Sept. 19, 1939. A. M. PLATTRING ET AL 2,173,662

DROPPER

Filed June 8, 1938

Fig. 1.

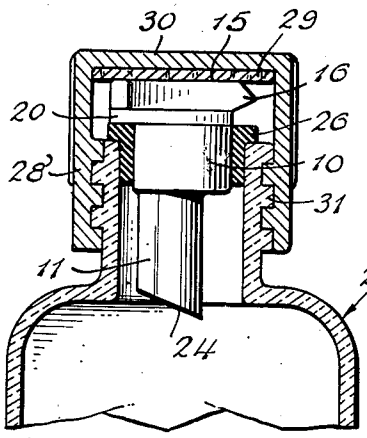


Fig. 2.

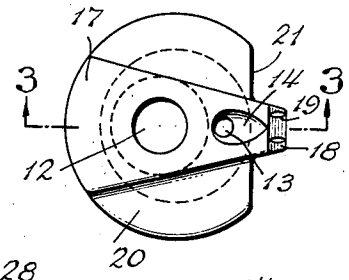


Fig. 4.

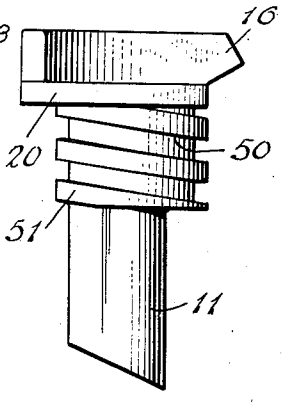


Fig. 3

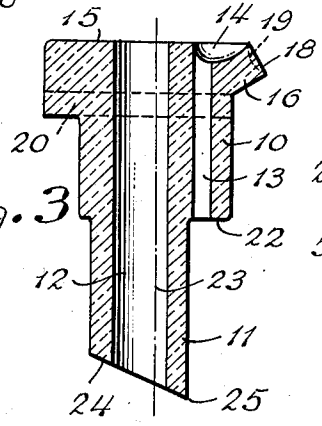


Fig. 8.

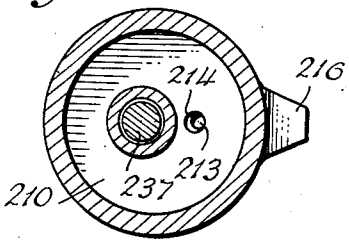


Fig. 5.

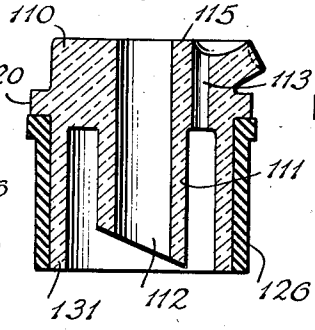


Fig. 6.

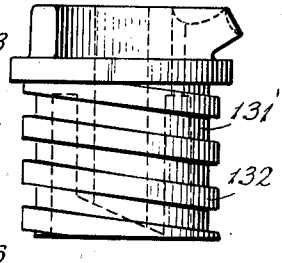
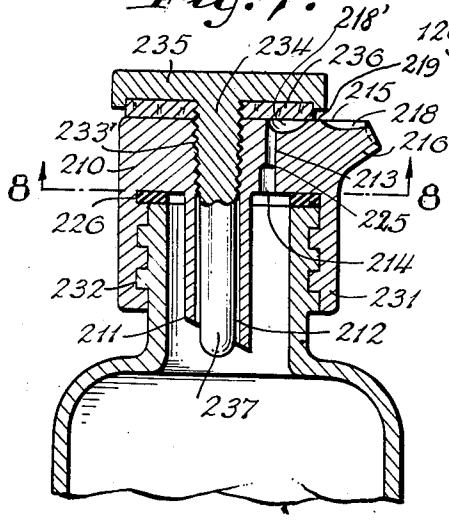


Fig. 7.



INVENTORS
ADOLPH M. PLATTRING
FREDERIC F. PLATTRING
BY Walter S. Bleistein
ATTORNEY.

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DROPPER

Adolph M. Plattring and Frederic F. Plattring,
New York, N. Y.

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6 Claims. (Cl. 221—148)

This invention relates to a dropper for a container and more particularly for a bottle for medicines and the like. The main object of the invention is to provide a device which is useful for the dropwise dispensing of liquids of various viscosities and surface tensions. The invention mainly consists in a dropper which may be secured to the opening of a container, as for instance the opening in a bottle neck, the dropper having a portion which extends farther downward from its top than another portion thereof, with a passageway for air through the length of said first mentioned portion, and another passageway through the length of the shorter portion for dispensing the liquid from the container, said second passageway being substantially parallel to and considerably narrower than the passageway for air.

Further details and objects of the invention are apparent from the description hereinafter, and the accompanying drawing showing several embodiments by way of example. In the drawing:

Fig. 1 is a side view of a dropper according to the invention and applied to a bottle with a cap, the bottle and the cap being shown in section.

Fig. 2 is a top plan view of the dropper of Fig. 1.

Fig. 3 is a section along line 3—3 of Fig. 2.

Fig. 4 is a side view of a modification.

Fig. 5 is a vertical section of another embodiment of the invention.

Fig. 6 is a side view of a modification of the dropper of Fig. 5.

Fig. 7 is a vertical section of another embodiment.

Fig. 8 is a section along line 8—8 of Fig. 7.

Referring now to Figs. 1 to 3, the dropper may be made of glass or any other suitable material; it comprises a main body portion 10 with a tubular extension 11. A relatively wide passageway or bore 12 for the entrance of air passes through the tubular extension 11 and the body 10. Parallel to the passageway 12 another passageway 13 for the dispensing of liquid is provided within the body portion 10. This passageway 13 is considerably narrower than passageway 12 and also considerably shorter than the latter, owing to the fact that it is in a portion of the body 10 which does not extend downward as far as the portion 11. A nose 16 projects laterally from the top portion of the body 10, and is arranged preferably opposite the passageway 12 in relation to passageway 13 This nose may be so shaped as to form together with said portion a wedge-like structure 17, the forward end of which is slantingly cut off to form an inclined dropping surface 18. The dropping surface 18 may be provided with grooves 19 extending downward from the top surface 15. Another groove 14 may be provided at the upper end of passageway 13 in the top surface 15 of body 10 and nose 16. This groove 14 is helpful in the formation of the individual drops, and guides the liquid towards the dropping surface 18. Thus, it is clear, that the passageway for the air will be on a higher level than the passageway for the liquid when the dropper is tilted with its nose downward. Another portion of the body 10 may form a flange 20. The flange 20 may be set off at 21, where nose 18 projects from the body 10. Owing to this arrangement, a sufficiently projecting nose can be formed which, notwithstanding the projection, can be covered by a bottle cap of relatively small size. It will be noticed that in the embodiment of Figs. 1 to 3 the passageway 12 is arranged eccentrically with respect to the axis 23. This is done in order to arrange both passageways 12 and 13 within a body of relatively small diameter. We prefer to arrange the lower surface 24 of the tubular extension 11 in which passageway 12 ends, aslant with respect to the axis 23 and suitably so directed that the deepest point 25 of said surface is on the same side of the dropper as nose 16. In other words, the plane of the surface 24 is aslant with respect to axis 23, and perpendicular to the plane defined by the axes of both passageways 12 and 13.

In order to secure the dropper in a bottle or the like, a gasket sleeve 26 may be provided as shown in Fig. 1 and the dropper may thus be tightly inserted in the neck of such bottle 28. In the modification of Fig. 4, the dropper body 50 is screw-threaded at 51, so that it may be screwed into corresponding threads of a bottle neck. The length of the tubular extension 11 is preferably so selected that it extends approximately through the length of the bottle neck 27 as shown in Fig. 1. In order to close the top openings of the dropper, a screw threaded cap 28' may be applied with a gasket 29 between the top wall 30 of the cap and the top surface 15 of the dropper body 10. By screwing 30 on the threads 31 of the bottle neck, not only the gasket 29 will close the openings of the apertures 12 and 13, but also the flanged gasket 26 will be compressed so that the dropper is tightly secured in the bottle. The compression of the gasket 26 which may be of rubber or any suitable material, holds the dropper safely within the bottle neck even if cap 30 is removed. The

dropper according to the invention operates in the following manner:

When, for dispensing liquid from the container 28, cap 30 is removed and the bottle tilted with nose 16 downward, air may enter through passageway 12, and the liquid may pass through passageway 13 so as to fill groove 14, and to form a drop which will fall off from surface 18. As further air enters the container, liquid will be dropwise dispensed.

We have found that in order to obtain best results at least a portion of the passageway 13 should have a diameter of between 0.8 and 1.3 millimeters, and at least a portion of the air passageway should have a width of between 3 and 4 millimeters. Other portions of the passageways may be wider than indicated. Owing to the fact that the air passageway 12 is considerably longer than the passageway 13 for the liquid, a certain difference in liquid pressure on the lower openings of both passageways is created when the bottle is tilted. This difference is helpful in permitting the air to enter the container to which the dropper is applied. On the other hand, the width of passageway 13 should be so selected that the liquid passing therethrough is subjected to sufficient friction to prevent an outflow of an uninterrupted jet. The slanting arrangement of the lower surface 24 of extension 11 is also helpful in the dropwise dispensing of the liquid from the bottle. We have found that a so constructed extension end prevents or at least counteracts the tendency of the liquid to form a membrane closing the passageway 12 and obstructing the air passage, which frequently happens, if the lower surface of the extension is perpendicular to the axis 23.

The size of the drops formed is largely dependent on the size of the dropping surface 18. In order to obtain drops of a normal size, such as dispensed by the Bruxelles norm dropper, the dropping surface should have a width of between 3 and 4 millimeters and a length of also between 3 and 4 millimeters. If the dimensions are correctly selected, the dropper according to our invention will dispense drops of a size corresponding to about 20 drops of water or about 40 drops of oil or about 60 drops of alcohol per cubic centimeter.

In conventional droppers which operate satisfactorily if aqueous liquids are dispensed therewith, it frequently happens that alcohol flows out too fast, so that no individual drops are formed or the drops cannot be counted. This is prevented by the dropper according to our invention, in the following manner:

If liquids are used having a certain surface tension such as water, practically no liquid will enter the air passageway, even if the liquid level is above the surface 24 when the bottle is tilted. Consequently, the entering air has to pass only through the liquid column which happens to be on top of surface 24. If, however, a liquid of a lower surface tension is used, such as alcohol, a certain quantity of such liquid will enter the passageway 12 and the air entering from the side of the surface 15 must pass the liquid column in passageway 12 in addition to that on top of surface 24. Thereby a certain braking force is exerted on the entering air which passes these columns in individual bubbles. In consequence thereof, the dispensing of the liquid through passageway 13 occurs dropwise in rhythm with the air bubbles entering the container.

We have found that the dropper operates well in the above mentioned manner if the entire passageway of the air has a length of approximately 1½ to 3 times that of the passageway for the liquid.

Another embodiment of the dropper according to the invention is shown in Fig. 5. In this case, the body 110 has a central lower extension 111 with a passageway 112 for air. A cylindrical portion 131 surrounds the extension 111 and the passageway 113 for the liquid ends in the space between cylinder 131 and the tubular extension 111. The outer wall of the cylindrical portion 131 and the body flange 120 serve to hold a gasket sleeve 126. In the modification of Fig. 6, the cylindrical portion 131' is provided with threads 132 so that the dropper may be screwed into an interiorly threaded neck of a container.

The embodiment shown in Figs. 7 and 8 has a body portion 210 with a nose 216, tubular extension 211 and a cylindrical portion 231. The cylindrical portion 231 is interiorly threaded at 232, so as to be screwed on an exteriorly threaded neck of a bottle.

In this embodiment, the passageway 213 for the liquid has an enlarged portion 214. If this is done, care should be taken that that wall portion 225 of the passageway, which is located on the side of nose 216 is unbroken, i. e., free of any recess throughout its entire length, so that the liquid may flow along this wall portion without interruption from portion 214 into the restricted portion of the passageway 213. If, therefore, 213 and 214 are cylindrical, they should be arranged so eccentrically with respect to each other as clearly shown in Fig. 8. The upper portion of the air passageway 212 may be threaded interiorly at 233 and a screw 234 with a head 235 may be provided to be screwed into the threads 233. A gasket 236 may be inserted between head 235 and the top surface 215 of the body 210. If this is done, both top apertures of the dropper are safely sealed. In order to provide such tight seal, the top groove consists, in this case, of two parts 218 and 218' interrupted by a shoulder portion 219 which is engaged by the gasket 236 when screw 234 is in position. In order to use the dropper, it is only necessary to remove the screw 234 with gasket 236. The screw 234 has a pin-like continuation 237 penetrating the entire length of extension 211 when the screw 234 is applied. This pin prevents liquid from entering the air passageway during transportation and is provided, because it is sometimes troublesome to remove a liquid of high viscosity and/or surface tension therefrom, which liquid might obstruct the air entrance when the bottle is in use. Similar pins may be provided in connection with the several embodiments of Figs. 1 to 6.

We do not limit ourselves to the details of construction and arrangement of parts which we have herein shown and described, as it will be obvious that various changes can be made without departing from the spirit and scope of our invention as defined in the appended claims.

What we claim is:

1. A dropper for a container comprising a body adapted to be secured to a container opening, a lower extension on said body, a first passageway for air, through said extension and said body, a second passageway in said body, substantially parallel to said first passageway, for dispensing liquid from the container, said second passageway being considerably shorter and nar-

rower than said first one, and a lateral nose on the upper portion of said body, said nose being arranged opposite said first passageway in relation to said second passageway, and the upper surface of said body having a groove extending from the upper end of said second passageway in the direction of said nose.

2. A dropper for a container comprising a body adapted to be secured to a container opening, a tubular extension on said body, a first passageway for air through said tubular extension and said body, a second passageway in said body substantially parallel to the first one for dispensing liquid from the container, said second passageway being considerably shorter and narrower than said first passageway, and a lateral nose on said body, said nose having a slanting dropping surface with grooves therein, and being arranged opposite said first passageway in relation to said second passageway, and the upper surface of said body having a groove extending from the upper end of said second passageway in the direction of said nose.

3. A dropper for a container comprising a flanged body adapted for insertion in a container opening, said body having a substantially flat upper surface, a lower tubular extension of said body, a first passageway for air, extending through said tubular extension and said body, a second passageway in said body, substantially parallel to and considerably narrower than the first one, for dispensing container liquid, a lateral nose on said body for the formation of drops, the upper surface of said nose being flush with the upper surface of said body, a cap adapted to cover said body with said nose, and provided with inner threads so as to engage mating threads of said container, and a gasket between the inner top surface of said cap and the upper surface of said body.

4. A dropper for a container comprising a body adapted to be secured to a container opening, a lower tubular extension of said body, a first passageway for air through said tubular extension and said body, the upper portion of said passageway being provided with screw threads, a second passageway in said body substantially parallel to the first one for dispensing container liquid, said second passageway being considerably shorter and narrower than said first passageway, a lateral nose on said body for the formation of drops, said nose being arranged opposite said first passageway in relation to said second passageway, a headed and threaded pin adapted to be screwed into said upper portion of said first passageway, and a gasket adapted to be pressed between the head of said pin and the said body, and being of sufficient size to cover the second passageway.

5. A dropper for a container comprising a body, a lower tubular extension on said body, a first passageway for air through said tubular extension and said body, a second passageway in said body, for dispensing liquid from the container to which the dropper is applied, said second passageway being substantially parallel to and considerably narrower than the first passageway, a lateral nose with a dropping surface opposite said first passageway in relation to said first passageway, means for sealing said first passageway, and a pin in connection with said means, said pin being so arranged and constructed as to engage substantially the entire length of said first passageway when said means are in sealing position.

6. A dropper for a container comprising a body adapted to be attached to said container so as to project into the latter, said body having a substantially flat surface, a lower extension of said body, a first passageway for air, extending through said extension and said body, a second passageway in said body, substantially parallel to and considerably narrower than the first one, for dispersing container liquid, a lateral nose on said body for the formation of drops, the upper surface of said nose being flush with the upper surface of said body, a removable member adapted to seal said passageway and to cover said nose, said member including means for holding it in sealing position.

ADOLPH M. PLATTRING.
FREDERIC F. PLATTRING.