Sept. 8, 1953 M. R. FIELDS 2,651,437

MEDICINE DROPPER

Filed Oct. 4, 1950

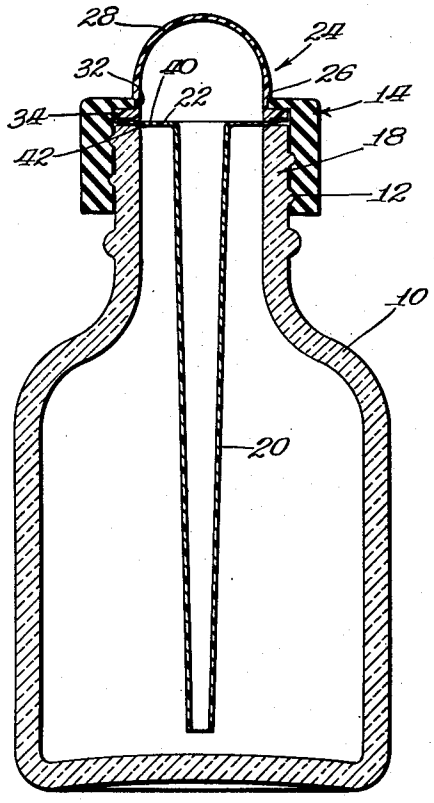


Fig. 1.

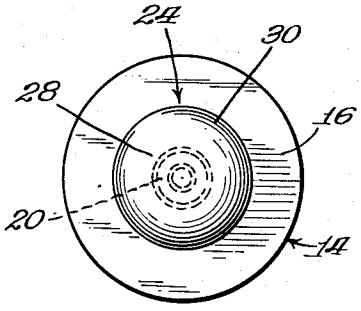


Fig. 3.

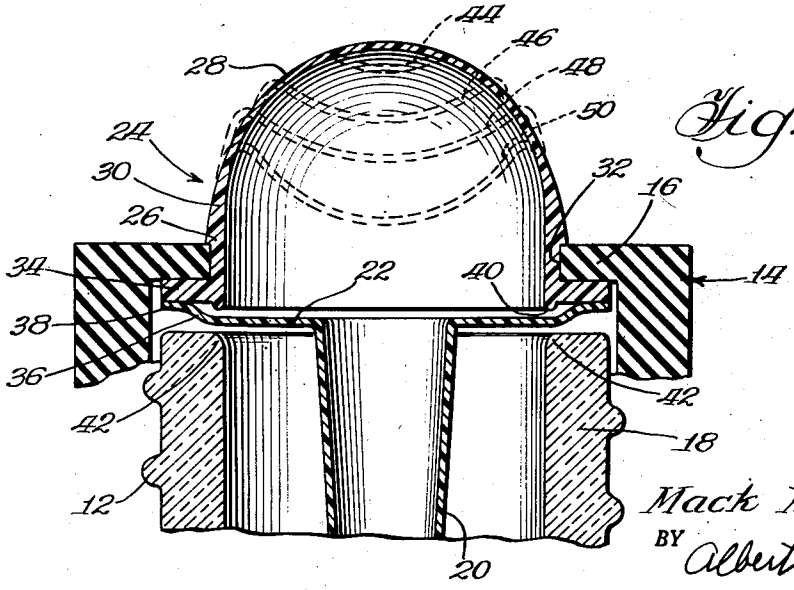


Fig. 2.

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Patented Sept. 8, 1953 2,651,437

UNITED STATES PATENT OFFICE

2,651,437

MEDICINE DROPPER

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Application October 4, 1950, Serial No. 188,423

7 Claims. (Cl. 222—208)

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This invention relates to medicine droppers and more particularly to one-piece medicine droppers having a positive discharge control.

Generally, the medicine droppers of the prior art are made with a glass pipette and a rubber bulb. The parts of such droppers must be manufactured with very close tolerances, as the bulb is frictionally held on the pipette, and a loose fitting bulb would fail to supply the necessary pumping action to draw liquid into the pipette. If such a rubber bulb dropper is used with oil, as for instance, fish liver oil, care must be taken by the user so that no oil gets into the rubber bulb, as the rubber parts deteriorate very rapidly in contact with oil.

According to the present invention, a medicine dropper is provided, made of a resilient, heat sealable plastic which is impervious to oil, and a dropper assembly which is a one-piece bulb and dropper combination. The device, also, serves as a cap liner as well as a medicine dropper.

Referring to the drawings:

Figure 1 is a vertical section of a complete medicament package, including a dropper assembly according to the invention;

Figure 2 is an enlarged section of the bulb and adjacent parts; and

Figure 3 is a top plan view of the parts shown in Figure 2.

In the embodiment of the invention selected for illustration, a conventional bottle 10 is provided with screw threads 12 to co-operate with a conventional annular Bakelite screw fitting 14. The screw fitting 14 has a large central opening peripherally defined by a narrow inwardly directed flange 16 which overlies the edge of the bottle neck 18. The dropper proper includes a slightly tapered pipette section 20 having a top flange 22.

The dropper proper is completed by the cap, indicated as a whole by reference character 24, which cap comprises a base annulus 26 of constant inside diameter and a somewhat thinner dome 28 which is substantially a portion of a perfect sphere subtending an angle of about 120° with respect to its own center of curvature. A gently tapered zone 30 joins the base annulus 26 and the dome 28.

The outer surface of the annulus 26 is provided with a shallow groove 32, and below the groove I provide an outwardly directed flange 34. The shoulder at the top of the shallow groove 32 is of such radial dimensions that the fitting 14 can be pushed down from the top and snap into place.

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The flange 22 of the pipette is illustrated as continuing outwardly to about the inner diameter of the bottle neck 18, and then sloping upward gently as indicated at 36 to end in a narrow peripheral lip 38 of the same outside diameter as the flange 34. Juxtaposing the pipette and cap and applying heat to the portion 38 and the outer edge of the flange 34 easily fuses the pipette and dome into a single unitary dropper without substantial alteration of the external configuration of the assembly.

The slight shoulder along the inner edge of the inclined portion 36 defines a contact member sufficiently yielding to engage the upper edge of the bottle neck 18 and accommodate itself to the variations in shape of the bottle neck unavoidable in mass production, thereby securing a good seal under moderate pressure. The effectiveness of the seal can be somewhat further enhanced by forming a small bead at 40 in the bottom inner edge of the flange 34. Because the process of glass manufacture will leave a slight curvature in the surface of the glass indicated at 42 in Figure 2, as distinguished from a sharp edge, the inclined portion 36 will tend to get a bearing against the glass along a line intermediate between the bead 40 and the weld at 38.

The particular configuration of the cap 24, especially when the material is polyethylene, enables a user to dispense medicament with acceptable accuracy and much greater speed than has been possible in the past. With the ordinary elongated rubber bulb, either tapered or tubular, the mechanical resistance of the bulb to distortion, and the forces exerted by the distorted bulb to bring it back to its original shape, are usually ample to aspirate the liquid, but not materially greater than that. This involves forces so small that no conscious muscular effort is required of the user to collapse the bulb completely and aspirate a much larger quantity of liquid than is desired.

With a dropper assembly according to the invention, pressure with the tip of a thumb or finger on the center of the dome 28 produces first a small central dimple, best defined geometrically by everting a small central area centered around the axis of the dropper assembly as indicated at 44 in Figure 2, and additional pressure enlarges the dimple into a position as indicated at 46 and 48 in Figure 2. In many instances where a dropper is used to administer a charge that should be made accurate within 20 or 25%, depression to a predetermined degree will lift the desired amount of liquid into the pipette with an entirely satisfactory degree

of accuracy. As the dimple grows larger, the area of contact between the finger and the dome increases, and the force increases also. When the desired liquid charge has been collected in the pipette, the dropper assembly is removed from the neck of the bottle and used in the usual manner.

Others may readily adapt the invention for use under various conditions of service by employing one or more of the novel features involved, or equivalents thereof. A popular small size for such a dropper is with the annulus **26** about one-half inch in inside diameter, but much larger sizes work well also. As at present advised with respect to the apparent scope of my invention, I desire to claim the following subject matter.

I claim:

1. In a medicine dropper assembly, in combination: a pipette; said pipette being of polyethylene plastic of a type chemically inert to oil and not wetted by water; aspirating means defining an enclosed enlargement of the space inside said pipette; said enlargement being above said pipette and in open communication with the upper end thereof; the lower end of said pipette remaining open; said aspirating means normally having maximum internal volume; and resilient restoring means resisting decrease of volume by deformation of said aspirating means; whereby volume reduction followed by release, with the lower end of the pipette immersed, will draw into said pipette a volume of liquid substantially equal to the initial decrease; said resilient restoring means opposing decrease of volume with a force that increases at a substantial rate throughout the available range of decrease; whereby the user can pick up a preselected volume of liquid without ocular inspection by using the maximum force exerted for deformation as a sensory gauge of quantity; said aspirating means being a cap of the same type plastic as said pipette; said aspirating means including a thin-walled outwardly concave spherical dome, evertable inwardly for volume reduction; whereby a finger used to reduce the internal volume by pressing on said dome, is subjected to contact over progressively increasing areas as the volume is reduced, and the tactile sense of contact area is also available to guide the user in securing a predetermined volume without ocular inspection; the resilient wall of said dome constituting said restoring means; said pipette having a top flange substantially normal to the pipette axis and extending radially out beyond the pipette wall a distance at least equal to the pipette radius; the outer edge of said flange being fused or welded to an adjacent annular portion of said aspirating means; said flange having an annular conical portion inside and adjacent its peripheral weld, offsetting the weld above the plane of the rest of the flange; means for clamping said pipette and aspirating means against the lip of a bottleneck by axial pressure applied to the periphery of said flange; said aspirating means having an annular abutment limiting axial distortion of said conical flange portion; said abutment being positioned to engage said flange along a circular contact line spaced radially inward from the line of contact between said flange and said bottle neck; said clamping means having screw-threaded engagement with said bottle neck and an inwardly-directed flange overlying said pipette flange; and resilient means in the nature of a shallow external groove in said aspirating means and an axially facing annular abutment defining the upper edge of said groove, for engaging the inner edge of said inwardly directed flange and holding said clamping means and aspirating means assembled when removed from said bottle neck.

2. In a medicine dropper assembly, in combination: a pipette; said pipette being of polyethylene plastic of a type chemically inert to oil and not wetted by water; aspirating means defining an enclosed enlargement of the space inside said pipette; said enlargement being above said pipette and in open communication with the upper end thereof; said aspirating means normally having maximum internal volume; the lower end of said pipette remaining open; said aspirating means being a polyethylene plastic cap including a thin-walled outwardly concave spherical dome, evertable inwardly for volume reduction; said pipette having a top flange substantially normal to the pipette axis and extending radially out beyond the pipette wall a distance at least equal to the pipette radius; said plastic cap having a radial annular portion of equal diameter of said pipette flange the outer edge of said flange being fused or welded to said annular portion of said aspirating means.

3. In a medicine dropper assembly, in combination: a pipette; said pipette being of polyethylene plastic of a type chemically inert to oil and not wetted by water; aspirating means defining an enclosed enlargement of the space inside said pipette; said enlargement being above said pipette and in open communication with the upper end thereof; said aspirating means normally having maximum internal volume; the lower end of said pipette remaining open; said aspirating means being a plastic cap including a thin-walled outwardly concave spherical dome, evertable inwardly for volume reduction; said pipette having a top flange substantially normal to the pipette axis and extending radially out beyond the pipette wall a distance at least equal to the pipette radius; the outer edge of said flange being fused or welded to an adjacent annular portion of said aspirating means; said flange having an annular conical portion adjacent its peripheral weld, offsetting the weld above the plane of the rest of the flange; means for clamping said pipette and aspirating means against the lip of a bottleneck by axial pressure applied at the periphery of said flange with the bottle neck in annular contact with said conical flange portion.

4. In a medicine dropper assembly, in combination: a pipette; said pipette being of polyethylene plastic of a type chemically inert to oil and not wetted by water; aspirating means defining an enclosed enlargement of the space inside said pipette; said enlargement being above said pipette and in open communication with the upper end thereof; said aspirating means normally having maximum internal volume; the lower end of said pipette remaining open; said aspirating means being a plastic cap including a thin-walled outwardly concave spherical dome, evertable inwardly for volume reduction; said pipette having a top flange substantially normal to the pipette axis and extending radially out beyond the pipette wall a distance at least equal to the pipette radius; the outer edge of said flange being fused or welded to an adjacent annular portion of said aspirating means; said flange having an annular conical portion adjacent its peripheral weld, offsetting the weld above the plane of the rest of the flange; means for clamping said pipette and aspirating means against the lip of

a bottleneck by axial pressure applied at the periphery of said flange with the bottleneck in annular contact with said conical flange portion; said aspirating means having an annular abutment limiting distortion of said conical flange portion.

5. In a medicine dropper assembly, in combination: a pipette; said pipette being of polyethylene plastic of a type chemically inert to oil and not wetted by water; aspirating means defining an enclosed enlargement of the space inside said pipette; said enlargement being above said pipette and in open communication with the upper end thereof; said aspirating means normally having maximum internal volume; the lower end of said pipette remaining open; said aspirating means being a plastic cap including a thin-walled outwardly concave spherical dome, evertable inwardly for volume reduction; said pipette having a top flange substantially normal to the pipette axis and extending radially out beyond the pipette wall a distance at least equal to the pipette radius; the outer edge of said flange being fused or welded to an adjacent annular portion of said aspirating means; said flange having an annular conical portion adjacent its peripheral weld, offsetting the weld above the plane of the rest of the flange; means for clamping said pipette and aspirating means against the lip of a bottleneck by axial pressure applied at the periphery of said flange with the bottleneck in annular contact with said conical flange portion; said aspirating means having an annular abutment limiting distortion of said conical flange portion; said abutment being positioned to engage said flange along a circular contact line spaced radially inward from the line of contact between said flange and said bottle neck.

6. In a medicine dropper assembly, in combination: a pipette; said pipette being of polyethylene plastic of a type chemically inert to oil and not wetted by water; aspirating means defining an enclosed enlargement of the space inside said pipette; said enlargement being above said pipette and in open communication with the upper end thereof; said aspirating means normally having maximum internal volume; the lower end of said pipette remaining open; said aspirating means being a plastic cap including a thin-walled outwardly concave spherical dome, evertable inwardly for volume reduction; said pipette having a top flange substantially normal to the pipette axis and extending radially out beyond the pipette wall a distance at least equal to the pipette radius; the outer edge of said flange being fused or welded to an adjacent annular portion of said aspirating means; said flange having an annular conical portion adjacent its peripheral weld, offsetting the weld above the plane of the rest of the flange; means for clamping said pipette and aspirating means against the lip of a bottleneck by axial pressure applied at the periphery of said flange with the bottleneck in annular contact with said conical flange portion; said aspirating means having an annular abutment limiting distortion of said conical flange portion; said abutment being positioned to engage said flange along a circular contact line spaced radially inward from the line of contact between said flange and said bottle neck; said clamping means having screw-threaded engagement with said bottle neck and an inwardly-directed flange overlying said pipette flange.

7. In a medicine dropper assembly, in combination: a pipette; said pipette being of polyethylene plastic of a type chemically inert to oil and not wetted by water; aspirating means defining an enclosed enlargement of the space inside said pipette; said enlargement being above said pipette and in open communication with the upper end thereof; said aspirating means normally having maximum internal volume; the lower end of said pipette remaining open; said aspirating means being a plastic cap including a thin-walled outwardly concave spherical dome, evertable inwardly for volume reduction; said pipette having a top flange substantially normal to the pipette axis and extending radially out beyond the pipette wall a distance at least equal to the pipette radius; the outer edge of said flange being fused or welded to an adjacent annular portion of said aspirating means; said flange having an annular conical portion adjacent its peripheral weld, offsetting the weld above the plane of the rest of the flange; means for clamping said pipette and asiprating means against the lip of a bottle neck by axial pressure applied at the periphery of said flange with the bottle neck in annular contact with said conical flange portion; said aspirating means having an annular abutment limiting distortion of said conical flange portion; said abutment being positioned to engage said flange along a circular contact line spaced radially inward from the line of contact between said flange and said bottle neck; said clamping means having screw-threaded engagement with said bottle neck and an inwardly-directed flange overlying said pipette flange; and means in the nature of an external groove in said aspirating means and a resilient annular abutment defining the upper edge of said groove, for engaging the inner edge of said inwardly directed flange and holding said clamping means and aspirating means assembled when removed from said bottleneck.

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