Feb. 17, 1953 J. A. SAFFIR 2,628,615

HYPODERMIC INJECTION DEVICE

Filed Dec. 28, 1949

Fig. 1.

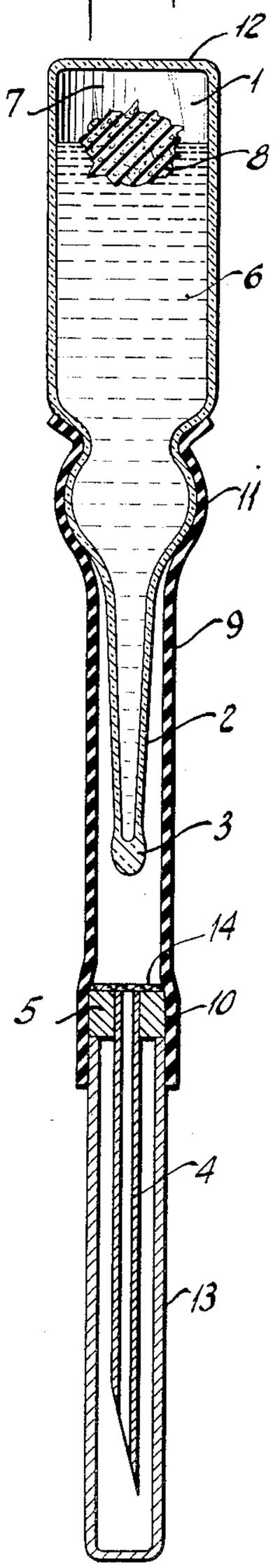


Fig. 2.

Fig. 4.

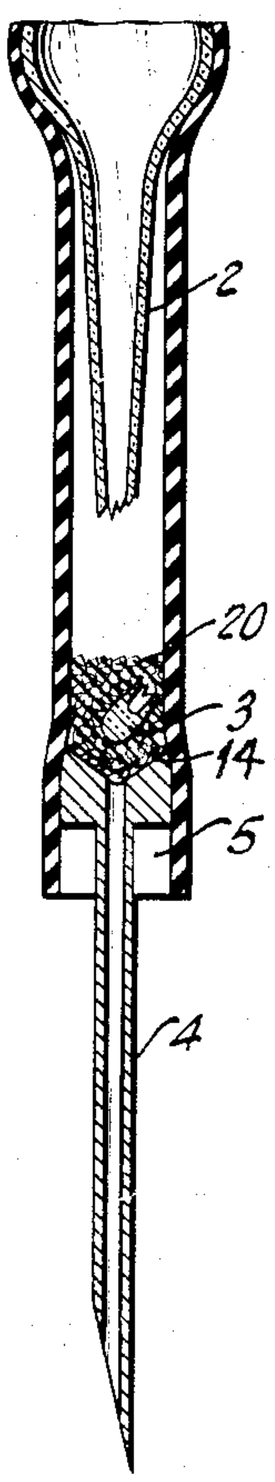


Fig. 3.

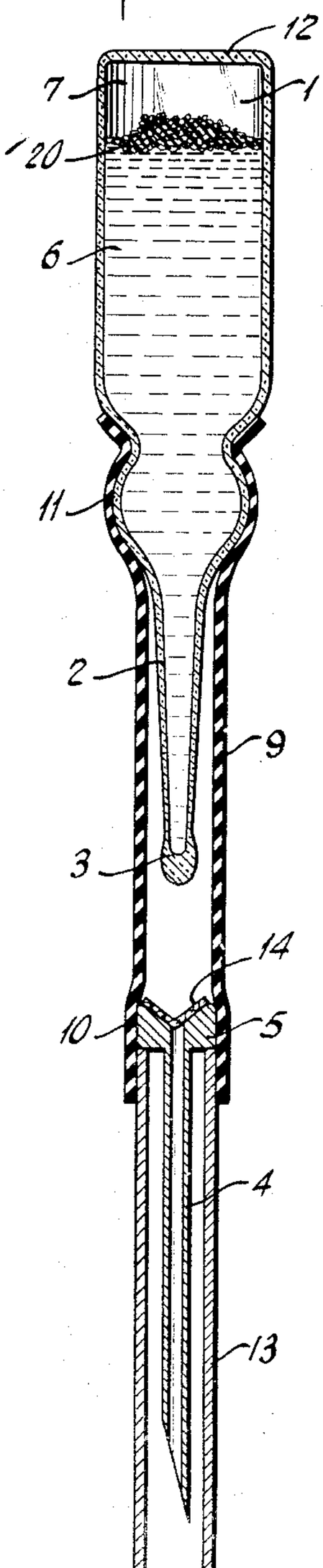


Fig. 5.

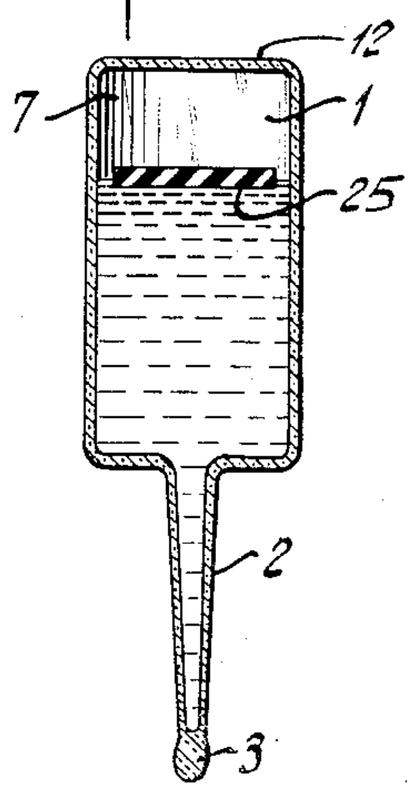
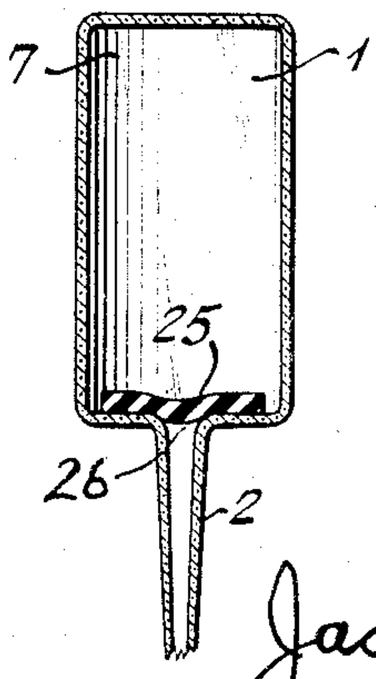


Fig. 6.



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UNITED STATES PATENT OFFICE

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HYPODERMIC INJECTION DEVICE

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6 Claims. (Cl. 128—216)

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This invention relates to medicament containers such as are sealed and frequently referred to as ampules, and more particularly applies to the self emptying type of container that has incorporated within it a means such as compressed gas, for example, to forcibly eject the medicament from the ampule, through the cannula and into the body.

It is an object of this invention to provide, in a medicament container of the self-emptying type in which compressed gas is the force for ejecting through a cannula and injecting into the body, a means of preventing the gas from following the injected fluid into the tissues.

Another object of this invention is to provide a self emptying ampule which will permit deep injections. At present most self emptying ampules are used for subcutaneous and shallow injections. A certain amount of the compressed air contained in an ampule for shallow injection may enter and often does enter the tissues.

However, when a deep injection is made into one of the muscles, it takes more pressure to eject the fluid medicament and this means even more gas under higher pressure. Consequently, more gas is apt to enter the tissues and this may cause discomfort and injury even to the point of danger.

One of the indications the physician has of the entrance of gas into the tissues is by watching the site of the injection for ballooning. But, unfortunately, by the time that sign manifests itself, gas is already present and some injury may have occurred, with a feeling of soreness, pain, and even edema.

With no present means for halting the escape of the gas, other than to stop the injection, of course, there is always some risk present.

Another object of this invention is to provide an ampule wherein there will be sufficient gas pressure to inject all of the medicament regardless of the resistance of the tissues encountered. In the present art, because of the likelihood of air entering the tissues in too large amounts where the tissues are soft and non-resistant, the average minimum of gas used, frequently does not supply sufficient force to empty the ampule and cannula.

Other objects and attendant advantages will be appreciated by those skilled in this art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawings in which

Figure 1 is a longitudinal elevation in section of one form of the invention consisting of an ampule and cannula.

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Figure 2 is a longitudinal elevation in section of the ampule in Figure 1 showing the appearance of the ampule per se after use.

Figure 3 is a longitudinal elevation in section of another form in accordance with this invention.

Figure 4 is a longitudinal elevation in section of part of the ampule shown in Figure 3 after use.

Figure 5 is a longitudinal elevation in section of still another modification.

Figure 6 is a longitudinal elevation in section of the ampule shown in Figure 5, after use.

Similar numerals refer to similar parts throughout the several views.

This invention contemplates the provision within an ampule of inert bodies floating on the surface of a fluid medicament and sufficient gas under pressure to act on the fluid and the bodies; in the case of the fluid to propel it through the ampule and cannula into the body tissues, and in the case of the inert floating bodies, to cause their movement to a given constriction point or filter where their damming up will act as a barrier to the passage of gas beyond that point.

Reference may now be had more particularly to Figure 1 wherein is illustrated one form of these ampules complete with the attached cannula for giving an actual injection.

The ampule has a body portion 1 and a more or less constricted portion or neck 2, which narrows and ends in an even more constricted manner at the tip 3, which is sealed. The body contains a fluid medicament 6 and gas under pressure 7. Floating on the fluid is a spongy or rubber-like soft mass 8, which can be made from any suitable material. A suitable material is one that will not in any way cause a deleterious effect on the medicament nor cause any discolorations or harmful reactions when sealed with the medicament for the period of time between manufacture and actual use. Sponge rubber, natural or synthetic, fiber glass cloth, or fiber glass spunk, cotton spunk, plastic or nylon fibres, synthetic fibre spunk, treated paper, cork, Vinylite acetate or chloride, sponge glass, are just a few of the materials that lend themselves under certain circumstances for fabrication for this purpose.

A hypodermic needle 4 is embedded in shank or needle holder 5, and this may be made of any suitable material such as metal, rubber, or plastic. The needle may be made from the usual materials such as metal or plastic.

The needle 4 and holder 5 are connected to

the ampule by a flexible tube 9 which is stretched over the shank of the needle holder 10 and the neck of the ampule 11 so as to form an air and liquid proof connection between these parts. A filter 14 of cloth, fiber glass, paper, or any other of the well known filtering materials is placed here to filter off any particles or broken glass or to stop the egress of the floating body 8 in the event that any part of these should pass through the ampule. A glass shield 13 keeps the needle sterile until it is to be used.

To inject the contents of this ampule, the shield 13 is removed, and the needle 4 is inserted into the tissues the desired distance, the usual precautions being observed to insure against the needle being in a vein. Then, with the ampule held with its bottom 12 up, the tip 3, within the flexible tube 9, is broken off with the fingers.

The compressed gas forces the fluid through the neck of the ampule and through the needle. The relatively soft mass 8 which has been floating on top of the liquid descends as the level of the liquid becomes lower and finally assumes the position shown in Figure 2 where it can be seen to be obstructing the exit from the ampule. This mass acts as a stopper and a valve to keep the gas from following the medicament and entering the needle and eventually the tissues.

In Figure 3, the mass 20, which will act as a stopper, comprises a plural number of small floating bodies, small enough to pass through the ampule after the liquid is discharged but large enough to be held by the filter 14.

In Figure 4, the tip 3 of the ampule is broken off. The floating bodies 20 have collected against the filter 14, and have formed a seal against the gas and prohibit their passing.

In Figure 5, the floating mass 25 is a thin wafer-like sheet which floats on the medicament. When the tip 3 is broken off and the liquid is discharged as shown in Figure 6, the floating mass 25 lodges on the bottom of the ampule and obstructs the exit 26, preventing the passing of the gas beyond that point.

While I have shown and described certain specific embodiments of my invention, I do not wish to be understood as limiting myself thereto, but intend to claim my invention as broadly as may be permitted by the scope of the appended claims.

I claim:

1. An ampule comprising a closed tubular glass container, having a restricted outlet portion adapted to be broken at its tip end, said ampule being filled with a liquid medicament, sufficient gas under pressure to eject said medicament when the ampule is opened, and an inert elastic mass floating on said medicament, said inert elastic floating mass being adapted to substantially seal the said restricted outlet portion against the passage of gas therethrough when the medicament has passed from the said container into the said restricted outlet portion.

2. An ampule of the self-emptying type having fluid medicament, gas under pressure, inert floating bodies disposed within said ampule, and a cannula extending from said ampule, said gas for propelling the fluid medicament through the ampule and cannula into the body tissues and said gas also for causing the succedent movement of the floating inert bodies to a given constriction where their damming up will act as a barrier to the further passage of said gas.

3. An ampule of the self-emptying type having fluid medicament, gas under pressure, inert floating bodies disposed within said ampule, and a cannula extending from said ampule, and a filter positioned between the ampule and the cannula to obstruct the flow of the said floating bodies, said gas being adapted for propelling the fluid medicament through the ampule and cannula into the body tissues and for causing the succedent movement of the floating inert bodies to the filter where their damming up will act as a barrier to the further passage of said gas.

4. A closed ampule containing medicament and a gas under pressure adapted for ejecting said medicament from the ampule, said ampule having a projection thereof adapted to provide an outlet for the flow of the medicament from said ampule, a mass inert to said medicament floating thereon within the ampule and adapted to seal the said outlet against the passage of gas therethrough after the medicament has been ejected through the said outlet.

5. A closed ampule containing medicament and a gas under pressure adapted for ejecting said medicament from the ampule, said ampule having a projection susceptible to breakage for providing an outlet for the flow of the medicament from said ampule, a resilient body inert to said medicament floating thereon within the ampule and adapted to seal the said outlet against the passage of gas therethrough after the medicament has been ejected through the said outlet.

6. A closed ampule containing medicament and a gas under pressure adapted for ejecting said medicament from the ampule, said ampule having a projection susceptible to breakage for providing an outlet for the flow of medicament from the said ampule, a body inert to said medicament floating thereon within said ampule, a cannula coordinated with said projection through a flexible attachment, and means for obstructing the passage of solid particles comprising the said inert floating body, said obstruction means being positioned between the outlet of the ampule and the cannula, the said inert body, when retained by the said obstruction means being adapted to prevent the passage of gas through the said obstruction means after the medicament has been ejected from the ampule and the cannula.

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