

July 11, 1967

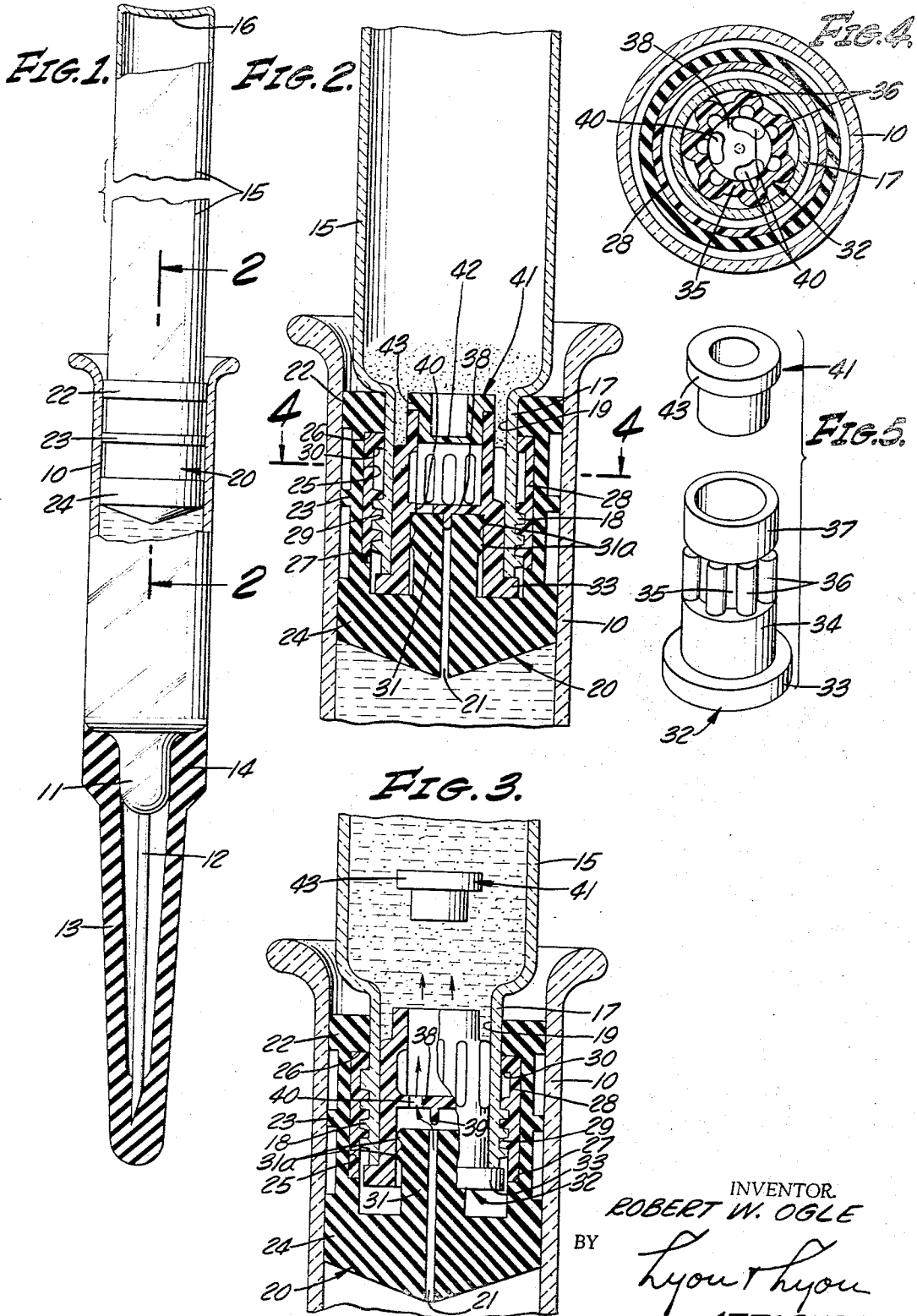
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3,330,280

COMBINATION SYRINGE VIAL AND PLUNGER AND SYRINGE

Filed Aug. 25, 1964

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

FIG. 6.

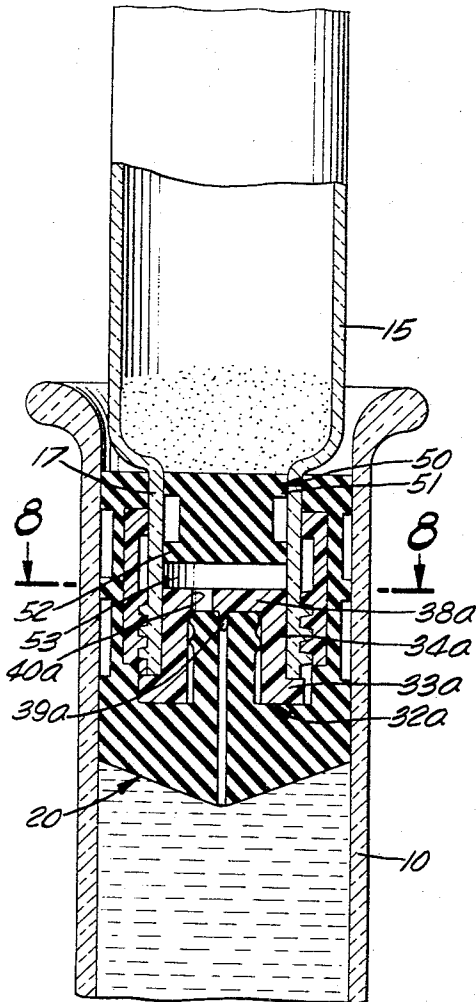


FIG. 7.

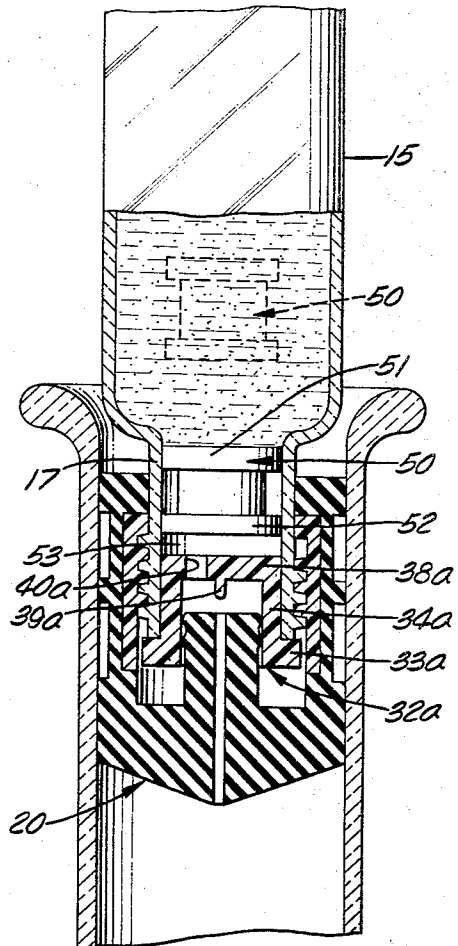


FIG. 8.

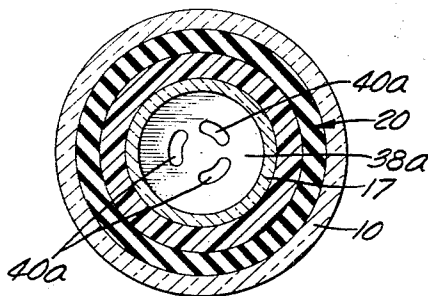
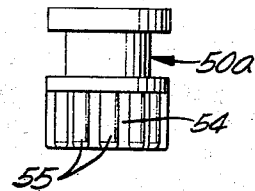


FIG. 9.



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COMBINATION SYRINGE VIAL AND PLUNGER AND SYRINGE

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 6 Claims. (Cl. 128—218)

This invention relates to a combination syringe vial and plunger and a syringe and more particularly to a syringe having a hollow vial adapted to contain a medicament which may be either in liquid or powder form, a syringe barrel which may also contain a liquid, a stopper separating the two and means for communicating the vial and the barrel when desired.

It is an object of this invention to provide a syringe as above-described in which incompatible liquids or powders can be stored and mixed only immediately before use. It is an object of the present invention to provide such a syringe combination which is economical, easy to assemble and easy to use.

These and other objects, features and advantages will be apparent from the annexed specification in which:

FIGURE 1 is a side view partly in section with parts broken away for clarity of illustration showing a syringe embodying the present invention;

FIGURE 2 is an enlarged fragmentary section taken vertically through the device shown in FIGURE 1 along the lines 2—2 of FIGURE 1;

FIGURE 3 is a section similar to FIGURE 2 showing the device in a different position;

FIGURE 4 is a section taken along the line 4—4 of FIGURE 2;

FIGURE 5 is an exploded perspective elevation of the plastic insert and cap;

FIGURE 6 is a fragmentary vertical section of a modification of the present invention;

FIGURE 7 is a view similar to FIGURE 6 showing the device in a different position;

FIGURE 8 is a section taken along the line 8—8 of FIGURE 6; and

FIGURE 9 is a side view of a modified plug.

Referring now more particularly to the drawings, there is shown a syringe having a barrel 10, a boss 11 on one end thereof in which is cemented a cannula or needle 12. A needle sheath 13 is provided having a portion having an internal diameter which is smaller than the external diameter of the needle 12 so that the needle is received in the end of this sheath with a press fit and securely sealed. The sheath 13 further has a portion 14 which is received upon the boss 11 with a press fit and again securely seals the needle. All of the foregoing is conventional. A glass vial 15 is provided closed at its upper end 16 and adjacent its lower end it is provided with reduced section 17 and a threaded section 18. The reduced portion 17 is hollow and provides an opening 19.

An elastomeric plug 20 is provided and is positioned within the barrel 10. Plug 20 has a small central bore 21 extending upwardly therein. The plug 20 is provided with a flange 22 which has a press fit with the internal diameter of the barrel 10. The plug 20 also has a ring 23 which also has a press fit with the internal diameter of the barrel 10 and finally, there is an enlarged portion 24 which also has a press fit as above. The interior of the plug 20 is hollow and is provided with a recessed section 25 forming a flange 26 at the upper end and a shoulder 27 at the lower end. A plastic insert 28 is pro-

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vided in the plug seating in the recess and against the flange 26 and shoulder 27. The plastic insert has a pair of threads 29 extending internally at the lower end thereof adapted to mate with the threads 18 on the glass vial 15. At the upper end of the insert 28 internal flange 30 is formed which acts as a stop to prevent complete unscrewing of the vial from the plastic insert 28.

The plug 20 is provided with a central upstanding post 31 having a pair of sealing rings 31a cast thereon which seal the post 31 to the interior of a vial insert 32 shown in perspective in FIGURE 5. The plastic insert 32 has a flange 33 at the bottom thereof, a cylindrical portion 34, a portion 35 having a series of ridges 36 extending longitudinally thereof and a further cylindrical portion 37. The insert 32 is seated in the reduced section of the vial 15 and the flange 33 is seated on the plug 20. The bore 21 extends through the post 31 as clearly shown in FIGURE 2. It will be noted that insert 32 internally at midway is provided with a web 38 having cast thereon a fit 39 and a series of slots 40 are cut therein. Shown in FIGURE 2 in its seated position is a cap 41 which is shown removed in FIGURE 5. This cap is in the form of a flanged cylinder having a closed bottom 42, which cap is seated in the closed position within the upper end of the insert 32 and held therein by a press fit being positioned by flange 43. The foregoing describes all of the mechanism involved in the first embodiment of the present invention. The operation of the above device is as follows:

Assuming the vial 15 to be loaded either with a powder or a liquid which is incompatible with the liquid which is contained in the barrel 10, the contents of the vial are isolated from the contents of the barrel during storage and prior to use by reason of the fact that the plug 20 seals with the interior walls of the barrel 10 as above-explained and that the fit 39 plugs the bore 21 in the plug 20, thereby precluding any possibility of either the fluid in the barrel 10 escaping either out of the barrel or communicating through bore 21 into the vial 15.

When it is desired to mix the contents of the barrel 10 and the vial 15 the user will make one full turn counterclockwise of the vial 15 which backs the vial 15 off into the position shown in FIGURE 3. It will be clearly noted that the fit 39 has thereby been removed from the bore 21 of the plug 20. As shown by the arrows in FIGURE 3, fluid is then free to pass through bore 21 into the space thus created between the web 38 and the top of the post 31. From there, as shown by the arrows, the fluid can be communicated through the slots 40 upwardly. Downward pressure on the vial 15 will create pressure against the cap 41 sufficient to dislodge the same upwards into the vial 15. This opens communication between the fluid in barrel 10 and the contents of the vial 15. When plug 20 reaches the bottom of barrel 10 it will be obvious that all of the fluid of barrel 10 has now been transferred upwardly into vial 15. At this point the user by shaking can fully commingle the fluid of barrel 10 and the either/or powder or liquid of vial 15. The user then by pulling upward on vial 15 returns said vial and plug assembly to its original position, thus transferring the commingled medicaments completely to barrel 10. The user then with a clockwise motion screws vial 15 which returns it to its closed position wherein the fit 39 reenters the bore 21 of the plug 20, thus sealing the plug 20 and no longer permitting the contents of barrel 10 to communicate with the interior of vial 15.

It is noted that in the operations above-described the sheath 11 has been entirely left in its position where it seals the needle 12. This has permitted the building up of sufficient pressure to eject the cap 41 and permit only communication of the fluid in barrel 10 into the vial 15 with no escape from the needle end. The sheath 11 is removed and simply by downward pressure on the vial 15 the medicament is injected into the patient. It will be noted that the plastic insert 32 is provided with a series of ridges 36 extending longitudinally thereof which provide communication for the lyophilizing process when insert 32 is assembled into vial 15 only to that rib portion. Upon completion of the lyophilizing process insert 32 is fully inserted into vial 15, thus providing a vial which is completely closed and which contains the sterile medicament.

Referring now more particularly to FIGURES 6, 7 and 8, there is disclosed a modification of the present invention in which most of the parts bearing similar numbers are identical with the parts disclosed in FIGURES 1 through 5, the differences in this case being that the insert 32 in this case has been divided in two, the lower portion of which is identical in that it has a flange 33a, a cylindrical portion 34a, a web 38a, slots 40a and a tit 39a. In addition there is embodied as shown in FIGURE 6 a plastic plug 50 which has two sealing ribs 51, 52, the dimensions of which in combination with the dimensions of the shortened insert 42a provide a dead air barrier 53, thus providing for a complete separation between any and all components involved therein.

Referring now more particularly to FIGURE 9, there is shown a modified version of the plastic plug 50a in which a section 54 is provided having a plurality of ridges 55 comparable to and for the same purpose as the ridges 36 of insert 32 in the first embodiment.

As noted in FIGURE 7 the plastic plug 50 will be ejected in substantially the same manner as the plastic plug 41 was expelled in the previous embodiment.

While there have been described what are at present considered preferred embodiments 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. In a syringe of the type comprising a barrel, a needle projecting into and from said barrel, and a plunger in said barrel the improvement comprising: a vial having a closed end and an open end; said vial having threads adjacent its open end; an insert seated in said open end of said vial comprising a substantially cylindrical member having an outer flange and an open inner end; said insert being provided with spaced longitudinal ridges leaving longitudinal passages therebetween, said ridges and passages being mounted on the exterior mid-portion of said insert and engaging the interior of the open end of the vial; said insert having a web spanning its inner cavity; said web having at least one opening therein and an outwardly extending tit; an ejectable plug fitted in the inner end of said insert; an elastomeric plug in said barrel having female threads receiving the threads on said vial and a bore in said plug arranged to receive and to be closed by said tit, said tit moving out of said bore upon unscrewing of said vial; said plug comprising said plunger.

2. In a syringe of the type comprising a barrel, a needle projecting into and from said barrel, and a plunger in said barrel the improvement comprising: a vial having a closed end and an open end; said vial having threads adjacent its open end; an insert seated in said open end of said vial comprising a substantially cylindrical member having an outer flange and an open inner end; said insert being provided with spaced longitudinal ridges leaving

longitudinal passages therebetween, said ridges and passages being mounted on the exterior mid-portion of said insert and engaging the interior of the open end of the vial; said insert having a web spanning its inner cavity; said web having at least one opening therein and an outwardly extending tit; an ejectable plug fitted in the inner end of said insert; an elastomeric plug in said barrel having female threads receiving the threads on said vial and a bore in said plug arranged to receive and to be closed by said tit, said tit moving out of said bore upon unscrewing of said vial; said plug comprising said plunger; said barrel having a boss; said needle projecting through said boss and a needle sheath seating on and sealing against said boss and receiving the open end of said needle with a press fit to seal said open end of said needle.

3. In a syringe of the type comprising a barrel, a needle projecting into and from said barrel, and a plunger in said barrel the improvement comprising: a vial having a closed end and an open end; said vial having threads adjacent its open end; an insert seated in said open end of said vial comprising a substantially cylindrical member having an outer flange and an open inner end; said insert being provided with spaced longitudinal ridges leaving longitudinal passages therebetween, said ridges and passages being mounted on the exterior mid-portion of said insert and engaging the interior of the open end of the vial; said insert having a web spanning its inner cavity; said web having at least one opening therein and an outwardly extending tit; an ejectable plug fitted in the inner end of said insert; an elastomeric plug in said barrel; a substantially rigid generally cylindrical insert in said plug having female threads receiving the threads on said vial and a bore in said plug arranged to receive and to be closed by said tit, said tit moving out of said bore upon unscrewing of said vial; said plug comprising said plunger.

4. In a syringe of the type comprising a barrel, a needle projecting into and from said barrel, and a plunger in said barrel the improvement comprising: a vial having a closed end and an open end; said vial having threads adjacent its open end; an insert seated in said open end of said vial comprising a substantially cylindrical member having an outer flange and an open inner end; said insert being provided with spaced longitudinal ridges leaving longitudinal passages therebetween, said ridges and passages being mounted on the exterior mid-portion of said insert and engaging the interior of the open end of the vial; said insert having a web spanning its inner cavity; said web having at least one opening therein and an outwardly extending tit; an ejectable plug fitted in the inner end of said insert; an elastomeric plug in said barrel; a substantially rigid generally cylindrical insert in said plug having female threads receiving the threads on said vial and a bore in said plug arranged to receive and to be closed by said tit, said tit moving out of said bore upon unscrewing of said vial; said plug comprising said plunger; said barrel having a boss; said needle projecting through said boss and a needle sheath seating on and sealing against said boss and receiving the open end of said needle with a press fit to seal said open end of said needle.

5. In a syringe of the type comprising a barrel, a needle projecting into and from said barrel, and a plunger in said barrel the improvement comprising: a vial having a closed end and an open end; said vial having threads adjacent its open end; an insert seated in said open end of said vial comprising a substantially cylindrical member having an outer flange and an open inner end; said insert being provided with spaced longitudinal ridges leaving longitudinal passages therebetween, said ridges and passages being mounted on the exterior mid-portion of said insert and engaging the interior of the open end of the vial; said insert having a web spanning its inner cavity; said web having at least one opening therein and an outwardly extending tit; an ejectable plug in said vial adjacent to but spaced from said insert.

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6. A vial for use in a syringe comprising a generally tubular member having a closed end and an open end; an insert in said open end; said insert being generally cylindrical and having an outer flange but having a central section provided with a plurality of spaced, longitudinally extending ridges having longitudinal passages therebetween, said ridges and passages engaging the interior of the open end of the vial; a web spanning the interior of said tubular member, said web having at least one opening therein and an outwardly extending tit on said web; and an ejectable plug fitted in the inner end of said tubular member.

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