United States Patent

[11] 3,572,559

[72] Inventor **Morton B. Stull**
Boonton, N.J. (c/o Stull Engraving Company, 221-223 Banta Ave., Garfield, New Jersey 07026)

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[45] Patented **Mar. 30, 1971**

[54] **MULTIPOSITION DISPENSING CAP**
6 Claims, 11 Drawing Figs.

[52] **U.S. Cl.** **222/499,** 222/546, 222/563
[51] **Int. Cl.** **B65d 41/28**
[50] **Field of Search** 222/546, 499, 522, 525, 562, 563, 521

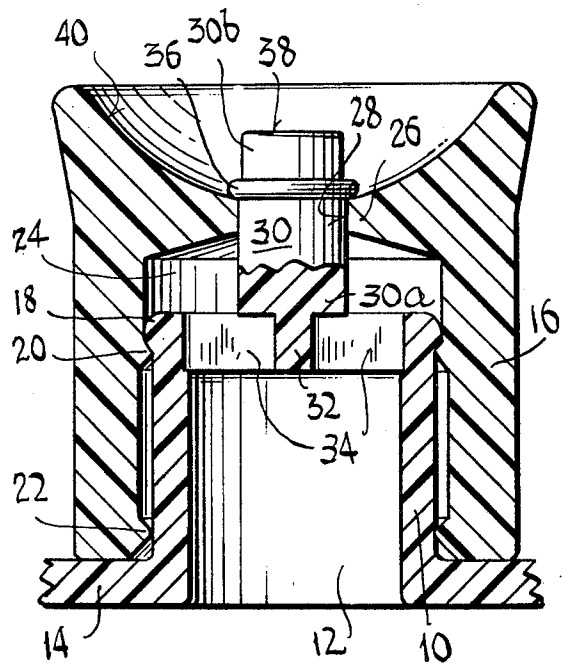
[56] **References Cited**

UNITED STATES PATENTS

2,998,902	9/1961	Thomas et al.	222/499
3,113,693	12/1963	Stull	222/546UX
3,120,910	2/1964	Nyden	222/525
3,216,630	11/1965	Stull	222/499
3,269,617	8/1966	Goth	222/562X
3,276,640	10/1966	Kessler	222/525

Primary Examiner—Robert B. Reeves
Assistant Examiner—Frederick R. Handren
Attorney—H. Gibner Lehmann

ABSTRACT: A dispensing cap construction comprising an orifice member attachable to a container, and a cap member movably mounted on the orifice member. The members have cooperable stopper and discharge passage portions. The stopper portion has at one point a side projection increasing its size. The cap member can have both a shallow, consumer seal position and a deep, factory seal position. For both said positions the stopper portion closes the cooperable discharge passage, whereas the passage is opened for a third or raised, dispensing position of the cap member. The deep position of the cap member effects a more secure seal of the passage, and requires a greater applying force than that needed to attain only the shallow cap position, this being due to the increased size of the stopper portion effected by its side projection.



2 Sheets-Sheet 1

Fig. 1

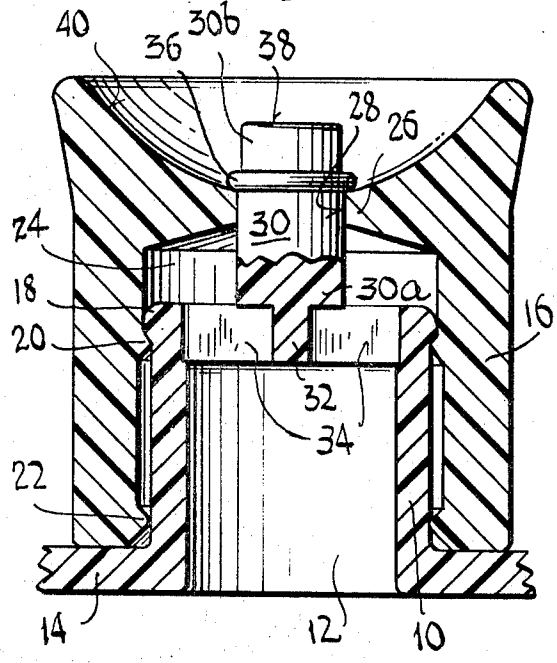


Fig. 3

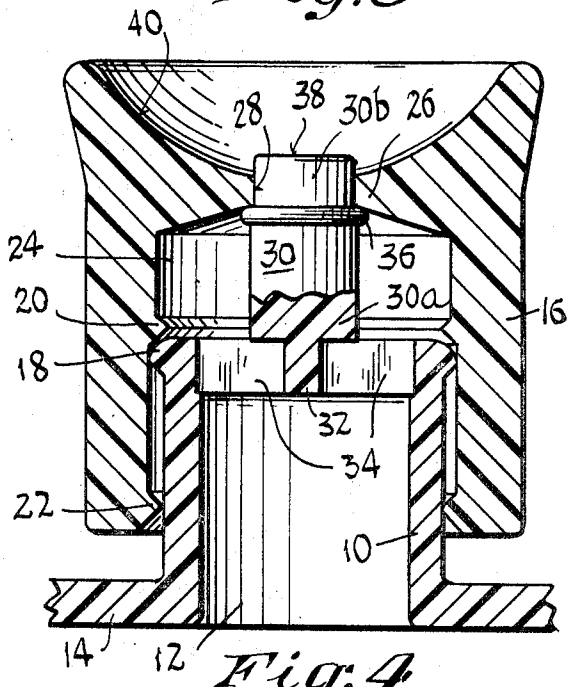


Fig. 4

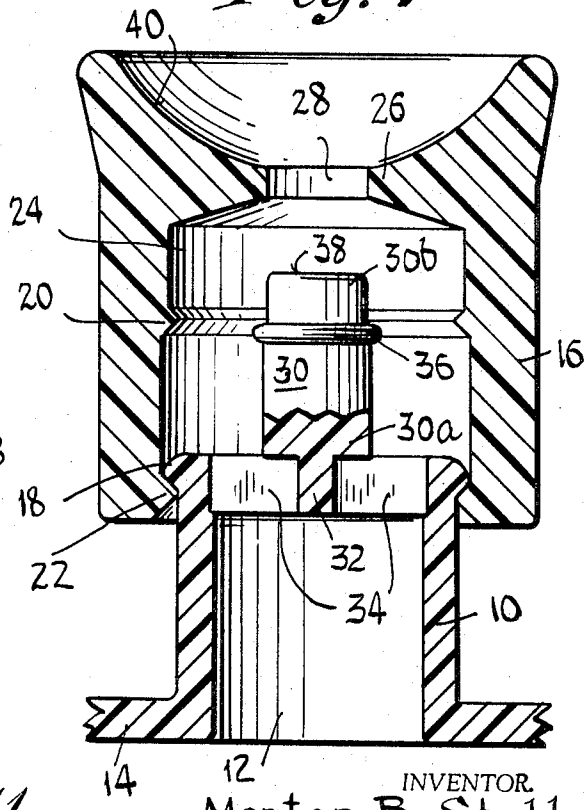
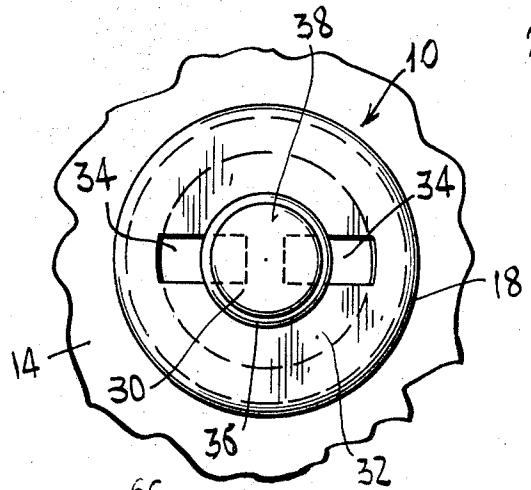


Fig. 2



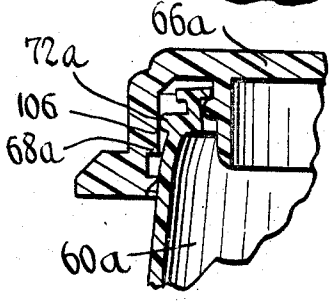


Fig. 11

INVENTOR.
Morton B. Stull
BY
H. Gilbert Schumann
AGENT

Fig. 5

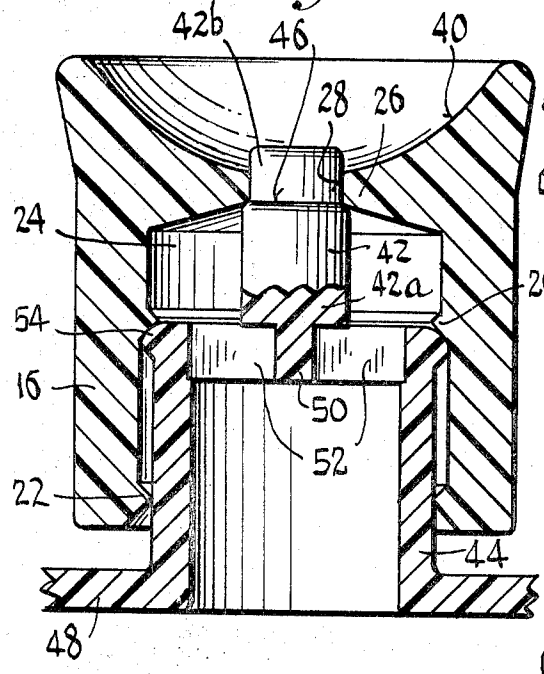
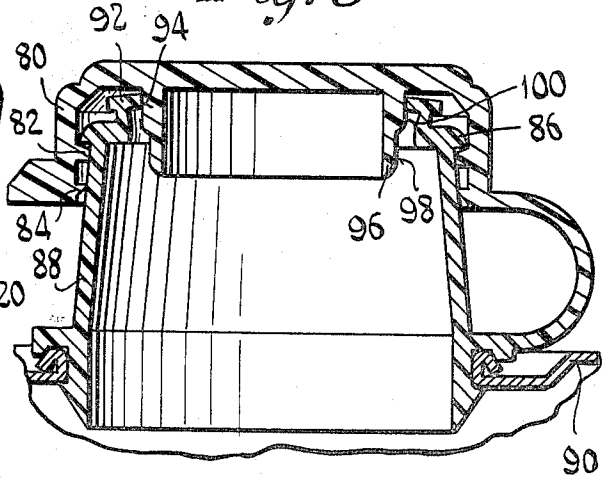


Fig. 8



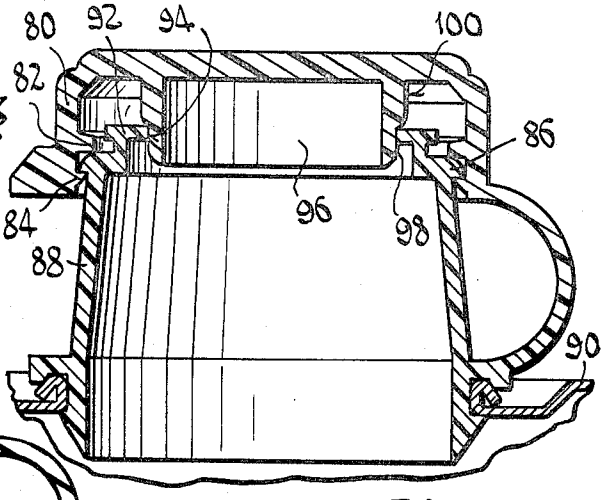


Fig. 9

Fig. 6

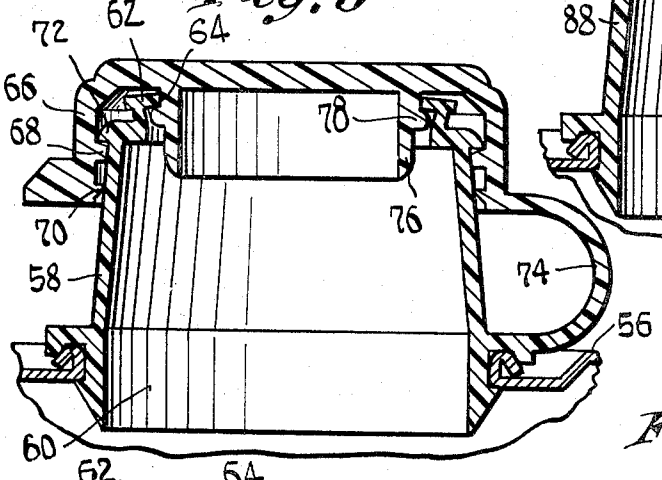


Fig. 10

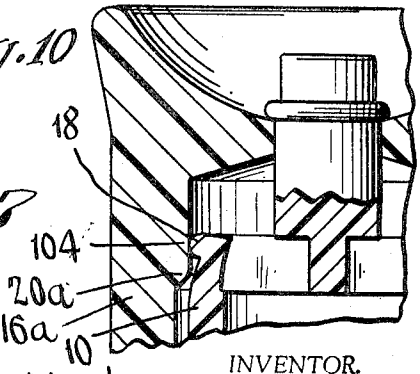
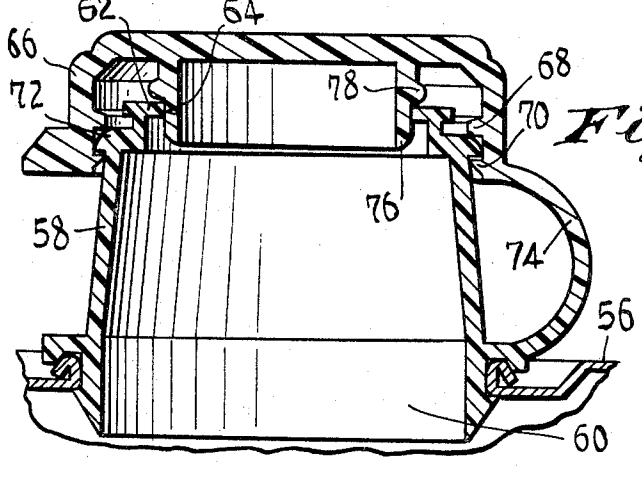


Fig 7



INVENTOR.
Morton B. Stull
BY
H. Gilbert Lehmann
AGENT

MULTIPOSITION DISPENSING CAP

CROSS REFERENCES TO RELATED APPLICATIONS AND PATENTS

1. U.S. Pat. No. 2,998,902
2. U.S. Pat. No. 3,113,693
3. U.S. Pat. No. 3,216,630
4. U.S. Pat. No. 3,339,773
5. U.S. Pat. No. 3,351,249
6. Copending application of Morton B. Stull, Ser. No. 602,004 filed Dec. 15, 1966, now U.S. Pat. No. 3,433,394, entitled "Dispensing Closure Cap."
7. Copending application of Morton B. Stull, Ser. No. 605,654 filed Dec. 19, 1966, now U.S. Pat. No. 3,370,764, entitled "Dispensing Screw-Type Closure Cap."
8. Copending application of Morton B. Stull, Ser. No. 605,805 filed Dec. 29, 1966, now U.S. Pat. No. 3,406,880, entitled "Dispensing Closure Cap."
9. Copending application of Morton B. Stull, Ser. No. 611,325 filed Jan. 24, 1967, now U.S. Pat. No. 3,407,967, entitled "Dispensing Closure Cap."
10. Copending application of Morton B. Stull, Ser. No. 652,915 filed Jul. 12, 1967, now U.S. Pat. No. 3,406,879, entitled "Reclosable Dispensing Cap."
11. Copending application of Morton B. Stull, Ser. No. 695,779 filed Jan. 4, 1968, now U.S. Pat. No. 3,439,842, entitled "Push-Pull Dispensing Cap."

BACKGROUND OF THE INVENTION

This invention relates to push-to-close, pull-to-open dispensing caps. A prior patent, U.S. Pat. No. 2,998,902, which discloses a cap of this type has a tubular orifice member provided with detents around the orifice or discharge passage, which are cooperable with the cap member to effect the deep, factory seal position of the latter or else the shallow, consumer seal position thereof. The cap member has a central discharge opening which is closed by a stopper or pin carried by the orifice member, for both the shallow consumer seal and the deep factory seal positions. The tightness of the two seals thus effected is substantially the same. At times this could be a drawback, as when added security of the deep, factory seal is felt to be desirable.

SUMMARY

The above shortcoming of the identified prior dispensing cap is obviated by the present invention, and one object of the invention is to provide a novel and improved push-pull dispenser cap of the type identified, wherein the deep, factory-seal position of the cap member effects a tighter and more secure sealing of the container contents that is required of the shallower, consumer seal position. This is accomplished by the provision of cooperable orifice and cap members having a multiposition relationship, and having cooperable stopper and discharge-opening portions, wherein the stopper portion has at one point a side projection or enlargement which increases its size at said point. For the deep position of the cap member the side projection of the stopper portion is engaged with the cooperable wall having the discharge opening, whereby there is had a tighter seal than for the shallow, consumer seal position of the cap member.

Other objects and advantages of the invention reside in a cap construction as above set forth, wherein the orifice and cap members are economical to fabricate, simple in construction, small and compact, easily molded of plastic substance, readily factory assembled and easily operated by the consumer, and reliable and effective in operation.

Other features and advantages will hereinafter appear.

In the drawings:

FIG. 1 is an axial sectional view of a multiposition dispensing closure construction, showing the cap member in the deep, factory-sealed position.

FIG. 2 is a fragmentary top plan view of the orifice member of the construction of FIG. 1.

FIG. 3 is an axial sectional view of the cap of FIG. 1, with the cap member shown in the shallow, consumer-sealed position.

FIG. 4 is an axial sectional view of the cap construction of FIGS. 1—3, showing the cap member in the open or dispensing position.

FIG. 5 is an axial sectional view of a cap construction constituting another embodiment of the invention, with the cap member being shown in the shallow, consumer-sealed position similar to that of FIG. 3.

FIG. 6 is an axial sectional view of a dispensing cap construction illustrating yet another embodiment of the invention, the cap member being shown in the deep, factory-sealed position.

FIG. 7 is an axial sectional view of the cap of FIG. 6, showing the cap member in the shallow, consumer-sealed position.

FIG. 8 is an axial sectional view of yet another embodiment of the invention somewhat similar to that of FIG. 6, showing the cap member in the deep factory-sealed position.

FIG. 9 is an axial sectional view of the cap construction of FIG. 8, showing the cap member in the shallow, consumer-sealed position.

FIG. 10 is a fragmentary axial sectional view of a cap construction like that of FIGS. 1—4 but showing a modified form.

FIG. 11 is a fragmentary axial sectional view of a cap construction like that of FIGS. 6 and 7 but showing another modification.

Referring first to FIGS. 1—4, the dispensing cap construction as illustrated therein comprises a tubular orifice member 10 having a large central discharge passage 12 through which the contents of the container may pass. The orifice member 10 may further comprise a base portion 14 which can either constitute a top wall of the container, or else a mounting cup or base attachable to a suitable formation on the top container wall, as is well understood in the art.

Movably mounted on the orifice member 10 is a cap member 16 arranged, in conjunction with the member 10, to have three different relative axial positions thereon, as shown in FIGS. 1, 3 and 4 respectively. In FIG. 1 the cap member 16 has a deep, factory-sealed position, in FIG. 3 the member has a shallow, consumer-sealed position and in FIG. 4 the cap member 16 has a raised, open or dispensing position.

Cooperable detent means are provided to enable the three positions to be readily determined and defined. The orifice member 10 has an annular external bead 18 at its upper end, and cooperable with such bead are annular internal beads 20, 22 provided in the bore of the cap member 16. The bead 22 is located at the bottom edge of the cap member, whereas the bead 20 is located intermediate the ends of the large central bore 24 thereof.

The cap member 16 has a transverse top wall 26 provided with a discharge opening 28 adapted to accommodate an imperforate stopper portion or closure pin 30 carried by the orifice member 10. For this purpose, the member 10 has a transverse top wall 32 on which the stopper 30 is mounted, said wall having a plurality of openings or passages 34 communicating with the central bore 12 of the member.

It will be noticed that, for the positions of FIGS. 1 and 3, the stopper pin 30 is accommodated in the discharge opening 28 of the cap member 16, thereby sealing said opening, whereas in the dispensing position of FIG. 4 the discharge opening 28 is free and clear to enable passage of the contents of the container as such contents are forced upward through the discharge passage 12 and openings 34 of the orifice member 10.

In accordance with the present invention the stopper portion 30 is provided with a side projection, which can be in the form of an annular bead 36 located at a point which is spaced from the free end 38 of the stopper portion, said projection and stopper portion providing an increased size or enlarged cross-sectional area at and also below said point. The side projection or bead 36 constitutes a minor obstruction which halts the cap member with the discharge opening 28 closed by the stopper portion and with the edges of said opening engaged

with the bead 36 when light closing pressures are applied to the cap member 16 to move the same to the shallow closing position of FIG. 3 from the open, dispensing position of FIG. 4. It will be understood that the cap members 10 and 16 are preferably molded of plastic substance such as polyethylene or the like, which has resilience or yieldability, being well known in the art.

By virtue of the yieldability of the closure members, particularly the outer cap member 16, the transverse top wall 26 thereof can surmount the annular bead 36 and pass the same in response to heavier closing pressures being applied to the member. This is illustrated in FIG. 1, wherein the stopper portion 30 continues to close the discharge opening 28 while the annular bead 36 is disposed at, and extends along the top edge of, the opening 28. Preferably, as shown, the portion of the pin 30 which is located below the annular bead 36 and which is designated 30*a* has a slightly greater diameter than the portion of the pin 30 (designated 30*b*) which is located above the bead 36. As a consequence, there is effected a tighter and more secure seal for the factory deep-sealed position of FIG. 1, as compared with the shallow consumer-sealed position of FIG. 3.

Preferably, the top transverse wall 26 of the cap member 16 has a dished or concave upper surface, indicated at 40, which can constitute a receptacle for holding excess material if any should exist at the time that the cap member 16 is pushed to the closed position. Also, the concave shape of the surface 40 assists in spreading or distributing the substance which is being discharged from the container.

Briefly, the operation of the cap construction illustrated in FIGS. 1—4 is as follows: The deep factory-sealed position shown in FIG. 1 is effected by power equipment, usually at the filling site. Such equipment, for example, will shift the cap member 16 from the fully opened position of FIG. 4 to the deep sealing position of FIG. 1, and the obstructions represented by interference with the annular beads 18, 20 and 36 will be readily overcome.

When it is desired to use the dispenser, the consumer grasps the cap member 16 and pulls it upward, as viewed in the FIGS., to the fully opened position of FIG. 4 wherein the discharge opening 28 is no longer obstructed by the pin 30. The contents of the container may then be readily ejected. When the consumer finishes with the use of the dispenser, he merely presses lightly downward on the cap member 16 to shift it to the shallow, closing position of FIG. 3. Such movement requires relatively little force, since the obstructions represented by the annular beads 18, 20, 36 do not have to be overcome. Thus, the sealing force required of the consumer is relatively light.

The seal effected by the positioning illustrated in FIG. 3 is not quite as secure as that of FIG. 1, but need not be so since it is merely necessary, for normal use by the consumer, to keep out air from the container and prevent leakage or spillage if the container should be accidentally upset or laid on its side. However, prior to the dispenser being placed in use by the consumer, it is extremely important that no leakage whatsoever of the container contents should occur, as during shipping, storage, and display of the dispenser. This is had, in accordance with the invention, as already explained above.

Another embodiment of the invention is illustrated in FIG. 5. The difference between this embodiment and that of the preceding FIGS. resides in the elimination of the annular bead 36. Instead, the stopper portion 42 carried by the tubular orifice member 44 has an annular shoulder 46 separating the large-diameter portion 42*a* of the stopper pin from the small-diameter portion 42*b* thereof.

Aside from such change, the cap construction otherwise is similar to that already described above, and like characters have been applied to similar portions of the cap member 16. However, with the FIG. 6 construction the consumer is not required to exert as much, or extreme force in order to initially open the cap. This can be an important advantage. The base of the orifice member 44 is designated 48, the top transverse wall 50, the discharge openings therein 52, and the outer annular bead thereof 54. Operation of the cap construction of FIG. 5 is generally the same as that described in connection with FIGS. 1—4.

Still another embodiment of the invention is illustrated in FIGS. 6 and 7, wherein the top wall 56 of a container carries an orifice member 58 having a central bore 60, a transverse top wall 62, and a discharge opening 64 in said wall. The orifice member 58 movably carries a cap member 66 having internal annular beads 68, 70 which are cooperable with an external annular bead 72 of the orifice member. A thin flexible web 74 connects the cap member 66 with the orifice member 58 whereby the cap member is held captive instead of being a separate piece.

Depending from the interior of the cap member 66 is an imperforate stopper portion 76 in the form of an annular flange adapted to be snugly received in the discharge opening 64 of the transverse wall 62. Intermediate its ends, the stopper portion or flange 76 has, at a point spaced from its free end a side projection shown as in the form of an annular bead 78. The portion of the flange 76 located below the bead 78 is of slightly smaller external diameter than the portion of the flange which is located above the bead. Accordingly, when the cap member 66 is in the deep factory-sealed position of FIG. 6, a tighter fit and a tighter seal is established between the orifice member and the cap member than when the cap member is in the consumer-sealed shallow position of FIG. 7. The cap member 66 is retained in the deep, factory-sealed position of FIG. 6 by the interference between the beads 68, 72 and between the bead 78 and the edge of the discharge opening 64. The resilience or yieldability of the molded plastic construction enables the cap member to be forced into the deep factory-sealed position of FIG. 6, and to be shifted by the consumer to either the position of FIG. 7, or else to the fully opened position (not shown) wherein the cap member 66 is completely removed from the orifice member 60 and only retained in connected relationship therewith by the thin flexible web 74.

It will be understood that the filling of the container can be effected with the cap assemblage completely removed. Previously the cap member 66 of the assemblage can be forced into the deep, factory-sealed position of FIG. 6 by automatic or power equipment, either at the factory of the cap manufacturer or the filler. Thereafter, the cap assemblage can be applied to the filled container, by a press-fit operation.

Yet another embodiment of the invention is illustrated in FIGS. 8 and 9, wherein the cap construction is generally similar to that of FIGS. 6 and 7 except that the annular detent bead 78 is omitted. The cap member 80 in FIGS. 8 and 9 has annular internal detent beads 82, 84 which are cooperable with an external detent bead 86 of the tubular orifice member 88, the latter being carried on the upper wall 90 of the container. The orifice member 88 has a transverse top wall 92 provided with a discharge opening 94, and the cap member 80 has a depending imperforate stopper portion 96 in the form of an annular flange, having a stepped outer periphery comprising sealing surfaces 98 and 100. The sealing surface 100 is of larger diameter compared with the surface 98 whereby a more secure seal is had for the deep factory-sealed position of FIG. 8 than for the shallow consumer-sealed position of FIG. 9. In general, the operation of the embodiments of FIGS. 6, 7 and FIGS. 8, 9 are similar to each other, as well as being similar to the embodiments of FIGS. 1—5.

The cap construction of FIG. 10 is very similar to that of FIGS. 1—4 but has the special advantage of the FIG. 5 construction, in that the consumer need not exert extreme force in order to initially open the cap. In FIG. 10 the members 10 and 16*a* have cooperable detent shoulders 18 and 20*a* respectively. In addition, the cap member 16*a* has an internal raised or land portion 104 which engages and provides a tight seal with the shoulder 18 for the deep cap position as shown.

Another modification is illustrated in FIG. 11, this being very similar to that of FIGS. 6 and 7, but with the special ad-

vantage of FIGS. 5 and 10 mentioned above. In FIG. 11 the portions 60*a* and 66*a* have cooperable detent shoulders 72*a* and 68*a* respectively. In addition, the cap portion 66*a* has an internal raised or land portion 106 which engages and provides a tight seal with the shoulder 72*a* for the deep cap position as shown.

It will now be understood from the foregoing that I have provided an improved molded plastic dispensing cap construction wherein the cap member has both shallow and deep sealing positions, the deep sealing position involving a more forceful fit and a tighter seal than the shallow position. The deep position is effected when the dispensing cap is assembled and sealed at the factory, whereas the shallow sealing position is utilized by the consumer for the reason that the force required in applying and removing the cap member is less, and the security of the seal need not be so great but instead merely sufficient to prevent leakage or spillage if the container should be upset or accidentally placed on the side. The dispensing cap construction is seen to be especially simple, easily molded, and reliable and foolproof in operation.

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

I claim:

1. A multiposition closure construction comprising, in combination:
   a. a tubular orifice member having a discharge passage through which the contents of a container may pass;
   b. a cap member movably mounted on the orifice member;
   c. one of said members having a cylindrical imperforate stopper portion devoid of passages through which a discharge can occur, said stopper portion having a free end and the other member having a transverse wall with a circular discharge opening receiving said stopper portion to halt the flow of the container contents therethrough;
   d. said imperforate stopper portion having detent means at a point spaced from its free end, comprising a side projection providing an enlarged cross-sectional size at said point, those areas of said stopper portion which are located axially apart at the opposite sides of said side projection being cylindrical and of different diameters, and each constituting a tight sealing fit in said circular discharge opening of said transverse wall;
   e. said side projection constituting a minor obstruction having a distinct tactual detent action which halts the cap member in a predetermined, clearly defined shallow closing position with the said discharge opening receiving the smaller-diameter stopper portion and being closed thereby and with the smaller diameter stopper portion exerting radial pressures on said transverse wall and an edge of said opening engaging the side projection when light closing pressures are applied to the cap member to move the same to said shallow, closing position; and
   f. said cap member moving to a deeper closing position wherein said transverse wall bypasses said side projection while the larger-diameter stopper portion closes the said discharge opening, when heavy closing pressures are applied to the cap member to overcome said detent means.

2. A multiposition closure construction comprising, in combination:
   a. a tubular orifice member having a discharge passage through which the contents of a container may pass;
   b. a cap member movably mounted on the orifice member;
   c. one of said members having a cylindrical imperforate stopper portion devoid of passages through which a discharge can occur, said stopper portion having a free end and the other member having a transverse wall with a circular discharge opening receiving said stopper portion to halt the flow of the container contents therethrough;
   d. said imperforate stopper portion having, at a point spaced from its free end, a side projection providing an enlarged cross-sectional size at said point, those areas of said stopper portion which are located axially apart at the opposite sides of said side projection being cylindrical and of different diameters, and each constituting a tight sealing fit in said circular discharge opening of said transverse wall;
   e. said side projection constituting a minor obstruction which halts the cap member with the said discharge opening receiving the smaller-diameter stopper portion and closed thereby with the latter exerting radial pressures on said transverse wall and with an edge of said opening engaged with the side projection when light closing pressures are applied to the cap member to move the same to a shallow, closing position;
   f. said cap member moving to a deeper closing position wherein said transverse wall bypasses said side projection while the larger-diameter stopper portion closes the said discharge opening, when heavy closing pressures are applied to the cap member;
   g. said side projection on the stopper portion comprising an annular bead; and
   h. said transverse wall being forced over and past said bead when the cap member is moved to said deeper closing position.

3. A closure construction as in claim 2, wherein the stopper portion is carried by the cap member.

4. A closure construction as in claim 2, wherein the stopper portion is carried by the tubular orifice member.

5. A closure construction as in claim 1, wherein:
   a. said members have cooperable annular detent shoulders disposed at the exterior of the tubular orifice member;
   b. said detent shoulders being engaged substantially simultaneously with engagement of said side projection and transverse wall; and
   c. one member having a raised land portion adjacent its said annular shoulder, engaged by the annular shoulder of the other member when the cap member is in said deeper closing position.

6. A closure construction as in claim 5, wherein the cap member has the raised land portion.