Jan. 8, 1935. G. N. HEIN 1,987,146

SYRINGE EQUIPMENT

Filed Jan. 20, 1931

Fig. 2.

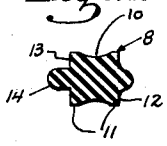


Fig. 1.

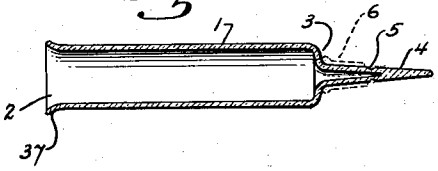


Fig. 3.

Fig. 4.

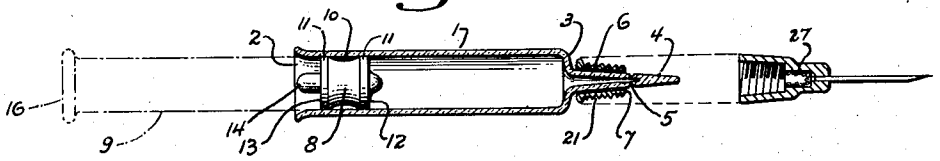


Fig. 5.

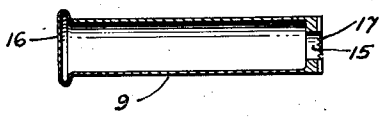


Fig. 6.

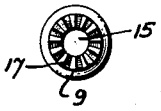


Fig. 7.

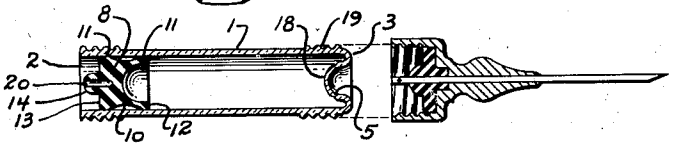


Fig. 8.

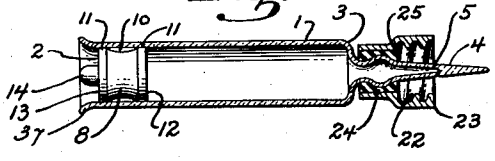


Fig. 9.

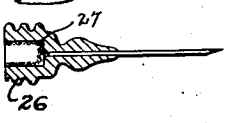
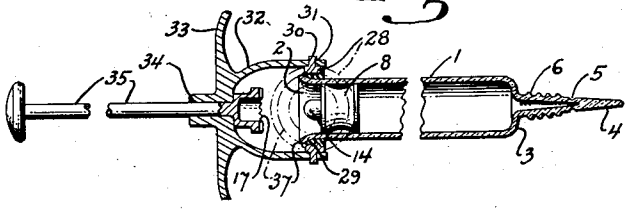


Fig. 10.



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1,987,146

SYRINGE EQUIPMENT

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2 Claims. (Cl. 128—218)

This invention relates to syringe equipment for liquids and particularly for a type of syringe wherein a container or vial for the liquid may be provided in package form so adapted that the package is utilized as the barrel of the syringe when in operative use.

Heretofore, it has been the most usually followed practice to provide a syringe having a chambered barrel portion, a piston with a piston head snugly fitting and reciprocable in the barrel and a perforated injection needle or cannula mounted at a discharge end of the syringe structure. In this type of syringe the structural parts may be termed as permanent, and it is necessary to transfer the liquid, or a pellet to be dissolved with liquid, from a separate container to the syringe barrel. This transfer exposes the liquid to the atmosphere and, in case of pellets, to actual handling, and the possibility of contamination of the injection fluid; also the syringe barrel may not be as carefully sterilized as is desirable.

The medical and dental professions particularly have for many years been endeavoring to find a type of syringe which was efficient, and sufficiently cheap in construction, so that a single injection quantity of liquid could be placed in a syringe container barrel direct by the manufacturer, and that single injection quantity used direct from the container, without measurement, and without having to transfer the liquid to an independent syringe structure, since, frequently, it is necessary to work so rapidly that an operator cannot stop in an operation to measure the liquid, nor does he care to always rely on an assistant, even assuming an assistant is available.

In the syringe art there has heretofore been used for many years a tapered tubular end of syringe barrel in the form of a tubular truncated cone, and known in the trade as a Luer tip, which is usually made integrally with a syringe barrel, whether the barrel be glass, metal, or other material. This tip has been in use for so long a time that it has become standardized and manufacturers of syringe frames and needles have frequently constructed their implements with a sleeve adapted to closely fit and form a leak-proof joint with a barrel provided with a Luer tip, which structure is known in the art as a Luer sleeve.

An object of this invention is to provide a syringe-forming outfit wherein the liquid may be placed within a container at a manufacturing plant, and put up in package form, wherein the package contains a plurality of containers each preferably holding a supply for a single injection, and the container may be used as a barrel for the syringe and discarded when emptied by its use, so as to avoid any possibility of contamination of the contents by exposure to atmosphere; to provide means whereby an injection needle may be mounted directly to such a syringe container; to provide such a syringe-forming barrel and container which has a slidable closure cork at one open end and a frangible opposite end, and to which an injection needle may be attached; to provide a slidable closure member for one end which may be used as a plunger head to expel the fluid, and which has a guide member thereon to be engaged by a plunger member; to provide a plunger member which is at one end adapted to engage said closure member and which has teeth thereon whereby the closure member may be axially rotated in the barrel; and to provide an economical, convenient, and efficient frame to support a syringe vial so that the vial may be readily removed and replaced.

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 drawing 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 drawing, wherein—

Fig. 1 is a sectioned longitudinal transverse view of container barrel.

Fig. 2 is a sectioned longitudinal transverse view of closure member.

Fig. 3 is a sectioned longitudinal transverse view of ferrule or truncated conical shell.

Fig. 4 is a sectioned longitudinal transverse view of assembly of devices of Figs. 1, 2 and 3, but with ferrule threaded to receive a needle base.

Fig. 5 is a sectioned longitudinal transverse view of a plunger having a serrated end portion.

Fig. 6 is an end view of plunger, disclosing serrated end portion.

Fig. 7 is a sectioned longitudinal view of modified form of container barrel having a frangible end internal cavity to be fractured by a needle end and having at its other end a puncturable closure cork, so that the container may also be used in inverted types of syringes.

Fig. 8 is a sectioned longitudinal transverse

view of modification of container barrel and threaded socket to receive needle.

Fig. 9 is a sectioned longitudinal transverse view of suitable needle for use in device shown in Fig. 8.

Fig. 10 is a longitudinal transverse section of a frame support for a plunger adapted for use with a container.

Referring to the drawing, in which like reference characters indicate corresponding parts in the several views, 1 represents, generally, a container body forming a syringe vial preferably of tubular cylindrical construction and of any suitable frangible material, such as glass, hard rubber or the like, having an end opening 2 formed therein and having its opposite end 3 normally closed by a frangible portion 4 preferably of lesser diameter than the cylindrical portion of the body, and preferably being a tubular cone-like structure, which is provided intermediate its length with a score line or breaking point 5. When the container is made of glass this extension is formed by blowing or drawing the glass, a procedure well known in the glass making art, but it cannot be entirely depended upon to produce mathematically precise side walls which would form a tight joint with a syringe sleeve of the aforesaid Luer type, nor is it suitably adapted to positively engage a needle so that the needle will not be blown off by pressure. I have provided a ferrule 6, of any suitable material, such as celluloid, brass, or moulded block tin, which is mounted on the extension portion 4 between the score line 5 and the end 3 of the cylindrical body, the score line preferably being located closely adjacent the outer end of the ferrule. The type of ferrule shown in Fig. 3 is of shape substantially corresponding to the so-called Luer tip, and adapts the container to use with the type of syringe frame having a Luer sleeve. The ferrule 6 may be adhered to the extension by suitable adhesive, such as shellac or sealing wax, as indicated by stippling at 7.

A suitable closure member 8 is provided for the open end 2, preferably of resilient material, such as cork or soft vulcanized rubber, and has snug slidable fit with the inner side walls of the body and cooperates with a plunger handle 9 to form a piston whereby the liquid in the container body may be expelled when the extension 4 is fractured on the score line 5. The closure member in my preferred form is provided with a circumferential side wall having a groove 10 therein, the edges of which snugly and slidably fit the inner container body wall, as at 11, and providing an inner face 12 and outer face 13. This form decreases the frictional resistance against the barrel walls and when pressed by plunger 9 against the contents of the barrel, the edges 11 are more readily expanded to make a leak-proof packing gland.

Centrally of the outer face 13 is provided a projecting extension portion 14, axial of the closure member and adapted to be engaged in an open end 15 of the plunger 9. The plunger 9 may, if desired, be a solid body with a recess to receive the closure portion 14, but is preferably hollow and closed at one end 16, and open, as at 15, at the other end, said end 15 being provided with teeth or serrated face 17 for the purpose of gripping the closure member 8, so that it may be axially rotated, the latter feature being to break any seal which may be intentionally formed, as by a wax wash to insure the contents of the container against contamination or evaporation, or unintentionally formed by adhesion of the closure member to the container walls, which if broken by direct pressure would cause a sudden expulsion of the liquid and possible loss of a portion thereof in an experimental pressure of the plunger to expel air from the injection needle and fill the cannula to its incision-point with the liquid to be injected.

In Fig. 7 is shown a tapered inwardly extending portion 18 formed integrally with the frangible end of the container. The advantage of this form (Fig. 7) is that the container is adaptable for use with syringes of several types. If it is desired to use a plunger of the type of Fig. 5, a needle, as shown in Fig. 7, is mounted to the frangible end by means of threads 19 with an end of the needle adapted to fracture the inward extension on the score line 5. If the container of Fig. 7 is desired to be used with an inverted type of syringe, the end 3 is not fractured, but the opposite end 2 of the container is fitted over a tubular piston having a needle to puncture the closure 8 through a recess 20 and upon pressure of the container the closure cork 8 serves as a piston head to expel the container contents through the tubular barrel.

In some instances, the injection needle will be blown from a Luer tip under the pressure injection and this is highly undesirable in the course of the injection. In Fig. 4 and Fig. 8 are shown means to positively hold the injection needle in engagement at the discharge end of the container, comprising in Fig. 4 an external threading of the ferrule 6, as at 21, and in Fig. 8 an internal threading, as at 22, of a socket 23 which is provided with a collar 24 cemented to the extension point 4 by suitable adhesive cement. The socket 23 may have provided at the base of its recess a gasket or gland 25 whereby a tight leak-proof joint is provided for the base 26 of an injection needle.

If desired, a needle having a strainer 27 intermediate the fracturable portion of the container and the cannula of the needle may be used to eliminate any possibility of fine fragments of the fractured container being carried into the injection stream. This syringe equipment may also be adapted to a suitable type of holding frame either with or without finger grip bars, one preferred embodiment being illustrated in Fig. 10, wherein an annular ring 28 preferably having a bevelled internal surface 29, is provided with oppositely disposed trunnions 30 mounted in openings 31 of arms of a yoke 32, which may have mounted thereon and extending radially therefrom finger grip bars 33. Concentric with the longitudinal axis of the yoke at its upper end is an opening 34 through which is slidably disposed a plunger 35, provided with a recessed head 36 adapted to engage the projection 14' of closure cork 8 in piston forming relation. This plunger head may also be provided with teeth of similar type and for similar purpose, as teeth 17 of Fig. 5.

To place a container in or remove a container from the holder, the bevelled ring 28 is pivoted on trunnions 30, so that the radial axis of the ring is substantially perpendicular to the axis of the yoke, as shown in dotted lines in Fig. 10, whereupon the container may be inserted or removed, free of obstruction, by the yoke or plunger head. When a container is within the annular ring, the bead or outward flare 37 seats upon the internal bevel of the annular ring. The purpose of this structure is that when the plunger is not inserted in the vial which is supported at its

plunger-receiving end, the gravitational force will tip the vial and its ring holder to a position where the radial axis of the ring and the vial are substantially perpendicular to the axis of opening 34 and plunger 35, so that a vial may be removed or a new one inserted, or the vial refilled, without the yoke or plunger interfering with such operations. The arms of the yoke 32 are therefore sufficiently long so that as the vial and ring swing on the pivotal axis of the ring the radius of the ring will not permit interference or contact with the retracted plunger head or yoke arms, and yet the arms are sufficiently short so that the plunger-receiving end of the vial will be in close proximity to the lower plunger end so that the plunger may readily enter and align the vial when the syringe is positioned vertically and the axis of ring and vial swing on the pivots into substantial axial alignment with the axis of opening 34 and plunger 35.

I claim:—

1. Syringe equipment for mounting tubular syringe vials which have one end outwardly flared and adapted to receive internally therein a plunger, comprising a member adapted to externally engage the outwardly flared portion of the vial and thereby support the body of the vial adjacent said plunger-receiving end said member being free of means to engage the vial at the discharge end and limit the length of a vial which may be supported in said member, a plunger support member pivotally mounted to said vial supporting member and having an opening at its radially central portion and a plunger member slidably mounted in said opening of the plunger support member, the pivotal axis of the vial supporting member being angular to the longitudinal axis of the plunger, and the distance from the central opening of the plunger support member to the pivotal axis of the vial support member being greater than the radius of the opening of the vial supporting member and sufficiently short so that when a vial is placed in said vial support member with the plunger-receiving end held by said member, the vial may swing on the pivotal axis of the vial support member and hold the plunger-receiving end of the vial closely adjacent the end of the plunger with the radial axis of the vial supporting member angular to the axis of the plunger.

2. Syringe equipment including the combination of a tubular syringe vial which has one end adapted to receive internally therein a plunger and which has an outwardly flared bead at said end, a ring member having an opening through which the vial body may be inserted, said ring member being adapted for externally engaging and thereby supporting the body of the vial adjacent said outwardly flared plunger-receiving end, a yoke pivotally mounted to said ring member, said yoke having an opening at its radially central portion, and a plunger member slidably mounted in the opening of said yoke, the pivotal axis of the ring being angular to the longitudinal axis of the plunger, and the arms of said yoke being of such length that the distance from the pivotal axis of the ring to the central opening of the yoke is greater than the radius of the opening of the ring, and said arms being sufficiently short so that when a vial is placed in said ring member with the plunger-receiving end held by said ring member, the ring may swing on its pivotal axis and hold the plunger-receiving end of the vial closely adjacent to the end of the plunger with the radial axis of the ring angular to the axis of the plunger.

GEORGE N. HEIN.