Aug. 30, 1960 B. M. E. BOUET 2,950,717

AMPULES

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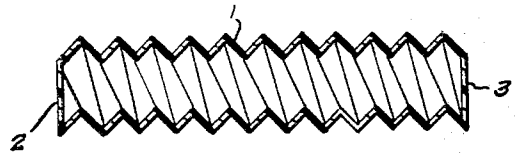

FIG. 1

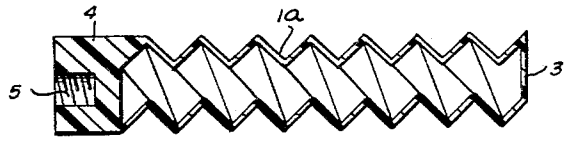

FIG. 2

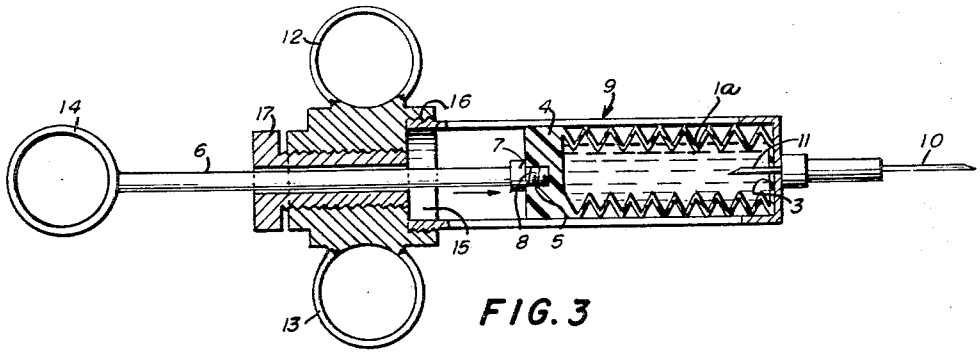

FIG. 3

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AMPULES

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The present invention relates to containers, and, more particularly, to hermetically closed containers.

This invention relates, still more particularly, to ampules containing liquid medicaments, intended to be used, in combination with hypodermic injectors of the type comprising a holder, on one extremity of which a hollow needle is mounted, said needle comprising a part projecting inside the holder and, in the other extremity, a movable pusher, the ampule being adapted to be placed in said holder, one of its ends being arranged to be pierced by said hollow needle inner part.

The known ampules of this type of hypodermic injectors are constituted by a glass tube closed at one of its ends by a thin wall and receiving in its other end a piston-plug usually made out of rubber, said thin wall being usually made either of rubber or of thin metal.

To make an injection with the known combination, one introduces the ampule in said holder with the thin wall brought against the hollow needle inner part, so as to be pierced by the same, while the piston-plug, closing the other end of the ampule, is brought against said pusher end.

The holder is usually provided with means to permit the operator to hold it with two fingers while the pusher is provided with means permitting to push the piston with the thumb.

The hypodermic injectors of the type specified are particularly useful for injections in the gums or in the bones, such injections requiring a strong push. The existing ampules to be used in combination with such injectors have different drawbacks.

It is very difficult to keep the liquid sterile due to the difficulty of making the piston-tube assembly completely air-tight. The necessity of a good seal increases naturally the resistance offered by the piston, while it is slidably displaced along the tube.

It is also to be noted that certain liquids have a chemical action on the rubber.

Furthermore, due to high pressures developed inside the ampule during the injection, particularly when the same is made in a bone, the glass tube can burst which, in turn, can provoke accidents.

One of the objects of the present invention is to provide an ampule which has none of the drawbacks of the existing ampules.

Another object of the invention is to provide an ampule of thermoplastic material for use in connection with a hypodermic injector, the body of said ampule having a generally tubular form, the wall of the tube being pleated so as to form a bellows, the end walls of of said tube being transverse to the axis of said tube and being hermetically sealed under sterile conditions after the liquid medicament has been introduced inside said body.

It will be readily understood that such an ampule will be perfectly sterile due to the hermetical seal link. Furthermore, the resistance of certain thermoplastic materials avoids the possibility of bursting under pressure and, anyhow, the danger of accidents which could be produced by the particles of broken glass tubes.

The ampule according to the invention offers furthermore practically no resistance when compressed, due to the bellows shape of its tubular body. Due to this shape, the axial deformation is rendered easier than in any other direction.

In certain cases, it is desirable or necessary to be able to deform the ampule in the direction opposite to the one which determines the injection.

Another object of the invention is to provide a container or ampule of thermoplastic material for use in connection with medical fluid injecting or collecting devices, but in which one of the transverse end walls is constituted by a thick annular disk on the outer face of which a threaded blind hole is formed.

In the existing hypodermic injectors of the type specified, the inside end of the pusher rod is usually threaded, so that it can be threadably engaged in said blind threaded hole to permit the deformation of the bellows-like body of the ampule axially in both directions.

Another object of the invention is to provide a container of the general type specified above, but in which no liquid is enclosed before sealing, said container being intended to be used in combination with a blood sucking or a blood collecting device, said device comprising a hollow needle to pierce one of the transverse wall ends and an actuating member to threadably engage the blind hole in the opposite transverse thick end wall to first collapse the container by axial deformation of its bellows-like body and then to bring it back to its normal shape, while sucking blood inside the container.

Preferred embodiments of the invention will be hereinafter described with reference to the accompanying drawings, given merely by way of example and in which:

Fig. 1 shows a sectional view of an ampule according to the invention.

Fig. 2 is a similar view of a container forming, for instance, a liquid medicament ampule.

Fig. 3 is a sectional view showing a hypodermic injector in combination with the ampule-container of Fig. 2.

In Fig. 1, an ampule body constituted by a bellows-like tubular element **1** is closed hermetically at its extremities by two thin transverse walls **2** and **3**, respectively. It must be well understood that to form an ampule one of said walls is sealed to the tubular body after a liquid medicament has been introduced in the tubular body under sterile conditions. The Fig. 1 shows, in fact, a complete ampule, to wit: the tubular body comprising the two transverse walls and a liquid medicament introduced, before sealing, in said body.

It must be also well understood that the thermoplastic material, the ampule body is made of, can be any conventional thermoplastic material such as polyethylene, polyvinyl chloride, etc. The specific nature of the thermoplastic material will be determined according to the liquid medicament in order to avoid every possible chemical reaction between the thermoplastic material and said liquid medicament.

Due to the bellows-like structure, the thermoplastic material is not necessarily very soft so that thermoplastic materials, other than polyethylene, may be used.

It will be clear that an ampule according to the invention is absolutely sterile, no leakage or penetration of air being possible.

In Fig. 2, the ampule or container **1***a* is of the same general construction as the one shown in Fig. 1, said ampule differing however from the one shown in Fig. 1 by the fact that the thin wall **2** is replaced by a thick disk-shaped wall **4** in which a threaded blind hole **5** is formed. This

thick wall can be used for collapsing or extending the ampule axially as desired.

Fig. 3 shows a hypodermic injector comprising a holder body **9**, one end of which is externally threaded for engagement with internal threads on a collar **15**. At the other end of the holder **9** is mounted a hollow needle **10**, one of the extremities **11** of said needle protruding inside the holder so as to pierce the thin walled extremity **3** of an ampule **1***a* mounted in said holder. The collar **15** at said one end of the holder **9** has an internally threaded, centrally disposed bore therethrough to receive and externally threaded sleeve **17** within which is mounted a push-rod **6**, the extremity **8** of which is threaded so as to be engageable in the internally threaded blind hole **5** in the thick end wall **4** of the ampule **1***a*. An abutment **7** is provided on the push rod **6** to limit the penetration of the threaded end **8** in the hole **5** and to increase the area of contact between the push-rod **6** and the thick wall **4** to permit said wall **4** to better resist mechanical stresses.

The holder **9** is held by two fingers engageable in the eyelets **12** and **13**, while an eyelet **14** is provided on the push-rod **6** to receive the thumb.

To make a hypodermic injection, one has simply to push with the thumb on the push-rod **6**, the abutment **7** of which compresses the ampule **1***a* so that the same collapses axially.

The combination of Fig. 3 offers the further advantage of permitting the use of an ampule **1***a* as an empty container for blood collection or for any other application in which a liquid is to be collected in a sterile container. For this purpose, after having placed an empty container of the type of Fig. 2 in the injector of Fig. 3, and after having screwed the push-rod **6** in the threaded hole **5**, **1***a* is first flattened as for injection by pushing the rod **6** home to blow out any air it contains, whereupon the needle is introduced e.g. into a vein of the patient. To suck the blood into the empty container, it then suffices to draw slowly on the rod **6**. It is to be noted that, in this application, the use of a collapsible container according to the invention, has the essential advantage of avoiding any passage or introduction of external air in the blood or other collected liquid as with the usual blood sucking devices.

Alternatively, an ampule of which the liquid is merely an antiseptic having no chemical action on blood may be used for blood collection. In this case, the said liquid will be merely ejected from the container by fully flattening the same under compression by means of the push-rod before effecting the blood collection as exposed above.

What is claimed is:

1. A fluid container of thermoplastic material for use in connection with medical fluid injecting or collecting devices, said container comprising a tubular, bellows-like, body having an integral thin transverse end wall and an integral thick transverse wall, and a blind threaded hole formed in the outer face of said thick transverse wall.

2. The combination with a fluid-injecting or collecting device for medical use, said device comprising a holder for a tubular element, a hollow needle protruding inside one end of said holder and an axially movable actuating member in the other end of said holder provided with a threaded end inside said holder; of a hermetically sealed fluid, sterile container of thermoplastic material comprising a tubular, bellows-like, body engaged in said holder and having a thin transverse end wall to be pierced by said hollow needle, a thick transverse wall, and a blind threaded hole formed in the outer face of said thick transverse wall to be engaged by said threaded actuating member end.

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