Title: DISPOSABLE SAFETY SYRINGE INCLUDING AN AUTOMATICALLY RETRACTABLE NEEDLE

Abstract: The present invention relates to a disposable safety syringe including an automatically retractable needle for preventing said syringe from being reused, comprising a cylindric body defining, at one end thereof, a needle coupling end-piece and being opened at the other end portion thereof for introducing thereinto a piston having a sealing gasket. The main feature of the invention is that on said piston are provided engaging means for engaging and retracting the needle after the delivering of the injection liquid.
DESCRIPTION

DISPOSABLE SAFETY SYRINGE INCLUDING AN AUTOMATICALLY RETRACTABLE NEEDLE

BACKGROUND OF THE INVENTION

The present invention relates to a disposable safety syringe, including an automatically retractable needle, for preventing the syringe from being reused.

As is known, a main problem of disposable syringes is that deriving from a possibility of reusing said syringes and a possibility that the syringe needle can accidentally prick the operator of the syringe.

For solving the above mentioned problem, safety syringes have been already constructed, in which are provided resilient means, operating between the syringe body and plunger, so as to cause the syringe needle to be automatically retracted, after having being used, since the syringe plunger is resiliently withdrawn from the syringe body.

Such a solution, however, has not been found as practical, since, during a regular use of the syringe, it is necessary to overcome the resilient urging force provided by the spring, and which must be of a comparatively high value, in order to assure a satisfactory withdrawing of the needle but which actually hinders a proper use by the operator.

SUMMARY OF THE INVENTION

Accordingly, the aim of the present invention is to overcome the above mentioned
drawbacks, by providing a disposable safety syringe, including an automatically retractable needle, for preventing the syringe from being reused, and allowing the syringe needle to be automatically retracted into the syringe body by resilient means which are inoperative during a regular use of the syringe.

Within the scope of the above mentioned aim, a main object of the present invention is to provide such a disposable safety syringe the needle of which can be retracted by very simple and efficient retracting means.

Another object of the present invention is to provide such a disposable safety syringe which, owing to its specifically designed constructional features, is very reliable and safe in operation.

Yet another object of the present invention is to provide such a disposable safety syringe which can be easily made starting from easily available elements and materials and which, moreover, is very competitive from a mere economic standpoint.

According to one aspect of the present invention, the above mentioned aim and objects, as well as yet other objects, which will become more apparent hereinafter, are achieved by a disposable safety syringe including an automatically retractable needle, said syringe comprising a syringe cylindric body defining, at one end portion thereof, an end piece for coupling the syringe needle and being opened, at the other end portion thereof, for receiving a syringe plunger including a sealing gasket, characterized in that said syringe further
comprises, on said syringe plunger, engaging means for engaging and retracting said needle, after having delivered the injection liquid.

**BRIEF DESCRIPTION OF THE DRAWINGS**

Further characteristics and advantages of the present invention will become more apparent hereinafter from the following detailed disclosure of a preferred, though not exclusive, embodiment of a disposable safety syringe including an automatically retractable needle for preventing the syringe from being reused, and being illustrated, by way of an indicative but not limitative example, in the accompanying drawings, where:

Figure 1 is a schematic exploded view illustrating the disposable safety syringe according to the present invention;

Figure 2 is a cross-sectional view of the syringe illustrating said syringe in a use condition thereof;

Figure 3 is a schematic view illustrating the end step of the injectable liquid delivering operation;

Figure 4 illustrates, on an enlarged scale, the position assumed by the needle and plunger of figure 2;

Figure 5 illustrates, on an enlarged scale, the position of the syringe needle and plunger or piston in the condition shown in figure 3; and

Figure 6 is a schematic view illustrating the retracting operation for retracting the syringe needle being performed by resilient means.
DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to the number references of the above mentioned figures, the disposable safety syringe, including a retractable needle, according to the present invention, which has been generally indicated by the reference number 1, comprises a syringe cylindric body 2, defining an inner chamber 3, in which a syringe piston or plunger can slide, said syringe plunger or piston being indicated by the reference number 4 and including a sealing front gasket 5 having a central opening 6, as it will become more apparent hereinafter.

Making now reference to the syringe constructional details, the syringe cylindric body 2 is provided, at one end portion thereof, with an end piece 7, thereon is applied a cap 8, housing in its inside a barrel element 11 which, at one end thereof, is coupled to a syringe needle 12 and, at the other end thereof, comprises resiliently spreadable wings, generally indicated by the reference number 13.

Said wings comprise a tapering portion 14 at their free end, adjoining cut-outs 16 ending with a tooth element 17, abutting against an abutment ring element 18 provided in the attachment region of the end-piece 7.

On the outer surface of the end-piece 7 are provided a plurality of slots 7a for improving the engagement of the cap 8.

Moreover, a further cut-out 16a is provided, which has a curved configuration, so as to substantially prevent the syringe needle from being re-engaged in the mentioned cap as it is withdrawn.
As shown, the cap 8 comprises a cylindric surface 19, therein said barrel element 11 is engaged for providing the required sealing.

The syringe plunger 4 defines, according to a feature of the invention, an axial cavity 20 which, at its portions thereat said gasket 5 is arranged, comprises a stop abutment 21 engaging, as the syringe is used, with an abutment element 22 defined by a nose 23 having clamping elements 24 which can be engaged with the mentioned resilient wings, as it will become more apparent hereinafter.

The nose 23 is coupled to recovering resilient means 30, housed in said axial cavity 20 and which, at the other end portion thereof, engages with a pawl, which can be locked at the flanged end portion 32 of the syringe plunger 30.

With the disclosed arrangement, the nose 23 projects from said central hole or opening 6 and is restrained in a stop abutment position by the stop abutment 21 engaging with the abutment 22.

As the syringe is used, and as shown in figures 2 and 4, the syringe plunger will perform its operating stroke to inject the injection liquid.

Under such a condition, the syringe needle is firmly held in its position due to the provision of the cap 8 and because of the engagement of the engagement of the tooth elements 17 with the locking abutment 18.

At the end of the injection, the clamping elements 24 of the nose 23, by engaging with the tapering portions 14, will cause the wings 13 to be radially contracted, thereby disengaging the tooth
elements 17 from the abutment 18, so as to allow the syringe needle to be disengaged from the mentioned cap.

Moreover, the nose 23 can disengage from the stop abutments 21, under a pushing force, and owing to the provision of the return spring 30, causing the needle to be immediately retracted, inside the axial cavity 20, as is clearly shown in figure 6.

In such a condition, the syringe cannot be absolutely reused.

Moreover, the needle will be arranged at a protected region thereby preventing any inuring to the syringe operator.

From the above disclosure it should be apparent that the invention fully achieves the intended aim and objects.

In particular, it is pointed out that a safety disposable syringe has been provided which, while having a very simple construction, allows the syringe needle to be automatically retracted upon the injection.

The invention, as disclosed, is susceptible to several modifications and variations, all of which will come within the scope of the invention.

Moreover, all of the constructional details can be replaced by other technically equivalent elements, depending on requirements.
CLAIMS

1. A disposable safety syringe including an automatically retractable needle, said syringe comprising a syringe cylindric body defining, at one end portion thereof, an end piece for coupling the syringe needle and being opened, at the other end portion thereof, for receiving a syringe plunger including a sealing gasket, characterized in that said syringe further comprises, on said syringe plunger, engaging means for engaging and retracting said needle, after having delivered the injection liquid.

2. A disposable safety syringe, according to the preceding claim, characterized in that said engaging and retracting means comprise a nose house inside an axial cavity formed on said syringe plunger, and that said nose can be coupled to said syringe needle and is connected to a return spring arranged in an axial cavity.

3. A disposable safety syringe, according to the preceding claims, characterized in that said syringe needle is coupled to a barrel element including resilient wings having, at their end portions, a tapering portion adjoining a cut-out delimited by an abutment tooth element in order to prevent said needle from being retracted, said abutment tooth element being coupled to a locking abutment element.

4. A disposable safety syringe, according to one or more of the preceding claims, characterized in that said barrel element is housed inside a cap
which can be pressure coupled to an end piece and that said cap defines, in its inside, a cylindric portion which can be tightly engaged with said barrel element.

5. A disposable safety syringe, according to one or more of the preceding claims, characterized in that said engaging and retracting means comprise a stop abutment provided in an axial cavity and engageable with an abutment formed by a nose including clamping elements which can be engaged with resiliently yieldable wings.

6. A disposable safety syringe, according to one or more of the preceding claims, characterized in that said nose projects from an opening defined by said plunger gasket and that said spring is resiliently preloaded for retracting said needle at the end of the injection liquid delivery operation.

7. A disposable safety syringe, according to one or more of the preceding claims, characterized in that at least one of the cut-outs defined on said resilient wings is curved so as to cause said needle to be arranged with a slanted orientation and for preventing said needle from exiting again.

8. A disposable safety syringe including an automatically retractable needle for preventing said syringe from being reused, characterized in that said syringe comprises one or more of the disclosed and/or illustrated features.