

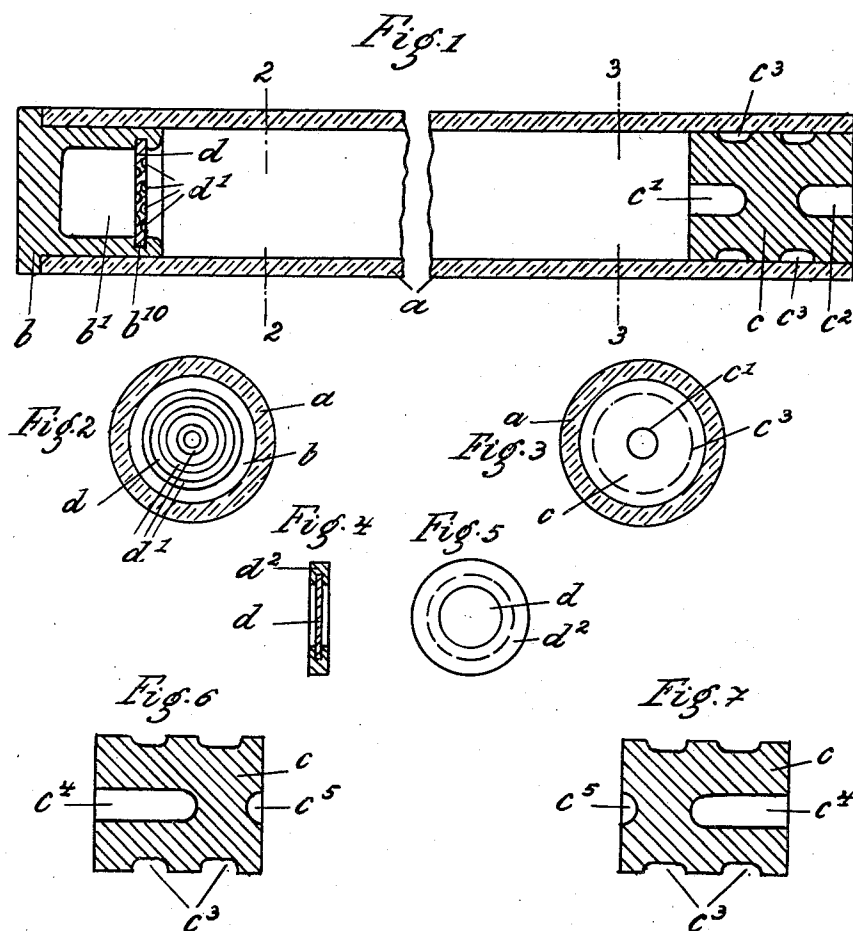
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AMPULE

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AMPULE

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1 Claim. (Cl. 128—218)

My invention relates to an improved ampule of the type which is insertable in the barrel of hypodermic syringes and comprises a tubular body closed at its opposite ends by plugs, one of which serves as the recipient of medicament and the other as a plunger for the expulsion of liquid from the tubular body.

The plug which receives the medicament is provided with a closure which may be removed from the exterior by a punch, a canule or by the hypodermic needle to permit the medicament to enter the liquid in the ampule body, while the other plug is displaced by the plunger of the hypodermic syringe in the expulsion of the liquid from the ampule.

The improvements contemplated by the present invention are directed firstly to the filling of the ampule and, secondly, to maintaining the medicament chamber fluid tight.

In ampules of ordinary construction the liquid which serves as a solvent for the medicament is generally introduced into the tubular body by the hypodermic needle through one of the plugs and inasmuch as in the present construction, the medicament containing plug should not be punctured from the outside I provide for the introduction of the liquid through the other plug. To this end, the plunger plug is centrally attenuated so that the needle may readily penetrate the same without displacing the plug. A desirable manner of effecting the attenuation is to provide the plug with a cavity or cavities.

I prefer to form in the plunger plug two coaxial cavities of like or unlike length, extending towards the centre of the plug from its opposite faces. The plug is provided with peripheral grooves which act in the nature of packings and the cavities are so small in diameter and terminate relatively to the peripheral grooves in such position that upon puncturing the attenuated part of the plug with a hypodermic needle for the purpose of injecting liquid into the ampule the plunger plug is not displaced. Furthermore, upon displacement of the plug by the piston of the syringe the needle is insulated against the outside of the plug and the fluid tightness of the peripheral grooves is fully maintained in that deformation of the ribs which define the grooves is prevented.

To introduce the liquid into the ampule the tubular body is first evacuated by the needle which extends through the plunger plug and then the liquid is injected through the same needle. It is obvious that the closure for the medicament chamber must be maintained fluid tight against

the suction and pressure effects of evacuation and liquid introduction, respectively, and this is accomplished, in accordance with the present invention, by making the closure or disc so elastic that its deformation during the filling operation will have no effect on the fluid tight connection of the edge or edges of the disc with the plug in which it is held.

In one form of my invention the fluid tightness of the disc is obtained by centrally weakening the disc as by forming grooves, preferably annular in form, on that part of either or both faces of the disc not in contact with the plug, and in another form of the invention the disc is marginally reinforced or thickened by application of suitable means thereto.

The invention is illustrated in the accompanying drawing in which Fig. 1 is a longitudinal sectional view on an enlarged scale of the improved ampule; Fig. 2 is a cross section on the line 2—2 of Fig. 1; Fig. 3 is a cross section on the line 3—3 of Fig. 1; Fig. 4 is a transverse section and Fig. 5 a plan view of a modified closure disc for the medicament chamber; Figs. 6 and 7 are longitudinal sectional views of modified forms of the plunger plug.

Referring to the drawing, *a* denotes the tubular ampule body closed at its opposite ends by the plugs *b* and *c*. The plug *b* is provided with the medicament receiving chamber *b'* sealed by the closure disc *d*.

The disc *d*, which is seated in a groove *b¹⁰* in a wall of the plug *b*, may have on either or both of its faces a series of grooves *d'* which increase the elasticity of the centre of the disc as compared with the marginal portion thereof seated in the groove *b¹⁰*, so that during and after filling the ampule the contents of the chamber *b'* are maintained fluid tight. The form of disc just described is that shown in Figs. 1, 2 and 3.

In the modified form of disc shown in Figs. 4 and 5, the central part of the disc may or may not be attenuated, but its rim or marginal part is reinforced or thickened at *d²* by material which serves in the nature of a packing. The material of the reinforcement may be applied in solid form to the disc or in fluid form of such consistency that it quickly sets and hardens on the disc.

The plunger plug *c*, in the form shown in Fig. 1, is provided with two oppositely extending, coaxial cavities *c'* and *c²* and with peripheral grooves *c³*. These cavities may be of equal length (Fig. 1) or they may be unequal in length, the longer cavity *c⁴* being either at the inside of the

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plug and the shorter cavity at the outside (Fig. 6) or, conversely, the shorter groove at the inside and the longer at the outside of the plug (Fig. 7).

In the several forms of the plug *c*, the cavities
5 are very small in diameter and so terminate in the plug that the intact part therebetween will not, upon penetration of the plug by the filling needle, cause displacement of the plug bodily nor will the fluid tight contact at the periphery of
10 the plug be lessened or adversely affected upon displacement of the plug by the plunger of the syringe. While I have shown the plug *c* as provided with two cavities it is obvious that one cavity of sufficient depth will serve the purpose,
15 in which case either the outer or inner face of the plug will remain unindented.

I claim:

As a new article of manufacture, an empty
20 sealed ampule adapted for subsequent filling from the outside, comprising an empty tube, a closure plug disposed at one end of said tube, said plug being provided with an inwardly open medica-

ment chamber, a closure disc internally closing said medicament chamber, said closure disc having concentric grooves therein at parts other than its marginal positions, and a plunger plug of substantially solid cross-section throughout, closing
5 up the other end of said tube and being displaceable therein, said plunger plug being provided with at least one longitudinal substantially central cavity of relatively small cross-section, whereby an attenuated locally weakened body
10 section is produced in said plunger plug, the latter tightly pressing against the walls of the empty tube, said tube being adapted to be filled from the outside by piercing the weakened section of said displaceable plunger plug, the pressure exerted by the latter upon the walls of the
15 tube being sufficient to prevent the plunger plug from being forced into the empty tube by the piercing of said weakened body section of the plunger plug.

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