March 10, 1964 M. B. STULL 3,124,280

DISPENSING CAP CONSTRUCTION

Filed May 1, 1961

Fig. 1

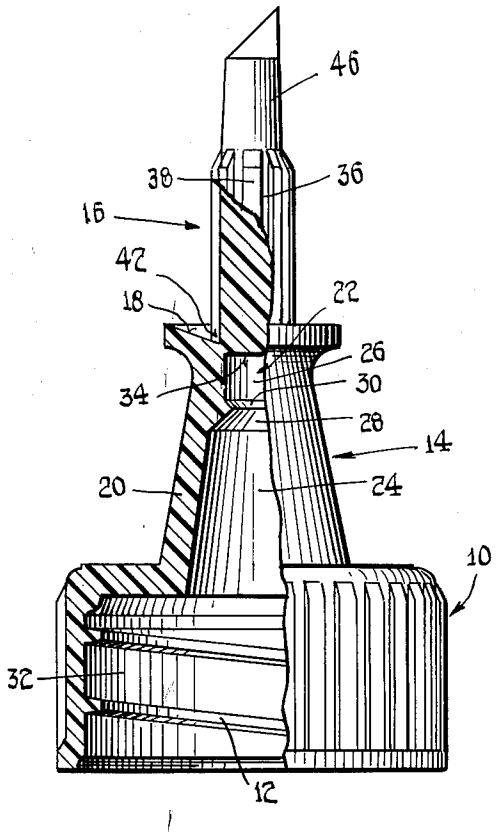


Fig. 3

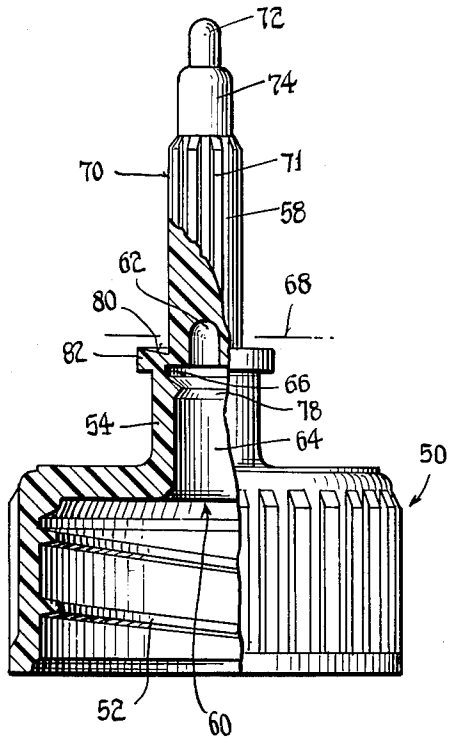
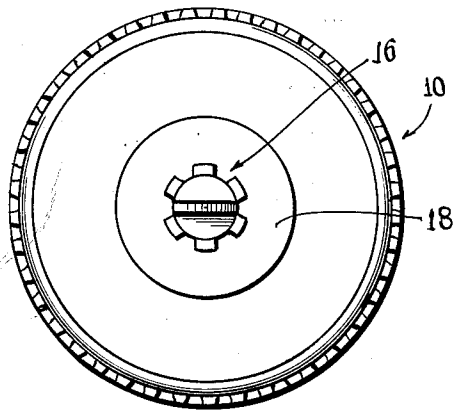


Fig. 2



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DISPENSING CAP CONSTRUCTION

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This invention relates to dispensing cap constructions which are adapted to be used with small containers such as bottles, vials and the like, and more particularly to reclosable cap constructions of this type, which are fabricated so as to be in an initially sealed state and to be readily broken or cut open by the user.

The invention concerns improvements in the cap construction illustrated and described in my Patent Number 2,930,063 dated March 29, 1960 and entitled "Dispensing Cap for Containers." In this patented cap construction there is provided a cap body having a projecting tubular nozzle portion, and having a combined sealing and closure plug extending beyond and molded as an integral part of the nozzle or orifice portion, said plug being adapted to be slit through as by a sharp knife, razor or the like, to expose a discharge orifice which is then subsequently reclosed by application of the reduced tip or opposite end of the severed plug.

In the patented cap construction the cutting through of the sealing means to sever the plug is intended to be done at the same location where the breakage or rupture occurs when the plug is removed by bending and breaking it. While such arrangement was satisfactory in general, it sometimes resulted in a rough broken edge which was somewhat deformed by the bending and breaking process, tending to defeat a clean appearance and under certain conditions to defeat a tight reclosure. The line of rupture was at all times not sharply defined whereby results might be unpredictable if a user did not properly carry out the bending and breaking procedure.

An object of the present invention is to provide a novel and improved dispensing cap construction of the general patented type outlined above, wherein the opening of the cap by bending and breaking off the tip portion is facilitated, being not only made easier but also resulting in a cleaner rupture edge.

Another object of the invention is to provide a novel and improved cap construction of the type set forth above, wherein the user has a choice of either cutting through or else breaking off the sealing member in order to open the cap, and wherein either procedure results at all times in a relatively clean edge and satisfactory discharge orifice, and in a tight and effective reclosing of the opened cap.

A further object of the invention is to provide an improved combination cap construction openable by either breaking or cutting, which has all of the advantages mentioned above, including facilitating the breaking of the frangible wall, the obtaining of a clean structural edge, and the effective reclosing of the cap.

A feature of the invention resides in the provision of an improved cap construction as above outlined, wherein a reinforcement action provided by a dripless nozzle tip located at the discharge orifice is utilized to facilitate the breaking open of the cap, while at the same time the tip enables a more saitsfactory dispensing of the fluid contents to be had.

Another feature of the invention resides in the provision of a novel cap construction wherein different-size discharge orifices are exposed, depending on whether the opening is done by the bending or breaking procedure or else by the cutting-through procedure, and wherein the severed piece has different-size plug portions which are respectively usable to restopper the container, for either of the above opening procedures.

Still another feature of the invention resides in the provision of an improved cap construction in accordance with the foregoing, wherein the size of the discharge orifice or passage may be accurately determined and held, regardless of the opening procedure and regardless of the size of the mouth which is exposed at the time of opening.

Still another feature of the invention resides in the provision of an improved cap construction which may be opened either by a bending and breaking or else by a cutting-through operation, wherein inadvertent opening of the cap under adverse conditions of use such as rough handling or the like is minimized while at the same time the bending-breaking procedure is not made difficult.

Other features and advantages will hereinafter appear.

In the drawings, which illustrate two different embodiments of the invention:

FIGURE 1 is a side elevational view of a cap construction shown on an enlarged scale, with portions broken away and illustrated in section to reveal interior details. This cap construction is intended to be opened especially by bending the tip or top portion to effect a break-off at the base, without the use of a cuting tool such as a scissors, blade or the like.

FIG. 2 is a top plan view of the cap construction of FIG. 1, also shown on an enlarged scale.

FIG. 3 is a side elevational view of a cap construction illustrating another embodiment of the invention, portions being broken away and shown in section to reveal the interior. This figure is also on an enlarged scale, and sets forth a cap construction of the type which may be opened by either cutting through or else breaking off a sealing portion or cork-like tip. The cap construction includes a plug-like tip having a stepped extremity with a small diameter receivable in a small bore of the cap body and a larger portion adjacent the small tip, which may be received in a large bore of the body, depending on whether the plug is cut through or bent and broken off.

Considering first FIGS. 1 and 2, the dispensing cap construction shown therein comprises a cap body indicated generally by the numeral 10, having means in the form of internal screw threads 12 by which it may be attached to the mouth of a container. The cap construction may be advantageously molded of a resilient plastic substance such as polyethylene or the like, and it will be understood that, by virtue of the yieldable nature of the material, in place of the internal screw threads 12 other means may be employed to retain the cap body in place on the container, as for example yieldable internal detent shoulders or ledges and the like. A special type of internal yieldable detent shoulder or bead construction adapted for use with a glass bottle type container, is illustrated and described in my Patent Number 2,990,076, issued June 27, 1961, entitled Closure Cap and Container Neck Construction.

The particular type of retention or detent means provided in the cap body 10 does not concern the present invention, and accordingly further details of the same are not given herein.

In accordance with the present invention, in conjunction with the cap body 10 of resilient plastic substance there is provided a novel and improved sealing and dispensing means comprising a projecting tubular member 14 carried by the cap body, and further comprising an integral combined sealing and stopper portion 16 in the form of a serrated plug which closes over an orifice of the dispensing member 14 and which may be readily bent and broken off to expose the said orifice, all in conjunction with a novel dripless pouring lip 18 which provides an important reinforcement function thereby to facilitate the breaking operation of the plug 16.

The dispensing member 14 is shown, in the illustrated embodiment of the invention, as being molded to con-

stitute an integral part of the cap body 10, such member having a truncated conical shape, with inwardly tapered conical walls 20 terminating at the annular dripless nozzle tip 18 which surrounds an outlet orifice 22 and which is spaced from the cap body portion 10 an appreciable distance.

The tubular dispensing member 14 has a large tapered bore 24 and also a smaller, generally cylindrical bore 26 which connects with the large tapered bore 24 by means of an intermediate conical connecting channel 28, there being further provided a small tapered internal shoulder or bead 30 between the channel 28 and the small cylindrical bore 26, the purpose of which will be later brought out.

As shown, the large tapered bore 24 communicates with the interior space 32 of the cap body 10 whereby the contents of the container may be dispensed or discharged by passing through the large bore 24, the connecting channel 28 and the small cylindrical bore 26 after the cap construction has been opened, as will be also explained below.

By the present invention there is provided between the combined sealing and stopper portion or plug 16 on the one hand and the dispensing member 14 on the other hand an annular zone 34 characterized by thin and intentionally frangible walls, this zone being located at the juncture of the plug and orifice (also seen to be in the base of the plug 16). The locating at the zone 34 of thin, frangible walls (adjacent the dripless nozzle tip 18) is of importance, and constitutes a feature of the invention in that the reinforcing effect of the dripless nozzle tip 18 at this point limits the yieldability of the end of the orifice member 14 and provides a desirable stiffness and rigidity thereto, by which breaking off of the plug 16 at the zone 34 is facilitated due to such rigidity enabling a fracture of the thin walls to be more readily effected.

In conjunction with the reinforcing effect of the dripless nozzle tip 18 there is also provided in accordance with the invention, deep serrations or grooves 36 extending longitudinally in the outer walls of the plug 16, which results in a plurality of longitudinally extending stiffening ribs 38. Such serrations and ribs have a stiffening effect on the plug 16, without requiring massive wall thicknesses minimizing any flexing of the same at the time that the plug is grasped for the purpose of bending and breaking it off from the orifice member 14. Thus, by virtue of the stiffening or reinforcing action of the dripless nozzle tip 18 in conjunction with the stiffening function of the ribs 38 and the better grip which such ribs provide when the plug 16 is being grasped, the opening procedure which depends upon fracture of the thin-walled zone 34 occurs more readily, and without noticeable difficulty.

Playing an important part in facilitating the break-off of the plug at the base thereof, is the outer or upper side surface of the dripless nozzle tip 18. It is seen that such upper surface is of dished formation, being conical in nature whereby a sharp corner 42 is formed at the juncture of the plug 16 and the lip 18. Such dished configuration of the dripless nozzle tip tends to resist further any raising movement of a portion of the orifice member 14 at one side of the plug 16 as the latter is being bent for the purpose of breaking it off. It will be understood that such portion at one side of the plug is on the side located away from the direction of bending, and in consequence of the restriction of movement of the orifice member at this point a fracture will more readily occur in response to such bending.

It is pointed out that where an area of intentional weakness is provided, as for example the thin-walled, frangible zone 34, any strengthening of other portions of the assemblage will accentuate the effect of the weakness of the thin walls, thereby resulting in an easier fracture operation.

Upon the plug 16 being broken off in the above manner, the small diameter bore 26 which comprises the orifice 22 will be exposed, thereby to enable the contents of the container to be discharged therethrough.

When it is desired to reclose the container after breaking off the plug 16, it is merely necessary to insert the stopper or tip portion 46 of the plug in the orifice and bore 22, 26, whereby the plug constitutes a conveniently removable stopper.

The provision of the internal tapering shoulder or bead 30 is of advantage in that such bead may serve several functions. During the closing of the cap construction, the bead is engaged by the plug tip 46, to render the reclosing of the cap construction more effective by providing a pressure seal. Further, during discharge or dispensing of the contents of the container, the bead 30 provides a restriction or constriction of the discharge orifice or bore, and limits the flow of substance to a desired rate.

It will be seen from the foregoing that I have provided a novel molded resilient cap construction wherein there is combined an orifice or dispensing member, a combined integral sealing and stopper portion carried by the orifice member, a zone of thin and intentionally frangible walls at the juncture of the orifice member and stopper portion together with a reinforcing dripless nozzle tip adjacent such juncture and serrations or hand grip means on the stopper portion, all to the end that the breaking off of such portion is facilitated when it is desired to unseal and open the cap construction for discharge of the container contents. The cap construction is seen to be relatively simple, and may be readily molded of polyethylene or plastic substance of similar formulation having the desired degree of resilience.

Prior to opening of the cap construction the contents of the container will be securely retained, and the container will remain sealed even though subjected to rough handling and other adverse conditions of use, inasmuch as the base portions of the serrations or ribs 38, where they join the dripless nozzle tip 18, provide a strengthening effect which is sufficient to prevent accidental breaking off of the plug means while at the same time such strengthening does not defeat the ready tearing of the frangible wall zone 34 and breaking off of the tip 16.

Another embodiment of the invention is shown in FIG. 3. This embodiment utilizes the novel break-off arrangement of FIGS. 1 and 2, but further provides a plug organization by which the cap construction may be opened through the use of a cutting tool such as a scissors or the like, in the event that it is not desired to employ the break-off type opening. When the cutting tool is used, the discharge orifice is of smaller size than when the plug is removed by bending and breaking, although this is not a limiting characteristic, since both types of orifices may be made of the same size with equal ease, or the orifice which is exposed when the tip is broken off may be a controlling factor such that severance of the tip by a cutting tool would not alter the effective flow or discharge of the container contents.

In FIG. 3 the cap body portion is indicated by the numeral 50, such body having the usual spiral screw threads 52 as shown. Projecting upward from the center of the cap body 50 is a projecting tubular orifice member 54 and also a combined serrated sealing and stopper portion 58 comprising a plug which constitutes an extension of the orifice member 54 as will be readily understood.

By the present invention there is provided in the orifice member 54 and plug 58 a stepped bore 60, disposed with a small diameter portion 62 located in the plug 58 and a large diameter portion 64 located in the orifice member 54. The invention further provides an annular zone 66 characterized by thin and intentionally frangible walls, located at the juncture of the plug 58 and the orifice member 54 whereby a forcible bending of the plug

effects fracture of said thin walls to expose the large diameter bore 64.

The plug 58, in the construction shown in FIG. 3, is severable by a cutting instrument such as a knife, scissors or the like along the broken line 68 whereby the cut passes through the small diameter bore 62 and exposes the same so that it may constitute an orifice.

The plug 58, at a location beyond the serrated handle portion 70 thereof has a stepped extremity comprising a small tip 72 and a larger tip portion 74 adjacent the small tip 72, the latter being receivable in the small diameter orifice 62 so as to constitute a stopper therefor. The large diameter portion 74 of the plug is receivable in the large diameter bore portion 64 to constitute a stopper, this depending upon whether the stopper plug 58 is removed by cutting it through along the line 68 or instead is removed by bending it to break the frangible walls 66.

In the first instance, the exposed orifice comprises the small diameter bore portion 62, which will receive the small diameter tip 72. In the case where the plug 58 is broken off by bending it, the large diameter orifice 64 will be exposed, and will accommodate the large diameter tip portion 74 of the plug 58. The user may thus select between fast and slow rates of dispensing as effected by the large or small orifice.

As with the embodiment of FIGS. 1 and 2, an internal annular shoulder or bead 78 is provided, which may be utilized for the purpose of restricting the flow of the container contents from the orifice 64 and which is engageable with the large diameter tip portion 74 so as to effect a tight seal of the container when the same is not in use.

It will be understood that the bead 78 may have different sizes or diameters whereby it may constrict to a greater or lesser extent the large diameter orifice or lower portion 64, thereby to limit the flow as desired. For example, the smaller or internal diameter of the bead 78 may be the same as the diameter of the small bore portion 62, or it may be made even smaller than such bore portion or else larger as shown in the figure.

Thus it will now be understood by considering FIG. 3 that I have provided a novel and improved cap construction wherein the combined sealer and stopper plug may be easily and quickly removed either by the use of a cutting instrument such as a scissors, sharp knife, razor or the like, or else without the use of tools by merely bending the plug so as to break it from the dispensing member 54 at the base of the plug. In either circumstance the stepped extremity of the stopper plug may be subsequently used to close the open cap construction, regardless of whether there is exposed the small diameter bore 62 as when the plug is removed by a cutting instrument, or the large diameter bore 64 as when the plug is removed by bending and breaking it off.

The cap construction shown is relatively simple, and fool-proof in operation. It resists accidental opening or fracture to a marked degree, by virtue of the provision of the longitudinally extending ribs 71 located on the exterior of the plug handle portion 70. As with the embodiment of FIGS. 1 and 2, the dished or conical upper surface 80 of the dripless nozzle tip 82 provided at the juncture of the stopper plug 58 and dispensing member 54 reinforces the latter at the break-off zone, thereby to facilitate the break-off operation, as already explained in connection with FIGS. 1 and 2.

Variations and modifications may be made within the scope of the claims, and portions of the improvements may be used without others.

I claim:

1. A dispensing cap construction comprising a cap body of resilient plastic substance, said body having means for attaching it to a container mouth; a tubular, projecting dispensing member carried by the cap body, said member having at a location spaced from the body an annular outward and radially extending dripless nozzle tip surrounding an outlet orifice, said tip comprising a pronounced outward flange effecting a substantial reinforcement of the walls of the member at said orifice, said member further including an integral combined sealing and stopper portion comprising a deeply grooved plug which closes over the said orifice and said member having thin and intentionally frangible walls at the juncture of the plug and orifice whereby a forcible bending of the plug effects fracture of said walls and severance of the plug, thereby to expose the orifice, said plug including at its end a stopper portion which is adapted to be press-fitted in the orifice to close the same, the reinforcement effected by the said flange of the dripless tip imparting a stability to the dispensing member at the orifice and the portions of the plug between the grooves stiffening the same while avoiding excessive wall thickness, whereby the breaking-off of the plug is facilitated.

2. A cap construction as in claim 1, in which the dispensing member has an internal annular bead located adjacent the pouring lip, said bead constituting a constriction in the bore of the member and limiting the flow of substance from the container to a predetermined value.

3. A cap construction as in claim 2, in which the internal annular bead has sloping walls and is disposed for engagement by the stopper portion of the plug when the latter is severed and inserted in the dispensing member, thereby to provide a pressure seal.

4. A dispensing cap construction arranged to be opened by either cutting through or breaking-off a sealing portion, comprising a cap body adapted to be secured to a container, said body having a projecting tubular orifice member and a combined sealing and stopper portion comprising a plug which constitutes an extension of the orifice member, said member and plug having a stepped bore disposed with a small diameter located in the plug and a large diameter in the member, there being thin and intentionally frangible walls at the juncture of the plug and member whereby a forcible bending of the plug effects fracture of said walls to expose the large diameter bore, said plug alternatively being severable by a cutting instrument at the small diameter bore to expose the same and having a stepped extremity with a small tip receivable in the small bore and a larger portion adjacent the small tip and receivable in the large bore, depending on whether the plug is cut through or bent and broken off, the exposing of the large diameter bore providing for a fast discharge rate and the exposing of the small diameter bore providing for a slow discharge rate.

5. A cap construction as in claim 4, in which the large diameter bore has a constricting annular internal bead to limit flow of liquid therethrough.

6. A cap construction as in claim 5, in which the large plug portion is engageable with the bead when inserted in the large diameter bore, to effect a seal.

7. A cap construction as in claim 4, in which the stepped extremity of the plug has tapered portions at the end of the small tip and between the small tip and the said larger portion to facilitate entry of these in the respective bores.

8. A cap construction as in claim 4, in which the orifice member has a pronounced annular outward and radially extending, dripless nozzle tip adjacent the stopper portion, said lip substantially reinforcing the member close to the thin frangible walls to impart stability whereby the breaking-off of the plug is facilitated.

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