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3,131,836

CLOSURE FOR TUBES AND THE LIKE

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2 Sheets-Sheet 1

FIG. 1

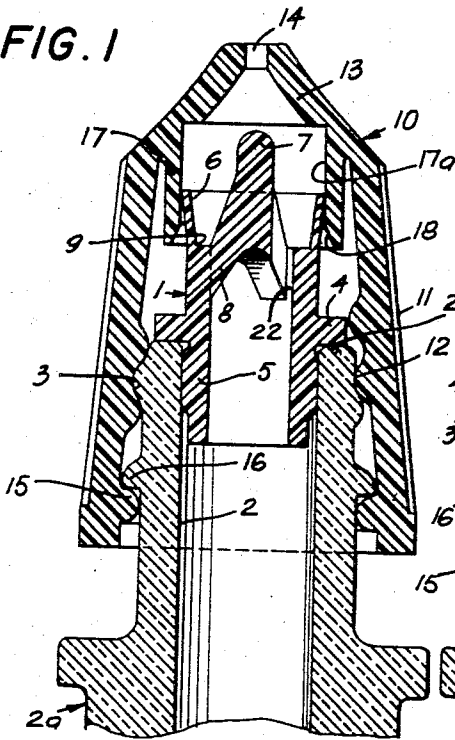


FIG. 2

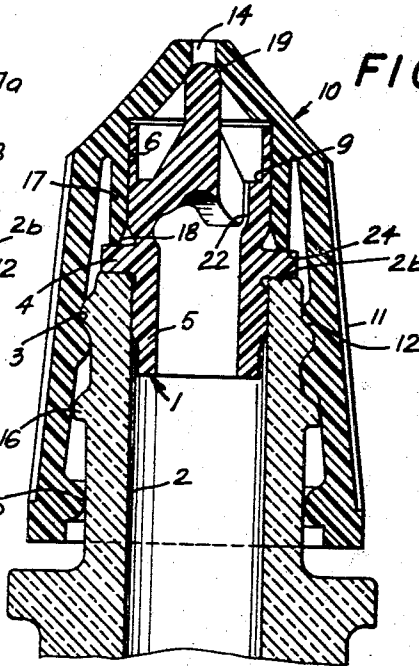
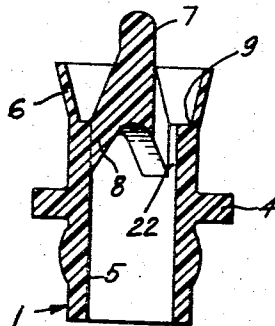
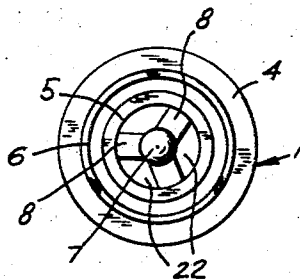


FIG. 3

FIG. 4



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FIG. 5

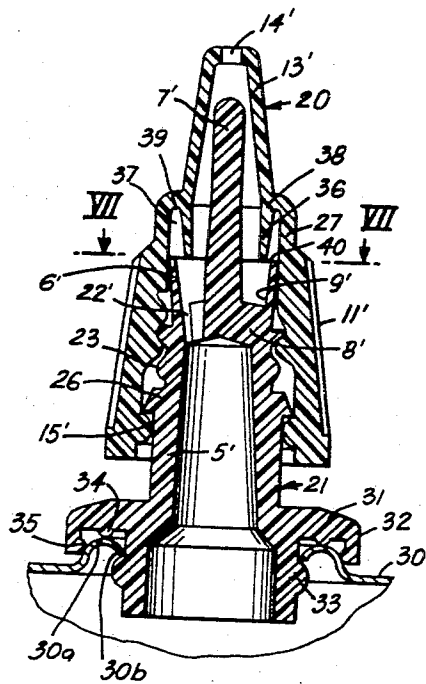


FIG. 6

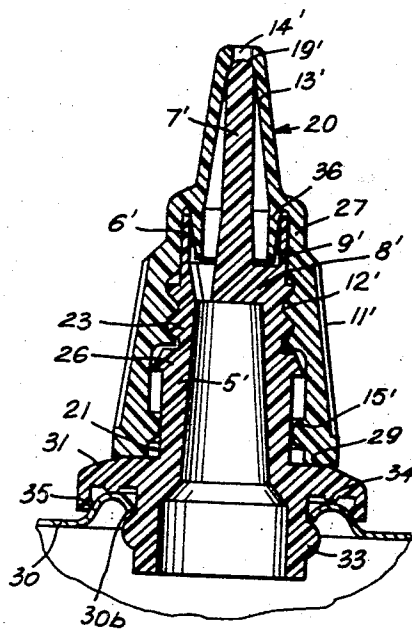
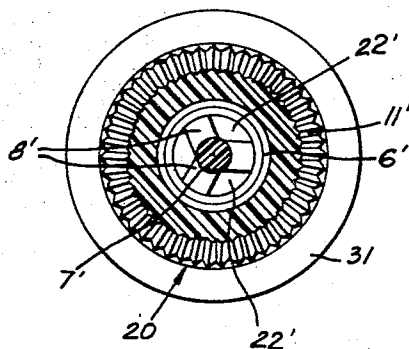


FIG. 7



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6 Claims. (Cl. 222-521)

The present invention relates to closures for tubes and other types of containers, and more particularly to closures which enable a user to dispense controlled quantities of a pasty, liquid or powdery material from such containers. For example, the containers provided with the improved closure may contain toilet preparations, edible pastes, cleaning liquids or any other materials adapted to flow, either freely or under pressure, through one or more dispensing orifices.

An important object of the present invention is to provide a closure arrangement of the type in which a closure member is threaded onto a dispenser or onto the neck of a container and is shiftable toward and away from the container to alternately seal or expose one or more dispensing orifices, and in which the dispenser and the closure member are constructed and assembled in such a way that no material can flow toward and between the mating threads by means of which the closure member is shiftable with respect to the container.

Another object of the invention is to provide a closure arrangement of the above outlined characteristics in which the closure member may sealingly engage with the dispenser at two or more points.

A further object of the invention is to provide a closure arrangement of the above outlined characteristics in which the closure member and the dispenser are constructed and assembled in such a way that they form at least one seal at both sides of the mating threads.

An additional object of the invention is to provide a very simple and reliable closure arrangement which may be manufactured of comparatively cheap and readily available materials, whose sealing action will remain unchanged after extended use, and which may be readily manipulated by persons having little technical skill.

A concomitant object of the invention is to provide a closure arrangement of the above described type certain components of which may be readily separated from a container and combined with another container, wherein the closure member cannot become detached from other components, and wherein the single or multiple sealing action is brought about in a fully automatic way in dependency on movements of the closure member into sealing position.

Still another object of the invention is to provide a closure arrangement at least certain elements of which may constitute integral component parts of a container, such as a tube for a pasty substance, a vitreous or ceramic vessel, a metallic can or the like.

With the above objects in view, the invention resides in the provision of a closure arrangement comprising a container which may but need not be formed with an integral or separable neck, a dispenser which comprises a tubular portion insertable into the neck or directly into the discharge opening of the container, the dispenser being formed with an at least slightly deformable annular rim which extends from its body portion in a direction away from the container and with a sealing member in the form of a preferably coaxial projection which extends beyond the rim in a direction away from the container, the projection and the body portion of the container being connected with each other and defining one or more channels for the passage of a powdery, pasty or liquid mate-

rial stored in the container, and a closure member formed as a cap one end of which is provided with one or more dispensing orifices and the other end of which is open so that the cap may be placed onto the dispenser or onto the neck of the container. The cap is axially shiftable with respect to the dispenser toward and away from the container so that the projection of the dispenser may alternately seal and expose each discharge orifice. The cap is formed with internal threads adapted to mesh with external threads provided on the neck or on the dispenser so that the cap is automatically shifted toward or away from the container depending upon in which direction it is rotated with respect to the dispenser. A portion of the cap may constitute a sleeve which engages with the aforementioned rim of the dispenser and deforms the same at least when the cap is moved into sealing position, the rim being deformable to such an extent that it forms a tight seal with the sleeve to prevent leakage of material rearwardly toward and between the mating threads. Alternately the sleeve may constitute a distinct internal annular member coaxial with the body portion of the cap, or the cap may be formed with a sleeve and with a skirt adapted to receive the rim therebetween, the sleeve and the skirt defining an annular compartment of such magnitude that the rim is at least slightly deformed when caused to penetrate into the compartment.

Certain other features of my invention reside in the provision of an external flange on the dispenser which may be engaged either by the sleeve or by the open rear end portion of the cap to form a secondary seal, and in the provision of suitable retaining means which prevents complete separation of the cap from the dispenser. The entire dispenser may consist of an at least slightly deformable material, e.g. rubber or a synthetic plastic, and the cap preferably consists of a somewhat more or fully rigid synthetic plastic material.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following detailed description of certain specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is an axial section through a closure arrangement embodying my invention, the closure means in the form of a plastic cap being shown in a position permitting discharge of a pasty, liquid or powdery material which fills the container;

FIG. 2 is a similar axial section through the closure arrangement showing the closure means in sealing position;

FIG. 3 is an axial section through a dispenser forming part of the closure arrangement;

FIG. 4 is a plan view of the dispenser;

FIG. 5 is an axial section through a modified closure arrangement showing the closure means in open position;

FIG. 6 is a similar axial section showing the closure means of FIG. 5 in sealing position; and

FIG. 7 is a transverse section taken along the line VII-VII of FIG. 5, as seen in the direction of arrows.

Referring now in greater detail to the illustrated embodiments, and first to FIGS. 1 and 2, there is shown a dispenser 1 made of a synthetic plastic material which is press fitted into the tubular neck 2 of a vessel or container 2a, the neck being formed with external threads 3. The dispenser comprises an annular flange 4 which abuts against the end face 2b at the open end of the neck 2 when the dispenser is driven home. The dispenser is essentially a tube having a main body portion 5 which communicates with the container and whose for-

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ward end extending from the neck 2 is connected or integrally formed with an outwardly and forwardly flaring rim 6 which is comparatively thin and at least slightly deformable. The dispenser 1 further comprises a sealing member here shown as a coaxial projection 7 which extends forwardly beyond the rim 6, i.e. in a direction away from the container 2a, this projection comprising a plurality of substantially radial supporting arms 8 extending toward and connected to or integral with the inner side of the tubular body portion 5 at the rear end or base 9 of the rim 6. The spaces 22 between each pair of supporting arms 8 constitute channels through which the contents of the container 2a may be discharged in a direction toward the projection 7.

The channels 22 are sealable by a closure member or cap 10 which is coaxial with the neck 2 and dispenser 1 and whose periphery is preferably knurled, as at 11, to provide a better grip when the cap is turned with respect to the neck 2. The cap is formed with internal threads 12 adapted to mesh with external threads 3 on the neck 2, and its forward end portion is of a conical shape, as at 13. This conical end portion has a tip formed with a coaxial dispensing orifice 14 which is aligned with and is movable toward and away from the projection 7 when the cap is respectively shifted toward and away from the container 2a.

The open rear portion of the cap 10 is formed with an internal retaining shoulder 15 which is adapted to engage with an annular retaining rib or bead 16 provided on the neck 2 rearwardly of the threads 3, the shoulder 15 being deformable under heavy axial pressure exerted against the cap so as to snap over the rib 16 and to retain the cap on the neck 2. Thus, the cap 10 is held captive for axial movements between the positions of FIGS. 1 and 2, i.e. toward and away from the container 2a, and is rotatable with respect to the neck 2. The spacing of the retaining shoulder 15 from the internal threads 12, and the spacing of external threads 3 from the retaining rib 16 is such that the shoulder 15 engages with the annular rear end face of the rib 16 when the orifice 14 is spaced from the projection 7 (see FIG. 1). On the other hand, the length of the neck 2 rearwardly of the retaining rib 16 is sufficient to permit axial displacement of the retaining shoulder 15 into the position of FIG. 2 in which the sealing member or projection 7 seals the rear end of the dispensing orifice 14. Thus, when in the position of FIG. 1, the cap 10 cannot impede the flow of a pasty, liquid or powdered material from the container 2a, the material passing through the neck 2, through the tubular body portion 5 and channels 22 of the dispenser 1, and about the projection 7 toward and through the dispensing orifice 14.

An important feature of my invention resides in the provision of an internal sleeve 17 which is preferably integral with the cap 10 and which is comparatively stiff so that it may deform the rim 6 at least when the cap is moved into the position of FIG. 2. The sleeve 17 has an inner surface portion 17a of cylindrical contour whose diameter is less than the maximum diameter at the forward end of the forwardly and outwardly flaring rim 6, and the sleeve is coaxial with the main body portion of the cap 10. The rear edge portion of the sleeve is chamfered around its inner periphery to facilitate the insertion of the rim 6 when the cap is placed onto the neck 2. In other words, the inner surface of the sleeve 17 consists of an outwardly flaring rear surface portion 18 and of a main or forward surface portion 17a which is of cylindrical contour, the surface portion 18 flaring in rearward direction, i.e. counter to the direction in which the rim 6 flares outwardly and forwardly toward the cylindrical surface portion 17a of the sleeve 17. The forward end of the rim 6 is in sliding and hence sealing engagement with the cylindrical surface portion 17a.

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FIG. 2 shows the cap 10 in closing or sealing position in which the cap is screwed down until the tip of the projection 7 comes into abutment with the inner side of the conical forward end portion 13, as at 19, to thereby seal the dispensing orifice 14. While the cap 10 is rotated and thereby axially shifted in a direction to move the retaining shoulder 15 away from the rib 16, i.e. in a direction toward the container 2a, the rim 6 is progressively forced into and is finally fully received in the stiff sleeve 17. The length of this sleeve is selected in such a way that the projection 7 fully seals the dispensing orifice 14 before the open rear end portion 24 of the sleeve 17 comes into abutment with the flange 4, i.e. the sealing action between the sleeve 17 and flange 4 is secondary to the sealing action between the conical forward end portion 13 and the projection 7.

Apart from any sealing which is brought about by the meshing threads 3 and 12, there are three seals against leakage, namely, at the point 19 where the projection 7 engages with the inner side of the conical forward end portion 13; at the point of engagement between the rear end portion 24 of sleeve 17 and the flange 4; and along the zone of contact between the stiff sleeve 17 and the deformable rim 6. In fact, since the entire dispenser 2 preferably consists of a material which is at least slightly deformable and more resilient than the material of the cap 10, the engagement between the projection 7 and the conical forward end portion 13 brings a deformation of the tubular body portion 5 forwardly of the flange 4 (see FIG. 2) so that the sealing action between the rim 6 and the sleeve 17 is further enhanced whenever the cap 10 is drawn tight. Consequently, any leakage between the flange 4 and rim 6 on the one hand, and between the sleeve 17 on the other hand is practically impossible; therefore, no liquid, pasty or powdery material can escape rearwardly toward and between the threads 3, 12 and about the annular rib 16.

Though FIG. 3 illustrates a dispenser 1 of synthetic plastic material, this dispenser may be made of rubber, if desired, it being important that the rim 6 and preferably the tubular body portion 5, too, should yield sufficiently to insure a multiple sealing action between the dispenser 1 and the cap 10.

As is shown in FIG. 1, the rim 6 is preferably in permanent sealing contact with the sleeve 17, i.e. even if the closure member 10 is in open position. Thus, no material can escape toward the threads 3, 12 at any time, regardless of the momentary position of the closure member.

Referring now to FIGS. 5 to 7, the modified dispenser 21 is externally threaded, as at 23, and is provided with an annular retaining rib 26 which is spaced from and located rearwardly of the screw threads 23. This rib is engageable by the internal retaining shoulder 15' of the cap 20. The cap is formed with internal threads 12' adapted to mesh with the external threads 23 and is preferably knurled, as at 11', to facilitate better grip by the fingers of a user. The forward end portion of the cap 20 consists of a tapering crown 13' which is formed with a coaxial dispensing orifice 14'.

The dispenser 21 is carried by a metallic, ceramic, vitreous, or plastic container 30, and, to that end, comprises a flange 31 which is formed with a concentric collar 32. The seal between the container 30 and the flanged rear end portion of the dispenser 21 comprises three spaced ribs 33, 34, 35 on the dispenser and a complementary annular bead 30a on the container. It will be seen that the dispenser 21 actually constitutes a neck for the container and that its tubular body portion 5' seals the discharge opening 30b in the container.

The dispenser 21 comprises an outwardly and forwardly flaring, comparatively thin, deformable rim 6' which is integral with the forward end of the main body portion 5' and which coaxially surrounds the sealing member or projection 7', this projection being secured to the main body portion 5' by a series of preferably radial-

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ly arranged supporting arms 8' defining therebetween channels 22' for the passage of a pasty, liquid or powdery material which is stored in the container 30. The main body portion 5' communicates with the container 30. The arms 8' are connected with the main body portion 5' at the rear end or base 9' of the rim 6'.

A portion of the cap 20 constitutes a comparatively stiff sleeve 27 whose inner diameter is less than the maximum outer diameter of the rim 6'; thus, when the cap is screwed down and is thereby axially shifted in a direction toward the container 30, the rim 6' is forced into the sleeve 27 and the projection 7' at the same time moves toward and finally seals the dispensing orifice 14'. When in the sealing position of FIG. 6, the projection 7' bears against the inner side of the crown or forward end portion 13' at the point 19', and the rim 6' is then preferably fully received in the sleeve 27. The sleeve coaxially surrounds an internal skirt 36 which extends rearwardly in a direction away from the dispensing orifice 14' so that the parts 27, 36 define an annular compartment 37 which tapers forwardly and outwardly in a direction toward the forward end 38 of the skirt 36. The forward end portion 39 of the compartment 37 is slightly narrower than the thickness of the forward end portion 40 on the rim 6'. Consequently, when the rim 6' is forced into the compartment 37, i.e. when the cap 20 is fully or nearly fully screwed onto the dispenser 21, the forward end portion 40 of the rim is compressed between the sleeve 27 and the skirt 36 to form a tight seal at a point forwardly of the screw threads 12' and 23 which supplements the seal at the point 19' formed between the projection 7' and the crown 13' as well as the seal between the rear end portion 29 of the cap 20 and the flange 31, the latter seal being located rearwardly of the screw threads.

According to a further modification of my invention which is not shown in the drawings, a non-threaded dispenser such as the dispenser 1 of FIGS. 1 to 4 may be formed with a simple shoulder instead of a continuous flange 4 and the outwardly flaring rim 6 may engage with a sleeve which, as the sleeve 27 in FIGS. 5 and 6, constitutes a component part of the main body portion of the cap 10. Also, the dispenser may form an integral part of a container or of a container neck, or the dispenser may simultaneously constitute an integral neck of the container.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can, by applying current knowledge, readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic and specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A closure arrangement, comprising, in combination, a container; a dispenser carried by said container and comprising a tubular body portion communicating with said container, said dispenser further comprising at least slightly deformable annular rim means connected with said body portion and flaring outwardly in a direction away from said container, and sealing means surrounded by and extending beyond said rim means, said sealing means and said body portion defining channel means; and closure means surrounding and shiftable with respect to said dispenser toward and away from said container, said closure means comprising an end portion remote from said container and formed with dispensing orifice means sealable by said sealing means when the closure means is shifted toward said container, and said orifice means being spaced from said sealing means to communicate with said channel means when the closure means is shifted away from said container, said closure means further comprising comparatively stiff annular sleeve means slid-

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ably receiving at least a portion of said rim means when the closure means is shifted toward said container, the dimensions of said rim means and of said sleeve means being such that the rim means is at least slightly deformed by and sealingly engages with said sleeve means at least when said orifice means is sealed, said container further comprising an annular rib means on the external surface thereof, and closure means further comprising an internal annular shoulder means, said rib means engaging said shoulder means as said closure means is shifted away from said container to prevent removal of said closure means.

2. A closure arrangement comprising, in combination, a container; a dispenser carried by said container and comprising a tubular body portion communicating with said container, said body portion formed with external threads, said dispenser further comprising an at least slightly deformable annular rim connected with said body portion and flaring outwardly in a direction away from said container, and a coaxial projection surrounded by and extending beyond said rim, said projection and said body portion defining channel means; and a cap surrounding said dispenser and formed with internal threads adapted to mesh with said external threads whereby the cap is rotatable with respect to said dispenser and axially shiftable toward and away from said container, said cap comprising an end portion remote from said container and formed with dispensing orifice means sealable by said projection when the cap is shifted toward said container, and said orifice means spaced from said projection to communicate with said channel means when the cap is shifted away from said container, said cap further comprising comparatively stiff annular sleeve means, said sleeve means having an internal substantially cylindrical surface of a diameter less than the maximum diameter of said rim, said cylindrical surface sealingly engaging with said rim at least when said cap is shifted toward said container.

3. A closure arrangement comprising, in combination, a container having a discharge opening; a dispenser of at least slightly resilient material removably and sealingly received in said discharge opening, said dispenser comprising a tubular body portion communicating with said container and formed with external threads, an at least slightly comparatively stiff annular rim connected with said body portion and flaring outwardly in a direction away from said container, and a coaxial projection surrounded by and extending beyond said rim, said projection comprising a plurality of substantially radial arms connected to and defining a plurality of channels with said body portion; a cap surrounding said dispenser and formed with internal threads adapted to mesh with said external threads whereby the cap is rotatable with respect to said dispenser and axially shiftable toward and away from said container, said cap comprising an end portion remote from said container and formed with a coaxial dispensing orifice sealable by said projection when the cap is shifted toward said container, and said orifice spaced from said projection to communicate with said channels when the cap is shifted away from said container, said cap further comprising an annular sleeve, said sleeve having an internal substantially cylindrical surface of a diameter less than the maximum diameter of said rim, said cylindrical surface sealingly engaging with said rim at least when said cap is shifted toward said container, said cap still further comprising an annular internal skirt coaxial with said sleeve and receivable in said rim, said sleeve and said skirt defining an annular compartment for said rim of such dimension that the rim is at least slightly deformed when the cap is shifted toward said container and said projection seals the dispensing orifice; and, retaining means comprising external rib means on said dispenser between said external thread and said container and an internal shoulder on said cap engageable

with said rib means when the orifice is spaced from said projection to prevent separation of the cap from said dispenser.

4. A closure arrangement comprising, in combination, a container comprising a tubular neck formed with external threads and comprising an open end remote from said container; a dispenser of at least slightly resilient material comprising a tubular body portion sealingly received in said neck, an at least slightly deformable annular rim connected with said body portion and flaring outwardly in a direction away from said neck, a flange surrounding said body portion and abutting against the open end of said neck, and a coaxial projection surrounded by and extending beyond said rim, said projection comprising a plurality of substantially radially arranged arms connected to and defining a plurality of channels with said body portion; and a cap surrounding said dispenser and said neck and formed with internal threads capable to mesh with said external threads whereby the cap is rotatable with respect to said dispenser and said neck whereby said cap is axially shiftable toward and away from said container, said cap comprising an end portion remote from said neck and formed with a coaxial dispensing orifice sealable by said projection when the cap is shifted toward said container, and said orifice being spaced from said projection to communicate with said channels when the cap is shifted away from said container, said cap further comprising a comparatively stiff distinct internal annular sleeve, said sleeve having an internal surface comprising a substantially cylindrical portion of a diameter less than the maximum diameter of said rim and a short interior portion flaring outwardly in a direction toward said container, said cylindrical surface portion sealingly engaging with said rim at least as the cap is shifted toward said container and said projection seals the dispensing orifice, said sleeve sealingly engaging with said flange as the dispensing orifice is sealed.

5. A closure arrangement comprising, in combination, a container; a dispenser carried by said container and comprising a tubular body portion communicating with said container, said dispenser further comprising at least slightly deformable rim means connected with said body portion and flaring outwardly in a direction away from said container, and sealing means surrounded by said rim means, said sealing means and said body portion defining channel means; and closure means surrounding and shiftable with respect to said dispenser toward and away

from said container, said closure means comprising an end portion remote from said container and formed with dispensing orifice means sealable by said sealing means when the closure means is shifted toward said container, and said orifice means spaced from said sealing means to communicate with said channel means when the closure means is shifted away from said container, said closure means further comprising comparatively stiff distinct internal sleeve means, said sleeve means having an internal surface comprising a substantially cylindrical portion of a diameter less than the maximum diameter of said rim means and a second portion flaring outwardly in a direction toward said container, said cylindrical surface portion sealingly engaging with said rim means at least when the closure means is shifted toward said container.

6. A closure arrangement comprising, in combination, a container; a dispenser carried by said container and comprising a tubular body portion communicating with said container, said dispenser further comprising at least slightly deformable rim means connected with said body portion and flaring outwardly in a direction away from said container, and sealing means surrounded by and extending beyond said rim means, said sealing means and said body portion defining channel means; and closure means surrounding and shiftable with respect to said dispenser toward and away from said container, said closure means comprising an end portion remote from said container and formed with dispensing orifice means sealable by said sealing means when the closure means is shifted toward said container, and said orifice means being spaced from said sealing means to communicate with said channel means when the closure means is shifted away from said container, said closure means further comprising comparatively stiff sleeve means, said sleeve means comprising a substantially cylindrical internal surface of a diameter less than the maximum diameter of said rim means, said cylindrical surface sealingly engaging with said rim means at least when the closure means is shifted toward said container.

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