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Omotani

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[54] **GLASS LINED INJECTOR**

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[52] **U.S. Cl.** ..... **128/218 DA**; 128/272

[51] **Int. Cl.**[2] **A61M 5/28**; A61J 1/06

[58] **Field of Search** .... 128/218 DA, 218 D, 218 M, 128/218 P, 218 R, DIG. 28, 215, 234, 220, 218 N, 272

[56] **References Cited**

UNITED STATES PATENTS

2,561,233	7/1951	Ryan et al.	128/218 D
2,568,029	9/1951	Seemar	128/272
2,578,394	12/1951	Blackman	128/218 P
2,720,880	10/1955	Whitaker et al.	128/218 D
2,768,623	10/1956	Marchano	128/218 NV
2,813,528	11/1957	Blackman	128/218 P
3,303,846	2/1967	Ogle	128/220
3,464,414	9/1969	Sponnoble	128/DIG. 28

FOREIGN PATENTS OR APPLICATIONS

1,038,875	8/1966	United Kingdom	128/218 R
655,418	1/1963	Canada	128/218 R
1,137,150	1/1957	France	128/218 D
2,013,159	10/1971	Germany	128/218 DA

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[57] **ABSTRACT**

A cylindrical injection syringe is made of synthetic resin and has the inner sides tightly lined with glass. The outlet at the needle end is sealed by a thin film of the same resin as the syringe is made from and is molded integrally with the syringe; and the interior of the syringe may be covered with an anti-corrosive protective film.

5 Claims, 6 Drawing Figures

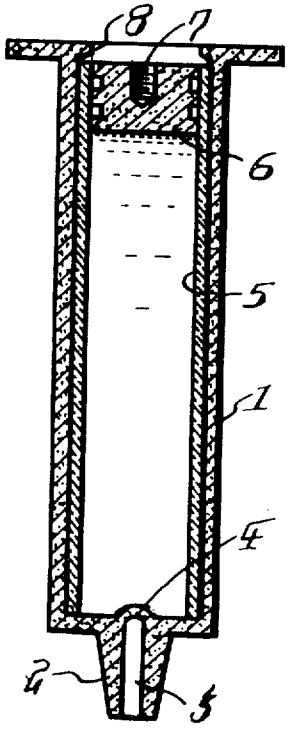


Fig. 1

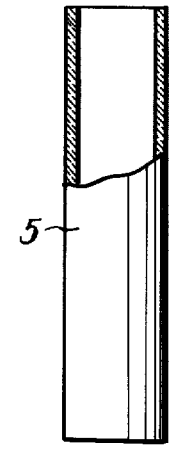


Fig. 2

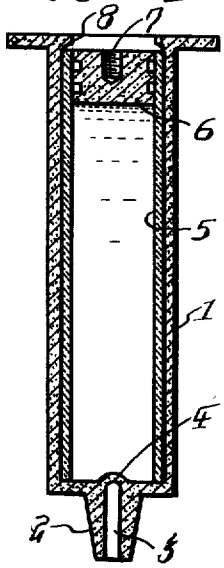
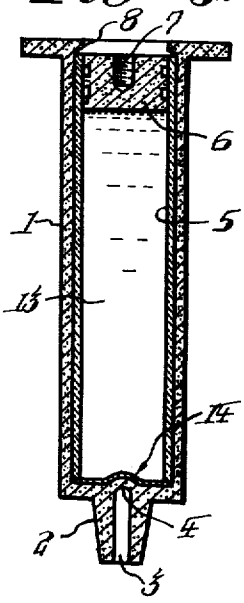


Fig. 3



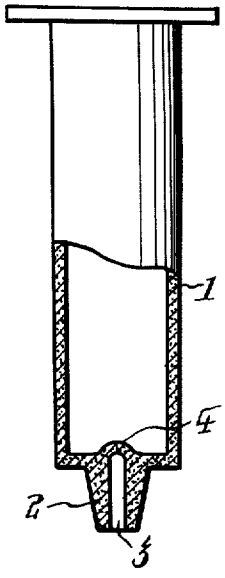


Fig. 4

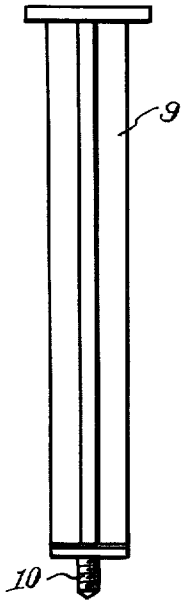


Fig. 5

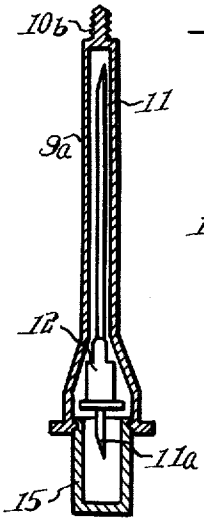
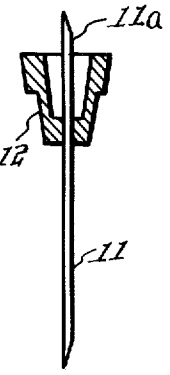


Fig. 6



GLASS LINED INJECTOR

This invention relates to improvements in injectors made of synthetic resin. More particularly, it concerns an injector syringe with the inner periphery lined with a glass pipe. The inner end surface of the glass pipe is covered with such material as anti-corrosive synthetic resin or synthetic rubber, so that the injector syringe itself can serve as a sealed container for liquid chemical which can be directly administered by operating with a piston rod a plug piston fitted in the upper end of the syringe.

It is well known in the art that injectors made of synthetic resins have been recently developed and they are inexpensive so that they can be used as consumables, being discarded after use, thus providing very hygienic effect. However, the liquid chemical used for administration is filled in an ampoule, and it must be withdrawn into the injector syringe by cutting the ampoule at the time of use. Thus, the operation is troublesome, and also minute glass particles are likely to be mingled into the liquid chemical at the time of cutting the ampoule. Further, the ampoule is prone to damage during transport or due to other causes.

In order to solve these problems, a cylindrical synthetic resin cartridge filled with liquid chemical and loaded in the injector syringe has been developed. However, this cartridge is naturally separate from the injector syringe, thus requiring separate manufacturing steps. Also, time and labor are required when loading the cartridge into the injector syringe. Further, depending upon the liquid chemical filled in the cartridge, the cartridge is prone to de-generation due to its contact with the synthetic resin. Furthermore, the injector syringe is prone to cracks or clefts when ambient temperature is low, although it has the merits of cheapness and handiness.

An object of the invention is to provide an injector having an injector syringe, which is made of a synthetic resin and has reinforced mechanical strength with its inner periphery lined with a glass pipe without using any adhesive.

Another object of the invention is to provide an injector, with which the liquid chemical preserved within the injector syringe is free from contact with the synthetic resin constituting the inner wall of the syringe and the chemical alteration of the drug is perfectly prevented.

The invention will now be described in conjunction with some embodiments thereof with reference to the accompanying drawing, in which:

FIG. 1 illustrates the manner of fitting a glass pipe into the injector syringe;

FIG. 2 is a longitudinal cross-section of an injector according to the invention;

FIG. 3 is a longitudinal cross-section showing another embodiment of the invention;

FIG. 4 is a front view showing a piston rod;

FIG. 5 is a longitudinal sectional view showing another example of the piston rod, and

FIG. 6 is a sectional view showing an injector needle used for the injector according to the invention.

In accordance with the invention, a glass pipe **5** is fitted into and made integral with an injector syringe **1** made of a synthetic resin, as shown in FIG. **1**, thus providing a glass lining on the inner periphery of the injector syringe **1** as shown in FIG. **2**. The syringe **1** has an injector needle mount **2** provided at its forward end.

The passage **3** in the mount **2** is closed with a thin nodal film **4**. The film **4** preferably has a profile upwardly curved as shown in FIG. **2**. A liquid chemical **13** is poured into the injector syringe **1** lined with the glass pipe **5** from the upper end opening thereof, and then a plug stopper or piston **6** made of anti-corrosive rubber or similar material is fitted in the open end. The plug piston **6** is formed with a threaded bore **7** open at its top.

FIG. **3** shows another injector according to the invention. In this injector, the inner surface of the forward end of an injector syringe **1** is not protected by the glass pipe **5**. Said injector forward end and the curved thin nodal film **4** are covered by an integrated protection film **14** of a material such as an anti-corrosive synthetic resin or silicone rubber.

The injector as described above according to the invention is combined with a piston rod **9** as shown in FIG. **4** or piston rod **9***a* as shown in FIG. **5** and an injector needle **11** as shown in FIG. **6**.

The piston rod **9** shown in FIG. **4** is provided at its forward end with a threaded projection **10**, which is screwed into the connection bore **7** formed in the plug piston **6** fitted in the upper end of the injector syringe **1**. The piston **9***a* shown in FIG. **5** has a hollow inner space, in which the injector needle **11** is accommodated, and which is sealed with a cap **15**. This piston rod **9***a* is also provided at its end with a threaded projection **10***a* to be screwed into the plug piston **6**.

The injector needle shown in FIG. **6** has a hub **12** made of a synthetic resin. The upper end **11**a of the needle penetrates the hub **12** and projects therefrom.

In the drawing, numberal **8** designates a rib projecting into the open end of the syringe for preventing the accidental removal of the glass pipe **5**.

The injector of the above construction according to the invention in situ constitutes a container, and the chemical **13** is sealed in it. To use this injector, the hub **12** of the injector needle **11** is first fitted on the injector needle mount **2** projecting from the end of the injector syringe **1**, whereby the upper end **11**a of the needle penetrates the nodal film **4** closing the passage **3** and intrudes into the interior of the syringe **1** for communication with the liquid chemical. Then, the threaded projection **10** or **10**a of the piston rod **9** or **9***a* of FIG. **3** or **4** is screwed into the connecting bore **7** of the plug piston **6**. Then, by pushing the piston rod **9** or **9***a* in the axial direction, the plug piston **6** is caused to slide along the inner periphery of the glass pipe **5**, thus forcing out the liquid chemical from the injector needle **11**. At this time, if the nodal film penetrated by the upper end **11***a* of the needle has an upwardly curved profile as shown in FIG. **4**, the curved film **4** is downwardly pressed with the pressure exerted by the chemical, so that it is strongly and closely urged against the periphery of the upper needle end portion **11***a* to thereby perfectly prevent the leakage of the liquid.

The injector according to the invention has various advantages. Firstly, since the injector syringe **1** itself serves as a container containing the liquid chemical sealed therein, the operation of withdrawing the liquid from an ampoule or the operation of loading a separate cartridge as in the prior art is not necessary. but it can be immediately used for administration by connecting the piston rod **9** or **9***a* to the plug piston **6**. Secondly, since the injector syringe **1** is lined with the glass pipe **5** and protection film **14**, the liquid chemical filled

therein is not prone to alternation. Further, by virtue of the double-wall structure the contraction and fissure of the synthetic resin in cold temperature can be perfectly prevented.

A method of manufacturing the syringe of the above construction will now be described. When lining the syringe 1 with the glass pipe 5, it is most important that the glass pipe 5 and synthetic resin body 1 of the syringe are integrally secured to each other. Also, increasing the production efficiency is important for reducing the cost of the injectors as the disposable.

In the aforementioned method, the glass pipe 5 has an outer diameter 0.1 to 0.2 millimeter smaller than the inner diameter of the syringe body 1 and is mechanically dropped from above the syringe body and fitted therein as shown in FIG. 1. The glass pipe 5 has a length suitable to the axial length of the syringe body 1. The syringe body 1 with the glass pipe 5 fitted therein is then transferred to a heating means, which is preferably an infrared radiation furnace or the like or may be an ordinary heating furnace. In the heating means, the syringe 1 is subjected to a heating treatment at a deformation threshold temperature. At this time, the molecules of the synthetic resin syringe body 1 are stabilized, and at the same time sterilization of the whole system is effected. With this treatment at the aforementioned deformation threshold temperature, the synthetic resin is subjected to the annealing contraction and perfectly secured to the glass pipe 5 for example by heat shrinking.

What is claimed is:

1. A double layer cylindrical injection syringe comprising: a continuous outer tubular body of synthetic resin free from openings along the length thereof and having at one end an integral needle securing hollow hub sealed fully across the entire inner end by a thin rupturable film; an injection needle on said hub; and at the other end of said body a radially projecting gripping flange and an opening sealed by axially displaceable plug means, the entire length of said body being integrally lined along the interior wall by a tightly fitted thin glass tube open at at least one end and positioned between said body and said plug means.

2. A syringe according to claim 1 including a piston rod and plug means which includes a socket for connection to said piston rod for driving the plug means along the glass tube towards the needle hub as a piston head to expel the contents of said tube through said hub.

3. A syringe according to claim 1 in which the rupturable film is made from the same synthetic resin as the tubular syringe body and an injectable liquid is sealed inside the glass tube by said film which is inflected radially to the interior of said tube and includes an interior protective coating extending fully across the inside of the hub end of said syringe.

4. A syringe according to claim 2 including means for storage of a needle within said piston rod.

5. A syringe according to claim 1 in which the resin and glass are tightly shrink fitted to each other.

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