E. W. PIERCE.

AMPUL.

APPLICATION FILED NOV. 27, 1914.

1,139,368. Patented May 11, 1915.

Fig. 6.

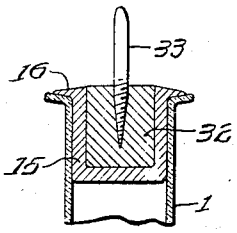


Fig. 1.

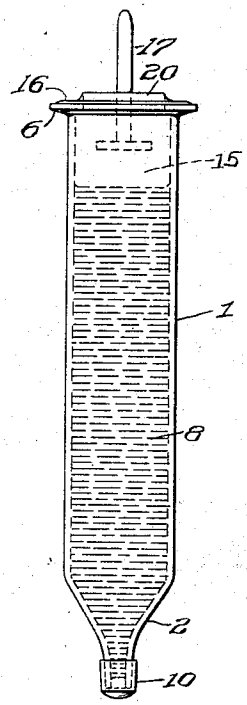


Fig. 2.

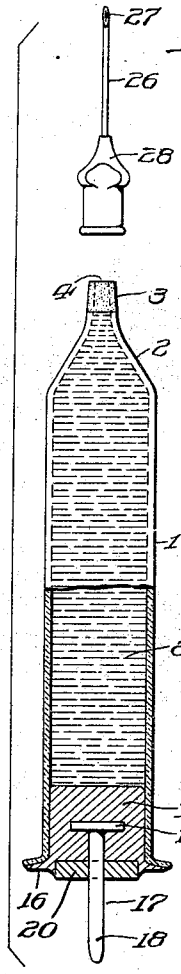


Fig. 5.

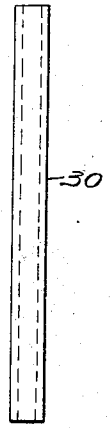
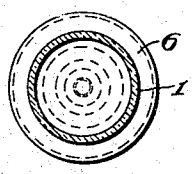


Fig. 3.

Fig. 4.



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AMPUL.

1,139,368. Specification of Letters Patent. Patented May 11, 1915.

Application filed November 27, 1914. Serial No. 874,099.

To all whom it may concern:

Be it known that I, EDWARD W. PIERCE, a citizen of the United States, and a resident of Cynwyd, in the county of Montgomery and State of Pennsylvania, have invented a certain new and useful Ampul, of which the following is a specification, reference being had to the accompanying drawing.

It is the custom of manufacturers of liquid serums, antitoxins and the like to commercially supply the same in sealed containers or ampuls of various shapes and sizes, the object being to place the liquid in the hands of the physician or other user in absolutely uncontaminated condition. When it is desired to utilize the liquid, the user fractures the ampul, generally at a point designed for this purpose, and transfers the contents thereof into a suitable instrument, such as a syringe, by means of which it can be injected or otherwise introduced into the body of the patient. This method is open to serious objections, among which may be mentioned the danger of the liquid becoming contaminated during its transfer from the ampul to the instrument; the necessity for the employment of an instrument separate from the ampul itself for the purpose of making the injection and the possibility of introduction into the liquid of bacteria present on the instrument from improper sterilization or other causes.

Among the principal objects of my invention are to provide an improved ampul comprising means whereby the injection of the contents may be accomplished directly from the ampul itself without the necessity of using a separate instrument and of transferring the contents thereto; to provide such an ampul which may be readily sterilized before using, if desired; which may be as readily transported as the present form of ampul, and which shall serve to maintain the contents in a thoroughly sterile and uncontaminated condition for any period of time prior to its employment.

Further objects of my invention are to provide an ampul having the aforementioned characteristics which may be cheaply and easily constructed, which shall be attractive in appearance and which may be readily, quickly and conveniently operated to effect an ejection of its contents without the possibility of contamination.

My invention further includes all of the other various novel features of construction and arrangement hereinafter more definitely specified.

In the accompanying drawing, in which is shown one embodiment of my improved ampul, Figure 1 is an elevation of the ampul in the form in which it may be supplied to the user and containing a suitable liquid; Fig. 2 is a similar view partially in central vertical section showing the ampul as it will appear when being prepared for operation; Fig. 3 is a central vertical section of the ampul with certain portions shown in elevation illustrating the various parts in the positions assumed during the process of ejecting the contents of the ampul; Fig. 4 is a transverse section through the body of the ampul taken on the line 4—4 in Fig. 3; Fig. 5 is an elevation of one of the details of the device; and Fig. 6 a fragmentary sectional view showing a detail of a slightly modified form of the invention.

Referring to the drawing, that form of my invention illustrated therein may consist of a body portion 1, preferably substantially in the form of a hollow cylinder, one end of which is constricted as at 2 to form the blunt cone-shaped point or nipple 3, having the relatively small passage 4 leading therethrough. The outside surface of the nipple adjacent the end of the ampul may be formed with any desired or standard taper, and preferably ground or otherwise perfectly finished during the process of manufacture for a purpose to be hereinafter described. The body of the ampul may preferably be formed of thin glass or other suitable material, the wall being turned outwardly adjacent the large end to provide a substantially laterally projecting peripheral flange 6, and for the purpose of preventing the liquid contents 8 of the ampul from escaping through the passage 4 the small end of the ampul may be closed by means of a cap or coating 10 of wax, paraffin, ozocerite or other similar impervious material which may preferably extend across the mouth of the passage and upwardly for a short distance therein and also upwardly on the exterior of the ampul for a short distance, thereby forming a liquid and air tight closure for the passage, which however may be readily removed when desired by scraping or otherwise. The cap may preferably be applied by dipping the small end of the

ampul into the substance from which the cap is formed while the latter is in a plastic or liquid condition, removing the ampul therefrom with a sufficient amount of the substance adhering thereto to form the cap and thereafter allowing the substance to set or harden in position, although, if desired, the cap may be formed in any other suitable or convenient manner, either directly upon the ampul or separate therefrom and attached thereto.

The small end of the ampul having been closed as hereinbefore described, the large end of the body, after the interior of the ampul has been thoroughly sterilized and the liquid contents introduced preferably in sufficient quantity to fill the same to a point a short distance from the large end, may be closed by pouring or otherwise introducing above the surface of the liquid, a quantity of wax, paraffin, ozocerite or other suitable preferably thermo-plastic material, preferably in fluid or semi-fluid condition and which is thereafter allowed to harden, forming a tight and impervious closure or plug 15 which serves to confine the liquid contents within the interior of the ampul. It is desirable that a sufficient amount of wax-like material be introduced within the ampul to completely fill the large end of the same above the liquid and to flow laterally over the surface of the flange 6 for substantially the width of the flange whereby another flange 16 is formed of the material, in order to insure a tight seal. If desired, however, only sufficient material may be employed to completely fill the cylindrical portion of the ampul, in which case, of course, the material will not form a laterally projecting flange on the upper surface of flange 6.

Preferably, while the wax or other material is hardening and before the same has assumed a permanent form, a preferably metal pin 17 comprising a cylindrical stem 18, a laterally projecting circular head 19 upon the end of the stem and an integral collar 20 of a slightly smaller diameter than the interior of the ampul about midway the length of the stem, is embedded therein in such position that the stem is located substantially coaxially with the body of the ampul and the side of the collar opposite to the head 19 approximately flush with the surface of the wax-like material. After the wax-like material has completely set and become permanently hardened as hereinbefore described, the pin will be firmly embedded within the plug and rigidly held thereby as shown in the drawing. The body of the ampul is now in condition for shipment from the manufacturer to the ultimate user, generally a physician, and for this purpose may be transported without danger of the liquid contents becoming contaminated or deteriorated in any way, the same being hermetically sealed within the body.

For the purpose of injecting the contents of the ampul, a suitable needle is employed, comprising the needle portion proper 26, having the usual fine internal opening 27 extending axially therethrough from the point of the needle to the rear end thereof and fixedly secured in the substantially cylindrical holder 28. The interior of the holder is slightly tapered to correspond with the cone-shaped nipple 3 of the ampul and is so proportioned and finished during the process of manufacture by grinding or in any other desired manner that it will form a close and liquid tight fit over the nipple and may be frictionally retained in position thereon when desired. A handle, 30, comprising a preferably cylindrical tube of glass, or other suitable material having an internal diameter slightly greater than the exterior diameter of the stem 18 is provided and in practice, the handle, ampul and needle are generally furnished together in one package so that the several parts of the device will be ready at hand when it is desired to utilize the contents of the ampul.

When it is desired to operate the device and to inject the contents thereof, the body is preferably held with its small end upward as shown in Fig. 2 and the wax-like cap 10 removed in any suitable manner leaving the ground surface of the nipple 3 exposed, any portion of the cap remaining in the passage 4 being either removed by a suitable instrument or merely perforated. The holder 28, carrying the needle, is then firmly seated upon the nipple 3, being retained in position by the engagement of the ground surfaces previously referred to. The ampul may now be inverted to the position shown in Fig. 3 and the handle 30 slipped over the projecting end of the stud 17 as clearly shown in that figure, the lower end of the handle engaging the surface of the collar 20. If the operator now exerts sufficient pressure longitudinally of the handle with one hand while holding the body of the ampul in the other, the plug 15 will move downwardly in the interior of the body, thereby acting as a tight fitting piston and ejecting the liquid contents through the passage 4 and needle 26 and into the body of a patient if the point of the needle be inserted under the skin in the well known manner, the lower end of the handle being prevented by its engagement with the collar 20 from cutting into the relatively soft material forming the plug. That portion of the plug comprising the flange 16 will either break off as the plug is moved from its initial position and remain upon the surface of the flange 6, or will turn upwardly, as shown in Fig. 3, and follow the main portion of the plug into the body of the ampul.

The downward movement of the plug may be continued until substantially the whole of the contents of the ampul has been ejected after which the needle may be withdrawn from the body of the patient and the whole device, including the needle and the handle, discarded.

In Fig. 6 is shown a slightly modified form of my invention, wherein a solid core 32 of preferably substantially cylindrical form and of a diameter a little less than the internal diameter of the body 1 is employed. The pin 33 is firmly affixed in the core which may be formed of wood or other suitable material, in any desired manner, and, after the liquid 8 has been introduced within the ampul the core is supported substantially coaxially with the body 1 and in such position that a space is left between its under surface and the surface of the liquid. The wax-like material 15 is then poured in and will fill up the space between the core and the liquid, as well as the space between the sides of the core and the body 1, thereby forming when hardened a hermetically tight seal as hereinbefore described. The operation of this form of the device is similar to that in which the whole plug is formed of wax-like material, the wax-like coating surrounding the core serving as a sort of packing and forming a tightly fitting piston during the operation of ejecting the contents of the ampul.

It will thus be seen that the contents of the ampul may be readily injected direct from the ampul itself without the necessity of the employment of a separate instrument, whereby considerable time is saved and the danger of possible contamination avoided, the liquid being introduced into the body of the patient in an absolutely sterile condition. Of course, it will be understood that before making the injection, the needle itself should be rendered thoroughly aseptic and for this purpose any suitable and well known means may be employed. To avoid the necessity of sterilizing the needle before making the injection, in practice the needle may be furnished by the manufacturer of the device in a suitable bottle or other container filled with a suitable antiseptic liquid, such as alcohol, from which the needle may be withdrawn just before its attachment to the body of the ampul, but, if desired, the needle may be furnished in any other manner and, of course, can be sterilized by the operator before making the injection in the ordinary way.

While I have herein described one form of my invention in considerable detail, I do not desire to limit myself precisely to that specific embodiment thereof, as it will be evident that various changes may be made in the details and arrangement of the various parts of the device without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention, I claim and desire to protect by Letters Patent of the United States:

1. In an ampul, the combination of a substantially cylindrical body portion having a constricted end, removable means normally sealing said end, means on said end operative to removably secure a needle holder thereon, and a plug interiorly adjacent the opposite end normally sealing the same, said plug formed of material in a melted state when introduced into the end of the body portion and which hardens when set and adapted to operate under end pressure as a sliding piston within said cylindrical body portion.

2. In an ampul, the combination of a cylindrical body portion composed of glass, having a rearward open end of like conformation in cross section, and a forward constricted end forming a nipple which is ground exteriorly, removable sealing means operative to hermetically seal said constricted end, a sealing plug within and hermetically sealing the opposite end initially, said plug being composed of material in a melted state when introduced into the end of the body portion and which hardens when set and adapted under end-pressure to operate as a sliding piston to eject the contents of the ampul.

3. In an ampul the combination of a substantially cylindrical body portion having an outwardly projecting flat rim on its rearward open end, and a constricted forward end constituting a nipple, means exterior to said last mentioned end operative to removably retain a needle holder thereon, removable means hermetically sealing said constricted end, and a sealing plug within the opposite end composed of material which is in a melted state when introduced into the end of the body portion and which hardens when set and operative primarily as a seal and secondarily, under end-pressure, as a sliding piston to eject the contents of the ampul.

4. In an ampul, the combination of a cylindrical body portion having a constricted end ground exteriorly and adapted to operatively maintain a needle holder thereon by frictional hold, initially plastic means operating when set to hermetically seal said end, a plug within and adjacent the opposite end operating primarily as a sealing device and secondarily as a sliding piston, composed of wax-like material in a melted state when introduced and which hardens when set, and means to apply end pressure to the plug, consisting of a flanged pin embedded within said plug while in a melted state and having a stem projecting beyond the exterior end of the plug.

5. In an ampul, a cylindrical body portion, composed of glass, and having a constricted end forming a nipple, ground exteriorly and adapted to frictionally maintain a needle holder thereon, removable sealing means on said end, a plug within and adjacent the opposite end of said body portion, composed of material in a melted state when introduced to form the plug and which hardens when set, operating primarily as a hermetic seal and secondarily as a sliding piston under applied end pressure, a projecting pin having its forward end embedded in said plug and means operating as a handle to said pin to cause the plug to aline with said body portion in its traverse thereof as a piston.

In witness whereof, I have hereunto set my hand this 25th day of November, 1914.

EDWARD W. PIERCE.

Witnesses:
GEORGE K. HELBERT,
ALEXANDER PARK.