United States Patent [19]

Ogle

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[54] **MINI DROPPER**

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[52] **U.S. Cl.**..... **222/209,** 222/420, 222/562

[51] **Int. Cl.**..... **B65d 37/00,** B65d 47/18

[58] **Field of Search**... 222/206, 209, 214, 215, 420, 222/421, 398, 207, 210, 211, 562, 538, 525; 128/272

[56] **References Cited**

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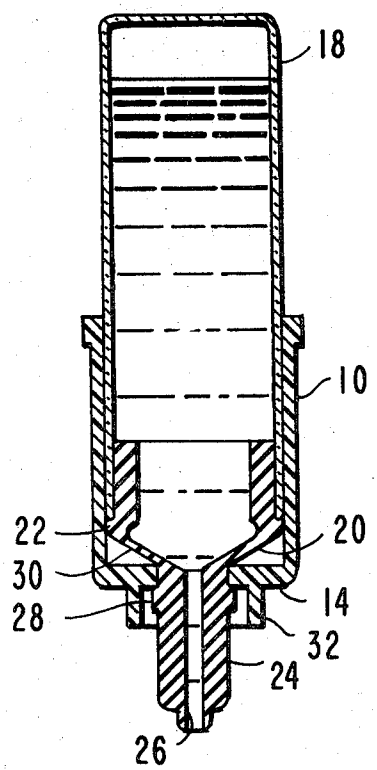
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Primary Examiner—Robert B. Reeves
Assistant Examiner—Francis J. Bartuska
Attorney, Agent, or Firm—Finkelstein & Mueth

[57] **ABSTRACT**

A device adapted to dispense reagents comprising an outer tubular member having an open end and a second end comprising an end wall having therein a concentric circular opening, a vial received in the open end of said tubular member having a resilient stopper sealing its open end, said stopper having an annular shoulder thereon to prevent reciprocation of said stopper in said vial, said stopper also having a projection thereon which is concentric with the stopper, a fluid passage through said stopper and projection, said projection extending through said concentric circular opening and beyond said end wall of the tubular member, said projection having an externally raised ring which forms a snap-fit on the exterior of the concentric circular opening to restrain the projection against longitudinal movement within the opening, said stopper also having an internally hollow convex dome-like configuration in proximity to the inner end of said projection and extending beyond the end of said vial which is adapted to be compressed when said vial is fully advanced within said tubular member to expel a drop of fluid from said vial through said fluid passage.

7 Claims, 5 Drawing Figures



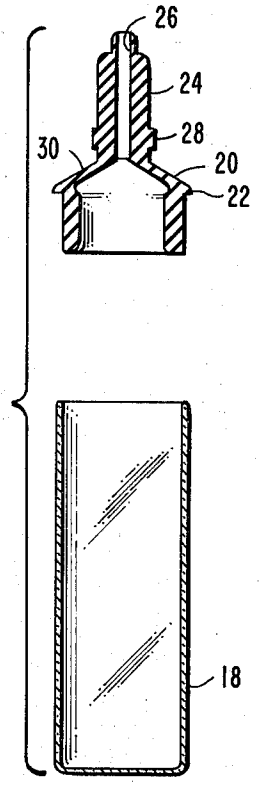


FIG.-3

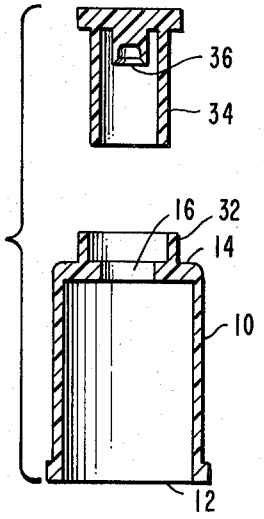
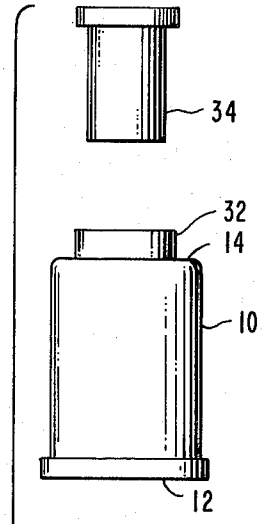
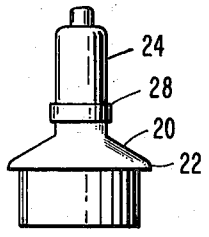


FIG.-2





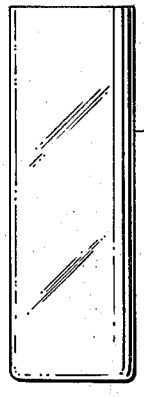


FIG.-1

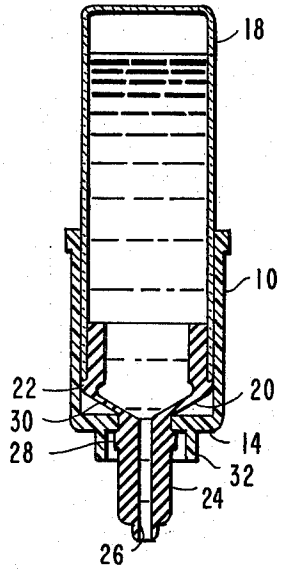


FIG.-4

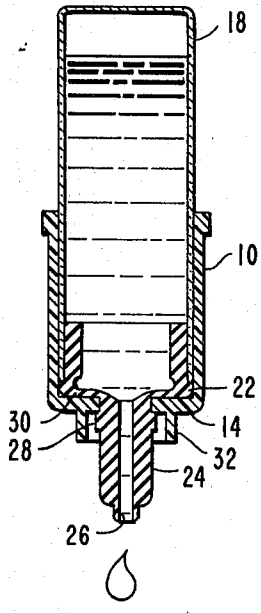


FIG.-5

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MINI DROPPER

BACKGROUND OF THE INVENTION

Drop dispensers for reagents including medicaments are well-known. The most common type comprises a glass pipette having a compressible bulb thereon which is operated by squeezing between two fingers. I have found that this device is not satisfactory for the application of reagents in the many instances where a precise amount of liquid must be applied directly to the surface of the skin. The bulb dispenses varying amounts of liquid depending on the pressure and grip of the operator. There is little or no reproducibility in the amount dispensed from drop-to-drop. Visual estimation of the amount dispensed is not feasible when the medication is to be applied directly to the skin. If the dropper is held above the skin surface, splashing occurs. The present invention provides a dropper device which dispenses any predetermined amount of fluid on a repeatable basis. The technique of the operator is not critical. The device is particularly useful in applications directly to the surface of the skin.

SUMMARY OF THE INVENTION

Briefly, this invention comprises a device adapted to dispense reagents comprising an outer tubular member having an open end and a second end comprising an end wall having therein a concentric circular opening, a vial received in the open end of said tubular member having a resilient stopper sealing its open end, said stopper having an annular shoulder thereon to prevent reciprocation of said stopper in said vial, said stopper also having a projection thereon which is concentric with the stopper, a fluid passage through said stopper and projection, said projection extending through said concentric circular opening and beyond said end wall of the tubular member, said projection having an externally raised ring which forms a snap-fit on the exterior of the concentric circular opening to restrain the projection against longitudinal movement within the opening, said stopper also having an internally hollow convex dome-like configuration in proximity to the inner end of said projection and extending beyond the end of said vial which is adapted to be compressed when said vial is fully advanced within said tubular member to expel a drop of fluid from said vial through said fluid passage.

It is an object of this invention to provide a novel dropper device for the application of medication and other reagents.

More specifically, it is an object of this invention to provide a reagent dropper adapted to repeatedly dispense any predetermined amount of liquid.

A further object of this invention is to provide a dropper particularly adapted to the application of a reagent to the surface of the skin.

These and other objects and advantages of this invention will be apparent from the detailed description which follows taken together with the accompanying drawings.

DESCRIPTION OF PREFERRED EMBODIMENTS

Turning to the drawings:

FIG. 1 is an exploded side view of the device of this invention.

FIG. 2 is a sectional view of the two uppermost parts shown in FIG. 1.

FIG. 3 is a sectional view of the two lower parts shown in FIG. 1.

FIG. 4 is a sectional view of the device of this invention in assembled form as it appears in the non-operating position.

FIG. 5 is a sectional view of the device of my invention in assembled form as it appears in the operating or drop-dispensing position.

Turning to the drawings in greater detail, the illustrated form of the invention comprises an outer tubular member **10** having an open end **12** and a second end **14** comprising an end wall having therein a concentric circular opening **16**, a vial **18** received in the open end of said tubular member having a resilient stopper **20** sealing its open end, said stopper having an annular shoulder **22** thereon to prevent reciprocation of said stopper in said vial. This is accomplished in the illustrated device by having the underside of annular shoulder **22** overlay and rest on the end of the walls of vial **18**. The stopper **20** also has a projection **24** thereon which is concentric with the stopper. Fluid passage **26** traverses said stopper **20** and projection **24**, said projection extending through and beyond said end wall of the tubular member **10**. The projection **24** has an externally raised ring **28** which forms a snap-fit on the exterior of the concentric circular opening to restrain the projection against longitudinal movement within the opening **16**. The stopper **20** also has an internally hollow convex dome-like configuration **30** in proximity to the inner end of the projection **24** which is adapted to be compressed when the vial **18** is fully advanced in said tubular member **10** to expel a drop of fluid from said vial through the fluid passage **26**. The tubular member **10** has a skirt-like extension **32** on its outer surface surrounding said projection, a cap **34** enclosing that part of the projection extending beyond the end wall, the exterior of said cap forming a seal with the interior of said skirt, said cap also having on the interior of its closed end, a projection **36** thereon adapted to seal on the exterior of the end of said projection **24** to thereby form a two-point seal.

Preferably annular shoulder **22** has an external diameter equal to or slightly larger than the inside diameter of tubular member **10** to maintain accurate alignment of the parts and provide a smooth action or feel for the operator.

In operation, the device is assembled by filling the vial **18**, inserting stopper **20** within the vial and then placing the stoppered vial within the tubular member **10**. The projection **24** is then pulled through opening **16** until ring **28** snaps into place as shown in FIG. **4**.

To use the device, the drop of reagent is dispensed by the application of a squeezing force between vial **18** and tubular member **10**, causing the compression of the dome-like portion **30**. The compression of the dome reduces the volume of liquid and air within the vial, expelling a drop through fluid passage **26**.

As will be apparent to those skilled in the art, the device of this invention can be made to dispense any desired predetermined volume of drop simply by the selection of the appropriate size and contour of the dome-like element **30**.

Having fully defined the invention, it is intended that it be limited only by the lawful scope of the appended claims.

1. A device adapted to dispense reagents comprising an outer tubular member having an open end and a second end comprising an end wall having therein a concentric circular opening, a vial received in the open end of said tubular member having a resilient stopper sealing its open end, said stopper having an annular shoulder thereon to prevent reciprocation of said stopper in said vial, said stopper also having a projection thereon which is concentric with the stopper, a fluid passage through said stopper and projection, said projection extending through said concentric circular opening and beyond said end wall of the tubular member, said projection having an externally raised ring which forms a snap-fit on the exterior of the concentric circular opening to restrain the projection against longitudinal movement within the opening, said stopper also having an internally hollow, imperforate convex dome-like configuration in proximity to the inner end of said projection and extending beyond the end of said vial which is adapted to be compressed when said vial is fully advanced within said tubular member to expel a drop of fluid from said vial through said fluid passage.

2. A device adapted to dispense reagents comprising an outer tubular member having an open end and a second end comprising an end wall having therein a concentric circular opening, a vial received in the open end of said tubular member having a resilient stopper sealing its open end, said stopper having an annular shoulder thereon to prevent reciprocation of said stopper in said vial, said stopper also having a projection thereon which is concentric with the stopper, a fluid passage through said stopper and projection, said projection extending through said concentric circular opening and beyond said end wall of the tubular member, said projection having an externally raised ring which forms a snap-fit on the exterior of the concentric circular opening to restrain the projection against longitudinal movement within the opening, said stopper also having an internally hollow, imperforate convex dome-like configuration in proximity to the inner end of said projection and extending beyond the end of said vial which is adapted to be compressed when said vial is fully advanced within said tubular member to expel a drop of fluid from said vial through said fluid passage, said tubular member having a skirt-like extension on its outer surface surrounding said projection, and a cap enclosing that part of said projection extending beyond said end wall, the exterior of said cap forming a seal with the interior of said skirt.

3. A device adapted to dispense reagents comprising an outer tubular member having an open end and a second end comprising an end wall having therein a concentric circular opening, a vial received in the open end of said tubular member having a resilient stopper sealing its open end, said stopper having an annular shoulder thereon to prevent reciprocation of said stopper in said vial, said stopper also having a projection thereon which is concentric with the stopper, a fluid passage through said stopper and projection, said projection extending through said concentric circular opening and beyond said end wall of the tubular member, said projection having an externally raised ring which forms a snap-fit on the exterior of the concentric circular opening to restrain the projection against longitudinal movement within the opening, said stopper also having an internally hollow, imperforate convex dome-like configuration in proximity to the inner end of said projection and extending beyond the end of said vial which is adapted to be compressed when said vial is fully advanced within said tubular member to expel a drop of fluid from said vial through said fluid passage, said tubular member having a skirt-like extension on its outer surface surrounding said projection, and a cap enclosing that part of said projection extending beyond said end wall, the exterior of said cap forming a seal with the interior of said skirt, said cap also having on the interior of its closed end, a projection thereon adapted to seal on the exterior of the end of said projection to thereby provide a two-part seal.

4. A device adapted to dispense reagents comprising an outer tubular member having an open end and a second end comprising an end wall having therein a concentric circular opening, a vial received in the open end of said tubular member having a resilient stopper sealing its open end, said stopper having an annular shoulder thereon to prevent reciprocation of said stopper in said vial, said annular shoulder having an external diameter of approximately equal to the internal diameter of said outer tubular member, said stopper also having a projection thereon which is concentric with the stopper, a fluid passage through said stopper and projection, said projection extending through said concentric circular opening and beyond said end wall of the tubular member, said projection having an externally raised ring which forms a snap-fit on the exterior of the concentric circular opening to restrain the projection against longitudinal movement within the opening, said stopper also having an internally hollow, imperforate convex dome-like configuration in proximity to the inner end of said projection and extending beyond the end of said vial which is adapted to be compressed when said vial is fully advanced within said tubular member to expel a drop of fluid from said vial through said fluid passage.

5. A device adapted to dispense reagents comprising an outer tubular member having an open end and a second end comprising an end wall having therein a concentric circular opening, a vial received in the open end of said tubular member having a resilient stopper sealing its open end, said stopper having an annular shoulder thereon to prevent reciprocation of said stopper in said vial, said annular shoulder having an external diameter of approximately equal to the internal diameter of said outer tubular member, said stopper also having a projection thereon which is concentric with the stopper, a fluid passage through said stopper and projection, said projection extending through said concentric circular opening and beyond said end wall of the tubular member, said projection having an externally raised ring which forms a snap-fit on the exterior of the concentric circular opening to restrain the projection against longitudinal movement within the opening, said stopper also having an internally hollow, imperforate convex dome-like configuration in proximity to the inner end of said projection and extending beyond the end of said vial which is adapted to be compressed when said vial is fully advanced within said tubular member to expel a drop of fluid from said vial through said fluid passage, said tubular member having a skirt-like extension on its outer surface surrounding said projection, and a cap enclosing that part of said projection

extending beyond said end wall, the exterior of said cap forming a seal with the interior of said skirt.

6. A device adapted to dispense reagents comprising an outer tubular member having an open end and a second end comprising an end wall having therein a concentric circular opening, a vial received in the open end of said tubular member having a resilient stopper sealing its open end, said stopper having an annular shoulder thereon to prevent reciprocation of said stopper in said vial, said annular shoulder having an external diameter of approximately equal to the internal diameter of said outer tubular member, said stopper also having a projection thereon which is concentric with the stopper, a fluid passage through said stopper and projection, said projection extending through said concentric circular opening and beyond said end wall of the tubular member, said projection having an externally raised ring which forms a snap-fit on the exterior of the concentric circular opening to restrain the projection against longitudinal movement within the opening, said stopper also having an internally hollow, imperforate convex dome-like configuration in proximity to the inner end of said projection and extending beyond the end of said vial which is adapted to be compressed when said vial is fully advanced within said tubular member to expel a drop of fluid from said vial through said fluid passage, said tubular member having a skirt-like extension on its outer surface surrounding said projection, and a cap enclosing that part of said projection extending beyond said end wall, the exterior of said cap forming a seal with the interior of said skirt, said cap also having on the interior of its closed end, a projection thereon adapted to seal on the exterior of the end of said projection to thereby provide a two-point seal.

7. A device adapted to dispense reagents comprising an outer tubular member having an open end and a second end comprising an end wall having therein a concentric circular opening, a vial received in the open end of said tubular member having a resilient stopper sealing its open end, said stopper having an annular shoulder thereon to prevent reciprocation of said stopper in said vial, said annular shoulder having an external diameter of approximately equal to the internal diameter of said outer tubular member, the underside of said annular shoulder resting on the open end of said vial, said stopper also having a projection thereon which is concentric with the stopper, a fluid passage through said stopper and projection, said projection extending through said concentric circular opening and beyond said end wall of the tubular member, said projection having an externally raised ring which forms a snap-fit on the exterior of the concentric circular opening to restrain the projection against longitudinal movement within the opening, said stopper also having an internally hollow, imperforate convex dome-like configuration in proximity to the inner end of said projection and extending beyond the end of said vial which is adapted to be compressed when said vial is fully advanced within said tubular member to expel a drop of fluid from said vial through said fluid passage.

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