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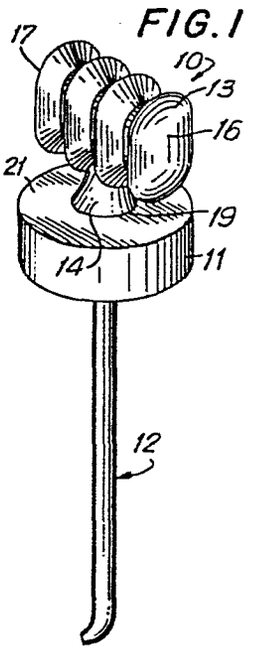
(54) **Dropper applicator.**

(57) Disclosed is a dropper applicator characterized by: (a) a cap (11); (b) a pump member (10) which extends above the cap (11) and comprises a bellows (13); and (c) an annular barrel (12) which extends downwardly from the cap (11), the interior of the annular barrel (12) being in fluid communication with the interior of the bellows (13). The bellows (13) has two ends (16, 17) opposite to each other that are adapted to be squeezed by a person in order to compress the bellows (13) and to expel fluids from the interior of the bellows (13) and the interior of the annular barrel (12).

FIG. 1



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DROPPER APPLICATOR

Background Of The Invention

The present invention is directed to an improved dropper applicator which has a bellows-like pump member. The dropper applicator of the invention is useful for applying drops of liquid compositions (e.g., cosmetic or medicinal compositions) onto parts of the body.

Medicine droppers which include a pump member having a bellows-like configuration are known in the art. Such medicine droppers also include an annular barrel having an open top end and an open bottom end, the interior of the annular barrel being in fluid communication with the interior of the bellows. In use, a liquid is drawn into the interior of the annular barrel and expelled therefrom in a process comprising at least three steps: (a) first, the user compresses the bellows to expel air from its interior and the interior of the annular barrel; (b) then, the user releases the bellows while at least the open bottom end of the annular barrel is inserted into a liquid, thereby permitting the bellows to expand to draw liquid into the interior of the annular barrel; and (c) the user then positions the open bottom end of the annular barrel adjacent to the part of the body onto which the liquid is to be applied and squeezes the bellows to expel the liquid

from the interior of the annular barrel onto that part of the body.

A number of different medicine dropper structures of the type described above have been proposed by prior art workers. Such structures are depicted, for example, in Mitchell United States Patents 3,124,171, 3,154,116, 3,215,171 and 3,379,196, Mitchell United States Design Patents 195,238 and 195,611 and Dash United States Design Patent 243,122. The medicine droppers depicted in the above patents are characterized by a common feature, namely, that in use each bellows-like pump member is compressed by pushing one side of the bellows downwardly in the direction of the axis of the dropper's annular barrel.

The medicine droppers depicted in the above patents are awkward to use. For example, with the medicine dropper depicted in the Mitchell '116 patent, the user must push bellows 12 downwardly with a first finger (or thumb) and at the same time grasp portions of the remainder of the medicine dropper (e.g., the cap 24) to offset the force exerted by the first finger (or thumb) and to prevent the medicine dropper from being pushed out of the user's grasp.

Some of the prior art medicine droppers include additional structure for the user to grasp in order to offset the force exerted when the bellows is pushed downwardly. For example, the medicine dropper depicted in Mitchell United States Patent 3,124,171 includes "a pair of integrally molded and diametrically positioned circular finger holds ... through which the index and next adjacent finger are to be inserted in the operation of the device, as in a hypodermic syringe." Similarly, the device shown in Fig. 8 of Mitchell United States Patent 3,215,171 includes "outstanding members 54 which act as finger holds when the thumb is pressed downwards ... to

evacuate the air in the bellows for easier operation of the dropper."

Even the medicine droppers of the two patents described in the preceding paragraph are awkward to use, requiring, in their intended mode of operation, the use of three fingers (or two fingers and a thumb). Moreover, the additional structure provided in those medicine droppers for "easier operation" not only adds to their expense and bulk, but also detracts from their aesthetic appearance.

Summary Of The Invention

An object of the present invention is to provide an improved dropper applicator which has a bellows-like pump member and is relatively easy to use as compared to the prior art structures described above.

Another object of the present invention is to provide an improved dropper applicator which has a bellows-like pump member and may be readily used with two fingers.

Yet another object of the present invention is to provide a dropper applicator which has a bellows-like pump member, is aesthetically pleasing and does not include extraneous structure to facilitate its use.

The above objects are achieved by the dropper applicator of the present invention, which comprises: (a) a cap, (b) a pump member which extends above the cap and comprises a bellows, and (c) an annular barrel which extends downwardly from the cap, the interior of the annular barrel being in fluid communication with the interior of the bellows.

The bellows, which comprises at least part of the pump member, has pleats and two ends opposite to each other that are adapted to be squeezed by a person in order to compress the bellows and to expel

fluid (i.e., air) from the interior of the bellows to outside the bellows via an opening provided in the bellows. The bellows is made of a flexible and resilient material so that when the bellows, in its compressed state, is released it expands back to the configuration it had before it was compressed by the user.

The annular barrel that extends downwardly from the cap has an open upper end and an open lower end. The interior of the pump member is in fluid communication with the interior of the annular barrel so that:

(a) when the bellows of the pump member is compressed: (i) fluid is passed from the interior of the pump member into the interior of the annular barrel via the open upper end of the annular barrel and (ii) fluid is passed from the interior of the annular barrel to the exterior of the dropper applicator via the open lower end of the annular barrel, and

(b) when the bellows in its compressed state is released, the bellows expands to draw fluid from the exterior of the dropper applicator into the interior of the annular barrel via the open lower end of the annular barrel.

Thus, in use, a person may squeeze the opposite ends of the bellows using two fingers to evacuate air from the interiors of the pump member and annular barrel. Thereafter, the user, with the open lower end of the annular barrel placed into a liquid, may release the bellows to draw the liquid into the interior of the annular barrel. Then, the user may place the open lower end of the annular barrel adjacent to the part of the body onto which the liquid is to be applied and, again using two fingers, may squeeze the bellows to apply the liquid onto that part of the body.

The pump member of the present invention preferably includes an annular shaft that extends between the bellows and the cap of the dropper applicator. The interior of the annular shaft is in fluid communication with the interior of the bellows and the interior of the annular barrel.

Preferably, the direction of the pleats of the bellows is at an angle of about 45-90° with respect to the plane of the top of the cap. In a particularly preferred embodiment, the pleats are vertical, i.e., their direction is at an angle of 90° with respect to the plane of the top of the cap. In other particularly preferred embodiments, the direction of the pleats is at an angle of about 55-65° with respect to the plane of the top of the cap.

Brief Description Of The Drawings

Fig. 1 shows a perspective view of a first embodiment of the invention from a position above its top.

Fig. 2 shows a front view of the first embodiment of the invention.

Fig. 3 shows a side view of the first embodiment of the invention.

Fig. 4 shows a front view of the pump member of the first embodiment of the invention, with the dropper applicator's barrel positioned in it.

Fig. 5 shows an enlarged view of a portion of Fig. 4.

Fig. 6 shows a perspective view of a second embodiment of the invention from a position above its top.

Fig. 7 shows a front view of the second embodiment of the invention.

Fig. 8 shows a perspective view of a third embodiment of the invention.

Fig. 9 shows a bottom view of the cap of the third embodiment of the invention.

Description Of The Preferred Embodiments

Referring now to Figs. 1-3, there are shown various views of a first embodiment of the invention. As shown, the dropper applicator of the first embodiment comprises pump member 10, cap 11 and annular barrel 12.

Pump member 10 comprises bellows 13 and annular shaft 14. The bellows 13 has two opposite ends 16 and 17 which are adapted to be squeezed by the user to compress the bellows. As shown in Figs. 1 and 3, ends 16 and 17 are oval in shape. However, other shapes of ends 16 and 17 may be utilized.

Bellows 13 is made of a flexible, resilient material which permits it to be squeezed by the user to evacuate air from its interior and to spring back to its original shape when the user releases its ends 16 and 17. For example, the bellows may be molded from a number of different plastic and rubber materials.

Cap 11 may be made from a number of materials, e.g., phenolic resins. As depicted by the dotted lines in Figs. 2 and 3, the inside surface of the cap is threaded so that the cap may be screwed onto a container. However, it should be understood that non-threaded caps, which are suitable for closing containers, may also be used in the present invention.

The cap may also be provided with a decorative overshell (not shown). The overshell, which may be made from a more expensive material than the remainder of the cap, may be glued onto the remainder of the cap by any suitable technique. The overshell may include printed matter and/or it may be constructed from a material having an aesthetically pleasing, lustrous finish.

The annular barrel, which suitably may be made from glass or a plastic material, has an open bottom end 18 and an open top end 19. The annulus of the annular barrel, which is depicted in Figs. 2 and 3 by dotted lines 20, is in fluid communication with the interior of pump member 10.

As best seen in Fig. 2, the bottom end of the barrel projects outwardly from the axis of the barrel. Such an arrangement facilitates drawing a liquid into the annular barrel when only a small amount of the liquid remains in the bottle.

Referring now to Fig. 4, there is depicted a front view of the pump member of the first embodiment with the dropper applicator's annular barrel positioned in it.

As shown in Fig. 4, the shaft 14 of the molded pump member 10 has a number of parts which, as will be described in more detail below, are engaged with and interact with the annular barrel 12 and cap 11 during the construction of the dropper applicator. Moving downwardly from the top of the shaft 14, the shaft comprises flared portion 23, indented portion 24, and lip portion 26. The annulus in shaft 14 is depicted by dotted lines 25.

Fig. 5 shows an enlarged view of a portion of the subassembly depicted in Fig. 4. As can best be seen from Fig. 5, the flared portion 23 and the annular barrel 12 are dimensioned and constructed so that: (a) the annular barrel may be inserted into the pump member by forcing the barrel's lip 22 through a hole provided in the pump member to the position depicted in Fig. 5; and (b) when the lip 22 is positioned as shown in Fig. 5, its underside rests on a ledge 28 which is provided in the interior of the flared portion 23 of the pump member. The ledge 28 and lip 22 cooperate, together with other structure of the dropper applicator, to maintain the barrel 12

in the position depicted in Figs. 4 and 5 during the normal use of the dropper applicator.

The top surface 21 of cap 11 is provided with a hole (not shown) for receiving the subassembly of the pump member 10 and barrel 12 depicted in Figs. 4 and 5. The hole in the cap is dimensioned so that, when the dropper applicator is assembled, the inside surface of the hole closely abuts indented portion 24 of the pump member.

In the preferred procedure for assembling the dropper applicator of the first embodiment, the upper end of the annular barrel 12 is inserted into the pump member 10 to the position depicted in Figs. 4 and 5. Then, the resulting subassembly comprising the pump member 10 and annular barrel 12 is pushed upwardly through the hole in the cap. The bellows 13 may be compressed during at least part of the upward movement to facilitate the passage of the bellows through the hole in the cap.

During the upward movement of the subassembly through the cap's hole, the inside edges of that hole ride over the flared portion 23 of the pump member, pushing the flared portion inwardly. Continued upward movement of the subassembly results in the flared portion 23 being pushed entirely past the cap to a position where the inside surface of the hole in the cap closely abuts indented portion 24 of the pump member. Thereafter, in normal use of the dropper applicator, the cap is held in that position by the bottom outside surface 31 of the flared portion 23 and by the top surface 32 of lip portion 26.

In the embodiment depicted in Fig. 1, the direction of the pleats of the bellows is vertical, i.e., the direction of the pleats is at an angle of 90° with respect to the plane defined by the top surface 21 of the cap. In a second embodiment of the invention, which is depicted in Figs. 6 and 7,

the direction of the pleats of the bellows 33 is at an angle of about 60° with respect to the plane defined by the top surface of the cap. Depending on the individual and the part of the body onto which a liquid is being applied, the dropper applicator of the second embodiment may be easier to use than the dropper applicator of the first embodiment.

With the exception of the direction of the pleats of the bellows, the construction of the second embodiment of the invention is substantially the same as the construction of the first embodiment. More particularly, like the first embodiment, the pump member 30 of the second embodiment comprises the bellows 33, having opposite ends 36 and 37, and an annular shaft 34 that extends between the dropper applicator's bellows and cap 31. The dropper applicator of the second embodiment also includes an annular barrel 32, which is identical or similar to the annular barrel of the first embodiment.

The manner in which the components of the second embodiment are joined together and how those components function are the same as in the first embodiment.

Referring now to Fig. 8, there is shown a perspective view of a third embodiment of the invention. Unlike the first two embodiments, the pump member 40 and cap 41 of the third embodiment is an integral structure. Such an integral structure may be made from suitable plastic materials by an appropriate injection molding technique.

Another difference between the third embodiment of the invention and the other embodiments described above is that the third embodiment of the invention does not include an annular shaft that extends between the bellows 43 and cap 41. Rather, the bellows 43 is molded directly adjacent to the cap 41.

It is, of course, not essential that the bellows 43 and cap 41 be injection molded as an integral structure. Rather, the bellows 43 and cap 41 may be separately formed and then joined together in a suitable manner.

Like the previous embodiments, bellows 43 includes two ends 46 and 47 which are opposite to each other and which are adapted to be squeezed to expel air from the interior of the bellows. Also like the previous embodiments, the inside surface of cap 41 includes screw threads for screwing the cap onto an appropriate container.

As can be seen from Fig. 9, the bottom surface of the cap has a hole 48 for receiving annular barrel 42. The construction and function of the annular barrel 42 are the same as the construction and function of the annular barrels utilized in the first and second embodiments described above.

Claims:

1. A dropper applicator characterized by:

(a) a cap (11;31;41);

(b) a pump member (10;30;40) which extends above the cap (11;31;41) and comprises a bellows (13;33;43), said bellows being made of a flexible, resilient material and having: (i) pleats, and (ii) two ends (16;17;36;37;46;47) opposite to each other that are adapted to be squeezed by a person in order to compress the bellows; and

(c) an annular barrel (12;32;42) extending downwardly from the cap (11;31;41) and having an open upper end (19) and an open lower end (18), the interior of the pump member (10;30;40) being in fluid communication with the interior of the annular barrel so that in use: (i) when the bellows (13;33;43) of the pump member (10;30;40) is compressed, fluid is passed from the interior of the pump member into the interior of the annular barrel via the open upper end of the annular barrel and fluid is passed from the interior of the annular barrel to the exterior of the dropper applicator via the open lower end of the annular barrel, and (ii) when the bellows in its compressed state is released, the bellows expands to draw fluid from the exterior of the dropper applicator into the interior of the annular barrel via the open lower end of the annular barrel.

2. The dropper applicator of claim 1 characterized in that the pump member (10;30) further comprises an annular shaft (14;34) that extends between the bellows (13;33) and container cap (11;31), the interior of the annular shaft being in fluid communication with: (i) the interior of the bellows, and (ii) the interior of the annular barrel (12;32).

3. The dropper applicator of claim 1 or 2 characterized in that the cap (41) and pump member (40) are integral.

4. The dropper applicator of claim 1 or 2 characterized in that the cap (11;31) and pump member (10;30) are constructed of separately made parts.

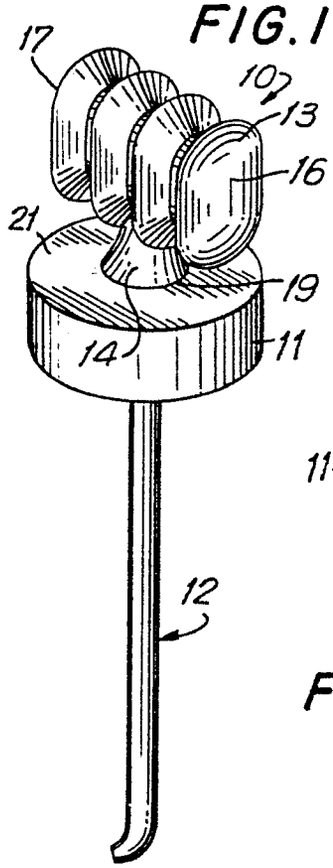
5. The dropper applicator of any of claims 1 to 4 characterized in that the cap (11;31;41) has an inside surface that is threaded for screwing the cap onto a container.

6. The dropper applicator of any of claims 1 to 5 characterized in that the direction of the pleats is at an angle of about 45-90° with respect to the plane of the top of the cap (11;31;41).

7. The dropper applicator of claim 6 characterized in that the angle is about 90°.

8. The dropper applicator of claim 6 characterized in that the angle is about 55-65°.

FIG. 1



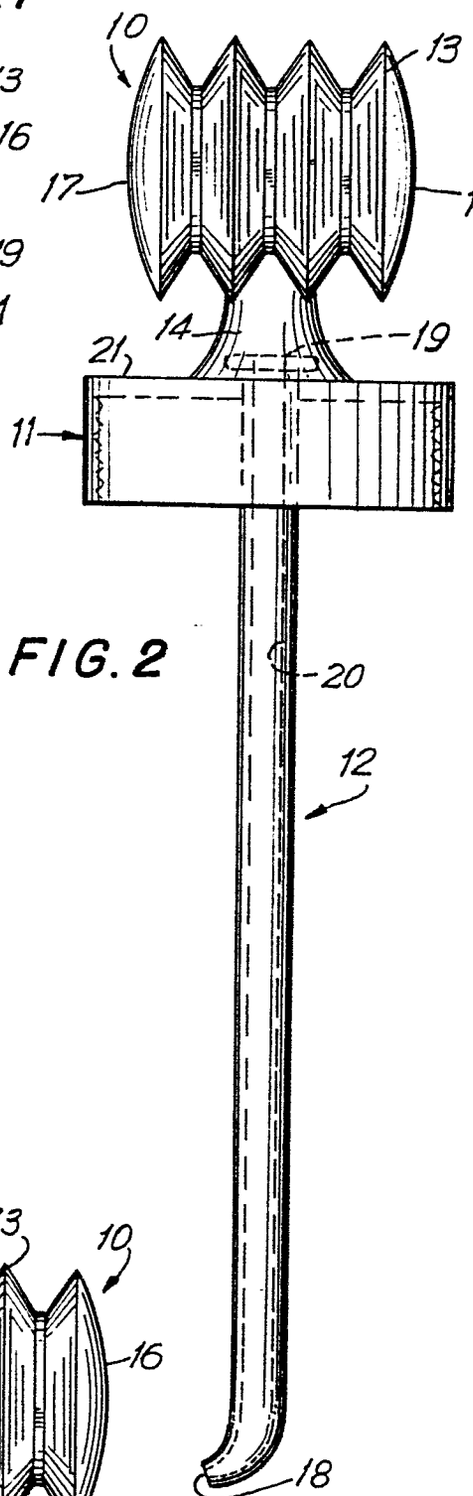


FIG. 2

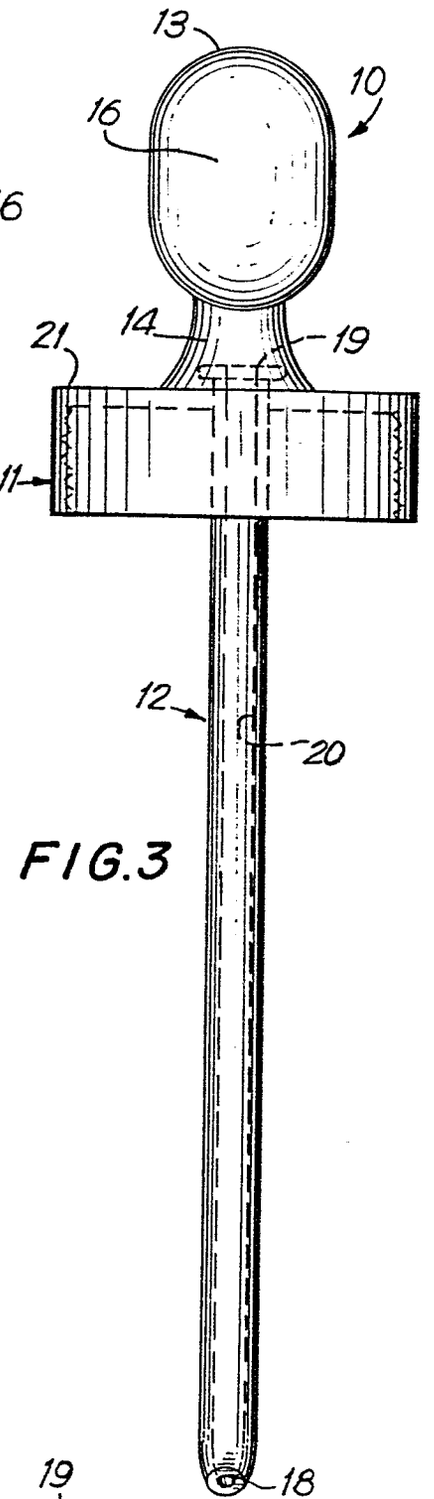
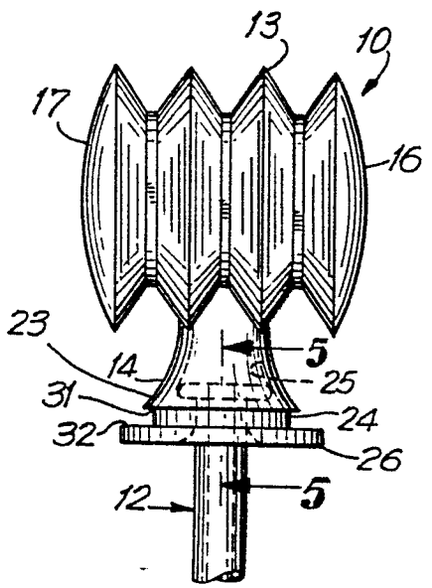


FIG. 3

FIG. 4



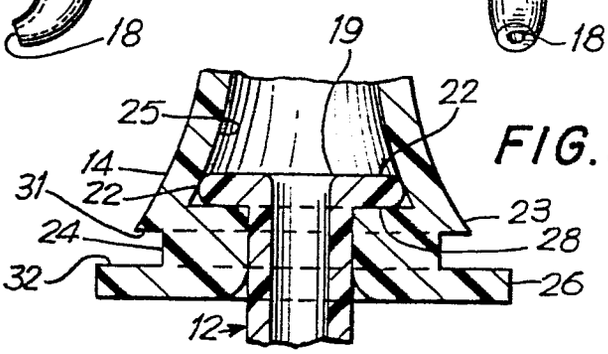


FIG. 5

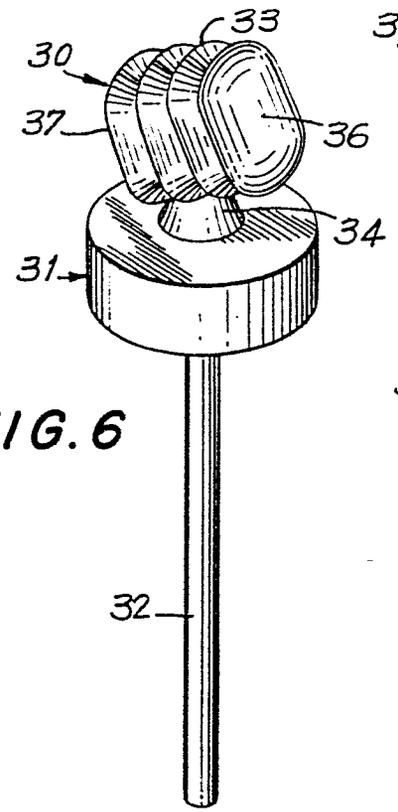


FIG. 6

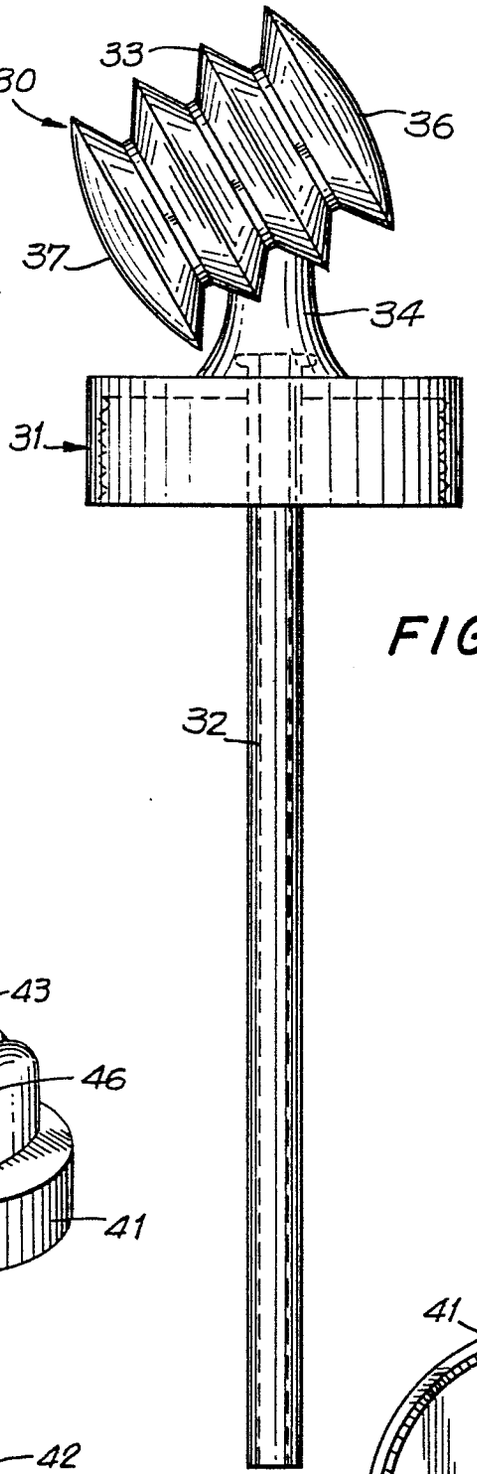


FIG. 7

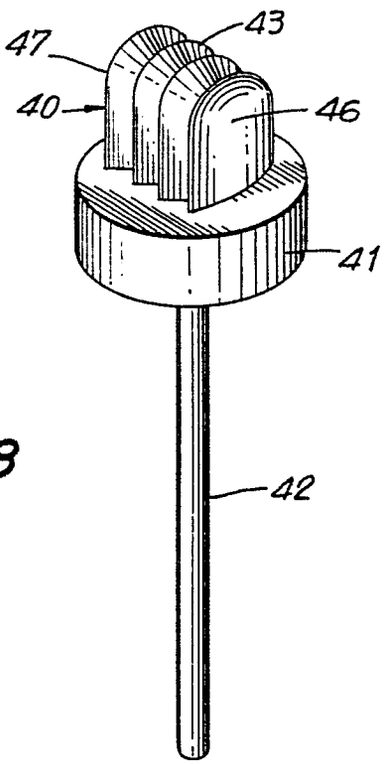


FIG. 8

FIG. 9