Aug. 15, 1933. S. KABNICK 1,922,811

MULTIPLE AMPULLA

Filed Nov. 7, 1929

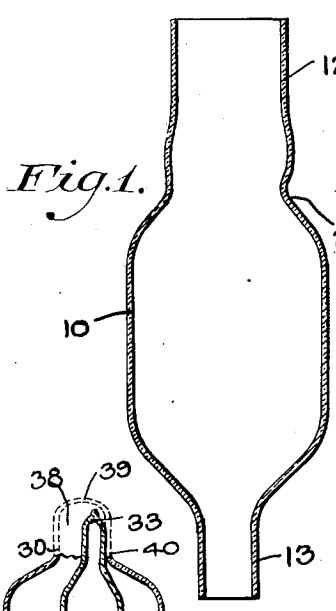


Fig. 1.

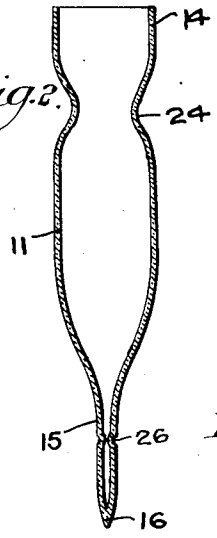


Fig. 2.

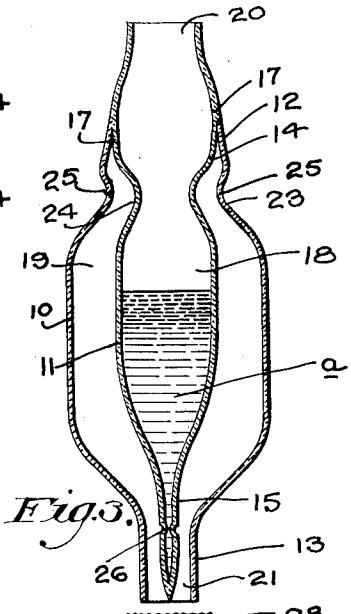


Fig. 3.

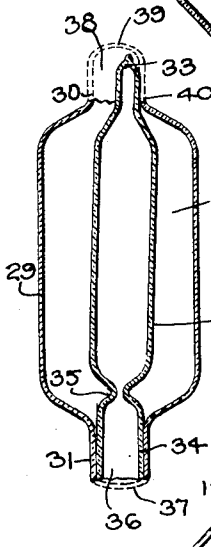


Fig. 7.

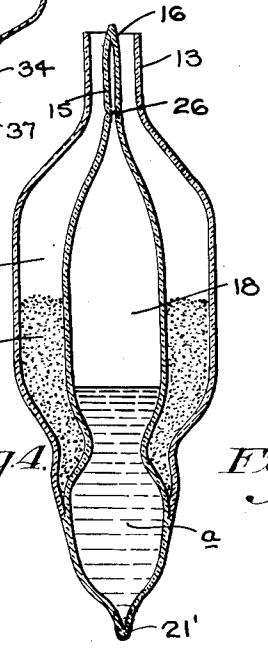


Fig. 4.

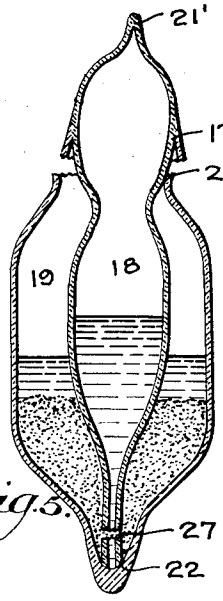


Fig. 5.

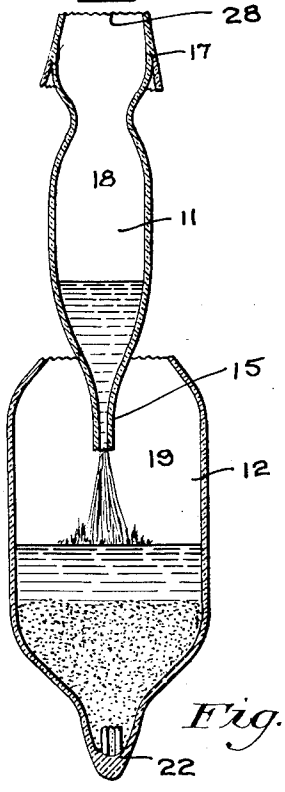


Fig. 6.

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MULTIPLE AMPULLA

Stuart Kabnick, Philadelphia, Pa.

Application November 7, 1929. Serial No. 405,376

4 Claims. (Cl. 128—272)

This invention relates to improvements in ampullæ for use in the therapeutic art and more particularly to ampullæ of the type described and claimed in my Patent No. 1,727,987, granted September 10, 1929, wherein different drugs or the like are maintained in separated relation until that time when they are to be mixed together.

Heretofore and prior to the invention disclosed in the aforementioned patent resort had been had to various expedients for maintaining different drugs in separated relation preliminary to their mixture, this being usually effected by storing each of the drugs in an individually sealed ampulla. In some instances, the ampulla was characterized by the provision of several compartments, usually two, separated by a web or partition of frangible material, the drugs being individually sealed within the compartments so formed. In order to effect the desired mixture of the drugs this frangible partition was pierced by means of a separate tool, such as a rod or probe, inserted longitudinally through the upper compartment of the ampulla. In other instances, the ampulla was provided with a lever operable to break the partition and so afford communication between the several compartments.

As in the Patent No. 1,727,987 already granted to me, it is among the general objects of the present invention to provide a construction of multiple ampulla having the simplest possible means for effecting the transfer of the drug contained in one compartment into the next adjoining compartment simultaneously as the compartments are separated.

A more specific object of the present invention is the provision of a still more simplified construction of multiple ampulla, the component parts thereof being relatively so designed and arranged as to greatly facilitate the assembly thereof into a completed unit.

A still further object of the present invention is to provide an improved method of assembling the several component parts of the multiple unit in consequence of which said unit may be manufactured not only at a reduced cost but much more quickly and expeditiously than was possible heretofore.

Other objects and advantages of the invention will appear more fully hereinafter.

The invention consists substantially in the combination, construction, location and relative arrangement of parts, as well as in the method of assembling the same, all as appears more fully hereinafter, as shown in the accompanying drawing and as finally pointed out in the appended claims. In the accompanying drawing, which for purposes of illustration and example shows one embodiment of the present invention:—

Figure 1 is a longitudinal sectional view of an outer member of a dual ampulla constructed in accordance with the present invention;

Figure 2 is a similar view of an inner member of a dual ampulla;

Figure 3 is a longitudinal sectional view wherein the outer and inner members of the ampulla are shown in assembled relation, the opposite ends of the ampulla being shown open or unsealed;

Figure 4 is a view similar to Figure 3 but showing the ampulla in inverted position with the open end of the inner compartment sealed;

Figure 5 is a sectional view corresponding to that of Figure 3 showing the lower end of the ampulla sealed as well as the manner of effecting separation between the inner and outer members of the ampulla;

Figure 6 shows the inner section of the ampulla in longitudinally spaced relation with respect to the outer section thereof, the upper end of said inner section being open to the atmosphere to thereby permit the therapeutic agent contained therein to flow freely for mixture with the agent contained in the outer section of the ampulla; and

Figure 7 is a longitudinal sectional view of a modified form of dual ampulla embodying the principles of the present invention.

Referring more particularly to the drawing it will be observed that the present ampulla is constructed entirely of glass or other such frangible and fusible material and consists of an outer member 10 and an inner member 11, the original forms of these members being shown in Figures 1 and 2 respectively. The outer member 10 is of generally tubular form, the upper and lower ends of which are reduced somewhat in diameter, as at 12 and 13 respectively. Preferably, but not necessarily, the upper end 12 of the member 10 is of a larger diameter than the lower end 13 thereof. The member 11 is also of generally tubular form the upper end 14 of which is open and the lower end of which is provided with an elongated hollow stem 15 of relatively small diameter. The bottom end of this stem is sealed, as at 16.

Figure 3 shows the members 10 and 11 in assembled relation, it being observed that the member 11 is telescopically received within the member 10. In order to facilitate the insertion

of the member 11 within the member 10 the maximum diameter of the former is slightly less than that of the upper neck 12 of the latter. When the member 11 is properly positioned within the member 10 the stem 15 of the former terminates well within the reduced end 13 of the latter and in this position the upper edge of member 11 is suitably sealed throughout its entire circumference to the upper reduced end 12 of the member 10, this sealing being effected preferably by melting or fusing the glass together, as at 17. It will be noted that while the upper ends of the members 10 and 11 are thus fused together, as at 17, the stem 15 of the inner member 11 is maintained in spaced relation with respect to the reduced lower end of the member 10. Preferably, the elongated stem 15 and said reduced end 13 are arranged in concentric relation. It will thus appear that an ampulla has been provided having two compartments, designated 18 and 19, arranged in concentric relation. Each of these compartments 18 and 19 is adapted to receive a therapeutic agent in the form of a liquid, powder, paste or the like. The agent which is receivable within the outer compartment 19 is introduced through the opening 21 formed in the bottom end of the ampulla.

When the ampulla is to be filled with the therapeutic agents desired, one of said agents is introduced through the opening 20 in the top end of the ampulla for reception within the inner compartment 18, this agent being designated *a*. The open end 20 is then sealed, as at 21', (see Figure 4) to thereby hermetically seal the agent *a* within the inner compartment 18. Having filled the compartment 18 partially or completely with the agent *a*, the ampulla is inverted so as to present the bottom end thereof upwardly, as in Figure 4. A second therapeutic agent *b* is then introduced into the compartment 19 through opening 21 whereupon the bottom end of the member 10 is fused to the adjoining end of the restricted hollow stem 15 of the member 11, as at 22 (see Figure 5).

When the compartments 18 and 19 have been sealed in the manner just described, the agents contained therein are hermetically sealed from the atmosphere and from each other, it being observed that the tubular body of the member 11 together with its elongated stem constitute the partition or web which separates the inner compartment 18 of the dual ampulla from the outer compartment 19 thereof. The sealing of the opposite ends of the ampulla is accomplished without subjecting either of the therapeutic agents *a* and *b* to undue heat.

For a purpose which will be apparent immediately hereinafter, the outer member 10 is provided in the outer portion thereof with an annular indentation 23. The inner member 11 is likewise idented, as at 24, the radius of curvature of indentation 24 being preferably greater than that of indentation 23. Provided in the external surface of the outer member 10 and located within the annular indentation 23 thereof is a circumferentially extending scratch or incision 25. A smaller scratch or incision 26 is provided around the elongated stem 15 of the inner member 11 at a point located immediately above the joint 22 formed when the lower end thereof is fused or sealed to the lower end 13 of member 10. With an ampulla constructed as just described it is an exceedingly simple matter to effect the necessary mixture between agents *a* and *b* respectively contained within the compartments 18 and 19. In order to establish communication between these compartments the first step is to break the member 11 away from the member 10, this break being facilitated by and taking place along the line of the scratch 25 formed in the external surface of the outer member 10 (see Figure 5). Simultaneously as this break occurs, the stem 15 shears off, as at 27, this latter break being facilitated by the scratch 26. The inner member 11 may then be lifted longitudinally with respect to the outer member 10 into substantially the position shown in Figure 6. So long as the upper end of the body 11 remains hermetically sealed, as at 21', none of the liquid agent *a* will flow out of the restricted stem even though the body 11 is lifted free of the body 10. Immediately, however, that this seal is broken, as at 28, the atmospheric pressure at opposite ends of the member 11 will be balanced with the result that agent *a* will be caused to flow freely out of said member 11 through the lower end of its stem 15 and into the compartment 19 for mixture or intermingling with the agent *b* contained therein.

By reason of the fact that the upper tubular portions of the members 10 and 11 are arranged in telescopic relation prior to sealing the same together, as at 17, the upper portion of the ampulla, that is the portion immediately above line 25 of breakage, is considerably reinforced and strengthened, thereby adequately insuring the same against fracture when the parts 10 and 11 are separated along the line 25. The formation of the annular indentations 23 and 24 in the members 10 and 11 respectively is such as to permit the greatest possible angular movement of the inner member 11 with respect to the outer member 12, thus assuring a clean break in the lower portion of the stem 15.

Figure 7 shows a modified form of dual ampulla constructed in accordance with and embodying the principal features of the present invention. In this modified form of ampulla an outer glass member 29 is employed having necks 30 and 31 at either end thereof. Nested within this outer member 29 is a tubular member 32 the diameter of which is such as to permit the same to be passed freely through the bottom neck 31 of the outer member. The upper end of the inner member 32 is sealed, as at 33, while the lower edge thereof is adapted to be integrally united, as at 34, to the corresponding end of the tubular member 29, this union being effected by fusing or melting the glass together.

Formed in the inner tubular member 32 adjacent the lower end thereof is a constriction 35. The inner member 32 is filled with a suitable therapeutic agent through the open end 36 thereof whereupon said open end is hermetically sealed in the usual manner as indicated by the broken line 37. The annular chamber 37' which is formed between the inner and outer members is filled through the opening 38 provided in the upper end of the member 29. When this chamber 37 is filled with the desired therapeutic agent or a vehicle for the agent contained within the member 32, the opening 38 is hermetically sealed in the usual manner as indicated by the broken line 39.

It will be observed that the upper sealed end 33 of the inner member 32 projects upwardly within the sealed neck 30 of the outer member to an extent sufficient to expose the upper extremity thereof when the seal 39 is broken. To effect communication between the interior of the

member 32 and the chamber 37 it is merely necessary to shift the inner member sidewards so that it breaks off at the constriction 35. The agent contained within said inner member 32 will flow freely into the chamber 37, this flow being materially assisted by breaking off the tip 33 of said inner member. To facilitate the removal of the dome-like seal 39 a circumferentially extending incision or scratch 40 may be provided in the external surface of the neck 30 of the outer member. A similar incision or scratch may be provided, if desired, in the constricted portion 35 of the inner member.

It will be understood that various changes in the present invention may be made from time to time without departing from the spirit or principles thereof and it is accordingly intended to claim the invention broadly, as well as specifically, as indicated by the appended claims.

What is claimed as new and useful is:—

1. An ampulla comprising a pair of substantially concentrically arranged tubular glass members, a hermetically sealed circumferentially extending jointure between the upper ends of said members, and an elongated hollow stem of reduced diameter communicating with the interior of the inner of said members and extending axially through an opening provided in the lower end of the outer of said members, the body of said outer member being of greater diameter than said inner member whereby to provide an annular chamber therebetween which is adapted to be filled through said last-mentioned opening.

2. An ampulla comprising a pair of tubular members arranged one within the other, the inner of said members being of smaller diameter than the outer thereof whereby to provide an annular chamber therebetween and said inner member being constricted in the lower portion thereof, the lower ends of said inner and outer members being integrally united together whereby to hermetically seal one end of said annular chamber, said inner member being adapted, upon movement thereof relatively to said outer member, to break off at the constricted point thereof whereby to effect communication between the interiors of said inner and outer members.

3. An ampulla comprising a pair of tubular members arranged one within the other, the inner of said members being of smaller diameter than the outer thereof whereby to provide an annular chamber therebetween and said inner member being constricted in the lower portion thereof, the lower ends of said inner and outer members being integrally united together whereby to hermetically seal one end of said annular chamber, said inner member being adapted, upon angular movement thereof relative to the longitudinal axis of said outer member, to break off at the constricted point thereof whereby to effect communication between the interiors of said inner and outer members.

4. In an ampulla, a pair of frangible members of tubular form arranged in nested relation, the lower ends of said members being integrally united together whereby to provide an annular chamber between said members one end of which is hermetically sealed, a constriction provided in said annular member adjacent the point of joinder thereof to said outer member, and means arranged in embracing relation with respect to the opposite end of said inner member and constituting a hermetic seal for the corresponding end of said outer member, said inner member being adapted, upon fracture of said last-mentioned seal, to be shifted angularly with respect to the axis of said outer member whereby to cause said inner member to break in the constricted zone thereof.

STUART KABNICK.