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SAFETY SYRINGE

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BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to a syringe, and more particularly to a syringe which comprises self-retractable needle design after the injection for added safety.

2. Description of Related Art

As shown in FIGS. 17 and 18, the existing safety syringe (Taiwan patent application 87219129) comprises an injector 1, a snapper 2 installed internally, a needle group 3 screwed into the snapper 2 and a movable push rod 4 within the injector 1. The injector 1 is internally fitted with a container 101, a self-retractable front-end hole 102 connected to the container 101 and a shoulder 103 located between the container 101 and front-end hole 102. The snapper 2 is provided with a disk 201 positioned on the shoulder 103, a cylinder 202 protruding coaxially from one side of the disk and an O-Ring 203 sleeved into the cylinder 202. Moreover, a flange 204 is mounted at the cylinder's 202 internal ring facing the axle and a threaded portion 205 at the other end. The needle group 3 is available with a needle stand 301 screwed into the threaded portion 205 and a needle body 302 fixed within the needle stand. Furthermore, the push rod 4 is provided with an operable rod 401, a piston 402 placed onto the rod 401 and sleeved air-tightly into the container 101 as well as a rabbet 403 that is installed externally (in reference to piston 402) and can be connected to the snapper 2 via the flange 204. A slot 404 is placed coaxially at the center of rabbet, thus offering an automatic elasticity to the rabbet 403. When the snapper 2 is sleeved into the container 101, cylinder 202 sleeved into the front-end hole 102, and disk 201 stopped by the shoulder 103, it is possible to make the push rod 4 insert into container 101 for stoppage of snapper 2 but the rabbet 403 cannot surpass the flange 204, and enable the snapper 2 to be positioned securely. Next, the

installation can be completed by screwing the needle stand 301 into the threaded portion 205 of snapper 2 from front-end hole 102 of the injector 1. In despite of above-specified intended applications of syringe, the following disadvantages occur during production and assembly:

1. As snapper 2 and O-Ring 203 are two individual components, two machines shall be required for the production and subsequent assembly, thus leading to an increased cost of configuration.

2. Owing to small size of O-Ring 203, manual assembly is rather difficult in practice. However, if it is installed mechanically, the natural elasticity of O-Ring is likely result in drop off and higher defective fraction. Also, in case machine is jammed by O-Ring 203, down time is likely to occur during maintenance.

3. During assembly, the push rod 4 is required to be inserted into the container 101 of injector 1 for stoppage of snapper 2, then the snapper 2 can be smoothly connected to the needle group 3, leading to inconvenient assembly without improved capacity.

4. The overall number of components is increased since O-Ring 203 is sleeved onto the snapper 2. Meanwhile, a slot 04 shall be placed at the center of rabbet 403 such that the rabbet 403 can pass through smoothly the flange 204.

5. As two stand-alone components, snapper 2 and needle stand 301 can only be fastened securely through assembly. And, snapper 2 is required to generate rotary movement in relation to needle stand 301, thus the needle stand 301 can be smoothly screwed into threaded portion 205 of snapper 2.

SUMMARY OF THE INVENTION

The major purpose of the present invention is to provide an easy-to-install safety

syringe, which can prevent the components from drop off during mechanical assembly for an improved capacity.

Another purpose of the present invention is to provide a safety syringe wherein the snapper is designed to result in automatic deviation of the needle body against exposure when the needle body is retracted into the injector.

The present invention is also aimed at offering a safety syringe wherein the snapper and needle group are incorporated to minimize the number of structural members and installation procedures.

The syringe of the present invention comprises an injector, a snapper installed internally, a needle group screwed into the snapper and a movable push rod within the injector. The major technological feature lies in a sealing member made of elastic materials, which is directly preformed onto the sleeve of snapper, and provided with an external section that is shaped outside of the sleeve and air-tightly locked into the inner wall of the injector container. Thus, when the push rod approaches the snapper coaxially, the rabbet is used for the connection of push rod and snapper.

The sealing member is available with many models, such as that covered only outside of the sleeve, or shaped by lower snapper, or upper/lower snapper, or upper threaded section/lower snapper. And, an oblique shoulder may be installed between lower snapper and hollow interior.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 shows an exploded view of the preferred embodiment of the present invention.

FIG. 2 shows a perspective view of the snapper of FIG. 1.

FIG. 3 shows an exploded view of the second preferred embodiment of the present invention.

FIG. 4 shows an exploded view of the third preferred embodiment of the present

invention.

FIG. 5 shows a perspective view of the snapper of FIG. 4.

FIG. 6 shows a cutaway view of the portion of line 4-4 of FIG. 4.

FIG. 7 shows a set of cutaway views of the installation of the snapper and needle group inside the injector.

FIG. 8 shows a schematic diagram on handling the push rod to fasten the rabbet in the snapper.

FIG. 9 shows another schematic diagram on pulling the push rod to retract the needle to the injector.

FIG. 10 shows a plane cutaway view of the snapper when operated with oblique shoulder.

FIG. 11 shows a schematic diagram of FIG. 10 on pulling the push rod to retract the needle to the injector.

FIG. 12 shows a plane exploded view of the fourth preferred embodiment of the present invention.

FIG. 13 shows a plane composition view of the fourth preferred embodiment of the present invention.

FIG. 14 shows a plane composition view of the fifth preferred embodiment of the present invention.

FIG. 15 shows a plane composition view of the variation of the fifth preferred embodiment of the present invention.

FIG. 16 shows a plane cutaway view of the one-piece installation of the push rod piston.

FIG. 17 shows a perspective exploded view of the existing safety syringe.

FIG. 18 shows the composition cutaway view of the safety syringe.

DETAILED DESCRIPTION OF THE INVENTION

The features and the advantages of the present invention is be more readily understood upon a thoughtful deliberation of the following detailed description of a preferred embodiment of the present invention with reference to the accompanying drawings.

As shown in FIGS. 1-2, a safety syringe embodied in the present invention comprises an injector 10, a snapper 20 installed within the injector 10, a needle group screwed into the snapper 20 and a movable push rod 40 within the injector 10.

The cylinder-shaped injector 10 is available with a tube 11 surrounding the axle L for definition of a container 111 and a self-retractable bound pipe 12 fastened onto one end of the tube 11. The bound pipe is internally provided with a small-sized aperture 121 connected to the container 111, while a stopper 13 and a groove 14 is placed at the joint of aperture and container 111.

Available with a sleeve 21 and a preformed sealing member 22 over the sleeve 21, the hollow tube-shaped snapper 20 is installed within the injector 10 from the opening of container 111 opposite to the aperture 121. And, the sleeve 21 is fitted with a disk 221 that can be fixed by the stopper 13. Made of elastic materials referred to as rubber in this example, the sealing member 22, is directly poured into the disk 221 of the outer sleeve 23, where the external diameter D of sealing member 22 is bigger than that of disk 221 of the corresponding sleeve 21. Thus, the sealing member 22 can insert into the groove 14 within injector 10 for elastic air tightness. Besides, the sleeve 21 is equipped with an upper pin joint 213 (an internal thread in this example) preformed into the hollow interior 210 and a lower snapper 215 (referred to as a spaced barb in this example).

The needle group 30 is available with a needle stand 31, a needle body 32 installed within the needle stand 31 and a cover 33 for the needle stand 31 and needle body 32.

Furthermore, with a snap ring 312 locked outside of the sleeve 21, the needle stand 31 is provided with a connector 311 that can be inserted into aperture 121 and linked to the upper pin joint 213.

The push rod 40, which inserts into the container 111 within the injector 10, is provided with an operable rod 41, a piston 42 mounted onto one end of the rod 41 and sleeved air-tightly into the container 111 as well as a rabbet 43 that is installed externally (in reference to piston 42) and can be locked into the lower snapper 215. When the rabbet is locked into the lower snapper 215, the push rod 40 and snapper 20 can be connected fixedly.

As shown in FIG. 3, a second safety syringe embodied in the present invention has a structure similar to the first one. The difference lies in the sealing member 22 with a lower snapper 216 within the sleeve 21, which can be used for the connection of the rabbet 43 of the push rod 40.

As shown in FIGS. 4-6, a third safety syringe embodied in the present invention comprises an injector 10, a snapper 20 installed within the injector 10, a needle group screwed into the snapper 20 and a movable push rod 40 within the injector 10.

The cylinder-shaped injector 10 is available with a tube 11 surrounding the axle L for definition of a container 111 and a self-retractable bound pipe 12 fastened onto one end of the tube 11. The bound pipe is internally provided with a small-sized aperture 121 connected to the container 111, while a stopper 13 and a groove 14 is placed at the joint of aperture and container 111.

Available with a sleeve 21 and a preformed sealing member 22 over the sleeve 21, the hollow tube-shaped snapper 20 is installed within the injector 10 from the opening of container 111 opposite to the aperture 121. The sleeve 21 is equipped with an outer sleeve 23 made of rigid plastics (referred to as PP material in this example) and an elastic member (referred to as rubber in this example) fixed within the outer sleeve 23.

And, the outer sleeve 23 is fitted with a disk 231 fixed by the stopper 13, a smaller circular tube 232 protruded from one side of the disk 231, an outer surface 233 surrounding axle L and corresponding to the disk 231 as well as an inner surface 234 opposite to the outer surface 233. The disk 231 is fitted with some radial channels 235 and some supporters 236 between the channels 235. The inner sleeve 24 provides a smooth flow via the help of channel 235 while the sealing member 22 extends inwards along with an inner ring surface 241 surrounding the axle L. The inner ring surface is provided with a first snapper 242 adjacent to container 111 and protruding towards axle L, a second snapper 243 opposite to the first snapper 242 and also protruding towards axle L, and a container 244 between the first/ second snapper 242, 243 and far from axle L as well as a shoulder 245 at the joint of first snapper 242 and container 244 along with a tapered guide member 246 adjacent to the container 111 and placed at one side of the first snapper 242. Made of elastic materials (referred to as rubber in this example), the sealing member 22 is directly poured into the disk 231 of the outer sleeve 23, where it can offer excellent binding effect to the disk 231 and inner sleeve 24 via the help of channel 235 (see FIG. 7), and enable inner sleeve 24 to be positioned fixedly via the help of supporter 236. Meanwhile, an outer ring can be placed onto the outer surface 233, while an inner ring is combined with inner sleeve 24, and the external diameter D of sealing member 22 is bigger than that of outer surface 233 of the corresponding outer sleeve 23.

The needle group 30 is available with a needle stand 31, a needle body 32 installed within the needle stand 31 and a cover 33 for the needle stand 31 and needle body 32. Furthermore, with a snap ring 312 that can be used for stoppage of the cover 33 outside of the circular tube 232, a needle stand 31 is externally provided with a connector 311 that can be inserted into aperture 121 and linked to the pin joint 331 within the container 233 by passing through the second snapper 243.

The push rod 40, which inserts into the container 111 within the injector 10, is

provided with an operable rod 41, a piston 42 mounted onto the rod 41 and placed air-tightly within the container 111 as well as a rabbet 43 that is installed externally (in reference to piston 42) and can be locked into the container 244 by passing through the first snapper 242. The minimum external diameter of the rabbet is bigger than the inner diameter of the first snapper 242. And, thanks to the material characteristics of inner sleeve 24, the rabbet 43 can be securely connected to the snapper 20 after passing through the first snapper 242.

During installation as shown in FIG. 7, firstly insert connector 311 of the needle group into the opening of circular tube 232 of the snapper 20, and enable the connector 311 to pass smoothly through the second snapper 243 via the material characteristics of inner sleeve 24, thus the needle group can be integrated with the snapper 20. Next, sleeve the snapper 20 and the covered needle 30 into the opening of the container 111 and subsequently into the injector 10, while align the needle body 32 and cover 33 with the aperture 121. When the sealing member 22 is sleeved into the groove 14 and the disk 231 fixed by the stopper 13, the snapper 20 and needle group 30 can be positioned within the injector 10. Finally, assembly can be finished by inserting one end of the push rod 40 fitted with piston 42 and rabbet 43 into the container 111, which can also be automatically finished without any possible separation of sealing member 22 and sleeve 21.

As shown in FIG. 8, when the injector is to be disposed after injection, the operator is only required to push the push rod 40 inwards the injector 10, whereby the rabbet can smoothly pass through the first snapper 242 until the container 244 via the help of material characteristics of inner sleeve 24, thus achieving the intended binding effect of push rod 40 and snapper 20; As shown in FIG. 9, when pulling the push rod 40 externally from the injector 10, the push rod 40 can activate the snapper 20 and needle group 30 to retract inwards the injector 10, until the needle body 32 and cover 33 are concealed within the injector. In such case, one can break the push rod 40 without any

danger of personal injury.

As shown in FIG. 10, inner sleeve 24' and inner ring surface 241' of the snapper 20' are available with an oblique shoulder 245' between the first snapper 242' and container 244'. The first snapper 242' is provided with an inclined hole 247' surrounding an inclined axle L', which has approx. 20 degree with the axle L and runs perpendicular to the inclined shoulder 245'. As shown in FIG. 11, when the push rod 40 is connected to the snapper 20' via the help of rabbet 43, the configuration of inclined hole 247' can enable the rabbet 43 to squeeze unilaterally the inner sleeve 24' outwards. Meanwhile, owing to the limitation of injector 10 upon the sealing member 22', the original pressure for unilateral squeeze can be released when the push rod 40 moves outwards from the injector 10 (remove the cover firstly). And, owing to the material characteristics of inner sleeve 24' and the presence of inclined hole 247' and inclined shoulder 245', an overall deviation can occur when the snapper 20' and the needle body 32' retract into the injector 10 (in such case the inclined hole 427' can be deformed due to the squeeze of rabbet 43). Finally, break the push rod 40 once the needle body 32 arrives at the stopper 13, thus avoiding the possible exposure of needle body 32.

As shown in FIGS. 12-13, a fourth safety syringe embodied in the present invention also comprises an injector 10, a snapper 20 installed within the injector 10, a needle group 30 screwed into the snapper 20 and a movable push rod 40 within the injector 10, of which the injector 10 and push rod 40 have the same structure as that in the third example. The features of the snapper 20 and needle group 30 are described below:

The difference lies in that the sealing member 22 is designed with both an internal threaded section 217 within the sleeve 21 and a lower snapper 216. So, the needle stand 31, which is provided with an outer threaded section 311, can be installed within the internal threaded section 217 while the lower snapper 216 can be used for the connection of rabbet 43 of the push rod 40.

As shown in FIG. 14, a fifth safety syringe embodied in the present invention also comprises an injector 10", a snapper 20" installed within the injector 10", a needle group 30" screwed into the snapper 20" and a movable push rod 40" within the injector 10", of which the injector 10" and push rod 40" have the same structure as that in the third example. The following are the features of the snapper 20" and needle body 30":

The snapper 20" is fitted with a sleeve 21", a performed sealing member 22" over the sleeve 21" and an integrated needle stand 25". The sleeve 21" is equipped with an outer sleeve 23" made of rigid plastics and an elastic inner sleeve 24" fixed within the outer sleeve 23". And, the outer sleeve 23" is fitted with a disk 231" fixed by the stopper 13", a smaller circular tube 232" protruded from the disk 231", an outer surface 233" surrounding axle L and corresponding to the disk 231" as well as an inner surface 234 opposite to the outer surface 233". The disk 231" is preinstalled with some radial channels 235" while the inner sleeve 24" is provided with an inner ring surface 241" surrounding the axle L. The inner ring surface is provided with a snapper 242" adjacent to container 111" and protruding towards axle L, a container 244" at one side of the snapper 242" and far from axle L. Made of rubber material, the sealing member 22" is directly poured into the channel 235". Moreover, and an outer ring can be placed onto the outer ring surface 233", while an inner ring is combined with inner sleeve 24", and the external diameter D of sealing member 22" is bigger than that of outer ring surface 233" of the corresponding outer sleeve 23".

The needle body 30" is directly fastened onto the needle stand 25" of the snapper 20", and protruded outside of the injector 10".

So, the fifth application example embodied in the present invention has incorporated a sleeve 21", a sealing member 22" and a needle stand 25", thereby minimizing the structural members and inconvenient production or assembly. The installation can be easily finished by inserting the needle body 30" into the needle stand 25". Comparatively, the existing syringe can be screwed only after rotating the needle

stand and snapper, so the present invention can virtually simplify the installation procedure with its reduced components.

The syringe shown in FIG. 15 is similar to the fifth application example, with the difference depending on: the inner sleeve 54 and inner ring surface 541 of the snapper 50 are also provided with an inclined shoulder 545 between the snapper 542 and container 544. And, the snapper 542 is available with an inclined hole 547 surrounding an inclined axle L, which runs perpendicular to the inclined shoulder 545. When the snapper 50 and needle body 60 retract into the injector, the needle body 60 without exposure can be guaranteed (similar to FIG. 11).

As shown in FIG. 16 for a universal application structure, the piston 42 of the push rod 40 is directly preformed into one end of the push rod 40, where a circular convex rib 421 is provided for a reliable binding effect.

In sum, the safety syringe embodied in the present invention has the following advantages:

1. As two integrated members, the sealing member 22 and sleeve 21 are internally provided with a snapper, thus offering rather convenient fabrication and assembly with simplified structure. And, thanks to the property of elastic sealing member 22, the rabbet 43 and connector 311 can be smoothly installed and securely fastened.
2. As an integral part of the same structural member, sealing member 22 and sleeve 21 can be fabricated by a single machine without any additional assembly, thereby saving the cost of configuration accordingly.
3. Either mechanical or manual assembly is not required because the sealing member 22 is preformed onto the sleeve 21 for improved cost-effectiveness. Also, benefited from the integral mechanical installation, the sealing member 22 does not generate any drop off, thus promoting the efficiency with reduced defective fraction and down time.

4. It is required to, during assembly, firstly combine the snapper 20 and needle group 30, and then position them into the injector 10. This process can be finished in an easy and fast way, thus improving the capacity to a greater extent.

5. The structural members can be minimized as sealing member 22 is directly preformed onto the sleeve 21. And, thanks to the material characteristics of the inner sleeve 24, no slot shall be additionally required for the rabbet 43. In practice, installation can be finished synchronously by the same machine.

6. The outer sleeve 23 and supporter 236 made of PP materials can be used to support the inner sleeve 24 and sealing member 22 made of rubber, thus serving the purpose of reliable connection and retraction when the rabbet 43 of push rod 40 is sleeved into the snapper 20.

In short, the safety syringe in the present invention has closely incorporated the elastic sealing member and sleeve, thus yielding air-tightness and improving the installation and capacity in an easy and cost-effective manner.

CLAIMS

I CLAIM:

1. A safety syringe comprises an injector with a bound pipe, where an aperture at the center is open to an internal container; a push rod, which is inserted into the container of injector via a piston with a rabbet; the snapper with a hollow sleeve can be locked into the aperture of injector's bound pipe. And, the sleeve is fitted with an upper pin joint and a lower snapper over the hollow interior, such that the needle stand is provided with a connector over the upper pin joint, and the lower snapper is provided for the linkage of push rod's rabbet. A needle group is composed of a needle stand and a needle body, of which the needle stand is mounted onto the exterior of sleeve of the snapper. The improvement lies in:

A sealing member of elastic materials is preformed onto the sleeve of the snapper, and provided with an external section that is shaped outside of the sleeve and air-tightly locked into the inner wall of the injector container.

2. The safety syringe defined in Claim 1, wherein an inclined shoulder is mounted between the lower snapper and hollow interior of said sleeve.

3. The safety syringe defined in Claim 1, wherein said push rod's piston is directly preformed into one end of the push rod.

4. A safety syringe comprises an injector with a bound pipe, where an aperture at the center is open to an internal container; a push rod, which is inserted into the container of injector via a piston with a rabbet; The snapper with a hollow sleeve can be locked into the aperture of injector's bound pipe. And, the sleeve is fitted with an upper

pin joint over the hollow interior. A needles group is composed of a needle stand and a needle body, of which the needle stand is provided with a connector for the linkage of the upper pin joint of the sleeve. The improvement lies in:

A sealing member made of elastic materials is preformed onto the sleeve of the snapper, and provided with an external section that is shaped outside of the sleeve and air-tightly locked into the inner wall of the injector container. And, the sealing member is fitted with a lower snapper within the sleeve for the pin joint of the push rod' rabbet.

5. The safety syringe defined in Claim 4, wherein an inclined shoulder is mounted between the lower snapper and hollow interior of said sleeve.

6. The safety syringe defined in Claim 4, wherein said push rod's piston is directly preformed into one end of the push rod.

7. A safety syringe comprises an injector with a bound pipe, where an aperture at the center is open to an internal container; a push rod, which is inserted into the container of injector via a piston with a rabbet; The snapper with a hollow sleeve can be locked into the aperture of injector's bound pipe. A needle group is composed of a needle stand and a needle body, of which the needle stand can be mounted onto the exterior of sleeve of the snapper. The improvement lies in:

A sealing member made of elastic materials is preformed onto the sleeve of the snapper, and provided with an external section that is shaped outside of the sleeve and air-tightly locked into the inner wall of the injector container. And, the sealing member is fitted with an upper and lower snapper within the sleeve, such that the needle stand is provided with a connector over the upper pin joint, and the lower snapper is provided for the linkage of push rod's rabbet.

8. The safety syringe defined in Claim 7, wherein an inclined shoulder is mounted between the lower snapper and hollow interior of said sleeve.

9. The safety syringe defined in Claim 7, wherein said push rod's piston is directly preformed into one end of the push rod.

10. A safety syringe comprises an injector with a bound pipe, where an aperture at the center is open to an internal container; a push rod, which is inserted into the container of injector via a piston with a rabbet; The snapper with a hollow sleeve can be locked into the aperture of injector's bound pipe. A group of needle group is composed of a needle stand and a needle body, of which the needle stand is mounted onto the exterior of sleeve of the snapper. The improvement lies in:

A sealing member made of elastic materials is preformed onto the sleeve of the snapper, and provided with an external section that is shaped outside of the sleeve and air-tightly locked into the inner wall of the injector container. And, the sealing member is fitted with an internal threaded section and a lower snapper within the sleeve, such that the needle stand is provided with an external threaded section for connection to the internal threaded section, and the lower snapper is provided for the linkage of push rod's rabbet.

11. The safety syringe defined in Claim 10, wherein an inclined shoulder is mounted between the lower snapper and hollow interior of said sleeve.

12. The safety syringe defined in Claim 10, wherein said push rod's piston is directly preformed into one end of the push rod.

13. A safety syringe comprises an injector with a bound pipe, where an aperture

at the center is open to an internal container; a push rod, which is inserted into the container of injector via a piston with a rabbet; The snapper with a hollow sleeve can be locked into the aperture of injector's bound pipe. A group of needle group is composed of a needle stand and a needle body, of which the needle stand is mounted onto the exterior of sleeve of the snapper. The improvement lies in:

A sealing member made of elastic materials is preformed onto the sleeve of the snapper, and provided with an external section that is shaped outside of the sleeve and air-tightly locked into the inner wall of the injector container. And, the sealing member is fitted with a lower snapper within the sleeve for the linkage of push rod's rabbet.

14. The safety syringe defined in Claim 13, wherein an inclined shoulder is mounted between the lower snapper and hollow interior of said sleeve.

15. The safety syringe defined in Claim 13, wherein said push rod's piston is directly preformed into one end of the push rod.