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(54) Title: BRUSH FOR APPLYING A PRODUCT TO THE EYELASHES OR EYEBROWS

(57) Abstract: The present invention relates to a brush for applying a product to the eyelashes or eyebrows, comprising: - a twisted core extending along a longitudinal axis, the core being formed from a wire (45), particularly a metal wire, folded into a U shape and twisted, and - bristles held in the core, the wire (45) defining, in cross section, a cavity, the cross section of the wire of the core being deformed at least in places.

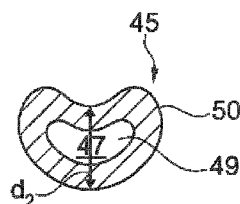


Fig. 2a



BRUSH FOR APPLYING A PRODUCT TO THE EYELASHES OR EYEBROWS

The present invention relates to brushes for applying a cosmetic product to keratinic fibers, particularly the eyelashes or eyebrows, particularly a makeup or care product, for example mascara, and to packaging and application devices comprising such a brush.

Very many applicators, in which the brush comprises a core formed by two branches of a metal wire that are twisted together and that define turns between which the bristles of the brush are held, are known. Since the bristles used are generally the same length, once the branches are twisted the brush has an envelope surface in the form of a cylinder of revolution. Such brushes have the drawback that they may exhibit a spiral effect, i.e. the ends of the bristles are distributed substantially in the manner of a helix owing to the twisting of the core. Distributing the bristles in this way may be detrimental to quality and uniformity when applying makeup to keratinic fibers.

German utility model DE 90 18 028.3 discloses a mascara brush in which the metal wire of the core has a square cross section.

International application WO 2015/145898 discloses mascara brushes in which the wire of the core may have a cross section of polygonal form, more particularly triangular, pentagonal, octagonal or square form.

Application FR 2 895 886 relates to a mascara brush comprising a twisted core made from metal wire, which may have a cross section of general circular form and comprise a flat portion, or have a polygonal or multi-lobed form, or even be composed of a plurality of strands twisted together.

In all the cases mentioned above, the metal wire of the core has a full cross section.

It is also known to use bristles having special cross sections so as to obtain, upon gripping of the bristles by the branches of the core, a distribution of the ends of the bristles over the envelope surface of the brush that reduces the spiral effect.

The use of bristles having special cross sections is, however, liable to restrict the choice of materials that can be used to produce the bristles.

Furthermore, such a choice may lead to problems of compatibility with the product to be applied and ultimately be particularly expensive.

As a result, there is a need for there to be a brush in which the bristles are better distributed while still allowing the eyelashes or eyebrows to be loaded with product, the product to be spread over them and the eyelashes or eyebrows to be satisfactorily lengthened, curled and separated.

5 There is also a need for there to be a brush of this type, without, at the same time, over-complicating its manufacture and increasing its cost.

The invention aims to meet all or some of these needs and therefore the subject thereof, according to one of its aspects, is a brush for applying a product to the eyelashes or eyebrows, comprising:

- 10 - a twisted core extending along a longitudinal axis X, the core being formed from a wire, particularly a metal wire, folded into a U shape and twisted, and
- bristles held in the core,
- the wire of the core defining, in cross section, a cavity, the cross section of the wire of the core being deformed at least in places.

15 The presence of the cavity makes it possible to use a wire having a cross section that is not full, which may enable it to deform more easily.

The cross section of the wire of the core is deformed at least in places owing to the squashing of said cavity upon twisting of the wire of the core.

20 The deformation of the cross section of the wire of the core that is obtained upon twisting the core allows the density of distribution of bristles held in the core as a helix to be improved and, particularly, this density to be made more diffuse, reducing the aforesaid spiral effect owing to the squashing of the cavity of the core wire when it is twisted.

25 The resulting brush may satisfactorily be loaded with product, particularly by virtue of the presence of zones forming a reserve for product between the bristles, the latter having their free ends arranged in a manner that is not entirely a helix. The brush may thus provide an improved result of separating the eyelashes or eyebrows and of combing them. Loading with product may be more uniform than when there is a spiral effect.

In cross section, the cavity may be open to the exterior.

30 In a variant, the cavity is closed in cross section, i.e. it is not open to the exterior in cross section. The cross section of the core is preferably hollow.

A further subject of the invention, independently or in combination with the aforesaid, according to another of its aspects, is a brush for applying a product to the eyelashes or eyebrows, comprising:

- a twisted core extending along a longitudinal axis X, the core being formed from a wire, particularly a metal wire, folded into a U shape and twisted, and
 - bristles held in the core,
- the wire of the core comprising a hollow cross section, providing an interior cavity.

“Hollow cross section” is understood to mean that the cross section of the wire comprises an interior cavity within.

The presence of the hollow wire of the core makes it possible, upon twisting of the core, to ensure a diffuse density of distribution of the bristles held in the core as a helix by virtue of the deformation of the hollow wire that is obtained upon twisting of the core.

The wire of the core may have a longitudinal channel running along it, particularly over its entire length. When the wire is observed in cross section, the longitudinal channel may be centered relative to the exterior contour of the wire in cross section. However, even when the longitudinal channel is provided centered relative to the exterior contour of the wire in cross section, there is still a certain lack of coaxiality between these elements along the wire during the latter's manufacture; a lack of coaxiality of this type also makes it possible to achieve a variable squashing of the wire upon twisting of the core and contributes to a diffuse density of the distribution of the bristles held by the core as a helix.

The interior cavity of the wire, particularly the longitudinal channel of the core, may, in cross section, be of a form with or without axial symmetry, with or without symmetry relative to a plane, with or without axisymmetry, particularly a form chosen from the following list, which is a non-limiting list: circular, non-circular, oblong, ellipsoidal, polygonal, particularly square, rectangular, triangular, pentagonal, hexagonal, octagonal, multi-lobed or star-shape.

The exterior contour of the wire of the core may, in cross section, be of a form chosen from the following list, which is a non-limiting list: circular, non-circular, oblong, ellipsoidal, polygonal, particularly square, rectangular, triangular, pentagonal, hexagonal, octagonal, multi-lobed or star-shape.

In cross section, the wire may be of a general C, V, U, horseshoe, kidney or gutter shape, particularly, or flattened.

In cross section, the wire may also have a double general form, such as a W, or a double U, for example, and thus have two cavities open to the exterior, or the form of an 8 or a B, for example, and thus have two cavities that are closed in cross section. In these embodiments, the two cavities may have cross sections that are identical or different.

The form of the interior cavity of the wire may, in cross section, be similar to the form of the exterior contour of the wire of the core, and particularly is homothetic thereto. "Similar form" is understood as the type of form being the same, without the size being the same, for example triangular in both cases. The form of the interior cavity of the wire in cross section and the form of the exterior contour of the wire of the core may, particularly, be concentric.

In a variant, the two forms of the interior cavity and external contour of the wire may be different from one another. For example, one may be circular while the other is polygonal, or vice versa.

The wire may have a larger transverse dimension, particularly a diameter, of between 0.2 and 1 mm, better still between 0.5 and 1 mm, or even between 0.65 and 0.8 mm, for example of the order of 0.6 to 0.7 mm.

The interior cavity of the wire may have a larger transverse dimension, particularly a diameter, of between 0.1 and 0.5 mm, better still between 0.15 and 0.45 mm, for example of the order of 0.2 to 0.4 mm.

The thickness of the wire around the cavity may or may not be constant. It may, for example, be between 0.1 and 0.8 mm, better still between 0.15 and 0.6 mm, or even between 0.2 and 0.5 mm, for example of the order of 0.3 to 0.4 mm.

A ratio of the interior surface of the cavity in cross section relative to the total surface, in cross section, of the wire may be between 0.2 and 1, better still between 0.3 and 0.9, or even between 0.4 and 0.8, being, particularly, between 0.5 and 0.7.

The deformation of the wire of the core may be quantified by the variation of a transverse dimension of the latter in cross section, at the deformation point, between the wire before deformation d_1 and the wire after deformation d_2 . This variation in the transverse dimension of the wire of the core may be between 10% and 90%, or even between 20% and 80%, better still between 30% and 70%.

The wire of the core may be manufactured by extrusion.

The cavity of the wire may be empty or, in a variant, filled with a filling material, for example a soft filling material.

5 The brush may comprise at least one bristle of solid cross section. The use of solid bristles may make it possible to achieve a better makeup wear property and a better combing of the eyelashes or eyebrows, and also to produce the brush less expensively. In one embodiment, all the bristles of the brush may have a solid cross section.

The brush may comprise at least one bristle of hollow cross section. In one embodiment, all the bristles of the brush may have a hollow cross section.

10 The bristles of the brush have free ends defining an envelope surface S of the brush. The envelope surface S may be of general cylindrical form. The envelope surface S may be at least partially in the form of a cylinder of revolution about the longitudinal axis X of the core.

The envelope surface S may have at least one facet. "Facet" is understood to mean a cutting in the envelope surface of the brush, delimited by visible edges. A facet is defined preferably by a generatrix extending in a plane perpendicular to the longitudinal axis of the core and progressing along a directrix, for example, coplanar with the longitudinal axis of the core. A facet may be planar or non-planar, having, for example, an outwardly concave or convex curvature. Such a curvature may depend on the rectilinear or curved form of the generatrix. In a variant, the curvature of the facet may vary, being, for example, undulating. A facet may be planar or convex. The facet or facets may promote the application and the transfer of the product onto the eyelashes or eyebrows.

25 The envelope surface S may have at least one groove. A groove may extend over at least half the length of the portion of the core carrying the bristles. "Groove" denotes a long, narrow cut provided in the envelope surface of the brush. A facet is different from a groove. A groove is long and narrow, having the form of a flute, whereas a facet is relatively wide and flattened. A groove is narrower than a facet. The grooves may allow a product reserve to be formed.

30 The brush may comprise at least two facets, or even three or more. In one embodiment, the brush comprises exactly two facets or exactly three facets. The brush may comprise at least two facets. These two facets may be symmetrical with one another, relative to a plane containing the longitudinal axis of the core. In a variant, the brush may

comprise three facets that may form a triangle when the brush is observed in cross section. The facets may be distributed uniformly about the longitudinal axis of the core.

The facets may all be identical. At least two facets may be identical to one another.

5 In a variant, the envelope surface has at least one first facet and at least one second facet that are different from one another. Owing to its different form, the second facet may make it possible to offer different makeup characteristics.

“Facets different from one another” should be understood to mean that the first and second facets differ from one another in terms of one at least of their width, length,
10 depth, distance to the core and angle relative to the core.

The second facet may be smaller than the first facet in terms of at least one of its dimensions, i.e. one at least of its width and/or its length and/or its depth are smaller than the width and/or length and/or depth of the first facet.

The envelope surface may have a general form that is at least partially
15 frustoconical or ogival. That may make it possible for there to be zones on the envelope surface that are located at different distances from the core and are thus wiped differently. The zones that are more loaded may be used to load the eyelashes with product and the zones that are less loaded may be used to separate the eyelashes.

The envelope surface may comprise a frustoconical distal portion with a cross
20 section that becomes smaller toward the free end of the core. The frustoconical distal portion may extend over a length greater than one quarter of the length L of the portion of the core carrying the bristles, better still more than one third of the length L of the portion of the core carrying the bristles, and even better still more than half the length L of the portion of the core carrying the bristles.

25 The envelope surface may have at least one cross section with a form that is not entirely polygonal, particularly a form that is at least partially circular, particularly of circular form on the side of the distal end. “On the side of the distal end” should be understood to mean that said at least one cross section is nearer to the distal end than to the proximal end of the portion of the core carrying the bristles; in other words, less than $\frac{1}{2}$ L
30 from the distal end of the portion of the core carrying the bristles and more than $\frac{1}{2}$ L from the proximal end of the portion of the core carrying the bristles, where L is the length of the portion of the core carrying the bristles measured between its proximal end and its

distal end. Said at least one cross section may be less than one third, or even less than one quarter of the length L of the distal end of the portion of the core carrying the bristles. The length L may be between 15 mm and 45 mm, better still between 20 mm and 40 mm, for example between 25 mm and 35 mm.

5 The brush may not have a distal end in the form of a point. It may be of not entirely prismatic form, at least at its distal end.

 The circular cross section may be provided as a point of the core located less than $1/3$ L from the distal end of the portion of the core carrying the bristles. The circular cross section may be provided as a point of the core located less than $1/4$ L from the distal
10 end of the portion of the core carrying the bristles.

 The brush may have no cross section of rectangular form, particularly at its distal end.

 The brush may be chamfered at its proximal and/or distal end. In an illustrative embodiment, the brush is chamfered at its distal and proximal ends.

15 The envelope surface may be symmetric relative to the longitudinal axis X of the core. In a variant, the envelope surface does not exhibit axial symmetry. The envelope surface of the brush may have various forms and particularly circular, oval, prismatic or other cross sections, with or without one or more notches or nicks. The core may be centered or non-centered in a cross section of the envelope surface. The brush may
20 comprise at least one crest or nick.

 The wire of the core may be entirely metallic or comprise an exterior sheath, made from plastics for example, surrounding a metal center.

 The core of the brush may be rectilinear or curved. It is preferably rectilinear.

 The branches of the core may be twisted to the left or to the right. It is
25 particularly advantageous to use a brush twisted to the left.

 The core may comprise two wires each folded as a U and twisted and then twisted together.

 The core may comprise a portion carrying bristles that has a proximal end intended to be fastened to the stem of the applicator and a distal end.

30 The distal end of the core may be located on the longitudinal axis Y of the stem to which the core is attached.

At its end opposite the brush, the stem may be fastened to a cap for closing a container.

Bristles

The bristles may be made from a synthetic material or from a natural material, such as cotton, being produced, for example, from thermoplastics, particularly synthetic materials chosen for example from polyethylene, polypropylene, polyethylene terephthalate, polyamides, particularly PA6, PA6/6, PA6/10 or PA6/12, PA11, particularly Rilsan®, a Hytrel®-Pebax® polymer, an acrylic or vinyl polymer, polyurethane, Teflon®, silicone and yet other thermoplastic polymers.

It may be possible, for example, for the bristles to be stretchy. The cross section of the bristles is preferably solid and may be circular or non-circular. The bristles may optionally be flock-coated. The bristles may comprise a capillary groove. Use may be made, in particular, of bristles having a cross section in a form chosen from the following list, which is a non-limiting list: circular, circular with a flat portion, flattened, star-shape, for example in the form of a cross or with three branches, in the form of a U, an H, a T, a V, or a hollowed-out form, for example circular or square, or forming ramifications, for example on the form of a snowflake, a prismatic cross section, particularly triangular or square or hexagonal, or an oblong form, particularly lens-shaped or in the form of an hourglass.

Use may be made of bristles having parts that are hinged relative to one another. Use may also be made of bristles having at least one capillary groove. The bristles held between the core may have, before being placed in the wire of the core, a rectilinear or non-rectilinear shape, for example an undulating shape. The bristles may undergo a treatment aimed at forming balls or forks at their ends. Use may be made of flocked bristles or else bristles produced by extrusion of plastics comprising a filler of particles, for example particles of a moisture-absorbing material capable of imparting a micro-relief to the surface of the bristles, or of giving them magnetic or other properties. The bristles may comprise a filler, for example a magnetic, bacteriostatic or moisture-absorbing compound, or else a compound intended to roughen the surface of the bristle or to help the eyelashes slide over the bristles. The bristles of the brush may or may not be magnetized.

The length of the bristles from the core to the free end may, for example, be between 1 and 7 mm, particularly between 2 and 5 mm.

Device

A further subject of the invention is a packaging and application device comprising:

- a container containing a product to be applied, and
- a brush according to the invention, as defined above.

The container may be provided with a wiping member for removing the excess product present on the stem and on the brush. This wiping member comprises, for example, a lip made from an elastomeric material, defining a wiping orifice of preferably circular cross section, the diameter of which corresponds substantially to that of the stem.

Manufacturing method

A further subject of the invention is a method for manufacturing a brush according to the invention, comprising the steps consisting in:

- providing a wire, in particular a metal wire, defining, in cross section, a cavity, comprising in particular a hollow cross section, comprising in particular an interior cavity therewithin,
- folding the wire as a U, i.e. as two parallel branches,
- arranging bristles between the two branches of the wire, and
- twisting the wire to form a brush with a twisted core, the cross section of the wire of the core being deformed at least in places, the brush having in particular an envelope surface having a cylindrical form, preferably an axisymmetric form, then, optionally,
- grooving and/or faceting the bristles so as to obtain grooves and/or one or more facets.

The cross section of the wire of the core is deformed at least in places owing to the squashing of said cavity upon twisting of the wire of the core.

Makeup method

A further subject of the invention is a makeup method, wherein a brush as defined above is loaded with product, particularly with cosmetic, makeup or care product, and then the product is applied to the surface to be made up, particularly the eyelashes or the eyebrows, preferably by performing a rotational movement or a combined rotational and translational movement of the brush relative to the surface to be made up, particularly relative to the row of eyelashes or eyebrows. The rotational movement is performed about

the longitudinal axis X of the core. The combined rotational and translational movement is performed by rotation about the longitudinal axis X of the core and translation along an axis perpendicular to the longitudinal axis X of the core.

5 The rotational movement or the combined rotational and translational movement of the brush makes it possible to place the surface to be made up in contact with a zone of the brush that is loaded with a large amount of product, and then with a zone promoting application, and to promote combing and separation.

Detailed description

10 The invention may be better understood from reading the following detailed description of non-limiting illustrative embodiments thereof and from examining the appended drawing, in which:

- Figure 1 shows an example of a packaging and application device according to the invention, in schematic and partial longitudinal section,
- 15 - Figure 2 is a cross section of the wire of the brush in Figure 1,
- Figure 2a is a view similar to Figure 2 of a cross section of the wire after deformation as a result of twisting,
- Figures 3a to 3m are views similar to Figure 2 of variant embodiments, and
- 20 - Figures 4a to 4g are views similar to Figure 2 of variant embodiments.

In the rest of the description, identical elements or elements having identical functions bear the same reference sign. Their description is not repeated for each of the figures, only the main differences between the embodiments being mentioned.

The packaging and application device 1 shown in Figure 1 comprises a
25 container 2 containing a product P to be applied to the eyelashes or the eyebrows and an applicator 3 that, in the example in question, may be fastened to the container 2 in a removable manner. The product P comprises, for example, one or more pigments, particularly an iron oxide. It is, for example, a mascara.

The applicator 3 comprises a stem 5, of longitudinal axis Y, provided at a distal
30 end 5a with a brush 10 according to the invention and at the other end with a gripping member 11, which likewise forms a cap for closing the container 2 in a sealed manner. As can be seen in particular in Figure 1, the container 2 has a body 13 provided at the top with

a threaded neck 14 onto which the gripping member 11 can be screwed in order to close the container 2 in a sealed manner. In a variant, the applicator may be fastened to the container in some other way.

5 The neck 14 may, as illustrated, accommodate a wiping member 20, which is, for example, inserted into the neck 14. This wiping member 20 comprises a lip 26 that defines a wiping orifice with a diameter adapted to that of the stem 5.

10 The brush 10 may be fastened, in a conventional manner, in a seat provided at the distal end 5a of the stem 5, which is advantageously made of thermoplastics. The brush 10 comprises a twisted metal core 40 comprising a portion 43, carrying bristles 41, of length L . The bristles 41 extend over a length L of the core that is preferably between 25 mm and 35 mm, for example equal to 30 mm. The core is fastened at a proximal end 40a in the corresponding seat of the stem 5, via a portion without bristles that may have a length of the order of 8 mm. The portion 43 of the core carrying the bristles has a free distal end 40b.

15 The core 40 of the brush 10 is rectilinear in the example in question, extending along a rectilinear longitudinal axis X. In a variant, it is curved.

The core 40 is formed conventionally by two branches of a metal wire 45 folded as a U and twisted to form the core, the bristles 41 being held between the turns of the core 40. The diameter of the metal wire 45 is, for example, between 0.1 and 1 mm. The diameter of the bristles is, for example, between 0.06 and 0.35 mm.

20 As illustrated in Figure 2 in cross section, the wire 40 of the core comprises a hollow cross section, providing an interior cavity 47. This interior cavity 47 is the result of the wire of the core having a longitudinal channel 49 running along it, over its entire length.

25 The presence of the interior cavity 47 allows the deformation of the cross section of the wire in places, upon twisting of the wire, as illustrated in Figure 2a. The transverse dimension d_1 varies upon deformation assuming the value d_2 , as illustrated in Figures 2 and 2a. The value of d_2 is, in the example described, approximately 50 to 60 % of d_1 .

30 In the example described in Figure 2, the longitudinal channel 49 is central in the case of the wire, but could, of course, be other than central, and the channel could be off-center relative to the exterior contour 50 of the wire 45. Moreover, even when the

longitudinal channel 49 is provided centered relative to the exterior contour 50 of the wire 45 in cross section, there is still a certain lack of coaxiality between these elements along the wire during the latter's manufacture; a lack of coaxiality of this type also makes it possible to achieve a variable squashing of the wire upon twisting of the core and
5 contributes to a diffuse density of the distribution of the bristles held by the core as a helix.

The interior cavity 47 is, in the example described, of general circular form, as is the exterior contour 50 of the wire 45.

It is not, of course, a departure from the scope of the present invention if their form is otherwise, and is, for example, oblong or ellipsoidal, as illustrated in Figure 3a, or
10 polygonal, particularly square, as illustrated in Figure 3b, or rectangular, as illustrated in Figure 3c, or triangular, as illustrated in Figure 3d, or hexagonal, as illustrated in Figure 3e. The form of the interior cavity 47 corresponds to the form of the cross section of the longitudinal channel 49.

In a variant, the two forms of the interior cavity and external contour of the
15 wire may be different from one another. For example, one may be circular while the other is polygonal, or vice versa. By way of example, Figures 3f to 3h illustrate an exterior contour of the wire of general circular form, with an interior cavity of, respectively, square, triangular and hexagonal general form. In the embodiments of Figures 3i and 3j, it is the interior cavity that is of circular general form, while the exterior contour of the wire is,
20 respectively, of triangular and hexagonal general form. Lastly, in the embodiment of Figure 3k, the exterior contour of the wire is of oblong general form, with an interior cavity of rectangular general form. In the embodiment of Figure 3l, the exterior contour of the wire is of rectangular general form, with an interior cavity of triangular general form. In the embodiment of Figure 3m, the exterior contour of the wire is of hexagonal general
25 form, with an interior cavity of triangular general form.

In the examples just described, the cavity 47 is closed in cross section, i.e. it is not open to the exterior in cross section.

In a variant, the cavity 47 may be open to the exterior in cross section. It may, for example, have a horseshoe form, as illustrated in Figure 4a, or a U-form, as illustrated
30 in Figure 4b, or a V-form, as illustrated in Figure 4c, or a flattened U-form, as illustrated in Figure 4d. It may also have a kidney form, as illustrated in Figure 4e.

In another variant, the cavity 47 may be practically closed, having the form of a gutter, being, particularly, of a practically closed-over U-form, as illustrated in Figure 4f, or a flattened C-form, as illustrated in Figure 4g.

5 Other combinations of forms of the interior cavity of the wire in cross section and of forms of the exterior contour of the wire of the core are, of course, possible, without departing from the scope of the present invention.

The ends 40a and 40b of the envelope surface S may be chamfered. This may make it easier for the brush 3 to pass through the wiping member 20. The chamfer at the distal end and the chamfer at the proximal end may be different. The chamfer at the distal end may, particularly, be at less of an angle than that at the proximal end. In a variant, the
10 brush may be without such end chamfers.

The invention is not limited to the illustrative embodiments just described, the features of which may be combined with one another within variants that are not illustrated.

15

CLAIMS

1. A brush (10) for applying a product to the eyelashes or eyebrows, comprising:

- 5 - a twisted core (40) extending along a longitudinal axis (X), the core being formed from a wire (45), particularly a metal wire, folded into a U shape and twisted, and
- bristles (41) held in the core,

the wire (45) of the core defining, in cross section, a cavity (47), the cross section of the wire of the core being deformed at least in places owing to the squashing of said cavity

10 (47) upon twisting of the wire of the core.

2. The brush as claimed in the preceding claim, wherein the cavity (47) is, in cross section, open to the exterior.

3. The brush as claimed in claim 1, wherein the cavity (47) is, in cross section, closed.

15 4. The brush as claimed in any one of the preceding claims, wherein the wire (45) of the core comprising a hollow cross section, providing an interior cavity (47).

5. The brush as claimed in any one of the preceding claims, wherein the wire (45) of the core has a longitudinal channel (49) running along it, particularly over its entire length.

20 6. The brush as claimed in the preceding claim, wherein the longitudinal channel (49) is central for the wire.

7. The brush as claimed in any one of the preceding claims, wherein the interior cavity (47) of the wire is, in cross section, of a form chosen from the following list: circular, non-circular, oblong, ellipsoidal, polygonal, particularly square, rectangular,

25 triangular, pentagonal, hexagonal, octagonal, multi-lobed or star-shape.

8. The brush as claimed in the preceding claim, wherein the exterior contour (50) of the wire of the core is, in cross section, of a form chosen from the following list: circular, non-circular, oblong, ellipsoidal, polygonal, particularly square, rectangular, triangular, pentagonal, hexagonal, octagonal, multi-lobed or star-shape.

30 9. The brush as claimed in any one of the preceding claims, wherein the form of the interior cavity (47) of the wire is, in cross section, similar to the form of the exterior contour (50) of the wire of the core, and particularly is homothetic thereto.

10. The brush as claimed in any one of the preceding claims, comprising at least one bristle (41) of solid cross section.

11. The brush as claimed in any one of the preceding claims, comprising at least one bristle (41) of hollow cross section.

5 12. The brush as claimed in any one of the preceding claims, wherein the wire (45) has a larger transverse dimension, particularly a diameter, of between 0.2 and 1 mm, better still between 0.5 and 1 mm, or even between 0.65 and 0.8 mm, for example of the order of 0.6 to 0.7 mm.

10 13. The brush as claimed in any one of the preceding claims, wherein the interior cavity (47) of the wire (45) has a larger transverse dimension, particularly a diameter, of between 0.1 and 0.5 mm, better still between 0.15 and 0.45 mm, for example of the order of 0.2 to 0.4 mm.

14. A packaging and application device comprising a container (2) containing a product (P) to be applied and a brush (10) as claimed in any one of the preceding claims.

15 15. A method for manufacturing a brush (10), comprising the steps of:

- providing a wire (45), in particular a metal wire, defining, in cross section, a cavity (47), comprising in particular a hollow cross section, comprising in particular an interior cavity (47) therewithin,
- folding the wire (45) into a U shape, as two parallel branches,
- 20 - arranging bristles (41) between the two branches of the wire, and
- twisting the wire (45) to form a brush with a twisted core, the cross section of the wire of the core being deformed at least in places owing to the squashing of said cavity (47) upon twisting of the wire of the core, the brush having in particular an envelope surface (S) having a cylindrical
- 25 form, preferably an axisymmetric form.

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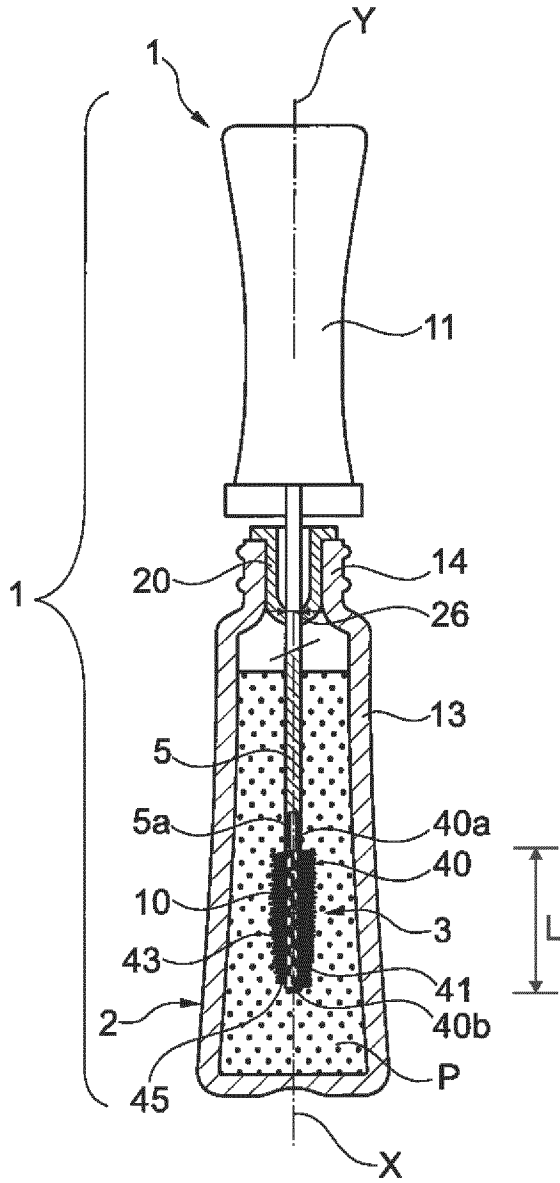


Fig. 1

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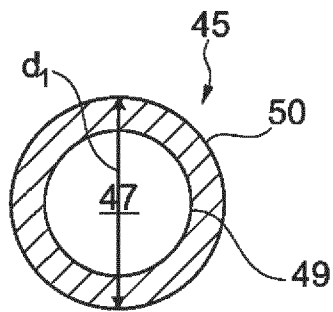


Fig. 2

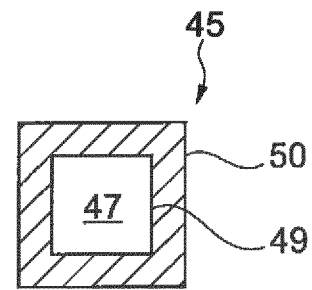


Fig. 3b

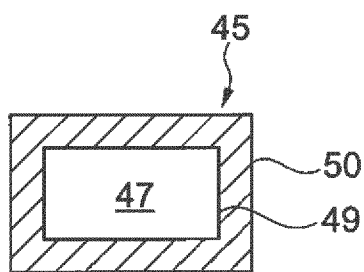


Fig. 3c

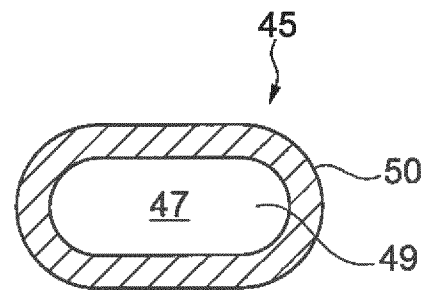


Fig. 3a

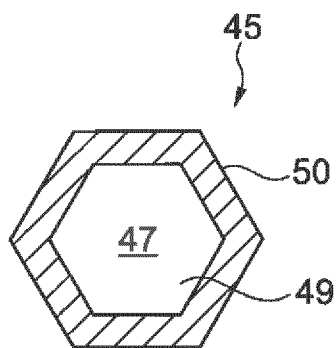


Fig. 3e

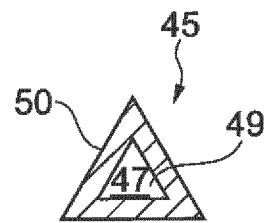


Fig. 3d

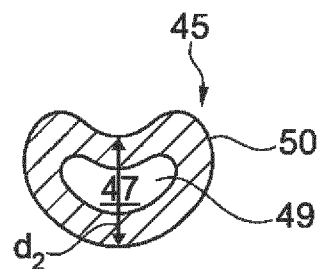


Fig. 2a

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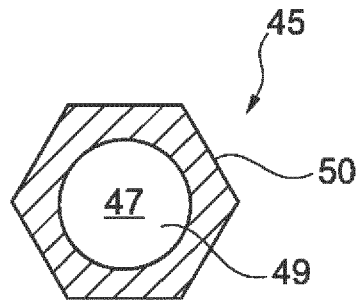


Fig. 3j

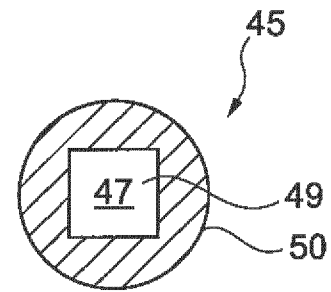


Fig. 3f

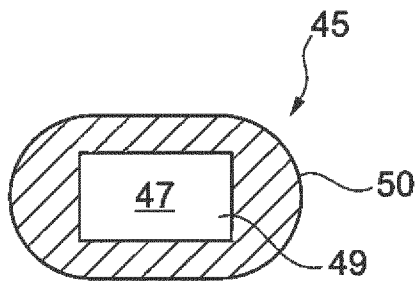


Fig. 3k

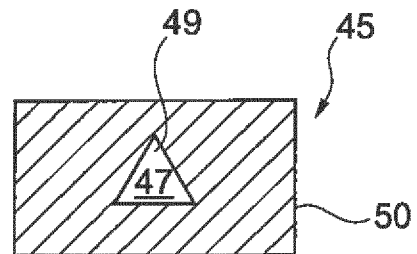


Fig. 3l

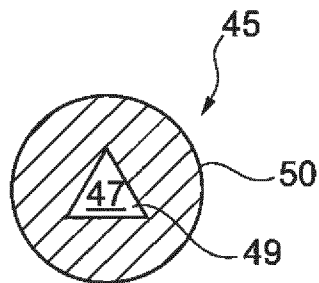


Fig. 3g

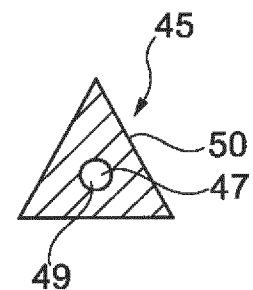


Fig. 3i

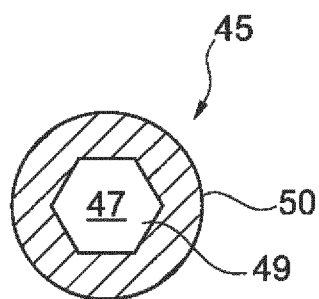


Fig. 3h

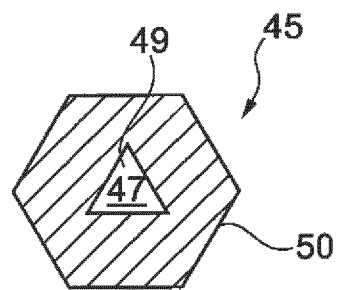


Fig. 3m

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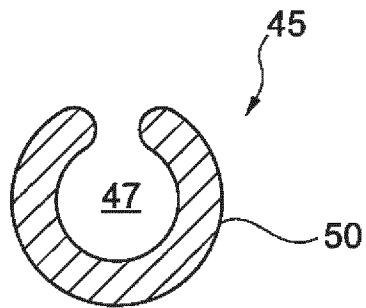


Fig. 4a

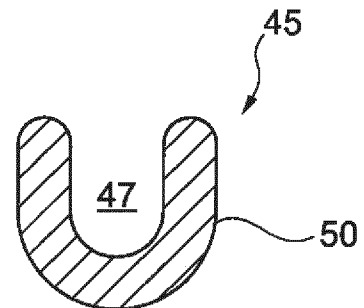


Fig. 4b

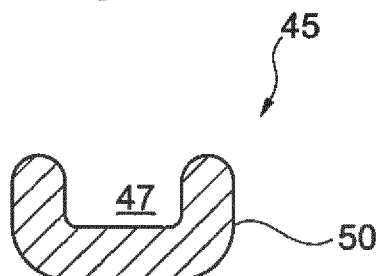


Fig. 4d

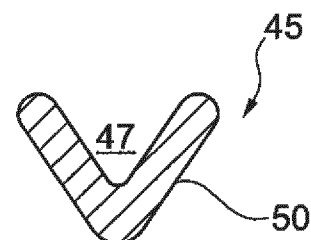


Fig. 4c

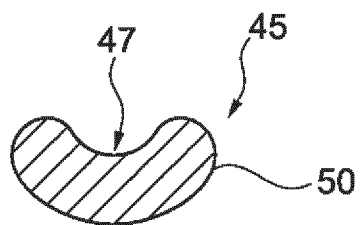


Fig. 4e

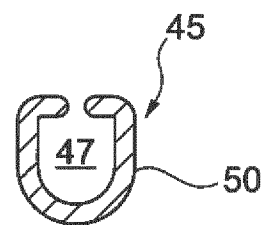


Fig. 4f

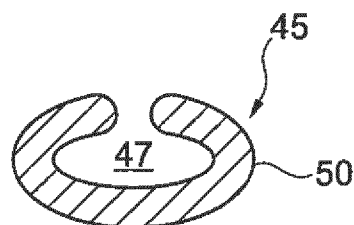


Fig. 4g

INTERNATIONAL SEARCH REPORT

International application No

PCT/EP2017/077495

A. CLASSIFICATION OF SUBJECT MATTER

INV. A46B9/02 A46B3/18
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A46B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2013/135623 A1 (STRAUMANN HOLDING AG [CH]) 19 September 2013 (2013-09-19) page 17, line 25 - page 18, line 9; figures 1, 2, 3 -----	1-15
X	US 2013/104925 A1 (CAULIER ERIC [FR]) 2 May 2013 (2013-05-02) paragraphs [0001], [0023], [0085] - [0087], [0100] - [0106]; figures 5, 7, 8 -----	1-15
X	FR 2 987 243 A1 (OREAL [FR]) 30 August 2013 (2013-08-30) page 4, line 15 - page 17, line 32; figures 3a-3f -----	1-15
A	EP 1 938 709 A1 (OREAL [FR]) 2 July 2008 (2008-07-02) abstract; figures 29-46 -----	1-15



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

16 November 2017

Date of mailing of the international search report

22/11/2017

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Horrix, Doerte

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2017/077495

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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			EP 2552277 A1 06-02-2013
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			FR 2909845 A1 20-06-2008
			US 2008184512 A1 07-08-2008