Dec. 4, 1962 H. E. R. KINGSBURY 3,066,834

DISPENSERS FOR LIQUIDS OR POWDERS

Filed Feb. 24, 1960



Fig. 1.



Fig. 6.

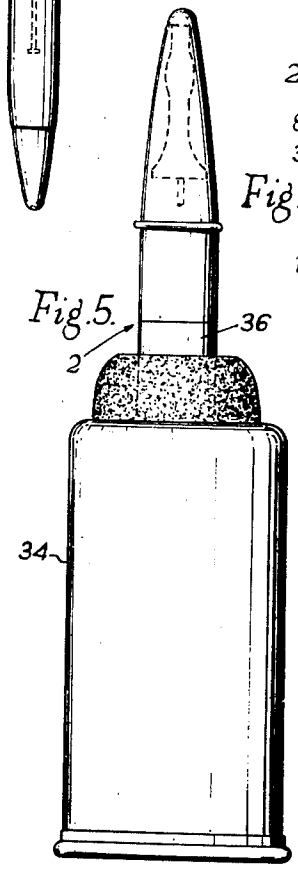


Fig. 5.

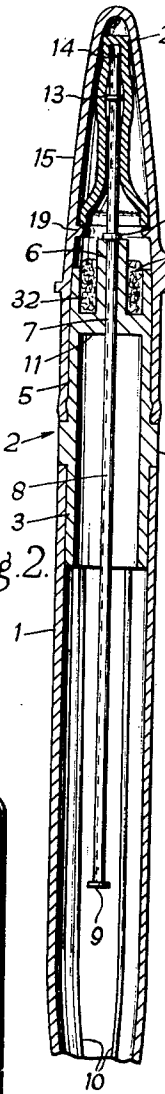


Fig. 2.

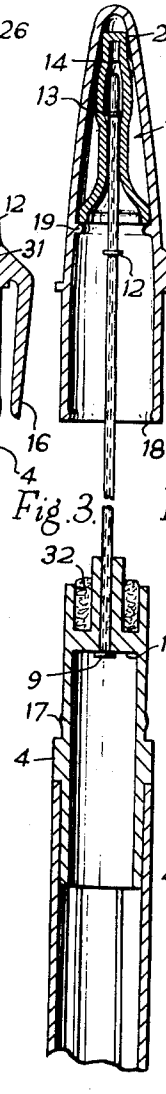


Fig. 3.

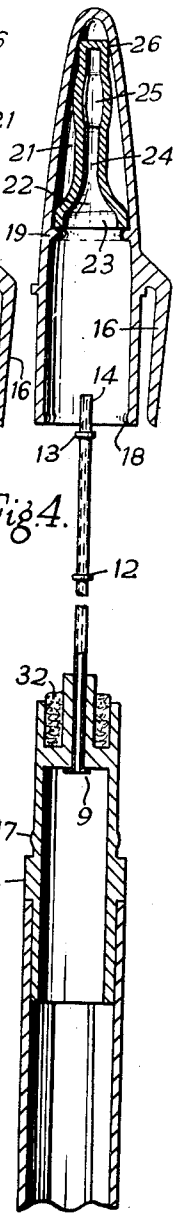


Fig. 4.

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DISPENSERS FOR LIQUIDS OR POWDERS

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The present invention relates to dispensers for liquids and powders and particularly but not exclusively oils.

An object of this invention is to provide an improved dispenser which is readily adjustable between a compact closed condition in which escape of its contents is effectively prevented and an operative condition in which it is adapted for the convenient depositing of small quantities of its liquid contents in places which are not readily accessible.

According to one aspect of this invention there is provided a dispenser serving, when used in combination with a resiliently distortable container having an orifice, for dispensing liquids or powders, comprising a body formed so that, in use, part of it serves as a closure for the orifice and part constitutes a neck extending outwards from the orifice and having a bore extending through it from an inner surface of the closure part to an outer surface of the neck part; a delivery tube arranged for sealed sliding movement in the bore between a fully withdrawn position, in which only a relatively short part of its length projects externally from the neck part and a fully extended position in which a relatively long part of its length so projects; and a cap removably fitted over the neck part or adapted to fit over a part of the container surrounding the orifice and provided internally with holding means arranged for releasably engaging the projecting part of the delivery tube; the arrangement being such that the delivery tube in the fully withdrawn position is releasably engaged by the holding means in the cap when the cap is fully engaged over the said part of the container and such that the cap, on being removed and pulled out a given distance away from the neck will draw out the delivery tube through the bore from the fully withdrawn position into the fully extended position before the holding means become disengaged from the delivery tube.

According to another aspect of this invention there is provided a dispenser for liquids or powders comprising: a resiliently distortable container having a bore extending from the inside to the outside of the container through a neck part; a delivery tube arranged for sealed sliding movement in the bore between a fully withdrawn position in which only a relatively short part of its length projects externally from the neck part and a fully extended position in which a relatively long part of its length so projects; and a cap removably fitted over the neck part or over a part of the container surrounding the bore and provided internally with holding means for releasably engaging the projecting part of the delivery tube; the arrangement being such that the delivery tube in the fully withdrawn position is releasably engaged by the holding means in the cap when the cap is fully engaged over the neck part or over the said part of the container and such that the cap on being removed and pulled out a given distance away from the neck part will draw out the delivery tube through the bore from the fully withdrawn position into the fully extended position before the holding means become disengaged from the delivery tube.

The expressions "fully withdrawn position" and "fully extended position" are used here to mean positions in which the small bore tube is prevented by engagement

with positive stops, abutments or the like from further movement into the container and out of the container respectively; the expression "sealed sliding movement" is used in relation to the fitting of the tube in the bore to mean that the sliding fit is sufficiently close to locate and guide the delivery tube while provision is made to prevent leakage of any appreciable quantity of the contents of the container between the outside of the tube and the wall of the bore, and the expressions "an inner surface of the closure part" and "an outer surface of the neck part" are used here to mean surfaces of the said body which when the body is fitted to the container form respectively an inner surface of the space in which the contents of the container are held and an external surface of the assembled container and body.

The invention will now be described by way of example with reference to the accompanying drawings in which:

FIGURE 1 is a side view of a dispenser for liquids according to the invention,

FIGURES 2, 3 and 4 are sectional views on an enlarged scale of the upper part of the dispenser shown in FIGURE 1 in three different stages of preparation for use,

FIGURE 5 is a side view of an alternative form of dispenser for liquids, and

FIGURE 6 is a sectional view showing the end part of a delivery tube.

In the embodiment shown in FIGURES 1–4, the dispenser, which is generally similar in appearance to a fountain pen, has a thin-walled nylon container **1** in the form of an elongated thimble with longitudinal internal reinforcing ribs **10**.

Secured in the mouth of this container is a spigot portion **3** of a polythene body **2** acting as a plug. Adjoining this spigot portion and integral with it is an enlarged diameter portion **4** the outer surface of which is flush with the outer surface of the container **1**. Adjoining the enlarged diameter portion on the side remote from the spigot portion **3** is a smaller diameter hollow cylindrical neck **5** carrying a nozzle-shaped extension **6**, both these portions also being integral with the previously-mentioned portions of the polythene body **2**. The body **2** may be made removable from the container **1** in order to enable the container to be refilled. A central longitudinal bore **7** extends through the nozzle-shaped extension **6** and in this bore is arranged, with sliding fit, a small bore nylon delivery tube **8**.

Provision is made to prevent escape for the contents of the container **1** from the dispenser between the wall of the bore **7** and the outside of the delivery tube **8**. Where the delivery tube **8** has an accurately uniform external diameter, it may be sufficient to arrange the delivery tube to be a close sliding fit in the bore or in parts of the bore in the form of internal annular ribs. Where however the delivery tube **8** is made from extruded nylon or other tubing the external shape and dimensions of which are not perfectly uniform along its length, auxiliary seals may be provided in, or at one end of, the bore, which are sufficiently resilient to accommodate variations in the external shape and dimensions of the delivery tube.

The end of the delivery tube **8** inside the container **1** is enlarged at **9** to form an annular rib which is adapted to abut against an inner surface **11** of the closure part of the body **2** thereby preventing further outward movement of the delivery tube **8** from the dispenser and improving the sealing between the delivery tube **8** and the bore **7** of the neck **5** when the delivery tube is fully extended.

A second external annular rib **12** is formed on the part of the delivery tube **8** outside the container **1** and limits the inward movement of the delivery tube **8** into the container **1**. The delivery tube **8** extends outwardly beyond the rib **12** and carries a third external annular rib **13** near

its open end 14. A nylon or high density polythene cap 15 is removably fitted over the neck 5 of the body 2. The cap 15 is formed integrally with a clip 16 which enables the dispenser to be carried in a pocket in the manner of a fountain pen when not required for use. Positive engagement of the cap 15 with the neck 5 is ensured by an annular bulge 17 near the enlarged portion 4 of the body 2 and an inturned annular lip 18 formed in the mouth 20 of the cap 18 and arranged to engage resiliently that part of the body 2 between the bulge 17 and the enlarged diameter portion 4 when the cap 15 is pushed fully home onto the neck 5.

Located in the inner end of the cap 15 by an internal annular rib 19 integral with the cap 15 in an insert 21 of polythene. The insert 21 is formed by an axially extending cavity 22 having a flared mouth 23, a restricted passage 24, an enlarged portion 25 adapted to engage snugly the third annular rib 13, without extensive deformation, and a closed end 26. The dimensions of the interior of the cap 15 and of the insert 21 are such that, when the cap is pushed fully home over the neck 5 into the position shown in FIGURE 2 the interior of the cap 15 freely accommodates the nozzle-shaped extension 6 of the plug 2 while the enlarged portion 25 of the insert 22 snugly engages the rib 13 of the delivery tube 8 and together with the closed end 26 of the insert 22 seals off the delivery tube 8.

A washer 31 of foamed synthetic plastic material such as polyurethane is located in an annular groove 32 in the top of the neck 5 and serves both to absorb any liquid which may leak out between the delivery tube 8 and its bore 7 and to act as an impregnated wiper for applying the liquid, for example, on to small articles such as screws or electronic valve pins. The sponge washer 31 is totally enclosed within the dispenser when the cap 15 is pushed fully home on the neck 5.

The external diameter of the portion of the cap 15 near its mouth is the same as that of the enlarged diameter part 4 of the polythene plug 2.

If the cap 15 is now removed and pulled axially away from the body 2, it will pull out the delivery tube 8 with it until the latter is brought to rest in a fully extended position by its inner enlarged diameter rib 9 engaging the inner surface 11 of the body 2 as shown in FIGURE 3. On further pulling out of the cap 15, the rib 13 will be forced through the restricted passage 24 in the insert 22, and sliding movement will take place between the cavity in the cap and the enlarged diameter outer end of the delivery tube 8 until the cap 15 is completely disengaged from the delivery tube 8. The dispenser can now be used to deposit small quantities of its liquid contents in places which would not otherwise be readily accessible. The extended projecting end 14 of the delivery tube can be inserted through narrow gaps and its flexibility enables it to be bent around small obstructing parts. The delivery tube being made of nylon can take a temporary set on being bent to a required shape and, since nylon is a good insulator, may safely be used for lubricating live electrical apparatus. The liquid is discharged from the outer end of the small bore tube by squeezing the walls of the container 1. After use, the cap 15 may be placed over the projecting end 14 of the delivery tube and pushed axially inward towards the body 2 until its mouth 20 begins to engage over the neck 5 of the body 2. The delivery tube is now brought to rest in its fully withdrawn position by engagement of the second rib 12 with the outer end surface of the extension 6, after which continued movement of the cap 15 towards the body 2 causes the rib 13 near the end 14 of the delivery tube 8 to be forced through the restricted passage 24 once again into engagement in the enlarged portion 25 of the insert 21.

The cavity 22 may alternatively be in the form of a substantially cylindrical bore of diameter smaller than that of the enlargement on the projecting part of the delivery tube. The cavity wall is then made sufficiently resilient to deform to the shape shown in FIGURE 2 when the end 14 of the delivery tube is forced into it and thereby to grip the end portion of the delivery tube resiliently.

In another embodiment of the invention, the cavity is again cylindrical or slightly tapered inwards towards its closed end but the cavity wall is more rigid. The projecting end of the small bore tube then includes a portion made of resiliently deformable material. This portion may, for example, have the form of a ring located between two ribs formed on the projecting part of the delivery tube.

The external diameter of this resiliently deformable portion is normally greater than the diameter of the cooperating part of the cavity wall so that the latter again grips the end portion of the delivery tube when the latter is forced into it and also seals off the duct in the delivery tube.

The embodiment illustrated in FIGURE 5 differs from the previously described embodiment in that the body portion 1 is replaced by a wider nylon bottle shaped container 34 having a flat tin plate base 35 spun with or without cement or flexible sealing material onto its lower end to close the lower end of the bottle 34 and to provide an annular flange suitable for supporting the dispenser in an upright position on a flat surface when not in use. The pocket clip 16 on the cap of the pen-shaped dispenser may be omitted in this embodiment.

The body 2 may again be made removable from the bottle 34, for example by adapting the body 2 to screw into the mouth 36 of the bottle 34 or by arranging the spigot 3 to be a tight push fit in the mouth 36 of the bottle 34, which could then be provided with an internal annular rib to engage elastically with an annular groove in the spigot.

FIGURE 6 shows an alternative construction of the external end of the delivery tube 8 for use in either of the previously described embodiments. In this construction the third annular rib 13 on the delivery tube is formed at 13A on the end 14 of the delivery tube 8. When used with liquids this form of tube end tends to deposit somewhat larger drops than does the previously described form. Otherwise the operation of the apparatus is identical.

In a further embodiment of the invention (not illustrated) the interior of the cap is formed with a tapered hollow part which freely accommodates the nozzle-shaped part of the polythene plug and beyond this tapered hollow part there is provided a smaller tapered bore into which the enlarged diameter outer end of the delivery tube is forced when the cap is fitted. The dimensions of this tapered bore are such in relation to the diameter of the enlarged diameter outer end of the tube that the latter becomes tightly engaged with the cap when the cap is pushed over the reduced diameter part of the polythene plug as far as it will go.

In alternative forms (not illustrated) of the previously described embodiments the part of the delivery tube within the container is guided in a central tubular guide having a seating forming part of a closed end at the extremity thereof corresponding to the closed end of the container body, which seating limits the inward travel of the delivery tube in the withdrawn position. For the greater part of its length this tubular guide has an internal diameter only just sufficient to allow for sliding movement of the delivery tube. At the end nearest the body, however, its wall is tapered outwardly and formed with apertures. Thus, when the delivery tube is in its fully withdrawn position, it is sealed off by the tubular guide from the contents of the dispenser. When, however, it is in its fully extended position the liquid contents of the dispenser can flow through the apertures in the outwardly tapered part of the tubular guide and enter the inner end of the delivery tube.

I claim:

1. A drop-by-drop liquid dispenser comprising a flexible walled container having a mouth, a closure member for said mouth having a bore therethrough, a small bore

delivery tube closely fitted in said bore for sliding movement therein and formed with abutment surfaces adapted to engage said closure member to limit the sliding movement of said tube therethrough between a retracted position in which a relatively short length of said tube projects outwardly from said closure member and an extended position in which a relatively long length so projects, and a cap releasably engaged on said closure member and provided internally with a cavity for accommodating said relatively short tube length, said cavity having a flared entrance at one end and a closed base at the other end, the flared entrance defining a restricted passage and opening to a zone having wall surfaces for releasably gripping said relatively short tube length to an extent such that, on removal of the cap, said short tube length will remain connected therewith until it reaches the extended position, whereupon continued movement of the cap will result in the release therefrom of the short tube length.

2. A dispenser for fluent material comprising a resilient container for said material having an opening therein, a closure member in said opening having a bore therethrough, a delivery tube having a portion of constant cross-section slidable and close fitting in said bore and an outlet portion, a first enlargement at the free end of said constant cross-section portion to limit outward movement thereof in said bore, a second enlargement at the junction of said constant cross-section portion and said outlet portion to limit inward movement of said tube in said bore and a cap releasably engaged on said closure member and provided internally with gripping surfaces for releasably gripping said outlet portion sufficiently to move said tube, on axial removal of said cap from said closure member, in said bore until said first enlargement contacts said closure member before releasing said outlet portion.

3. A drop-by-drop liquid dispenser comprising a flexible-walled container having an opening therein, a closure member secured in said opening and having a bore therethrough, a small bore delivery tube having a portion of constant cross-section slidable and close fitting in said bore and an outlet portion adjoining said portion of constant cross-section, a first enlargement at the free end of said portion of constant cross-section to limit outward movement of said tube in said bore, a second enlargement at the junction of said portion of constant cross-section and said outlet portion, to limit inward movement of said tube in said bore and a cap releasably engaged on said closure member and provided internally with resiliently deformable walls for gripping said outlet portion, said resiliently deformable walls defining a cavity extending inwardly into the cap from a flared mouth inside the cap through a region having a cross-section greater than that of said outlet portion to include a region having a normal cross-section less than that of said outlet portion.

4. A drop-by-drop liquid dispenser comprising a resilient-walled container having an orifice, a closure member having a spigot portion secured in said orifice, a neck portion outside said container and a bore through said spigot and neck portions, a close fitting small bore tube

slidably located in said bore, a first annular rib on said tube at the end thereof inside said container, a second annular rib on said tube adjacent the end of said tube outside said container, a third annular rib on said tube intermediate said first and second ribs and outside said container, and a cap having a skirt releasably engaged on said closure member neck portion and an end portion provided internally with resiliently deformable walls defining a cavity and adapted to grip said second annular rib sufficiently firmly to draw out said tube in said bore on removal of said cap until said first rib contacts said spigot before said second rib is released by said cavity walls.

5. A pen-type drop-by-drop liquid dispenser comprising a resilient-walled elongated container having an opening at one end thereof, a closure member having a hollow spigot portion secured in said opening and a cylindrical neck portion extending outside said container and having a bore therethrough, an annular shoulder on said neck portion, an annular ridge on said neck portion and spaced from said shoulder, a small-bore delivery tube having a sliding portion slidable and close-fitting in said bore and an outlet portion adjoining said sliding portion, a first annular enlargement at the junction of said tube portions outside said bore, a second annular enlargement on the end of said tube inside the container, a hollow removable cap of resilient material having a cylindrical skirt engaged on said neck and abutting said shoulder, an inturned lip at the open end of said skirt being snapped over said ridge between said ridge and said shoulder and an insert of resilient material secured in the interior of said cap and formed with a closed ended cavity in which said outlet nozzle is releasably engaged, said cavity extending from a flared mouth directed towards the open end of said cap through successively first a region having a cross-section less than that of the outlet nozzle part therein engaged and a second region having a cross-section greater than that of said outlet nozzle part engaged in said first region.

6. A pen-type drop-by-drop liquid dispenser according to claim 5, in which a third annular enlargement is formed on said outlet nozzle and is releasably engaged in said second region.

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