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APPLICATOR CAP

3,108,314

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2 Sheets-Sheet 1

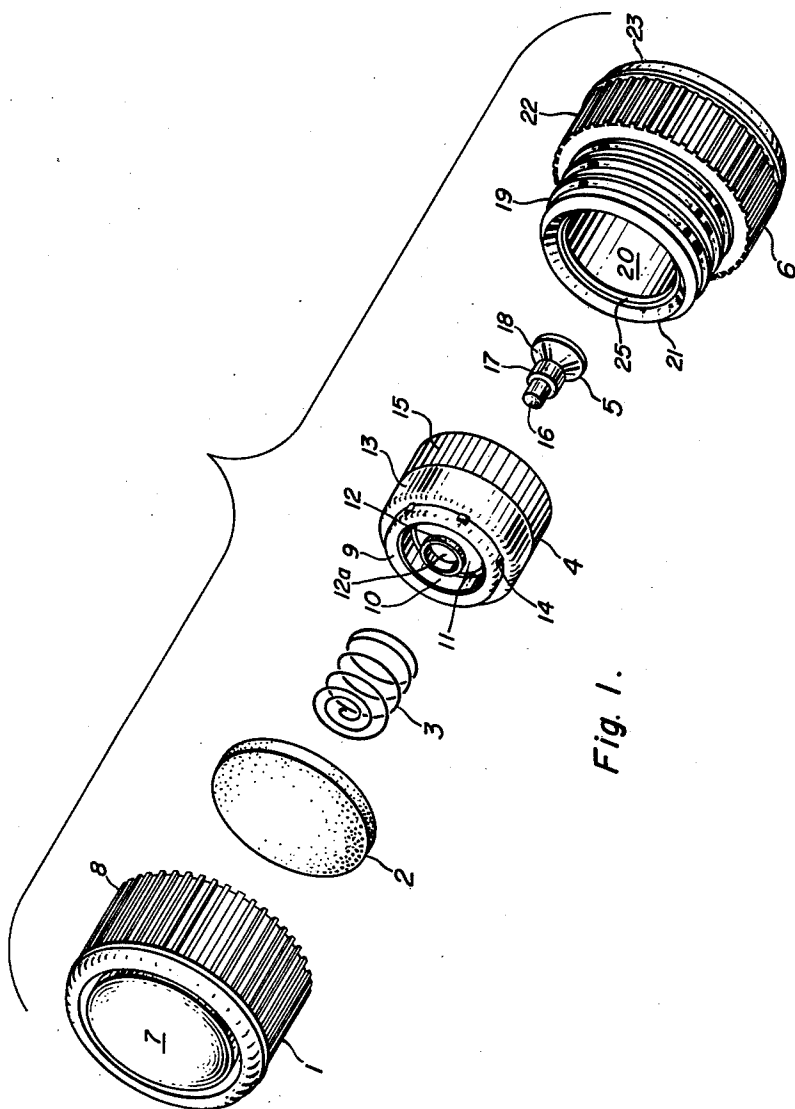


Fig. 1.

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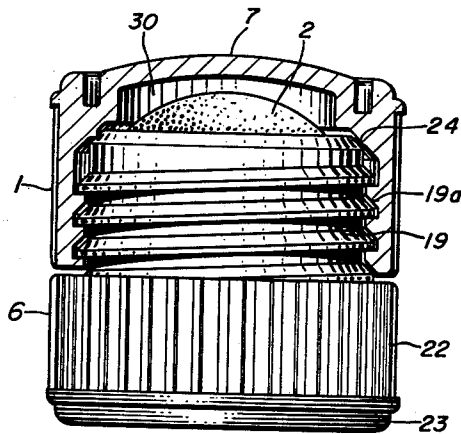


Fig. 2.

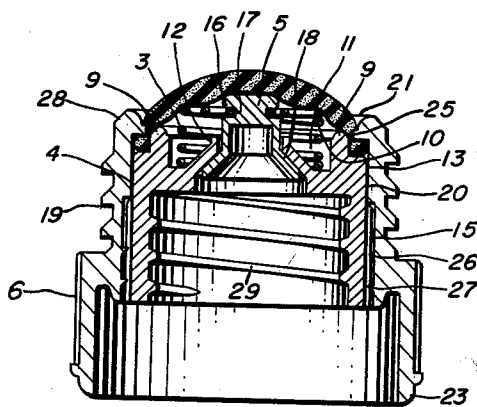


Fig. 3.

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## APPLICATOR CAP

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3 Claims. (Cl. 15—566)

This invention is concerned with applicator caps made or formed from a plastic material and used essentially for the purpose of applying liquids and the like to various surfaces.

There are available in this art many types of applicator caps. Most of the known types of applicator caps require a swedging process for the assembly of the component parts of the cap. This process leaves a great deal to be desired in that the component parts of the caps do not always unite together perfectly, with a consequence that there is a great deal of waste. Further, the caps are not efficient and often leak. In view of these problems, the expense of manufacturing these caps is much greater than the cost of manufacturing the cap of the invention herein described.

It is a primary object of the within invention to provide an applicator cap having component parts that may be assembled mechanically, and not swedged.

It is another object of the within invention to provide an applicator cap that is efficient in operation and having components which may be manufactured from a molded process.

It is yet another object of the within invention to provide a well-designed, neat-appearing, efficient, non-leaking applicator cap made of a plastic material in various colors.

It is still another object of the within invention to provide an applicator cap that does not require any heat in the assembly of its component parts.

These and other objects are obtained by a novel arrangement in assembling the cap from various component parts including a novel spring valve assembly which opens and closes, controlling the flow of the solution to the applicator component itself. Also, there is provided in the device a seal groove which is in the shape of a V and tightly seals the applicator cap on a 45 degree angle upon the cap being tightened.

For a better understanding of the within invention, reference is made to the following detailed description and to the drawings, in which:

FIGURE 1 is an exploded perspective view of the various component parts which make up the device.

FIGURE 2 is a side elevational view of the cap with its component parts fully assembled and with the upper portion of the cap cut away.

FIGURE 3 is a side elevational view of the view shown in FIGURE 2 in cross section showing assembled the various component parts which are shown in perspective in FIGURE 1.

The invention consists of an enclosure cap 1 with a sleeve member 6. Enclosure cap 1 is cylindrical in shape and has a top surface 7 and vertical serrations 8. A reference may be had to FIGURE 1 of the drawing for a better understanding of the cap 1. The sleeve member 6 has serrations 22 which are also vertical, adapting the sleeve for better gripping. Sleeve 6 has a bottom ring 23 which has no actual function but which is a necessary design for mold production and also lends itself for ornamental design. The sleeve member 6 has on its upper outside surface threads 19 for engagement with threads 19a, which are on the inside surface of the enclosure cap 1. Reference is made to the view of FIGURE 2 wherein the enclosure cap 1 is broken away and is shown circumscribing the threads 19 of the sleeve member 6. As can be seen from this view, the threads 19a are proximate the threads 19 of the sleeve

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member 6. The sleeve member 6 has a hollow interior 20. Around the upper portion of the sleeve member 6 is the sponge guard ring 21. On the inside of the sponge guard ring 21 is the pinch ring 25 for the sponge 2.

The sleeve member 6 when assembled contains the sponge 2, the helical spring 3 and the valve support for the valve assembly 4. The view of FIGURE 1 shows these basic components, along with the valve member 5 and the top enclosure cap 1.

While FIGURE 1 is an exploded view, it is herewith expressly stated that the assembly of the sleeve member 6 is not in the sequence shown in the exploded view of FIGURE 1. The exploded view of FIGURE 1 was drawn to clearly describe this invention. However, all of the components, starting with the sponge 2, the spring 3, the valve support 4 and the valve member 5 are inserted from the bottom of the sleeve member 6 proximate the bottom ring 23. The method of insertion and assembly will be explained hereinafter.

The sponge 2 has the shape of a wafer, as shown in FIGURE 1, and may be made of rubber or of a synthetic plastic known as polyurethane. It is also within the scope of this invention to use a cloth material, or even a tightly woven fabric, such as canvas and the like.

The helical spring 3 is made of a stainless steel material to prevent corrosion. The upper three turns on the spring lie within the same plane as will be explained hereinafter.

The valve support 4 is the means that supports the valve assembly. There is on the valve support 4 an upper ring surface 9, which may be referred to as the sponge locking ring. Proximate ring 9 on the interior thereof of the valve support 4 is the spring well surface 10. The spring well 11, itself, circumscribes the spring guide ring 12. The inner portion of the spring guide ring 12 is hollow and is open. Inserted within the spring guide ring 12 is the valve member 5. On the outer portion of the valve support 4 below the sponge lock ring 9 is the seal surface 13. Between the locking ring 9 and the seal surface 13 are the sponge locking lugs 14 disposed concentrically about the upper surface of the seal surface 13. There are in this embodiment six sponge locking lugs 14, equally and concentrically placed about the sponge locking ring 9, as shown in FIGURE 1.

The valve member 5 comprises a spring anchor tip 16 at the top thereof. Below the tip 16 is the anchor tip seat 17 for the spring 3, which might also be referred to as the spring ledge 17. Below the spring ledge 17 is the valve seat, itself, 18. The valve seat 18 is a truncated conical member, fastened integrally with the anchor tip portion 17.

Reference is made to the view of FIGURE 2, wherein the enclosure cap 1 has a sealing V 24 on its inner surface just above where the threads 19 and 19a terminate, and just below or to the sides of the sponge 2. Complementary to the V sealing arrangement 24 in the cap 1 are the 45° seals 28 on the sleeve 6. These seals 28 are located just below the sponge 5 and on each side thereof. The seal 28 is in fact a circular 45° bevel surface.

The most important details of construction of the within device, and particularly for the purpose of combining the components into an integral device, are the locking beads 26 and 27 which circumscribe the interior of the sleeve member 6. Reference is made particularly to the view of FIGURE 3, wherein the beads 26 and 27 are shown. In this view, they can be seen on both sides of the assembly.

The design of the within applicator cap assembly is such that it may be assembled completely by mechanical procedures, rather than by hand and heat. No mullage,

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glue, cement, or any other types of known methods of fastening, including screws and bolts, are employed.

The first phase of assembling the components is for the valve support 4 to be assembled with the valve member 5 and the helical spring 3. The valve member 5 is placed in an upright position. The valve assembly 4 is placed thereover so that the spring anchor tip 16 enters the opening within the spring guide ring 12. The spring 3 is then placed into the spring well 11 surrounding the anchor tip seat or spring ledge 17. The spring 3 is then compressed down over the spring anchor tip 16 and the spring anchor tip 16 is then swedged, locking the spring 3 around the anchor tip seat 17 beneath the spring anchor tip 16. The valve member 5 is now maintained snugly against the bottom of the opening within the ring 12. The only time that the valve seat 18 will be released from tight contact with the opening within 12 is when there is tension against the spring 3. This will force the spring 3 to force the valve seat 18 away from the opening and permit air or fluid to pass therethrough. Otherwise, it is a tight-fitting seal.

The next phase of the assembly of this cap concerns the sponge 2. The sponge 2 is placed from the bottom 23 of the sleeve member 6 up into the top opening thereof proximate the sponge guard ring 21. The assembled sleeve member 4 having already therein the valve member 5 and the spring 3 is then pushed from the bottom of the sleeve member 6 up into the inside of the sleeve member 6, forcing the sponge to be locked into engagement with the sponge locking ring 9 and the pinch ring 25, as aforementioned. The sleeve member 6 has, as mentioned, within its inner surface the locking beads 26 and 27. Locking beads 26 and 27 engage the vertical serrations 15 on the valve support member 4. Under the pressure which is used to force this valve support member 4 into the sleeve member 6, the seal surface 13 is forced right up into the top portion of the inner surface 20 of the sleeve member 6.

The sponge 2 is not only held together by the tight and frictional fit between the surface 25 and the surface 9, which have been referred to heretofore as the pinch ring for the sponge 25 and the sponge locking ring 9, but also the sponge 2 is held in position by the function of the sponge locking lugs 14. In the embodiment shown, there are six lugs 14. All of the lugs 14 cannot be seen in the drawing of FIGURE 3, but the lugs 14 do make contact with the sponge at the inside surface of the pinch ring 25. They not only assist in making the sponge permanently secured, but also act as a stop mechanism for preventing the valve support assembly 4 from being pushed through the sleeve 6 under a pressure of 250 pounds per square inch.

When the cap 1 is placed upon the threads 19 and its own threads 19a engage the threads 19, it is screwed down tight to prevent the sponge 2 from being operated against the spring 3. It is to be noted that the upper three turns on spring 3 lie within the same plane to offer support to the bottom surface of the sponge 2 in order to maintain the sponge 2 in a rigid convex position. In FIGURE 2 it can be seen that the cap 1 will not come down and make contact with the sponge, as there is an opening or an air space 30 between the top of the sponge and the lower surface of the enclosure cap top 7. However, in case there is a slight leakage, which might happen on a defective cap, or through heat and expansion or for a wearing-out process, there is a V shape seal in the cap, which has already been described as the sealing V 24. Proximate seal V 24 on the sleeve assembly is the 45° seal or sleeve 28, which as aforementioned, is a bevel shape surface which runs the entire circumference of the top of the sleeve 6. This bevel surface of 45° 28 operates with the V shape seal 24, so as to make an air-tight, liquid-tight seal between the enclosure cap 1 and the sleeve member 6.

Inside the valve member assembly 4, are the threads

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29. The threads 29 are for the purpose of attaching the applicator cap assembly to the container which will carry the liquid or fluid that is to be applied through the valve applicator cap. It is contemplated that the container will be cylindrical in shape, at least at the top, and will have threads that are complementary to the threads 29 in the valve assembly member 4.

The machinery which is used to assemble the within cap, and which is not part of this invention as exhibited, exerts a pressure of 250 pounds per square inch on the valve support member 4 when pushing same up into the inside of the sleeve member 6. The sleeve member 6 appears, as shown in FIGURE 2, fully assembled. The sponge 2 has a convex shape extending out from the sponge guard ring 21. The sponge guard ring 21 acts as a bumper or guard for the sponge 2 to prevent it from being torn when it is being used.

The applicator cap is, of course, simple to operate. It is contemplated that the cap will be fastened to a container in the usual manner. Assuming that the container carries a form of antiseptic, the antiseptic, being in a fluid state, is filled in the container. The container is turned upside down so that the fluid will operate on a gravity feed. It will not come out of the container unless there are forces exerted against the sponge 2, which of course, will force the spring 3 to push the valve seat 18 away from the bottom of the opening of the ring 12. If a person is using the applicator on an open wound, he would put the sponge 2 on the wound and press down slightly. The antiseptic would then flow through the opening 12a onto the sponge 2 and would then be disbursed by the sponge 2 onto the desired surface of the area in contact.

Certain dimensions in the drawing have been somewhat exaggerated to clearly define and teach the invention.

It is contemplated that certain equivalent materials may be employed without departing from the spirit and scope of the invention, and also that the change of shape and size of the various components shall not materially depart from the spirit of the invention.

In consideration of the foregoing, I claim:

1. An applicator cap comprising a cylindrical enclosure cap, a cylindrical sleeve member, a cylindrical valve support of a smaller diameter than the sleeve member and coaxially press fitted into the sleeve member, a valve member of a smaller diameter than said valve support, a spring well within said valve support, a helical spring terminating in a substantially coplanar spiral winding, and a thin sheetlike, sponge means, said valve member located within said valve support, said helical spring being operably connected to the top of said valve member, the top of said valve member located inside of said spring well, said sponge means being fastened about its periphery, between said valve support and said sleeve member and being urged upwardly therefrom at a series of concentric positions by said spiral spring winding, said valve support being located within said sleeve member, threads on the outside surface of said sleeve member and threads on the inside surface of said enclosure cap, whereby said enclosure cap may securely engage said valve member, a 45° beveled surface on the outer periphery of said sleeve member, a V shaped surface extending inwardly from the inside of the enclosure cap, whereby when said enclosure cap makes secure engagement with said valve member, said V shaped surface and said beveled shaped surface contact each other and securely seal the sponge from the outside and prevent leaking.

2. An applicator cap comprising a cylindrical enclosure cap, a cylindrical sleeve member, a cylindrical valve support of a smaller diameter than the sleeve member, a valve member of a smaller diameter than said valve support, a spring well within said valve support, a helical spring mounted within said spring well, said spring terminating in a substantially coplanar spiral winding, and

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a thin sheetlike, sponge means, said valve member located within said valve support, said helical spring being operably connected to said valve member, said sponge means being fastened between said valve support and said sleeve member, the spiral winding of said spring engaging the sponge means at a plurality of concentric positions thereby urging the sponge outwardly from the sleeve member, said valve support being located within said sleeve member, threads on the outside surface of said sleeve member and threads on the inside surface of said enclosure cap, whereby said enclosure cap may securely engage said valve member, a plurality of sponge locking lugs located concentrically about the upper portion of said valve support for aiding in the fastening of the said sponge means between said valve support and said sleeve member, a 45° beveled surface on the outer periphery of said sleeve member, a V shaped surface extending inwardly from the inside of the enclosure cap, whereby when said enclosure cap makes secure engagement with said valve member, said V shaped surface and said beveled shaped surface contact each other and securely seal the sponge from the outside and prevent leaking.

3. An applicator cap comprising: a cylindrical enclosure cap, a cylindrical sleeve member, a cylindrical valve support of a smaller diameter than said sleeve member

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and coaxially press fitted into the sleeve member, a valve member of smaller diameter than said valve support, a spring well within said valve support, a helical spring terminating in a substantially coplanar spiral winding, a thin sheetlike sponge means, said valve member located within said valve support, said spiral winding of the helical spring being operatively connected to the top of said valve member, the top of said valve member located inside of said spring well, said sponge means being fastened about its periphery between said valve support and said sleeve member and being supported and urged upwardly at a series of concentric positions by the turns of said spiral winding on the spring, said sleeve member being externally threaded and said cap member being internally threaded to threadably engage therewith, and cooperating sealing means on said cap member and sleeve member to interengage when the cap is threaded onto the sleeve and prevent leakage of fluid therebetween.

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