

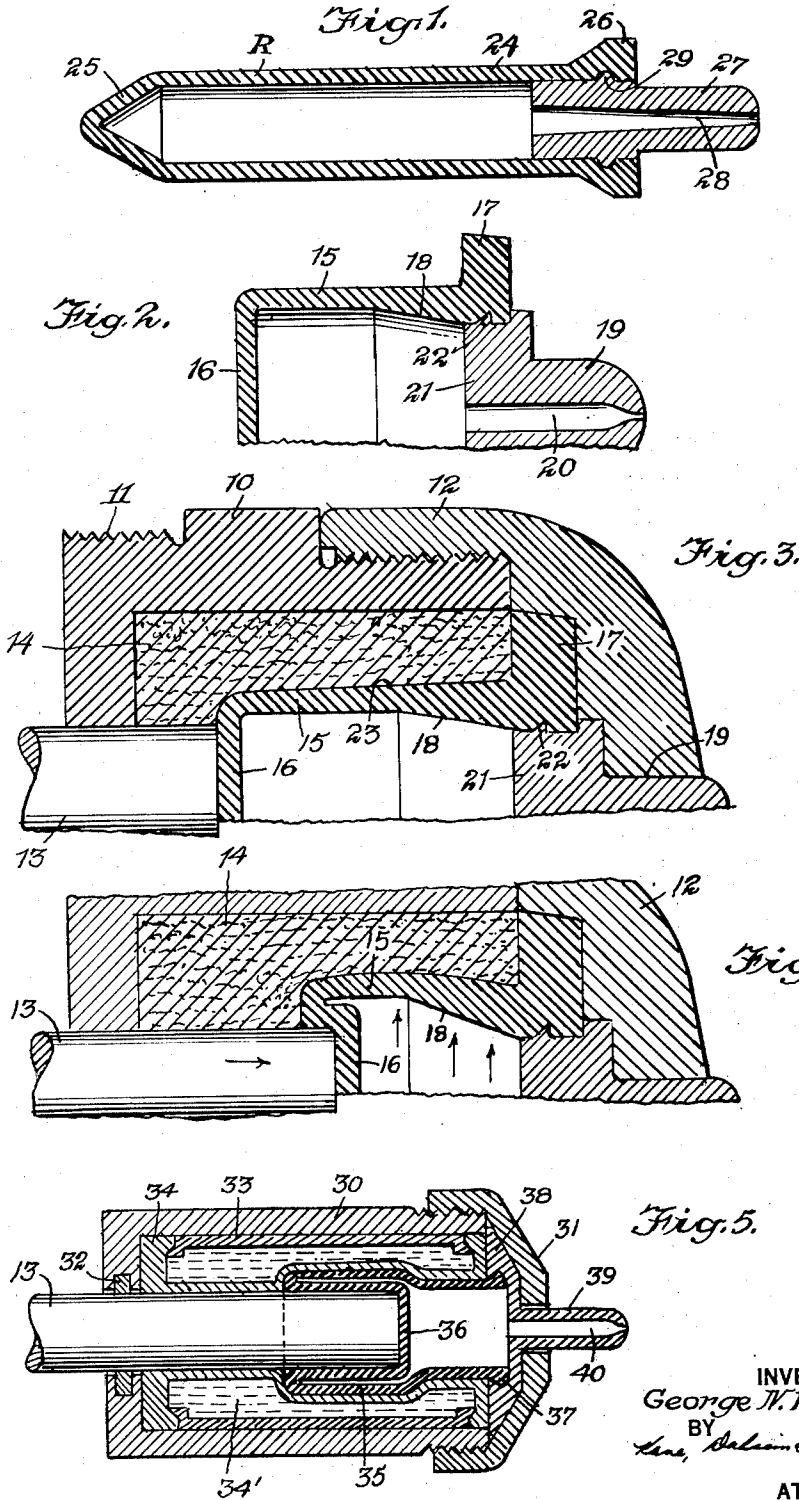
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AMPULE

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AMPULE

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Original applications September 1, 1949, Serial No. 113,598, now Patent No. 2,737,946, dated March 13, 1956, and August 24, 1950, Serial No. 181,161, now Patent No. 2,667,873, dated February 2, 1954. Divided and this application September 10, 1953, Serial No. 379,326

4 Claims. (Cl. 128—173)

This invention relates to a structurally and functionally improved ampule for use in connection with the hypodermic injection of medicaments.

The present application is a division based upon prior applications in my name and identified in the Washington Patent Office records under Hypodermic Injection Apparatus, Serial No. 113,598, filed September 1, 1949, now Patent No. 2,737,946 of March 13, 1956, and Serial No. 181,161, filed August 24, 1950 on Ampule, now Patent No. 2,667,873 of February 2, 1954.

By means of the present invention, an ampule is furnished and which—if desired—may be used, cleaned and sterilized and re-used any number of times but which may also be subject to a "one-time" use should the operator desire such procedure.

Moreover, by following the present teachings, an ampule is provided which will be ideally suited for use in connection with hypodermic injection apparatus having a power mechanism for causing the desired ejection of liquid; the apparatus being conveniently of the type in which pressures are generated such that the medicament may penetrate the skin without it being necessary to employ the usual relative long hollow needle to assure a proper distribution of the medicament within the tissues.

Still another object is that of providing units of this type which are capable of ready and economical manufacture by quantity production methods and in which the medicament may be maintained in stable condition for desired periods aside from the fact that the ampules may be readily cleaned and sterilized so that they are in proper condition to receive and retain the medicament.

With these and other objects in mind, reference is had to the attached sheet of drawings illustrating practical embodiments of the invention and in which:

Fig. 1 is a sectional side view of one form of ampule assembly;

Fig. 2 is a similar view but showing merely a major fragment of an alternative assembly;

Fig. 3 is a fragmentary sectional side view in enlarged scale showing the ampule of Fig. 2 disposed in association with an injection apparatus;

Fig. 4 illustrates the position which the parts assume during the ejection stroke of that apparatus; and

Fig. 5 is a sectional side view of a slightly different form of apparatus and showing an additional embodiment of ampule in association therewith.

Referring primarily to Figs. 3 and 4, the numeral 10 indicates a collar which may be coupled by means of screw thread 11 with the body of a hypodermic injection apparatus. Associated with that body is a plunger 13 which is power projected in a number of different manners. So projected, it will extend into a space defining a medicament chamber and which space, as in Figs. 3 and 4, is filled with a displaceable material 14, such as rubber. A loading cap 12 is connected with collar 10 by, for example, screw threads and when dismounted, affords access to the medicament chamber.

That chamber receives an ampule constructed in ac-

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cordance with the present teachings. Conveniently, and as shown in Fig. 2, it may include a cup-shaped body presenting side walls 15 and a base portion 16. An outwardly extending thickened flange 17 preferably defines the lip of the cup. A nozzle including a tip portion 19 provided with a bore 20 forms a part of the ampule assembly by preferably having its base 21 provided with an outstanding ridge 22 which may be flared in a forward direction to engage the corresponding surfaces of a recess or groove in the thickened wall portion of the cup in line with its flange 17. That cup is preferably furnished with an inwardly inclined face 18 extending between the major portion of the side walls 15 and the zone of flange 17.

If it is not desired to employ an ampule of the specific structure shown in Fig. 2, then conveniently the outer faces of the side walls 15 may be flared as indicated at 23 in Fig. 3. Otherwise, an ampule as shown in Fig. 1 may be employed. In the latter view, it will be seen that the numeral 24 indicates the side wall or body of the cup-shaped ampule which, in this instance, is relatively elongated and has its base portion 25 in the form of a cone. In common with the structures shown in Figs. 2 and 3, an outwardly flared and thickened flange portion 26 is disposed adjacent the lip of the cup. A nozzle 27, formed with a bore 28 has its base portion extending into the cup bore. An outwardly extending bead or rib 29 projects into a correspondingly formed recess or groove in the inner face of the cup in substantial alignment with flange 26.

While other materials may be employed, it is definitely preferred to have the bodies of the cups formed of natural or synthetic rubber. The nozzles are preferably formed of metal. If a velocity injection apparatus is involved, then as shown, the bores 20 and 28 of the nozzles may be tapered or constricted to define diameters that liquid streams of such fineness are formed so that the medicament will pierce the epidermis without the aid of a skin-penetrating needle. Otherwise, these bores may include any desired configuration.

With an ampule disposed within the medicament chamber as in Fig. 3 and the loading cap in proper position, plunger 13 may be released for projection. In such projection, it will bear against the base 16 of the cup and invert the latter upon itself as shown in Fig. 4. The flange of the cup being adequately supported, it follows that despite high pressures which may be developed, there will be no danger of a separation occurring between the cup and the nozzle base. As the cup inverts upon itself and expands, it will act against the displaceable material 14. The latter will support the cup against bursting or undue distortion. As the cup tends to expand adjacent the flange portion incident to the continued inward movement of its base 16, portions of the material 14 will move inwardly behind the base and into contact with the advancing plunger 13. Due to the flared construction and surfaces as indicated as 18, it follows that substantially all medicament will be expressed by the time the base of the ampule is disposed adjacent the inner face of the nozzle. A result entirely parallel to the foregoing may follow in connection with the ampule structure as shown in Fig. 1.

Referring to the structure shown in Fig. 5, the numeral 13 again indicates the power plunger. 30 indicates a casing portion forming a part of the injection apparatus and with which a loading cap 31 is preferably associated by means of screw threads. A seal 32 may be mounted by casing 30 and engage plunger 13. Within the casing, a medicament chamber is defined by a structure different than the displaceable mass of material 14. As shown, a sleeve assembly may define this chamber and include, for example, an outer member 33 which sealingly engages a spool 34. At least the latter should be formed of a rub-

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ber or rubber-like material and define a bore within which the ampule is disposed. Intervening the sleeve 33 and spool 34, is a body of fluid 34' which should preferably be liquid of any proper characteristics.

In this instance, the ampule will include a cup-shaped member which may be relatively elongated and embrace side walls 35 defining at their inner ends a base portion 36. Adjacent its opposite end, the cup is formed with an outwardly extending flange 37. The edge of this flange keys into a recess formed in the base 38 of a nozzle 39 having a bore 40. In common with bores 20 and 28, bore 40 may be constricted adjacent its outer end to define a fine stream of medicament or else need not be so constricted.

In any event, it will be understood that with plunger 13 projecting against base 36, the cup will be inverted upon itself to expel medicament through bore 40. The parts will be supported against the high pressures generated and no separation will occur between the cup and the base of the nozzle. The body of liquid 34' being preferably present, the side walls of the cup are also adequately supported during the ejection stroke.

Thus, among others, the several objects of the invention as specifically aforementioned are accomplished. Obviously, numerous changes in construction and rearrangement of the parts might be resorted to without departing from the spirit of the invention as defined by the claims.

What is claimed is:

1. An ampule assembly including in combination a flexible cup, a nozzle member including a bored base

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and tip, an edge of said base sealingly engaging the cup surface adjacent its edge, a cup-enclosing structure and displaceable material within said structure in contact with the outer face of said cup to support the latter against bursting.

2. An ampule assembly as specified in claim 1, the sealing engagement embracing inter-engaging relatively raised and recessed surfaces formed in a base edge and adjacent cup surface.

3. An ampule assembly as specified in claim 1, an outwardly extending flange at the edge of said cup and means forming a part of said structure to engage said flange to support said cup and nozzle.

4. An ampule including in combination a flexible cup, a nozzle member comprising a bored base and tip, said member being connected to said cup adjacent its edge, the base of said cup being projectible towards the nozzle base through the cup bore, the walls of said cup inverting upon themselves during such projection, the bore of said cup being tapered in the direction of its edge and adjacent that edge, and the outer face of said cup being flared in the direction of its edge.

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