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PISTON SYRINGE FOR MEDICAL USE

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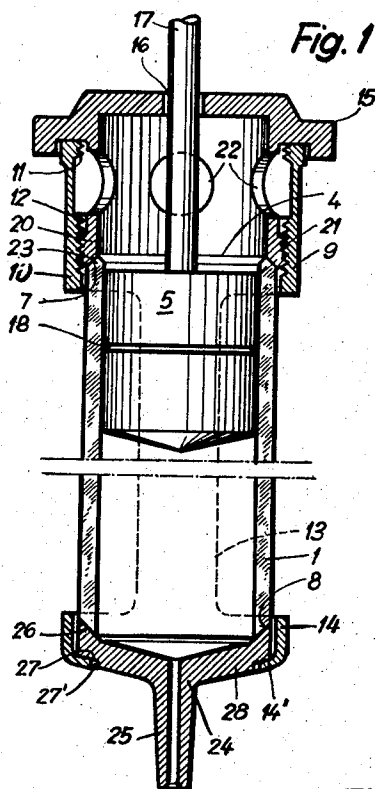


Fig. 1

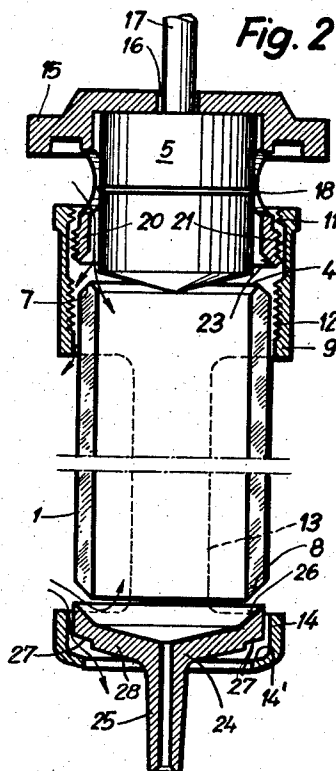
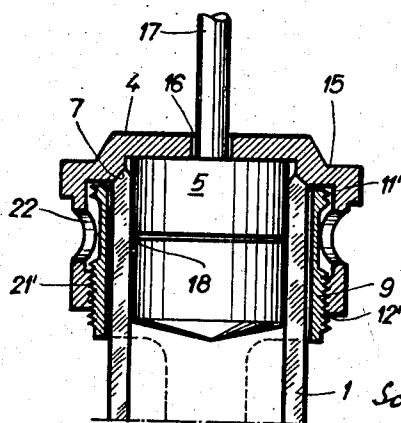


Fig. 2

Fig. 3



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PISTON SYRINGE FOR MEDICAL USE

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4 Claims. (Cl. 128—218)

1

This invention relates to syringes for medical use of the kind in which the glass tube is enclosed in a metal or other shell and the metal nozzle serving to hold the injection needle is pressed by suitable connecting means against the rim at the suction end of the glass cylinder and, by the release of these connecting means, is altogether separated from the glass cylinder, uncovering these contacting surfaces for complete sterilisation and protecting the cylinder against damage due to the different coefficients of expansion of glass and metal.

It is an object of this invention to improve this type of syringe by the provision of means whereby the uncovering of the contacting surfaces both at the suction and the pressure ends and the restoration of a perfectly tight fit at these points after sterilisation can be effected in a particularly simple and effective manner without requiring expensive high-precision work.

In the syringe according to this invention the open-work metal or other shell or casing enclosing the glass cylinder is formed with an internally threaded sleeve at the end where the piston enters the cylinder, an externally threaded hollow screw plug extending into this sleeve and meshing with its internal thread, this plug serving not only for pulling the flanged suction end of the shell or casing against the nozzle and tightly pressing same against the rim of the glass cylinder, but also by its inner edge for providing a tight fit for the piston end of the cylinder, so that by unscrewing this plug both cylinder rims as well as the contact faces of the shell or casing and the nozzle are laid bare and can be contacted at all points by the sterilising medium, while avoiding damage to the glass tube.

Other objects and features will be apparent as the following description proceeds, reference being had to the accompanying drawings showing, by way of examples, two embodiments of the invention, and wherein

Fig. 1 is a section through a first embodiment in working position,

Fig. 2 is a similar view of the first embodiment in the sterilization position,

Fig. 3 shows a portion of a second embodiment in working position.

Referring to the drawings and first to Figs. 1 and 2, 1 is a graduated glass cylinder whose rims are formed with ground conical or wedge-shaped outer surfaces 7 and 8, respectively. The cylinder is enclosed in an open-work shell or casing 9 formed with windows 13 uncovering the usual graduation (not shown). The sleeve 9 forming

2

the top end of the shell is formed with two internal threads 11 and 12 arranged in spaced relation. The nozzle end of the casing 9 is curved inwards to form an abutment 14 for the nozzle.

In the working position shown in the drawing the outwardly threaded sleeve 20 of a hollow screw plug carrying a head 15 is screwed into the internal thread 12 of sleeve 19. Its head 15 is perforated at 16 to admit the piston rod 17. When the piston 5 is entirely withdrawn from the glass cylinder (Fig. 2), it is lodged in the sleeve 20.

The surface of the piston 5 is formed with a circular groove receiving an elastic ring 18 acting as a piston brake sliding on the inner wall of the cylinder 1 when the piston 5 is moved. The flange of the head 15 projects beyond the casing portion 10 and is of polygonal shape. The sleeve 20 is provided with an external thread 21 alternately engaging the internal thread 11 or the internal thread 12 of the portion 10. Furthermore, the sleeve 20 is formed with openings 22 between the thread 21 and the head 15. The free end of the sleeve 20 has a ground conical inner surface 23 corresponding to the surface 7 of the cylinder.

The nozzle 24 has a bottom part 28, which closes the lower end of the cylinder and the conical fitting 25 for the injection needle. On the inner surface of its rim the nozzle 24 is formed with a conical seat 26 bearing against the surface 8 of the cylinder. Outwardly the nozzle is formed with a shoulder 27 having the form of a truncated cone, said shoulder being wider than the part 14' of the supporting flange 14, which has also the form of a truncated cone, and which bears against the nozzle. By inserting the nozzle in such manner that the axis of the cylinder and the nozzle axis coincide, the part 27' of the shoulder 27 remains uncovered, so that a pivotal movement of the axis of the nozzle with regard to the axis of the cylinder is possible within the limit of the width of the shoulder. Such movement becomes necessary in case the bearing surfaces 7 or 8 of the cylinder or the surface 26 of the nozzle are machined inexactly so that after tightening the bearing surfaces 23 and 7 on the one hand and 26 and 8 on the other hand, the axis of the casing and the nozzle axis are not aligned. This lack of alignment is technically unimportant as long as all bearing surfaces are in close contact, and the tightness of the syringe is nevertheless guaranteed. To this end however the nozzle must be able to swing up to a certain degree out of the axis of the cylinder and

of the casing, such swinging being made possible by the dimension of the effective supporting flange and the form of a truncated cone of the opposite bearing surfaces of the nozzle and the supporting flange. In this connection it is important that the bearing surfaces 8, 26, 27 and 14' have the form of truncated cones so that the tightening of the closing cap and the strain created by the supporting flange upon the nozzle displaces the nozzle until its axis coincides with the axis of the truncated cone formed by the lower bearing surfaces of the cylinder. The nozzle remains in this position in spite of the transversal strain and of the fact that the supporting flange only has a two-point contact with the nozzle.

The dimensions of the different parts are so chosen that on the closing cap 15, 20 being screwed onto the internal thread 12 of the sleeve 10 its bearing surface 23 engages the corresponding bearing surface 7 of the upper cylinder rim. The bearing surface 8 of the cylinder 1 presses the nozzle 24 against the inner surface of the flange 14 of the casing 9, holding in this way all parts together. In this working position the syringe may be used after an injection needle has been inserted in a well-known manner unto the fitting 25. Thus by the combination of the conical bearing surfaces of the casing with the supporting flange, the nozzle clamped between this flange and the glass cylinder by means of one single nut, and by the freedom of swinging of the nozzle relative to the cylinder axis it becomes possible to obtain absolute sterility for the syringe, no joint rings being required, all bearing surfaces being laid bare to be scavenged freely by the sterilisation medium and no manipulation after sterilisation being required near the nozzle, the tightness of which is guaranteed even if slight inexactitudes in manufacturing should occur. For sterilization of the syringe the closing cap 15 is unscrewed from the internal thread 12 to such an extent that its thread 21 lies in the space between the two internal threads 11 and 12. Thereby, the parts hitherto held together by the closing cap 15, namely the casing 9, the nozzle 24 for the needle and the cylinder 1 are separated from one another and all the bearing surfaces are uncovered. This sterilization position is represented in Fig. 2. Now the sterilization-medium can enter through the openings 22 of the closing cap 15, the openings of the casing 9 and also between the cylinder 1 and the sleeve 20 and between the nozzle 24 and the cylinder 1 and the flange 14 respectively while scavenging the bearing surfaces 7 and 23 and the bearing surfaces 8 and 26. Therefore, by a mere loosening of the closing cap and without any further manipulations all the surfaces to be sterilized are accessible for the sterilization-medium. When the parts shall be returned into working position tightening the closing cap on the internal thread 12 is sufficient. Due to the bearing surfaces 8 and 26 the nozzle 24 for the needle is readjusted into its initial position a complete tightness increased by the wedging effect of the conical seat being obtained. The important advantage of this arrangement resides in the fact that readjusting into the working position is possible without touching the nozzle or the lower portion of the syringe with the hands, so that complete sterility is guaranteed. This readjustment is possible owing to the slight swinging movement which can be imparted to the nozzle and which is not

affected by any irregularity of the conical bearing surfaces and has no influence on the tightness. The nozzle will in this case assume a slightly oblique position, but will nevertheless bear with its whole bearing surface against the lower rim of the cylinder. Finally, the upper internal thread 11 serves the purpose of taking the syringe to pieces in a simple way for cleaning, in that all the parts may be separated from one another as soon as the closing cap 15 has been unscrewed from the internal thread 11.

In Fig. 3 a second embodiment of the invention is represented which differs from the former in that the closing cap is a cap nut with an internal thread 21'. In consequence, the upper portion of the casing has two external threads 11' and 12' which, according to the working position are to engage the internal thread 21' of the cap nut.

The characteristic features of the device shown in Fig. 3 are the same as in the first embodiment.

We wish it to be understood that we do not desire to be limited to the details of design shown and described, for obvious modifications will occur to a person skilled in the art.

What we claim is:

1. Syringe comprising in combination, an inner tube and a piston and piston rod reciprocable within said tube, the rims of said tube having a wedge-shaped cross-section, a protective shell surrounding said tube being open at both ends, the shell section surrounding the piston entrance of said tube being a threaded sleeve with a rim fitting the tube rim, an inwardly extending flange at the suction end of said shell, an outwardly flanged nozzle abutting by its flange against the inwardly extending shell flange and being formed with a flange surface fitting the rim of the suction end of said tube, and a hollow flanged screw cap formed with a passage for the rod of said piston and fitting the thread of said shell sleeve.

2. The syringe of claim 1, in which the sleeve forming the piston end of the shell is formed with an inner thread and the flanged cap is a hollow screw plug fitting the inner thread of the sleeve.

3. The syringe of claim 1, in which the nozzle flange is formed with a circumferential shoulder forming the seat for the inwardly directed flange at the suction end of the shell and the contacting surfaces of said shoulder and said shell flange extend at an angle other than a right angle to the syringe axis.

4. The syringe of claim 1, in which the shell sleeve is formed with two threads arranged in spaced relation.

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