

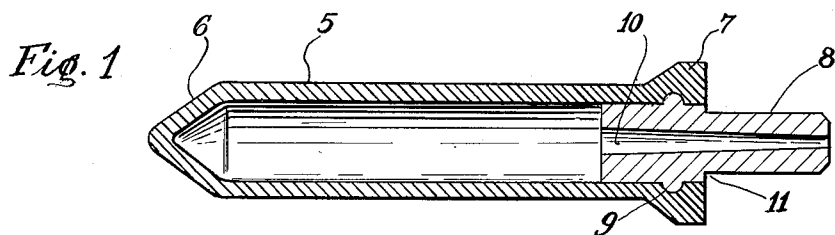
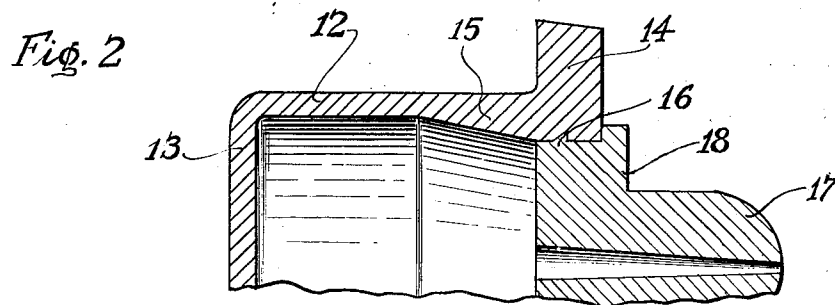
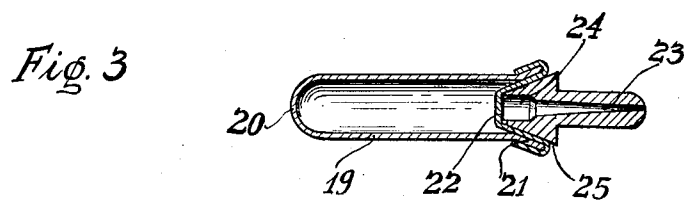
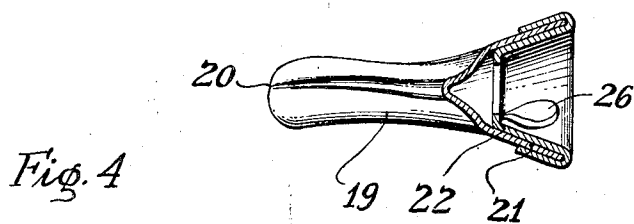
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AMPOULE

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AMPOULE

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1 Claim. (Cl. 128-272)

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This invention relates to a structurally and functionally improved ampule to contain medicament. The present application is a continuation-in-part of my prior applications for U. S. Letters Patent, Serial No. 30,047, filed May 29, 1948, on injection assembly and Serial No. 113,598, filed September 1, 1949.

By means of the present invention an ampule is furnished, which may be disposed in a hypodermic injection apparatus capable of discharging the medicament through the epidermis and into the underlying tissues without the use of a skin-penetrating needle.

It is an object to furnish a unit of this character which may be cheaply manufactured, sterilized and filled and which, after a single use, may be discarded. Moreover, within the present teachings, an ampule may be provided which will be capable of being refilled any number of times; both types of units being readily capable of association with the injection apparatus and—after discharge—being easily removable therefrom.

An additional object is that of providing units of this type which are capable of ready and economical manufacture by quantity production methods and in which the medicament may be maintained in stable condition for indefinite periods of time and until it is to be injected.

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

Fig. 1 is a sectional side view of one type of ampule;

Fig. 2 is a similar view of a second type of ampule;

Fig. 3 shows a still further form of ampule; and

Fig. 4 is a perspective view, partly in section and showing a discharged ampule as illustrated in Fig. 3.

Primarily referring to Fig. 1 the numeral 5 indicates a sack or hollow body, preferably formed of rubber or similar material. The rear end of this sack may present a reduced or conical end portion 6. Its opposite end is preferably defined by a thickened outwardly extending flange 7. All of these parts may be integral with each other. A nozzle 8 conveniently formed of metal is provided and coupled to the open end of body 5 by having the adjacent surfaces provided with relatively raised and recessed portions.

Preferably as shown the sack has its inner face in line with flange 7 formed with a groove. Into

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the latter an outwardly extending flange 9, forming a part of the nozzle, extends. Thus, a coupling is furnished which will prevent accidental separation of the parts and also furnish a leak-proof seal. However, by expanding the parts of the sack adjacent its open mouth the nozzle may readily be detached from the sack. That nozzle is furnished with a bore 10, the outer end of which may be reduced to define an orifice having, for example, a diameter of around .005". Accordingly, if sufficient pressure is exerted, medicament within the sack will be ejected at high velocity and in a fine stream. Therefore, with the nozzle adjacent or in contact with the surface to be injected, the medicament will penetrate the epidermis without it being necessary to employ a skin-piercing needle.

In use, an ampule of this type is placed within an operating compartment. Adequate support will be present in that the forward face of the main body of the nozzle is preferably defined by a flange 11. Also as shown the rear surface of flange 7 may be tapered. Therefore, these surfaces may be engaged by correspondingly extending surfaces forming a part of the injection apparatus. Accordingly, they will be adequately supported even under extremes of pressure, so that there will be no danger of the nozzle being accidentally detached from the sack. Therefore, when pressure is applied to the base portion and exterior surfaces of the sack, the latter will be collapsed. Such collapse will be resisted by the contained fluid so that the collapse will be somewhat gradual. In any event, the ultimate position of the parts will—with the presently visualized injection assembly—embrace a sack portion which is completely constricted so that all medicament is ejected therefrom through the bore of the nozzle. The only portion of the sack not so collapsed will be the open end of the same which is supported by the nozzle body.

In the form of device as shown in Fig. 2 the ampule again includes a sack 12 of rubber or similar material which has a flattened base portion 13 and an open end defined by a flange 14. Adjacent that open end the bore of the sack may be somewhat constricted by thickening the wall of the same as indicated at 15. Within the area of the flange the sack bore is formed with a recess into which the flanged portion 16 of the nozzle 17 may extend. Thus, a coupling similar to that aforescribed is provided. In common with the nozzle shown in Fig. 1 the forward face of the nozzle 17 may be defined by a surface 18 extending perpendicular to the axis of the nozzle.

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zle bore. Also as shown, flange 16 may be flared forwardly. This construction will resist to a maximum extent separation of the parts even when the latter are subjected to extreme pressures. In this form of structure substantially all medicament is discharged from the ampule when the sack has been collapsed upon itself either by constriction or inverting of the latter.

In the form of unit shown in Figs. 3 and 4, the ampule body embraces a sack 19 preferably formed of metal such as thin gauge stainless steel, foil or other acceptable materials. This sack will have a closed end portion 20 and an open opposite end portion defined by an outwardly flared surface 21. That surface will correspond substantially to the flaring of the inner surface of flange 7 as in Fig. 1. After the ampule has been filled with medicament it is conveniently sealed by a cap in the form of a cup 22. The edges of this cup extend around and are preferably crimped into contact with the adjacent surfaces and the flared portion 21. The base of the cup conveniently extends well into the mouth of the ampule.

Associated with the latter is a nozzle body 25 formed with a bore 23 which may terminate in an enlarged recess 24. When the parts are operatively associated, that recess will extend adjacent the base portion 22.

The tapered side walls 25 of the nozzle body will extend in contact with the adjacent side walls of cup 22. The parts are, of course, properly enclosed and supported by the adjacent surfaces of the assembly of the injector and with a surface of the latter preferably bearing against the outer flange or surface of the nozzle body. If now the ampule is subjected to a collapsing action all parts of the assembly will be supported excepting only the base of cup 22.

The pressures being much greater than the force required to rupture the wall of the ampule, it follows that the base of the cup will rupture as indicated by flap 26 in Fig. 4 and in line with recess 24. The walls of the sack will be collapsed upon themselves. This action will be similar to the action aforescribed in connection with the structure of Fig. 1. In any event a substantially complete discharge of medicament will occur from the ampule. As will also be understood, the ampule as shown in Figs. 3 and 4 is preferable to the type intended for a single

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use. The ampules shown in Figs. 1 and 2 may be refilled any desired number of times (after sterilization). It is generally intended that the nozzle unit shall be reused, especially in view of the small expense involved in the formation of the parts.

It is, of course, apparent that portions of the assembly as shown in Figs. 3 and 4 could be reused. This would occur after proper sterilization of the parts. Where it is desired to furnish a single assembly requiring no manipulation of the parts to combine the ampule and nozzle bodies in operative relationship then, as indicated in Fig. 3, these parts might be disposed adjacent each other. In that event suitable adhesive or other expedients could be employed to maintain the base of the nozzle within the cup portion.

Thus, among others, the several objects of the invention as specifically aforesaid are accomplished. Obviously numerous changes in construction and rearrangement of the parts might be resorted to without departing from the spirit of the invention as defined by the claim.

I claim:

1. An ampule for a velocity injection apparatus, said ampule comprising a hollow body formed of flexible material and presenting closed and open end portions, a flared surface forming a part of said body adjacent its open end, a nozzle provided with an aperture of such reduced diameter that medicament may be ejected therefrom in a fine stream, a base forming a part of said nozzle, a rupturable cup secured to said body adjacent its open end for closing the latter, said cup being formed with a flared surface disposed adjacent the flared surface of said body and the base portion of said nozzle being similarly flared and disposed in sealing contact with the surface of said cup.

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