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(54) **COSMETIC BRUSH COMPRISING BRISTLES HAVING EXTERNAL DEPRESSIONS**

KOSMETIKBÜRSTE MIT BORSTEN MIT ÄUSSEREN VERTIEFUNGEN

PINCEAU DE MAQUILLAGE COMPRENANT DES SOIES PRESENTANT DES DEPRESSIONS EXTERNES

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Description

FIELD OF THE INVENTION

[0001] The present invention relates to a process for making a cosmetic brush, and more specifically, to a process for making a brush comprising bristles having external depressions.

BACKGROUND OF THE INVENTION

[0002] Plastic brushes are known in the art. Several international applications describe brushes made by the injection molding process and the processes therefore. Examples include: WO 02/03831 A1, titled Method and Device For Producing Bristle Products and Bristle Products; assigned to Coronet-Werke GmbH of Germany, German patent application DE 10201635.6, titled Method and Device For the Production of Bristles, assigned to Coronet-Werke GmbH of Germany; German patent application DE 10212701.8, titled Bristle, Method and Device For Its Production and Bristle Product, assigned to Coronet-Werke GmbH of Germany; and German patent application 10221869.2, titled Method of Manufacturing a Bristle Structure on a Carrier, assigned to Coronet-Werke GmbH of Germany.

[0003] Generally, plastic brushes can be made by a two-step process. First, a hollow core having a multiplicity of orifices through its surface can be formed from a first plastic material. Second, a second plastic material can be injected, under pressure, into the hollow core, so that the escaping (or "extruded") through the recesses soft plastic forms individual bristles as the second material solidifies. The first and second materials can be identical, or different. The position of the orifices and their shapes can be chosen to define the position of the bristles and their cross-sectional configuration.

[0004] Now, it has been discovered that cosmetic brushes, such, for example, as those used for mascara application to eye lashes, can be improved by providing, at least partially, individual bristles that have a concave portion thereon. US2004/0011375 discloses a mascara brush with bristles secured between two twisted wire segments wherein the free ends of the bristles are tapered wedge-shaped in cross-section to improve combing result. It is believed that such a brush will deliver a more refined application of liquid mascara to the lashes and reduce the potential for the lashes to "stick" to one another when the liquid mascara is applied to the lashes.

[0005] Accordingly, the present invention provides a process for making a cosmetic brush comprising a plurality of bristles, wherein selected bristles have at least one external depression oriented in a direction parallel to the longitudinal axis of the selected bristle.

SUMMARY OF THE INVENTION

[0006] The invention provides a process for making a cosmetic brush in accordance with claim 1.

[0007] A cosmetic brush made according to the process of the present invention comprises a substantially longitudinal stem and a plurality of bristles extending therefrom. Each bristle has a base associated with the stem and a free end opposite to the base. Each bristle has external walls and a longitudinal axis oriented along the length of the bristle. The walls of the bristle can be concave, round, planar, or convex. The brush as a whole has a major axis disposed along the stem of the brush.

[0008] According to the present invention, at least some of the bristles, termed herein as "selected bristles," made according to the process of the present invention have at least one external depression in their walls. The depression of each of the selected bristles is oriented in a direction substantially parallel to the longitudinal axis of the bristle.

[0009] The selected bristle can have any suitable shape in its cross-section perpendicular to the bristle's longitudinal axis. For example, the selected bristle can have a cross-section that includes oblong, polygon, circular, curbed, rhombic, trapezoid, or any other shape.

[0010] The number of the depressions per bristle can also vary. For example, the bristle can have on, two, three, four, and more depressions. In one embodiment, the depression or depressions extend through the entire length of the selected bristle. In another embodiment, the depression or depressions extend only through a portion of the selected bristle. In still another embodiment, the depression is located at the free end of the selected bristle.

[0011] In the selected bristles having more than one depression, the location of the depressions may vary. For example, in the selected bristles having two depressions, the depressions can be located opposite to each other. In the selected bristle having three or four depressions, the depressions can be spaced substantially equidistantly from one another, as viewed in the cross-section perpendicular to the longitudinal axis of the selected bristle.

[0012] The bristles may have differential lengths. In one embodiment, for example, the lengths of the bristles are such that the ends of several bristles consecutively disposed next to one another, as viewed in a cross-section of the brush perpendicular to the major axis, form an imaginary line that is straight In another embodiment, such a line can be concave or convex.

[0013] The bristles may be made to gradually taper from the base towards the free end. Alternatively, the bristles may have a generally uniform thickness (with the exception of the selected bristles cross-sections of which are at least partially affected by the longitudinal depression), or taper from the free ends towards the bases of the bristles.

[0014] In one embodiment, the ends of at least some of the bristles, either selected or otherwise, have concave depression. Those depressions are different and distinct from the depressions in the walls of the bristles, for the

depressions in the free ends of the bristles are not disposed longitudinally in relation to the longitudinal axes of the bristles.

[0015] The longitudinal axes of the bristles and the major axis of the brush can be mutually perpendicular. The embodiment is contemplated in which those are not mutually perpendicular, i.e., the axes of at least some of the bristles and the major axis of the brush form an obtuse angle or angles therebetween.

[0016] The brush of the present invention can be made by a process that includes a so called "injection molding" technique, i.e., a process wherein a molten material is injected, under pressure, into a closed form having a cavity of a desired shape, to fill the cavity, cooled to solidify in the cavity, and released from the cavity. Several patents documents listed herein above and incorporated by reference describe the injection molding process in sufficient detail.

[0017] The process for making the cosmetic brush of the present invention is defined in claim 1 and comprises the steps of forming a hollow stem from a first moldable material; providing a plurality of bristle-forming channels surrounding and abutting the hollow stem, each of the bristle-forming channels terminating with an end and having a length, the plurality of bristle-forming channels comprising selected bristle-forming channels, each of the selected bristle-forming channels having at least one protuberance therein; injecting a second moldable material into the hollow stem under pressure sufficient to rupture the hollow stem in predetermined locations corresponding to the bristle-foaming channels and to fill the bristle-forming channels with the second moldable material so that the second moldable material assumes the shape of the bristle-forming channels; and solidifying the second moldable material disposed in the bristle-forming channels thereby forming the plurality of bristles of the brush being made, wherein the plurality of bristles comprises selected bristles formed in the selected channels and having at least one external depression thereon.

[0018] The protuberances can be disposed along the length of the selected bristle-forming channels and / or at the end of the selected bristle-forming channels, depending on a desired configuration of the bristles being formed. The bristle-forming channel can be formed, for example, by a plurality of plates disposed consecutively adjacent to one another, wherein mutually adjacent plates have surface patterns that form, in combination, a desired profile of the bristle-forming channel.

[0019] The step of forming a hollow stem from a first moldable material can be accomplished by injecting the first moldable material under pressure into a support form structured to form the hollow stem. The first moldable material and the second moldable material may be identical or, alternatively, may differ from one another.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020]

Fig. 1 is a side view of an embodiment of a brush according to the invention;

Fig. 2 is a cross-sectional view of the brush of Fig. 1, taken along lines 2-2; and

Figs. 3 to 6 are perspective views of various embodiments of the selected bristles of the brush of the present invention.

Fig. 7 is a plan view of an exemplary embodiment of the bristle having a depression intermediate the base of the bristle and the end thereof.

Fig. 8 is a schematic cross-sectional view of an embodiment of a support form that can be used for making the brush according to the process of the present invention by extrusion molding.

Fig. 9 is a schematic cross-sectional and partial view of the form shown in Fig. 8, taken along lines 9-9, and showing a cross-section of a selected bristle-forming channel having a protuberance therein.

Fig. 10 is a schematic cross-sectional view taken along lines 10-10 of Fig. 9, and showing a plan view of one embodiment of the protuberance of the bristle-forming channel.

Fig. 11 is a schematic perspective view of one embodiment of the bristle-forming channels.

DETAILED DESCRIPTION OF THE INVENTION

[0021] Fig. 1 shows an embodiment of a brush 10 that can be made according to the process of the present invention comprising a substantially longitudinal core, or stem, 260 having a longitudinal, or major, axis A, and a plurality of bristles 50 extending therefrom. Each bristle has a base associated with the stem and a free end opposite to the base. Each bristle has external walls and a longitudinal axis B oriented along the length of the bristle (Fig. 5). The walls of the bristle 50 can be concave, round, planar, or convex, Figs. 3-5.

[0022] The embodiment of Fig. 1 also has an optional stem 20 that, via an optional locking groove 30, can be attached to a handle (not shown). The brush 10 may be trimmed, to change the length of some bristles or otherwise form a particular configuration of the brush 10 in a cross-section perpendicular to the major axis A. For example, Figs. 2 shows that the trimming can be made to comprise an envelope curve 60 of approximately triangular shape with rounded or skewed corners 70 so that the bristles 50 have differential lengths. The same effect

can be achieved by using a process of the present invention, and without trimming, as will be discussed in more detail below.

[0023] According to the present invention, at least some of the bristles 50 have at least one external depression 120 in their walls. These bristles are termed herein as "selected bristles," because the process of the present invention (described herein below) allows one to design what bristles should be structured to have at least one external depression. The depressions of the selected bristles can be oriented in a direction parallel to the longitudinal axes B of the bristles, or, alternatively or additionally, can be disposed at free ends of the bristles.

[0024] Bristles 50 can comprise bristles having a generally round cross-section (Figs. 4 and 6), bristles 50b having a generally oblong, or elongated, cross-section (Figs. 3 and 5), or bristles having any other suitable general cross-section, for example, polygonal. As used herein, the term "oblong" refers to a geometrical shape that generally has unequal dimensions in two mutually perpendicular directions. The selected bristle can have any suitable shape in its cross-section perpendicular to the bristle's longitudinal axis. For example, the selected bristle can have a cross-section that includes oblong, polygon, circular, trapezoid, or any other shape.

[0025] The number of the depressions 120 per the selected bristle can vary. For example, the selected bristle can have one, two, three, four, and more depressions 120. In the selected bristles having more than one depression 120, the location of the depressions may vary. For example, in the selected bristles having two depressions 120, the depressions can be located opposite to each other, Figs. 3 and 5. In the selected bristle having three, four, or more depressions 120, the depressions can be spaced substantially equidistantly from one another, as viewed in the cross-section perpendicular to the longitudinal axis B of the selected bristle (Figs. 3-5) or can be differentially spaced from one another (not shown). In the embodiments shown in Figs. 3-5, the depressions 120 extend through the entire length of the selected bristle. In other embodiments, the depression or depressions 120 can extend only through a portion of the selected bristle, as shown, for example, in Fig. 7. The depression can extend from the base of the selected bristle and terminate before it reaches the free end of the selected bristle; or the depression can extend from the free end of the selected bristle and terminate before it reaches the base of the selected bristle. The embodiment is contemplated in which the selected bristle has more than one depression wherein at least one depression extends through the entire length of the bristle, and the other depression or depressions extends only through a portion of the length of the bristle in any manner described herein above.

[0026] The bristles 50 may have differential lengths. In one embodiment, for example, the lengths of the bristles 50 are such that the ends of several bristles consecutively disposed next to one another, as viewed in a cross-section of the brush perpendicular to the major axis A, form an imaginary line that is straight (Fig. 2, line 60). In another embodiment, such a line can be concave (not shown) or convex (Fig. 2, line 70). Thus, in its cross-section perpendicular to the major axis A, the brush may or may not be circumferentially symmetrical.

[0027] The bristles 50 can be made to gradually taper from the base towards the free end (Figs. 1-6). Alternatively, the bristles 50 may have a generally uniform thickness (with the exception of the selected bristles, cross-sections of which are at least partially affected by the longitudinal depression), or taper from the free ends towards the bases of the bristles 50 (not shown).

[0028] In one embodiment, the ends of at least some of the bristles 50 have concave depression 110, Fig. 4. Those concave depressions 110 are different and distinct from the depressions 120 in the walls of the bristles, for the depressions 110 in the free ends of the bristles 50 are not disposed longitudinally in relation to the longitudinal axes B of the bristles 50. In some embodiments of the brush of the present invention, the selected bristles can have both the longitudinal depression or depressions 120 and the concave depression 110 at the free end of the selected bristle.

[0029] The longitudinal axes B of the bristles 50 and the major axis A of the brush 10 can be mutually perpendicular. The embodiments is contemplated; however, in which those are not mutually perpendicular, i. e., the axes B of at least some of the bristles 50 and the major axis A of the brush 10 form acute or obtuse angle or angles therebetween (not shown).

[0030] The brush of the present invention is made by using a technique known as "injection molding." Injection molding is, in essence, a process wherein molten plastic is deposited under pressure, or injected, into a closed form having a cavity of a desired shape, to fill the cavity, then cooled to solidify in the cavity, and then released from the cavity. One skilled in the art will appreciate that using the injection molding process, it is possible to form virtually any desired configuration of the bristles, including the selected bristles of the present invention. In addition, the injection molding technique allows one to control the length of individual bristles, so that trimming of the finished brush may not be needed in order to form a certain cross-sectional profile of the brush, as shown, for example, in Fig. 2.

[0031] The brush of the present invention is made by an injection-molding process, using a multi-component molding injection machine 200, schematically shown in Fig. 8. First, a hollow stem 260 is provided. The hollow stem 260 can be made from any suitable material, for example, plastic or resin such as polypropylene, and may include any suitable thermoplastic or thermosetting materials. The hollow stem 260 can be formed by injection-molding or any other means known in the art. As an example, in Fig. 8, the hollow stem 260 is formed and disposed in the injection machine 200. The hollow stem 260 may comprise any suitable shape in its cross-section per-

pendicular to the major axis, for example, cylindrical (shown in the exemplary embodiment of Fig. 1), rectangular, triangular, polygonal, or any combination thereof, or any other shape, including irregular geometric shape (not shown).

[0032] A plurality of bristle-forming channels 250 is provided. The bristle-forming channels 250 are disposed so that their entrances abut the hollow stem 260 in predetermined locations in which the bristles 50 of the brush being constructed should be disposed after the brush has been constructed. The overall configuration and geometry of the bristle-forming channels 250 corresponds to the desired overall geometry and configuration of the brush being made. Each of the bristle-forming channels 250 terminates with an end and has a predetermined length. Depending on the size and length of the bristle-forming channels 250, the bristle-forming channels 250 can be made by any means known in the art, for example using conventional drilling techniques, laser, chemical erosion, wire electrical discharge machine (EDM), or any other suitable means. The bristle-forming channels 250 can be formed, for example, by a plurality of coated plates 300 (Fig. 11) disposed consecutively adjacent to one another, wherein mutually adjacent plates 300 have surface patterns that form, in combination, a desired profile of the bristle-forming channels 250.

[0033] In accordance with the present invention, the plurality of bristle-forming channels 250 include selected bristle-forming channels 250a, i.e., the channels that are structured to form the selected bristles having at least one external depression 120 thereon, as described herein above. For this purpose, each of the selected bristle-forming channels 250a has at least one protuberance 290 therein. The protuberance or protuberances 290 can be disposed along the length of the selected bristle-forming channel 250a, at the end of the selected bristle-forming channels 250a, or both, depending on a desired configuration of the selected bristle being formed.

[0034] In the next step, a second moldable material 270 is injected, under pressure, into the hollow stem, to form the bristles (Fig. 8). The second moldable material can comprise the material identical to the first moldable material, or, alternatively, may differ therefrom. Only for the purposes for example, the second moldable material can comprise any suitable thermoplastic elastomer (TPE), such as, for example, styrene-ethylene-butylene-styrene (SEBS) block copolymer. The pressure under which the second moldable material 270 is injected should be sufficient to rupture the hollow stem 260 and form perforations in locations corresponding to the bristle-forming channels 250 and further to fully fill the bristle-forming channels 250 with the second moldable material 270 so that the second moldable material 270 assumes the shape of the bristle-forming channels 250. These perforations formed in the stem 260 serve, in effect, as spinnerets for the second moldable material. The second moldable material 270 that fills, under pressure, the selected bristle-forming channels 250 forms the selected bristles that have external depressions described herein above, the depressions being a "negative" of the protuberances 290 of the selected bristle-forming channels 250a.

[0035] After the second moldable material 270 solidify in the bristle-forming channels 250, the brush comprising the stem 260 and the plurality of bristles 50 extending therefrom can be released from the injection machine. If the plurality of plates 300 is used to form the bristle-forming channels 250, the plates 300 can be moved apart from one another, thereby releasing the formed bristles 50.

[0036] If desired, an optional step of injecting a third moldable material 280 (Fig. 8) into the hollow stem 260 to fill the stem 260, can be used. When the process is completed, the bristles 50 are integrally bound to the third material 280 that has filled the stem 260. The third moldable material can comprise a material identical to at least one of the first moldable material or the second moldable material, or can be chose to be different from either the first moldable material and the second moldable material.

[0037] While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the scope of the invention. It is, therefore, intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

Claims

1. A process for making a cosmetic brush (10) comprising a longitudinal stem (260) and a plurality of bristles 50 extending therefrom, the process comprising steps of:

(a) providing a hollow stem (260) from a first moldable material;

(b) providing a plurality of bristle-forming channels (250) surrounding and abutting the hollow stem (260), each of the bristle-forming channels (250) terminating with an end and having a length, the plurality of bristle-forming channels (250) comprising selected bristle-forming channels (250a), each of the selected bristle-forming channels having at least one protuberance (290) therein;

(c) injecting a second moldable material (270) into the hollow stem (260) under pressure sufficient to rupture the hollow stem (260) in predetermined locations corresponding to the bristle-forming channels (250) and to fill the bristle-forming channels with the second moldable material (270) so that the second moldable material (270) assumes the shape of the bristle-forming channels (250);

(d) solidifying the second moldable material (270) disposed in the bristle-forming channels (250) thereby forming the plurality of bristles of the brush (10), and wherein the plurality of bristles (50) comprises selected bristles (50) which are formed in the selected channels (250a) having at least one protuberance (290) therein and which thereby have at least one depression (120) thereon.

2. The process according to claim 1, wherein in the step of providing a plurality of bristle-forming channels (250), the or each protuberance (290) is disposed along the length of the selected bristle- forming channels (250a).

3. The process according to claim 1 or claim 2, wherein in the step of providing a plurality of bristle-forming channels (250), the or each protuberance (290) is disposed at the free end of the selected bristle-forming channels (250).

4. The process according to any one of claims 1 to 3, wherein the step of providing a plurality of bristle-forming channels (250) comprises a step of providing a plurality of plates (300) disposed side-by-side consecutively in an abutting relation to one another, wherein mutually abutting plates (300) have surface patterns that form, in combination, a desired profile of the bristle-forming channels (250).

5. The process according to any one of claims 1 to 4, wherein in the step of forming a hollow stem (260) from a first moldable material and in the step of injecting a second moldable material (270), the first moldable material and the second moldable material (270) are identical.

6. The process according to any one of claims 1 to 5, wherein in the step of forming a hollow stem (260) from a first moldable material and in the step of injecting a second moldable material (270), the first moldable material and the second moldable material (270) differ from one another.

7. The process according to any one of claims 1 to 6 , further comprising a step of filling the hollow stem (260) with a third moldable material (280).

Patentansprüche

1. Verfahren zur Herstellung eines Kosmetikpinsels (10), umfassend einen länglichen Stiel (260) und eine Vielzahl von Borsten (50), die von diesem ausgehen, wobei das Verfahren folgende Schritte umfasst:

(a) Bereitstellung eines hohlen Stiels (260) aus einem ersten formbaren Material;
(b) Bereitstellung einer Vielzahl von Borstenformkanälen (250), die den hohlen Stiel (260) umgeben und an ihn anschließen, wobei jeder der Borstenformkanäle (250) an einem Ende abschließt und eine Länge aufweist, wobei die Vielzahl von Borstenformkanälen (250) ausgewählte Borstenformkanäle (250a) umfasst und sich in jedem der ausgewählten Borstenformkanäle mindestens ein Vorsprung (290) befindet;
(c) Einspritzen eines zweiten formbaren Materials (270) in den hohlen Stiel (260) unter ausreichendem Druck, um den hohlen Stiel (260) an vorgegebenen Stellen, die den Borstenformkanälen entsprechen, zu durchbrechen und die Borstenformkanäle mit dem zweiten formbaren Material (270) zu füllen, sodass das zweite formbare Material (270) die Form der Borstenformkanäle (250) annimmt.
(d) Verfestigen des in den Borstenformkanälen abgelagerten zweiten formbaren Materials (270) und dadurch Formen der Vielzahl der Borsten des Pinsels (10), wobei die Vielzahl der Borsten (50) ausgewählte Borsten (50) umfasst, die in den ausgewählten Kanälen (250a) geformt werden, die innen mindestens ein Vorsprung (290) und dadurch außen mindestens eine Vertiefung (120) aufweisen.

2. Verfahren nach Anspruch 1, wobei im Schritt der Bereitstellung einer Vielzahl von Borstenformkanälen (250) der bzw. jeder Vorsprung (290) entlang der Länge der ausgewählten Borstenformkanäle (250a) angeordnet wird.

3. Verfahren nach Anspruch 1 oder Anspruch 2, wobei im Schritt der Bereitstellung einer Vielzahl von Borstenformkanälen (250) der bzw. jeder Vorsprung (290) am freien Ende der ausgewählten Borstenformkanäle (250a) angeordnet wird.

4. Verfahren nach einem der Ansprüche 1 bis 3, wobei der Schritt der Bereitstellung einer Vielzahl von Borstenformkanälen (250) einen Schritt umfasst, in dem eine Vielzahl von Platten (300) bereitgestellt wird, die nebeneinander und aneinander angrenzend angeordnet werden, wobei aneinander angrenzende Platten (300) Oberflächenstrukturen aufweisen, die in Kombination ein gewünschtes Profil der Borstenformkanäle (250) bilden.

5. Verfahren nach einem der Ansprüche 1 bis 4, wobei im Schritt der Formgebung eines hohlen Stiels (260) aus einem ersten formbaren Material und im Schritt des Einspritzens eines zweiten formbaren Materials (270) das erste formbare Material und das zweite formbare Material (270) identisch sind.

6. Verfahren nach einem der Ansprüche 1 bis 5, wobei im Schritt der Formgebung eines hohlen Stiels (260) aus einem ersten formbaren Material und im Schritt des Einspritzens eines zweiten formbaren Materials (270) das erste formbare Material und das zweite formbare Material (270) voneinander abweichen.

7. Verfahren nach einem der Ansprüche 1 bis 6, das weiterhin einen Schritt des Füllens des hohlen Stiels (260) mit einem dritten formbaren Material (280) umfasst.

Revendications

1. Procédé de fabrication d'une brosse cosmétique (10) comprenant une tige longitudinale (260) et une pluralité de soies (50) s'étendant de celle-ci, le procédé comprenant les étapes consistant à :

   (a) fournir une tige creuse (260) à partir d'un premier matériau pouvant être moulé ;
   (b) fournir une pluralité de canaux formant des soies (250) entourant et venant en appui contre la tige creuse (260), chacun des canaux formant des soies (250) se terminant en une extrémité et ayant une longueur, la pluralité de canaux formant des soies (250) comprenant des canaux formant des soies sélectionnés (250a), chacun des canaux formant des soies sélectionnés ayant au moins une protubérance (290) dans celui-ci ;
   (c) injecter un deuxième matériau pouvant être moulé (270) dans la tige creuse (260) sous une pression suffisante pour rompre la tige creuse (260) dans des emplacements prédéterminés correspondant aux canaux formant des soies (250) et remplir les canaux formant des soies avec le deuxième matériau pouvant être moulé (270) afin que le deuxième matériau pouvant être moulé (270) prenne la forme des canaux formant des soies (250) ;
   (d) solidifier le deuxième matériau pouvant être moulé (270) disposé dans les canaux formant des soies (250) formant ainsi la pluralité de soies de la brosse (10), et où la pluralité de soies (50) comprend les soies sélectionnées (50) qui sont formées dans les canaux sélectionnés (250a) ayant au moins une protubérance (290) dans ceux-ci et ayant ainsi au moins une dépression (120) sur ceux-ci.

2. Procédé selon la revendication 1, où dans l'étape de fourniture d'une pluralité de canaux formant des soies (250), la ou chaque protubérance (290) est disposée le long de la longueur des canaux formant des soies sélectionnés (250a).

3. Procédé selon la revendication 1 ou 2, où dans l'étape de fourniture d'une pluralité de canaux formant des soies (250), la ou chaque protubérance (290) est disposée à l'extrémité libre des canaux formant des soies sélectionnés (250).

4. Procédé selon l'une quelconque des revendications 1 à 3, où l'étape de fourniture d'une pluralité de canaux formant des soies (250) comprend une étape de fourniture d'une pluralité de plaques (300) disposées côte à côte consécutivement dans une relation de butée les unes par rapport aux autres, où les plaques mutuellement en butée (300) ont des motifs de surface qui forment, en combinaison, un profil désiré de canaux formant des soies (250).

5. Procédé selon l'une quelconque des revendications 1 à 4, où dans l'étape de formation d'une tige creuse (260) à partir d'un premier matériau pouvant être moulé et dans l'étape d'injection d'un deuxième matériau pouvant être moulé (270), le premier matériau pouvant être moulé et le deuxième matériau pouvant être moulé (270) sont identiques.

6. Procédé selon l'une quelconque des revendications 1 à 5, où dans l'étape de formation d'une tige creuse (260) à partir d'un premier matériau pouvant être moulé et dans l'étape d'injection d'un deuxième matériau pouvant être moulé (270), le premier matériau pouvant être moulé et le deuxième matériau pouvant être moulé (270) sont différents l'un de l'autre.

7. Procédé selon l'une quelconque des revendications 1 à 6, comprenant en outre une étape de remplissage de la tige creuse (260) avec un troisième matériau pouvant être moulé (280).

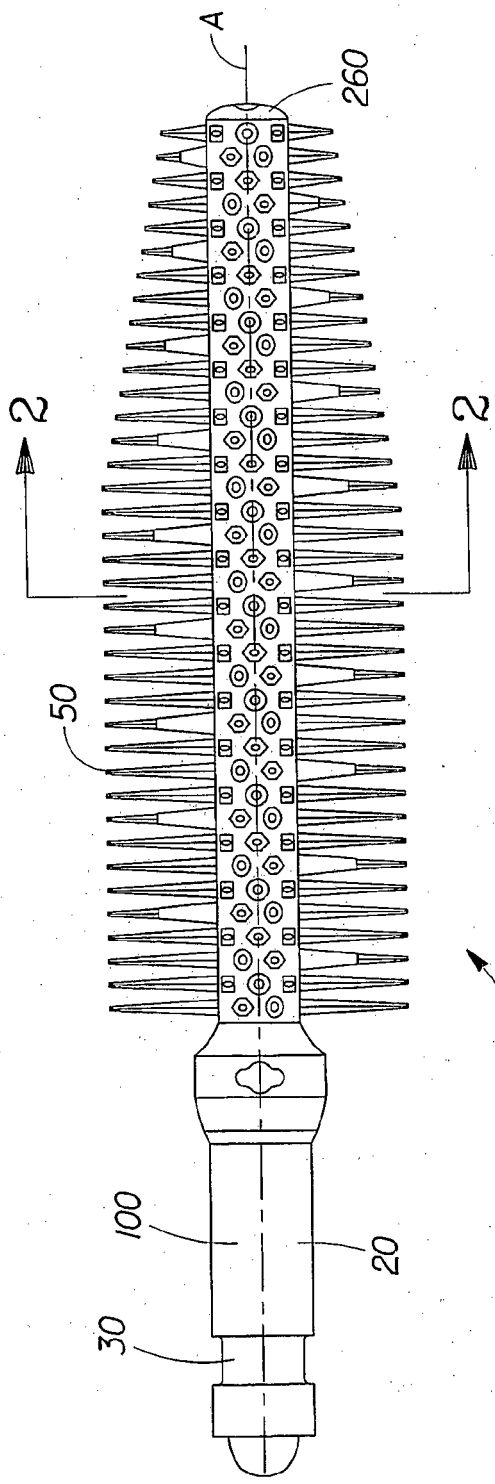

Fig. 1

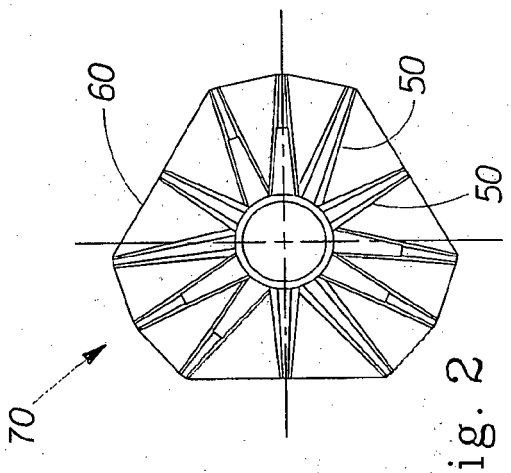

Fig. 2

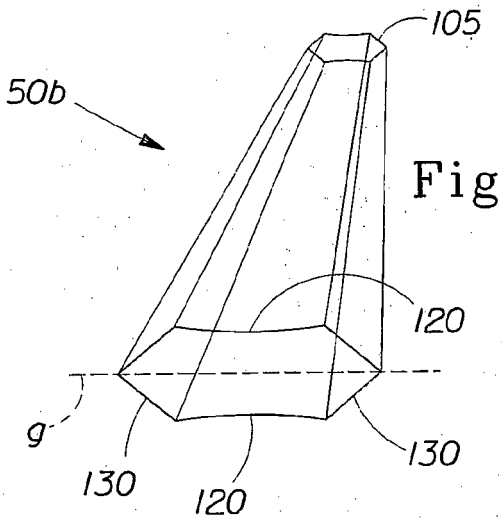

Fig. 3

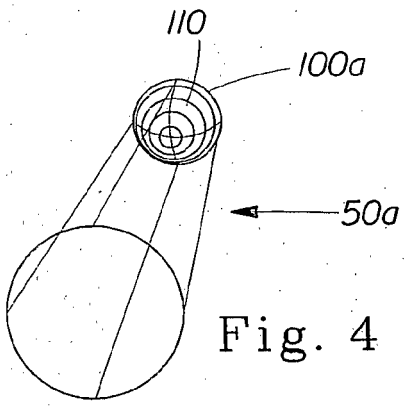

Fig. 4

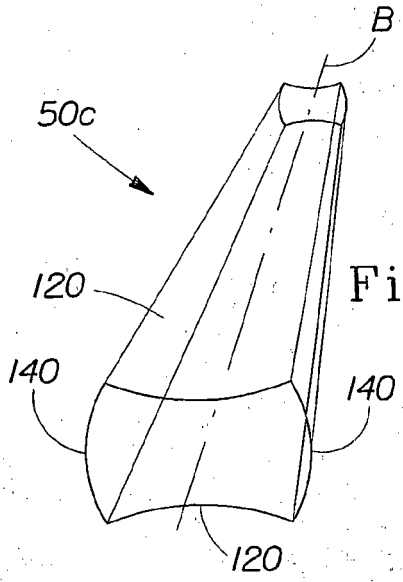

Fig. 5

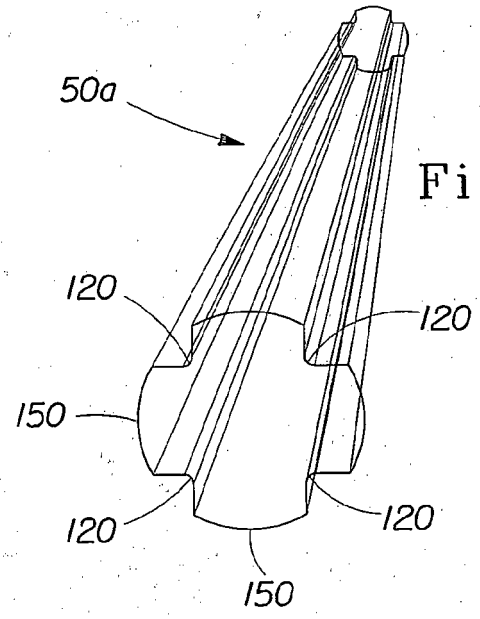

Fig. 6

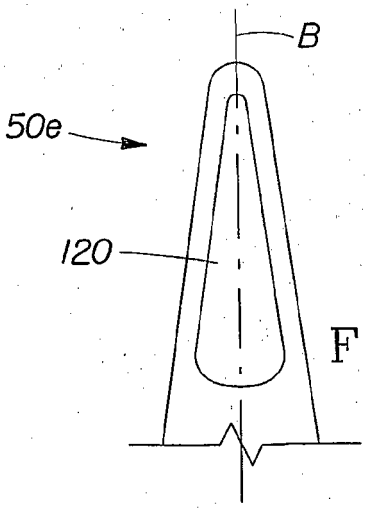

Fig. 7

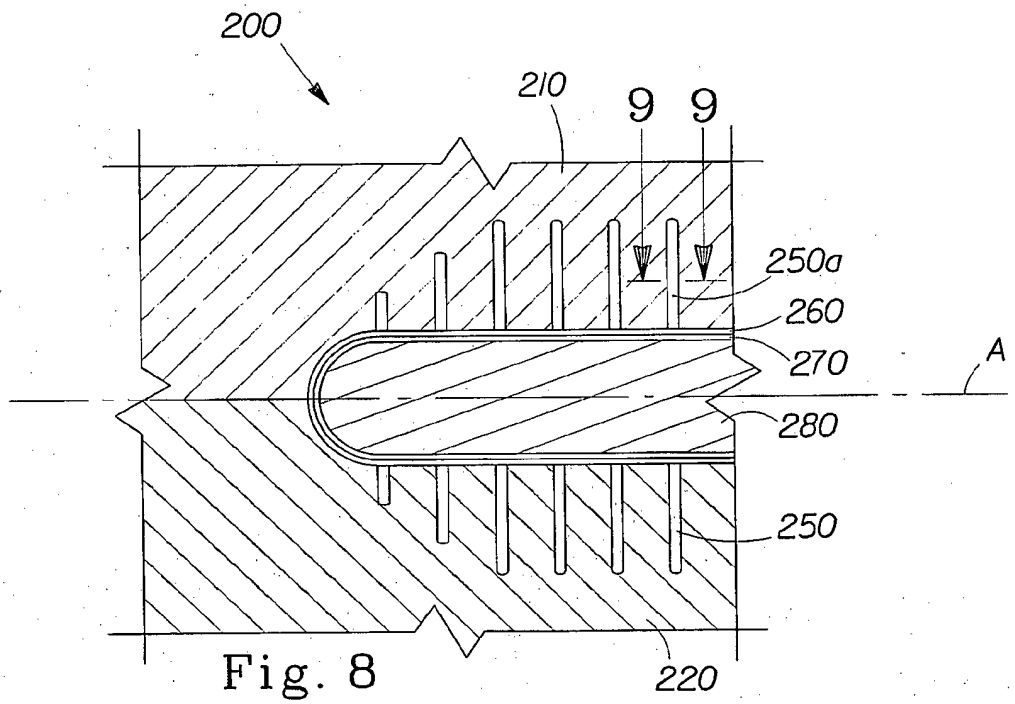

Fig. 8

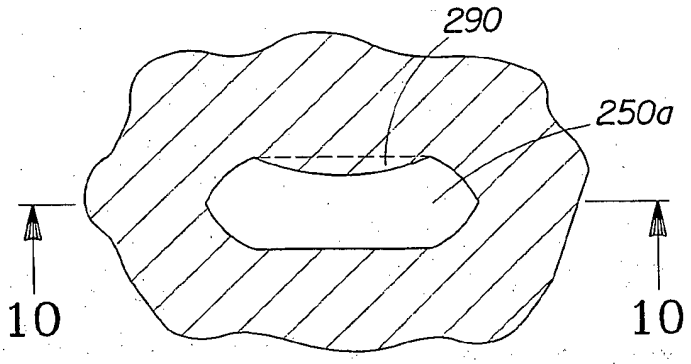

Fig. 9

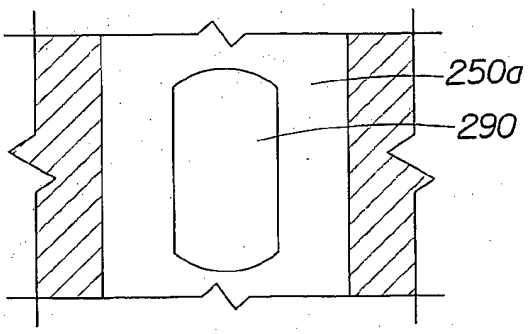

Fig. 10

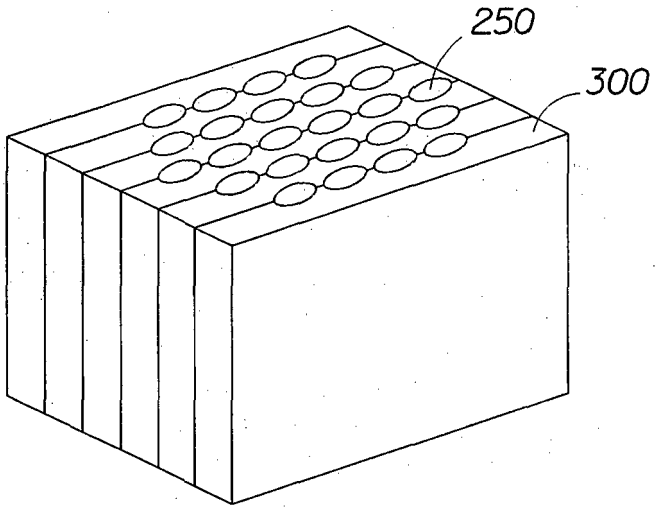

Fig. 11

REFERENCES CITED IN THE DESCRIPTION

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