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(54) **Applicator brush**

(57) The invention is an applicator brush with an elongate stem extending from a cap. A tuft of elongate bristles extend from a bristle end of the stem and at least a portion of the elongate bristles have substantially rectovular cross sections.

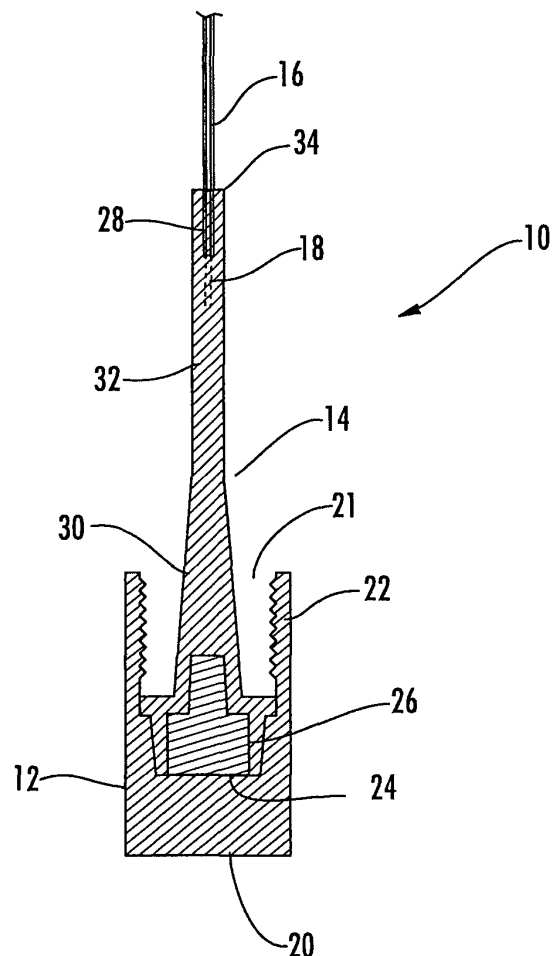


FIG. 1

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Description

FIELD

[0001] This invention relates to the field of brush construction. More particularly, this invention relates to an improved construction of brushes with triangular brush filaments for the application of nail polish and similar materials.

BACKGROUND OF THE INVENTION

[0002] Nail polish and other fluid cosmetic products are often applied using a brush applicator. The brush applicators are generally attached to the cap of a nail polish bottle. In a typical arrangement, a circular brush stem extends from the inside bottom surface of the top of the bottle cap. A circular tuft of bristles with circular cross sections typically extends from a circular opening in the distal end of the stem. When these brushes are used to apply nail polish to a fingernail, the end portion of the tuft of bristles has a tendency to flare out over the surface of the fingernail under the pressure of the person using the brush. Such flaring often causes difficulty in controlling the nail polish application and/or results in an uneven coat of nail polish over the surface of the fingernail. The pressure-induced flaring shape or pattern of conventional bristle configurations can also cause undesirable spread of polish to the skin adjacent the fingernail.

[0003] Conventional brush applicators are also difficult to use in detail work involving very small or relatively inaccessible areas.

[0004] Accordingly, a brush construction is needed which limits undesirable flaring and other problems with conventional brush bristles and provides a user with improved control over the application of nail polish and similar materials.

SUMMARY OF THE INVENTION

[0005] The present invention relates to an applicator brush with an elongate stem extending from a cap. A tuft of elongate bristles extends from adjacent a bristle end of the stem. At least a substantial portion of the bristles have substantially triangular cross sections with preferably equal length sides. In some embodiments, the bristles are aligned in at least two quadrilateral rows of bristles having substantially parallel major axes.

[0006] In one embodiment, the tuft of bristles comprises from about 200 to about 220 elongate bristles at least a substantial portion of which have a generally triangular cross-section. In preferred embodiments, the generally triangular cross-section is substantially an equilateral triangular cross-section. The tuft of bristles is preferably folded about a staple and frictionally retained thereby within a socket or blind bore in the stem adjacent the bristle end. The socket or blind bore is preferably generally rectovular in cross section with a major and a minor

axis along at least a substantial portion of its depth. Many or all of the bristles are preferably substantially aligned into quadrilateral rows of bristles, and also generally parallel to the major axis of the opening. This enables a user to apply material from the bristles into a surface such as a nail in a swipe direction with the major axis of the opening (and therefore the major axes of many or all of the quadrilateral rows of bristles) generally perpendicular to the swipe direction for better control over the manner of delivery of material onto the surface. For fine or narrowly precise work, the stem can be rotated about 90° so the minor axis of the opening is generally perpendicular to the swipe direction for better control. It is a feature of the invention that the configuration of the bristles provides a tuft which is considerably stiffer against bending or user-applied pressure forces associated with the swipe across the surface to help maintain a desired narrow path or limited flaring for better control.

[0007] In other embodiments, the major axes of the quadrilateral rows of bristles may be substantially aligned generally perpendicular to the major axis of the opening.

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] Further advantages of the invention will become apparent by reference to the detailed description when considered in conjunction with the figures, which are not to scale so as to more clearly show the details, wherein like reference numbers indicate like elements throughout the several views, and wherein:

[0009] FIG. 1 is a cross-sectional view of a brush according to a preferred embodiment of the invention;

[0010] FIG. 2a is a frontal view of a stem and a tuft of bristles folded about a staple prior to insertion into the stem into a blind bore of the stem according to a preferred embodiment of the invention;

[0011] FIG. 2b is a frontal view of a stem with a tuft of bristles inserted into the stem according to a preferred embodiment of the invention;

[0012] FIG. 3a is a top view of a brush according to a preferred embodiment of the invention;

[0013] FIG. 3b is a detailed cross-sectional view of a portion of a tuft of bristles according to a preferred embodiment of the invention;

[0014] FIG. 3c is a detailed cross-sectional view of a portion of a tuft of bristles according to another preferred embodiment of the invention;

[0015] FIG. 4 is a side view of a tuft of bristles folded about a staple according to a preferred embodiment of the invention; and

[0016] FIG. 5 is a cross sectional view of a stem according to a preferred embodiment of the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

[0017] Figure 1 illustrates a preferred embodiment of a brush construction according to the present invention

wherein a brush 10 includes a plastic stem 14 extending from a cap 12 and a tuft of bristles 16 connected to the stem 14 using a staple 18 in a manner described in more detail hereinafter.

[0018] Cosmetic products and other brush-applied products are often sold to consumers within bottles (not shown) which are sealed by a cap 12. The cap 12 may be any type of sealing closure suitable for a bottle. In a preferred embodiment, the cap 12 is substantially cylindrical and has a closed end portion. An internal bore extends from an open end 21 of the cap 12 through a length of the cylindrical cap 12 to a closed end portion 20. Although a cylindrical cap is preferred, any shaped cap is suitable for the present invention. For example, the cap may be generally rectangular, square, triangular, or any other geometric shape. The cap 12 may also include ergonomic features, such as concave portions disposed in the sides of a cap to better fit a user's hands. Further, the cap 12 may be substantially solid or solid through any portion thereof.

[0019] The cap 12 is preferably secured to a bottle by way of threading 22 along the internal walls of the bore which threadably engage male or external threads adjacent an upper opening of a bottle.

The cap may also be connected to the bottle using a snap fit attachment or other suitable attachment methods.

[0020] In one embodiment, the brush 10 is directly attached to or made a part of the cap 12 wherein at least a portion of the brush 10 is submerged in brush-applied product, for example nail polish, when the cap 12 is secured to or assembled with a bottle. As shown in Figure 1, a seat 24 in the closed end portion 20 of the cap 10 may be dimensioned to frictionally receive and retain an attachment end 26 of the brush stem 14. The attachment end 26 may also be retained within the seat 24 by an adhesive or other fastening mechanism. In alternate embodiments, the brush 10 may be molded as an integral part of the cap. In another alternate embodiment, the brush 10 may not be attached to a cap 12 and may be provided independently from a bottle of brush-applied product such as having its own handle for use independent of a cap or bottle.

[0021] In a preferred embodiment, the brush stem 14 extends out from an internal or blind bore opening of the cap. The brush stem 14 is preferably made of a plastic material, such as polyethylene or polypropylene, and is preferably 1 to 3 inches in length. As shown in the figures, the brush stem 14 preferably includes a conical or tapered section 30 extending from adjacent the attachment end 26. Preferably, a generally oval or generally rectangular distal section 32 of the brush stem 14 (i.e., a "rectovular" section 32) extends from adjacent the distal end of the conical section 30 to adjacent a bristle end 34. The cross-section of the section 32 is most preferably substantially ovular with a major axis across its widest portion and a minor axis across its narrowest portion, where the major and minor axes are preferably substantially perpendicular. Being preferably rectovular, Section 32 may

also have a generally rectangular cross section or a hybrid rectangular and ovular section with substantially flat sides and rounded ends. In alternate embodiments, the stem 14 may have a generally rectovular cross-section extending only from adjacent the attachment end, or the brush stem 14 may have a generally rectovular cross-section substantially throughout its entire length. In other embodiments, the stem may have a generally circular, triangular, polygonal, or tubular cross section or any combination thereof.

[0022] In a preferred embodiment, an internal socket or blind bore 28 is provided in the stem adjacent the bristle end 26 of the stem for retaining the tuft of bristles 16 within the stem 14. As can be seen in Figure 3a, the socket 28 also preferably has a rectovular cross section with a major axis that is preferably substantially parallel to the major axis of the preferably rectovular stem and a minor axis that is substantially parallel to the minor axis of the preferably rectovular stem. Again, as used herein, "rectovular" is meant to indicate a generally oblong cross-sectional configuration, such as substantially flat sides along or parallel to the major axis and semi-circular ends, as in the shape of the socket 28 shown in Figure 3a, (i.e., a "hybrid" rectangular and ovular configuration), or a substantially rectangular or a substantially ovular cross-section. All such configurations are considered "rectovular" as this term is used herein. The internal socket 28 preferably has a rectovular cross-section with a major axis dimension or width across of about 1/8 inch and a minor axis dimension or width across of about 1/20 inch. Preferably, the major/minor axes are dimensional so as to have an approximately 5:2 length/width ratio. Further, the socket 28 is preferably about 1/4 inches deep to a solid bottom. In alternate embodiments, the internal socket 28 may have any suitable dimensions. In other alternate embodiments, the socket may have a circular, square, or other geometrically shaped cross sections. In further alternate embodiments, the stem may not contain a socket or blind bore and/or the tuft of bristles may be retained in the stem by alternate structures, such as by an integral formation with a tuft generally fixedly projecting from or made a part of a stem.

[0023] A tuft of bristles 16 preferably includes from about 200 to about 220 individual bristles. The bristles are preferably about 0.5 to 2 inches in length. The bristles are preferably plastic filaments, such as nylon, polyethylene, or polypropylene filaments. As shown in Figure 4, the tuft of bristles 16 may be formed by folding the bristles at the midpoint of their length around a substantially U-shaped staple 18. Figure 2a shows a tuft of bristles folded around a staple prior to insertion into the socket 28. During manufacture of the brush 10, the staple 18 (with a tuft of bristles folded thereabout) is preferably inserted into an opening 27 of the socket 28 such that the legs of the staple drive or wedge into the bottom of the socket 28. The embedded staple 18 frictionally retains the tuft of bristles 16 within the socket 28. The fold of the tuft of bristles is therefore retained between the bend or middle

part of the staple 18 and the bottom of the socket 28, and the balance of the tuft is folded about the staple 18 so that the bristles thereof extend out of the socket 28 in a direction generally opposite to the direction or orientation of the legs of the staple 18, thereby forming the tuft of bristles 16 projecting from opening 27. Accordingly, in a preferred embodiment, the tuft of bristles 16 includes from about 400 to about 440 bristle ends extending from the opening 27 adjacent the bristle end 34 of the brush stem 14. In alternate embodiments, the tuft may be retained in the stem by other methods, such as adhesives or melting the bristles in the bristle end of the stem as by sonic welding and the like.

[0024] In a preferred embodiment, the staple 18 may be made of a metal or metallic material such as stainless steel. In alternate embodiments, the staple 18 may be made of plastic material. Such plastic staples may be preferred for uses with corrosive products or products incompatible with metals, such as teeth whitener and the like. However, when a plastic staple is used the legs of staple 18 may be unable to embed within or penetrate into the bottom of a plastic socket 28. In such an embodiment, the staple and tuft folded thereabout preferably have a substantially greater cross section dimension than the cross section dimension of the socket 28 so that they may have a compression or friction fit against the sidewall of socket 28, and be retained thereby. Further, the socket 28 may be lengthened so that the legs of the plastic staple are not unduly impeded or crumpled by contact with the end or bottom of the socket 28.

[0025] The rectovular cross section of the socket 28 of preferred embodiments offers many advantages over prior art brushes 10, which were generally formed with circular sockets 28. The rectovular shape of the socket 28 helps guide the staple 18 into the proper position to properly hold the bristles 16. The length of the bend of staple 18 about which the tuft is folded preferably is slightly less than the width of the internal socket 28 at its major axis. This configuration allows the staple 18 and the corresponding tuft of bristles to self-align into proper position in the socket 28 substantially parallel to the major axis of the socket. Accordingly, the staple 18 is constrained against fitting into the socket 28 in any orientation other than substantially parallel to the socket's major axis, as the width is the greatest at that portion of the elongate cross section of the socket 28.

[0026] In one embodiment, as shown in Figure 3a, when inserted into the socket 28, the tuft of bristles 16 is urged into a configuration having an elongate or rectovular cross section with a major and minor axis substantially parallel to the corresponding major and minor axes of the preferred rectovular socket 28.

[0027] Figure 3b shows a detailed cross sectional view of a portion of the tuft of bristles 16 in one embodiment where the bristles 16 have a rectovular cross section. In this embodiment, a substantial portion of the bristles have a substantially rectangular cross section. However, it will be understood that all or part of the bristles may have a

substantially ovular cross-section with major and minor cross-sectional axes and/or the hybrid configuration discussed above with substantially flat sides and circular ends. According to one embodiment, the bristles with substantially rectangular cross sections include two sides greater in length than the other two sides of the rectangular cross section. The longer sides will be referred to as the major sides of the bristle's rectangular cross section substantially parallel to the major axis and the shorter sides will be referred to as the minor sides of the bristle's rectangular cross section substantially parallel to the minor axis. In one embodiment, the minor side of the bristles is from about 1.5 mils to about 3 mils in length and the major side is from about 2.5 mils to about 4 mils in length.

[0028] As shown in Figure 3b, the bristles 16 are preferably substantially aligned such that the major sides of the bristles 16 are substantially parallel to the major sides of the other rectangular bristles 16 in the tuft. The bristles 16 tend to self-align in such a pattern when the tuft of bristles 16 is being assembled and inserted into the socket 28 of the brush. Furthermore, the major sides of the bristles 16 have a tendency to self-align parallel to the base or bend of the staple 18 and the major axis of the cross section of the socket 28. In one embodiment, the bristles 16 are disposed such that at least about 90% of the bristles 16 align with their major sides are substantially parallel to each other, to the length orientation of the bend of the staple, and to the major axis of the preferred rectovular socket 28. The tendency of the bristles 16 to self-align with each other and generally parallel to the major axis of the socket 28 is believed to be a result, at least in part, of being folded about their midpoint around the bend of the staple 18 during assembly. The bristles 16 are believed to be stiffer in certain respects when they are folded about their minor axis in a direction perpendicular to their major axis than they are when they are folded about their major axis in a direction perpendicular to their minor axis due to their preferred rectovular cross sections. Thus, when the bristles 16 are folded around the bend of the staple, they tend to fold in the direction of least resistance, i.e., about a line substantially parallel to their major axes, such that they are similarly oriented.

[0029] As shown in Figure 3c, an alternate preferred embodiment of a tuft of bristles 17 is shown in a cross-sectional view. In this embodiment, bristles 17 have a substantially triangular cross-section. Preferably, triangular bristles 17 are substantially equilateral and each bristle side preferably has approximately the same side length. In some embodiments, the length of the sides of the triangular bristles is selected from the range of about 1 mil to about 4 mils. Triangular bristles 17 provide many advantages over bristles with other shapes including their tendency to pack more closely than bristles of other shapes such as circular shapes. Triangular bristles 17 provide the opportunity to include more bristles in a socket because they can be packed more tightly than other

shaped bristles. As shown in Figure 3c, limited space is lost in between bristles 17 because they are packed tightly together. As the bristles 17 are packed into the socket, they are believed to substantially align in the configuration as shown forming groups having substantially quadrilateral cross sections, referred to herein as "quadrilateral rows" 19 of bristles 17.

[0030] Additionally, the triangular bristles 17 result in less splaying than bristles of traditional circular shapes because they are tightly packed together and provide support for one another. As shown in Figure 3c, the bristles 17 are packed such that they leave little or no space between adjacent bristles 17 of the same row. Therefore, the bristles 17 tend to move together as a tuft rather than splaying and moving in directions different than the tuft as a whole.

[0031] Furthermore, in view of the interlocking nature of the triangular bristles 17, each quadrilateral row acts substantially as a singular group of bristles. One result of these tightly packed rows of triangular bristles 17 is that each packed row of bristles 17 moves as if it is a singular, elongate quadrilateral group of bristles moving against the other singular, elongate quadrilateral group of bristles.

[0032] The major axis of these quadrilateral rows 19 of bristles 17 is preferably substantially parallel to the major axis of the socket, and therefore, the quadrilateral rows 19 of bristles 17 tend to bend in the typical direction of brushing. This minimizes any splaying effect and improves accuracy of application. As used herein, when the term "major axis" is used to refer to the tuft of bristles 17, it is referring to the major axis of the quadrilateral rows 19 made of a plurality of bristles 17.

[0033] The triangular bristles 17 and their tendency to self-align with each other into quadrilateral rows 19 of bristles 17 enables the brush bristles 17 to be more tightly packed together than traditional brushes with circular bristles, and therefore promotes attainment of an optimal or maximum packing factor, where the packing factor is the ratio of total bristle cross sectional area of a tuft of bristles 17 and the cross sectional area of the socket 28.

[0034] In a preferred embodiment of the present invention, the tuft of bristles 16 has a packing factor greater than about 0.85. An increased packing factor tends to increase brush stiffness, thereby providing a user with greater control when using the brush.

[0035] The preferred rectovular cross section of the socket 28 in conjunction with the cross section assumed by the tuft of bristles 16 or 17 within the socket 28 and the preferred ovular section 32 of the brush stem 14 in accordance with a preferred embodiment of the invention combine to indicate to a user the proper direction for moving the brush during an application process. The preferred oval section 32 of the stem 14 may beneficially encourage a user to hold the brush 10 with his or her fingers pressed against the flat sides of the oval section 32, which are generally parallel to the major axis 40 of the oval socket 28. Furthermore, when a user is viewing

the brush 10 and determining in which direction to use the brush 10, the major axis of the tuft of bristles 16 or the quadrilateral row 19 of bristles 17 being longer than the minor axis indicates to the user that brushing in the direction perpendicular to the wider major axis will provide a correspondingly wider application of brush applied product, whereas brushing in the direction perpendicular to the narrow minor axis will provide a correspondingly narrower trail of brush applied product. Thus, the overall configuration of the brush 10 assists a user in properly or predictably using the brush.

[0036] The preferred embodiment of the brush 10 therefore provides for at least two separate brushing modes. A primary brushing mode occurs when a user brushes in a direction generally perpendicular to the major axis of the tuft of bristles 16 or the quadrilateral rows 19 of bristles 17, leaving a relatively wide application of product. In a preferred embodiment, the primary brushing mode is used to apply a majority of product. When a brush 10 is used in its primary brushing mode the bristles 16 and the quadrilateral rows 19 of bristles 17 bend in the direction perpendicular to their major axis. As explained above, the bristles 16 and quadrilateral rows 19 of bristles 17 are less stiff when bending about a line parallel to their major axis (and the fold line about the staple) which tends to enable the bristles to bend more easily when used in the primary brushing mode. However, the bristles 16 and quadrilateral rows 19 of bristles 17 are stiffer in the non-brushing direction in a primary brushing mode. This stiffness in the non-brushing direction desirably limits flaring during use of a brush in the primary brushing mode. Accordingly a user is better able to maintain a substantially constant application and to more precisely apply brush applied product to a brushing surface.

[0037] Detailed applications of product may require an application width which is less than the width applied in a primary brushing mode. For such detailed applications, the secondary brushing mode creates a narrower brushing trail as it is moved in the direction perpendicular to the minor axis of the tuft of bristles 16 or 17. The secondary brushing mode may be used to apply a smaller or narrower width application of product. These alternate brushing modes were previously unavailable using typical brushes with tufts of bristles having a circular cross section. Such typical brushes could only be used to apply substantially a single width application of product.

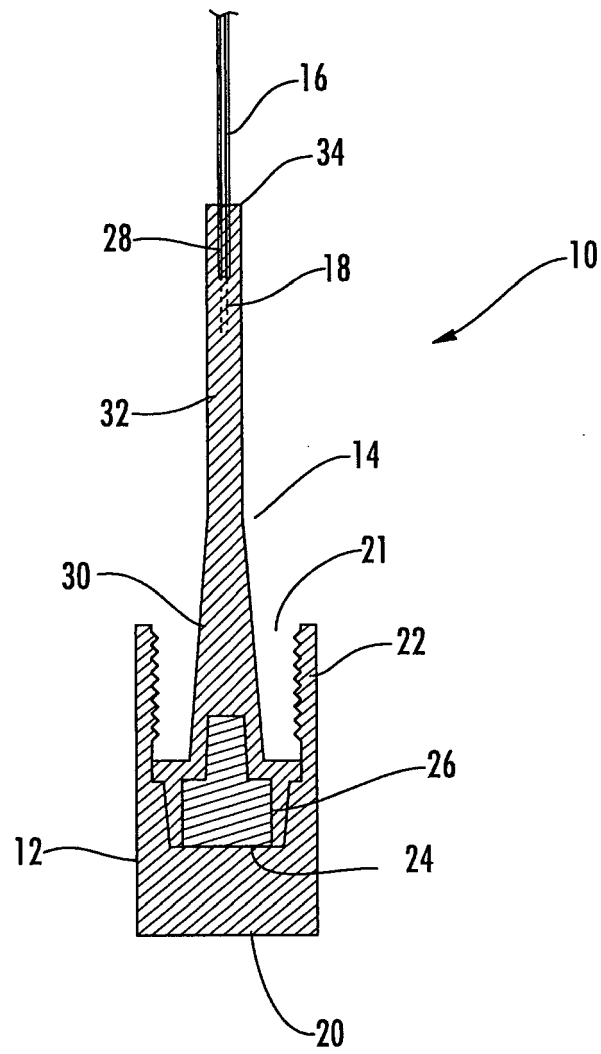
[0038] Cosmetic products have been used herein as an example to describe the principles of the invention covered herein. However, the applicator brush 10 described above can also be associated with other applicator needs. Furthermore, the foregoing description of preferred embodiments for this invention have been presented for purposes of illustration and description. For example, in some embodiments of the invention, the major axes of the rectangular bristles are substantially aligned generally perpendicular to the major axis of the opening, creating a stiffer tuft with less tendency to fan out, under the pressure associated with swiping action

in directions perpendicular to the major axis of the opening.

[0039] The foregoing description is not intended to be exhaustive or to limit the invention to the precise form disclosed. Obvious modifications or variations are possible in light of the above teachings. The embodiments are chosen and described in an effort to provide the best illustrations of the principles of the invention and its practical application, and to thereby enable one of ordinary skill in the art to utilize the invention in various embodiments and with various modifications as is suited to the particular use contemplated. All such modifications and variations are within the scope of the invention as determined by the appended claims when interpreted in accordance with the breadth to which they are fairly, legally, and equitably entitled.

Claims

1. An applicator brush for use in applying substances to a surface, the applicator brush comprising an elongate stem and a tuft of elongate bristles with substantially triangular cross sections projecting from an opening adjacent a bristle end of the stem which opens to a blind bore within the stem, wherein the bristles are folded about a staple disposed in the bore.
2. The applicator brush of claim 1, wherein one side of each of a substantial portion of the bristles are aligned generally parallel to a major axis of the stem.
3. The applicator brush of claim 1, wherein one side of each of a substantial portion of the bristles are aligned generally parallel to a major axis of the staple.
4. The applicator brush of claim 1, wherein the tuft comprises from about 400 to about 440 bristle ends.
5. The applicator brush of claim 1, wherein the blind bore has a rectovular cross section along at least a substantial portion of its length.
6. The applicator brush of claim 1, wherein the blind bore has a substantially hybrid rectangular and oval cross section along at least a substantial portion of its length.
7. The applicator brush of claim 1, wherein the tuft has a generally rectovular cross section.
8. The applicator brush of claim 1, wherein the tuft has a generally circular cross section.
9. The applicator brush of claim 1, wherein the tuft has a packing factor greater than about 0.85.
10. The applicator brush of claim 1, wherein at least a substantial portion of the bristles have a substantially equilateral triangular cross section with a width selected from a range of about 1 mil to about 4 mils.
11. The applicator brush of claim 1, wherein at least a portion of the stem has a substantially rectovular cross section.
12. The applicator brush of claim 1, wherein the bristles are arranged in a plurality of substantially quadrilateral rows having substantially parallel major axes.
13. The applicator brush of claim 1, wherein the elongate stem extends from a cap with the opening spaced from the cap substantially by the length of the stem.
14. The applicator brush of claim 13, further comprising a container of the substance attached to the cap such that the tuft of bristles is retained submerged in the substance.
15. The applicator brush of claim 1, wherein the brush is a nail polish applicator brush for applying nail polish to the surface of a fingernail.

**FIG. 1**

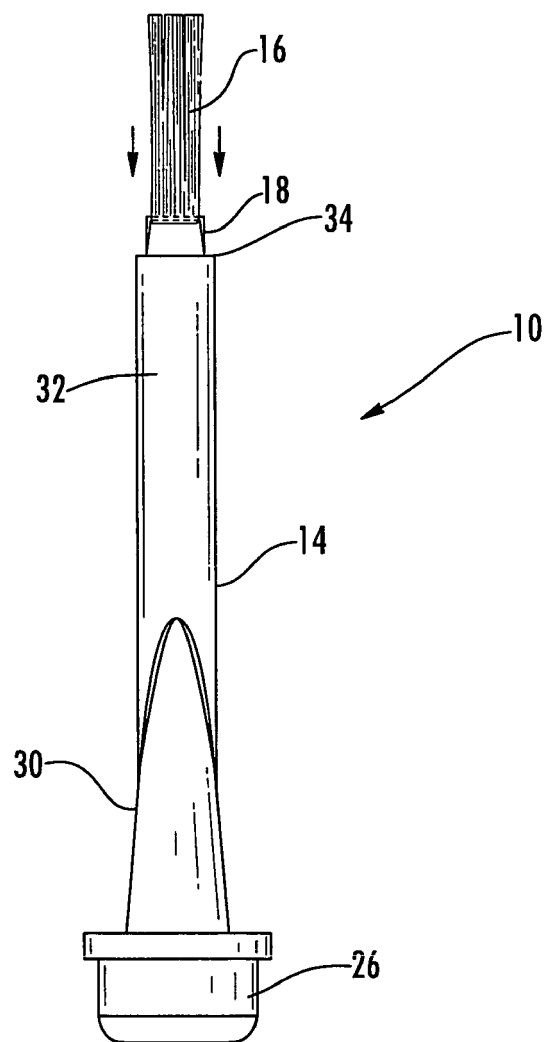


FIG. 2a

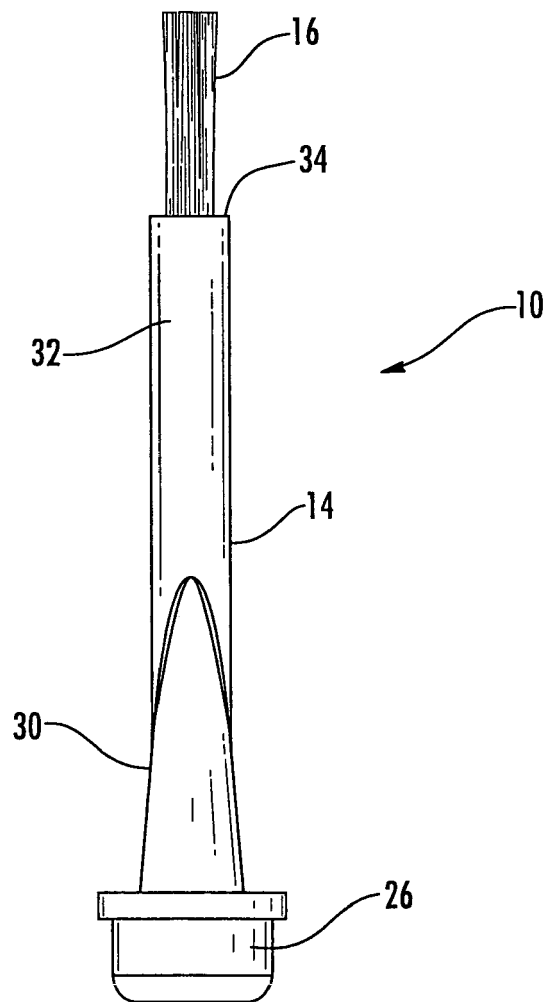
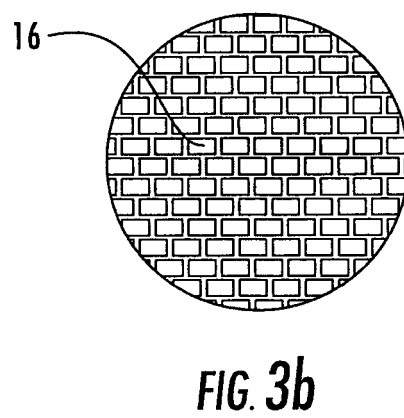
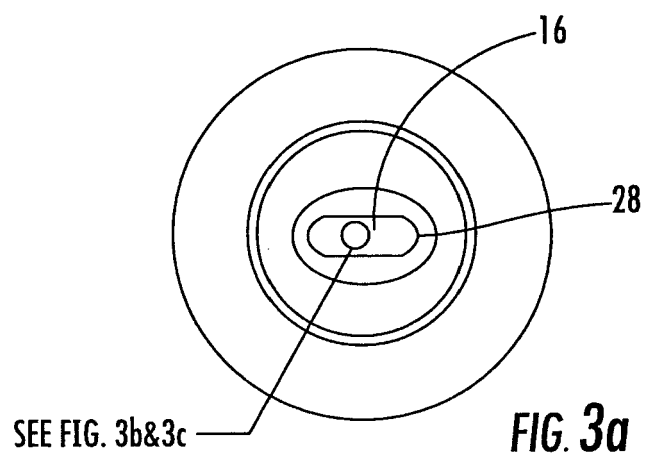


FIG. 2b



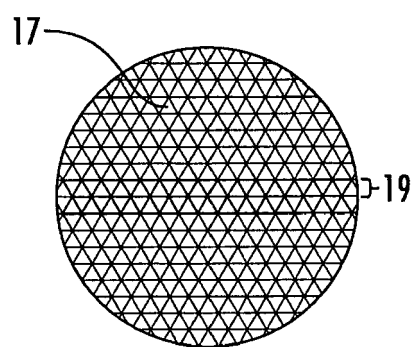


FIG. 3c

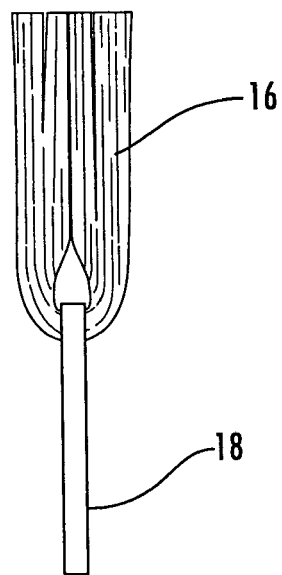


FIG. 4

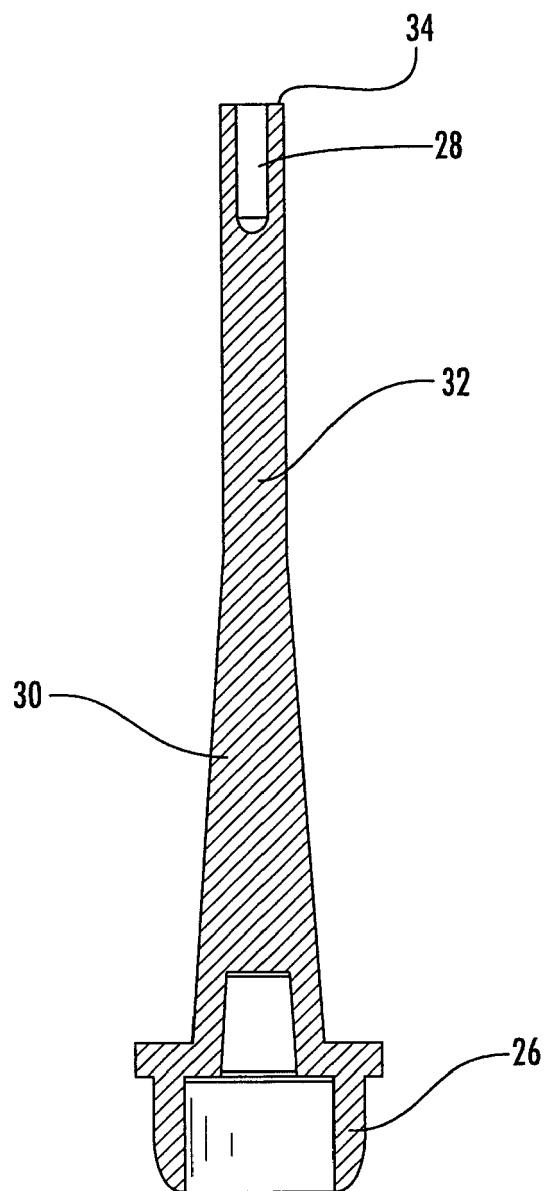


FIG. 5



EUROPEAN SEARCH REPORT

Application Number
EP 08 25 3735

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 13 March 2009	Examiner Cardan, Cosmin
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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