June 25, 1929. A. E. SMITH 1,718,603

AMPUL

Filed Jan. 18, 1928

Fig. 1

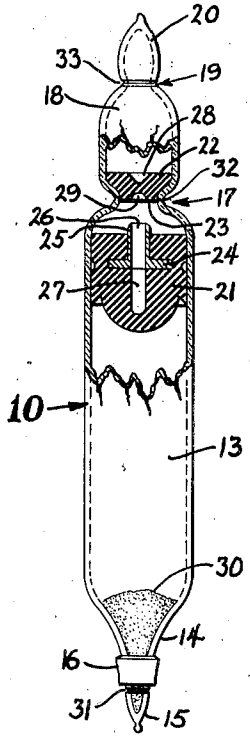


Fig. 2

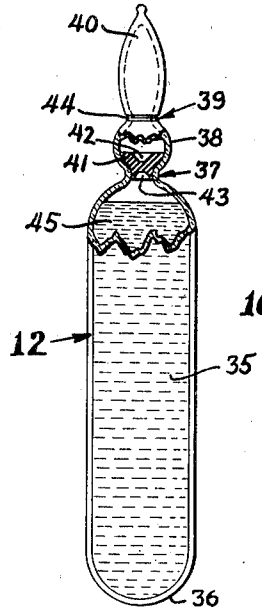


Fig. 3

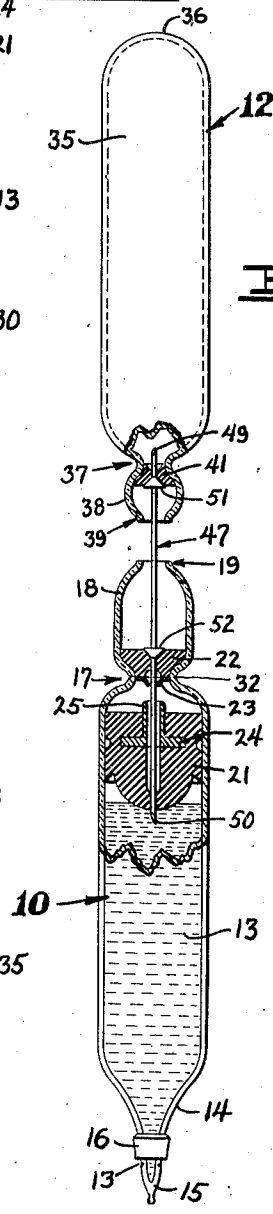


Fig. 4

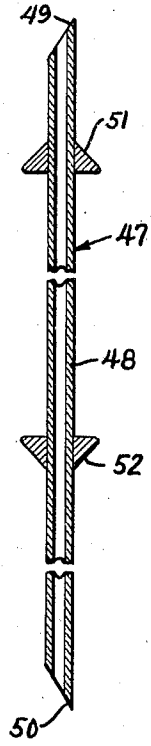
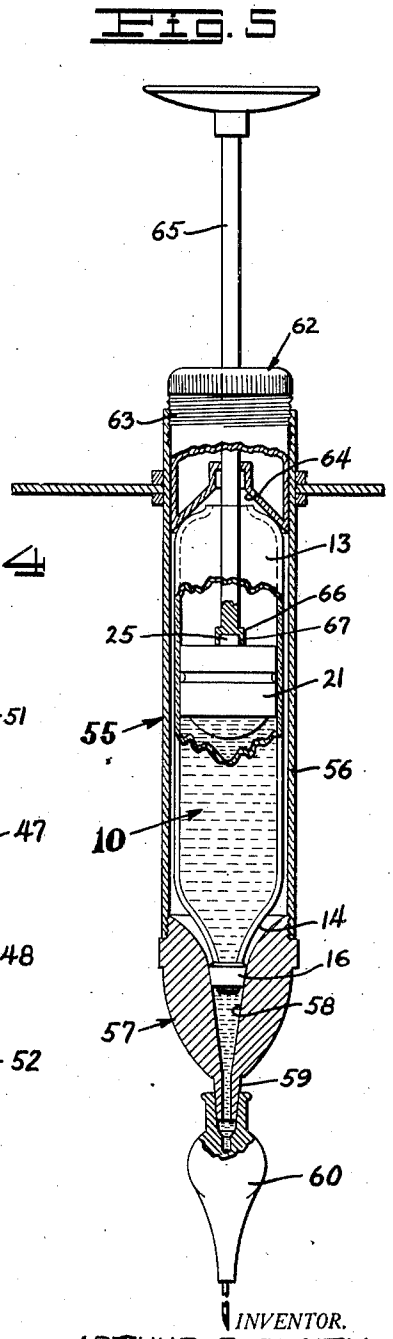


Fig. 5



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Patented June 25, 1929. 1,718,603

UNITED STATES PATENT OFFICE.

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AMPUL.

Application filed January 18, 1928. Serial No. 247,545.

This invention relates to improvements in cartridge-like containers or ampules.

The general object of this invention is to provide an improved means and method for mixing and handling a drug.

A specific object of this invention is to provide an improved means and method for mixing a drug with a vehicle wherein the drug and the vehicle are contained in independent containers or ampules and wherein the ampules are placed in communication and the solution made without contact with the atmosphere.

Another object of this invention is to provide improved drug and vehicle containers or ampules wherein the drug and vehicle are each hermetically sealed and wherein means is provided for transferring the vehicle from its container to the drug container.

A further object of the invention is to provide a drug containing ampul having means therein for expelling the contents of the ampul.

An additional object of my invention is to provide an improved ampul.

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

Fig. 1 is an elevation partly in section of my improved drug containing ampul.

Fig. 2 is an elevation partly in section of my improved vehicle containing ampul.

Fig. 3 is a view showing the method of and means for transferring the contents of one ampul to the other.

Fig. 4 is an enlarged central longitudinal fragmentary section through the connecting device, and

Fig. 5 is a longitudinal section through a syringe showing my improved drug containing ampul operatively positioned therein.

Referring to the drawing by reference characters I have indicated my improved drug containing ampul generally at 10 and my improved vehicle containing ampul generally at 12.

In the following description, although I refer to the containers as ampules, I wish it to be understood that my invention applies to containers and receptacles in general and is not limited to the particular construction or for the particular purpose which I will hereinafter describe.

The drug containing ampul 10 as shown in Fig. 1 comprises a hollow tubular body 13 preferably of glass having at one end a tapered neck 14 which terminates in a reduced closed tip 15. Surrounding the tapered neck 14 I may provide a resilient collar 16 which is preferably made of a good grade of rubber.

The end of the body 13 opposite the reduced end 15 is constricted as at 17 and provided with a reduced portion 18 which is constricted as at 19 and terminates in a reduced closed tip 20. A movable stopper 21 preferably of rubber is provided in the body portion 13 adjacent to the constriction 17 and a stopper 22 likewise preferably of rubber, is provided in the reduced portion 18 adjacent the constriction 17.

At the constriction 17 a disk 23 is provided which is preferably made of metal such as platinum foil and which is fused to the inner side walls of the ampul at the time of manufacture.

The stopper 21 as stated, is preferably made of a good grade of rubber and includes a metallic disk 24 having a hub 25 thereon which extends above the upper end of the stopper. The disk is moulded in the stopper or is inserted therein after the stopper is made. An aperture 26 is provided in the disk and hub and communicates with a recess 27 in the stopper which terminates short of the end of the stopper opposite the hub 25.

The stopper 22 is also preferably made of a good grade of rubber and includes a conical recess 28 in its upper surface and a semi-spherical recess 29 in its under surface.

The body 13 of the ampul 10 is adapted to contain a drug 30, and the interior of the body 13 may be exhausted on both sides of the stopper 21 to form a partial vacuum before the reduced end 15 of the tapered neck 14 is closed.

To render the tip 15 readily removable from the tapered neck 14 I preferably weaken it as by scoring or etching it as at 31. For rendering the reduced portion 18 readily removable from the body 13 I preferably weaken it at the constriction 17 as by etching it as indicated at 32 and to render the reduced tip 20 readily removable from the reduced portion 18 I preferably etch it at the constriction 19 as indicated at 33.

The vehicle containing ampul 12 as shown comprises a glass body portion 35 formed closed at one end as at 36. The opposite end of the body 35 is constricted as at 37 and provided with a reduced bulbous portion 38

which is constricted as at 39 and terminates in a closed tip 40.

Within the bulbous portion 38 and adajacent the constriction 35 I provide a stopper 41 which is preferably made of a good grade of rubber and includes a central conical recess 42 in one end and a semi-spherical recess 43 in the opposite end. To render the tip 40 readily removable from the bulbous portion 38 I preferably weaken it as by etching it at the constriction 39 as indicated at 44. The body 35 of the ampul 12 is adapted to contain a vehicle 45 such as sterile distilled water.

To prepare the ampules 10 and 12 for mixing the contents thereof as shown in Fig. 3, the reduced tip 20 of the ampul 10 is broken from the reduced portion 18 at the etching 33 and the tip 40 of the ampul 12 is broken from the bulbous portion 38 at the etching 44.

For conducting the vehicle 45 from the ampul 12 into the ampul 10 I have indicated generally at 47 an improved double ended hollow stylus, but it will be understood that any other suitable means may be used. This stylus is preferably made of metal and as shown in detail in Fig. 4 comprises a hollow stem 38 sharpened at each end as at 49 and 50 and provided intermediate its ends with spaced stops 51 and 52.

To transfer the vehicle 45 from the ampul 12 to the ampul 10 the end 49 of the stylus is inserted into the bulbous portion 38 of the ampul 12 until the stop 51 comes to rest in the conical recess 42 of the stopper 41. When the stop 51 of the stylus is positioned in the stopper recess 42 the end 49 protrudes into the interior of the body 35 of the ampul 12 as shown in Fig. 3. The end 50 of the stylus is then inserted into the reduced portion 18 of the ampul 10 until the stop 52 comes to rest in the conical recess 28 of the stopper 22 in the reduced portion 18.

When the stop 52 is positioned in the conical recess 28 of the stopper 22 the end 50 of the stylus has passed through the stopper 22, fractured the metallic partition 29, entered the aperture 26 of the hub 25, passed through the solid portion of the stopper 21 and extends into the body 31 of the ampul 10 as shown in Fig. 3.

As soon as the end 50 of the stylus passes completely through the stopper 21 the vehicle 45 in the ampul 12 flows through the hollow stem 48 due to the vacuum in the body 13 of the ampul 10, thereupon forming a drug solution in the ampul 10 as shown in Fig. 3.

The drug containing ampul 10 is particularly designed for insertion in a syringe for ejecting the contents of the ampul. In Fig. 5 I have shown the ampul 10 as operatively positioned in an improved syringe indicated generally at 55. This syringe as shown includes a body portion or barrel 56 which is adapted to be closed at one end by a tip 57. The tip 57 includes a conical aperture 58 and a reduced tip 59 to which a hypodermic needle 60 is adapted to be attached in any desired manner.

The end of the syringe opposite the tip 57 is adapted to be closed by a cap 62 which may be detachably secured to the syringe barrel 56 in any desired manner such as by screw threads 63. The lower portion of the cap 62 is adapted to fit within the barrel 56 and includes a conical recess 64. A plunger rod 65 is adapted to be carried by the cap 62 and includes an enlarged head 66 which is provided with a recess 67.

To insert the ampul 10 in the syringe the cap 62 is removed, the reduced tip 15 of the ampul broken from the tapered neck 14 at the etching 31 and the ampul inserted in the barrel 56 so that the resilient collar 16 is positioned in the conical recess 58 of the tip 57. The cap 62 is then replaced and in so doing the end of the ampul opposite the collar 16 enters the cap recess 64 and automatically becomes correctly centered in the syringe barrel. Upon further movement of the cap 62 the resilient collar 16 on the ampul will be forced into tight engagement with the side walls of the conical recess 58 of the tip 57 and thereby form a fluid tight seal between the ampul and the syringe.

To expel the contents of the ampul the plunger rod 65 is moved towards the tip 57 until the plunger rod head 66 abuts the stopper 21. When the plunger rod head abuts the stopper the projecting portion of the hub 25 fits within the plunger rod head recess 67 and prevents lateral movement of the plunger rod and subsequent tilting of the stopper 21 when making an injection. Upon further movement of the plunger rod towards the tip 57 the stopper 21 will thereby be moved and caused to act as a piston to expel the contents of the ampul through the open end at the etching 31. The more pressure required to expel the contents of the ampul the tighter the collar 16 will engage the side walls of the recess 58.

From the foregoing description it will be apparent that I have provided an improved method and apparatus for storing drugs and their vehicles in separate containers or ampules and for mixing the drugs and their vehicles wherein the ingrediments remain sterile and wherein simplicity of operation and efficiency are obtained.

Having thus described my invention, I claim:

1. In an ampul of the class described, a body portion closed at one end, the opposite end of said body being constricted to provide a bulbous portion, said bulbous portion terminating in a closed tip, a stopper in said bulbous portion adjacent said constriction and a movable stopper in said body portion.

2. An ampul of the class described com-

prising a body portion terminating in a closed tip, a frangible partition in said ampul to provide two compartments, a stopper in one of said compartments in said body, said stopper being adapted to be moved in said body and a second stopper in the other compartment adjacent said partition.

3. An ampul of the class described comprising a body portion, said body having a tapered neck at one end terminating in a closed tip, a reduced portion at the end of said body opposite said neck, said ampul being constricted between said body and said reduced portion, a frangible metallic partition in said ampul at said constricted portion, a stopper in said body adjacent said constricted portion, said stopper being adapted to be moved in said body, a second stopper in said reduced portion adjacent said metallic partition, the end of said reduced portion opposite said metallic partition being constricted and terminating in a closed tip.

4. An ampul of the class described comprising a body portion, a stopper adapted to move in said body, said body being closed at each end portion beyond the stopper and said body being partially exhausted in each end portion.

5. An ampul comprising a body terminating in a closed end, a reduced portion at the end of said body opposite said first mentioned end, said ampul being constricted between said ends, a frangible metallic partition in said ampul at said constricted portion, a stopper in said body adjacent said constricted portion, said stopper being adapted to be moved in said body, a second stopper in said reduced portion adjacent said metallic partition, the end of said reduced portion opposite said metallic partition being constricted and terminating in a closed tip.

6. For use in an ampul, a cork comprising a resilient body having a cylindrical outer surface, said body having a central open ended cavity therein, said cavity extending from one end of said body to a point spaced from the other end thereof, a washer embedded in said body, said washer having an aperture aligned with said cavity, said washer being positioned intermediate the length of said cavity and having a tubular member thereon extending towards the open end of said cavity.

7. For use in an ampul, a cork comprising a resilient body having a cavity therein, said cavity extending from one end of said body to a point spaced from the other end thereof, a washer of larger area than said cavity and located in said body, said washer having a cylindrical member thereon directed towards the open end of said cavity.

8. In a stylus, an elongated body having an open end and having a hollow portion thereon communicating with said end, means on said stylus to limit its movement in one direction through an aperture and other means on said stylus to limit its movement in a reverse direction through another aperture.

In testimony whereof, I hereunto affix my signature.

ARTHUR E. SMITH.