both edges of east and west wings' edges of shaft 22A are with a plurality of male trapping latches 222 in row manner adjacent to shaft flange 231 wherein another pair of opposite north and south wings' edges are plain and slippery. Rubber gasket 30 (FIG. 1d) is a round shaped soft rubber body which acts as a main member of a piston 201 enclosing first piston flange 251, second piston flange 252 and third piston flange 253 of plunger head 20A underneath, disposed with a distal central hole 33 at one end, lying externally with a projected proximal seal 31 at other end, and a distal seal 32 in the proximity of central hole 33 therein. Rubber luer lock 50 (FIG. 1e) is a round shaped rubber body which is made of the medical rubber raw materials mixing with some medical plastic raw materials causing its characteristic is much more harder than existing common rubber but remains little elastic rubber characteristic. Luer lock 50 comprises a distal central hole 521

exposing a part of a hollow nozzle 54 with a nozzle lumen 55 at one end which elongation originated from the approximate midst within, and a proximal central hole 52 with a supporting seal 51 projected outwardly at other end. In the proximity of distal central hole 521 is disposed with a several male linear protuberances which are in vertical and separate manner spread evenly on the external surface of luer lock 50, wherein a threaded portion 56 is located at the inner wall of distal central hole 521. Internally, immediate to proximal opening hole 52 is disposed with a female interlocking notch 53 which dimension is bigger than male interlocking tip 26 of plunger head 20A therein, extending forwardly a hollow passage of nozzle lumen 55 within nozzle 54 therein (to be seen on FIG. 13). Needle carrier 40 (FIG. 1f) comprises a hollow needle 42 ended with a sharp tip 43 which other end is fixed with glue at a needle holder 44 penetrating a little bit within a needle hub 41A, adjacent to which proximal end is a projected hub flange 41 outwardly therein. Spring 60 (FIG. 1g) is a coil of tension spring compressed tightly without loosen gaps in between having a couple of end-rings 61 and 62 at both distal and proximal ends respectively. Rubber valve 70 (FIG. 1h) is a round shaped rubber body which is made of the rubber raw materials mixing with some plastic raw materials causing its characteristic is much more harder than existing common rubber but remains little elastic rubber characteristic, including a proximal hollow hole 76 disposed internally with a plurality of safety catches 77 at one end, and externally, lying a primary seal 71 declining downward to meet with a secondary seal 72, adjacent to which is a spring mounting notch 73 with its uplifted rim 74 therein, ended with a distal central hole 75.

FIG. 2a is a cross-sectional view of barrel 10 which has been detailed on FIG.1a. FIG. 2b is a top-sectional view illustrating female protuberances 17 spread in even manner along the interior of protruding nose 16 therein. FIG. 3a is a cross-

sectional view of luer lock 50 which has been detailed on FIG. 1e. FIG. 3b is a top-sectional view of the portion of luer lock 50 comprising distal central hole 521 with thread portion 56, male protuberances 57, nozzle 54 and nozzle lumen 55 therein. FIG. 4 is a top-sectional view of the portion of luer lock 50 when fixing into interior of protruding nose 16, characterized in that both male and female protuberances 17 & 57 are opposed with each other therein. FIG. 5 is a cross-sectional view of needle carrier 40 which has been detailed on FIG. 1f. FIG. 6a is a cross-sectional view of plunger head 20A enclosed by rubber gasket 30 to form up piston 201 which has been detailed on FIG. 1b and 1d. FIG. 6b is a top-sectional view of the portion of tip head 26A relating to male interlocking tip 26 with a gap 27 in between. FIG. 6c is a cross-sectional view of plunger head 20A on another side enclosed by rubber gasket 30, characterized in illustrating that tip 26 is plain and without gap 27 on this side. FIG. 7 is a cross-sectional view of coiled spring 60 which has been detailed on FIG. 1g. FIG. 8a is a cross-sectional view of rubber valve 70 which has been detailed on FIG. 1h. FIG. 8b is a top-sectional view of rubber valve 70 illustrating when fixing between proximal opening end 12 and primary catch 13 within barrel 10, characterized in that all safety catches 77 are disposed outwardly in parallel and row manner evenly along the north and south portion of proximal central hole's 76 inner wall, remaining the rest of east and west portion in plain and slippery manner therein. FIG. 9a is a cross-sectional view of plunger 20 on one side illustrating the north and south wings' edges of flanged shaft 22 are disposed with male safety latches 221, remaining the rest of east and west wings therein in plain and slippery manners, and similarly, male trapping latches 222 are only disposed on the edges of both east and west wings of flanged shaft 22A, which has been detailed on FIG. 1c. FIG. 9b is a cross-sectional view of plunger 20 on other side, characterized in that fragile connectors 242 are absence, leaving gap 241 within the area of fragile

portion 24 therein. FIG. 9c is a top-sectional view of flanged shaft 22 attached to polygonal push button 21 therein.

FIG. 10 is a cross-sectional view illustrating in assembled manner when luer lock 50 headed with supporting seal 51 is fixed snugly at interior of protruding nose 16 abutted by luer catch 151, and piston 201 which notch 282 locks against distal ring 61 of coiled spring 60 which proximal ring 62 is locked at notch 73 of rubber valve 70 which is externally fixed steadily at both catches 13 and 14 adjacent to proximal opening end 12 of barrel 10. Female threaded portion 281 of piston 201 supportably engaged with male threaded portion 223 of flanged shafts 22A & 22 in co-alignment with male trapping latches 222, fragile portion 24 and male safety latches 221 penetrated through proximal central hole 76 of rubber valve 70, and coiled spring 60 inserting into interior of barrel 10 as assembled in the factory upon production, characterized in that both wings of flanged shaft 22 comprising male safety latches 221 are being pushed towards the portions of safety catches 77 of rubber valve 70, and simultaneously both wings comprising male trapping latches 222 on flanged shaft 22A are towards the portions which are without safety catches 77 within rubber valve 70, wherein needle carrier 40 is standing by for operation.

FIG. 11 is a cross-sectional view of the finished assembled syringe when preparing to use, wherein needle hub flange 41 of needle carrier 40 is screwed snugly into distal central hole 521 of luer lock 50 along threaded portion 56 in the exact manner like screwing into existing disposable luer lock syringe with same tight feeling because luer lock 50 is made of mixture with rubber and plastic, causing its hardness like plastic characteristic, and simultaneously interior of needle hub 41A is mounted snugly onto nozzle 54 for avoiding leakage, wherein piston 201 has been pushed stopping in front of proximal opening hole 52 of luer

lock 50, characterized in that at this stage, male safety latches 221 of flanged shaft 22 have been trapped by safety catches 77 within rubber valve 70, whereby plunger 20 cannot be automatically moved backward solely by tension force of coiled spring 60 unless in additional with manual force to do so, this design is for securing the safety in case hollow needle 42 is still inside the human body and the user neglects to control plunger 20 during injection process due to any unforeseen reasons.

FIG. 12a is a cross-sectional view illustrating the drawing fluid manner like traditional disposable syringe does, withdrawing plunger 20 by manual force until obtaining the required amount of medication or fluid, then stop. FIG. 12b is an enlarged cross-sectional view illustrating the relationship between male safety latches 221 of flanged shaft 22 and safety catches 77 within rubber valve 70, characterized in that distal rim 221A of latch 221 is designed inclining towards proximal rim 221B, and oppositely, distal rim 77A of safety catch 77 is designed declining towards proximal rim 77B, whereby proximal rim 221B of latch 221 will meet more strong opposition from distal rim 77A of catch 77, so that latches 221 will be abutted by catches 77 when solely withdrawn by spring tension force, but under one circumstance that latch 221 can pass across catch 77 because of valve's 70 rubber elastic characteristic which will become softer when meeting additional manual force together with spring tension force. On contrary, when pushing plunger 20 for injection, declination of rim 221A of latch 221 when meeting with same declination of rim 77B of catch 77, causing latches 221 is easy to go across catches 77 therein.

FIG. 13 is an enlarge partial cross-sectional view illustrating the injection manner when plunger 20 is pushed at the extreme end within barrel 10, wherein inner diameter of central hole 52 is a bit smaller than outer diameter of male interlock-

ing tip 26, yet, due to a minor elastic rubber characteristic nature specifically exists in luer lock 50 and also tip head 26A is declining towards tip 26 additionally with a gap 27 to be pressed narrower, integrated causing male interlocking tip 26 can be inserted through central hole 52 into female interlocking notch 53 comfortably. Reversely, due to major hard plastic characteristic nature specifically exists in luer lock 50 and also base of tip 26 is flat, additionally, inner base of central hole 52 is flat also, such that tip 26 is difficult to return out of central hole 52, whereby tip 26 is trapped loosely within notch 53 accordingly.

FIG. 14 is a cross-sectional view illustrating the on-retraction manner when injection is finished, turning push button 21 about 90 degrees either towards clockwise or anti-clockwise direction, causing male safety latches 221 of flanged shaft 22 be turned to same direction towards the internal flat and slippery portions of central hole 76 of rubber valve 70, and oppositely the flat and slippery edges of flanged shaft 22 will go across safety catches 77 within rubber valve 70 instead, thereby avoiding the interruption of safety catches 77 therein, whereby the compression force of spring 60 will automatically retract piston 201 carrying together with luer lock 50 and needle carrier 40 into interior of barrel 10, characterized in that simultaneously, male trapping latches 222 of flanged shaft 22A are turned also being towards safety catches 77 of rubber valve 70.

FIG. 15 is a cross-sectional view illustrating the finished retraction manner when plunger 20 is fully withdrawn by compressed force from coiled spring 60 automatically, wherein male trapping latches 222 of flanged shaft 22A are abutted by safety catches 77 within central hole 76 of rubber valve 70, whereby flanged shaft 22A is trapped within barrel 10, allowing flanged shaft 22 to be pressed broken at fragile connectors 242 of fragile portion 24 into two pieces so as to save

the volume of rubbish bin when discarding besides further safeguard to prevent reusable again, simultaneously characterized in that further due to dimensions of both notch 53 and central hole 52 of luer lock 50 are bigger than that of tip 26 and tip supporting flange 254 of plunger head 20A respectively, which therefore cannot afford to support the weight of luer lock 50, causes luer lock 50 loosen declining at distal end resulting needle tip 43 of needle carrier 40 to lean against the inner wall of barrel 10. Under this circumstance, if attempting to push plunger 20 forward, needle tip 43 will be abutted by interior base 15, resulting bending and damaged at tip 43 within barrel 10, thereby further ensuring more safeguard to avoid the spent needle accidentally fallen off barrel 10 to cause needle stick injuries.

While the invention has been described in connection with what is presently considered to be the most practical and preferred embodiment, it is to be understood that the invention is not to be limited to the disclosed embodiment, but on the contrary, is intended to cover various modifications and equivalent arrangements included within the spirit and scope the appended claims.

CLAIMS

What is claimed is:

1. An auto safety syringe comprising:

(a) a hollow elongated barrel means including a protruding nose with a distal opening at one end and a finger grip adjacent to a proximal opening at other end, lying internally one or a plurality of abutting structures in the proximity of said proximal opening end, and one or a plurality of retaining structures located internally at one end of said protruding nose where a several female protuberances are disposed within inner wall of said protruding nose therein.

(b) a plunger which is adapted to fit within and move axially in said barrel means, includes a push button at proximal end, a shaft having one or a plurality of male safety structures connected to a fragile portion with a piston supported by a flange structure extending forwardly a loosen means attached to a male interlocking structure at distal end;

(c) an adaptor made of hard but elastic rubber material comprising: a distal central hole exposing a part of a hollow nozzle with a nozzle lumen at one end which is an elongation originated from the midst within, and a proximal central hole with a supporting seal structure projected externally at other end. In the proximity of said distal central hole is disposed with a several male protuberances on the external surface of said adaptor, wherein a threaded portion is located at the inner wall of said distal central hole. Internally, adjacent to said proximal opening hole is disposed with a female interlocking structure which dimension is bigger than said male interlocking structure of said plunger therein, extending forwardly a hollow passage within said nozzle opening fluid communications between said nozzle lumen of said adaptor or through the hollow needle if applied and interior chamber of said barrel means.

(d) a hollow rubber element having a distal opening at one end and a proximal opening at other end, with one or a plurality of seals lying in parallel separately and externally at the midst thereon;
(e) a hollow penetration means includes an elongated needle ended with a sharp distal tip at one end engaged with a hub extending a projected flange at other end adapted to detachably engage with said threaded portion of said adaptor enabling to penetrate into human body for injection or collecting fluid, which can be retracted into interior of said barrel means.
(f) a spring element which is in coil manner compressed tightly.
(g) a spring mounting member includes one or a plurality of structures to mount said spring element together with one or a plurality of female safety structures.

2. An auto safety syringe according to claim 1 wherein said retaining structure is to retain said adaptor within said protruding nose of said barrel means snugly and properly.

3. An auto safety syringe according to claim 1 wherein said female protuberances of said protruding nose matched with said male protuberances of said adaptor is to abut said adaptor to move either direction of clockwise or anticlockwise within said protruding nose when turning said need hub.

4. An auto safety syringe according to claim 1 wherein said female interlocking structure comprises a loose room headed with a smaller central opening hole within said adaptor is to receive said male interlocking structure aligning said loosen means of said plunger, and retain said male interlocking structure staying loose therein, characterized in that it causes said adaptor engaged together with said hollow penetration means to stay loose within said barrel means, so that said

sharp tip of said penetration means is abutted by bottom base within said barrel means.

5. An auto safety syringe according to claim 1 wherein said male safety structures of said shaft and said female safety structures of said spring mounting member are in nature of one or a plurality of protuberances, characterized in that inclination or declination of each said male protuberance and female protuberance is opposite to each other at each distal rim and proximal rim respectively.

6. An auto safety syringe according to claim 1 wherein said abutting structure is to abut said spring mounting member in or out of said barrel means.

7. An auto safety syringe according to claim 1 wherein said fragile portion of said plunger allowed to break therein.

8. An auto safety syringe according to claim 4 wherein said male interlocking structure comprises an arrow-shaped tip ended with a smaller tip head and a gap in between.

9. An auto safety syringe according to claim 4 wherein said loosen means of said plunger is a flange smaller in diameter than said central opening hole of said adaptor.

10. An auto safety syringe according to claim 5 wherein said male safety structure of said shaft is a male safety latch and a male trapping latch which are located on different sides of said shaft respectively, and said female safety structure of said spring mounting member is a safety catch.

11. An auto safety syringe comprising:

a hollow, axially elongated cylindrical barrel comprises a distal opening at one end with an interior base, and a proximal opening adapted with one or a plurality of abutting structures therein at other end;

a plunger which is adapted to fit within and move axially in said barrel, includes a push button at proximal end, a shaft having one or a plurality of male safety structures connected to a fragile structure with a piston extending forwardly a loosen means attached to a male interlocking structure at distal end;

an adaptor comprising: a female interlocking structure at one end, and a threaded portion is disposed centrally at other end;

a hollow needle with a sharp distal tip at one end engaged by a hub extending a project flange at other end;

a springy element comprises a distal end and a proximal end;

a spring mounting structure comprises one or a plurality of female safety structures.

Said springy element is engaged in between said spring mounting structure at one end, and said piston at other end within said barrel. Said adaptor is adapted to engage at said distal opening of said barrel, and said needle is engaged detachably at said threaded portion within said adaptor snugly, and said female interlocking structure of said adaptor is adapted to receive said male interlocking structure aligning said loosen means of said plunger, characterized in that said male interlocking structure is loose staying within, and can afford to pull said adaptor with said needle into interior of said barrel upon retraction of said plunger, in the manner that said adaptor declines together with said needle causing said needle tip leans on the inner wall of said barrel and is abutted by said base within. Additionally, said male safety structures of said plunger associate with said female safety structures of said spring mounting structures disallow said plunger be withdrawn automatically by the compression force from said springy element

unless manually operating on said push button or said plunger to do so. Furthermore, said female safety structures are able to trap said piston within said barrel disallowing to return upon final withdrawal of said plunger, and simultaneously, allowing said plunger to break at said fragile structure provided therein.