Feb. 26, 1957 F. R. WITTNEBERT ET AL 2,782,438

SEALED FOUNTAIN BRUSH

Filed Feb. 18, 1955

Fig. 1

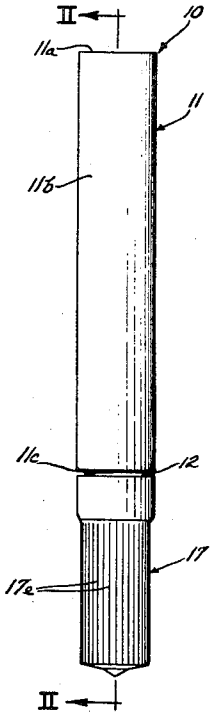


Fig. 2

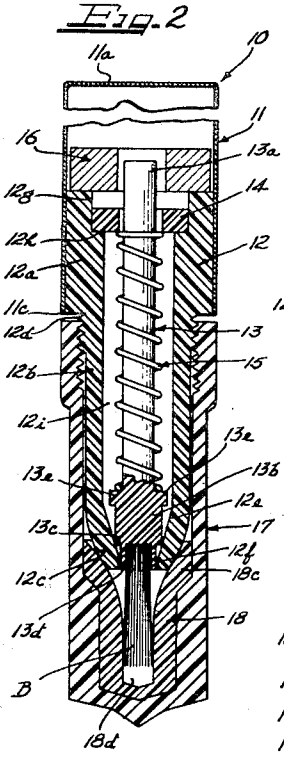


Fig. 3

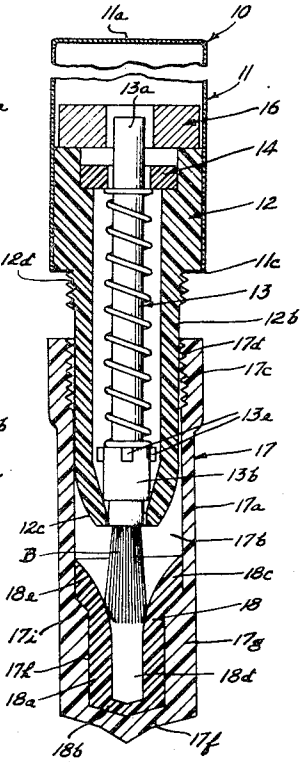


Fig. 4

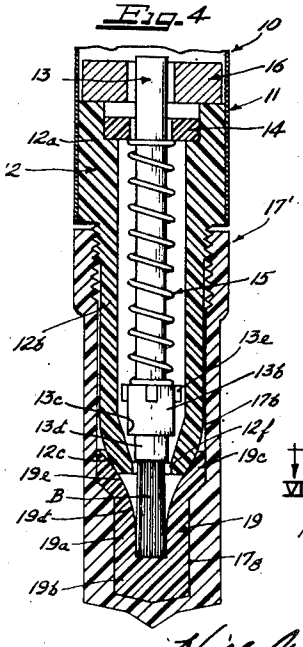


Fig. 5

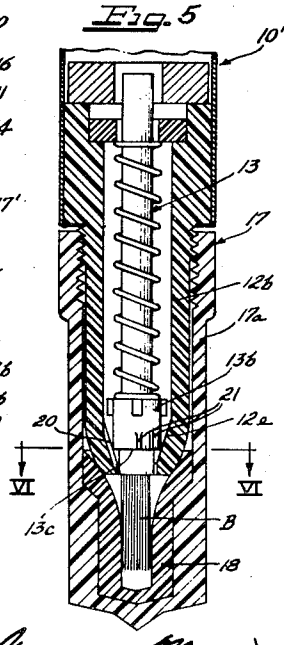
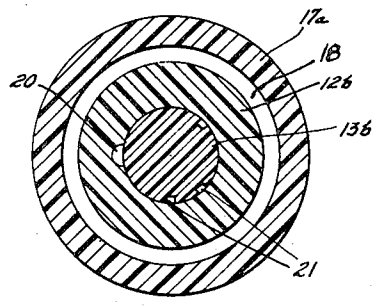


Fig. 6



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United States Patent Office 2,782,438 Patented Feb. 26, 1957

2,782,438

SEALED FOUNTAIN BRUSH

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Application February 18, 1955, Serial No. 489,040

7 Claims. (Cl. 15—139)

This invention relates to a fountain applicator or fountain brush having a sealing cap which guides and then confines the applicator in a shaping recess while providing a multiple seal for the contents of the device. Specifically, this invention relates to a valved fountain brush having a cap or cover isolating the brush in a sealed recess either in or out of communication with the contents of the device and equipped with guide walls leading to the recess so that damage of the brush cannot occur in applying or removing the cap or cover.

Valved fountain brushes equipped with closure caps adapted to retract the valve and brush into its container are known. This retraction of the brush into the container frequently displaces contents of the containers to "pump" slugs of fluid through the nozzle into the cap. When materials such as quick-drying paints, lacquers, enamels and stains, or the like fluids having highly volatile solvents, are stored in the container, this discharge may occur with a forceful "burping" action if the vapor pressure of the volatile fluids in the containers creates a super-atmospheric pressure. Since the valve is unseated by the cap, the interior of the cap which is at atmospheric pressure, will provide a lower pressure zone or receptacle for the fluid. These slugs can accumulate in the cap and a messy applicator nozzle or clogged cap may result.

The present invention now provides a sealing cap and nozzle arrangement for a fountain applicator brush which will receive the brush in its extended position beyond the nozzle in a brush shaping recess and which will be guided by the nozzle so that the brush cannot be damaged. If desired, the valve may be equipped with venting pasages or the cap may partially depress the brush to join the contents of the nozzle with the cap recess. No discharge of slugs of fluid into the cap will result because the brush depressing action is not sufficient to displace or pump fluid from the nozzle and does not occur until the brush is seated in its small shaping recess which is just large enough to accommodate the brush and will not have a slug receiving zone of lower pressure than the fluid pressure in the nozzle. The burping action of the prior known caps equipped with brush depressing means cannot occur.

The caps of this invention are preferably equipped with resiliently deformable seal cups or liners which are impervious to the vapors of solvents and the like ingredients in the contents of the fountain brush. Suitable seal cups or liners can be formed of plastics such as polyethylene, nylon, Taflon and the like. The cup or liner material should not be softened or hardened by exposure to the contents of the fountain brush and should always retain sufficient resiliency to create a back pressure seal.

The seal cup equipped caps of this invention cooperate with the nozzle of the fountain brush, the valve of the fountain brush, and the side wall of the fountain brush to provide a triple seal for the brush. In this arrangement, the brush is isolated from the atmosphere as well as from the contents of the applicator. If desired, however, the brush may remain in communication with the contents of the applicator. The cap is preferably threaded on the nozzle to draw the seal up tightly against the nozzle end. The cap end does not bottom on the nozzle so the cup can always be tightly bottomed on the nozzle end.

A feature of this invention resides in the provision of cooperating guide walls on the fountain brush nozzle or housing and on the cap to insure centering of the brush in the seal cup without bending or splitting the brush bristles.

Another feature of the invention includes the provision of brush bristles which are sufficiently long and stiff enough to be engaged by the end wall of the seal cup in the closure cap for depressing the brush to open the valve and thereby maintain the brush in communication with the contents of the applicator when the brush is sealed in the cup.

It is then an object of this invention to provide a fountain applicator with a closure cap that will effectively seal the applicator in a small applicator shaping recess and which will be guided so as to align the recess with the applicator.

Another object of this invention is to provide a fountain brush having a dispensing nozzle equipped with a spring loaded brush carrying a valve wherein a closure cap embracing the nozzle has a resiliently deformable sealing cup adapted to sealingly engage the end of the nozzle and form a recess for receiving and shaping the brush.

A still further object of the invention is to provide an improved closure cap for fountain brushes whereby the brush is sealingly housed in a small recess in the cap and the recess is automatically aligned with the brush in applying the cap.

A specific object of this invention is to provide a fountain brush with a plastic nozzle having a head press fit into the end of a cylindrical barrel and an elongated nozzle with a valve seat at the dispensing end thereof and a brush-carrying valve therein together with a closure cap having an elongated skirt or guide wall threaded for engagement with the nozzle adjacent the head and carrying a resiliently deformable sealing cup in the closed end thereof to seat against the dispensing end of the seat against the dispensing end of the nozzle and receive the brush therein.

Other and further objects of this invention will be apparent to those skilled in this art from the following detailed descriptions of the annexed sheet of drawings which, by way of preferred examples only, illustrate several embodiments of this invention.

On the drawings:

Figure 1 is a side elevational view of the applicator and closure cap assembly of this invention in closed position;

Figure 2 is a longitudinal cross-sectional view with parts in elevation and with parts broken away, taken along the line II—II of Figure 1 and illustrating the assembly on an enlarged scale;

Figure 3 is a view similar to Figure 2 but illustrating the manner in which the closure cap is guided on the nozzle;

Figure 4 is a view similar to Figure 2 but illustrating a modified closure cap arrangement for partially depressing the brush to unseat the valve;

Figure 5 is a view similar to Figure 2 but illustrating a modified valve and valve seat arrangement; and

Figure 6 is a view taken along the line VI—VI of Figure 5.

As shown on the drawings:

The applicator or fountain brush **10** of Figures 1 to 3, comprises an elongated tubular barrel **11** preferably composed of metal such as aluminum, zinc, or the like, a

nozzle 12 projecting from one end of the barrel and preferably composed of a thermo set plastic such as Bakelite, a valve and brush unit 13 slidable in the nozzle, a guide washer 14 press fit in the inner end of the nozzle and preferably composed of plastic, to hold the unit 13 in the nozzle, a spring 15 for propelling the unit 13 and a heavy metal agitator ring 16 in the barrel 11 to stir the contents of the barrel.

The nozzle 12, according to this invention, is closed by a relatively deep cap 17 preferably formed of thermo-set plastic material such as Bakelite. This cap carries an insert cup or liner 18 composed of resiliently deformable but relatively rigid material such as Teflon, Nylon, or Polyethylene resins.

The barrel 11 has a closed end 11*a*, an elongated side wall 11*b* and an open end 11*c*. The barrel is cylindrical in shape and has a considerable length to simulate a fountain pen. The shape of the barrel can vary as desired and can include a bottle type of reservoir unit, or the like.

The nozzle 12 has a cylindrical configuration with an enlarged head 12*a* press fitted into the open end or mouth 11*c* of the barrel 11. A reduced diameter elongated cylindrical shank portion 12*b* projects from the head 12*a* beyond the end 11*c* of the barrel and has a rounded converging dispensing end 12*c*. Threads 12*d* are formed on the nozzle shank 12*b* adjacent the head 12*a*. A tapered valve seat 12*e* is formed in the dispensing end of the nozzle and converges to a circular orifice 12*f* in the center of the nose 12*c*.

The head 12*a* has an enlarged counterbore 12*g* extending to a radial shoulder 12*h* on which the plastic washer 14 is bottomed. A cylindrical bore 12*i* extends through the nozzle shank 12*b* to the tapered valve seat 12*e*.

The brush unit 13 has a solid rod or shank portion 13*a* fitting freely through the aperture in the washer 14 and adapted to project into the aperture of the agitating ring 16. A head 13*b* on the end of this shank or rod 13*a* provides a shoulder 13*c* adapted to seat on the tapered valve seat 12*e*. A reduced diameter hollow cup portion 13*d* projects from the shoulder 13*c* freely through the orifice 12*f* and carries a tuft of brush bristles to form a brush B which projects beyond the orifice. Lugs 13*e* project radially at spaced intervals around the circumference of the head to form guides for the unit 13 by slidably engaging the bore 12*i* whenever the unit is closed.

The spring 15 is bottomed on the lugs 13*e* and head 13*b* at one end and at the other end is bottomed on the washer 14. The spring surrounds the rod or shank portion 13*a* and is effective to seat the valve on the nozzle seat and to urge the brush beyond the end of the nozzle.

Fluid from the barrel 11 is in full communication with the nozzle passage 12*i* and is dispensed from this passage through the orifice 12*f* under the modulated control of the valve 13*c*. The bristles of the brush B are stiff enough so that end pressure of the brush will unseat the valve to accommodate flow from the passage 12*i* to the brush bristles.

The ring 16 is submerged in fluid, such as paint, in the barrel and is adapted to be surged through the fluid to agitate the same and create a mixing of the ingredients. Since the ring 16 receives the rod or shank 13*a* when it reaches the end of its stroke at the head 12*a*, the fluid in the barrel is subjected to a pump action which tends to force it into the nozzle passage 12*i*.

The cap 17 is molded to have an elongated side wall or skirt 17*a* defining a cylindrical bore 17*b* of slightly larger diameter than the portion 12*b* of the nozzle whereby the skirt will freely embrace the nozzle. The open end of the cap preferably has a thickened skirt portion 17*c* which has internal threads 17*d* for threaded engagement with the threads 12*d* on the nozzle. The thickened portion 17*c* reinforces the threaded end of the cap. The main side wall or skirt 17*a* of the cap beyond the thickened portion 17*c* is preferably fluted or grooved as shown at 17*e* in Figure 1 to provide a hand grip for facilitating threading of the cap.

The closed end of the cap 17*f* has a thickened side wall portion 17*g* to also reinforce the closed end. This thickened portion 17*g* defines a reduced diameter bore 17*h* in the closed end of the cap joined with the bore 17*b* by a tapered shoulder 17*i*.

The sealing cup 18 in the cap 17 has a cylindrical main body portion 18*a* sized for snug press fitted relation in the bore 17*h* together with an end head 18*b* for bottoming on the closed end 17*f* of the cap. The cup 18 has an enlarged head 18*c* for snug press fitted relation in the bore 17*b* and for bottoming on the shoulder 17*i*. The cup provides a cylindrical recess 18*d* in the axial central portion of the closed end of the cup and head 18*c* of the cup provides a steeply inclined bell mouth or tapered entrance mouth 18*e* to this recess 18*d*. The recess 18*d* has a diameter for snugly receiving the brush B so as to shape the brush bristles and maintain them in closely associated relation to preserve a good painting end. The mouth 18*e* of the cup guides the brush bristles into the recess 18*d* and also forms a seat for sealing engagement with the nose end 12*c* of the nozzle.

As illustrated in Figure 3, when the cap 17 is applied to the nozzle 12, the skirt or wall 17*a* of the cap will slidably engage the nozzle portion 12*b* to align the seal cup 18 with the brush B before the brush engages the cup. The skirt 17*a* is sufficiently long so that the cap must be axially aligned on the nozzle before the brush bristles can be engaged by the cup. Then, as the aligned cap is advanced to the threads 12*d* of the nozzle, the brush will smoothly slide into the recess 12*d* of the sealing cup while its bristles are gathered together by the bell mouth portion 12*e* of the cup recess. When the cap is threaded onto the nozzle, the brush bristles will be surrounded by the smooth confining side walls of the cup recess 18*d* and will not be twisted or damaged. However, if the bristles should stick to the side wall of the recess 12*d* as the cap is rotated, the entire brush unit 13 can rotate with the cup so that the bristles will not be twisted.

As illustrated in Figure 2, the cup head 18*c* sealingly engages the rounded nose 12*c* of the nozzle when the cap is tightly threaded on the nozzle. In this arrangement, the brush B is thereby isolated or sealed in the recess 18*d*. It is doubly sealed from communication with the atmosphere by the sealing engagement of the cup head and nozzle end and by the sealing engagement of the cap and nozzle threads. In addition, the brush is sealed from the contents of the nozzle by the valve 13*c* being seated on the valve seat 12*e*. Since the brush is not retracted into the nozzle by the cap and since the recess provided by the cup 18 is just large enough to accommodate the brush and is sealed from the atmosphere, the heretofore encountered discharge of slugs of fluid accompanying the closing of heretofore known devices with brush retracting caps, is avoided and the cup recess will not be filled with the contents of the container even if the valve is opened. Any minute quantity of fluid which would flow through an opened valve will be assimilated by the brush to keep the cup relatively clean.

In the modification of Figure 4, the applicator 10 of Figures 1 to 3, is equipped with a modified cap 17′ and the same reference numerals of Figures 1 to 3, have been used to designate identical parts. The cap 17′ receives in the closed end thereof a modified seal cup 19 composed of the same material as the cup 18. The cup 19 has a cylindrical body portion 19*a* similar to the body portion 18*a* of the cup 18. However, a thick end wall 19*b* is provided on the cup. The end head 19*c* fits in the bore 17*b* of the cap and the recess 19*d* provided by the main body portion 19*a* is shallower than the recess 18*d* of the cup 18. The bell mouth or tapered mouth 19*e* of the head 19*c* thus feeds a shallower closed bottom recess than the mouth 18*e* of the cup 18.

When the cap 17' is applied to the nozzle 12, it is guided in the same manner as illustrated in Figure 3 but before the cap 17' is tightened on the nozzle, the end wall 19*b* of the cup 19 abuts the end of the brush B to retract the brush and open the valve 13*c*. The valve is thereby slightly "cracked" and the brush is slightly retracted when the cap is tightened on the nozzle. In this arrangement, therefore, the contents of the container are joined with the recess in the cup when the cap is seated on the nozzle so that the brush will not be isolated from the reservoir as in the modifications of Figures 1 to 3. This communication may be desirable to keep the brush exposed to the solvents in the reservoir. However, the partial retraction of the brush will not permit the heretofore encountered "burping" action effected by complete retraction of the brush with the cap.

In the embodiment of Figures 5 and 6, a modified applicator 10' is closed with the cap 17 of Figures 1 to 3 and parts identical with parts described in Figures 1 to 3 have been marked with the same reference numerals.

In Figures 5 and 6, the cap 17 does not retract to brush but the brush remains in communication with the contents of the nozzle when the cap seals the brush. For this purpose, the tapered valve seat 12*e* of the nozzle is equipped with one or more grooves 20 and the valve head 13*b* is equipped with one or more notches 21 at spaced intervals around the periphery thereof at the valve shoulder 13*c*. Thus, even when the valve is closed, the passages provided by the grooves or notches 20 and 21, will join the contents of the nozzle with the brush and the sealed brush in the cup 18 will remain in communication with the fluids in the nozzle. While the grooves 20 in the valve seat and notches 21 in the valve, have been illustrated, it will be appreciated that either the grooves or the notches could be used alone. Of course, no "burping" action will occur in applying the cap and the cup 18 will remain clean.

From the above descriptions it will, therefore, be understood that this invention provides a fountain applicator brush with an improved closure cap or seal that isolates and shapes the brush and is guided by the applicator nozzle so that the brush cannot be damaged in applying the cap.

It will be understood that variations and modifications may be effected without departing from the scope of the novel concepts of this invention.

We claim as our invention:

1. A fountain applicator brush which comprises a fluid container having a dispensing orifice at one end thereof surrounded by a tapered end wall and an elongated cylindrical side wall depending from that end wall, a brush having bristles projecting from said orifice and receiving fluid from said container, a closure cap having a deep cylindrical skirt for embracing said guide wall to axially align the cap on the container, said cap having a closed end with an internal axially extending reduced diameter well sized for snugly receiving and shaping the brush bristles into compact relation, said closed end having a steeply tapered mouth converging from said skirt to said well along a path which will smoothly guide the bristles into the well in the event of misalignment of the brush and well, said tapered mouth embracing said tapered end wall of the container when the brush is in the well, and coacting threads on the container and in the skirt to draw the mouth and tapered end wall into sealed relation to simultaneously seal the brush and the fluid.

2. A fountain applicator brush which comprises a container for fluid having a dispensing nozzle with an elongated side guide wall and an end nose with a dispensing orifice through the end thereof and an internal valve seat adjacent the orifice, a spring loaded bristle brush and valve unit reciprocably mounted in the nozzle having a valve coacting with said seat and a brush projecting beyond the valve and through the orifice, said brush extending appreciably beyond the orifice when the valve

is seated on the valve seat, a closure cap having a skirt snugly guided on the guide wall of the nozzle, said cap having a closed resiliently deformable end seal portion defining an axial brush shaping well of sufficiently reduced diameter to gather and confine the brush bristles, said well having a steep diverging mouth, said skirt and guide wall coacting to align the well with the brush, said mouth smoothly directing the brush into the well without bending the bristles of the brush in the event of misalignment of the bristles and the well, the large end of said mouth embracing the end nose of the nozzle when the brush is in the well, coacting threads on the nozzle and in the cap to draw the mouth into wedge seated relation with the nozzle for sealing the brush and fluid, and said valve being lifted off the valve seat upon application of end load on the brush to modulate flow of fluid from the container to the brush.

3. A fountain applicator brush which comprises a container having a dispensing nozzle with an elongated side guide wall and an orifice through the end thereof, a spring loaded brush and valve unit shiftably mounted in the nozzle and having a valve for regulating flow to said orifice and a brush projecting beyond said valve and adapted to extend through said orifice, a closure cap having a deep skirt for snugly embracing the guide wall of the nozzle to align the cap axially on the nozzle, said cap having a resiliently deformable seal portion adapted to surround the orifice and sealingly engage the end of the nozzle along a steep inclined wedging plane, said seal converging from the skirt of the cap to a small closed recess in the cap aligned with the brush when the skirt aligns the cap on the nozzle, said recess accommodating the length of the brush projecting beyond the orifice and being sized for shaping the brush into compacted form, said converging seal portion being effective to smoothly gather and guide the brush bristles in the recess, and cooperating means on the cap and nozzle to draw the deformable seal into wedge fit engagement with the end of the nozzle while securing the cap on the nozzle whereby the brush and container will be sealed by the cap.

4. A fountain brush which comprises a cylindrical metal barrel, a cylindrically bored plastic nozzle having an enlarged head portion press fit in the mouth of said barrel and a reduced diameter shank portion projecting beyond the barrel and providing a guide wall, threads on said shank portion adjacent the head, said shank portion having a rounded converging end nose with a dispensing orifice through the end thereof registering with said bore and a valve seat diverging from the inner end of the orifice to the full diameter of said bore, a brush and valve unit rotatable and longitudinally shiftable in said nozzle, said unit including a shank with a head coacting with said valve seat to provide a modulating valve control for flow of fluid to said orifice, a spring surrounding said shank urging the valve against said seat, a brush carried by said head and projecting freely beyond the orifice, a plastic cap having a cylindrical skirt with an internally threaded open end for threaded engagement with the threads on the nozzle and a closed end overlying the skirt, a resilient insert seal cup lining the closed end of the cap and having a brush shaping longitudinal well sized to snugly receive the brush and hold the bristles together, said skirt coacting with the guide wall on the shank portion of the nozzle for guiding said cap on the nozzle to align the well of the cup with the brush, said well having a relatively steep outwardly flaring entrance mouth diverging to the skirt of said cap, the large end of said entrance mouth surrounding the end nose of the nozzle to form a resilient wedge seal thereon when the cap is threaded on the nozzle threads, and said steep flare of said mouth smoothly guiding the brush into said well without bending the brush bristles.

5. A fountain applicator which comprises a container

having a dispensing nozzle, a spring loaded valve and brush unit in the nozzle including a valve coacting with the nozzle to control flow from the nozzle and a brush receiving fluid flow from the valve, a closure cap for the nozzle having a deep skirt guided by the nozzle to axially align the cap on the nozzle, said cap having a deformable end portion defining a reduced diameter internal well in the cap sized to receive the brush in snug compacted relation therein, said end portion diverging along a steep inclined path from said well to the cap skirt to provide a deformable seal to sealingly engage the end of the nozzle around the orifice, and said well having an end wall for thrusting against the end of the brush to open the valve when the cap is secured to the nozzle, said skirt engaging said nozzle to align the well with the brush before the brush enters the well and said diverging seal portion smoothly directing the brush into the well in the event of misalignment of the well and brush.

6. A fountain applicator having a dispensing nozzle with an elongated side wall, a rounded end nose, and a spring loaded valved brush controlling flow therefrom, said brush projecting beyond said nozzle, a closure cap for sealing the applicator, said cap having an elongated skirt slidably embracing the nozzle to align the cap with the brush, said cap having a seal cup portion providing a recess sized for snugly receiving the brush and having a steeply flaring mouth for sealingly engaging the nose of the nozzle in steep inclined relation, said cap and nozzle having coacting threads to draw the cup tightly against the nozzle and seal the brush in the cup recess, and at least one passage accommodating breathing between the nozzle interior and the brush even when the valve is closed.

7. A fountain brush which comprises a fluid container having an elongated side wall with a dispensing orifice at one end surrounded by a tapered end wall, a brush projecting from the orifice adapted to receive fluid from the container, a skirted cap embracing the side wall to axially guide the cap onto the container, an internal shoulder in said cap, a deformable seal cup in said cap having a body portion defining a well sized to snugly receive and shape the brush and a head portion bottomed on the shoulder and defining a steep tapered mouth converging from the skirt to the well to smoothly direct the brush into the well, and coacting means on the cap and container to wedge the mouth into sealed relation with the tapered end wall and squeeze the head between the end wall and shoulder whereby both the brush in the well and the fluids in the container are sealed.

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