Title: Disposable safety syringe

The present invention relates to a disposable so-called safety syringe.

Disposable syringes that must be discarded after use have been developed to prevent contamination: such syringes generally include a pump body attached to the needle protected by a sheath before use. However, it has been realised that it is possible to refill these syringes and therefore to reuse them, whence serious risks of contamination.

One example of a disposable hypodermic syringe is described in the document US-A-5.045.064. The syringe described includes valve means consisting of a stud mobile along a threaded shaft, a diaphragm between the stud and the needle. During an injection, the liquid to be injected, pushed by the plunger, entrains the stud by rotation along the diaphragm which traps it but allows the liquid to pass through it.

The syringe can therefore be used again if the stud does not cooperate with the diaphragm.

Also, one aim of the present invention is to provide a disposable so-called safety syringe that cannot be refilled after it is first used.

Another object of the invention is to provide a syringe of this kind which can be manufactured easily and at lower additional cost compared to existing disposable syringes.

The above objects, and others that will become apparent hereinafter, are achieved by a disposable so-called safety syringe including a cylindrical pump body which is extended by a needle fastened to the body and which includes a plunger and a proximal part fitted with the needle and a distal part of larger diameter including the plunger, the proximal part including valve means, characterised in that the valve means comprise, on the one hand, a fixed member fastened to the inside wall of the

proximal part and a mobile member between the fixed member and the outlet from the distal part into the proximal part, the mobile member consisting of a valve connected by a compression leaf spring one end of which is fastened to the base of the valve and the other end of which is fastened to the inside wall of the proximal part of the pump body.

The fixed member advantageously consists of at least one abutment fastened to the inside wall of the proximal part of the pump body.

In a preferred embodiment of the invention the fixed member includes at least two abutments regularly distributed on a common circle and fastened to the inside wall of the proximal part.

The valve is advantageously of cylindrical-conical shape, the conical part being directed towards the distal part of the pump body and the cylindrical part including the propulsion means such as fins disposed at its periphery.

The following description, which is not limiting on the invention, must be read in conjunction with the accompanying drawings, in which:

- figure 1 is a plan view of a disposable so-called safety syringe in accordance with the present invention;

- figure 2 is a view in section taken along the line II-II in figure 1, before any use of the syringe; and

- figure 3 is a view in section taken along the line II-II in figure 1 after filling the syringe.

As can be seen in the figures, a syringe includes a cylindrical pump body 1 fitted with a plunger 2 and a needle 3 fastened to the pump body 1.

The pump body 1 has a proximal part 4 carrying the needle 3 and a distal part 5 of larger diameter containing the plunger 2; the proximal part 4 includes valve means.

The skilled person is aware that "proximal" refers to any part at the needle end and "distal" refers to any part at the plunger end.

The valve means comprise, on the one hand, a fixed member 6 fastened to the inside wall of the proximal part 4 and a mobile member 7 that can move between this fixed member 6 and the outlet 8 of the distal part 5 into the proximal part 4.

The fixed member 6 consists of at least one abutment fastened to the inside wall of the proximal part 4 of the pump body 1. In a preferred embodiment, the fixed member 6 consists of two abutments 6a and 6b disposed symmetrically on a common circle on the inside wall of the proximal part 4.

In accordance with the present invention, the mobile member consists of a valve 7 connected by pressure means 9 to the inside wall of the proximal part 4. The valve 7 is of cylindrical-conical shape, the conical part 7a being directed towards the distal part 5 of the pump body 1 and the cylindrical part 7b including propulsion means such as fins 10 disposed at its periphery.

The pressure means preferably consist of a leaf spring 9 one end of which is fastened to the base of the valve 7 and the other end of which is fastened to the inside wall of the proximal part 4 of the pump body 1, for example in the vicinity of the fixing of the needle 3 therein: the leaf spring is of the compression type.

When the syringe is empty, the valve 7 is held in position by the fins 10 cooperating with the abutments 6a and 6b, as shown in figure 2, the leaf spring holding the valve 7 pressed against the abutments. On actuating the plunger 2 to fill the syringe, the aspirated liquid enters the needle 3 and then the proximal part 4 without lifting the valve 7 off the abutments 6a and 6b which form a seat, due in particular to the shape of the fins 10, so that it is able to enter the distal part 5 to the required level.

During injection, the liquid pushed by the plunger 2 creates a flow that exerts on the fins 10 of the valve 7 a force propelling the latter towards the outlet from the distal part 5 into the proximal part 4, the leaf spring 9 also contributing to this same movement. The thrust of the plunger 2 nevertheless remains sufficiently high to counterbalance positively the propulsion force exerted on the valve 7.

When the injection is completed, the valve 7 is pressed against the outlet from the distal part 5 into the proximal part 4 by the leaf spring 9, and is held pressed against it: it is therefore impossible to aspirate a liquid and thereby reuse a syringe in accordance with the present invention.

CLAIMS

1. A disposable so-called safety syringe including a cylindrical pump body (1) which is extended by a needle (3) fastened to said body (1) and which includes a plunger (2) and a proximal part (4) fitted with said needle (3) and a distal part (5) of larger diameter including said plunger (2), said maximal [sic] part (4) including valve means, characterised in that said valve means comprise, on the one hand, a fixed member (6) fastened to the inside wall of the proximal part (4) and a mobile member (7) between said fixed member (6) and the outlet (8) from the distal part (5) into said proximal part (4), said mobile member consisting of a valve (7) connected by a compression leaf spring (9) one end of which is fastened to the base of said valve (7) and the other end of which is fastened to the inside wall of said proximal part (4) of the pump body (1).

2. A syringe according to claim 1, characterised in that the fixed member (6) consists of at least one abutment fastened to the inside wall of the proximal part (4) of the pump body (1).

3. A syringe according to claim 2, characterised in that the fixed member includes at least two abutments (6a, 6b) regularly distributed on a common circle and fastened to the inside wall of the proximal part (4).

4. A syringe according to claim 3, characterised in that the valve (7) is of cylindrical-conical shape, the conical part (7a) being directed towards the distal part (5) of the pump body (1) and the cylindrical part (7b) including the propulsion means such as fins (10) disposed at its periphery.