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(54) **BRUSH FOR APPLYING FOR NAIL POLISH**

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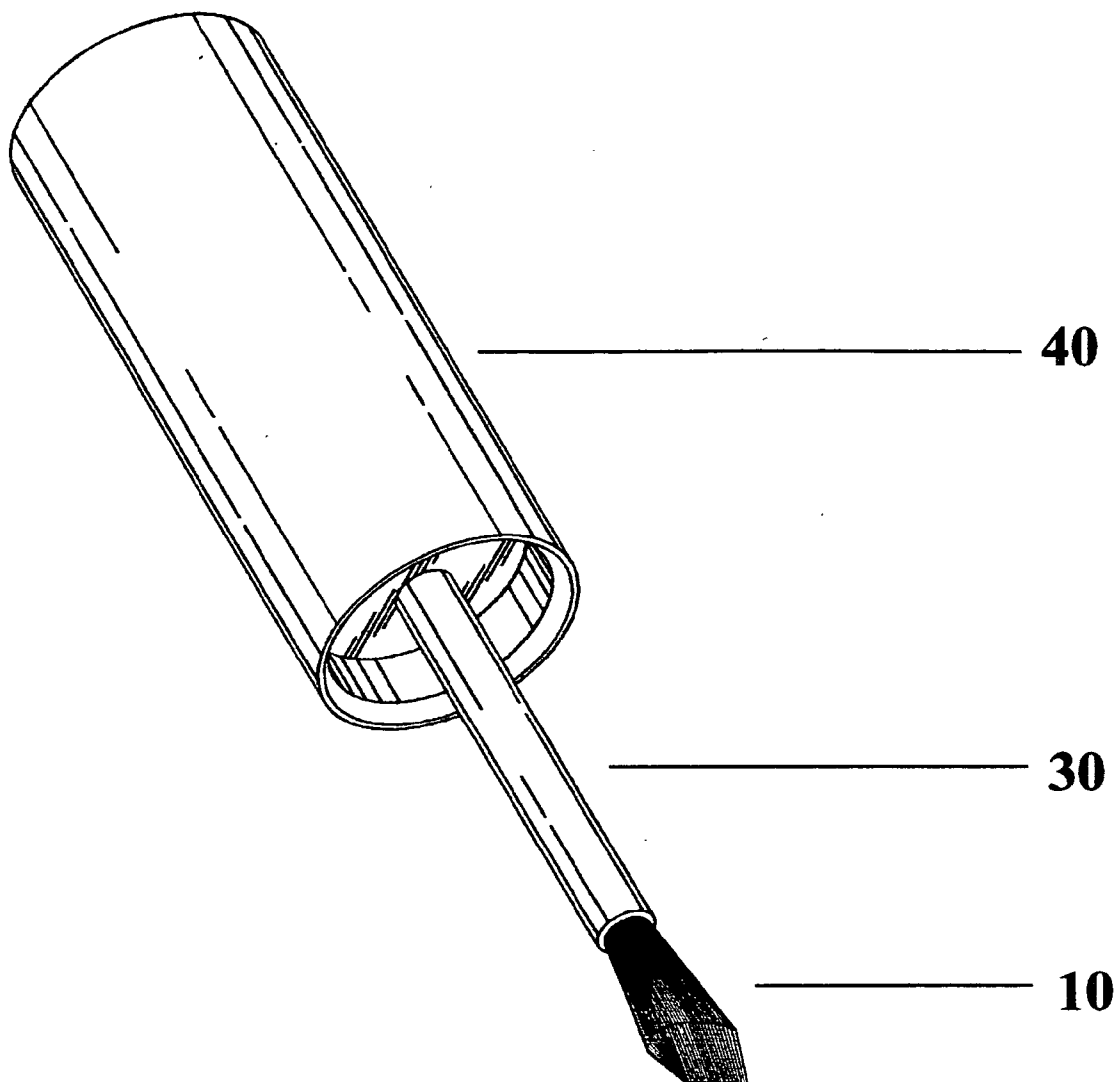
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(57) **ABSTRACT**

The present invention provides a brush for application of nail polish to the fingernails. The brush comprises a distal portion tapered in width and thickness to form a wedge-shaped or pointed tip. This tapered shape allows the use of a relatively thick brush, capable of holding a sufficient amount of nail polish to completely coat a single fingernail, while permitting the coating of a fingernail without getting nail polish in surrounding tissue.



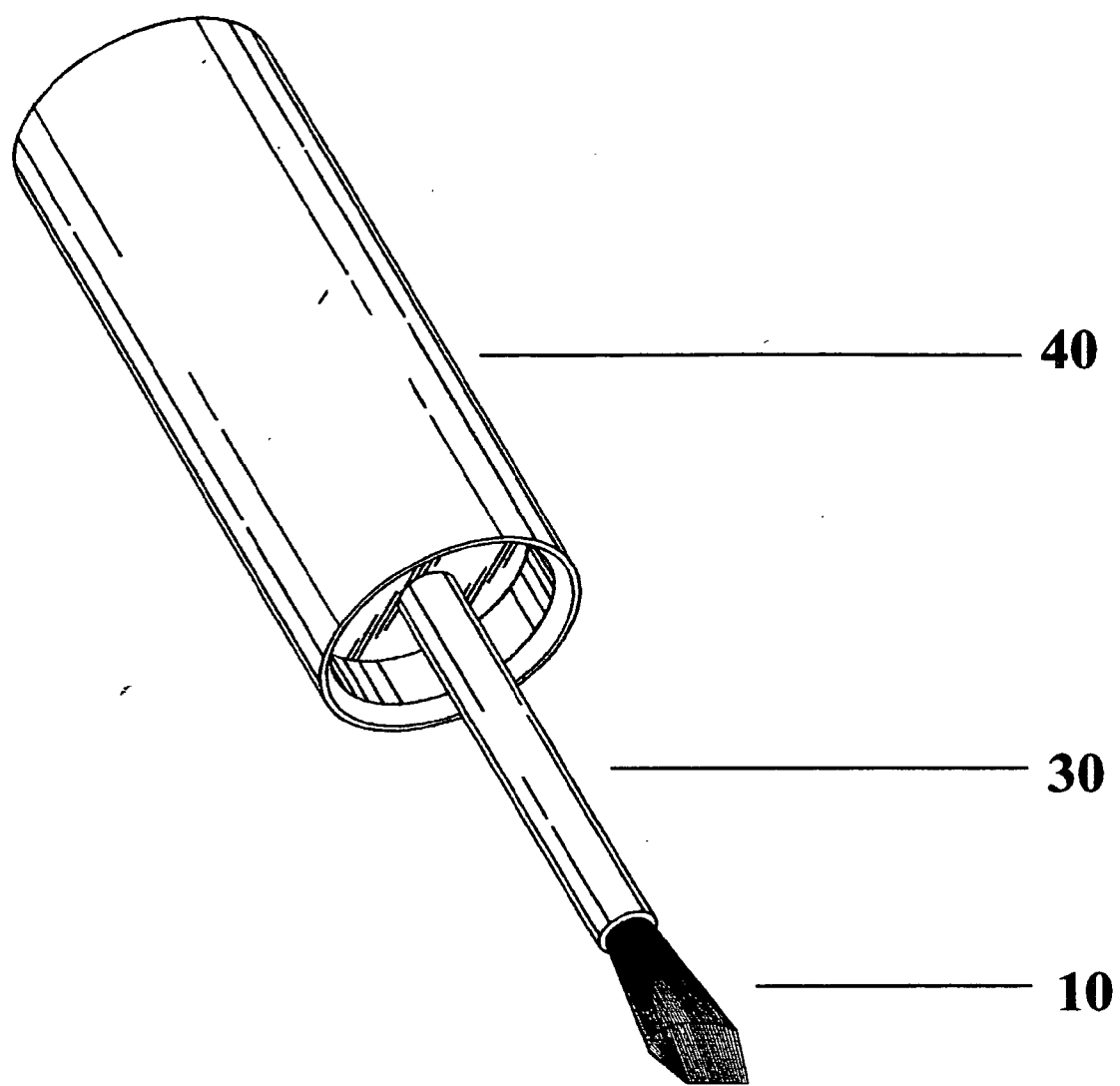


Figure 1

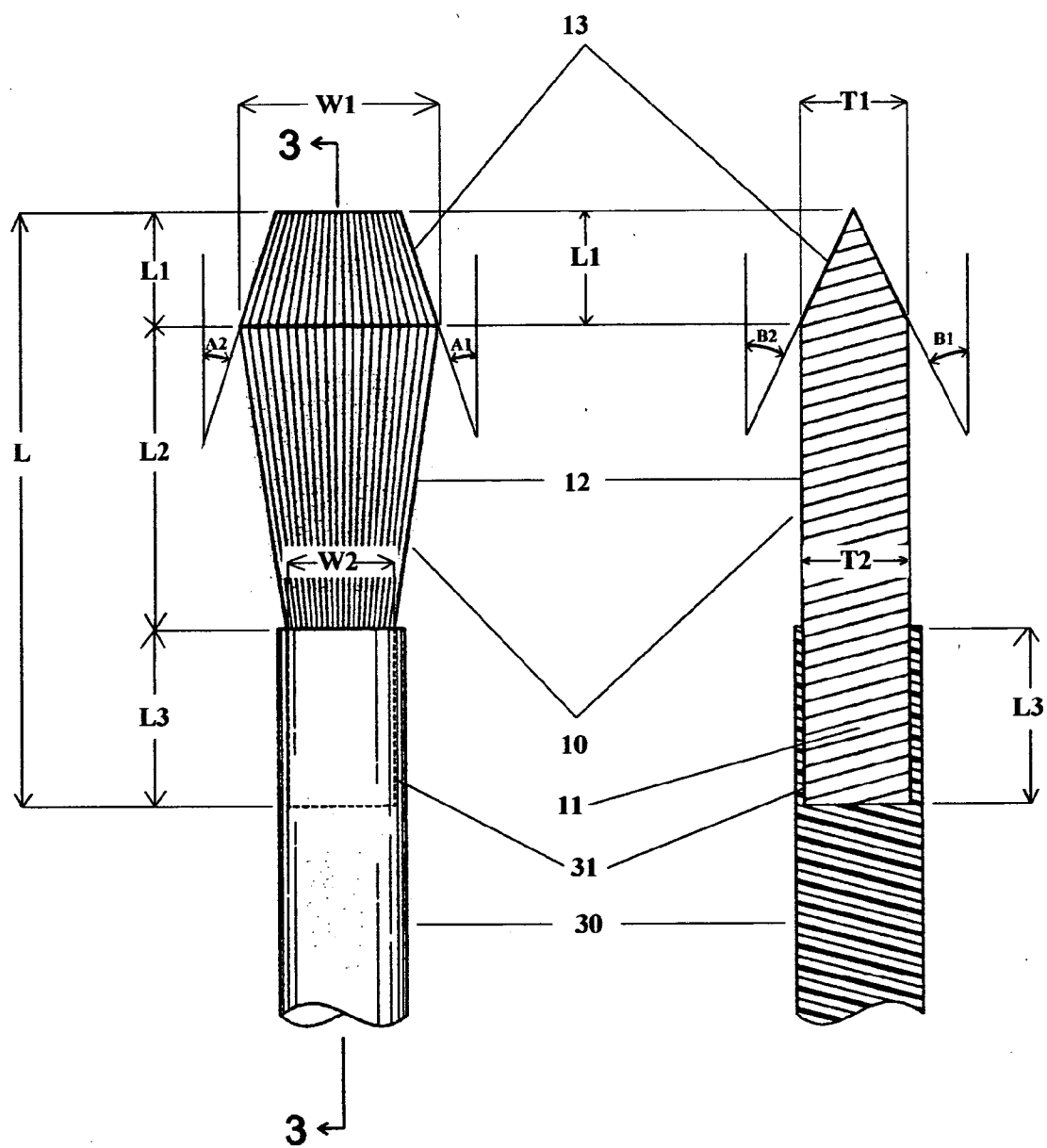


Figure 2

Figure 3

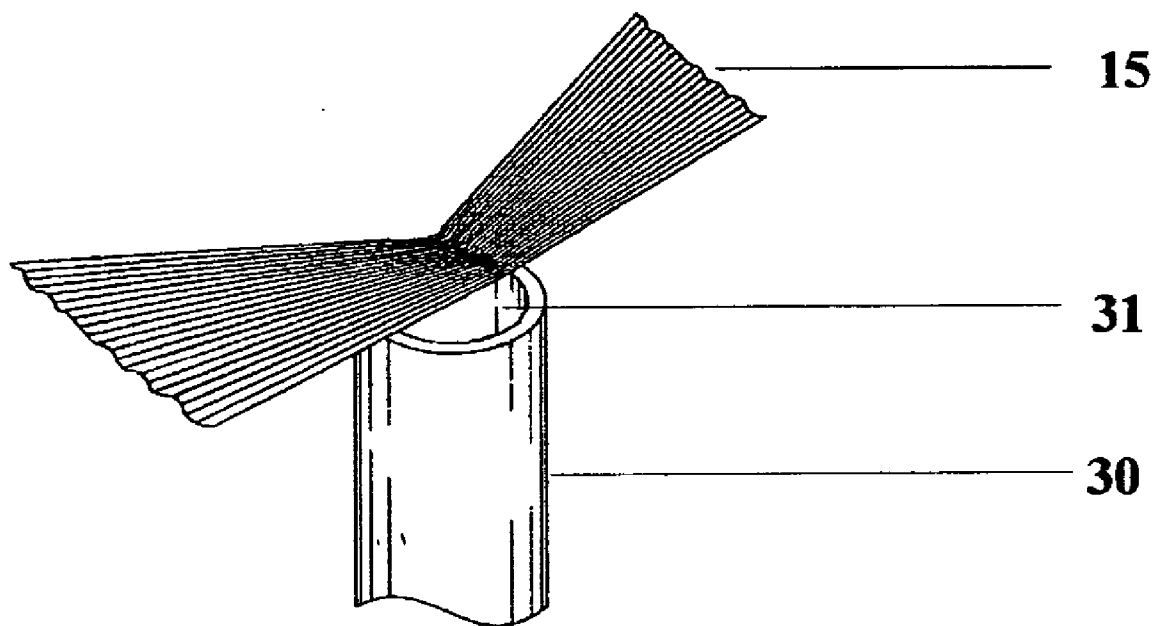


Figure 4

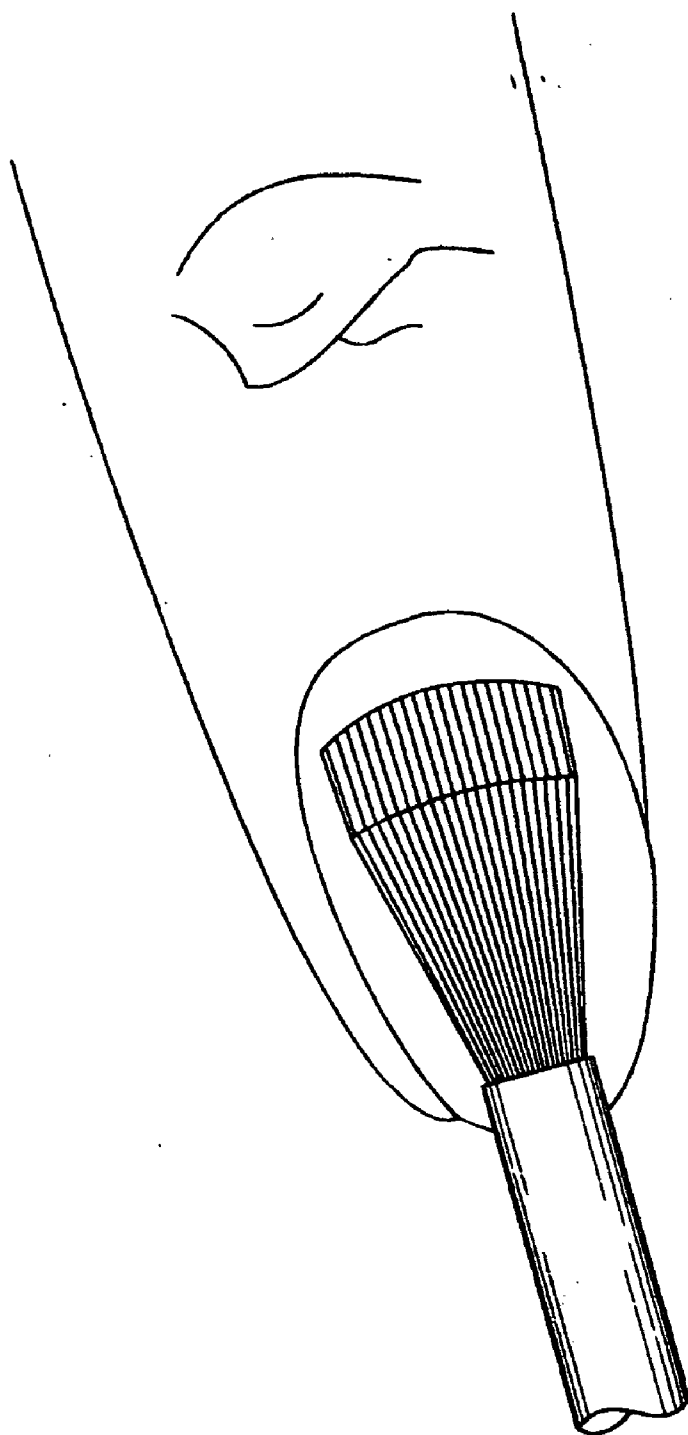


Figure 5

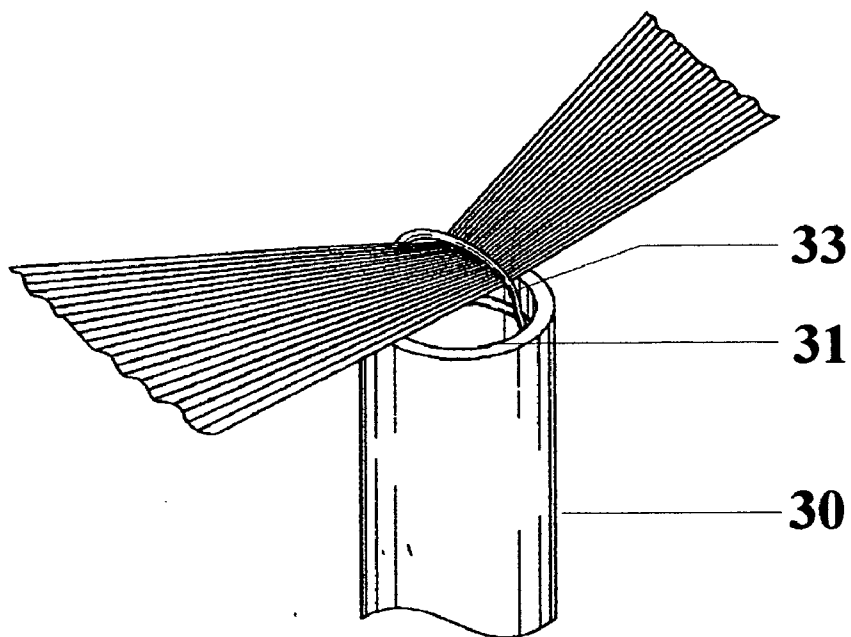


Figure 6

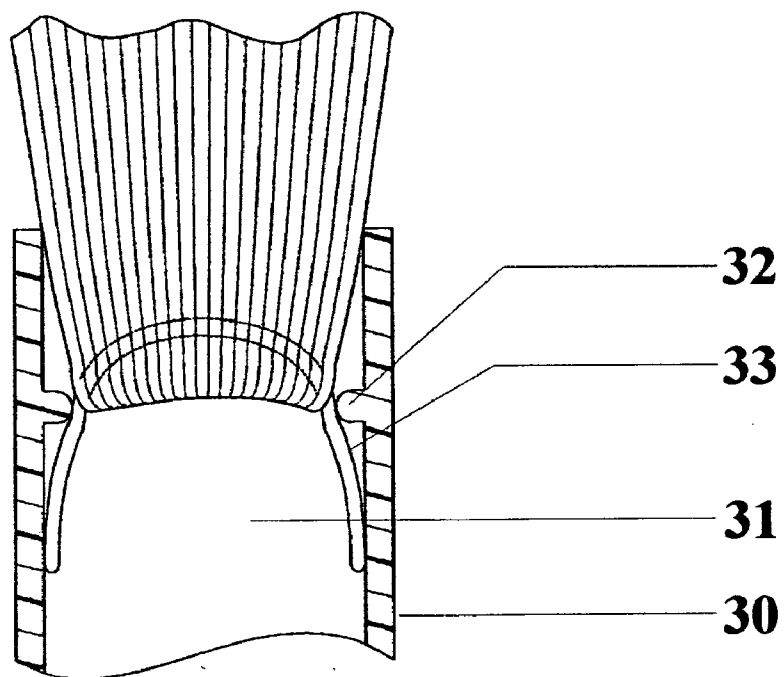


Figure 7

BRUSH FOR APPLYING FOR NAIL POLISH

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention relates to a brush for applying nail polish to fingernails. (Nail polish is also known as nail varnish or nail enamel.) Nail polishes are typically viscous liquids which harden by solvent evaporation, and are frequently pigmented.

[0002] Nail polish applicators known in the art generally consist of a small brush or pad, which is attached to a stem; the stem in turn is usually attached to the cap which serves to seal the opening of the nail polish container. When the container is closed by the cap, the applicator extends into the nail polish in the container. The cap typically serves as a handle for the applicator, and is frequently of a shape facilitating such use.

[0003] In applying nail polish to a fingernail, the brush or other type of applicator is dipped into the nail polish container, then withdrawn and applied to the nail so as to coat or paint the nail. It is desirable that the applicator carry a sufficient load of nail polish from the nail polish container to the fingernail to permit an entire nail can be coated in a single application, without requiring the applicator to be dipped into the nail polish container a second or additional time. Nail polish is formulated to dry or set rapidly, and with multiple dip-and-apply operations it is difficult to avoid undesirable ridges or other visible marks caused by premature drying of a first partial application before a second application to complete the coverage can be performed.

[0004] It is also desirable that the brush or other applicator have an accurately defined shape or outline when applied to the fingernail, to facilitate coating the desired nail surface completely without getting polish on the surrounding cuticle or finger surface.

[0005] Various approaches have been taken in the art to meet these requirements. Nail polish reservoirs integral with the applicator handle have been used, as taught, for example, by Gueret, U.S. Pat. No. 4,841,996, Keating et al., U.S. Pat. No. 5,294,207 and Nakagawa, U.S. Pat. No. 5,720,563. Patel et al., U.S. Pat. No. 6,174,099, teaches a nail polish container and applicator such that the container can be attached to the applicator in an inverted position, delivering nail polish to the applicator through the stem, which is hollow.

[0006] Such devices are characterized by manufacturing complexity, and are relatively expensive to fabricate. They are prone to clogging; and have not met with widespread acceptance.

[0007] Brushes for the application of nail polish comprising bristles which are serrated or grooved in cross section, or undulating along their length are taught by Gueret, U.S. Pat. Nos. 6,280,113, 6,210,060 and 5,588,447. Such brushes are claimed to carry a larger load of nail polish than those employing conventional, substantially right-circular-cylindrical, bristles. Brushes comprising bristles of a plurality of compositions and flexural stiffness are also taught by Gueret, op. cit., and are also claimed to carry a larger load of nail polish. Brezler, U.S. Pat. No. 6,311,359, and Gueret, U.S. Pat. No. 6,210,060, teach bristles containing a surface-modifying additive to improve the load carrying capacity of brushes for applying nail polish.

[0008] To enhance the ability of the brush or other applicator to coat the desired fingernail surface completely without getting polish on the surrounding cuticle or finger surface, applicators and brushes of various shape have been developed. Gueret, U.S. Pat. Nos. 6,210,060 and 5,588,447 teaches brushes for the application of nail polish or other cosmetic substances comprising a tuft of substantially parallel bristles affixed to a stem, the stem being attached too the cap of the cosmetic container. The brushes taught by Gueret can have distal ends terminating in a substantially straight edge which is perpendicular to the axis of the tuft, or at an angle to such axis. Brushes with distal ends terminating in a curve are also taught by Gueret.

[0009] The substantially uniform cross section of the tufts of substantially parallel bristles taught by Gueret, op. cit., can be rectangular, circular, or curved in the form of a sector of a right-circular annulus, the latter cross-section conforming better to the generally curved surface of the fingernail.

[0010] None of these brushes are completely successful in carrying a sufficient load of nail polish to cover a fingernail in a single dip-and-apply operation while controlling the shape of the applicator at the applicator-fingernail interface so as to facilitate accurate coverage of the fingernail without getting nail polish on surrounding tissue.

OBJECTIVES AND SUMMARY OF THE INVENTION

[0011] It is an objective of the present invention to provide a brush for the application of nail polish which, when dipped into nail polish in a reservoir, will take up a sufficient quantity of nail polish to coat a fingernail in a single application, without requiring further dipping into the nail polish reservoir.

[0012] It is a further objective of the invention to provide a brush for the application of nail polish which facilitates coating the desired nail surface completely without getting polish on the surrounding cuticle or finger surface.

[0013] It is a still further objective of the invention to provide brush for the application of nail polish which, when applied to the fingernail, adopts a shape generally conforming the shape of the fingernail.

[0014] It is a still further objective of the invention to provide brush for the application of nail polish which can be affixed to the cap, lid or other means of closure of a container for nail polish.

[0015] It is a still further objective of the invention to provide brush for the application of nail polish which is simple and inexpensive to manufacture.

[0016] The present invention provides a brush for the application of nail polish the distal end of which is tapered in two substantially perpendicular directions, with the angle of the two tapers being chosen independently for optimum coating accuracy and conformity to the fingernail shape. The dual-tapered design of the invention allows a substantially fuller brush to be used, to allow fuller loading of the brush with nail polish, without sacrificing accuracy in applying the nail polish to the fingernail.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] **FIG. 1** is a perspective sketch of the nail polish brush of the present invention.

[0018] **FIG. 2** shows the front view of the nail polish brush of the present invention.

[0019] **FIG. 3** shows a cross-section of the nail polish brush of the present invention in plan view.

[0020] **FIG. 4** illustrates a method of fabricating the nail polish brush of the present invention.

[0021] **FIG. 5** is a perspective drawing of the nail polish brush of the present invention as it would be applied to a fingernail.

[0022] **FIGS. 6 and 7** illustrate an alternative method of fabricating the nail polish brush of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0023] **FIG. 1** shows the brush of the present invention, which comprises a tuft of bristles **10** whose root or proximal end is inserted into the distal end of a stem **30**. The proximal end of stem **30** may preferably be affixable to a cap **40** or other closure of a nail polish container.

[0024] Tuft **10**, which is illustrated in more detail in **FIGS. 2 and 3**, may be substantially rectangular, substantially square, substantially oval or elliptical, or substantially circular in cross section, and is comprised of proximal root portion **11**, which is inserted in stem **30**, body portion **12** and distal tip portion **13**. Tuft **10** is characterized by: total length **L**, which is the sum of tip length **L1**, body length **L2**, and root length **L3**; width **W1** at maximum fullness and width **W2** of the root portion **11**, at emergence from stem **30**; and thickness **T1** at maximum fullness and thickness **T2** of the root portion **11**, at emergence from stem **30**. It will be understood that, in brushes of the present invention with substantially square or substantially circular cross section, the values for **W1** and **T1** will be substantially the same, as will the values for **W2** and **T2**.

[0025] The bristles in tip region of tuft **10** are preferably shaped or trimmed, for example by cutting or abrading, so that both the width and thickness decrease progressively and substantially linearly toward the distal end of tip **13**. The angles of decrease of width with respect to the axis of the brush are characterized as **A1** and **A2**, as shown in **FIG. 2**, and the angle of decrease in thickness with respect to the axis of the brush, shown in **FIG. 3**, are characterized as angles **B1** and **B2**. In the most general case, **A1** need not equal **A2**, **B1** need not equal **B2**, and angles **A** will in general not be the same as angles **B**.

[0026] The bristles in the tip region may taper in thickness down to zero at the tip, to form a linear edge, so that the distal tip portion will resemble a wedge with tapered sides, as illustrated in **FIGS. 1 and 3**. Alternatively, the bristles may taper in thickness down to a blunt tip, so that the tip portion is shaped substantially like a truncated rectangular-base pyramid.

[0027] It has been discovered that, with the tapered brush of the present invention, it is possible to use a much fuller brush (i.e., a brush with larger width **W1** and thickness **T1**) while still retaining a relatively small profile when pressed against the fingernail. The increased fullness increases the nail polish carrying capacity of the brush, so that a fingernail can be completely coated in a single application, without requiring the applicator to be dipped into the nail polish

container a second or additional time, while the smaller profile of the brush when pressed against the fingernail will make accurate application of the nail polish possible, facilitating coating the fingernail completely without getting any nail polish on surrounding tissue.

[0028] The exposed bristle length, **L1+L2**, may be between about 10 mm and about 40 mm, but is preferably about 15 mm. Tip length **L1** may be between about 2 mm and 10 mm, but is preferably about 3 to 5 mm. Body length **L2** may be between about 5 mm and 38 mm, but is preferably about 10 to 12 mm.

[0029] The tuft of bristles may be substantially circular or substantially rectangular or elliptical in cross section, but is preferably rectangular. **W2**, the width of root portion **11**, can be between about 1 mm and about 10 mm, but is preferably about 3 mm. **T2**, thickness of root portion **11**, can be between about 0.5 mm and about 10 mm, but is preferably about 1 mm to 1.5 mm.

[0030] Stem **30** will preferably be fabricated of polypropylene or polyethylene, and may be of any shape chosen for convenience or aesthetics. It will preferably be circular in cross section, with a diameter of about 3 to 5 mm and a length chosen so that the tip of tuft **10** will extend almost to the bottom of the desired nail polish container with which it is intended to be used. Stem **30** will preferably have a cavity or opening **31** in the distal end, of dimensions approximating the cross-section of root portion **11** of the tuft. The sides of the opening will preferably be substantially parallel to the axis of stem **30**. The opening will preferably be about 3 to 5 mm deep, and of sufficient depth to accommodate the entire root portion **11** of tuft **10**.

[0031] The tuft of bristles will generally spread out in the body section. Consequently **W1** will generally be greater than **W2**, and **T1** will generally be greater than **T2**. The degree of spreading will be determined by such factors as the nature of the bristle material, the exposed length of the bristles, the diameter and stiffness of the bristles, and any surface treatment applied to the bristles. The spreading can also be controlled by the method used to insert and/or fasten the bristles in cavity **31**.

[0032] Any suitable bristle material may be used, but is preferably Tynex®, a 6-12 polyamide produced by the E. I. DuPont de Nemours Co., Wilmington, Del. The bristle diameter may be between about 2 mils (i.e., 0.002", 0.051 mm) and 8 mils (0.0203 mm), but is preferably about 2.5 to 3.5 mils (0.064 to 0.089 mm). Tynex bristles may be obtained with various cross-sectional profiles, such as hollow and solid quadrilobal, and also with a textured surface; the cross-sectional profile will affect both bristle stiffness and nail polish carrying capacity. Preferable bristles are Tynex® type BK427 (solid round) or, most preferably, type BK495 (solid round with a textured surface).

[0033] The tuft is tapered as illustrated in **FIGS. 2 and 3**. Angles **A1** and **A2** may take any values from 0° (i.e., no taper) to about 45°, but preferably **A1** and **A2** are substantially equal, and about 15° to 25°. Likewise, angles **B1** and **B2** may take any values from 0° to about 45°, but preferably **B1** and **B2** are substantially equal, and about 10° to 20°. It will be understood that, if tuft **10** is circular in cross section, the values of all of the above angles will be the same, and tip **13** will be substantially conical or the frustum of a cone.

[0034] The nail polish brush of the present invention may be fabricated by fastening a tuft of bristles of the chosen length L into a stem consisting of thick-walled plastic tubing, or a solid rod of plastic into which a suitable cavity 31 has been formed by drilling, pressing, or any other technique known in the art. The plastic will preferably be polypropylene. In the preferred method, a quantity of heated thermoplastic material, such as the "hot-melt glue" known to the art, is inserted into the distal end of cavity 31, and a bundle of about 50 bristles of length twice the desired tuft length L are bent in the middle and pressed into thermoplastic material in cavity 31 of the stem by means of a broach or similar tool. In this method of fabrication, illustrated in FIG. 4, cavity 31 may be slightly larger than root cross-section dimensions W2 and T2, allowing the bristles to spread somewhat as they emerge from stem 30. In an alternative method of fabrication, the root end of the bristles are coated with a thermosetting polymer; and a bundle of about 100 bristles making up a single tuft are then compressed into a bundle of the desired cross-sectional configuration and heated to bond the bristles into a tuft. The tuft will then be inserted into cavity 31 and sealed by heating or other method known to the art.

[0035] Tuft 10 may be shaped by cutting, by means of scissors or razor blade, by abrading, or by any other method known to the art.

[0036] Finally, the proximal end of stem 30 is preferably fastened to a suitable cap for a bottle of nail polish by heat-sealing, gluing, or other technique known to the art.

[0037] It is found that the brush made as described above carries a sufficient load of nail polish to completely coat one nail, without requiring additional immersions in the nail polish reservoir. It is also found that the tapered tip, when applied to the fingernail assumes a compact shape approximating the shape of the fingernail, as illustrated in FIG. 5, which allows accurate application of the nail polish to the fingernail with minimal risk of accidentally getting nail polish on the surrounding tissue.

[0038] The preferred method of fabrication described above is suitable for producing small numbers of brushes. It will be understood, however, that alternate fabrication methods known in the art will be used for commercial production of large numbers of the nail brush of the present invention.

[0039] Suitable cutting and abrading equipment for fabricating production quantities of the nail polish brush of the present invention is produced by Zahoransky Maschinenbau, Freiburg, Germany and by Machines Boucherie N.V. of Izegem, Belgium. Complete automated brush-fabricating machines are available from these and other manufacturers, which combine the operations of assembling the requisite number of bristles into a tuft, inserting and fastening the tuft into a suitable stem, and shaping the tuft as desired.

[0040] In a method of fabrication more suited to high-volume production, a cavity 31 about 5 mm deep of width 3 mm and thickness 1.5 mm is machined or pressed into the distal end of stem 30 which is composed substantially of polypropylene, using any of the techniques well known in the art. A bundle 15 containing about 50 bristles of Tynex® BK427 about 40 mm in length is placed over cavity 31, as shown in FIG. 5, the opening being filled with hot-melt thermoplastic glue. The bristle bundle is then pressed into

cavity 31 with a small broach or similar tool, and secured in place until the glue hardens. The distal 3 mm of the tuft is next tapered so that angles A1 and A2 are equal and about 20° and angles B1 and B2 are equal and about 15°. The tapering is performed by cutting on a Model Z4DIA55 mm rotary cutter available from Machines Boucherie N.V. of Izegem, Belgium. The result is a nail polish brush according to the present invention with L2 about 10 mm and L1 about 3 mm. Root dimensions W2 and T2 are about 3 mm and 1.5 mm, respectively. The bristles spread out somewhat, so that width W1 is about 4 mm and thickness T1 is about 2 mm. The width and thickness at the tip are about 2 mm and 0.5 mm respectively. The resulting brush is dipped into a suitable nail polish reservoir and applied to the fingernail as illustrated in FIG. 5.

[0041] In an alternative method of high-volume fabrication, stem 30 is formed of polypropylene by injection molding with a circular cross section, and a 3 mm by 1.5 mm cavity 31 3 mm deep in the distal end. The opening has molded-in ridge 32 illustrated in FIG. 7 which extends about 0.2 mm into the opening. A bundle of about 50 Tynex® BK495 bristles 15 about 36 mm in length is located over the opening, and metal staple 33 is driven down into 31 as illustrated in FIGS. 6 and 7, drawing the bristles down with it. The resulting tuft spreads out to a width and thickness at the distal end of about 5 mm and 2.5 mm respectively. The distal 5 mm of the bristles is then tapered with a Model Z4DIA55 mm rotary cutter available from Machines Boucherie N.V. of Izegem, Belgium with angles A1, A2, B1 and B2 all equal and about 12°. The resulting brush has root dimensions W2 and T2 about 3 mm and 1.5 mm, respectively, and width W1 about 4 mm and thickness T1 about 2 mm. The distal end of the brush tapers in width to about 2 mm, and tapers in thickness down to a fine edge or ridge.

[0042] While the foregoing describes the preferred mode of practicing the invention, other embodiments are possible. Tuft 10 may be circular in cross section and tapered conically to a blunt (frustum) or fine point. The tuft may comprise a plurality of Tynex® bristle types and diameters, or bristles of other synthetic or natural material. The method used to fabricate the brush may be chosen from a wide range of brush-fabricating techniques well known and widely practiced in the art.

[0043] Other embodiments will be apparent to one skilled in the art, which will change various details of the present invention without limiting its scope. Furthermore, the foregoing description of the preferred embodiment of the invention and the best mode for practicing the invention are provided for the purpose of illustration only and not for the purpose of limitation of the invention, which will be defined by the claims.

1. A brush for applying nail polish to human fingernails comprising a tuft of bristles fastened into a stem, wherein the portion of said tuft protruding from said stem has a proximal and a distal portion and terminates in a tip, and wherein said tuft has a rectangular cross section comprising upper and lower elongated sides spaced apart by a thickness dimension, and left and right short sides spaced apart by a width dimension, wherein the distal portions of said upper and lower sides are each tapered, and said left and right sides are each tapered such that the thickness and width of said tuft decrease progressively toward the tip.

2. The brush of claim 1 wherein the thickness of said tuft of bristles at the tip decreases to zero to form an edge at the tip.

3. The brush of claim 1 wherein length of the elongated sides are equal to the length of the shorter sides to form a tuft with a square cross section.

4. The brush of claim 3 wherein the thickness and width of said proximal portion of said tuft of bristles decrease to zero to form a point at the tip.

5. A brush for applying nail polish to human fingernails comprising a tuft of bristles fastened into a stem, wherein the portion of said tuft protruding from said stem has a proximal and a distal portion, and wherein said tuft has a substantially ellipsoidal cross section characterized by a major axis and a minor axis, wherein the length of said major axis defines a width dimension and the length of said minor axis defines a thickness dimension, wherein the distal portion of said tuft is tapered with the width and thickness decreasing progressively toward the tip.

6. The brush of claim 5 wherein the thickness of said proximal portion of said tuft of bristles decreases to zero to form an edge at the tip.

7. The brush of claim 5 wherein said major axis and said minor axis are equal to form a tuft with a substantially circular cross section.

8. The brush of claim 7 wherein the width and thickness of said proximal portion of said tuft of bristles decreases to zero to form a point at the tip.

9. The brush of claim 1 wherein the proximal end of the stem is fixed to a closure for a nail polish container.

10. The brush of claim 2 wherein the proximal end of the stem is fixed to a closure for a nail polish container.

11. The brush of claim 3 wherein the proximal end of the stem is fixed to a closure for a nail polish container.

12. The brush of claim 4 wherein the proximal end of the stem is fixed to a closure for a nail polish container.

13. The brush of claim 5 wherein the proximal end of the stem is fixed to a closure for a nail polish container.

14. The brush of claim 6 wherein the proximal end of the stem is fixed to a closure for a nail polish container.

15. The brush of claim 7 wherein the proximal end of the stem is fixed to a closure for a nail polish container.

16. The brush of claim 8 wherein the proximal end of the stem is fixed to a closure for a nail polish container.

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