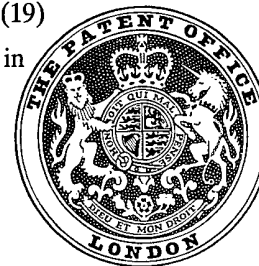


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ASR GM



(54) DISPOSABLE MEDICAMENT INJECTOR

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CHLINGER a Canadian citizen, of 7  
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06333 United States of America, do hereby  
5 declare the invention, for which I pray that a  
patent may be granted to me, and the  
method by which it is to be performed, to be  
particularly described in and by the follow-  
ing statement:-

10 This invention relates to medicament  
injectors and is more particularly concerned  
with injectors intended to be used once and  
then thrown away.

15 According to this invention there is provided  
a medicament injector comprising a  
cylindrical barrel having inner and outer  
surfaces and open at both its forward and  
rear ends, a plunger slidably carried in the  
20 barrel in sealing relation with the inner  
surface of the barrel, a diaphragm assembly  
fixedly mounted in the forward end of the  
barrel, said diaphragm assembly including a  
hollow body portion, a flexible wall closing  
25 off one end of the body portion to form a  
medicament chamber between the plunger  
and the flexible wall, and a hollow needle  
spaced from the flexible wall and outside the  
medicament chamber, said needle being  
30 arranged and adapted to pierce the flexible  
wall when said wall is caused to flex into  
contact therewith by depression of the  
plunger to establish fluid communication  
between the medicament chamber and the  
35 needle, and a nose cap which is mounted on  
the forward end of the barrel and which  
carries or is adapted to carry a cannula  
which comes into fluid communication with  
the medicament chamber via the hollow  
40 needle when the flexible wall is pierced by  
the needle.

The invention will now be explained in  
more detail with reference by way of exam-  
ple to the accompanying drawings, in which:

45 *Figure 1* is a longitudinal sectional view of  
an injector according to the invention in the

loaded condition ready for use.

*Figure 2* is a longitudinal sectional view of  
the injector after the plunger has moved  
forward to flex the diaphragm end wall  
inwardly for piercing by the needle to allow  
50 medicament to flow therethrough;

*Figure 3* is a sectional view of the finger  
grip which is applied to the rear end of the  
barrel;

55 *Figure 4* is an elevational view of the  
finger grip of *Figure 3* illustrating the finger  
gripping elements as viewed from the forward  
end of the finger grip;

*Figure 5* is a sectional view of the nose cap  
which is applied to the forward end of the  
60 barrel and is adapted to receive various  
gauges of cannulas; and

*Figure 6* is a partial sectional view of a  
combination nose cap and spike adapted to  
fit on the forward end of the barrel in place  
65 of the nose cap of *Figure 5*.

As illustrated in *Figures 1* and *2*, the  
disposable medicament injector 10 comprises  
a cylindrical glass barrel 12 having an  
open rear end 14 and an open forward end  
70 16 and an inner surface 18 and an outer  
surface 20. A rubber plunger 22 is sealingly  
and slidably carried in the rearward portion  
of the barrel 12. The plunger 22 is provided  
with a plurality of circumferential ridges 24  
75 which act as sealing means for the plunger.  
The forward end of the plunger is closed by  
an end face 26 while the rear end has a  
threaded opening 28 adapted to threadedly  
mount a plunger rod 30. 80

A diaphragm assembly 34 is positioned in  
the forward end portion of the barrel 12 and  
comprises a cylindrical body 36 having an  
outer surface 38 snugly engaging the inner  
85 surface 18 of the barrel 12. The body 36 has  
an open forward end 40 and a rear end  
closed by a flexible end wall 42 to form a  
medicament chamber 44 between said flexi-  
ble end wall and end face 26 of the plunger  
90 22. The forward portion of the outer surface

38 of the diaphragm body 36 is cut away to a small depth to form a shoulder 44 and circumferential space 46. A needle mount 48 is fitted within the diaphragm body 36 and fixedly carries needle 50 having its rear pointed end 52 spaced from the flexible end wall 42. The forward end 54 of the needle 50 is so positioned that fluid communication is established with the forward end of the barrel 12.

Referring to Figures 3 and 4 which illustrate the finger grip 60 and to Figure 1 wherein the finger grip 60 is mounted on the rear end of the barrel 12, said finger grip comprises a circular portion 62 having a pair of finger grip elements 64, 64 extending diametrically outwardly from the portion 62 and generally perpendicular to the longitudinal axis of the glass barrel 12. An outer circumferential wall 66 extends forwardly from the portion 62 and is sized such that the inner surface 68 of the wall 66 snugly engages the outer surface 20 of the glass barrel 12. Similarly, a circular inner wall 70 extends forwardly from the portion 62 and is sized so that its outer surface 72 will snugly engage the inner surface 18 of the glass barrel 12. It is by means of the engagement of the finger grip inner and outer walls 70 and 66, respectively, with the confronting surfaces of the glass barrel 12 that the finger grip is retained thereon. On the inner side where the portion 62 and the outer wall 66 meet there is provided a slight undercut 76 to give a small amount of flexibility to the portion 62 and the outer wall 66 during the insertion of the glass barrel 12 into the space between the outer and inner walls, 66 and 70, respectively.

Referring to Figure 5 which illustrates one type of nose cap suitable for use and to Figure 1 wherein the nose cap 80 is mounted on the forward end of the barrel 12, said nose cap includes a circular body portion 82 having a central opening 84 therethrough. An outer circumferential wall 86 extends rearwardly from the circular body portion 82 and is sized so that the inner surface 88 of the wall 86 snugly engages the outer surface 20 of the glass barrel 12. Similarly, a circular inner wall 90 extends rearwardly from the circular body portion 82 and is sized such that the outer surface 92 of the inner wall 90 snugly engages the inner surface 18 of the glass barrel 12. Here again, it is by means of the engagement of the nose cap 80, inner and outer walls 90 and 86, respectively, of the circular body portion 82 and with confronting surfaces on the glass barrel 12 that the nose cap 80 is held thereon. As in the finger grip 60, a slight undercut 94 is formed where the body 82 and the outer wall 86 meet to provide a small amount of flexibility for easing the assembly of the nose cap onto the barrel 12. It should be

noted that the inner wall 90 is shorter than the outer wall 86 and that its end abuts the shoulder 44 on the diaphragm body 36 to position the diaphragm assembly 34.

A cylindrical bearing 100 projects forwardly from the circular body portion 82 with its longitudinal axis in alignment with the opening 84 in the aforesaid body portion 82. The outer surface 102 of the bearing 100 is provided with a taper corresponding to the standard Luer Lok Taper. Additionally, an internally threaded collar 106 extends outwardly and forwardly from the circular body portion 82 to surround the cylindrical bearing 100. The bearing 100 and collar 106 provide mounting means for various cannula assemblies. More specifically, cannula hub 110 whose inner surface 112 has a taper coinciding with that on the outer surface 102 of the bearing 100 fits on said bearing and supports cannula 120 affixed to the forward end of the hub 110.

In use, the disposable medicament injector 10 as shown in Figure 1 has a cannula 120 of the desired gauge assembled onto the cylindrical nose cap bearing 100 and the plunger rod 30 is suitably attached to the plunger 22. Forward movement of the plunger 22 under force exerted by plunger rod 30 forces the medicament in chamber 44 forwardly, thus causing the diaphragm assembly end wall 42 to flex forwardly toward the end 52 of needle 50. As shown in Figure 2, this flexing in the forward direction causes the needle point 52 to pierce end wall 42 and establish fluid communication between chamber 44 and the cannula 120 for exiting of the medicament. Forward movement of the plunger 22 continues until ejection is complete.

The nose cap may be of various types depending upon the intended use. For example, the nose cap could be of the spike type providing an integral cannula as illustrated in Figure 6. In this construction nose cap 120 comprises a generally circular body portion 122 having a central opening 124 therethrough. An outer circumferential wall 126 extends rearwardly from the body portion 122 and is sized so that the inner surface 128 thereof is adapted to snugly engage the outer surface of a syringe barrel in the manner illustrated in Figures 1 and 2. Similarly, a circular inner wall 150 extends rearwardly from the body portion 122 and is sized such that the outer surface 132 thereof is adapted to snugly engage the inner surface of a syringe barrel as in Figures 1 and 2. As in the nose cap 60 of Figure 1, nose cap 120 is provided with an undercut 134, where the body portion 122 and the outer wall 126 meet, for the same purpose as in the embodiment of Figure 1. A spike member 140 constituting the cannula extends forwardly from the body portion 122

to complete the spike type nose cap.

Additional nose cap assemblies may be used in this syringe combination, the only limitation with regard to structure being that such nose cap must have the two coaxially extending walls adapted to fit over and grip the inner and outer walls of the syringe barrel so as to retain the nose cap thereon.

There are numerous advantages derived from the injector unit of this invention. First of all, almost limitless cannula gauges may be employed. Secondly, virtually any medicament can be stored in the device. As is now apparent, the normal way to ship and store the injector unit would be without the cannula assembly and, of course, the plunger rod would not be assembled to the plunger. Savings in space for storage purposes is immediately apparent. Thirdly, the unit is the ultimate in simplicity and reliability. Further, this injector is quite economical to manufacture. This economy is brought about by many factors including the manner in which the finger grip and nose cap are assembled onto the glass barrel.

Further, in connection with the mounting of the finger grip 60 and the nose cap 80 onto the glass barrel 12, it should be noted that in this particular instance both the finger grip and nose cap are made of polypropylene which is a plastics having the desirable characteristic of retaining its memory after molding, i.e., retains its size to a very close tolerance. Obviously, any other plastics having these same characteristics would also be suitable.

Plastics including polypropylene as used herein, like most other materials will expand and contract due to temperature changes and possibly humidity changes. Thus, with both the inner and outer walls of the finger grip snugly engaging the respective surfaces of the glass barrel, the finger grip will always be held onto said barrel. More particularly, if the finger grip outer wall expands and becomes slightly loose, the finger grip inner wall will also expand and provide tighter than normal engagement to overcome this. The reverse will be true if cooling takes places, i.e., the outer wall contracts to firmly grip the glass barrel as the inner wall somewhat loosens its engagement with the barrel.

In view of the above, it should now be apparent that no additional means are needed to retain the finger grip and the nose cap firmly assembled on the glass barrel. This eliminates use of adhesives or cooperating distortedly shaped elements on mating surfaces of the respective parts.

WHAT WE CLAIM IS:

1. A medicament injector comprising a cylindrical barrel having inner and outer surfaces and open at both its forward and rear ends, a plunger slidably carried in the

barrel in sealing relation with the inner surface of the barrel, a diaphragm assembly fixedly mounted in the forward end of the barrel, said diaphragm assembly including a hollow body portion, a flexible wall closing off one end of the body portion to form a medicament chamber between the plunger and the flexible wall, and a hollow needle spaced from the flexible wall and outside the medicament chamber, said needle being arranged and adapted to pierce the flexible wall when said wall is caused to flex into contact therewith by depression of the plunger to establish fluid communication between the medicament chamber and the needle, and a nose cap which is mounted on the forward end of the barrel and which carries or is adapted to carry a cannula which comes into fluid communication with the medicament chamber via the hollow needle when the flexible wall is pierced by the needle.

2. An injector as claimed in claim 1 wherein the cylindrical barrel is provided with a finger grip means on its rear portion.

3. An injector as claimed in claim 2 wherein the finger grip means is an integral moulding comprising finger grip elements extending outwardly from the barrel and annular inner and outer walls extending forwardly from the finger grip elements and radially spaced from each other so as snugly to receive the rear end portion of the barrel therebetween.

4. An injector as claimed in any one of Claims 1 to 3, wherein the nose cap includes a body portion with annular inner and outer walls extending rearwardly therefrom and being spaced so as snugly to receive the forward end portion of the barrel therebetween.

5. A medicament injector comprising a cylindrical glass barrel open at both its rear and forward ends, a plunger slidably carried in the barrel adjacent the rear end thereof, said plunger sealingly engaging the inner surface of the barrel, a diaphragm assembly mounted in the forward end of the barrel, said diaphragm assembly comprising a cylindrical diaphragm body snugly engaging the inner surface of the barrel, the forward end of the diaphragm body being open and the rear end being closed by a flexible end wall to form a medicament chamber between the plunger and the aforesaid flexible end wall, a needle mount fitted within the diaphragm body, and a hollow needle carried by said needle mount, the rear end of the needle being spaced forwardly of the flexible end wall whereby when the plunger is forced forwardly the end wall will flex and be brought into contact with the rear end of the needle to cause the needle to pierce the end wall and allow the medicament to flow through the needle, a finger grip mounted

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on the rear of the barrel, said finger grip including a pair of finger grip elements extending diametrically outwardly from the body and generally perpendicular to the glass barrel, which finger grip elements are formed in one piece with annular outer and inner walls extending forwardly from the rearward end of the barrel and spaced from each other a distance equivalent to the thickness of the glass barrel to form a barrel receiving space into which the rear end of the glass barrel is inserted so to be snugly gripped by said inner and outer walls, a nose cap mounted on the forward end of the barrel, said nose cap including a body portion having a central opening there-through, inner and outer walls extending rearwardly from the body portion, said inner and outer walls being spaced from each other to form a space into which the forward end of the barrel is inserted so as to be gripped by the inner and outer walls thereby to retain the nose cap on the barrel, and cannula hub receiving means extending forwardly from the nose cap body and in fluid communication with the opening in said body, said cannula hub receiving means being adapted to mount a cannula hub receiving means.

6. A medicament injector substantially as herein described with reference to the accompanying drawings.

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FIG. 1.

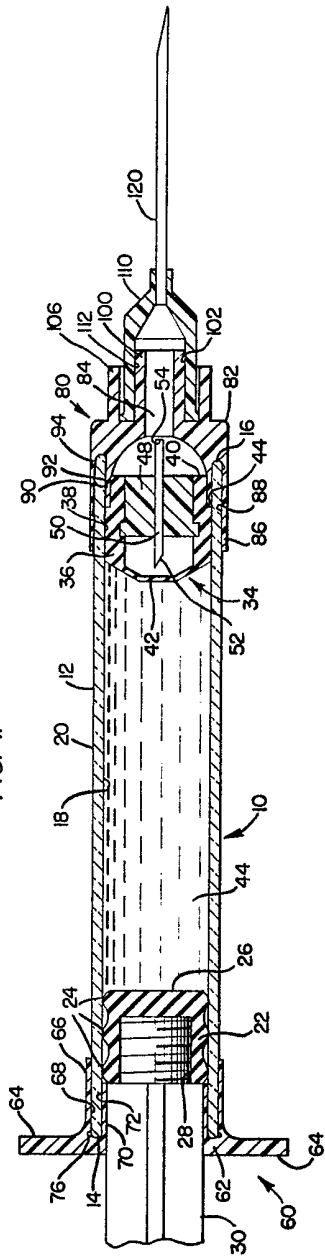


FIG. 2.

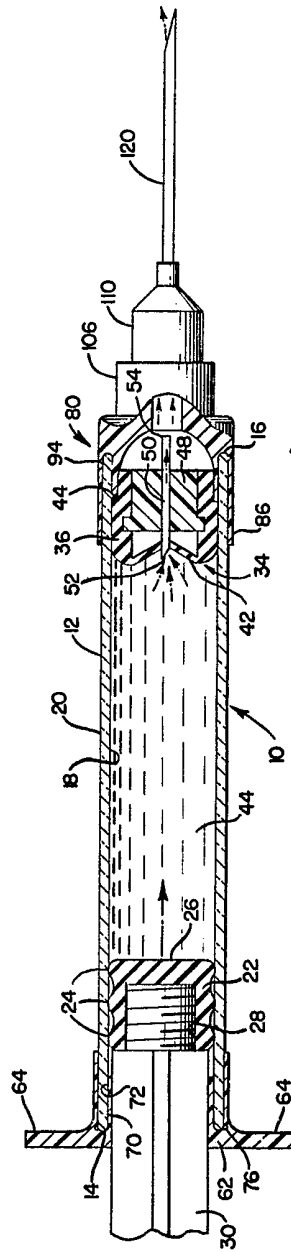


FIG. 3.

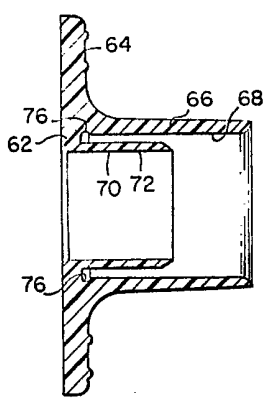


FIG. 4.

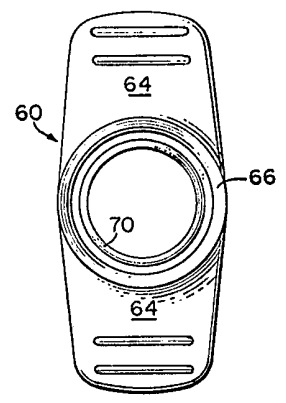


FIG. 5.

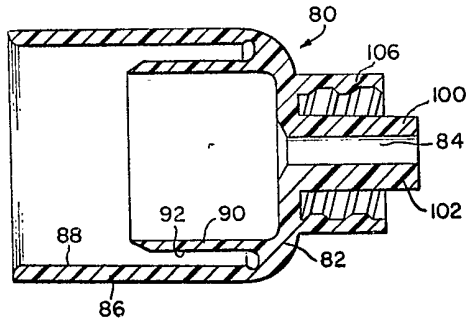


FIG. 6.

