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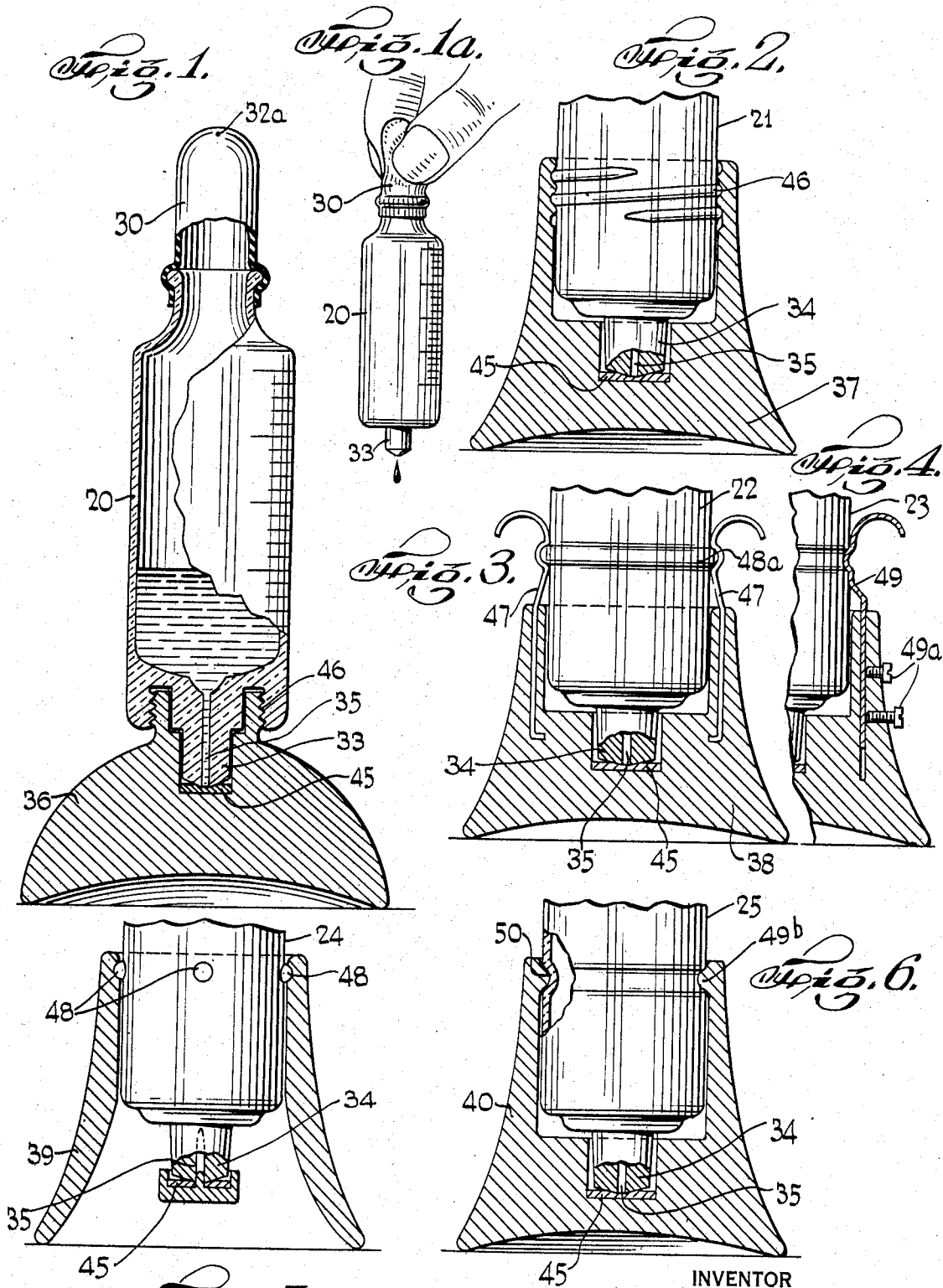
J. H. SCHLESINGER

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LIQUID DISPENSER

Filed May 18, 1940

2 Sheets-Sheet 1



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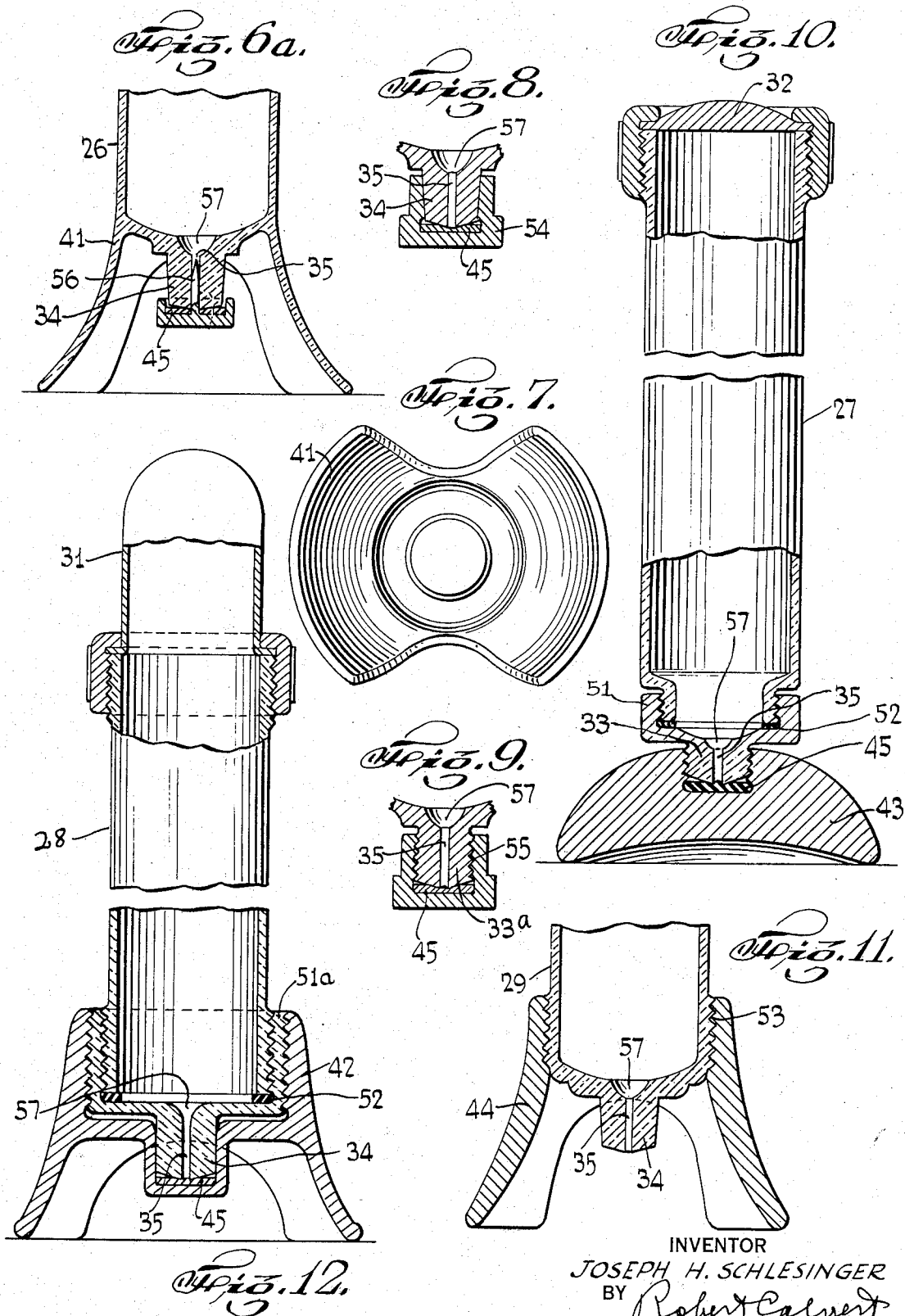
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2,363,474

LIQUID DISPENSER

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Application May 18, 1940, Serial No. 335,888

6 Claims. (Cl. 221-148)

This invention relates to a storage container and dispenser for liquids and particularly to a dispenser adapted to avoid contact of the liquid within the container with oxygen or humidity of the atmosphere or with any closing element for the container.

Certain subject matter disclosed but not claimed herein is claimed in my co-pending application Ser. No. 554,053, filed September 14, 1944, and entitled "Liquid dispenser."

It is usual in medical and dental practices to dispense controllable quantities of liquid by means of a device including a stopper member and a liquid withdrawal element. Thus, there is used a common medicine dropper including a bulbous cap and a small tube engaged at one end by the cap. In another form of the device, a small glass rod is inserted at one end into the stopper for the container so that, when the stopper and attached container are withdrawn, a drop of liquid may be taken from the exposed end of the rod.

In dentistry, for example, it is customary to add phosphoric acid dropwise from a container to delicately colored powders for porcelain fillings. These powders are very sensitive to contamination by colored impurities. Also their setting time is greatly affected by the proportion of water in the acid or the like that are to be made into paste form before use. The phosphoric acid is ordinarily removed from the container by means of a medicine dropper associated with the closing member for the mouth of the container. The phosphoric acid, in spite of care, occasionally contacts the rubber. Also, when the dropper is removed for delivery of the desired number of drops of the phosphoric acid, air enters the bottle. The remaining acid gradually becomes contaminated; a sediment settles to the bottom of the phosphoric acid in the container. Furthermore, air strikes the phosphoric acid which wets the outside of the tube of the dropper. As a result, there is objectionable dilution of the phosphoric acid by moisture absorbed from the air.

Because of these difficulties it is common practice for the phosphoric acid in the container to become so contaminated that a considerable portion of the total originally purchased must be discarded. In other cases, the changing concentration of the phosphoric acid or the increasing contamination by impurities leads to discoloration or other disadvantage in the said cement.

While the dispenser of the present invention is adapted particularly for the delivery of phosphoric acid, the dispenser is adapted also for de-

livery of small, approximately controllable quantities of other liquids or chemical reagents.

Briefly stated, the dispenser of the present invention comprises a container that is preferably cylindrical, a resilient diaphragm closing the charging mouth of the container, a delivery nipple provided with an outlet orifice at the end of the container which becomes the lower end when the container is in operating position, a base supporting the container in generally upright position, and means closing the outlet orifice at times other than those at which the liquid is to be delivered from the orifice. Particularly satisfactory results have been obtained when the base is secured to the container at a position substantially above the delivery end thereof, as will be described later.

The invention is illustrated in the attached drawings to which reference is made.

Figs. 1, 10, and 12 are elevational views partly in section of dispensing devices constructed in accordance with the invention.

Fig. 1a is an elevation of a dispenser in the operating position.

Figs. 2, 3, 4, 5, 6, 6a, 8, 9, and 11 are vertical sectional views of parts of modified forms of the dispenser which may be substituted for corresponding parts of the devices shown in complete assembly in Figs. 1, 1a, 10, and 12.

Fig. 7 is a bottom plan view of the stand of Fig. 6a.

In the various figures like reference characters denote like parts.

There are shown rigid containers such as glass vessels represented by reference characters 20—28. The containers suitably are graduated; the graduation where not shown may be similar to that of Figs. 1 and 1a. Ordinarily the containers are rigid, generally cylindrical, and of the style of tall, narrow bottles provided at one end with a charging mouth and at the other end having a discharge nipple provided with outlet orifices. Various styles and sizes and shapes of container may be used, however.

The charging mouths are closed by resilient diaphragm members 30, 31 or 32. These diaphragm members may be bulbous or they may be generally or nearly flat as in the case of diaphragm 32. Means of suitable type secure these diaphragms as at their edge portions in approximately air-tight relationship around the charging mouth of the container. When subjected to pressure the diaphragms increase the pressure within the container to a pressure at least slightly above the prevailing atmosphere pressure.

In the form shown in Fig. 1, the diaphragm is provided with a minute hole 32a, placing the interior of the container in communication with the outside air and adapted to permit the pressure within the container to become equalized with slowly changing outside pressure. In this way, the gradual building up of pressure or partial vacuum within the container with changing barometric pressure, is prevented. There is thus avoided the tendency to force liquid prematurely from the container and breathing of air into and out of the container, with changing outside pressure.

The diaphragm may be composed of any suitable resilient material, such as rubber or neoprene.

The delivery nipple may be of the type indicated at 33, 33a, and 34.

In some cases the nipple is provided with screw threads on its approximately vertically extending exterior, the term "threads" being used herein to include lugs or discontinuous threads, here or wherever used on any part of the device. Nipple 34 is smooth on the outside and tapered slightly so as to adapt it to a friction fit with a cap to be described. Orifice 35 extends through the delivery nipples, suitably approximately centrally and generally lengthwise of the nipple. The orifice may be of capillary fineness or may be larger, the size of opening being generally larger when the dispenser is to be used with viscous liquids.

A special feature of the invention is the supporting stands or bases 36-44. Except as noted elsewhere, the stands are suitably rigid. They may be constructed of glass, molded plastics, metal, or the like. The stands are substantially wider than the narrowest width of the containers measured from side to side or at least as wide as the smallest diameter of the container. Means are provided for securing the base to the body of the container, in some cases detachably and in some cases permanently. Thus base 41 (Fig. 6a) is an integral part of the container. Base 44 (Fig. 11) may, if desired, be permanently secured to the container, as by means of a cementing medium (not shown).

Base 36, for instance, is provided with a recess and gasket 45 resting upon the floor of the recess in the base. The approximately vertical wall of the recess is threaded and adapted to engage the threads on the wall portion 46 created in the bottom of the container. When the base is screwed home, the gasket is forced against the base of the delivery nipple and closes the outlet orifice 35. When there is used a base screwed to the nipple or other part of the container, or clipped thereto, then the dispenser may be disengaged from the base. It is then in operating position, as shown in Fig. 1a, finger pressure being applied to the bulbous diaphragm to cause one or more drops of liquid to be dispensed through the outlet orifice. When the liquid desired has been delivered, then the pressure on the bulb is released and the nipple 33 is restored to its tight engagement with the base and against the gasket 45.

Particularly satisfactory results with tall forms of containers are obtained when the base is secured to the container at a position substantially above the lower or delivery end thereof. This feature is illustrated by a number of assemblies, Figs. 2, 3, 4, 5 and 6. On the other hand, of short form the containers may have the base secured satisfactorily to the lower exterior end of the

container as in Figs. 1, 10, 11, and 12. In Fig. 2, the base 37 has an upstanding flange provided with threads which engage a threaded portion 46 of the container at a position remote from the lower end of the container, say at a position about a fourth of the distance from the bottom to the top thereof.

The base 39 of Fig. 5 is hollowed out at the bottom. Near the top it carries an annular groove. The container 24 of this assembly is provided with teats 48 which are disposed at spaced positions on the wall of the container and adapted to be engaged in the said groove.

The base 38 (Fig. 3) is secured to upstanding grooved spring elements 47, as by the lower end of the said elements being embedded in a plastic composition at the time the composition is molded into the shape of base 38. The container 22 is provided with a circumferential bead 48a which is engaged in the groove of the spring elements 47.

In the modification shown in Fig. 4 for one side only of the assembly, an arrangement similar to that of Fig. 3 is used, except that the bead 48a is replaced by a groove and the spring clips 49 have a bead which engages the said groove. Furthermore, the springs are adjustable as to position, by means of the set screws 49a arranged as shown. Also, the springs are readily replaceable.

In the form shown in Fig. 6, the base 40 is itself resiliently yieldable. Such a base may be constructed of moderately hard rubber, neoprene, or other suitable material. The base includes an upstanding flange provided with an inwardly extending bead 49b. The container in this modification carries a groove 50 adapted to register with and be engaged by the bead 49b of the base.

The base 41 of Fig. 6a is continuous with and suitably integral with the container 26 and is cut out at the bottom as shown in the plan view of Fig. 7. The cut-out provides finger holes through which the operator may obtain access to the delivery nipple of the container and view the discharge when the dispenser is being used to deliver drops.

In the form shown in Fig. 10, the base 43 is screwed to the delivery nipple 33, which, in turn, is part of a cap member 51 screwed to the outside of the lower end of the container. The cap serves as the bottom of container 27. Gasket 52 is disposed between the open-end of the container and cap 51. The threads on the nipple and sides of the container may be reversed, one being right and one being left.

Fig. 12 shows in general an assembly similar to that at the lower part of Fig. 10, except that the parts are somewhat differently shaped and the nipple, which is integral with the cap 51a, fits within a recess in the stand 42 where the gasket 45 is provided in the floor of the recess in the stand. The stand 42, in turn is screwed to the threaded outer portion of the cap 51a which is provided with threads to receive the corresponding thread of the stand 42.

Stand 44 (Fig. 11) is hollowed out at the bottom and cut out on the sides. It engages a threaded lower portion of the container, as illustrated at 53.

The gaskets 45, wherever used, are held against the end of the discharge nipple as by pressure of the base or of a special cap member. The gaskets are composed of resiliently yieldable materials that, in the small area exposed to liquid at the end of the orifice, is without substantial contaminating effect upon the liquid in the con-

tainer. The gaskets may be composed, for example, of cork, rubber sheeting, or the like.

Cap members that may be placed over the discharge nipples are illustrated in detail in Figs. 8 and 9. Such caps may be used over the nipple of any of the dispensers, the form of nipple in any figure being subject to change from threaded to plain exterior or vice versa to accommodate the selected form of cap.

The cap member 54 of Fig. 8 fits by friction against the smooth exterior of the discharge nipple 34. A gasket 45 resting in the bottom of the cap is held against the orifice. This cap is intended for use with all the containers having nipples of smooth exterior.

In the screw-type cap of Fig. 9, the cap engages the threaded exterior of the discharge nipple, as shown at 55, the gasket 45 being disposed as previously described. This cap is intended for use with the nipples having a threaded exterior.

Another form of cap that may be used is that shown in Fig. 6a. Here the cap contains a pin or needle-like element 56 of material that is corrosion resistant and insoluble under the conditions of use. The element extends upwardly from the bottom of the cap and fits into the orifice. The fit is friction-tight.

The delivery ends of the containers are suitably provided with a funnel-like recess 57 opening upwardly, as shown particularly in Figs. 8 and 9 and communicating with the discharge orifice 35.

Articles made as described, particularly when the base engages the container at a position substantially above the lower end thereof, are resistant to breakage when a lateral displacing force is applied to the container, are relatively inexpensive to manufacture, and are convenient to use. They permit delivery of liquid dropwise from the container without exposure of the liquid within the container to outside air, moisture, or to any such material as rubber or cork ordinarily used for stoppers on containers, over any appreciable area of contact.

Any trace of contamination introduced at the very limited zone of contact with the gasket affects only the liquid at the outer end of the orifice, the portion of the liquid first removed when liquid is expelled from the orifice. Also, the tapering of the nipple towards the orifice makes easy the wiping of the point of the nipple, with a clean cloth or the like before drops are delivered from the nipple.

This application is a continuation in part of my application Serial No. 259,275 for One-way droplet dispenser, filed March 1, 1939.

It will be understood that the details given are for the purpose of illustration, not restriction, and that variations of shape and/or size of the containers and bases and other variations within the spirit of the invention are intended to be included within the scope of the appended claims.

What I claim is:

1. A dispenser for liquids comprising a rigid container including a body, a charging mouth, and a delivery end provided with an orifice opening downwardly, a resilient diaphragm closing the said mouth and adapted when pressed to create within the container a pressure above atmospheric, a supporting stand for the said container, means attaching the stand directly and positively to the said body of the container at a position spaced from the said delivery end and a gasket disposed below the orifice and pressed against the delivery end by the said base so as to close the orifice.

2. A dispenser as described in claim 1, the said attachment means including a threaded portion of the wall of the container and a threaded upper portion of the said base engaging the threaded portion of the container.

3. A dispenser as described in claim 1, the said delivery end being a nipple and the said orifice extending lengthwise within and through the nipple, the said base having a recess adapted to receive the said nipple, a gasket being disposed between the base of the said recess and the outer end of the said nipple, and the attachment means pressing and holding the gasket firmly against the outer end of the nipple, so that the gasket closes the orifice.

4. A dispenser of the kind described in claim 1, the said delivery end having an inside wall provided with a funnel-like recess opening upwardly and communicating at the lower part of the recess with the said orifice.

5. A dispenser for liquids comprising a rigid container including a body having a charging mouth and a delivery end provided with an orifice, a resilient diaphragm closing the said mouth and adapted when pressed to create within the container a pressure above atmospheric, a supporting stand for the said container, means attaching the stand to the body of the container so as to avoid slipping of the container towards or away from the stand, and means associated with the stand for closing the orifice, the body of the container being provided with an annular recess opening outwardly and the stand having an upwardly extending annular flange registering with and being engaged in the said recess.

6. A dispenser for liquids comprising a rigid container including a body, a charging mouth and a delivery end provided with an orifice opening downwardly, means for closing the said mouth and for creating within the container a pressure above atmospheric, a supporting stand for the said container, and means removably attaching the stand directly and positively to the said body of the container at a position spaced from the said delivery end, the stand carrying a closing surface for the orifice and the means for attaching the stand to the said body causing the closing surface to close the orifice when the stand is attached to the body.

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