

March 9, 1943.

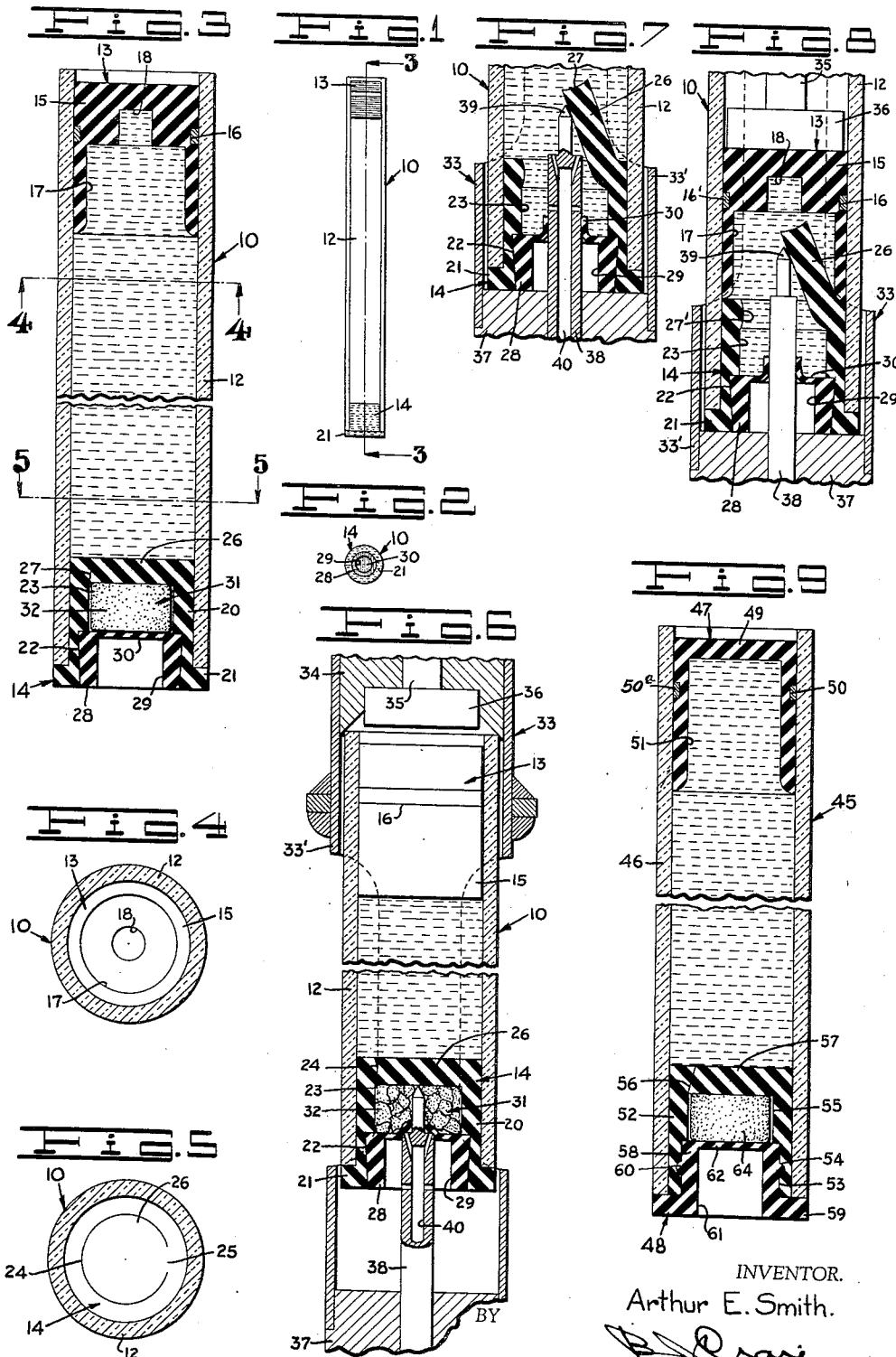
A. E. SMITH

2,313,483

AMPOULE

Filed Jan. 4, 1941

2 Sheets-Sheet 1



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By

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AMPOULE

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2 Sheets-Sheet 2

Fig. 10

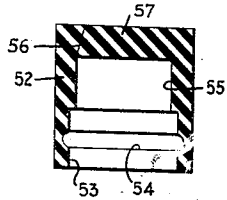


Fig. 11

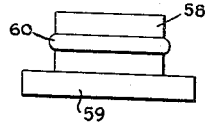


Fig. 16

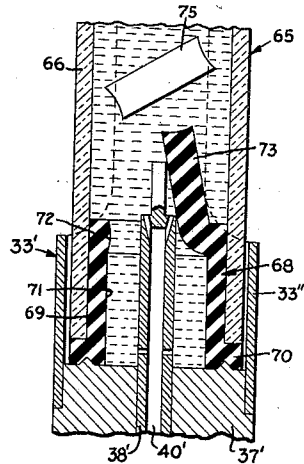


Fig. 12

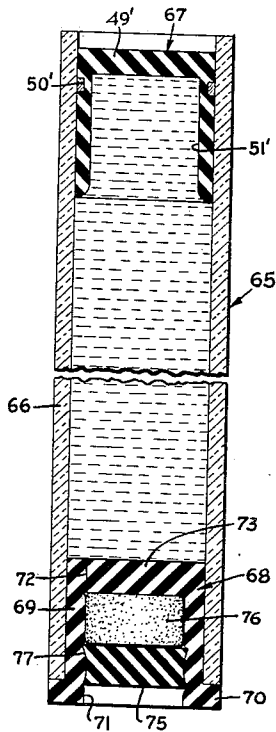


Fig. 14

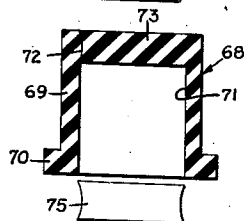


Fig. 15

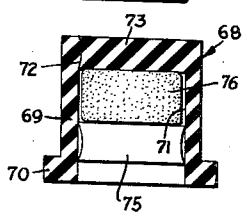


Fig. 17

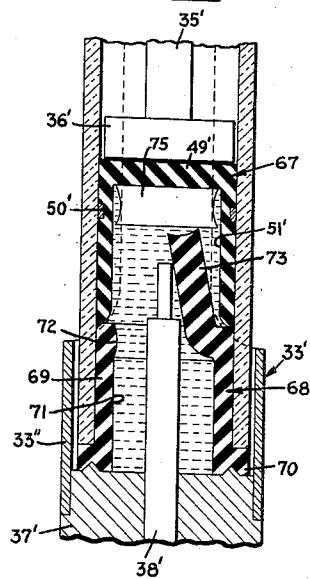
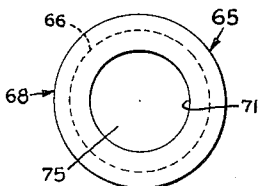


Fig. 13



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AMPOULE

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7 Claims. (Cl. 128—272)

This invention relates to improvements in medicinal containing ampoules, the contents of which are adapted to be discharged therefrom by placing the ampoule in a suitable syringe.

The general object of the invention is to provide an improved ampoule wherein the vehicle and medicament are remotely maintained therein until a predetermined time.

Another object of the invention is to provide an improved ampoule including a body portion having an end closed by a novel stopper member containing a medicament.

A further object of the invention is to provide an ampoule including a body portion having a liquid therein and closed at one end by a stopper having a chamber therein containing a medicament and having a hinged trap door member closing the inner end of the chamber to hermetically seal the medicament from the liquid in the ampoule body and having opposite the trap door a fracturable diaphragm portion hermetically sealing the medicament from the atmosphere.

Other objects and the advantages of this invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is a side elevation of my improved ampoule.

Fig. 2 is an end view of discharge end of the ampoule.

Fig. 3 is an enlarged fragmentary section taken on line 3—3 of Fig. 1.

Fig. 4 is a section taken on line 4—4 of Fig. 3.

Fig. 5 is a section taken on line 5—5 of Fig. 3.

Fig. 6 is a fragmentary central longitudinal section thru a syringe showing the ampoule shown in Fig. 1 being inserted therein.

Fig. 7 is a fragmentary view similar to Fig. 6, showing the ampoule fully inserted into the syringe.

Fig. 8 is a fragmentary view similar to Fig. 7 showing the positions of the ampoule stoppers after the liquid has been discharged from the ampoule.

Fig. 9 is a fragmentary central longitudinal section thru an ampoule embodying modified features of my invention.

Fig. 10 is a central longitudinal section thru the lower stopper of the ampoule shown in Fig. 9 before the plug member is positioned therein and before the stopper is positioned in the ampoule.

Fig. 11 is a side elevation of the stopper plug member before being inserted in the stopper.

Fig. 12 is a fragmentary central longitudinal section thru an ampoule including a further modification of my invention.

Fig. 13 is an end view of the discharge end of the ampoule shown in Fig. 12.

Fig. 14 is a central longitudinal section thru the lower stopper of the ampoule shown in Fig. 12 before it is positioned in the ampoule and showing the disc member removed from, but aligned for placement in, the stopper.

Fig. 15 is a view similar to Fig. 14 showing the disc member positioned in the stopper.

Fig. 16 is a fragmentary longitudinal section thru a syringe with the ampoule shown in Fig. 12 fully inserted therein, and

Fig. 17 is a view similar to Fig. 16 showing the positions of the stopper members when the liquid is fully discharged from the ampoule.

Referring to the drawings by reference characters I have indicated my improved ampoule generally at 10. As shown the ampoule 10 includes a hollow cylindrical glass body 12 closed at one end by a plunger stopper 13 and at the opposite end by a container stopper 14.

The plunger stopper 13 includes a rubber body 15 having a groove 16 therearound intermediate the length thereof which may be filled with a suitable lubricant 16' such as paraffin. Opening thru the inner end thereof the body 15 has a recess 17 therein and opening into the bottom of the recess 17 the body has a reduced co-axial recess 18 therein.

The container stopper 14 includes a body portion 20 made of rubber or similar material having at one end an enlarged flange portion 21 which overlaps and engages the adjacent end of the ampoule body 12. Opening thru the outer end thereof the body 20 has a recess 22 therein, the side walls of which converge towards the outer end. The body 20 further includes a reduced recess 23 co-axial with the recess 22 and opening thereinto. The portion of the body between the inner end thereof and the bottom of the recess 23 is severed as at 24 (see Fig. 5) on line with the side walls of the recess 23 except for a small hinge portion as at 25 thus forming a trap door 26 in the inner end of the stopper body 20.

The severing at 24 is preferably done in such a manner that the side walls of the trap door portion 26 are concavely shaped and the adjacent walls of the body portion are convexly shaped, as at 27', to match the side walls of the trap door as indicated at 27 (best shown in Figs. 7 and 8). In assembly the portion 27 is slightly

stretched while the trap door is moved to closed position. The concave and convex portions tend to produce a tight fit.

Within the recess 22 I provide a plug member 28 which like the stopper body 20 is made of rubber and the side walls of which are convergently tapered to match the taper of the recess 22. Opening thru the outer end thereof the plug 28 has a co-axial recess 29 therein which is of a predetermined depth to leave only a thin diaphragm portion 30 between the bottom thereof and the inner end of the plug. To insert the plug 28 the wall at the outer end of the recess is slightly stretched and the plug is slightly compressed and the parts are then pushed together whereupon they tightly engage each other and the convergence tends to produce a tight fit.

When the plug 28 is positioned in the recess 22 in engagement with the bottom thereof the recess 23 is formed into a closed chamber 31 in which, before the insertion of the plug, a medicament tablet 32 is positioned.

The interior of the ampoule body 12 between the bottom of the recess 18 of the stopper 13 and the inner end of the stopper 14 is filled with a suitable liquid vehicle such as distilled water.

In use the ampoule 10 is adapted to be positioned in any suitable syringe such as indicated at 33 which includes a hollow cylindrical body portion 33' having a closure member 34 at one end thru which a plunger rod 35 having a head 36 thereon projects and which at the opposite or discharge end is closed by a tip portion 37 having a stem portion 38 projecting into the body 33 a predetermined distance with the inner end thereof pointed as at 39 and having suitable discharge passages 40 therein.

To mix the medicament and the vehicle and discharge the contents of the ampoule 10 it is positioned in the syringe 33 with the container stopper 14 thereof towards the syringe tip 37. As the ampoule is moved towards the tip 37 the stem 38 enters the plug recess 29 and the pointed end 39 thereof engages the diaphragm 30 puncturing it and enters the chamber 31 where it breaks up the soft medicament tablet 32 as shown in Fig. 6. Thereafter the end 39 of the stem engages the trap door 26 and forces it towards the stopper 13 as shown in Fig. 7, whereupon the liquid vehicle enters the chamber 31 and dissolves the broken up medicament tablet.

Thereafter the plunger head 36 is moved into engagement with the outer end of the stopper 13. Upon further movement of the plunger rod towards the tip 37 the stopper 13 is moved towards the stopper 14 whereupon the liquid within the ampoule body is forced therefrom thru the discharge passages 40 of the syringe stem 38. As the stopper 13 approaches the stopper 14 the extended trap door 26 of the stopper 14 enters the recess 17 of the stopper as shown in Fig. 8 thus allowing the maximum discharge of the liquid from the ampoule.

So that an operator can readily determine the correct end of the ampoule to insert into the syringe first, I preferably make the stoppers 13 and 14 of differently colored material. As an illustration in Figs. 1 and 2 I have shaded the stoppers to show the stopper 13 made of a blue colored material, the stopper 14 of a white colored material and the plug member 28 made of a red colored material.

In Figs. 9, 10 and 11 I have indicated a modified form of my invention embodied in an ampoule which is indicated generally at 45. As

shown the ampoule 45 includes a hollow cylindrical glass body portion 46 closed at one end by a plunger stopper 47 and at the opposite end by a container stopper 48.

The stopper 47 includes a body portion 49 having a groove 50 therearound intermediate its length which is filled with a suitable lubricant 50^a such as paraffin. Opening thru the inner end thereof the body 49 has a co-axial recess 51.

The stopper 48 includes a body portion 52 made of rubber or similar material having a co-axial aperture 53 opening thru the outer end thereof. Intermediate the depth thereof the side walls of the recess 53 have a semi-circular groove 54 therearound. Opening thru the bottom of the recess 53 and co-axial therewith the body 52 has a reduced recess 55 therein.

The portion of the body 52 between the inner end thereof and the bottom of the recess 55 is partly severed as at 56 similar to the previously mentioned severing 24 of the stopper 14, to form a trap door 57.

The side walls of the trap door 57 however, are preferably convergently tapered outward as shown instead of being concave as in the previously described stopper 14. In assembly the end portion of the stopper body portion 52 is slightly stretched and the trap door is then moved to closed position. The convergence tends to produce a tight fit.

Positioned in the recess 53 of the stopper body 52 I provide a plug member 58 having an enlarged flange portion 59 which overlies and engages the outer end of the stopper body 52 and the adjacent end of the ampoule body 46. Intermediate the length thereof the plug 58 has an integral semi-circular head 60 therearound which is positioned in the groove 54 of the stopper body 52. The head 60 engaging in the groove 54 tends to prevent ready removal of the plug.

Opening thru the bottom thereof the plug member 58 has a co-axial aperture 61 therein which is of a predetermined depth to leave only a thin diaphragm portion 62 between the bottom thereof and the inner end of the plug. When the plug member 58 is positioned in the recess 53 in engagement with the bottom thereof the recess 55 is formed into a closed chamber in which before the insertion of the plug a medicament tablet 64 is positioned. The interior of the ampoule body 46 between the bottom of the recess 51 of the stopper 47 and the inner end of the stopper 48 is filled with a suitable liquid vehicle such as distilled water.

In use the ampoule 45 is adapted to be inserted in a syringe such as the previously described syringe 33 and the operation of dissolving the medicament in the vehicle and discharging the liquid from the ampoule 45 is the same as described in connection with the ampoule 10.

In Figs. 12 to 17 inclusive, I have shown a further modification of my invention embodied in an ampoule which is indicated generally at 65. As shown the ampoule 65 includes a hollow cylindrical body portion 66 closed at one end by a rubber plunger stopper 67 and at the opposite end by a rubber container stopper 68.

The plunger stopper 67 is the same in all respects to the previously described stopper 47 of the ampoule 65 so therefore I have indicated like portions thereof by similarly primed reference numerals.

The stopper 68 includes a body portion 69 having an enlarged flange portion 70 on the outer end thereof which overlies the adjacent end of

the ampoule body 66. Opening thru the outer face thereof the body 69 has a co-axial recess 71 therein of a predetermined depth. The portion of the body 69 between the inner end thereof and the bottom of the recess 71 is partly severed as at 72 similar to the previously described severing 24 of the stopper 14 to form a trap door portion 73.

Positioned in the recess 71 a predetermined distance from the end of the stopper, I provide a rubber disc member 75. The edges of the disc member 75 are formed concave.

Before the stopper 68 is positioned in the ampoule body 66 the recess 71 is of the same diameter as that of the disc 75 and the outer diameter of the stopper body 69 is larger than the interior of the ampoule body 66.

When assembling the stopper 68, a medicament tablet 76 is positioned in the recess 71 and then the disc 75 is placed therein. Thereafter the stopper is placed in the ampoule and in so doing, it is compressed whereupon a portion of the side walls of the recess 71 bulge into the concave edge of the disc 75 as indicated at 77 (Fig. 12).

In use the ampoule 65 is adapted to be placed in a syringe such as indicated at 33' which is similar to the previously described syringe 33, so therefore I have indicated like portions by similarly primed reference numerals. However, in the syringe 33' the end of the discharge stem 38' may be made flat instead of pointed as shown in Fig. 6.

The ampoule 65 is placed in the syringe body 33' with the stopper 68 towards the tip 37' and thereafter moved towards the tip until the end of the stopper 68 firmly engages the inner face of the tip 37'. As the ampoule 65 is thus moved into the syringe the end of the discharge stem 38' engages the disc 75 forcing it and the medicament tablet 76 towards the stopper 67 thereby forcing the trap door 73 to swing inwardly as shown in Fig. 16. The disc 75 and tablet 76 are forced into the ampoule body until the disc 75 is past the trap door 73 as shown in Fig. 16.

To eject the liquid from the ampoule the operator moves the plunger head 36' into engagement with the stopper 67 and forces the stopper 67 towards the stopper 68 thereby forcing the liquid out of the ampoule body into and thru the aperture 40' in the discharge stem 38'.

As the stopper 67 approaches the stopper 68 the disc 75 enters the recess 51' and thereafter the extended trap door 73 enters the recess 51' as shown in Fig. 17 thus allowing a maximum discharge of the liquid from the ampoule.

The construction described is designed for containers in which it is desired to maintain a drug in a compartment sealed off from the solvent for the drug. For example, since Novocain deteriorates when in solution, a Novocain tablet or powder may be placed in the chamber in the container stopper and the solvent for the Novocain placed in the main body of the container. When the trap door is opened, the Novocain will enter into the solvent providing the desired fresh solution.

From the foregoing description it will be apparent that I have provided a novel medicinal ampoule which is simple in construction and highly efficient in use.

I claim:

1. A container stopper comprising a body portion having an outwardly opening recess therein, the portion of the body at the bottom of the

recess being severed substantially in alignment with the adjacent side wall of the recess except for a small hinge portion, thus forming a trap door, the severed portion having a periphery, sealingly engaging the container stopper body, and a plug member seated in and sealingly engaging the inner wall of said container stopper recess, said plug member including a diaphragm portion closing the outer end of said recess and a medicament adjacent the diaphragm and within the container stopper recess.

2. In a container stopper, a body having an outwardly opening recess therein and having a second reduced recess co-axial with the first recess and opening therinto and with a shoulder at the junction of the recesses, the portion of the body at the bottom of the second recess being severed substantially in alignment with the adjacent side wall of the recess except for a small hinge portion, thus forming a trap door, the severed portion having a bevelled periphery, the portion of the container stopper body engaged by the trap door having a bevelled portion for engaging the bevelled periphery of the trap door, the wall of said first container stopper recess having an inwardly directed groove and a plug member seated in said first container stopper recess, said plug member having a flange adapted to engage the end of a cylindrical body portion of an ampoule, said plug member having a body portion engaging the container stopper side wall and the shoulder at the inner end thereof, said plug member having an outwardly directed bead engaging in the groove in the wall of the first recess and also having a recess therein co-axial with the first and second recesses, a thin diaphragm forming the inner wall of the plug member recess and a medicament adjacent the diaphragm and within the container stopper second recess.

3. The combination of an ampoule comprising an elongated cylindrical glass body and a container stopper member, said container stopper member being made of resilient material and including a cylindrical body portion arranged in the glass body, said container stopper member having an outwardly opening recess therein, the portion of the container stopper member at the bottom of the recess being severed substantially in alignment with the adjacent side wall of the recess except for a small hinge portion, thus forming a trap door, the severed portion having its periphery sealingly engaging the container stopper body, and a closure member seated in said recess and spaced from the trap door, said closure member including a pierceable diaphragm portion and a peripheral portion sealingly engaging the container stopper member and a medicament adjacent the closure member and within the container stopper recess.

4. The combination of an ampoule comprising an elongated cylindrical glass body and a container stopper member, said container stopper member being made of resilient material and including a cylindrical body portion arranged in the glass body, said container stopper member having an outwardly opening recess therein and having a second reduced recess co-axial with the first recess and opening therinto and with a shoulder at the junction of the recesses, the portion of the body at the bottom of the second recess being severed substantially in alignment with the adjacent side wall of the recess except for a small hinge portion, thus forming a trap door, the severed portion having its periphery

sealingly engaging the container stopper body and a plug member seated in said container stopper recess and engaging the shoulder, said plug member having a recess therein co-axial with said first and second recesses, a thin diaphragm forming the inner wall of the plug member recess and a medicament adjacent the diaphragm and within the container stopper second recess.

5. The combination of an ampoule comprising an elongated cylindrical glass body, a plunger stopper member and a container stopper member, said container stopper member being made of resilient material and including a cylindrical body portion arranged in the glass body, said container stopper member having an outwardly opening recess therein, the portion of the container stopper at the bottom of the recess being severed substantially in alignment with the adjacent side wall of the recess except for a small hinge portion, thus forming a trap door, the severed portion having its periphery sealingly engaging the container stopper body, and a plug member seated in said container stopper recess, said plug member sealingly engaging the container stopper, said plug member having a thin diaphragm forming the outer wall for the container stopper member recess, a medicament adjacent the diaphragm and within the container stopper recess, said plunger stopper being slidable in the glass body and including an inwardly opening recess forming a peripheral flange, said peripheral flange being adapted to surround said trap door when the latter is opened and the plunger stopper is moved inwardly.

6. The combination of an ampoule comprising an elongated cylindrical glass body and a container stopper member, said container stopper member being made of resilient material and including a cylindrical body portion arranged in the glass body, said container stopper having an outwardly opening recess therein and having a second reduced recess co-axial with the first recess and opening thereinto and with a shoulder at the junction of the recesses, the portion of the container stopper bottom of the second recess being severed substantially in alignment with the adjacent side wall of the second recess except for a small hinge portion, thus forming a trap door, the severed portion having its periph-

ery engaging the container stopper body, said container stopper first recess having an inwardly directed groove and a resilient plug member seated in said container stopper first recess, said plug member having a flange engaging the end of the glass body, said plug member engaging said shoulder, said plug member having an outwardly directed bead engaging the groove in the first recess and also having a recess co-axial with the first and second recesses, a thin diaphragm forming the inner wall of the plug member recess and a medicament adjacent the diaphragm and within the container stopper second recess.

7. The combination of an ampoule comprising an elongated cylindrical glass body, a plunger stopper, said plunger stopper being disposed in said glass body, said plunger stopper being made of rubber and having an inwardly opening recess in one end thereof, and a container stopper, said container stopper member being made of resilient material and including a cylindrical body portion arranged in the glass body, said container stopper having an outwardly opening recess therein and having a second reduced recess co-axial with the first recess and opening thereinto and with a shoulder at the junction of the recesses, the portion of the container stopper at the bottom of the container stopper second recess being severed substantially in alignment with the adjacent side wall of the associated recess except for a small hinge portion, thus forming a trap door, the portion of the container stopper adjacent to the trap door having an overhanging portion for engaging the periphery of the trap door, the wall of said container stopper first recess having an inwardly directed groove and a plug member seated in said container stopper first recess, said plug member engaging the said shoulder, said plug member having an outwardly directed bead engaging in the groove in the wall of the first recess and also having a recess therein co-axial with the container stopper first and second recesses, a thin diaphragm forming the inner wall of the plug member recess and a medicament adjacent the diaphragm and within the container stopper second recess.

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