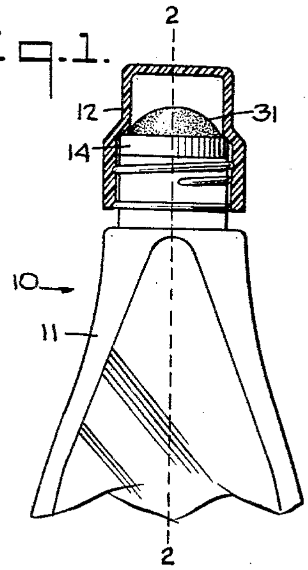
Feb. 16, 1965 W. J. LUEDTKE 3,169,267

FLUID APPLICATOR

Filed March 29, 1963

Fig. 1.



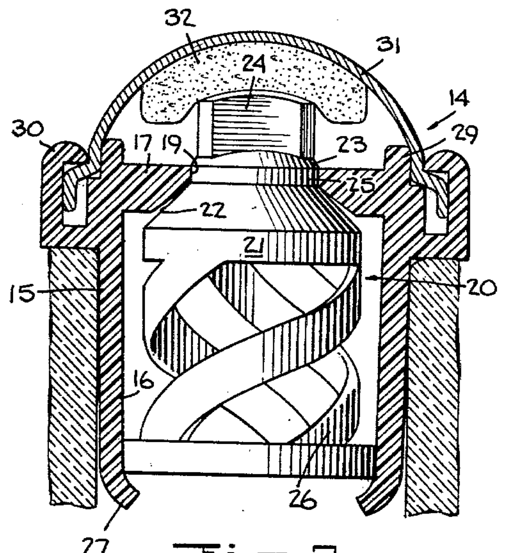


Fig. 2.

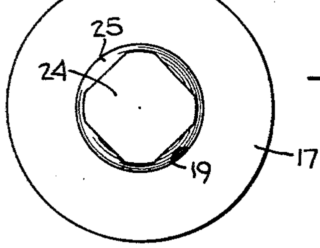
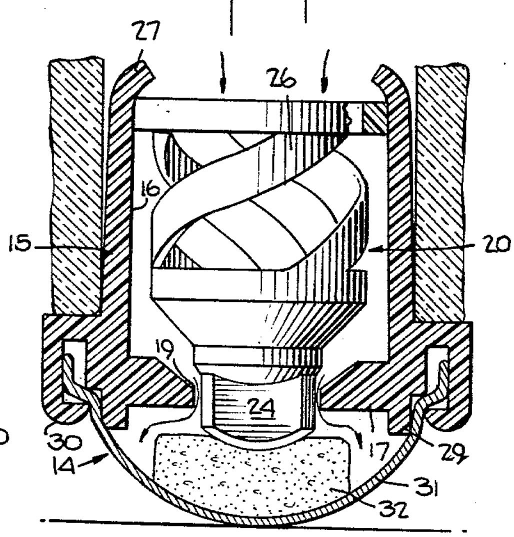


Fig. 5.

Fig. 4.



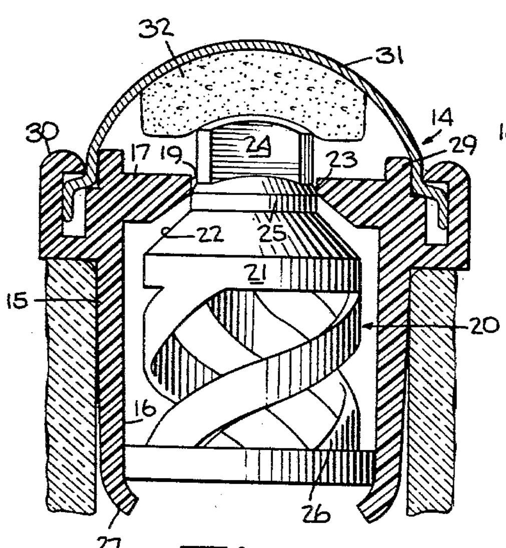


Fig. 3.

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FLUID APPLICATOR

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5 Claims. (Cl. 15—566)

This invention relates to fluid applicators, and more particularly, to daubers for the application of fluids such as shoe polish, deodorants, medicaments and the like to a surface to be treated.

It is known to provide daubers of the class described comprising a container and flow control means positioned in an opening in the container. Such flow control means frequently comprise a bored body member and a closure member, and these parts are normally resiliently positioned relatively to one another to prevent flow of the fluid from the container and are arranged so that the closure member may be moved, by the application of an exterior force, to a position to open or unseal the body bore to permit the flow of fluid from the container. The opening force is usually applied by inverting the dauber and pressing it against an object to which the fluid is to be applied so that when the bore is unsealed, the fluid flows by gravity onto the surface of the object. To prevent the untimely unsealing of the bore, and to enhance the appearance of the dauber, a removable overcap is usually provided to cover the flow control assembly.

While such constructions have achieved a certain degree of commercial success, the effectiveness of the seals of which I am aware has not been entirely satisfactory. Thus it has been proposed, for example, to utilize a steel sphere as the closure member and to urge this lightly by spring force into contact with a conical surface of a plastic body member; or to attempt to seal the dauber by urging complementary conical plastic surfaces against one another. It will be apparent to those persons skilled in the art that in neither case can effective sealing be achieved since the first proposal relies upon line contact, while both proposals are subject to interference by dirt particles and require exceedingly precise and costly fabrication and machining techniques, particularly in view of the commercial practise of including surfactants in the dauber contents to promote fluid flow.

An important aspect of the problem resides in the fact that the inefficient seals with which I am familiar often permit leakage due to rough handling in transit, thus presenting an unsightly and commercially disadvantageous condition when the over-cap is removed. This situation becomes even more significant when it is realized that some producers now desire to utilize transparent over-caps to improve the dress of the package, thus necessitating high integrity seals capable of withstanding the normal abuse of shipment. Notwithstanding this need, it is also important that the consumer be able to induce flow of fluid from the dauber by the application of only a gentle force to unseal the flow control parts.

Accordingly, I have conceived by my invention an effective solution to the problem presented and have actually constructed a successfully operating and commercially desirable dauber based upon that concept.

In essence I contribute by my invention, a dauber comprising a container having an opening and fluid flow control means positioned in the opening to control the flow of fluid therethrough. The latter means are constructed to effect a primary seal to avoid leakage under the rough handling conditions frequently prevailing prior to the first use by the consumer, during shipment, for example; and a secondary seal effective to prevent fluid flow from the container under conditions of normal use after the primary seal is broken.

As a particular feature of my invention, the flow control means may include a body formed with a bore and an end wall, means forming an aperture in the end wall opening into the bore, and closure means in the bore forming a primary fluid seal when in a first position relatively to the means forming the aperture, a secondary seal when in a second position, and unsealing the aperture when in a third position to permit the flow of fluid from the container. I provide spring means within the bore to urge the closure means to the second position.

Preferably, the closure means is formed with a stem extending through the aperture in the body so that when the assembly is inverted and pressed against the surface to which the fluid is to be applied, the force exerted on the stem effects movement of the closure means to the third position so that the fluid may flow by gravity from the container. A porous pad may cover the stem and aperture to aid in even distribution of the fluid.

As another feature of the invention, I form the body of a semi-rigid resilient material and, while the projecting part of the stem is narrower than the aperture, the base of the stem has an enlarged portion which is in fact slightly wider than the aperture. Thus, when the container is filled by the manufacturer, and the flow control means assembled, the stem is pressed through the aperture under force sufficient for the enlarged part of the stem to distend the aperture and form a tight, press fit with the surface of the end wall defining the aperture. It will be appreciated by those skilled in the art that such an arrangement affords a tight seal along a peripheral band of complementary surfaces contiguous along a rather substantial area, rather than along only a line of contact.

Actually, I form the stem with a tapered portion between the projecting part of the stem and its enlarged part, this tapered portion acting as a cam surface properly to center the stem relatively to the aperture when the former is moved to primary sealing position, and also to assist in gradual distention of the aperture for reception of the enlarged part of the stem.

As a further feature of the invention, the secondary seal is effected after the primary seal is broken by the force of the spring urging the closure means towards the aperture. For convenience of the consumer, the spring force must be relatively light, at least not of sufficient magnitude to effect the primary seal. Thus, the spring force will urge the tapered part of the stem against the inner edge of the surface defining the aperture. Again, the tapered surface acts to cam the stem into proper alignment; and, while the inner edge of the surface against which the tapered part of the stem engages may be sharply angulated, it will be recalled that the body is formed of semi-rigid resilient material. Accordingly, the edge is deformed to comply with the contour of the engaging tapered surface to effect a peripheral band of sealed surfaces of some substantial area as distinguished from line contact. It will be appreciated that the present concept provides a wiping action between surfaces as both the primary and secondary seals are effected thus removing any foreign matter which might otherwise tend to interfere with the seals.

If desired, it is possible to form the closure member also of a semi-rigid resilient material so that the spring may be integrally formed as a part of this member.

There has thus been outlined rather broadly the more important features of the invention in order that the detailed description thereof that follows may be better understood, and in order that the present contribution to the art may be better appreciated. There are, of course, additional features of the invention that will be described hereinafter and which will form the subject of the claims appended hereto. Those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures for carrying out the several purposes of the invention. It is important, therefore, that the claims be regarded as including such equivalent construction as do not depart from the spirit and scope of the invention.

A specific embodiment of the invention has been chosen for purposes of illustration and description, and is shown in the accompanying drawings, forming a part of the specification, wherein:

FIG. 1 is an elevation view of a dauber according to the present invention;

FIG. 2 is an enlarged cross sectional view of my flow control means taken along the lines 2—2 of FIG. 1 and illustrating the parts in the primary seal position;

FIG. 3 is a detail view similar to FIG. 2 but illustrating the parts in secondary seal position;

FIG. 4 is similar to FIGS. 2 and 3 but shows the flow control means in open or unsealed position; and

FIG. 5 is a top plan view of the flow control means.

Referring now to the drawings, and more particularly, to FIG. 1 thereof, there is shown a dauber **10** embodying the features of the present invention and comprising a fluid container **11** and a cap **12** which may be of the screw-on type and fabricated of transparent glass or plastic, for example. The flow control means **14** is positioned as by friction fit in the opening at the upper end of the container, as shown.

FIG. 2 illustrates details of the flow control means **14** and shows the parts in a first or primary seal position. Thus, I provide a body **15** fabricated of a semi-rigid resilient material such as polyethylene, for example, and which is longitudinally bored as at **16** to take the form of a tubular member at the outer end of which I form an end wall **17** having a central aperture **19** defined by vertical sides.

A closure member **20** is movable axially in the bore **16**, as will be more fully described, and serves as a closure for the aperture **19** in the body end wall. The member **20** has a base **21** formed with an upwardly converging conical surface **22** merging with a centrally disposed upstanding stem **24**. As shown in FIGS. 2 to 5, the stem extends through the aperture **19** in the body end wall **17**, and is narrower in plan than the aperture **19**. Actually, I prefer to form the aperture of circular configuration and the stem rectilinear in plan so that fluid may flow around the stem and through the aperture without the necessity of withdrawing the stem from the aperture. Additionally, the lower region **25** of the stem is formed of enlarged width and merges with the upper narrower portion of the stem through an annular tapered surface **23**.

The lower region **25** of the stem just above the surface **22** is circular in plan, has vertical sides and is slightly wider than the width of the apertures **19** for a purpose later to be made apparent. By way of example, the aperture may be of the order of .252 inch in diameter and the enlarged region **25** of the stem about .258 inch in diameter, while the narrower upper part of the stem may measure of the order of .242 inch diagonally.

A compression spring **26** is positioned in the bore **16** below the base **21** and bears against an internal shoulder **27** at its lower end and against the bottom of the base at its upper end to urge the closure member **20** towards the end wall **17**. I prefer to form the spring and closure member integrally and, for this reason, I fabricate them of a semi-rigid resilient material such as polyethylene which is inherently characterized by the resilience necessary for the spring **26** and which is non-reactant with the intended contents of the dauber.

In assembling the flow control means, the integral closure member and spring are inserted into the lower end of the bore **16**, the lower end of the spring being snap

fit onto the shoulder **27**, and the stem **24** projecting through the aperture **19**. The base is forced upwardly so that the inclined surface **23** engages the lower edge of the resilient material defining the aperture **19**, thus camming the closure member into central disposition within the bore and also distending the aperture **19** until the enlarged lower region **25** of the stem tightly engages the end wall **17** defining the aperture in a press fit effectively to seal the aperture. Because of the inherent resilience of the material involved, the mating surfaces will complement one another and afford a perfect primary seal secured by friction against failure due even to the rough treatment apt to be sustained in packing, shipment, and the like. It is important here to note that this primary seal is achieved along a peripheral zone of considerable area determined by the depth of the end wall **17** and of the enlarged portion **25** of the stem.

In use, the dauber is inverted (FIG. 4) and pressed against any surface until the stem is forced inwardly of the aperture to break the primary seal and permit the flow of fluid by gravity from the container **11**, through the bore **16** and the aperture **19**, around the stem **24** and out of the flow control means. Upon release of this initial pressure on the stem, the spring **26** urges the base **21** and stem **24** towards the body end wall **17**, the inclined surface **23** acting again to cam the base and stem into central disposition relatively to the aperture **19**. The spring need not be powerful enough again to effect the primary seal already described, but does urge the surface **23** against the inner edge of the aperture to deform this edge region, because of the resilience of the material, to form an annular zone or band of complementary surfaces, in mutual engagement as distinguished from line contact, to afford a secondary seal suitable for the less rugged handling normally expected in domestic use. In further operation, the dauber is merely inverted and pressed gently against the surface to which the liquid is to be applied to break the secondary seal and permit the flow of fluid from the container.

In the commercial embodiment, I form the body **15** with a pair of adjacent, concentric annular flanges **29**, **30** around the outer portion of the end wall **17** which I utilize to secure the marginal edges of a porous pad **31** which is made of felt or other fabric or the like effective to promote smooth and even distribution of the fluid flowing from the container. A pad of foam rubber **32**, for example, may be positioned between the felt pad **31** and the top of the stem **24**, if desired. The flange **29** is upstanding while flange **30** is disposed radially outwardly of the flange **29** and also extends upwardly but curves inwardly at its upper end towards flange **29** to reduce the space between the two and provide gripping means for the pad.

From the foregoing description, it will be seen that I contribute a dauber comprising a container and flow control means including a body and closure member constructed and arranged to provide a relatively tight primary seal when in a first relative position, a secondary seal when in a second relative position and a fluid flow passage when in a third relative position. It will further be seen that both such seals are achieved by complementary surfaces of relatively considerable area rather than merely by line contact.

I believe that the construction and operation of my dauber will now be understood and that the advantages of my invention will be fully appreciated by those persons skilled in the art.

I claim:

1. A dauber of the class described, comprising a fluid container having an opening, and fluid flow control means positioned in said opening and controlling the flow of fluid from said container, said fluid flow control means including a body formed with a longitudinal bore and an end wall, means forming an aperture in said end wall opening into said bore, closure means in said bore having a

stem extending through said aperture and formed with a surface for engaging the portion of said end wall defining said aperture in a friction fit resisting disengagement thereof and constituting a primary seal, said closure means having a second surface for engaging a zone of said means forming said aperture to constitute a secondary seal, said seals being broken by application of force to the stem of said closure means extending through said aperture thus to permit the flow of fluid from said container, and spring means in said bore urging said closure means into a position to effect said second seal.

2. A dauber of the class described, comprising a fluid container having an opening, and fluid flow control means positioned in said opening and controlling the flow of fluid from said container, said fluid flow control means including a body formed with a longitudinal bore and an end wall, means forming an aperture in said end wall opening into said bore, closure means in said bore having a stem extending through said aperture and formed with a peripheral surface for engaging a complementary surface of the portion of said end wall defining said aperture in a friction fit resisting disengagement thereof and constituting a primary seal, said closure means having a second surface inclined relatively to said first surface for engaging a zone of said means forming said aperture to constitute a secondary seal, said seals being broken by application of force to said stem thus to permit the flow of fluid from said container, means camming said closure means into position coaxial with said body upon movement of said closure means towards sealing position, and spring means in said bore urging said closure means into a position to effect said second seal.

3. A dauber of the class described, comprising a fluid container having an opening, and fluid flow control means positioned in said opening and controlling the flow of fluid from said container, said fluid flow control means including a body formed of semi-rigid resilient material and having a longitudinal bore and an end wall, means forming an aperture in said end wall opening into said bore, closure means movable axially in said bore and having a stem projecting through said aperture and formed with an enlarged portion of slightly larger width than said aperture for engaging the surface of said end wall forming said aperture in a relatively tight friction fit resisting disengagement thus to form a primary seal along a peripheral zone of said enlarged surface of an area substantially equal to the area of said end wall surface, said closure means having a peripheral inclined surface converging from said enlarged surface in the direction of flow from said container for engaging the inner edge of said means forming said aperture and deforming same to effect a secondary seal along a second peripheral zone of said closure means, said primary and secondary seals being broken by application of force to said stem and spring means in said bore urging said closure means into said secondary seal position, said inclined surface serving to center said closure means relatively to said body when moving towards sealing position.

4. A dauber of the class described, comprising a fluid container having an opening, and fluid flow control means positioned in said opening and controlling the flow of fluid from said container, said fluid flow control means including a body formed of semi-rigid resilient material and having a longitudinal bore and an end wall, means forming an aperture in said end wall opening into said bore, closure means movable axially in said bore and having a stem projecting through said aperture and formed with a peripheral surface of a slightly larger width than said aperture for engaging the surface of said end wall forming said aperture in a relatively tight friction fit resisting disengagement thus to form a primary seal along a peripheral zone of said enlarged surface, said closure means having a peripheral inclined surface converging from said enlarged surface in the direction of flow from said container for engaging the inner edge of said means forming said aperture and deforming same to effect a secondary seal along a second peripheral zone of said closure means, said primary and secondary seals being broken by application of force to said stem, said closure means also being formed of semi-rigid resilient material, and spring means in said bore formed integrally with said closure means and urging said closure means into said secondary seal position.

5. A dauber according to claim 3, further characterized in that a porous member overlies said end wall to effect smooth and even distribution of fluid flowing from said container.

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CHARLES A. WILLMUTH, *Primary Examiner.*