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R. W. OGLE

2,666,433

SYRINGE

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FIG. 1

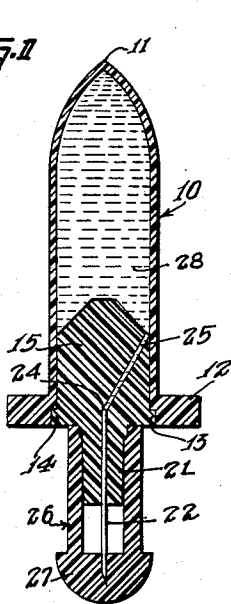


FIG. 2

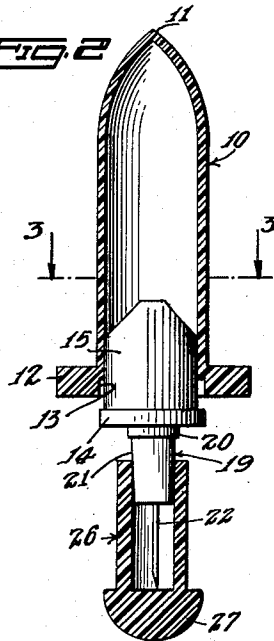


FIG. 3

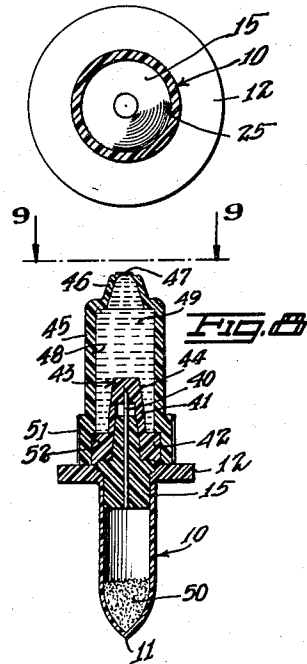


FIG. 4

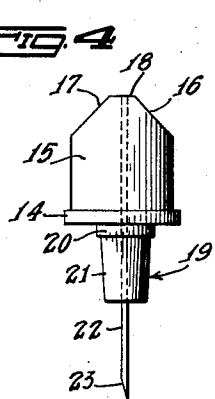


FIG. 6

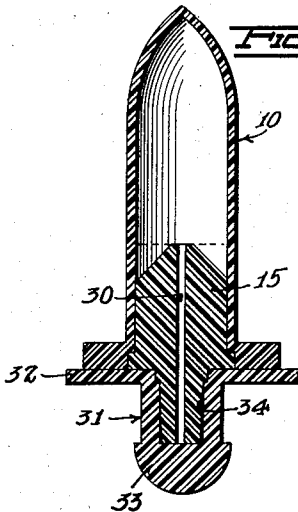


FIG. 9

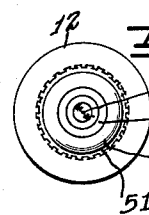


FIG. 5

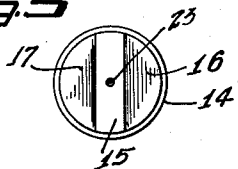
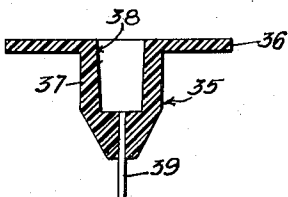


FIG. 7



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SYRINGE

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7 Claims. (Cl. 128—216)

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This invention relates to a syringe and more particularly to a disposable syringe adapted for intra-muscular injections.

It is a feature of this syringe that in the preferred embodiment all parts except the needle are formed from polyethylene plastic with a result that the device can be made at a very nominal cost.

It is an object of this invention to provide a disposable syringe which may be prefilled with an injectable and thus supplied to the physician in ready to use form.

It is another feature of this invention that novel plug means are used within the fluid containing tube to insure proper filling of the plug with the liquids either so as to present a desired amount of air or so as to positively exclude any air.

It is another object of this invention to provide such a novel plug which is shaped to permit the injection from the syringe of all or substantially all of the fluid contained therein.

It is another object of this invention to provide in one of the embodiments a syringe package containing upon one side a powdered injectable and upon the other side a diluent therefore, which when ready to be used can be mixed just prior to injection.

It is another object of this invention in an alternative embodiment to provide an inexpensive syringe of the type described which instead of being used once and thrown away can be reused the user injecting only a portion of the injectable fluid with each use.

These and other objects and advantages of the present invention will be apparent from the annexed specification in which:

Figure 1 is a vertical section through a syringe embodying the present invention showing the same filled and sealed.

Figure 2 is a view partly in section of the device shown in Figure 1 partially assembled.

Figure 3 is a section taken along the line 3—3 of Figure 2.

Figure 4 is a front view of one of the plugs employed in the present invention.

Figure 5 is a plan view of the plug shown in Figure 4.

Figure 6 is a vertical section through an alternative embodiment of the present invention.

Figure 7 is a vertical section of the needle structure employed with the embodiment shown in Figure 6.

Figure 8 is a vertical section of a second alternative embodiment.

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Figure 9 is a plan view of the device shown in Figure 8.

Referring now more particularly to the drawings, the invention comprises a generally tubular member 10 closed at its upper end as at 11 and having a flange 12 at its lower end. The member 10 is formed of polyethylene plastic and the walls of the tube are thin enough to be easily deformable between the fingers of a user.

The flange 12 has an enlarged opening 13 therein forming a shoulder upon which shoulder the flange 14 of a plug 15 is adapted to seat. The plug 15 is also formed of polyethylene plastic and the cylindrical walls thereof have a sliding fit with the interior of the tube 10.

The upper end of the plug 15 has sides 16 and 17 beveled as shown, which bevel is truncated as at 18. The plug 15 is also provided with a post 19 having an enlarged shoulder 20 and a gently tapered frustoconical portion 21. A surgical needle 22 having an opening 23 is provided extending axially through the plug. In the embodiment shown in Figure 1, the needle extends into the plug to a point indicated at 24 and in this embodiment the plug is provided with a bore or passage 25. This bore or passage 25 communicates the upper end of the needle 22 to the interior of the tube 10 substantially at the point where the taper of one of the sides 16 or 17 intersects the interior of the tube 10.

In the embodiments shown in Figures 4 and 5, the needle 22 is extended completely through the plug 15 axially thereof and ends at the truncated portion 18.

A cap 26 is provided also formed of polyethylene plastic and the cap 26 is provided with an end piece 27 which is enlarged sufficiently so that when the device is assembled, as shown in Figure 1, the lower end of the needle 22 and all of the opening 23 therein will be embedded in the plastic material of the end 27 thus securely sealing the needle and preventing escape of any of the fluid 28 from the interior of the tube 10. The flange 14 has a press fit with the shoulder to form another seal.

The enlarged shoulder 20 is designed to have a larger diameter than the interior of the cap 26 so that when the cap is pressed firmly on the post 19 the cylindrical cap 26 expands due to its inherent resiliency and a firm clamping action to the shoulder 20 occurs.

With a plug as shown in Figure 1 with a passage 25 therein, when it is desired to assemble the syringe, fluid is placed in the tube 10 which is inverted and the plug 15 is then pressed into

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the tube, any excess fluid escaping through the passage 25 and outwardly through the needle 22. With a plug of the type shown in Figures 4 and 5, however, as the plug is pressed downwardly into the tube it will first make contact with the fluid therein in the region of the truncated portion 18 and air will be trapped between the beveled side walls 16 and 17 and the interior of the tube 10. Any excess fluid will be expelled through the needle 22 and this air retained. In certain cases it is desirable to have a certain amount of air present, for instance, when it is desired to aspirate the syringe. Thus the type of plug shown in Figures 4 and 5 will be used in this case.

In either embodiment the tapered sides 16 and 17 form a surface which the forwardly sliding thumb and finger of the user will finally rest upon in expelling the injectable from the tube 10. As the fingers thus press the walls of the tube down upon the tapered sides 16 and 17, completely all of the space within the tube is collapsed thus assuring that substantially all of the fluid originally contained in tube 10 is injected into the patient. In prior devices of the same general type this has never been possible.

Referring now more particularly to the embodiment shown in Figures 6 and 7, this embodiment employs a tube 10 and plug 15 identical with the one shown in Figures 1, 2, 4 and 5 with the exception that a straight bore or passage 30 is provided axially of the plug and no needle is used.

A cap 31 is employed having a flange 32 and an enlarged head 33. The cap has its inner edges 34 formed to fit the frustoconical shape of the post 19 and a press fit is maintained not only with the sides of the post 19 but with the end thereof. This provides an assembly in which the tube 10 may be filled with fluid to be injected and the same is retained therein by the cap 31. When it is desired to use the syringe, the cap 31 is removed and a needle assembly 35 is placed over the post 19. The needle assembly, as shown in Figure 7, comprises a flange 36, a body 37 which is formed similarly to the cap 31 so that its inner walls 38 have a press fit with the outer walls of the post 19 and a needle 39 is provided axially of the member 35 extending outwardly thereof and having a tapered opening not shown. Thus the needle communicates with the passage 30 when assembled on the tube.

It is contemplated that the physician may be provided with only one of the members 35 which can be used, removed, the tube recapped and the needle sterilized. This device shown in Figure 7 will, in such case, be made entirely of metal.

With the embodiment shown in Figures 6 and 7, the user can give a small amount of an injection, the amount being less than all of the injectable contained within the tube and then recap it for later use. This is particularly useful in the case of allergy shots.

Referring now to the device shown in Figures 8 and 9, in this embodiment the tube 10 is again present similar to the tube 10 in the previous embodiments. The plug 15 is similar to the plug shown in the previous embodiments except that the needle 40 is shown somewhat shorter; however, this need not be the case. In this case, the cap 41 is provided with a flange 42, an enlarged head 43 and frustoconical side walls 44. A vial 45 is provided having a flange 51 which has an enlarged bore 52 forming a shoulder on the interior thereof. The vial 45 is thus adapted to fit

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and seal against the flange 42 and have its inner walls 48 spaced substantially away from the outer wall 44 of the cap thus providing a substantial reservoir for fluid 49.

The vial 45 has an end piece 46 which includes a very thin membrane 47. This membrane is in the order of six to ten millimeters thick and the entire vial is formed of polyethylene plastic.

The device thus described is adapted to retain a dry powder 50 in the tube 10 and the liquid 49 in the vial 45. When the device is placed in use, the tube 10 and plug 15 are removed from the cap 41 without removing the cap 41 from sealing relation to the vial 45. The needle 40 is then pushed through the thin membrane 47 and the tube 10 collapsed to draw fluid from the vial into the tube for mixture with the powder 50. The fluid and powder can be worked back and forth between the tube and vial as many times as desired to insure mixing.

The membrane 47 is of the thickness indicated in order to prevent plugging of the end of the needle with a portion of plastic as the needle is pushed through the membrane. It has been found that if such thin membranes are used the formation of such plugs will be prevented.

While there has been described what is at present considered a preferred embodiment of the present invention, it will be appreciated by those skilled in the art that various changes and modifications can be made therein without departing from the essence of the invention and it is intended to cover herein all such changes and modifications as come within the true spirit and scope of the appended claims.

I claim:

1. A syringe comprising: a generally cylindrically shaped tube formed of polyethylene plastic and having thin walls adapted to yield under normal pinching pressure between a user's thumb and finger; said tube having a closed end and an open end; a flange on said tube adjacent said open end; a plug adapted to fit within and close said open end; the inner end of said plug being tapered on two sides to form an upper end having a truncated V-shaped cross section; said plug, when said plug is in place, extending into said tube with said tapered sides spaced from the inner wall of said tube; and a hollow needle extending through said plug and outwardly therefrom.

2. A syringe comprising: a generally cylindrically shaped tube formed of polyethylene plastic and having thin walls adapted to yield under normal pinching pressure between a user's thumb and finger; said tube having a closed end and an open end; a flange on said tube adjacent said open end; a plug adapted to fit within and close said open end; the inner end of said plug being tapered on two sides to form an upper end having a truncated V-shaped cross section; said plug, when said plug is in place, extending into said tube with said tapered sides spaced from the inner wall of said tube; and a hollow needle extending from the apex of said truncated plug and outwardly therefrom.

3. A syringe comprising: a generally cylindrically shaped tube formed of polyethylene plastic and having thin walls adapted to yield under normal pinching pressure between a user's thumb and finger; said tube having a closed end and an open end; a flange on said tube adjacent said open end; a plug adapted to fit within and close said open end; the inner end of said

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plug being tapered on two sides to form an upper end having a truncated V-shaped cross section; said plug, when said plug is in place, extending into said tube with said tapered sides spaced from the inner wall of said tube; said plug being formed with a passage extending from substantially the outer edge of one of said tapered sides to the axis of said plug and a hollow needle axially disposed in said plug communicating with said passage and extending outwardly from said plug.

4. A syringe comprising: a generally cylindrically shaped tube formed of polyethylene plastic and having thin walls adapted to yield under normal pinching pressure between a user's thumb and finger; said tube having a closed end and an open end; a flange on said tube adjacent said open end; a plug adapted to fit within and close said open end; the inner end of said plug being tapered on two sides to form an upper end having a truncated V-shaped cross section; said plug, when said plug is in place, extending into said tube with said tapered sides spaced from the inner wall of said tube; and a hollow needle extending through said plug and outwardly therefrom; said tube having an enlarged portion adjacent said flange forming a seat and said plug having a flange adapted to fit within said seat.

5. A syringe comprising: a generally cylindrically shaped tube formed of polyethylene plastic and having thin walls adapted to yield under normal pinching pressure between a user's thumb and finger; said tube having a closed end and an open end; a flange on said tube adjacent said open end; a plug adapted to fit within and close said open end; the inner end of said plug being tapered on two sides to form an upper end having a truncated V-shaped cross section; said plug, when said plug is in place, extending into said tube with said tapered sides spaced from the inner wall of said tube; and a hollow needle extending through said plug and outwardly therefrom; said plug having an outwardly extending post; and a cap adapted to fit over said post in sealing contact therewith, said cap having an end in which the open end of said needle embeds to seal said needle when said cap is in place on said post.

6. A syringe comprising: a generally cylindrically shaped tube formed of polyethylene plastic and having thin walls adapted to yield under normal pinching pressure between a user's thumb and finger; said tube having a closed

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end and an open end; a flange on said tube adjacent said open end; a plug adapted to fit within and close said open end; the inner end of said plug being tapered on two sides to form an upper end having a truncated V-shaped cross section; said plug, when said plug is in place, extending into said tube with said tapered sides spaced from the inner wall of said tube; and a hollow needle extending through said plug and outwardly therefrom; said plug having an outwardly extending post; and a cap adapted to fit over said post in sealing contact therewith, said cap having an end in which the open end of said needle embeds to seal said needle when said cap is in place on said post; said post having an enlarged shoulder at the base thereof of greater diameter than the inner diameter of said cap and said cap being formed of polyethylene plastic whereby said cap is adapted to expand and form a clamping seal on said enlarged shoulder when driven into place.

7. A syringe comprising: a generally cylindrically shaped tube formed of polyethylene plastic and having thin walls adapted to yield under normal pinching pressure between a user's thumb and finger; said tube having a closed end and an open end; a flange on said tube adjacent said open end; a plug adapted to fit within and close said open end; the inner end of said plug being tapered on two sides to form an upper end having a truncated V-shaped cross section; said plug, when said plug is in place, extending into said tube with said tapered sides spaced from the inner wall of said tube; said plug having an outwardly extending post frustoconical in shape, said plug being provided with a bore communicating with the interior of said tube and a cap adapted to fit over said post in sealing contact therewith.

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