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HYPODERMIC INJECTION ASSEMBLY

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Fig. 1

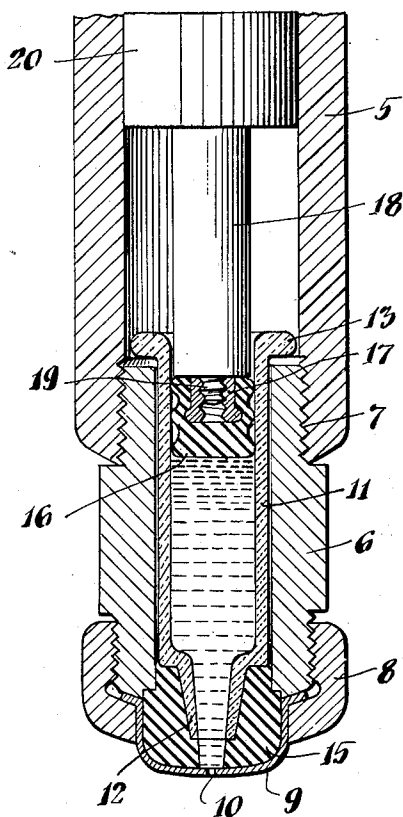


Fig. 2

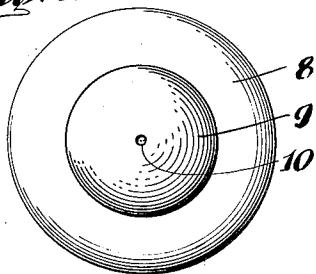
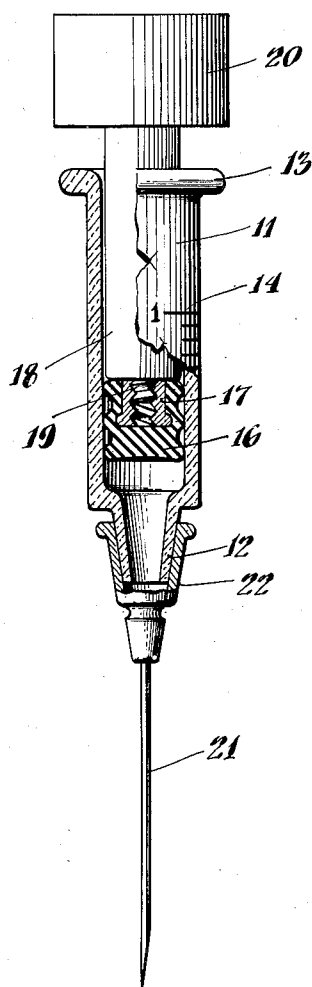


Fig. 3



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HYPODERMIC INJECTION ASSEMBLY

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3 Claims. (Cl. 128—173)

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This invention relates to a structurally and functionally improved hypodermic injection assembly and specifically has reference to a velocity injection apparatus, which, without the aid of a tissue-piercing needle injects medicament through the skin and into the underlying flesh and muscles of the patient.

It is a primary object of the invention to furnish in such an assembly a structure by means of which the physician or other person making the injection may be assured that the proper type of medicament will be injected and moreover, that precisely the desired quantity of medicament will be expelled from the apparatus.

A further object is that of designing an assembly embracing parts for manipulation by the physician or other operator and which parts will embody structures and functions similar to those heretofore encountered in the practice of hypodermic injections employing tissue-piercing needles. Therefore the physician will meet no difficulties or strangeness in employing these portions of the apparatus and will be able to proceed with the injection with full assurance that the injection will conform to his decision as to the quality and quantity of the medicament to be injected.

An additional object is that of furnishing an assembly which will embody relatively few parts, each individually rugged and simple in construction and capable of manufacture according to quantity production methods; such parts when assembled operating over long periods of time with freedom from all difficulty.

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

Fig. 1 is a fragmentary sectional side view of the lower or outer portion of an assembly, Fig. 2 is an end view thereof, and

Fig. 3 is a sectional side view of a complete grouping of the medicament-receiving apparatus.

Referring primarily to Fig. 1, it will be seen that the reference numeral 5 indicates the body of an injection device to which an extension 6 may be coupled by means of threads 7. Secured to the outer end of the extension by means of a loading or retaining ring 8 is a cap 9. The latter is formed with an orifice 10 which may be either relatively minute (for example from .003" to .006"), or relatively large. While only a single orifice has been illustrated, a suitable number of the same may be formed in the plate 9 or its equivalent.

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As will be understood, an apparatus such as this receives a charge of medicament. This may be assured by drawing the liquid into a suitable chamber. Ordinarily, however, the medicament has heretofore been contained in a cartridge or ampule. A proper motive force has been employed to expel the medicament from this cartridge or ampule. Such force might be a source of compressed air or gas, a spring or other suitable driving medium. In any event, with the release of this force the medicament has been ejected through the single or multiple orifices at such velocity that with the apparatus disposed in contact with the skin, the medicament has been injected through that layer into the tissues underlying the same.

Physicians have voiced some objection to the use of apparatus such as this, particularly in connected with the cartridges or ampules containing the medicament. More especially, these elements have heretofore been formed of opaque material such as metal. This, of course, has made it impossible for the physician to reassure himself (in the case of a pre-filled cartridge or ampule) that a proper quantity of medicament is present within the same. Regardless of the opacity of the element, the physician has also not been able to assure himself that the medicament contained within the ampule or cartridge was fresh and of proper quality. These difficulties are overcome by the present teachings.

More particularly, the medicament, according to this invention, will be receivable within a tubular body such as a barrel 11. This barrel will be similar in appearance to the barrel of an ordinary hypodermic syringe, although it may be designed to be more resistant to strains. It will be provided with a forward portion 12 similar to that which receives the needle-mounting hub of an ordinary syringe. Also, it will be provided with a bead or flange portion 13 at its rear or upper end. These parts may be formed of any suitable material such as metal. However, preferably they are formed of transparent or translucent glass or plastic. Where transparent the exterior of the barrel may present indicia 14 providing, for example, graduations corresponding to a total of 1 cubic cm., and which, over all scale, may be sub-divided into 10 parts. As will be understood, 1 cubic cm. of medicament will afford enough capacity for an ordinary injection. If desired, the capacity of the barrel 11 might be greater or less than this quantity. The diameter of the barrel will be such that it may be slidably accommodated within the bore of the

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extension 6 and be supported by the surfaces thereof. The length of that bore should be such that it may accommodate, adjacent its lower or outer end a seat or support 15 formed of rubber or other suitable material and which will be shaped to conform to the lower or outer end portion of the barrel 11. With the barrel in position, its upper end should extend beyond the upper end of extension 6 to at least a small extent as shown in Fig. 1.

Slidably mounted within the bore of barrel 11 is a piston 16. Conveniently the latter is formed of rubber or similar material and may be impregnated with a proper lubricant, so that it will slide without undue friction throughout the length of the barrel. Preferably the piston 16 has embedded within it and exposed upon its upper or outer face a metallic ferrule 17 presenting a threaded bore portion. A rod 18 having a diameter almost equal to that of the bore of barrel 11 is engageable with the outer or upper face of piston 16 for projecting the latter. A threaded stem 19 preferably forms an integral part of rod 18 and engages the threads formed in the bore of ferrule 17. Thus, rod 18 and piston 16 may be coupled against relative movement. The upper end of rod 18 has secured to it a head 20. This head may function as a knob for the fingers of the operator and may also serve as a bearing member or piston against which the aforementioned motive force may act.

In any event, assuming that barrel 11 is withdrawn from the extension 6, then it will be understood that a filling cannula 21 may have its hub 22 mounted on the outer end portion 12 as shown in Fig. 3. The rod 18 may be coupled against movement with respect to piston 16. With the parts in suitably sterile condition, the piston 16 will have been projected by means of the rod 18 to a point adjacent the lower or outer end of barrel 11. The outer end of the cannula 21 may now be immersed within a desired liquid or medicament mixture to be injected. Thereupon the operator, by grasping knob 20, may retract rod 18 and with it the piston 16. Therefore medicament will be drawn through the cannula 21 into the barrel until the latter has been filled with liquid to the desired extent. Aspirating and expelling actions may be resorted to by the physician or other attendant to assure himself that all air has been removed from the interior of the barrel and between its lower end and the surface of the piston. Also, the quantity of the dosage may be accurately determined by reference to scale 14. In other words, the same technique will be resorted to as is used in the conventional filling of an ordinary hypodermic syringe employing a tissue-piercing needle. Therefore, the physician may employ medicament of such manufacture as he customarily utilizes and may assure himself that the body of this medicament is of proper volume and ready for injection.

Thereupon he simply removes the cannula or needle 21 and having separated extension 6 from body 5 introduces the tube or barrel 11 into the bore of that extension until the outer end of the barrel bears in firm contact against the cushioning and stop member 15. During this manipulation of the parts the assembly is conveniently held so that all of the mechanism extends in an upward direction. Thereafter, and with cap 9 and retaining ring 8 in position, the apparatus may be turned so that the cap 9 projects downwardly as shown in Fig. 1. As afore brought out,

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the outer end of the barrel preferably extends slightly beyond the inner or upper end of extension 6. This, of course, is desirable so that the barrel may be subsequently grasped and withdrawn from the extension. However with the barrel completely filled, it will be observed that the upper or extending portion of the barrel is of such length that the stopper 16 extends from a plane substantially adjacent the upper end of the barrel to a plane well within the extension 6.

With the medicament-containing member in position as described, it will be understood that the rod 18 and its knob or piston portion 20, will extend into operative relationship with the force-supplying mechanism (not shown), of the injection apparatus. Therefore, if the outer end of the apparatus is placed adjacent the tissue to be injected and the mechanism is caused to function, the rod 18 will be projected under substantial force and velocity. Due to the fact that the piston or stopper 16 extends within the bore of barrel 11, pressures will not be generated within this unit above extension 6 which would be destructive to the barrel. It will be supported throughout its entire operative length, by the adjacent surface of extension 6 and the surfaces of the cushion or supporting element 15. Therefore, even if the barrel or tube 11 be formed of glass, there will be little, if any, likelihood of the parts breaking. The injection may be continued until the entire body of medicament has been injected. With the completion of the injection, the physician will be assured that just the proper medicament of a known brand and quality has been expelled by the apparatus. Thereafter the extension 6 may be detached from body 5 and the barrel and its rod may be removed. After this, all parts including the barrel assembly, the extension 6, cap 9, seat 15, etc. may be cleaned and sterilized according to usual and accepted techniques. The barrel 11 may now be refilled by simply directly immersing its forward portion 12 into a body of medicament or else applying the needle 21 to this mounting portion and immersing the outer end of that needle. Thereupon, all air may be expelled by projecting the piston 16. Of course, if desired or necessary, all the parts may be sterilized prior to filling the barrel.

As afore brought out, the coupling between the rod 18 and the piston 16 and the knob 20 mounted by that rod will permit of the piston being withdrawn and an aspirating action being obtained. It is apparent that the knob or element 20 might embrace numerous different configurations best suited for the functions which are to be achieved. Also the discharge end of the apparatus might likewise embody various structures.

It is also apparent that numerous other 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.

I claim:

1. A hypodermic assembly of the type in which medicament is ejected under sufficient velocity and in a fine stream such that it penetrates the epidermis without the aid of a tissue-piercing needle, said assembly including in combination a body formed with a cylinder bore, an extension coupled to said body and formed with a barrel-accommodating bore, a barrel removably disposed in said latter bore, a piston reciprocable within said barrel, a force transmitting rod

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movable within the cylinder bore of said body and bearing against said piston to project the latter within said barrel, a flange forming a part of said barrel and overlying that adjacent end of said extension which is coupled to said body and a cushioning support adjacent the opposite end of said extension and providing a seat to retain said barrel within said extension.

2. A hypodermic assembly of the type in which medicament is ejected under sufficient velocity and in a fine stream such that it penetrates the epidermis without the aid of a tissue-piercing needle, said assembly including in combination a body formed with a cylinder bore, an extension coupled to said body and formed with a barrel-accommodating bore, a barrel removably disposed in said latter bore, a piston reciprocable within said barrel, a force transmitting rod movable within the cylinder bore of said body and bearing against said piston to project the latter within said barrel, a flange forming a part of said barrel and overlying that adjacent end of said extension which is coupled to said body, a cushioning support adjacent the opposite end of said extension and providing a seat to retain said barrel within said extension, a needle mounting nose portion forming a part of said barrel and the surfaces of said support being contoured to bear against said nose portion.

3. A hypodermic assembly of the type in which medicament is ejected under sufficient velocity

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and in a fine stream such that it penetrates the epidermis without the aid of a tissue-piercing needle, said assembly including a body formed with a cylinder bore, an extension coupled to said body and formed with a barrel-accommodating bore, a force transmitting rod movable within the cylinder bore of said body and cooperative with a barrel disposed in the bore of said extension to expel medicament therefrom, a retaining ring detachably coupled to the outer end of said extension, a cap formed with an orifice and maintained in position by said ring and a barrel support disposed adjacent said cap and ring for retaining a barrel disposed within the bore of said extension.

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