

June 26, 1928.

1,674,927

A. E. SMITH

AMPUL

Filed Jan. 5, 1926

2 Sheets-Sheet 1

FIG. 1

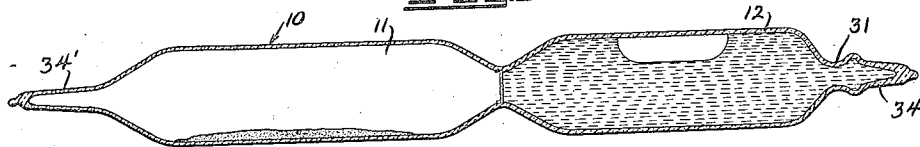


FIG. 2

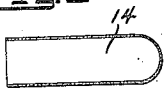


FIG. 3

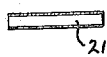


FIG. 4



FIG. 5

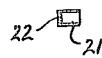


FIG. 6

FIG. 7

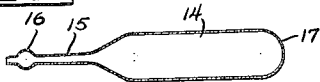


FIG. 8

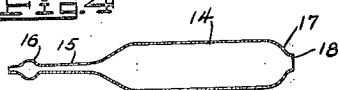


FIG. 9

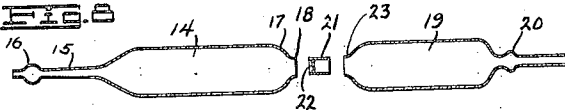


FIG. 10

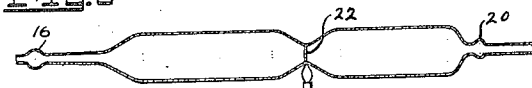


FIG. 11

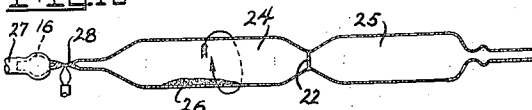


FIG. 12

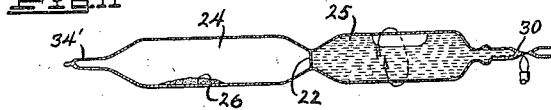
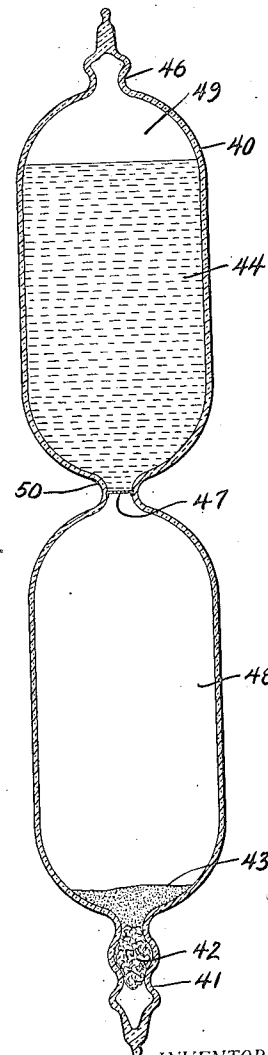
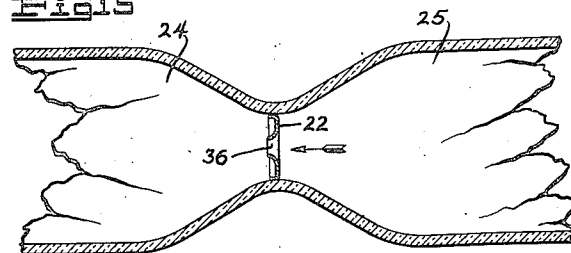


FIG. 13



INVENTOR.

ARTHUR E. SMITH

BY

Arthur E. Smith

ATTORNEY.

June 26, 1928.

A. E. SMITH

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FIG. 17

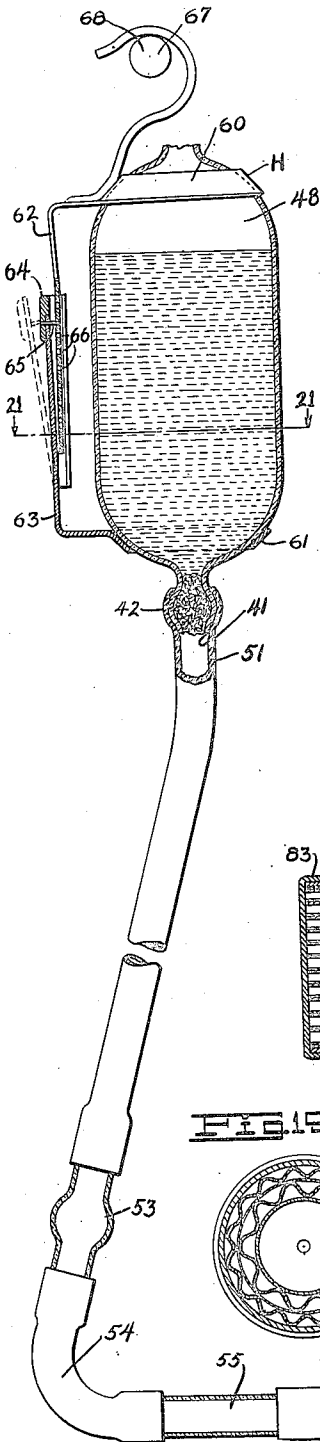


FIG. 12

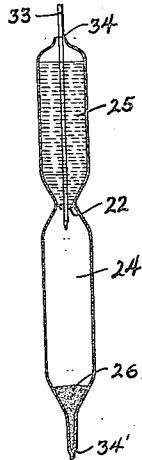


FIG. 13

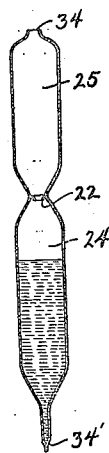


FIG. 14

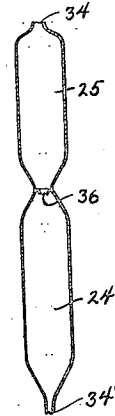


FIG. 21

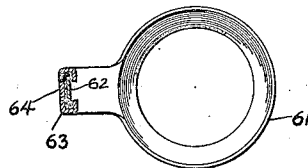


FIG. 18

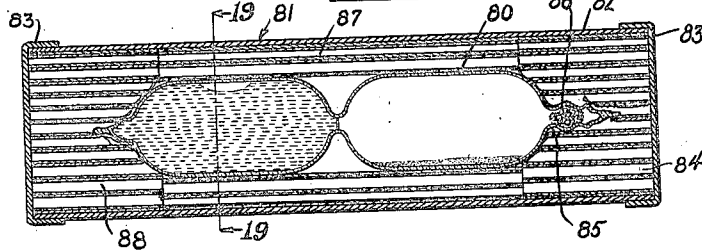


FIG. 19

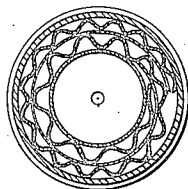
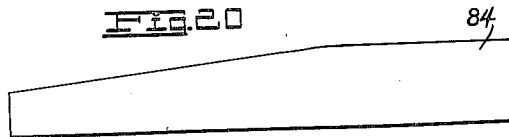


FIG. 20



INVENTOR.
ARTHUR E. SMITH

BY *Boffroy*
ATTORNEY.

UNITED STATES PATENT OFFICE.

ARTHUR E. SMITH, OF LOS ANGELES, CALIFORNIA.

AMPUL

Application filed January 5, 1926. Serial No. 79,313.

This invention relates to ampules or similar containers.

The general object of the invention is to provide an ampul including separate chambers or compartments wherein dissimilar ingredients are preserved and wherein means is provided for allowing the ingredients to mix to form a desired product.

A specific object of the invention is to provide a container including two compartments which are normally out of communication with each other, but which can be placed in communication with each other and wherein the separate compartments have sealed therein the component parts necessary to provide a drug in solution.

Another object of the invention is to provide a glass ampul including a plurality of compartments wherein one compartment includes a drug and wherein the other compartment includes a vehicle for the drug.

Another object of the invention is to provide an ampul including two parts or compartments and wherein a frangible metallic member separate the two compartments.

Another object of the invention is to provide an ampul including two parts or compartments which are separated by means of a frangible metallic seal, and wherein one of the compartments contains a drug and the other a vehicle, and wherein the drug containing compartment is exhausted whereupon rupture of the metallic seal will allow the vehicle to pass into the drug holding chamber.

Another object of the invention is to provide an ampul including two parts or compartments one of which has a drug therein and the other contains a vehicle together with means for allowing the drug and vehicle to mix and wherein each end of the ampul is provided with a frangible neck portion which may be broken off.

A further object of the invention is to provide an improved stand or support for holding an ampul embodying the features of my invention.

Another object of the invention is to provide an improved shipping container whereby my improved ampul may be transported.

A further object of my invention is to provide a novel method for making ampules.

Other objects of the invention will be apparent from the following description taken

in connection with the accompanying drawings, wherein:

Fig. 1 is a sectional view of the completed ampul;

Fig. 2 shows a glass tube from which the ampul is made;

Fig. 3 shows a neck drawn on one end of the ampul;

Fig. 4 shows the other end of the ampul blown out;

Fig. 5 illustrates a glass tube from which the connecting neck is formed;

Fig. 6 is a view of the metallic cupped shaped partition or diaphragm;

Fig. 7 is a view of the connecting neck with the metal partition fused thereon;

Fig. 8 is a view showing both body portions of the ampul and the connecting neck about to be assembled;

Fig. 9 shows the two body portions and the neck assembled, and being fused together;

Fig. 10 is a view showing the drug inserted in one compartment, with the compartment exhausted and being hermetically sealed;

Fig. 11 is a view showing the drug in one compartment with the vehicle in the other compartment and being sealed therein;

Fig. 12 shows the means of fracturing the metallic partition;

Fig. 13 shows the water and drug mixed together;

Fig. 14 shows the ampul after the solution has been withdrawn;

Fig. 15 is an enlarged section showing the metallic disc fractured;

Fig. 16 is a view showing a modified shape of ampul;

Fig. 17 shows the mixed solution in the ampul together with the apparatus for supporting the ampul and injecting the solution;

Fig. 18 is a sectional view of the ampul in my improved shipping receptacle;

Fig. 19 is a section on line 20—20, Fig. 19, Fig. 20 is a development of an end member used in the shipping receptacle, and

Fig. 21 is a section on line 21—21, Fig. 17. Referring to the drawing by reference characters, I have shown an ampul embodying the features of my invention at 10.

In the following description, although I refer to the invention as embodied in an ampul, I wish it to be distinctly understood

that my invention applies to containers and receptacles in general and is not limited to the particular construction or for the particular purposes which I will now proceed to describe.

The ampul in the preferred form comprises two separate containers 11 and 12.

The ampul is preferably made from a tube as shown at 14, Fig. 2. This tube is first heated and is provided with a neck portion 15 on which a bulbous portion 16 is blown. The end 17 of the tube is then worked to provide a neck 18 as shown in Fig. 4. In a similar manner a tube 19 is manufactured which has a bulbous portion 20 thereon.

In manufacturing my ampul I next take a cylindrical glass tube 21 and fit within this tube a cupped metal foil member 22 which is inserted in place with the flanged edge in engagement with the inner wall of the tube as shown in Fig. 7.

The tube 21 shown in Fig. 7 is shorter than the same tube as shown in Fig. 5. This is due to the fact that the ends of the tubes are removed after the disc 22 is fused in place.

After the three parts 14, 19 and 21 have been manufactured and are assembled substantially as shown in Fig. 8 the neck 18 is fused to one end of the tube 21. After this is done the neck 23 on the tube 18 is fused to the other end of the tube 21 so that we have in effect two part ampul having a frangible metallic foil disc fixed to the wall as shown in Fig. 9 to thus provide two compartments which are hermetically sealed from each other.

It will thus be seen from the foregoing description that I have provided an ampul consisting of two compartments, 24 and 25. I next place a drug 26 in the compartment 24. This drug may be of any character, for instance salvarsan, neo-salvarsan, sulpharsphenamine, sodium iodide, etc. The drug in the proper amount having been placed in the compartment 24, I then exhaust the compartment by arranging the tube 27 of a vacuum producing machine over the bulbous portion 16. After being exhausted the compartment 24 is sealed as at 28. It will thus be apparent that I have provided a container having a drug sealed therein in vacuum.

In the compartment 25 I next place a vehicle for the drug which, for example, may be distilled water. The compartment 25 is then sealed as at 30 and the ampul is ready for use.

The ampul and the two compartments thereof may be of any desired shape or configuration to suit the particular requirements of each use and I do not wish to be limited to the particular details heretofore or hereafter described.

In practice, in using my improved ampul,

as it may be employed for the purpose of injecting a solution, the constricted neck 30 is first etched with a file as at 31 and the neck is broken off.

Next a sterile probe, applicator or wire 33 is inserted through the small opening at 34, through the vehicle in compartment 25 and is thrust through the thin metal disc 22 which breaks the vacuum in compartment 24. The action of the vacuum extracts or draws the vehicle through the ruptured metal partition into compartment 24. This dissolves the drug contained therein, thus making the desired solution.

The next step is to break off tip 34' also shown in Fig. 14. This allows the injecting solution to pass from the compartment 24 into a hypodermic syringe or other container.

Other technic which may be employed, instead of breaking the tip 34' is to fracture the ampul at the platinum seal 22 as described to separate the compartments, insert a hypodermic needle through the hole 36 at the metallic seal and draw the solution into a syringe. In other words, the neck 31 and the constricted glass neck surrounding the foil disc would be fractured and the tip 34' would not be broken. However, the breaking of the tip 34' and filling of the syringe as described, is preferable as it is more rapid and convenient.

Another method which may be used instead of employing the hypodermic syringe as above described is the gravity method which I will now proceed to describe. In using the method I prefer to employ an ampul such as shown at 40 in Fig. 16. This ampul is similar in many respects to the ampul previously described, although it is indicated as provided with an additional bulbous portion 41 which contains sterile cotton or gauze 42 therein. The drug 43 and the vehicle 44 may be of any character for the purpose intended.

In using this type of ampul by the gravity method, I etch and break off the end 46 of the ampul after which I pierce the frangible disc 47 in any desired manner, thus causing the vacuum in the compartment 48 to draw the vehicle present in the compartment 49 into the compartment 48 thereby dissolving the drug.

In injecting salvarsan (original) the solution obtained after the distilled water is drawn through the metallic disc must be neutralized with sodium hydroxide before it is injected. Accordingly I add, drop by drop, a solution of sodium hydroxide with a medicine dropper until the solution has neutralized. Before this is done I nick the ampul at 50 and break apart the two compartments 48 and 49. The compartment 48 is then placed in a suitable holder H (see Fig. 17) and the neck is nicked at 41 and broken off. A flex-

ible tube 51 is then arranged over the bulbous portion 41. This flexible tube is connected in any desired manner with a needle 52 for injection. In the accompanying drawing I have shown the connection as including a transparent glass tube 53, a rubber tube 54, a second transparent tube 55, and another rubber tube 56, although it will be understood that other means of connection may be employed.

The holder previously mentioned comprises an upper member 60 and a lower member 61, both of which are shown as arranged to engage the upper and lower part of the receptacle 48. The members 60 and 61 are connected to arms 62 and 63. The arm 63 is provided with a resilient tongue 64 which has a pin 65 thereon. This pin is adapted to fit within apertures 66 in the member 64. The members 62 and 63 are more or less resilient so that the compartment 48 will be tightly grasped between these members. The member 60 may be provided with a hook 67 for engaging a support 58 to hold the device in the proper position.

In Figs. 18, 19, and 20, I have shown a shipping receptacle for one form of my ampules. In these figures the ampul is indicated at 80 and the shipping receptacle at 81. The receptacle comprises an outer container 82 having an end cap 83 at each end thereof. Within the receptacle 81 at one end I arrange a strip of corrugated paper 84. This strip tapers to one end and is rolled as shown in Fig. 19 so that a cavity 85 is provided to receive a tip of the ampul. The body of the receptacle 80 is provided with corrugated board 87 which provides a cylindrical cushion portion to receive the main portion of the ampul, while the other end is provided with a removable, rolled, corrugated strip 88 which is similar to the corrugated strip 84, previously described.

The container is presented to the trade with the end 84 in place and with the cushion wall 87 in place. In shipping an ampul it is inserted in the top with the tip 86 filled in the cavity 85 and with the body of the ampul engaging the cylindrical surface of the cushioning member 87. The cushion end member 88 is then inserted in place as shown in Fig. 18 and the other end cap is applied and secured.

With this type of container lateral move-

ment of the ampul is prevented by a member 87 while longitudinal movement of the ampul is prevented by the end members 84 and 88, but at the same time the resilient support prevents injury to the ampul.

Having thus described my invention, I claim:

1. An ampul comprising a tubular glass member closed at each end and having a frangible metallic member secured to the inner wall thereof intermediate the ends thereof to form a partition and provide two compartments.

2. An ampul comprising a tubular member closed at each end and having a restricted part intermediate its ends, and having a thin frangible metallic foil disc fused to the inner wall of said restricted portion to provide two compartments.

3. An ampul comprising a tubular member closed at each end and having a frangible metallic member secured to the inner wall of said tubular member to provide two compartments, one compartment of said ampul having a drug sealed therein, the other compartment of said ampul having a vehicle for the drug therein.

4. An ampul comprising a tubular member closed at each end and having a plane frangible member of single thickness secured to the inner wall thereof to provide two compartments, one compartment of said ampul being exhausted and having a drug sealed therein.

5. An ampul comprising a tubular member closed at each end and having a restricted part intermediate its ends, a thin, frangible, metallic, foil, cupped disc fused to the inner wall of said restricted portion to provide two compartments, a neck on each end of the ampul, one compartment of said ampul being exhausted and having a drug sealed therein, the other compartment of said ampul having a vehicle therein.

6. A glass ampul comprising a body having two compartments therein, means to hermetically seal the compartments from each other, said means comprising a planar frangible member of single thickness, a drug in one of said compartments, a vehicle in the other compartment, the drug holding compartment being exhausted.

In testimony whereof, I hereunto affix my signature.

ARTHUR E. SMITH.