

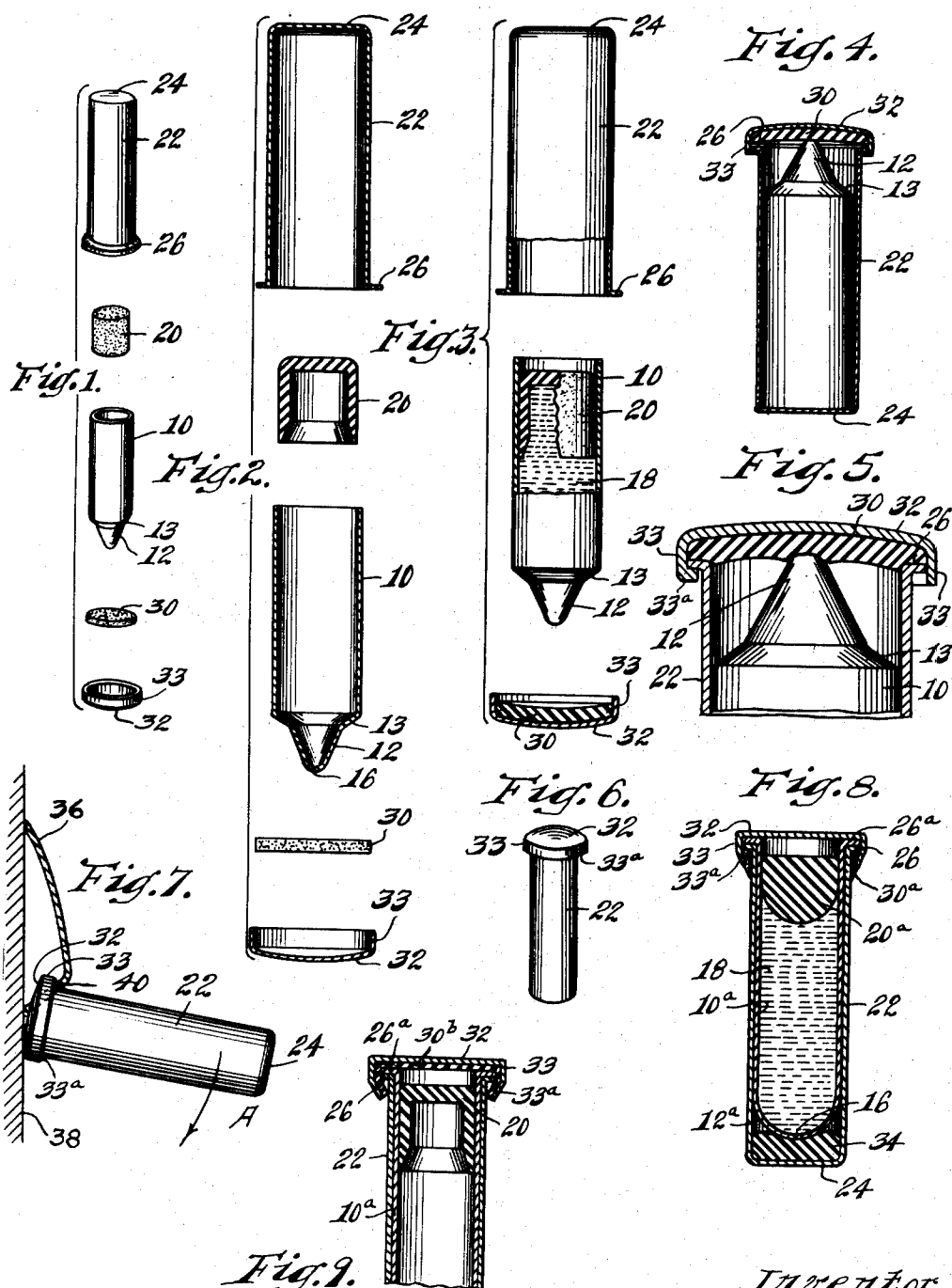
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JACKET FOR JET INJECTION AMPOULES

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JACKET FOR JET INJECTION AMPOULES

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5 Claims. (Cl. 206—63.2)

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This invention relates to a jacket for receiving, protecting and sealing in sterile condition that type of hypodermic jet injection ampule disclosed and claimed in my copending application, Serial No. 93,282, filed May 14, 1949, when the ampule is used in jet therapy as disclosed and claimed in my copending application, Serial No. 77,517, filed February 21, 1949.

These jet injection ampules are adapted to contain liquid medicament and a follower which acts as a piston, the follower being in an open end of the ampule which is cylindrical in form and has its other end closed. The closed end of the jet ampule is pierced by a jet discharge orifice on the order of .002" to .005" diameter and the purpose of the ampule is to effect a jet type hypodermic injection by means of a holder and actuating device or "hypo" jet injector for the ampule which holds the cylindrical container of the ampule while forcing the follower downwardly under pressure and/or impact, thereby ejecting liquid medicament through the discharge orifice in the form of a true jet having the required power to penetrate through the epidermis of a human being or animal and then continue penetration to the fat tissues, fascia or muscles depending on the jet velocity and other factors, without the necessity of using a hypodermic needle for first producing an opening through the epidermis. In this way the jet of liquid is injected to a subcutaneous position, to the fascia or to an intramuscular position without the attendant pain and discomfort of the usual hypodermic needle. The holder and actuating device above referred to constitutes a hypo jet injector disclosed and claimed in my copending application, Serial No. 94,579, filed May 21, 1949.

An approach was made toward jet injection (see the following Lockhart patents)

Number	Date
2,322,244.....	June 22, 1943.
2,322,245.....	June 22, 1943.
2,380,534.....	July 31, 1945.
2,398,544.....	April 16, 1946.

but I have found that the apparatus disclosed in those patents does not accomplish the results expected, particularly when quantities of liquid in excess of 1/50 cc. are to be injected.

My medicament charged jet injection ampule is furnished to the doctor or patient who places it in the hypo jet injector and operates the pressure producing mechanism to effect the jet injection operation. The charged jet injection

ampule, that is, the container with the medicament in it and the follower behind the medicament, presents a problem with respect to protection against contamination and against leakage or evaporation of the medicament through its minute jet discharge orifice. The jet orifice, due to its minute size, can not readily be plugged but must be covered or otherwise sealed with a seal that is readily removable. It is also highly desirable to have the charged jet ampule delivered to the injector in a sterile condition and this applies particularly to the closed end of the ampule which contacts the epidermis during the hypodermic jet injection operation and which might introduce bacterial contamination through the opening formed in the epidermis by the jet of medicament. To safeguard against such a happening the ampule should be sterilized when charged and then sealed against subsequent bacterial contamination, or sterilized after sealing as by subjection to a suitable electric discharge or germ killing electric field.

It is also desirable to insure that the follower will remain in its proper position in the jet ampule without any possibility of accidental dislodgment, and to accomplish all these desirable results the main object of my present invention is to provide a jacket which will meet the enumerated requirements.

Another object is to provide a jacket in the form of a cylinder having one end closed, and a removable cap on the other end, the jacket and cap enclosing the jet ampule completely.

Still another object is to provide a resilient sealing means in the jacket which effectively seals the jet orifice of the jet ampule against leakage of the medicament therefrom.

A further object is to provide a cap which can be connected with the jacket by a simple spinning or bending operation around the periphery of the cap and to provide a gasket or sealing means for the cap with respect to the jacket which produces a perfect hermetic seal of the entire charged jet ampule within the jacket, the jacket and its cap also preventing dislodgment of the follower due to expansion of the medicament caused by a rise in temperature or due to any other factors that might be involved.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my jet injection ampule jacket whereby the objects contemplated are attained as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawings wherein:

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Figure 1 is an enlarged exploded perspective view of the elements of my jet injection ampule and my jacket therefor;

Figure 2 is an exploded sectional view thereof shown on a still larger scale;

Figure 3 shows the same parts partially assembled, the jet ampule filled with liquid, the follower placed therein and the jet discharge orifice sealing element placed in the cap for the jacket;

Figure 4 shows a further step in the assembly, the jet injection ampule being in place in the jacket and the cap dropped onto the jacket;

Figure 5 illustrates the last step with the cap and its sealing element forced to its final position on the jacket and the cap partially locked in position by spinning its peripheral edge to final position;

Figure 6 is a perspective view of the jacketed jet injection ampule, this view being full size for a 1 cc. dosage of medicament although of course the size can vary considerably to suit different dosages, 1 cc. being a practical size for maximum dosage with a practical degree of concentration of medicament in the vehicle liquid;

Figure 7 is a side elevation of the jacketed ampule showing it being associated with a cap remover for the purpose of removing the cap so that the charged ampule can be transferred from the jacket to the injector when the hypodermic injection is to be made; and

Figures 8 and 9 are cross sections showing modifications.

On the accompanying drawing I have used the reference numeral 10 to indicate the container portion of the ampule. The container may be made of sheet metal or molded of plastic or glass and is illustrated as having a constricted lower end 12, a shoulder being formed at 13 to engage a shouldered surface in the injector when the ampule is received therein. The constricted end 12 may assume other shapes as disclosed in my first above-mentioned co-pending application and has a minute jet discharge orifice 16 which on the average would be about .00325" in diameter.

The container 10 is adapted to contain a liquid 18 which is a desired medicament and which is retained in the container 10 by a plug-like follower or piston 20. The follower is preferably in the form of a cup-shaped piston as illustrated. The follower serves as a piston when the ampule is held in the injector and the follower is forced toward the discharge orifice 16.

The follower may be made of rubber, neoprene or similar rubber-like substance so that it seals well in relation to the interior surface of the container 10 and this container acts as a cylinder in conjunction with the follower 20 acting as a piston for effecting the displacement of the medicament from the jet ampule. Obviously the force of the plunger against the follower 20 may be sufficiently great for generating pressures in thousands of pounds per square inch on the liquid 18 so that the velocity of the jet of liquid issuing from the orifice 16 is sufficient for, in some cases epidermic penetration and in other cases intramuscular penetration.

The present invention contemplates particularly a jacket for the charged jet ampule 10—18—20 and this jacket may take the form of cylinder 22 of aluminum or other sheet metal having a closed end 24 and an open end surrounded by an out-turned annular flange 26.

The complete jacket further includes an orifice sealing element 30 in the form of a disk of neoprene or the like and a thin sheet metal cap 32

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having a peripheral flange 33. The cap may be made of aluminum or any suitable metal that will permit the flange 33 to be bent to the final position shown at the left side in Figure 5 by means of a rolling operation or the like.

In the assembly of the jet ampule in the jacket, the sealing disk 30 is first inserted into the cap 32 as shown in Figure 3 and the charged jet ampule is then turned end-for-end and permitted to drop into position as shown in Figure 4. The cap is then placed loosely in position on the jacket whereupon the disk 30 is spaced from the flange 26 because the lower end of the ampule is supported by the wall 24. The purpose of this arrangement is so that the disk 30 can be forced to the final position of Figure 5 whereby it is under compression on the flange 26 and over the orifice 16 as shown so as to effect an adequate seal for the jet orifice of the ampule with respect to atmosphere. The spinning operation on the flange 33 causes it to bend as indicated at 33a. This causes the disk 30 to form a hermetic seal between the jacket 22 and its cap 32 as well as for the orifice, the final jacketed ampule being shown in Figure 6.

A modification is illustrated in Figure 8 in which the same jacket 22 is used having the flange 26 but a modified ampule 10a is used having a flange 26a overlying the flange 26. The ampule 10a has a rounded lower end 12a pierced as at 16 to form a desirable orifice 16 and the orifice is sealed within the capped jacket by means of a disk 34 in the bottom of the jacket instead of the disk 30 in the cap. Substantially the same cap 32 is used having the depending flange 33 turned in at 33a but a different arrangement of seal between the cap and the jacket is provided in the form of a band 36a of resilient material such as rubber or the like against which the turned-in edge 33a of the flange 33 engages with sufficient force to compress the material 36a. This material may be neoprene or the like painted around the jacket 22 under the rim 26 or the jacket can be dipped in a liquid composition that hardens after dipping.

This figure also illustrates a modified form of follower piston 20a in the form of a solid plug rounded at its lower end to fit the round end 12a of the ampule 10a when the plug is all of the way down as a result of operation of the ampule in the injector.

In Figure 9 another modification is shown in which the same type of follower 20 as disclosed in Figures 1, 2 and 3 is used in an ampule of the general type shown in Figure 8 but instead of the seal 30a a sealing disk 30b is used which may be comparable to the disk 30 or extend over the edges of the flanges 26 and 26a and under the flange 26 as illustrated if desired.

With either the form of invention shown in Figure 4 or Figure 8 the orifice 16 is effectively sealed when the ampule is forced to its final position against either the disk 30 of Figure 4 or the disk 34 of Figure 8 by securing the cap 32 in position.

A cap 32 of the character disclosed is readily removable in substantially the same manner as the removal of a crown cap from a bottle. Figure 7 illustrates a cap remover element 36 which may be U-shaped in cross section and secured to a supporting surface 38. The element 36 has a lip 40 under which the edge of the cap 32 is engaged whereupon by swinging the ampule downwardly as indicated by the arrow A the cap is pried off the jacket and the charged ampule

may be dropped out of the jacket 22 and into the hypo jet injector. For convenience, the support 38 of Figure 7 is the injector itself.

From the foregoing specification it is obvious that I have provided a jacket which contains means to seal the jet orifice of a hypo jet injection ampule and also hermetically seals the entire charged ampule against contamination between the time of filling and assembly at the factory and the time of use by the doctor or patient. After the ampule is removed from the jacket it is ready for instant use and insurance is had that the end 12 which contacts the skin of the patient surrounding the point of injection will be in sterile condition so as to minimize the possibility of bacteria entering the body through the injection opening made by the jet of medicament that issues from the ampule when the injector is operated.

Some changes may be made in the construction and arrangement of the parts of my jet injection ampule jacket without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims such modified forms of structure or use of mechanical equivalents as may be reasonably included within their scope.

I claim as my invention:

1. In a jacket for a jet injection ampule, a cylindrical element closed at one end and open at the other end, a sealing element for said ampule located in the closed end of said cylindrical element, and a removable cap for said cylindrical element, said cap retaining said ampule in said cylindrical element with a jet orifice thereof sealed by compressing said sealing element, said cap having an intumed edge to retain it in position on said cylindrical element and said cylindrical element having a flange received in said intumed edge, and a resilient sealing band around said cylindrical element below said flange and adapted to be compressed by the edge of said cap when so turned in.

2. In a jacket for a jet injection ampule consisting of a container provided with a minute jet orifice, a cylindrical container having a closed end, sealing means within said closed end for sealing said jet orifice, the other end of said cylindrical container being open and provided with an outturned annular flange, a cap for said cylindrical container having a periphery adapted to be bent under said flange, said cap in its installed position forcing said ampule into pressure engagement with said sealing element, and sealing means around said cylindrical container below said flange and contacted by the turned-in edge of said cap to form a hermetic seal between the cylindrical container and the cap.

3. For use with a jet injection ampule of the type comprising a cylinder having medicament therein, a minute jet discharge orifice at one end of the cylinder and a follower in the other end of the cylinder; a jacket comprising a cylindrical element having a closed end and an outturned

flange at the opposite end, said cylindrical element being adapted to receive said ampule with its jet discharge orifice adjacent the closed end of the cylindrical element, sealing means interposed between said closed end and said jet discharge orifice, a cap for retaining said ampule in position with said sealing means under compression, and a gasket between said cylindrical element and said cap.

4. The combination of a jet injection ampule and a container therefor wherein the container completely encloses said jet injection ampule, said ampule having one end reduced in diameter and closed except for a minute jet discharge orifice, said container having one end closed and being open at the other end, a sealing element for said discharge orifice of said ampule, and a cap for said container, said sealing element being located in said cap and spanning both said container and said closed end of said ampule with the reduced portion thereof entering said sealing element to insure it sealing said discharge orifice, said cap being removable from the container for permitting disassociation of the discharge orifice of the ampule from said sealing element whereby the container, cap and sealing element may be discarded and the ampule is thereupon completely ready for use and may be dropped out of the container with said discharge orifice foremost into a jet injector for use therein.

5. The combination of a jet injection ampule and a cylindrical element to serve as a container therefor, said ampule having a closed end provided with a jet discharge orifice, said cylindrical element having one end closed and open at the other end, a sealing element for said jet discharge orifice of said ampule, a removable cap for said cylindrical element, said sealing element being located in said cap, the length of the cylindrical element being such in respect to the length of the ampule that when the ampule is placed within the cylindrical element and forced to a seated position on said sealing element by said cap, said closed end of said ampule will enter the surface of said sealing element whereby the sealing element will be under compression across such orifice, said cap retaining said ampule in said cylindrical element with said orifice thereof, and with said cap relative to said cylindrical element, sealed by said sealing element.

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