

[72] Inventor **Allan Stewart Frieze**
Maplewood, New Jersey
 [21] Appl. No. **731,188**
 [22] Filed **May 22, 1968**
 [45] Patented **Aug. 18, 1970**
 [73] Assignee **Becton, Dickinson and Company**
Rutherford, New Jersey
a Corp. of New Jersey

3,320,954 5/1967 Cowley.....128/218(N)UX
 3,342,319 9/1967 Faulseit 206/43
 3,391,695 7/1968 Sarnoff.....128/218(NV)UX

FOREIGN PATENTS

236,138 11/1961 Australia 128/218(NV)UX
 444,809 2/1949 Italy 128/218(N)UX

Primary Examiner—Samuel Koren

Assistant Examiner—James H. Czerwony

Attorney—Kane, Dalsimer, Kane, Sullivan and Kurucz

[54] **HYPODERMIC SYRINGE**
9 Claims, 4 Drawing Figs.

[52] U.S. Cl..... **128/218,**
128/221

[51] Int. Cl..... **A61m 5/18,**
A61m 5/14, A61m 5/32

[50] Field of Search..... **128/218,**
218m, 218n, 218s, 218nv, 221; 206/43

[56] **References Cited**

UNITED STATES PATENTS

3,021,942 2/1962 Hamilton.....128/218(N)UX

ABSTRACT: A hypodermic syringe capable of storing a medicament in the barrel thereof for an extended period of time prior to use. The syringe includes a hub having a tapered internal bore portion for receiving and frictionally engaging a correspondingly tapered projecting tip on the barrel. A highly elastic and stretchable film is secured across the receiving end of the hub bore to close the tapered bore. When the projecting tip is inserted fully into the tapered bore, the elastic film is stretched to closely surround and seal the projecting tip to seal the medicament in the barrel.

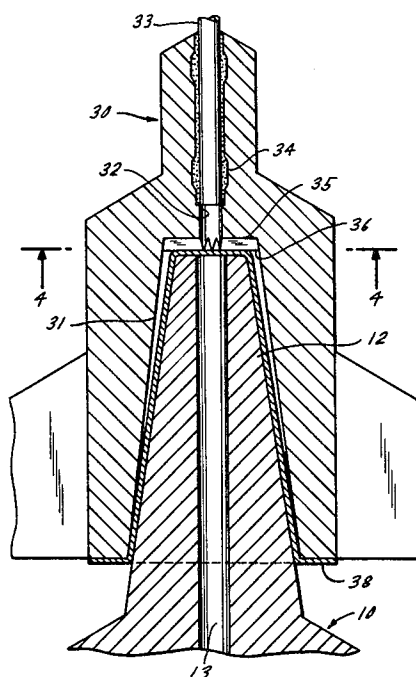


FIG. 1

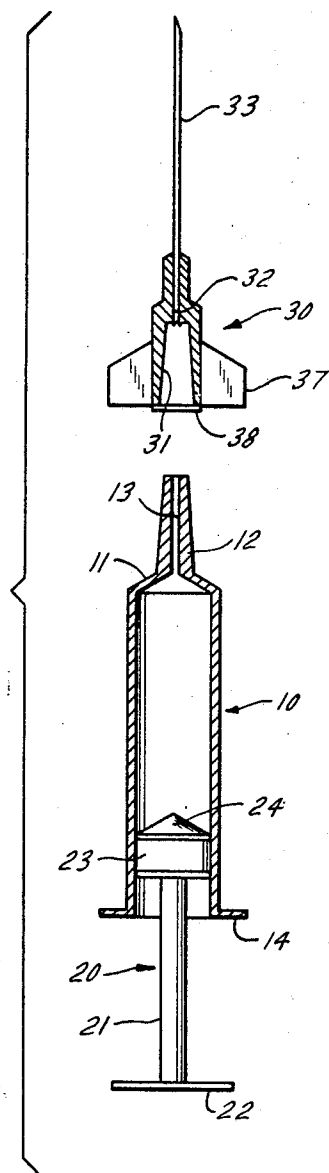


FIG. 2

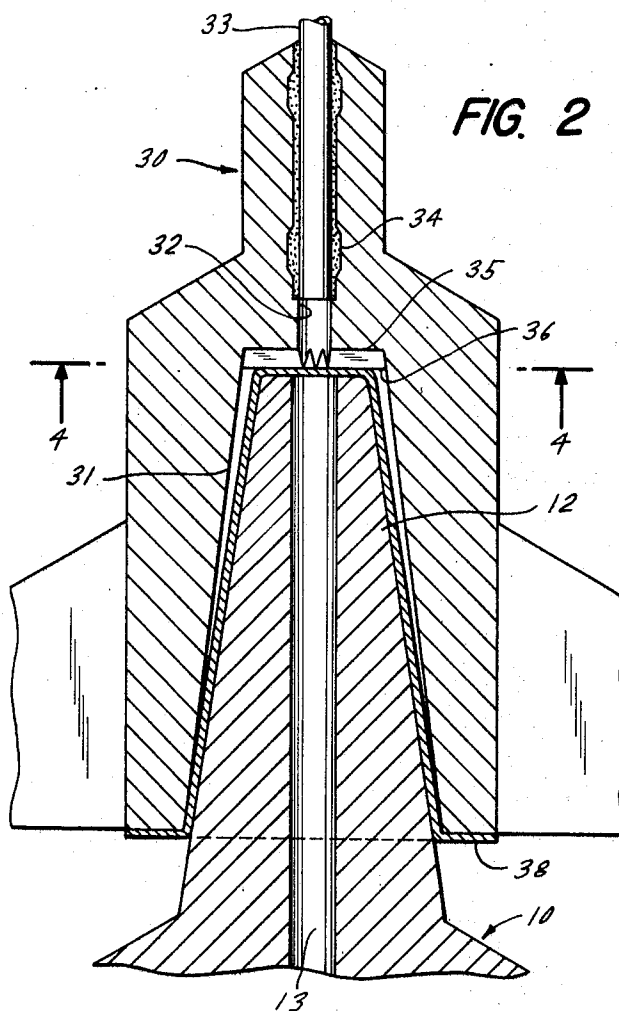


FIG. 3

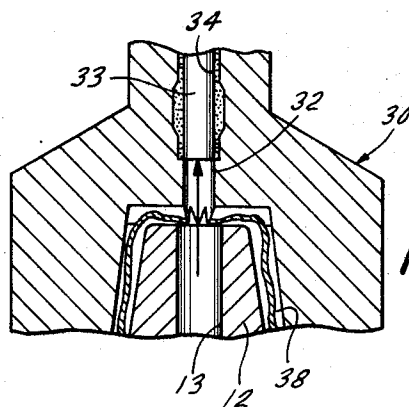
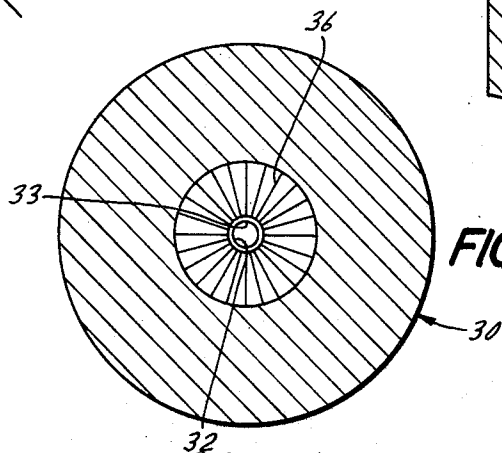


FIG. 4



INVENTOR
ALLAN STEWART FRIEZE

BY
Kane, Dekimer, Kane, Sullivan & Smith
ATTORNEYS

HYPODERMIC SYRINGE

BACKGROUND AND SUMMARY OF THE INVENTION

This invention relates to a prefilled hypodermic syringe. More particularly, it relates to a syringe wherein a plastic film is positioned between the barrel and hub to seal the medicament in the barrel, such that the barrel may be used as a storage container for an extended period of time without the stability of the medicament being affected.

Hypodermic syringe assemblies commonly comprise a metal cannula mounted in a hub having a tapered internal bore. The hub is mounted on a barrel which includes a correspondingly tapered tip adapted to be received and frictionally retained in the bore of the hub to maintain the assembly of the two elements.

In a broad sense, this invention relates to the provisions of a flexible elastic film secured to the hub across the open outer end of the bore. Thus, when the tapered projecting tip of the barrel is inserted into the hub bore, the elastic film is stretched to closely surround and seal the end of the tip. When an injection subsequently is desired, the film seal may be broken easily by firmly depressing the plunger of the syringe until the fluid pressure causes the film to rupture. In the alternative, the hub may be provided with serrated teeth at the internal end of the tapered bore such that upon rotation of the barrel relative to the hub, the seal is broken to permit the medicament to exit through the needle.

It is an object of the present invention to provide an improved sealing structure for a prefilled hypodermic syringe wherein the hub may be readily assembled to the barrel and yet will be firmly held in place against accidental displacement while in use. It is also an object to provide a seal which may be easily ruptured to permit the medicament to exit through the hub and cannula.

It is an additional object of this invention to provide a syringe of the type described having an improved and economical design such that the device may be discharged after a single use. An additional object is to provide a syringe which may be stored in filled condition for indefinite periods of time without the stability of the medicament being affected.

These and other objects will readily become apparent from the following detailed description.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an exploded cross-sectional view of the syringe hub and barrel prior to assembly.

FIG. 2 is an enlarged cross-sectional view showing the mounting structure of the hub and barrel.

FIG. 3 is a fragmentary view of the mounting structure after the seal has been ruptured.

FIG. 4 is a cross-sectional view taken along the line 4—4 of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The syringe of the subject invention comprises a barrel 10, plunger 20 and hub 30. The barrel includes at one end a tapered end wall 11, and a tapered projecting tip 12. A passage 13 extends coaxially through the tip to permit the medicament to exit therethrough. The opposite end of the barrel is open and includes a transverse finger grip 14.

The syringe barrel may be formed from any suitable material which is inert to the medicaments or other materials used therein. Thus, it may be made from glass, or a suitable plastic material such as polypropylene, polyethylene or polystyrene.

The plunger 20 includes a piston rod 21 having a disc-like handle portion 22 at one end and a stopper or piston 23 assembled therewith in the conventional manner at its opposite end. The piston rod 21 may be made of a material similar to that of the barrel 10. The stopper or piston 23 is preferably made from a suitable elastomeric material which is inert to the medicaments used in the syringe, such as natural or synthetic rubber. The piston 23 is adapted to sealably engage the inter-

nal wall of the barrel and may have a tapered head portion 24 which corresponds to the taper of the end wall 11.

The hub 30 includes a substantially coaxially disposed bore having a tapered portion 31 at one end and a cylindrical portion at the other end. A cannula 33 is disposed in the cylindrical bore portion 32 and may be retained therein in a conventional manner by a suitable resin binder 34 such as an epoxy resin. The hub 30 may be made from any suitable thermoplastic material such as polyethylene, polypropylene, polystyrene, cellulose acetate or the polymers or copolymers of vinyl chloride.

The juncture of the tapered bore 31 and cylindrical bore 32 is defined by a transverse surface 35 which may be roughened for the purposes hereinafter set forth. In the illustrated embodiment, the surface 35 comprises a plurality of radially extending relatively sharply pointed ribs or corrugations 36. The hub may also include a number of radially extending external flanges 37.

A thin elastic film 38 is secured across the open end of the tapered bore 31 in the manner illustrated in FIG. 1 prior to the assembly of the hub and barrel. The film 38 may be secured by any suitable bonding agent or cement about the periphery of the bore 31, or it may be secured thereto by heat sealing. The film may be made from any of a variety of flexible resilient materials which are inert to the medicament in the barrel, such as the elastomeric thermoplastic materials polyvinyl chloride, polyurethane, or natural or synthetic rubber.

In use, the barrel 10 is initially filled with the desired medicament. The hub 30 is then assembled on the tapered projecting tip 12 in the manner illustrated in FIG. 2. During this assembly operation, the film 38 is stretched about the tip 12 to form a tight seal at the end of the passage 13. By design, the film 38 will be stretched to a point near its elastic limit such that the film is relatively frangible in this position. The frictional resistance imparted between the tip 12 and tapered bore portion 31 by the film 38 will be sufficient to securely retain the two members in assembled relation. If desired, the tip 12 may be tapered at an angle slightly less than the taper of the bore 31 to facilitate seating of the tip against the end wall 35, note FIG. 2. The syringe may then be stored until it is ready for use.

Shortly before the injection is to be made, the film seal 38 may be easily broken by firmly depressing the plunger 20 until the fluid pressure ruptures the film. The medicament will then be free to exit through the passage 13 and into the cannula 33 in the manner shown in FIG. 3. In certain applications, it may be desirable to utilize a film seal which is not easily ruptured by fluid pressure alone. In such cases the transverse wall 35 which contacts the upper portion of the film may be roughened. In the illustrated embodiment, such roughening is accomplished by the provision of a plurality of radially extending ribs 36. When such a roughened surface is employed, the film seal may be easily broken by slightly rotating the barrel relative to the hub. The flanges 37 on the hub are provided to facilitate this rotation.

While a particular embodiment of the present invention has been described in detail herein, it should be understood that the scope of the invention is to be determined from that of the appended claims only.

I claim:

1. In a hypodermic syringe having a barrel with an integral tapered projecting tip,

a hub having a substantially coaxially disposed bore, said bore including a tapered portion at one end adapted to receive said tapered projecting tip, and a highly elastic and stretchable film secured to said hub across said bore one end to close said tapered bore portion, whereby when said projecting tip is inserted fully into said tapered bore, said elastic film is stretched to closely surround and seal said tip.

2. The hypodermic syringe as defined in Claim 1 wherein the internal end of said tapered bore portion is defined by a roughened transverse surface.

3. The hypodermic syringe as defined in Claim 2 wherein said roughened transverse surface includes a plurality of radially extending ribs.

4. The hypodermic syringe as defined in Claim 3 wherein said elastic film is heat-sealed about the outer periphery of said tapered bore portion. 5

5. The hypodermic syringe as defined in Claim 4 wherein a cannula extends into said hub bore at the end opposite said tapered bore portion.

6. A hypodermic syringe capable of storing a medicament for an extended period of time prior to use, said syringe comprising: 10

a tubular barrel having a tapered projecting tip at one end and an open opposite end;

a plunger disposed in the open end of said barrel and including a resilient piston in sealing engagement with the wall of said barrel; 15

a hub assembly attached to said tapered projecting tip of said barrel, said hub assembly having a bore therethrough which includes a tapered portion at one end receiving and frictionally engaging said tapered 20

projecting tip, and a cylindrical portion at the opposite end having a cannula secured therein, and

a frangible film disposed intermediate said tapered projecting tip and said tapered portion of said bore, said frangible film comprising a highly elastic and stretchable film secured to said hub across said bore one end to close said tapered bore portion, whereby when said projecting tip is inserted fully into said tapered bore, said elastic film is stretched to closely surround and seal said tip, whereby the contents of said barrel are precluded from entering the bore of said hub assembly.

7. The hypodermic syringe as defined in Claim 6 wherein the juncture of said tapered bore portion and cylindrical bore portion in said hub assembly is defined by a roughened transverse surface. 15

8. The hypodermic syringe as defined in Claim 7 wherein said roughened transverse surface includes a plurality of radially extending and sharply pointed ribs.

9. The hypodermic syringe as defined in Claim 8 wherein said hub includes a plurality of external flanges. 20

25

30

35

40

45

50

55

60

65

70

75