Nov. 12, 1957 G. W. FERGUSON 2,812,763

SYRINGE ASSEMBLY

Original Filed March 8, 1954

Fig. 1

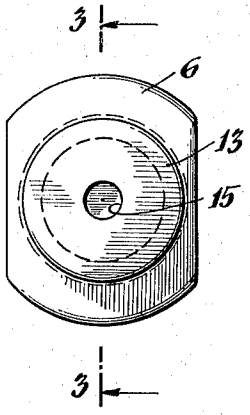
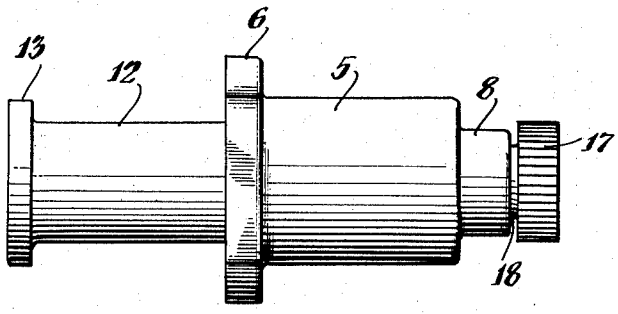


Fig. 2



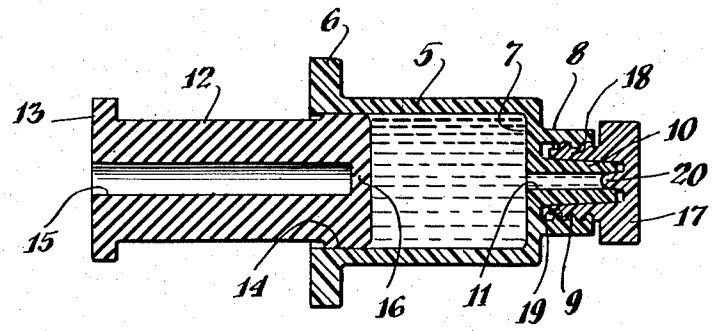


Fig. 3

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SYRINGE ASSEMBLY

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1 Claim. (Cl. 128—218)

This invention relates to a structurally and functionally improved hypodermic syringe assembly; the present application being a substitute for my prior application for United States Letters Patent Serial No. 414,807, filed March 8, 1954, and identified under "Syringe Assembly," now abandoned.

It is an object of the invention to furnish a structure of this character which may be either repeatedly used or else subjected to a "one-time" use, after which it is discarded. When so employed, it may be filled with medicament which will be maintained in stable condition free from contaminating factors for indefinite periods of time. However, the unit may be instantly rendered available for use when this becomes necessary.

A further object is that of furnishing a syringe to which a standard needle may readily be fitted and which syringe will be ideally adapted for placement in a kit such as is employed in the Armed Services, the assembly including relatively few parts, each individually simple in construction and capable of manufacture by inexpensive quantity production methods.

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

Fig. 1 is a rear view of the syringe assembly;

Fig. 2 is a side elevation thereof, and

Fig. 3 is a sectional side view taken along the line 3—3 in the direction of the arrows as indicated in Fig. 1.

In these views the numeral 5 indicates the syringe barrel which, in accordance with conventional practice, may be formed with a flange 6 adjacent its rear or open end and provided with an end wall 7 on its opposite end. All parts of this unit are preferably constructed of a plastic such as natural polyethylene, although other substances may be employed.

With a view to providing a mounting for a needle, the forward wall has extending from its outer face a collar 8, the inner face of which is formed with a spiral groove 9 for cooperation with the extended edge portions of a needle hub (not shown). This collar is concentrically disposed with respect to a tip 10 which also extends forwardly of end wall 7 to a point preferably beyond the edge of collar 8. This nozzle is formed with a bore 11 and is tapered throughout its length to provide a surface properly cooperable with the bore of the needle hub to establish a seat for and seal with the latter. The tip or nozzle 10 being also preferably formed of polyethylene an inherent resiliency and flexibility will be incorporated in this part such that it will—under pressure—conform to the adjacent needle hub surfaces.

Cooperating with barrel 5 is a plunger. That plunger may again be formed of a number of different materials. Preferably, however, it will include a body 12 formed of natural or synthetic rubber. It also includes an enlarged head or actuating portion 13 adjacent its rear end and a forward or piston portion 14 adjacent its forward end. The diameter of the latter should be slightly larger than

the bore of barrel 5 but not so large that it may not be slightly compressed to enter that bore. Thus, it is again apparent that a proper seal will be established between this piston portion and the bore face of the barrel. Such a seal will, of course, also be assured if the dimensions of the parts are generally proper and because of the comfortable nature of the materials of which these parts are formed. Body 12 is formed with a bore 15 extending through to its rear face. This bore terminates short of the forward face of the enlarged or piston portion 14. Therefore, a wall 16 exists at this point. That wall being formed of a material having restoring tendencies it follows that if wall 16 is pierced by a cannula which is subsequently withdrawn, the structure will be self-sealing.

To normally maintain the forward end of the syringe in an asceptic condition and guard the contained medicament against escape and contamination, a cap is employed. This cap as shown may include a head portion 17, the outer edge of which is conveniently knurled. It also includes a plug in the form of a sleeve 18 of relatively heavy gauge, the outer face of which is preferably threaded as at 19 to engage with threads 9. The bore of this sleeve is tapered to conform to the tapering of tip 10. Centrally of its head, the cap embraces a tapered protuberance 20. The end of the latter is sufficiently reduced so that it may enter bore 11 and establish a sealing contact with the edge defining the outer part of this bore and the surfaces adjacent such edge. The cap is preferably formed of the same material as the body 5. The length of skirt or plug 18 is such that, when seated, it preferably clears the base of the recess defined between tip 10 and collar 8. Likewise, when fully projected, the inner face of the head portion 17 may clear or contact the outer edge of collar 8. In this connection, it will be understood, due to the wedging action of the parts as they cooperate a definite limit will be imposed upon the amount the stopper or sleeve parts 18 of the cap may be telescoped with respect to the adjacent parts associated with the barrel.

At the same time a proper sealing contact will under all circumstances be established because of the materials which will be employed and which—as threads 9 and 19 are relatively turned towards a tightening position—will cause the sleeve to somewhat extend with respect to its head portion 17. This will have the result that the protuberance or valve body 20 will be forced into bore 11 to a maximum extent thus assuring a proper contact. That contact will inevitably result in a proper seal because of the support provided to the tip by the outer face of the latter contacting the bore of sleeve 18. This will prevent any possible loss of medicament at this point. A secondary seal will, of course, be established between the bore of that sleeve and the outer tapered face of the tip or nozzle 10. The threads will prevent any accidental detachment of the cap.

In use, it will be appreciated that all of the parts are cleaned and sterilized. The cap may now be mounted in sealing contact upon the forward end of the syringe; the plunger having been fully projected to where the forward face of its piston portion lies in contact with the inner face of walls 7. Now, by introducing a suitable filling needle or cannula into recess or socket 15, wall 16 may be penetrated. Thereupon, by forcing the desired medical solution through this needle the body 5 of the syringe barrel will be filled with liquid to the desired extent as shown, for example, in Fig. 3. Under these circumstances piston 14 will be forced rearwardly to the position also shown. The unit may now be stored for any desired period of time and in filled condition. It will be instantly ready for use by removing the cap, employing a sterile needle and mounting the latter on the forward end of the syringe barrel.

Of course, other methods of filling the syringe may likewise be resorted to. Also, if the syringe is to be subjected to repeated use it is apparent that the same techniques as heretofore utilized in connection with the cleaning, sterilization and filling of glass syringes may be utilized. The device will be extremely compact and where used in prefilled condition will contain just the amount of medicament which is desired.

Thus, among others, the several objects of the invention as specifically aforenoted are achieved. Obviously numerous changes in construction and re-arrangements of the parts might be resorted to without departing from the spirit of the invention as defined by the claim.

I claim:

A syringe assembly including in combination a barrel, an end wall for said barrel, a bored tip extending outwardly from said wall, a collar also extending outwardly from said wall and concentrically disposed with respect to said tip, a cap, a sleeve forming a part of said cap to receive said tip within its bore and engage with the surface of the latter the outer face of the tip, said collar and sleeve being formed of distortable material, said sleeve being of relatively heavy gauge whereby it provides a support for said tip as said sleeve is introduced into the space between the latter and said collar to assure a sealing contact between said sleeve and tip, a head portion forming a part of said cap and having a diameter larger than said sleeve to overlie the end of said collar with said cap in applied position, cooperating threads forming a part of said sleeve and collar and engaged with each other, a protuberance extending inwardly from the head portion of said cap and formed of similar material, said protuberance projecting into the bore of said tip to establish sealing contact therewith and the adjacent faces of said tip and the bore of said sleeve being tapered to provide mating engaging surfaces throughout substantially the entire length of said tip.

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