

April 15, 1969

A. H. RITZ

3,438,549

PRE-FILLED SYRINGE

Filed Sept. 29, 1967

Sheet 1 of 2

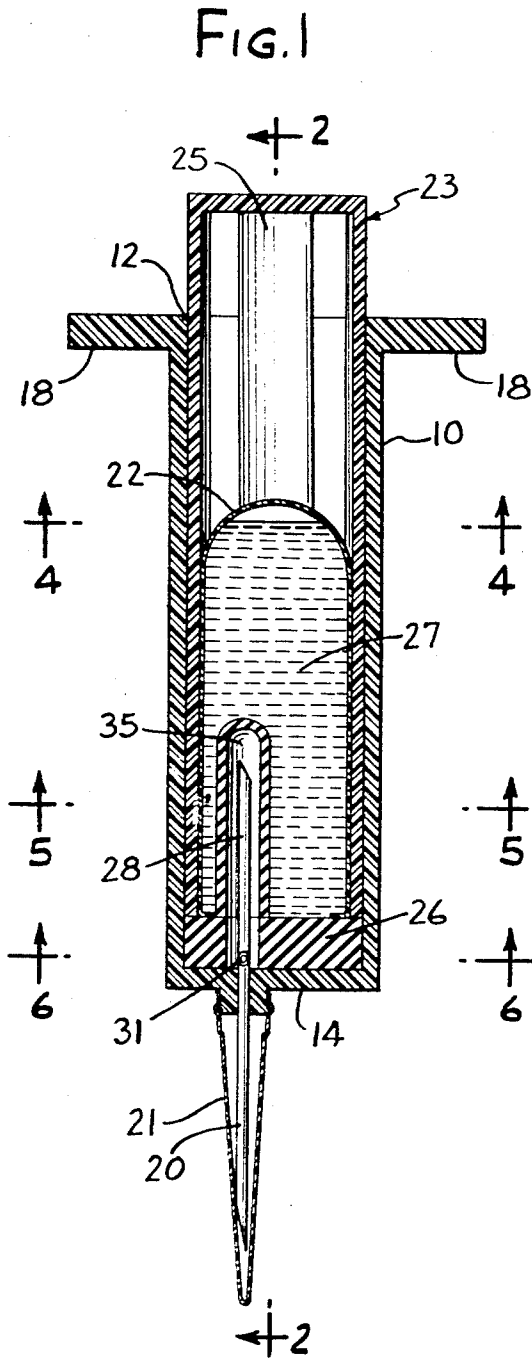
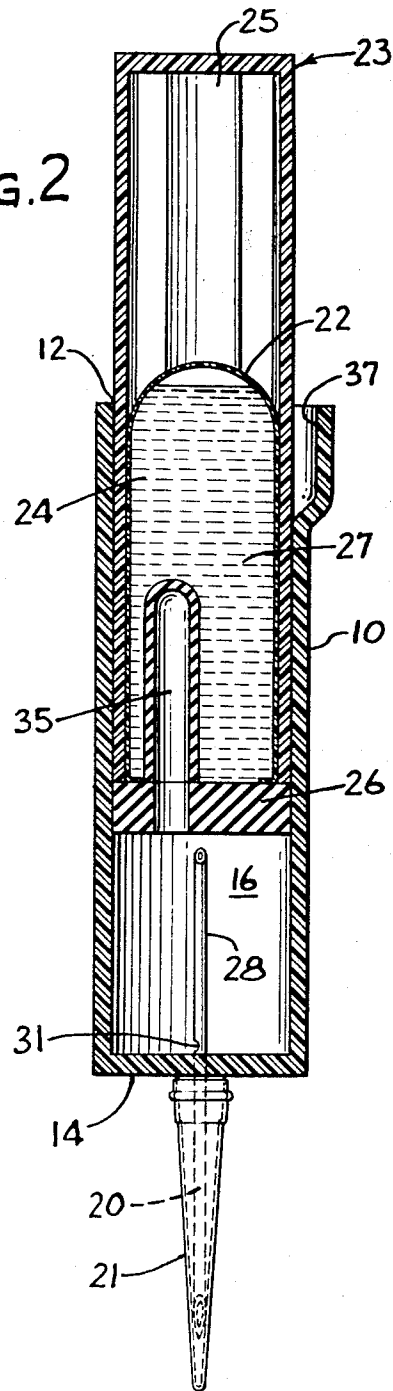


FIG. 2



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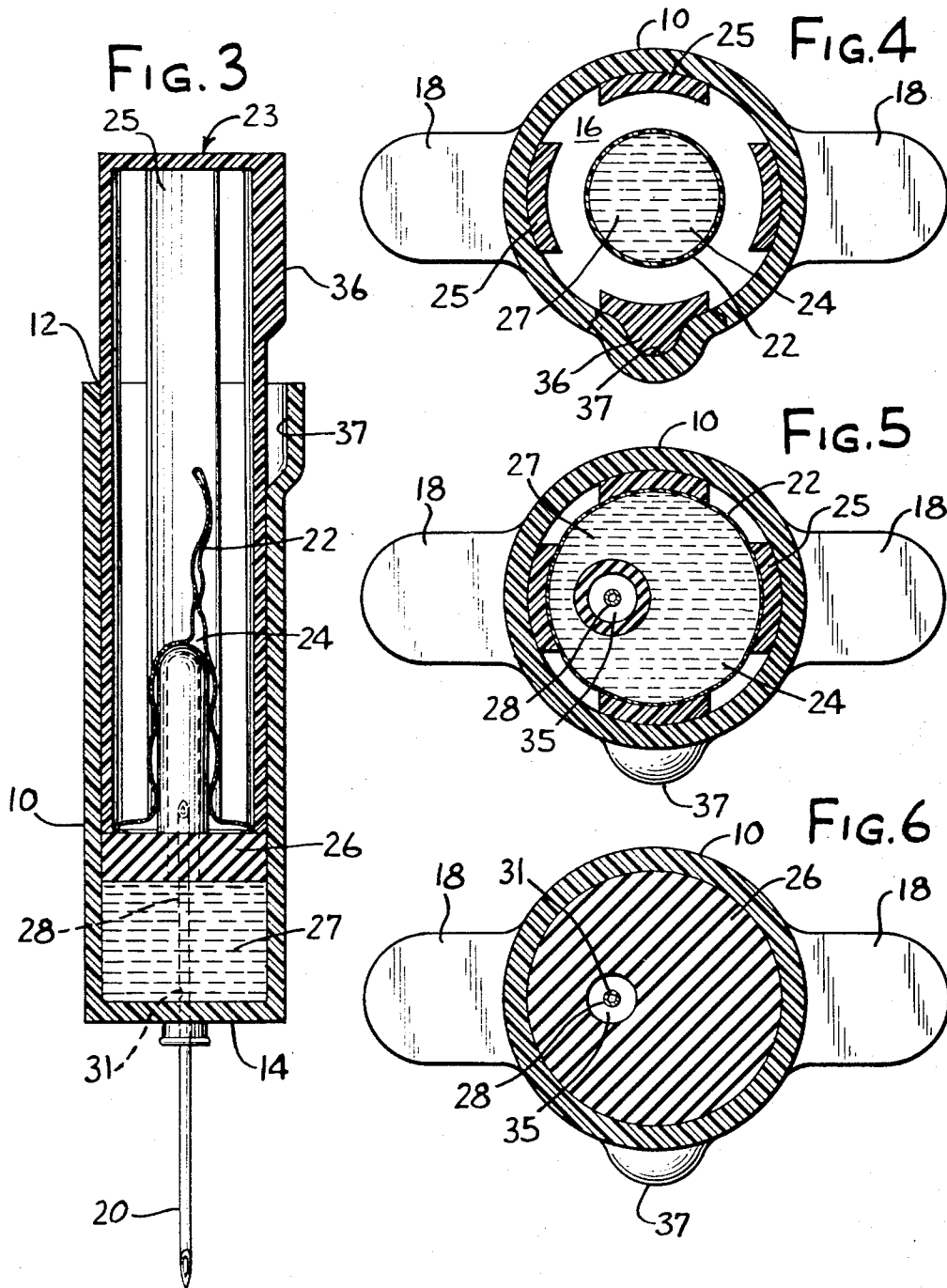
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PRE-FILLED SYRINGE

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4 Claims

ABSTRACT OF THE DISCLOSURE

An ampule which is part of a piston-like assembly in said syringe, defines a liquid chamber having an inner end wall which, while in one angular aspect, is punctured by a needle to discharge liquid from said chamber upon ampule movement into the barrel from an extended position. A pouch which is associated with the piston-like assembly and isolated from said chamber, is arranged to receive the needle and prevent puncturing of the inner end wall when the ampule is moved into the barrel provided the piston is disposed in another angular aspect.

The present invention relates to a syringe. More particularly the invention relates to a syringe of the class having a barrel for receiving a reciprocative ampule with a self-sealing end wall adapted to be breached in the syringe barrel for delivering ampule contained liquid.

A syringe of the class comprehended by the invention has a hypodermic needle which extends outwardly from one end of its barrel for delivery of the fluid within its ampule. A pointed member for puncturing the self-sealing end wall of the ampule projects into the syringe barrel and may be fashioned integrally with the hypodermic needle whereupon movement of the ampule from an extended position into the syringe barrel, the pointed member breaches the self-sealing end wall for removing fluids from the ampule. The conventional arrangement of a syringe is such that its ampule must be disposed in an extended aspect to prevent puncturing of its self-sealing end wall. This requirement produces a cost element in syringe handling, packaging, shipping, and storage which may translate to a significant sum if syringes are disposable and aseptically packaged at their source according to customary practice.

It is an object of the present invention to provide an improved syringe of the indicated class.

It is a further object of the invention to preclude the requirement for extending the ampule from the barrel of said syringe when it is not in use.

It is another object of the invention to minimize the cost of handling, packaging, shipping, and storing said syringe.

The features of the invention for achieving the foregoing objects are embodied in a syringe having a barrel with an open end and a fluid delivery outlet disposed opposite said open end. A first chamber in which an ampule is disposed as a piston is defined by said barrel. The ampule is arranged for reciprocation axially of the chamber through said open end between an extended position and an inserted position, and said ampule defines a second chamber. Means are provided for releasing liquid from said second chamber as said ampule is moved between said extended and said inserted position and while arranged at one angular aspect. However, means are provided for preventing liquid flow from said ampule while it is disposed within the barrel of the syringe at another angular aspect.

The foregoing and other objects, features and advantages of the invention will become more apparent upon consideration of the following description and appended

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claims, when considered in conjunction with the accompanying drawings wherein the same reference character or numeral refers to like or corresponding parts throughout the several views.

On the drawings:

FIG. 1 is longitudinal sectional view of a syringe embodying one form of the invention and showing an ampule in a first angular aspect in fully inserted position within the barrel of the syringe.

FIG. 2 is a longitudinal sectional view according to line 2—2 of FIG. 1 but showing the ampule in a second angular aspect and in an extended position.

FIG. 3 is a view of the barrel similar to FIG. 2 but with a needle cover removed and showing the ampule disposed between said extended and fully inserted positions and in the same angular aspect as FIG. 1.

FIG. 4 is a cross sectional view according to the line 4—4 of FIG. 1.

FIG. 5 is a cross sectional view according to the line 5—5 of FIG. 1.

FIG. 6 is a cross sectional view according to the line 6—6 of FIG. 1.

Referring now more particularly to the drawings, there is shown a syringe comprised of a syringe barrel 10 defining therein a chamber 16 and having an upper opening 12 and a lower outlet portion 14. Barrel 10 may be of glass or rigid plastic fabrication and fashioned with a pair of oppositely extending finger-gripping wings 18 adapted to be engaged from beneath by index and second fingers of a hand when the syringe is used. A hollow hypodermic needle 20, which is in fluid communication with chamber 16, is mounted and projects outwardly from the outlet end portion 14 of syringe barrel 10; and a removable needle cover 21 encloses the outwardly projecting part of needle 20 in an air tight seal.

A reciprocative assembly 23 which is movable in and out of barrel 10 through opening 12 comprises an elongated cage or frame 25 having an inner rupturable or breachable self-sealing membrane 26 which forms a floor for said cage. In the present embodiment membrane 26 is proportioned as a piston for snug and sliding fit within barrel 10 so that upon extension of cage 25 from barrel 10 a partial vacuum will be drawn in chamber 16. An ampule 22 comprises container means which is, but need not be, of collapsible and plastic fabrication and defines a second chamber 24 for fluid 27. Ampule 22 is disposed in cage 25 and is breachably sealed by securance to membrane 26 which forms an inner end wall for said ampule so that it may be moved with reciprocative assembly 23 between a first position in which said reciprocative assembly is extended through opening 12 (FIG. 2) so that membrane 26 cannot be breached at any angular aspect and a second position in which said ampule is inserted in said barrel (FIGS. 1 and 3) sufficiently for breaching membrane 26 in a manner to become apparent from the ensuing description.

For removing liquid 27 from chamber 24, breaching means, comprising a hollow pointed or puncturing member 28 projects into chamber 16 from the bottom 30 on syringe barrel 10. Although puncturing member 28 is shown fashioned integrally with needle 20, it need not be. The length of the puncturing member is such that when ampule 22 is disposed in its first position, the sealable membrane 26 cannot be breached under any circumstances. Whereas, when said ampule is disposed between its second or inserted position and said first position, membrane 26 will be breached provided said ampule is disposed at a proper angular aspect, as will be hereinafter explained. Puncturing member 28 has an aperture 31 for delivering liquid from chamber 24 through the wall of the puncturing member to chamber 16 once membrane 26 has been breached. An axially elongated groove or

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pouch 35 which is isolated from chamber 24 is formed in the lower end portion of reciprocative assembly 23. An exterior key, or spline 36 (FIGS. 3 and 4) which is fashioned on reciprocative assembly 23 is adapted for snug sliding engagement in an upwardly opening outwardly extending keyway or pocket 37, formed in barrel 10, when ampule 22 is disposed in a first angular aspect (FIGS. 1 and 3) and enables reciprocation of ampule 22 from an extended to a fully inserted position relative said barrel. Pouch 35 is proportioned for reception of and receives puncturing member 28 when ampule 22 is in its fully inserted position and thereby precludes breaching membrane 26 by puncturing member 28. The foregoing feature permits reciprocative assembly 23 to be stored in a fully inserted position within the barrel during handling, packaging, and subsequent storage.

Removal of liquid 27 from chamber 24 can occur only when ampule 22 is disposed in a second angular aspect, that is when puncturing member 28 has a relative angular attitude (FIG. 2) in which it will breach membrane 26 upon partial insertion of ampule 22 into barrel 10. Accordingly then, spline 36 will not be engaged in or aligned with pocket 37. It is appreciated that insertion of ampule 22 into barrel 10, while said ampule is in its second aspect, will be limited by engagement of the lower end of said spline 36 with the upper end of said barrel. However, puncturing member 28 is proportioned so that, notwithstanding such limitation membrane 26 can be punctured.

Flow from chamber 24 into chamber 16 through aperture 31 will be facilitated by the partial vacuum which has been drawn in chamber 16, as aforesaid. Removal of fluid from the syringe, that is chamber 16, however, requires that reciprocative assembly 23 be disposed in its first angular aspect for reinsertion into the barrel 10 beyond the limited condition of insertion possible while said assembly is disposed in its second angular aspect. With reciprocative assembly 23 disposed in said first angular aspect it may be wholly inserted in barrel 10 to force any liquid then in chamber 16 through aperture 31 out of said last chamber through needle 20 provided needle cover 21 has been removed as in FIG. 3.

As many substitutions or changes could be made in the above described construction, and as many apparently widely different embodiments of the invention within the scope of the claims could be constructed without departing from the scope and spirit thereof, it is intended that all matter contained in the accompanying specification shall be interpreted as being illustrative and not in a limiting sense.

What is claimed is:

1. In a syringe having a barrel with a liquid delivery end and an open end, the combination of: an ampule

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having a chamber for storage of liquid and a breachable end wall for sealing said chamber, said ampule mounted for selective reciprocation in said barrel between an extended position and an inserted position, and for selective rotation in said barrel between a first angular aspect and a second angular aspect when in said extended position; eccentrically mounted wall breaching means within said barrel for discharging liquid from said chamber as said ampule, while disposed in said second aspect, is moved between said extended position and said inserted position, and a correspondingly eccentrically mounted pouch isolated from said chamber and for reception of said wall breaching means while said ampule is disposed in said first aspect in said inserted position to prevent breach of said wall.

2. The combination of claim 1 further characterized by means for reciprocatively and releasably locking said ampule in said first angular aspect.

3. The combination of claim 2 in which said means comprises an axially extending spline and means for releasably holding said spline in said first angular aspect, said spline and releasable holding means associated with said ampule and barrel.

4. In a syringe the combination of: a barrel having an open end, a fluid delivery outlet disposed opposite said open end and a first chamber; an assembly including container means having a second chamber and arranged in said first chamber for reciprocation axially thereof through said open end between an extended and an inserted position, and a hollow member fixed relative said barrel for puncturing said container means to establish liquid communication between said first and second chambers as said assembly is moved between said extended and said inserted position, said container means having a pocket for receiving said hollow member as said assembly is moved between said first and second position to prevent puncturing said ampule and arranged for angular rotation between first and second aspects in which said hollow member is, respectively, aligned for reception in said pocket and puncturing said container means.

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U.S. Cl. X.R.

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