

Oct. 3, 1933.

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1,929,247

SYRINGE EQUIPMENT AND APPARATUS

Filed Jan. 20, 1931

2 Sheets-Sheet 1

Fig. 1.

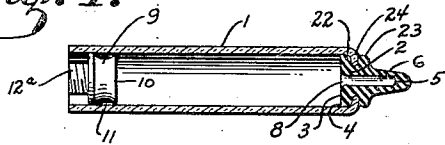


Fig. 3.

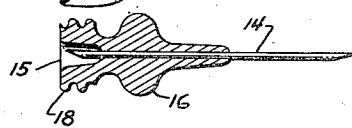


Fig. 2.

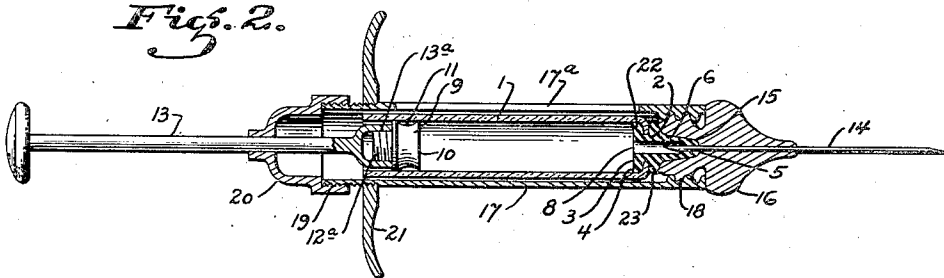


Fig. 4.

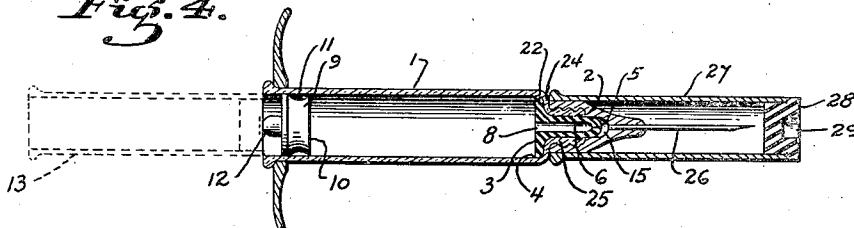


Fig. 5.

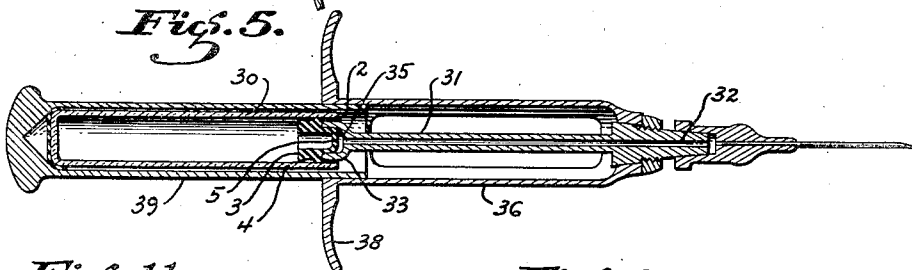


Fig. 11.

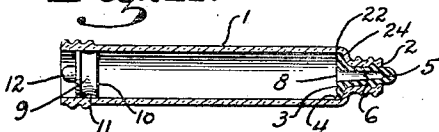


Fig. 6.

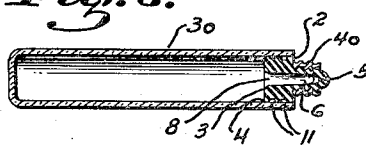
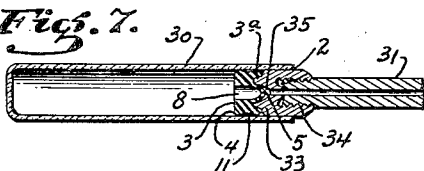


Fig. 7.



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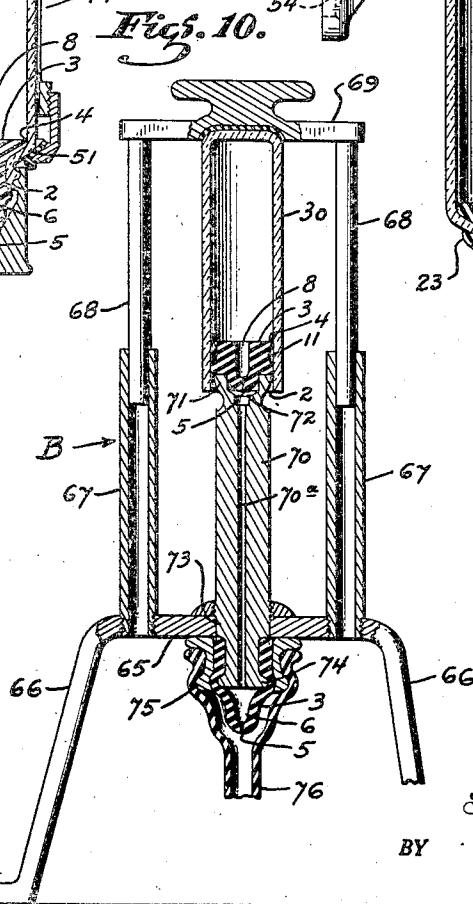
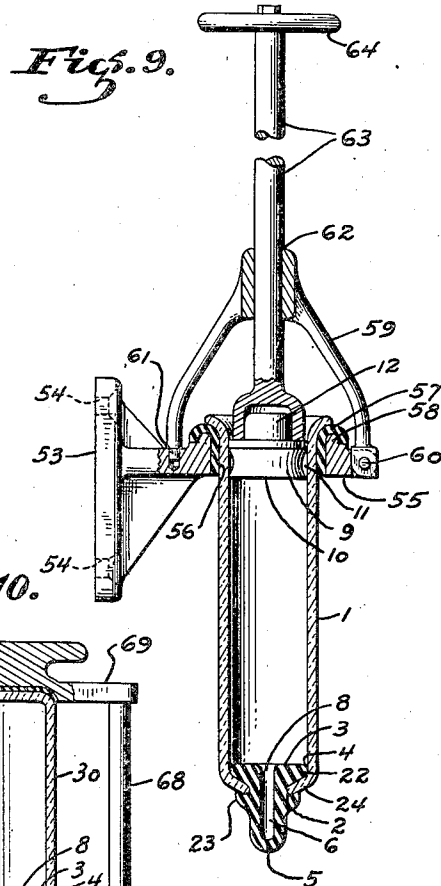
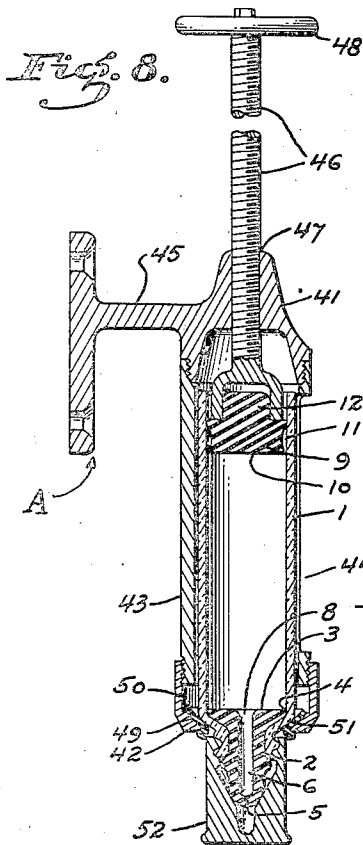
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SYRINGE EQUIPMENT AND APPARATUS

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2 Sheets-Sheet 2



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SYRINGE EQUIPMENT AND APPARATUS

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3 Claims. (Cl. 128—218)

This invention relates to syringe equipment and particularly to syringes in which it is desired to expel liquids from an original container wherein the contents are sealed against impurities or foreign matter, and which are readily adaptable to packaging of a number of units in a container, so that it is not necessary to transfer the contents to separate dispensing containers at time of use. Such syringes are highly desirable in the dental and medical professions for subcutaneous and venous injections, and in other situations where it is advantageous to have fluid dispensed from a normally closed container vial.

The invention herein may also be used in dispensing apparatus employing the syringe principle of expulsion of contents of a vial by pressure, and is adaptable to use with pastes and plastic materials equally with fluids.

Among the objects of the invention are to provide a container vial adaptable to packaging of a number of vial units in a container, and wherein the contents of the vials may be placed therein at point of manufacture and the contents expelled direct from the vial, either completely or in portions without exposing the vial contents to extraneous impurities; to provide for closing said contents within the vial against impurities; to provide a closure for vials which permits the contents of the vial to be discharged through a discharge orifice by pressure thereon, and which automatically closes upon cessation of the pressure; to provide apparatus to expel the contents of such containers by hand pressure and by mechanical leverage and to provide apparatus whereby such apparatus may be mounted upon and operated on a wall or bracket support.

With the above mentioned and other objects in view, the invention consists in the novel construction and combination of parts hereinafter described, illustrated in the accompanying drawings and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction within the scope of the claims may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

To more clearly comprehend the invention, reference is directed to the accompanying drawings, wherein—

Fig. 1 is a longitudinal section of vial body and closure members.

Fig. 2 is a longitudinal section of vial body of Fig. 1 in operative mounting in a syringe frame.

Fig. 3 is a longitudinal section of injection needle having double ended cannula.

Fig. 4 is a longitudinal section of vial body in syringe forming relation, with closure members in syringe forming relation, and an end adapted for mounting of injection needle, and a needle casing with casing transposed to a plunger shown in dotted lines.

Fig. 5 is a longitudinal section of syringe assembly showing inverted type syringe wherein the vial is a plunger and the closure is a piston head.

Fig. 6 is a longitudinal section of vial for inverted syringe, with threaded closure.

Fig. 7 is a longitudinal section of vial and closure with portion of a modified form of piston end.

Fig. 8 is a vertical section of side view of vial support for wall mounting with vial mounted therein and plunger threadedly operable.

Fig. 9 is a side view vertical section of wall mounting bracket with vial depending vertically therein.

Fig. 10 is a vertical elevation in section of vial showing inverted type of use in a counter or table dispenser.

Fig. 11 is a longitudinal section of vial threaded at each end to engage other syringe forming equipment.

There are two general groups of vial syringes and dispensers, one of which is known as the regular type, wherein a plunger is received in one end of the container and by pressure discharges the fluid from the opposite end of the container, as illustrated in Figs. 2 and 4, and the other type known as the inverted type in which the container is open at one end only, said open end being slidably mounted over a tubular piston, the container per se being the plunger member, as shown in Figs. 5, 6 and 7.

The vial is of a type suited to the expelling equipment with which it is to be used. Fig. 1 shows a vial for use in a regular syringe having a frame with a plunger opposite the discharge end. Fig. 4 shows a vial for use without a vial frame and wherein a plunger support may be threadedly attached to one end of the vial and a tubular needle attached to the discharge end of the vial, whereas Figs. 5, 6 and 7 show the container or vial used with the inverted type of syringe in which it is necessary to have one end only of the container or vial open.

Application of the invention to dispensing of liquids or pastes for all purposes and of all kinds, is merely a matter of degree in change of size

of the vial and suitable type of dispensing apparatus, such as shown in Figs. 8, 9 and 10.

Referring to the drawings, wherein like characters of reference designate corresponding parts, 1 is a container or vial having a tubular body preferably circular in transverse section and made of suitable body-forming material, preferably transparent, such as glass, and having an opening at a discharge end 2, whereat is mounted a discharge nipple 3 which is slidable axially internally of the tubular body and tightly engages the internal walls of the discharge end, as at 4, so as to close the opening thereof against leakage.

The nipple 3 has a body of elastic material, such as resilient rubber, and through its wall is provided with a discharge opening 5 which is preferably a puncture or incision without removal of material of the nipple, such as a slit made with a razor blade or a puncture made with a sharp instrument, so that the elastic material, by reason of its elasticity or resiliency will spring together upon withdrawal of the incision instrument, so as to close the opening of the slit or puncture against normal opening, but leaving the slit or puncture open in the sense that upon pressure within the container, the elasticity or resiliency of the material will cause the walls of the slit or puncture to spread apart so as to permit discharge of the contents of the container.

The nipple is preferably provided with an axially extended tubular portion 6, into which the slit or puncture 5 opens, the tubular portion having an opening at its opposite end into the container body, as at 8.

In containers or vials which have one end open only and are intended for the inverted type of syringe or dispenser, (see Figs. 6, 7 and 10), the nipple is the only closure required for the container, and is axially slidable therein, and thereby acts as a sealing cork when the container is not being operated, and as a dispenser and a piston head during operation to expel the contents of the container.

In the containers or vials which have an opening at both ends and are intended for syringes of regular type, (see Figs. 1 and 4), the nipple is preferably positively positioned relative to the discharge end opening 2, so as not to be blown from its seat at the discharge end of the vial, as by a circumferential shoulder 22 which provides a base seated within the container, abutting a flange 24 which extends radially inward of the container wall. A shoulder 23 may also be provided externally of the flange 24.

As illustrated in the varying modified structures of nipples shown in the respective views, the part of the tubular portion 6 which has the puncture or slit 5 therein extends axially beyond the shoulder or base portion 22, providing a discharge orifice which, in opening responsive to pressure within the tubular body, is not required to overcome the resistance of the resilient pressure of radial material in the shoulder or base 22 and thus permits extrusion of the vial contents upon exertion of considerably less pressure within the tubular body than would otherwise be required and prevents sudden spurts of material in filling a cannula just prior to an injection.

In containers for vials for use with the regular type of syringes or dispensers, a closure cork 9 is provided for what may be termed the filling end of the tubular container body, the cork being preferably of resilient material, such as rubber. The cork closure 9 has snug slidable fit with the inner wall of the container, and preferably is pro-

vided with end faces 10 connected by a side wall which preferably has one or more circumferential grooves 11 which permits ease of sliding by providing for a minimum of frictional contact between the cork and container walls. One end face of the cork 9 is preferably provided with a projection 12, which may have corrugations or threads 12a, adapted to be engaged by one end of a plunger member 13, which may be threaded, as at 13a to positively engage corresponding threads of the projection 12, to axially rotate the cork, or move it in either direction.

The container has thus far been described as solely a discharging device. In entrevenous injections it is desirable that a syringe be capable of drawing blood from a vein, to insure that a vein has actually been entered by the injection needle, prior to injection. For this purpose, a double ended tubular injection needle is used (see Fig. 3), one end of the cannula 14 extending free into a recess 15 in the needle base 16, and adapted to pass through the puncture 5 and to be closely gripped by the resilient walls thereof when the punctured portion of the nipple body is received within said recess 15. Thus, prior to injection, the plunger 13 and the cork 9 may be drawn outwardly to cause suction of venous blood into the container, which immediately notifies the operator that a vein has been punctured and the plunger is then depressed inwardly to discharge the fluid and complete the injection.

For use of the vial in Fig. 1, a syringe frame 17 is provided which may be fenestrated, as at 17a, to afford view therethrough, and the frame mounts at one end a needle base 16, as by threads 18, the base being provided with recess 15 into which the end of the resilient nipple is snugly received, so that the wall of the recess forms a support against the walls of the nipple and insures tight closure of the puncture 5 when pressure is not exerted within the vial to open same.

The frame is adapted to mount at its other end, as by threads 19, a guide 20 for the plunger 13. The frame may also be provided with finger grip bars, either integrally with the guard 20 or as a separate member 21 which is mounted circumferential of the frame.

As shown in Fig. 4, the container is adaptable to use without a frame, the flange 24 being extended axially of the tube to provide a tubular neck 25 preferably threaded externally and adapted to mount a needle base having a cannula 26 and having recess 15 threaded to engage the threads of the container neck. A tubular needle casing 27 is removably mounted on the needle base and has its opposite end preferably sealed by a closure cork 28. The casing preferably has an outer diameter similar to the inner diameter of the container body, so that it may be transposed and used as a plunger 13 (see dotted lines Fig. 4). The closure cork in the casing is provided with a recess 29 which engages the projection 12 of the snugly slidable cork 9, and axially aligns cork and piston.

In the inverted type of syringe (see Figs. 5, 6 and 7), the container vial 30, with its closure nipple 3 are mounted at an end of a tubular shaft 31 having its discharge end 32 adapted to mount an injection needle. The opposite end of the tubular shaft is provided with a head 33 which is preferably removable by means of threads 34 and is provided with recess 35 into which the punctured portion 5 of the nipple is received. Upon depression of the container 30 over the piston head 33, the nipple 3 is retracted in the vial

and the contents are expelled through the puncture 5 which opens under pressure and discharges the vial contents through the tubular shaft and needle. Upon cessation of the pressure, the puncture 5 automatically closes and again seals the contents from exposure to contamination.

A frame 36 may be provided to guide the reciprocation of the container relative to the tubular shaft, and finger grip bars 38 may be provided extending radially outward from the frame. It is desirable that a plunger casing 39 be provided to slide within the frame and carry therein the tubular container vial.

Modifications of the nipple structure for inverted syringes are shown in Figs. 6 and 7. In Fig. 6, a threaded ferrule 40 is provided so that the nipple may be threadedly engaged by a suitably threaded piston head, if desired. In Fig. 7 a nipple structure is disclosed wherein the outer face of the nipple is provided with an annular groove or recess 3^a into which the edges of the piston head seat, and thus provide for the manufacturing advantage of reducing the depth of recess 8.

In the use of the vial in apparatus acting on the syringe principle, Figs. 8 and 9 illustrate the regular type, and Fig. 10 illustrates the inverted type. Both types are adapted for use in the medical and dental professions in place of the gravity syringe or water bottle, where a large quantity of solution or paste is desired for intermittent use during operations or in like situations, and a suitable conduit tube may be attached over the nipple 3. These types of syringe dispensers are also adaptable for use in individual units or in batteries, and are especially advantageous for household and store uses where it is desired to package liquids or pastes in original closed containers and from which the contents may be dispensed in its entirety or in portions without change of container or exposure to foreign matter, and so that when a portion of the contents are dispensed, the remaining contents are not exposed to atmosphere or any contamination. Ordinarily, the containers or vials would be made in larger sizes for household and store usage than when used in an injection syringe for subcutaneous and venous injections.

In Figs. 8 and 9, the tubular container is 1, and is preferably disposed vertically, and is provided with nipple 3 and slidable closure cork 9. In Fig. 8 a supporting frame generally indicated A is provided having a top 41, a bottom portion 42 and side wall 43, therebetween and providing a chamber whose walls are preferably fenestrated as at 44 to permit view of the container. A bracket 45 may be attached to the frame A for mounting the syringe dispenser on a wall or support. A threaded plunger 46 is threadedly engaged in an opening 47 in the top and at one end engages the closure cork 9 so that as the plunger is axially rotated in one direction by means of hand wheel 48, the closure cork 9 will be depressed to expel the contents of the container through the nipple 3, and upon being rotated in the other direction, will withdraw the plunger for insertion of a new or refilled container. The bottom closure 42 has a tapered opening 49 therethrough which preferably mounts a self-retaining resilient gasket 50 against which shoulders 51 of the container bear. If desired, a removable dust cap 52 may be provided over the end of the nipple.

In Fig. 9 a modified form of frame and plunger are provided, comprising a bracket 53 mountable

on a wall by suitable means, such as screws 54, and provided with a horizontally disposed annular ring container support 55, said ring preferably mounting over its upper edge and abutting its inner wall, as at 56, an annular resilient cushion 57 in which case the filling end of the container is provided with an external annular bead 58 to engage said cushion and support the container therein. A plunger frame or guide 59 is suitably mounted on the annular ring 55, pivoted at 60, and snugly fitting holes 61 in the ring. The frame 59 has an opening 62 aligned vertically with the radial center of the annular ring 55, said opening being adapted to receive therethrough a reciprocable plunger member 63 having at one end an operating hand piece 64 and having its opposite end contacting with the closure cork 9, so that by pressure upon the plunger, the contents of the vial container 1 may be discharged through the slit or puncture 5 of the nipple.

Fig. 10 is especially adapted to a syringe of the inverted type, the container vial 30 and nipple 3 being of the same type shown in Fig. 5. A frame is provided, generally indicated B, which has a base 65, preferably mounted on legs 66. Extending upwardly from the base are vertical guide members 67 which slidably receive and thereby guide prongs 68 of a vertically reciprocable top member 69. A tubular shaft 70 is vertically mounted on the base and is provided at its upper end with a head 71 having a recess 72 adapted to receive therein the punctured end 5 of nipple 3, and the other end of the tube extends through an opening 73 in the base and is arranged thereat so as to support a second punctured nipple 3 preferably by a radially extending annular bead 74 over which resilient walls of the nipple may be slid and be deformed, so as to support the nipple by resilient grip. This second nipple may be further sustained in its mounting on the end of the tube by a ferrule 75 snugly fitting around the walls thereof to which ferrule may be mounted a conduit tube 76. Upon depression of the top 69, container 30 is depressed vertically over the tubular shaft 70 with relation to which it is slidably guided, the shaft 70 combining with the nipple to form a piston to provide pressure whereby the contents of the container are extruded through the puncture 5 into the tube 70^a and through the puncture of the second nipple, the second nipple serving to prevent impurities from entering the tube 70^a. Upon cessation of the pressure, the punctures of both nipples close by the resilience of the material thereof.

It will be noted that the closing of the nipple by its own inherent resilience, prevents any back suction resulting from rebound of vial contents or of the resilient closure corks, upon cessation of the expelling pressure, and when used in injection syringes, there is no drawback or suction of the contents of the needle or of blood or solution that has once been injected, nor will air be drawn into the needle during intermission between successive injections. The automatic closing of the discharge opening results in retaining the unused solution in unpoluted condition, so that it may be used in portions until the vial is entirely emptied, thus resulting in great saving of injection fluids.

The advantages of this type of vial are apparent for purposes of sterilization. It may be placed in boiling water, without blowing out the closure members, since the expansion from heat

is relieved by a very small amount of fluid being expelled from the nipple, which closes thereafter by its own resilience.

I claim:—

- 5 1. A container for syringe equipment including a tubular body having an opening at one end, a nipple of elastic material mounted at said open end and having a base portion providing a shoulder and having a tubular portion normally
10 extended beyond the shoulder, said nipple being provided with a puncture in the extended tubular portion normally closed by the resilience of the elastic material of the nipple and adapted to open responsive to pressure within the body.
- 15 2. A container for syringe equipment including a tubular body having an opening at one end, a nipple of resilient material adapted to normally close the opening of said one end portion of said tubular body, said nipple having a base portion
20 and an extended portion of less radial diameter than the base, said nipple having an axial tubular recess therein open at said base portion and having a closure wall at said extended portion, said closure wall being of lesser thickness of material than the thickness of material of the wall
25 at the said base and said extended portion having a puncture therethrough, the face walls of which are normally in contact so as to close said puncture and which are adapted to spread apart responsive to pressure within the tubular body.
- 30 3. A container for syringe equipment including a tubular body one end of which has an opening surrounded by a flange extending radially inwardly, and a nipple of elastic material adapted to normally close the opening of said end portion of said tubular body, said nipple having a base
35 adapted for seating on said flange within the tubular body, and having a portion extending through the opening and of lesser diameter than said base, said extended portion being provided with a puncture therein which is normally closed responsive to the elasticity of the nipple material, said puncture being adapted to open responsive to pressure within the tubular body.
- 40 4. In container equipment for extruding contents by pressure, a nipple of elastic material adapted for mounting at a portion of the container provided with an opening, comprising a base, an extension portion connected to the base
45 and of less diameter than the base providing a radial shoulder on the base, and providing walls of lesser thickness at the extended portion than at the base portion, said extended portion having a puncture therein which is normally closed re-

sponsive to the elasticity of the nipple material and which is adapted to open responsive to pressure within a container to which the nipple is mounted.

5. A container for syringe equipment including a tubular body having an opening at one end, a nipple of elastic material slidably mounted within said tubular body, said nipple having a base portion providing a shoulder and a tubular portion normally extended beyond the shoulder, said
80 nipple being provided with a puncture in the extended tubular portion normally closed by the resilience of the elastic material of the nipple and adapted to open responsive to pressure within the body.

6. In syringe equipment, a closure member for an open end of a container body, comprising a nipple of elastic material having a base portion providing a shoulder and having a tubular portion normally extended axially beyond the shoulder,
90 said nipple being provided with a puncture in the extended tubular portion normally closed by the resilience of the elastic material of the nipple and adapted to open responsive to pressure within the body.

7. In syringe equipment, a closure member for an open end of a container body, comprising a nipple of elastic material having a base portion adapted for engaging the wall of the container body and having a discharge end portion comprising an axial extension from the base portion for extending beyond the base portion when the base portion is in engagement with the container wall, the base portion and the extended
100 discharge portion being tubular and the extended discharge end portion having the tube therein normally closed adjacent its extrusion end.

8. In syringe equipment, a closure member for an open end of a container body, comprising a nipple of elastic material having a base portion adapted for engaging the wall of the container body and having a discharge end portion comprising an axial extension from the base portion for extending beyond the base portion when the base portion is in engagement with the container wall, the base portion and the extended discharge portion being tubular and the extended discharge end portion having the tube therein normally closed adjacent its extrusion end, the said discharge end portion including means whereby a
120 tubular injection device may be connected to said discharge end portion.

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