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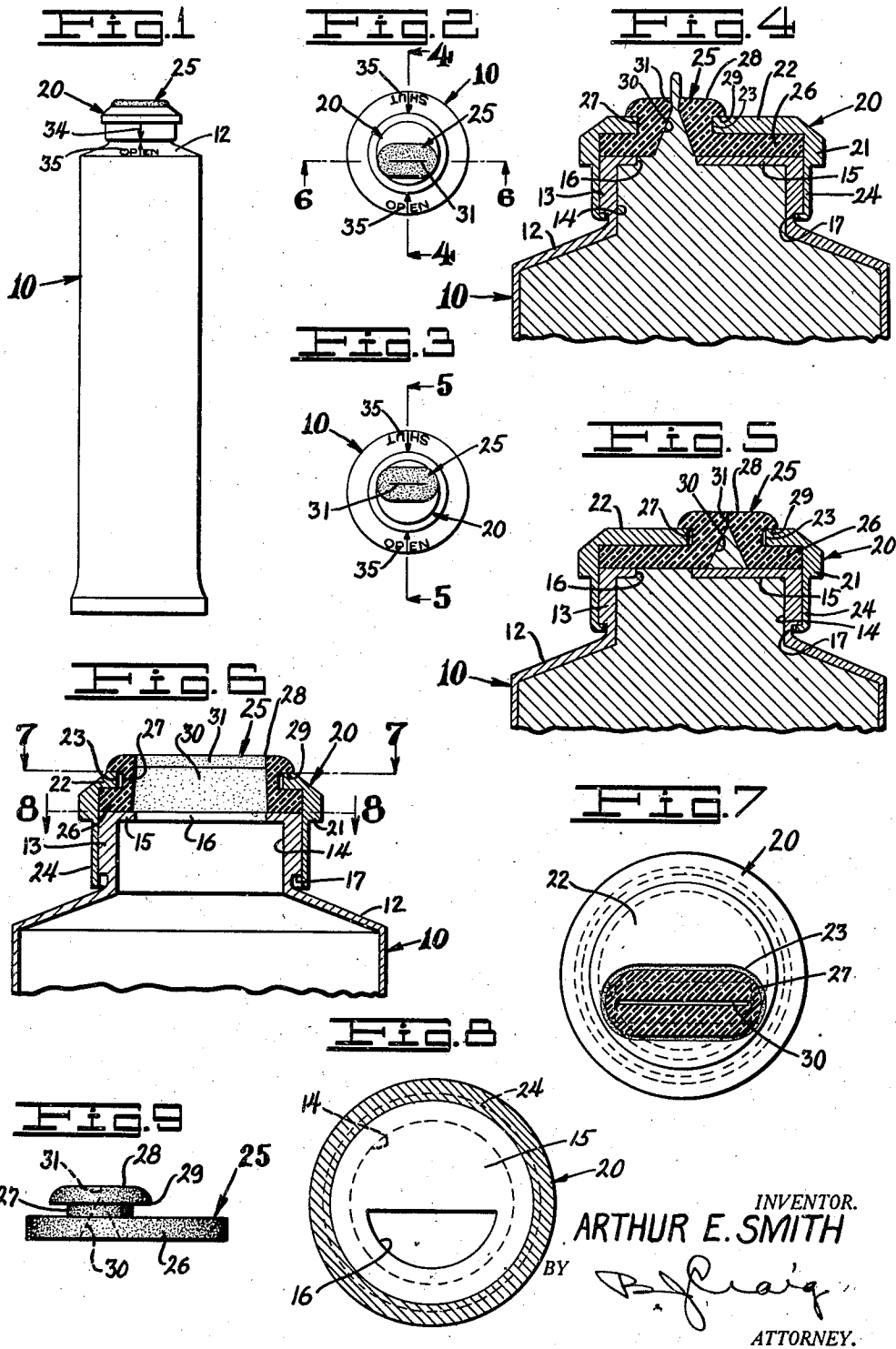
A. E. SMITH

1,748,681

RECEPTACLE CLOSURE

Filed May 28, 1928

2 Sheets-Sheet 1



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Feb. 25, 1930.

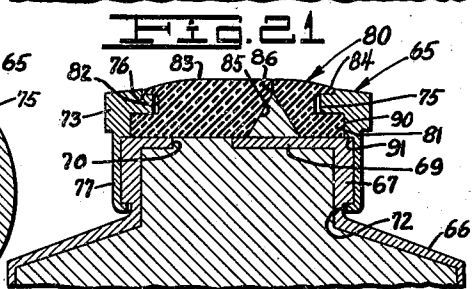
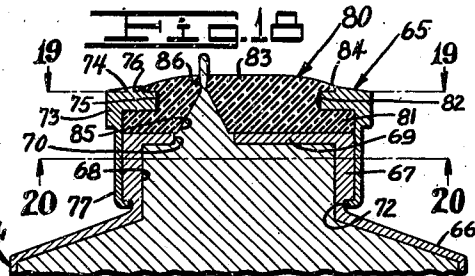
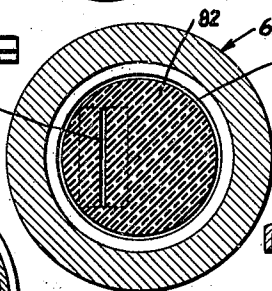
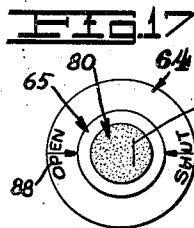
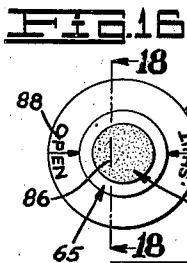
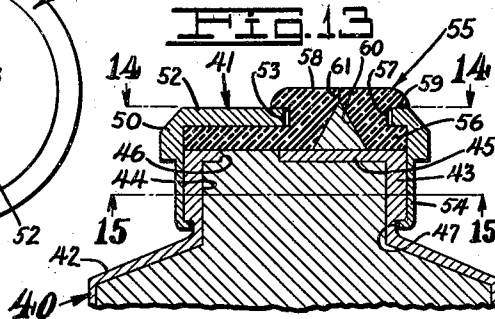
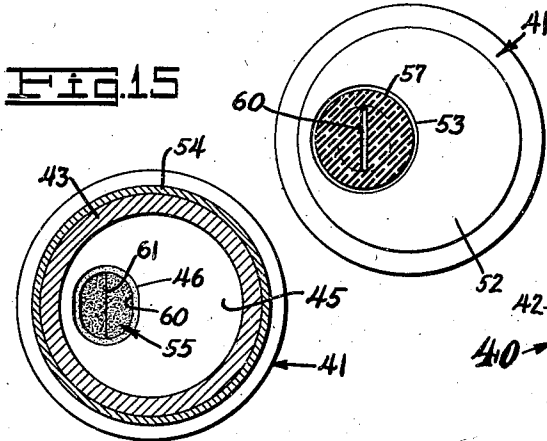
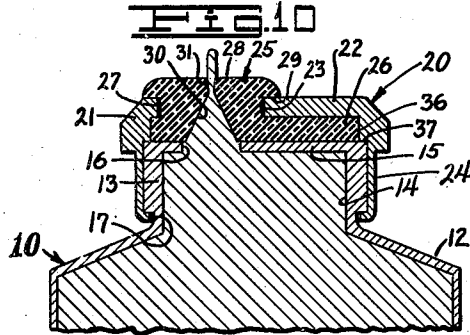
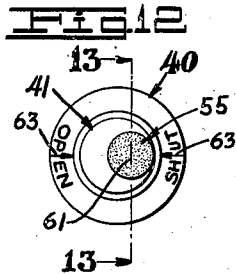
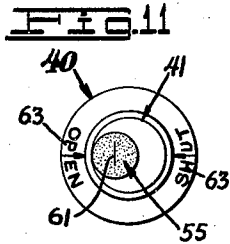
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RECEPTACLE CLOSURE

Filed May 28, 1928

2 Sheets-Sheet 2



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RECEPTACLE CLOSURE

Application filed May 28, 1928. Serial No. 281,130.

This invention relates to improvements in closures for receptacles.

The general object of this invention is to provide an improved valved closure for a collapsible tube.

Another object of the invention is to provide a novel valved revoluble cap for a collapsible tube.

A further object of the invention is to provide novel means for retaining an automatic valve on a closure cap.

Other objects and the advantages of this invention will be apparent from the following description taken in connection with the accompanying drawings wherein:

Fig. 1 is an elevation of a collapsible tube embodying the features of my invention.

Fig. 2 is a top plan view of the closure of Fig. 1 showing the cap turned to a position wherein the tube contents may be discharged.

Fig. 3 is a view similar to Fig. 2 showing the cap turned to a closed position.

Fig. 4 is an enlarged section taken on line 4—4 of Fig. 2 showing the valve opened by pressure of the tube contents.

Fig. 5 is a section taken on line 5—5 of Fig. 3.

Fig. 6 is a section taken on line 6—6 of Fig. 2, showing the cap before it is fastened to the tube neck.

Fig. 7 is a section taken on line 7—7 of Fig. 6.

Fig. 8 is a section taken on line 8—8 of Fig. 6.

Fig. 9 is a detail side elevation of the automatic valve shown in Figs. 1 to 7 inclusive.

Fig. 10 is a section through a slightly modified form of cap having a valve therein similar to the valve shown in Figs. 1 to 9 inclusive and showing the valve opened by pressure of the tube contents.

Fig. 11 is a top plan view of a modified form of a collapsible tube having a cap thereon which includes a modified form of automatic valve and shows the cap turned to an open position.

Fig. 12 is a view similar to Fig. 11 showing the cap turned to an open position.

Fig. 13 is an enlarged section taken on the line 13—13 of Fig. 12.

Fig. 14 is a section on line 14—14 of Fig. 13 showing the cap turned to an open position.

Fig. 15 is a section taken on line 15—15 of Fig. 13 showing the cap turned to an open position.

Fig. 16 is a top plan view of a collapsible tube having a cap thereon which includes a further modified form of automatic valve showing the cap turned to an open position.

Fig. 17 is a view similar to Fig. 16 showing the cap turned to a closed position.

Fig. 18 is an enlarged section taken on line 18—18 of Fig. 16.

Fig. 19 is a section taken on line 19—19 of Fig. 18.

Fig. 20 is a section taken on line 20—20 of Fig. 18.

Fig. 21 is a section through a modified form of cap having a valve therein similar to the valve shown in Figs. 16 to 20 inclusive and shows the cap turned to a closed position.

Referring to the drawings by reference characters I have shown my invention in connection with a collapsible metallic tube indicated generally at 10. In the following description I will describe my invention as used in connection with tubes of this character which are particularly adapted for the purpose of dispensing material such as dental creams and pastes, although it will be understood that the invention is not limited to this particular use, but may be used for dispensing other plastic or semi-viscous substances which flow more or less freely.

As shown in the accompanying drawings, the collapsible tube 10 is provided with a conical end portion 12 having a cylindrical neck 13 integral therewith. The neck 12 includes a cylindrical recess 14 which communicates at one end with the interior of the tube 10 and is provided at the other end with a transverse partition 15 having an eccentrically located substantially semi-circular aperture 16 therethrough. Adjacent the juncture of the conical end portion 12 and the neck 13 I provide an external groove 17.

A metallic cap indicated generally at 20 is adapted to be positioned on the neck 13 and is shown as including a body portion 21,

a top 22 having an eccentrically located aperture 23 therein and a skirt portion 24. The cap 20 includes an automatic valve indicated generally at 25 which is preferably made of a good grade of rubber vulcanized to the desired elasticity.

As clearly shown in Fig. 9 the automatic valve 25 includes an annular body portion 26 having an eccentrically located substantially elliptical neck 27 thereon on which is provided an enlarged substantially elliptical head 28 which includes an overhanging peripheral flange 29. An aperture 30 is provided in the body portion 26 and the neck 27 and a slit 31 in the head communicates with the aperture 30.

The automatic valve 25 is adapted to be positioned in the cap 20 so that the valve neck 27 is positioned in the cap aperture 23 and the valve head 29 protrudes beyond the top 21 of the cap and the valve head flange 29 overlaps the cap aperture 23 as clearly shown in the drawings.

The circumference of the valve neck 27 is preferably less than the circumference of the cap aperture 23 as shown in Fig. 7. The length of the neck 27, i. e. the distance between the top of the valve body 26 and the under side of the head flange 29, is preferably less than the thickness of the side wall of the cap aperture 23. Thus when the valve 25 is positioned in the cap 20 the side wall of the cap aperture 23 distorts the valve head 28 and exerts a pressure thereon which tends to retain the valve discharge slit 31 closed. The amount of pressure exerted on the valve head to retain the slit closed may be regulated by varying the thickness of the cap aperture relative to the distance between the top of the valve body and the under side of the valve head.

The valve 25 may be positioned in the cap before or after the latter is placed on the neck 13 of the tube and the ends of the cap skirt 24 spun into the neck groove 17 as shown in Figs. 4 and 5.

When the cap is operatively positioned on the tube the recess 30 of the valve 25 is adapted to register with the aperture 16 of the neck partition 15 as shown in Fig. 4. When the cap is in the position shown in Fig. 4 it is only necessary to apply pressure to the tube 10 to force the contents thereof out through the valve slit 31 which opens as clearly shown in Fig. 4. The difference in the area of the valve neck 27 and the cap aperture 23 allows the valve neck to expand when the tube contents are being discharged. After the pressure on the tube has been removed the elasticity of the valve forces the slit 31 closed again.

When the cap 20 is turned to the position shown in Fig. 5 so that the valve recess 30 does not register with the tube aperture 16 pressure on the tube will not force the tube con-

tents out. An indicator 34 may be provided on the cap 20 which is adapted to coact with indicia matter on the tube such as indicated at 35 to show the open and closed positions of the valve.

In Fig. 10 I have shown a slightly modified form of cap at 20. This cap is provided with an internal shoulder 36 so that instead of the bottom of the valve 25 contacting with the entire top surface of the tube partition 15 as shown in Figs. 4, 5 and 6, a shoulder 37 is provided which contacts with the peripheral top edge of the tube neck. This simplifies the positioning of the cap on the tube when the ends of the cap skirt are spun into the grooves 17 and enables the cap to be turned from one position to another with less effort.

In Figs. 11 to 15 inclusive I have shown a collapsible tube 40 having a metallic cap 41 thereon which includes a modified form of automatic discharge valve. The tube 40 is provided with a conical end portion 42 having a cylindrical neck 43 integral therewith. The neck 42 includes a cylindrical recess 44 which communicates at one end with the interior of the tube 40 and is provided at the other end with a transverse partition 45 having an eccentrically located substantially elliptical aperture 46 therethrough.

Adjacent the juncture of the conical end portion 42 and the neck 43 I provide an external groove 47. The cap 41 is adapted to be positioned on the neck 43 and is shown as including a body portion 50, a top 52 having an eccentrically located annular aperture 53 therein and a skirt portion 54. The cap 41 includes an automatic valve indicated generally at 55 which is preferably made of a good grade of rubber suitably vulcanized.

As shown, the automatic valve 55 includes an annular body portion 56 having an eccentrically located annular neck 57 thereon on which is provided an enlarged annular head 58 which includes an overhanging peripheral flange 59. A recess 60 is provided in the body portion 56 and the neck 57 and a slit 61 in the head communicates with the recess 60.

The automatic valve 55 is adapted to be positioned in the cap 41 so that the valve neck 57 is positioned in the cap aperture 53 and the valve head 59 protrudes beyond the top 52 of the cap and the valve head flange 59 overlaps the cap aperture 53 as clearly shown in the drawings.

The circumference of the valve neck 57 is preferably less than the circumference of the cap aperture 53 as shown in Fig. 14 and the distance between the top of the valve body 56 and the underside of the head flange 59 is preferably less than the thickness of the side walls of the cap aperture 53. Thus when the valve 55 is positioned in the cap 41 the side walls of the cap aperture 53 distort the valve head 58 and exert a pressure there-

on which tends to retain the valve discharge slit 61 closed. The amount of pressure exerted on the valve head to retain the slit closed may be regulated by varying the length of the neck 57 relative to the thickness of the cap.

After the valve 55 has been positioned in the cap 41 the cap is placed on the neck 43 of the tube and the ends of the cap skirt 44 are spun into the neck groove 47 as shown in Fig. 13.

When the cap is operatively positioned on the tube the recess 60 of the valve 55 is adapted to register with the aperture 46 of the neck partition 45 as shown in Fig. 15. When the cap is in this position it is only necessary to apply pressure to the tube 40 to force the contents thereof out through the valve slit 61 which opens as previously described and shown in connection with the valve 25. The difference in the circumference of the valve neck 57 and the cap aperture 53 allows the valve neck to expand when the tube contents is being discharged. After the pressure on the tube has been removed the elasticity of the valve forces the slit 61 closed again.

When the cap 41 is turned to the position shown in Fig. 13 so that the valve recess 60 does not register with the tube aperture 46 pressure on the tube will not force the tube contents out. Suitable indicia such as indicated at 63 may be provided on the tube 40 and adapted to coact with an indicator on the cap 41 to show the open and closed positions of the valve.

In Figs. 16 to 20 inclusive I have shown a collapsible tube 64 having a cap 65 thereon which includes another modified form of discharge valve. The collapsible tube 64 is provided with a conical end portion 66 having a cylindrical neck 67 integral therewith. The neck 67 includes a cylindrical recess 68 which communicates at one end with the interior of the tube 65 and is provided at the other end with a transverse partition 69 having an eccentrically located aperture 70 there-through. Adjacent the juncture of the conical end portion 66 and the neck 67 I provide an external groove 72.

The cap 65 is adapted to be positioned on the neck 67 and is shown as including a body portion 73, a top 74 having a centrally located annular aperture 75 and a countersunk recess 76 therein and a skirt portion 77. The cap 65 includes an automatic valve indicated generally at 80 which is preferably made of a good grade of vulcanized rubber.

As shown, the automatic valve 80 includes an annular body portion 81 having a concentrically located annular neck 82 thereon on which is provided an enlarged annular head 83 which includes an overhanging peripheral flange 84. An eccentrically located recess 85 is provided in the body portion 81

and the neck 82 and a slit 86 in the head communicates with the recess 85.

The automatic valve 80 is adapted to be positioned in the cap 65 so that the valve neck 82 is positioned in the cap aperture 75 and the valve head 83 protrudes beyond the top 74 of the cap and the valve head flange 84 is positioned in the countersunk recess 76 of the cap.

The circumference of the valve neck 82 is preferably less than the circumference of the cap aperture 75 as shown in Fig. 19 and the distance between the top of the valve body 81 and the under side of the head flange 84 is preferably less than the thickness of the side walls of the cap aperture 75. Thus when the valve 80 is positioned in the cap 65 the side wall of the cap aperture 75 distorts the valve head 83 and exerts a pressure thereon which tends to retain the valve discharge slit 86 closed. The amount of pressure exerted on the valve head to retain the slit closed may be regulated as previously described.

After the valve 80 has been positioned in the cap 65 the cap is placed on the neck 67 of the tube and the ends of the cap skirt 77 are spun into the neck groove 72 as shown.

When the cap is operatively positioned on the tube the recess 85 of the valve 80 is adapted to register with the aperture 70 of the neck partition 69 as shown in Fig. 18. When the cap is in this position it is only necessary to apply pressure to the tube 64 to force the contents thereof out through the valve slit 86 which opens as shown in Fig. 18. The difference in the circumference of the valve neck 82 and the cap aperture 75 allows the valve neck to expand when the tube contents is being discharged. After the pressure on the tube has been removed the elasticity of the valve forces the slit 86 closed again.

When the cap 65 is turned to the position shown in Fig. 17 the valve recess 85 does not register with the tube aperture 70 and pressure on the tube will not force the tube contents out. Indicia matter such as indicated at 88 may be provided on the tube 64 to coact with an indicator on the cap 65 to show the open and closed positions of the valve.

In Fig. 21 I have shown a modified form of cap 65 which is provided with an internal shoulder 90 so that instead of the bottom of the valve 80 contacting with the entire top surface of the tube partition 69 as shown in Fig. 18 a flange 81 is provided which contacts with the peripheral top edge of the tube neck which simplifies the positioning of the cap on the tube when the ends of the cap skirt are spun into the groove 72 and which enables the cap to be turned from one position to another with less effort.

Although in the foregoing description I have referred to my invention as embodied in a collapsible tube, I wish it to be understood

that it may be used for other purposes if desired.

From the foregoing description it will be apparent that I have provided an improved closure for tubes containing plastic, semi-viscous or free flowing materials, which can be economically manufactured and is highly efficient in use, and which satisfies the conditions necessary to produce a sanitary article.

Having thus described my invention, I claim:

1. In combination with a closure having a wall portion and having an aperture in the wall portion, a valve, said valve being formed of flexible material, said valve comprising a body portion and a neck, said valve neck fitting said wall aperture and being of less perimeter than said wall aperture, said neck having a discharge aperture therein.

2. In combination with a receptacle having a neck thereon, a cap fitted over said neck, said cap including an apertured top wall, a valve carried by said cap, said valve being formed of flexible material and including a neck, said valve neck fitting said cap aperture and being normally of less height than the thickness of said cap top wall and under tension when operatively positioned on said cap, said neck having a slit therein.

3. In combination with a collapsible tube including a relatively stiff neck having an end portion and having a discharge opening in the end portion, a cap, said cap being rotatable and including a top portion, a valve in said cap, said valve being rotatable with said cap, said valve having a bottom surface movable over the end portion of said tube, said valve having a discharge aperture and said end having a discharge aperture alignable with said discharge aperture.

4. An automatic valve for use with a closure, said valve including a body portion, a reduced neck eccentrically positioned on said body portion and an enlarged head centrally positioned on said neck, said body portion having a recess and said head having a slit extending therethrough to said neck and communicating with said recess.

5. A valve for use in a receptacle, said valve being formed of flexible material, said valve comprising a body portion and a head connected to said body by a neck, said body portion having parallel top and bottom plane faces, a recess in said valve body portion and said neck and a slit extending from said recess through said head, said slit adapted to be normally closed by the tension of said neck and adapted to be forced open.

6. In combination with a receptacle, including a relatively stiff neck and having an eccentric discharge opening in the end thereof, a closure for said receptacle including an end portion, said end portion having an aperture therein, a flexible, separately formed, valve in

said closure for controlling passage through said closure aperture, said closure being movable on said neck whereby in one position said closure aperture registers with said neck aperture and in another position said two apertures are out of register.

7. The combination of a collapsible tube including a relatively stiff neck and having an eccentric discharge opening in the end thereof and a cap, said cap including a top portion and a skirt portion, an eccentric aperture in said top portion of said cap, a self closing valve in said aperture, said cap being positioned on said neck, said cap being mounted to turn on said neck whereby in one position said cap aperture and valve registers with said neck aperture and in another position said two apertures are out of register.

8. A closure for a collapsible tube, said closure including a wall having an aperture therein, a valve carried by said closure, said valve being formed of flexible material, said valve comprising a body portion and a head connected to said body by a neck, said body portion being positioned in said closure with said neck positioned in said aperture, said closure having a slit extending therethrough.

9. In combination with a receptacle having an end portion and having an aperture in said portion, a closure fitted on said neck, said receptacle closure including a top wall having an aperture therein, a valve carried by said closure, said valve being formed of flexible material, said valve comprising a body portion and a neck, said neck being positioned in said aperture of said closure top wall, said valve having a slit therein, said slit being normally closed and adapted to be forced open by the contents of said receptacle.

10. In combination with a collapsible tube having a relatively stiff neck thereon, a transverse partition adjacent the end of said neck, an aperture in said partition at one side of the center of said partition, a valve member engaging the entire end of said partition, a cap fitted over said neck, said cap including a top and a side wall surrounding said valve, said cap being rotatable on said neck and having an aperture therein, said valve being formed of flexible material, said valve comprising a body portion including a neck positioned in said cap aperture.

11. In combination with a collapsible tube including a relatively stiff neck having an eccentric discharge opening in the end thereof, a cap, said cap including a top portion and a skirt portion, said cap having an eccentric aperture in said top portion, said cap being positioned on said neck, an internal shoulder on said top portion, said shoulder being adapted to space the inner face of said cap top portion from the top surface of said tube neck, said cap being turnable on said neck whereby in one position said cap aperture registers with said neck aperture and in another position said two apertures are out of register.

other position said two apertures are out of register.

12. A cap for a collapsible tube, said cap including a top wall and a side wall, an eccentric aperture in the top wall of said cap, a valve carried by said cap, said valve being formed of flexible material, said valve comprising a body portion and a head connected to said body by a neck, said body portion being positioned in said cap with the head engaging the outer surface of the top of said cap, said valve being positioned in the aperture of said cap top wall, a recess in said valve body portion and said neck and a slit extending from said recess through said head, said slit being adapted to be normally closed and adapted to be forced open when said cap aperture is moved to register with said partition aperture.

13. In combination with a collapsible tube having a relatively stiff neck thereon, a transverse partition adjacent the end of said neck, an aperture in said partition at one side of the center of said partition, a cap fitted over said neck, said cap including a top wall spaced from said partition and a side wall surrounding said neck, means to hold said cap rotatable on said neck, said cap having an aperture adapted in one position of said cap to register with said aperture in said partition, a valve carried by said cap, said valve being formed of flexible material, said valve comprising a body portion and a neck, said neck being positioned in said aperture of said cap top wall, said valve body having a slit adapted to be normally closed and adapted to be forced open by the contents of said collapsible tube when said cap aperture is moved to register with said partition aperture.

14. In combination with a collapsible tube having a relatively stiff neck thereon, a transverse partition adjacent the end of said neck, an aperture in said partition at one side of the center of said partition, a cap fitted over said neck, said cap including a top, said cap being rotatable on said neck, an aperture in the top of said cap, a valve carried by said cap, said valve being formed of flexible material, said valve comprising an annular body portion including an annular head connected to said body by an annular neck, said body portion being positioned in the cap, said valve neck being positioned in said cap aperture and said head being positioned to overlie the top of said cap, said valve neck being of less circumference than the circumference of said cap top wall aperture and said neck normally being of less height than the thickness of said cap top wall and being under tension when operatively positioned on said cap, said valve having a dispensing aperture normally closed by the tension of said neck.

15. In combination with a collapsible tube having a relatively stiff neck thereon, a trans-

verse partition adjacent the end of said neck, said partition having an aperture at one side of the center, a cap fitted over said neck, said cap including a top wall spaced from said partition and side walls adapted to surround said neck, said cap being rotatable on said neck, the top wall of said cap having an aperture, said aperture being adapted in one position of said cap to register with said aperture in said partition, a valve carried by said cap, said valve being formed of flexible material, said valve comprising a body portion and a head connected to said body by a neck, said body portion being positioned between said partition and said cap top wall and in engagement with said partition and said top wall, said valve head being positioned on the outer face of said top wall and overlying said top wall aperture, said valve neck fitting said cap aperture and being of less perimeter than said cap aperture, and said neck being normally of less height than the thickness of said cap top wall and being under tension when operatively positioned on said cap, said valve having a slit therein, said slit being adapted to be normally closed by the tension of said neck and adapted to be forced open by the contents of said collapsible tube when said cap aperture is moved to register with said partition aperture.

In testimony whereof, I hereunto affix my signature.

ARTHUR E. SMITH.