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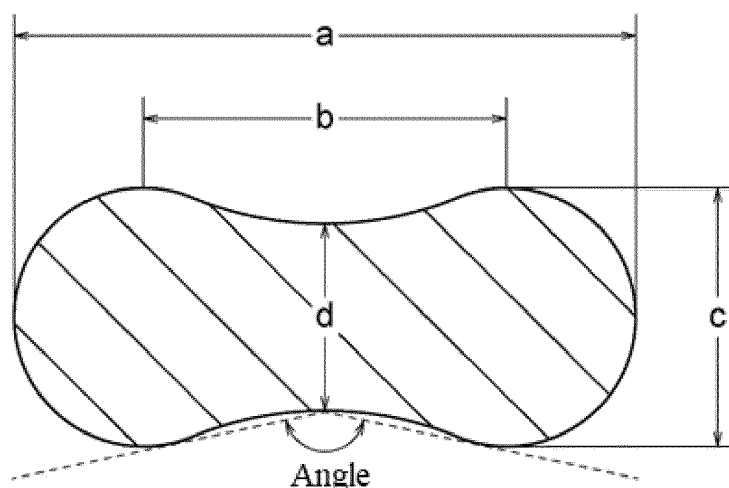
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(54) **MAKEUP BRUSH BRISTLE MATERIAL AND MAKEUP BRUSH USING SAID BRISTLE MATERIAL**

(57) An object is to provide a makeup brush bristle material and a makeup brush bristle material assembly, both made of synthetic resin, as well as a makeup brush using such bristle material or bristle material assembly, all offering good uptake and release properties with respect to powder or liquid cosmetics. As a solution, a

makeup brush bristle material constituted by S-twisted or Z-twisted synthetic resin monofilaments, characterized in that the cross-section of the monofilaments in the direction orthogonal to the axis of fiber has a cocoon shape, is provided.

[FIG. 1]



Description

Technical Field

[0001] The present invention relates to a makeup brush bristle material, a makeup brush bristle material assembly, and a makeup brush.

Background Art

[0002] Traditionally, squirrel hair, horsehair, goat hair and other natural animal hairs have been used as bristle materials for makeup brushes. Natural animal hairs, which reportedly have favorable properties of taking up and releasing liquid or powder cosmetics and are also flexible, soft to the touch, and pleasant to the feel during use, have many regular users. In particular, makeup brushes using squirrel hair and goat hair are highly regarded by consumers as the animal hair makeup brushes of finest quality. Despite their many advantages, however, natural animal hairs are limited in supply because they are natural resources, and the sentiments for the protection of animals and global ecosystems, etc., are gradually reducing their availability. In recent years, therefore, bristle materials made of synthetic fibers are proposed for use in makeup brushes to substitute natural animal hairs.

[0003] For example, Patent Literature 1 proposes a brush bristle material for makeup brush or other brush, whose primary component is polypropylene terephthalate and which exhibits a specific bending recovery rate. It is specifically disclosed that a brush bristle material made solely of polypropylene terephthalate, even when its tip is tapered, offers superior durability to a brush bristle material made solely of polybutylene terephthalate, and is also more flexible and softer than conventional brush bristle materials (refer to Patent Literature 1).

[0004] Patent Literature 2 proposes a makeup brush bristle material, constituted by a complex monofilament of core-sheath structure having a tapered part formed at one end thereof. It is specifically disclosed that shaping the cross-section of the tapered part as a circle, and the cross-section of the main body part other than the tapered part as an eight-petal flower, makes the bristle material suitable for use in makeup brushes as it offers both excellent performance in terms of liquid cosmetic application, and pleasant feel comparable to natural animal hairs during use (refer to Patent Literature 2).

Background Art Literature

Patent Literature

[0005]

Patent Literature 1: Japanese Patent Laid-open No. 2003-245133

Patent Literature 2: Japanese Patent Laid-open No. 2009-201794

Summary of the Invention

Problems to Be Solved by the Invention

[0006] Natural animal hairs are subtly crimped, so when they are bundled, the tip of the application part becomes flared, which is particularly suitable for blurring blushes, eye shadows, and other powder cosmetics. On the other hand, brush bristle materials made of synthetic fibers remain straight, instead of flaring, at the tip of the application part when bundled because the synthetic fibers themselves are straight; accordingly, they are known to be suitable for applying eyeliners, lipsticks and other solid, paste, or liquid cosmetics, but not suitable for applying powder cosmetics.

[0007] Accordingly, an object of the present invention is to provide a makeup brush bristle material and a makeup brush bristle material assembly, both made of synthetic resin, as well as a makeup brush using such bristle material or bristle material assembly, all suitable for applying both powder cosmetics and liquid cosmetics, or more specifically, offering good uptake and release properties with respect to powder or liquid cosmetics.

Means for Solving the Problems

[0008] After studying in earnest to achieve the aforementioned object, the inventors of the present invention discovered that an S-twisted or Z-twisted brush bristle material made of a synthetic resin and having a specific cross-section shape would offer exceptional uptake and release properties with respect to powder or liquid cosmetics, and finally achieved the aforementioned object.

[0009] To be specific, the key points of the present invention are as follows:

1. A makeup brush bristle material constituted by S-twisted or Z-twisted monofilaments made of a synthetic resin, characterized in that the cross-section of the monofilaments in the direction orthogonal to the axis of fiber has a cocoon shape.
2. A makeup brush bristle material according to 1, characterized in that the monofilament has a narrow tip part having a tapered shape.
3. A makeup brush bristle material according to 2, characterized in that the narrow tip part having a tapered shape is branched.
4. A makeup brush bristle material according to any one of 1 to 3, characterized in that the synthetic resin is a polyester resin.
5. A makeup brush bristle material according to 4, characterized in that the polyester resin consists of one or two or more types selected from polytrimethylene terephthalate, polyethylene terephthalate, and polybutylene terephthalate.
6. A makeup brush bristle material assembly constituted by a mixed assembly of S-twisted and Z-twisted monofilaments made of a synthetic resin, character-

ized in that the cross-section of the monofilaments in the direction orthogonal to the axis of fiber has a cocoon shape.

7. A makeup brush characterized in that it uses, at least partially, the makeup brush bristle material according to any one of 1 to 5 or the makeup brush bristle material assembly according to 6.

Effects of the Invention

[0010] The makeup brush bristle material proposed by the present invention, as it has two unique three-dimensional shapes including twists and a specific cross-section shape, demonstrates synergistic effects from a combination of the respective three-dimensional shapes and achieves uptake and release properties with respect to powder or liquid cosmetics that are superior to natural animal hairs. Furthermore, by having a narrow tip part having a tapered shape, the makeup brush bristle material offers both softness to the touch and flexibility comparable to natural animal hair.

Brief Description of the Drawings

[0011]

[FIG. 1] A schematic cross-sectional view of a cocoon shape pertaining to a makeup brush bristle material according to the present invention.

[FIG. 2] A schematic cross-sectional view showing an example of a cocoon shape according to the present invention.

[FIG. 3] (A) to (C) are schematic views of cross-section shapes not included in the present invention.

[FIG. 4] An optical microscopic photograph (x150) of a makeup brush bristle material according to the present invention.

[FIG. 5] An optical microscopic photograph (x100) of a makeup brush bristle material with a branched narrow tip part, according to the present invention.

[0012] [FIG. 6] A graph showing the evaluation test results of the Examples under "Use Performance Evaluation of Makeup Brushes 1: Evaluation of Powder Uptake Property."

[0013] [FIG. 7] A graph showing the evaluation test results of the Examples under "Use Performance Evaluation of Makeup Brushes 2: Evaluation of Powder Release Property."

Mode for Carrying Out the Invention

[0014] The present invention relates to a makeup brush bristle material, a makeup brush bristle material assembly, and a makeup brush, each constituted by S-twisted or Z-twisted synthetic resin monofilament, wherein the cross-section of the monofilaments in the direction orthogonal to the axis of fiber has a cocoon shape.

[0015] The present invention is explained in detail below.

[0016] The makeup brush bristle material proposed by the present invention is constituted by synthetic resin monofilaments having a twist structure based on S-twist or Z-twist. In other words, it has a helical structure representing either an "S-twisted bristle material (twisted to right)" or "Z-twisted bristle material (twisted to left)" and, unlike straight fibers or wavy fibers, flares three-dimensionally in directions crossing at right angles with the axis of the helix.

[0017] The volume occupied by a single bristle material having such helical structure based on twist, is greater than the volume occupied by a bristle material of planar zigzag structure formed by the conventionally known gear-crimp method, and a makeup brush bristle material assembly or makeup brush comprising the makeup brush bristle materials proposed by the present invention becomes fluffy and highly voluminous because it contains many void parts inside as the bristle materials are prevented from overlapping with or adhering to each other, even in a stationary state. Additionally, combining S-twist and Z-twist allows for further increase in the void parts inside and the three-dimensional feel can be enhanced as a result, which is desirable.

[0018] The number of twists in each of the makeup brush bristle materials proposed by the present invention is set preferably in a range of 30 T/m (turns/meter) or greater but no greater than 100 T/m (turns/meter), or more preferably in a range of 40 T/m (turns/meter) or greater but no greater than 90 T/m (turns/meter), for both S-twist and Z-twist, so that, when they are made into a makeup brush bristle material assembly or makeup brush, void parts in which to retain powder or liquid cosmetics are formed between adjacent bristle materials. So long as the number of twists is within the aforementioned ranges, a helical structure can be given to the fibers in their length direction based on a wavelength width over 10 mm but not exceeding 35 mm.

[0019] Normally, adding a three-dimensional feel to a monofilament requires it to be hard-twisted in order to make the wavelength width shorter; with the makeup brush bristle material proposed by the present invention, on the other hand, the number of twists is reduced (loose twisting) to make the wavelength width longer. By reducing the number of twists as described above, a brush bristle material with a greater three-dimensional feel can be obtained, and also several of such monofilaments can be twisted together and then combed to open the fibers with ease, which provides an added benefit of higher manufacturing efficiency. Also, hard twisting tends to make the bristle material less elastic and rough to the touch.

[0020] On the other hand, a wavelength width over 35 mm makes the twisting loose and the bristle material closer to being straight, leading to less three-dimensional flare of the bristle materials and reduced voids between the bristle materials, the result of which is a tendency of

the trapped or retained amount of powder or liquid cosmetics to drop. Meanwhile, when the wavelength width is smaller than 10 mm, the bristle materials tend to tangle up together and the manufacturing efficiency drops as a result. The wavelength width of the makeup brush bristle material proposed by the present invention is preferably 11 mm or greater but no greater than 25 mm, or more preferably 12 mm or greater but no greater than 20 mm.

[0021] The makeup brush bristle material proposed by the present invention is constituted by S-twisted or Z-twisted synthetic resin monofilaments whose cross-section in the direction orthogonal to the axis of fiber has a cocoon shape.

[0022] The cross-section shape of the makeup brush bristle material proposed by the present invention is explained according to FIGS. 1 to 3. FIGS. 1 and 2 are both schematic views of cross-section shapes representing the makeup brush bristle material proposed by the present invention. FIGS. 3 (A) to (C) are schematic views of cross-section shapes not included in the present invention.

[0023] The cocoon shape under the present invention refers to a rice bale shape resembling a cocoon spun by a silkworm--oblong with a gradual constriction at the center portion (mid body portion)--as shown in FIG. 1, and does not include cross-section shapes with no constriction at the center portion (mid body portion) like the one shown in FIG. 3 (A). Also, while the cocoon shape under the present invention includes shapes having a large constriction at the center portion (mid body portion) like the one shown in FIG. 2, it does not include shapes having a sharp-angled, groove-like constriction(s) like the ones shown in FIGS. 3 (B) and (C).

[0024] The cocoon shape under the present invention is characterized in that, as shown in FIGS. 1 and 2, the "angle" formed by the two tangential lines (dotted lines) originating from the center part of constriction and extending along the gradual constriction is greater than 90 degrees but smaller than 180 degrees. With the cocoon shape under the present invention, this "angle" is preferably 100 degrees or greater, or more preferably 120 degrees or greater, or yet more preferably 130 degrees or greater. In embodiments not included in the present invention, a sharp-angled, vertical groove is constituted where the "angle" formed by the two tangential lines (dotted lines) originating from the center part of constriction and extending along the constriction is smaller than 90 degrees, as shown in FIG. 3 (B).

[0025] The inventors of the present invention had previously confirmed that the uptake property (catching property) of a makeup brush bristle material with respect to powder or liquid cosmetics would improve when a vertical groove is present in the length direction of fiber. However, the inventors of the present invention discovered for the first time that, if this vertical groove has a sharp angle (within 90 degrees), any powder or liquid cosmetic taken up by the makeup brush bristle material would be retained in this vertical groove and the release property

(releasing property) would drop. In other words, the inventors of the makeup brush bristle material proposed by the present invention discovered that it would demonstrate excellent uptake and release properties, especially release property (releasing property), with respect to powder or liquid cosmetics when its cross-section is shaped as a cocoon having a gradual streamlined shape, or specifically a constriction whose "angle" as described above is greater than 90 degrees but smaller than 180 degrees, and finally completed the present invention.

[0026] The cross-section shape of the makeup brush bristle material proposed by the present invention is explained in greater detail according to FIG. 1.

[0027] In FIG. 1, a represents the long diameter (hereinafter referred to as "long diameter a"), b represents the depression width (hereinafter referred to as "depression width b"), c represents the short diameter (hereinafter referred to as "short diameter c"), and d represents the depression diameter (hereinafter referred to as "depression diameter d"), of the makeup brush bristle material proposed by the present invention.

[0028] With the makeup brush bristle material proposed by the present invention, the long diameter a is in a range of 100 μm or greater but no greater than 200 μm , within which a range of 110 μm or greater but no greater than 170 μm is preferred, and a range of 120 μm or greater but no greater than 160 μm is more preferred. The depression width b is in a range of 50% or greater but no greater than 75% of the long diameter a, the short diameter c is in a range of 10 μm or greater but no greater than 100 μm , and the depression diameter d is 40% or greater but no greater than 90% of the short diameter c. The aspect ratio of long diameter a and depression diameter d (a/d) is in a range of 1.1 or greater but no greater than 8.0, within which preferably it is in a range of 2.0 or greater but no greater than 7.8. Also, the aspect ratio of short diameter c and depression diameter d (c/d) is in a range of 1.1 or greater but no greater than 3.0, where preferably it is in a range of 1.1 or greater but no greater than 2.5.

[0029] When its long diameter a, depression width b, short diameter c and depression diameter d are in the aforementioned ranges, the makeup brush bristle material proposed by the present invention demonstrates excellent performance in terms of catching and releasing properties with respect to powder or liquid cosmetics.

[0030] The makeup brush bristle material proposed by the present invention has a twist structure based on S-twist or Z-twist, and its cross-section also has a cocoon shape, and by combining these two unique three-dimensional shapes, it demonstrates synergistic effects and, in terms of catching and releasing properties with respect to powder or liquid cosmetics, and particularly releasing property with respect to powder or liquid cosmetics, it demonstrates exceptional initial releasing property. As explained in detail in Examples later, the makeup brush bristle material proposed by the present invention has excellent performance in that its catching property with

respect to powder cosmetics is approx. 1.3 to 1.8 times higher than goat hair makeup brushes that are highly regarded by consumers as the animal hair makeup brushes of finest quality. Also, in terms of releasing property (releasing property) with respect to powder or liquid cosmetics, its initial release property (releasing property) is approx. 1.2 times higher than goat hair makeup brushes, which is excellent performance. These uptake and release effects with respect to powder or liquid cosmetics as demonstrated by the makeup brush bristle material proposed by the present invention, or specifically its excellent performance in terms of both uptake and release properties, are particularly significant effects confirmed for the first time by the inventors of the present invention.

[0031] The makeup brush bristle material proposed by the present invention is constituted by monofilaments made of a synthetic resin. For this synthetic resin, one or two or more types may be selected from polyamide resins, polyolefin resins, polyacrylonitrile resins, polyester resins, and other synthetic resins, and used alone or in combination; among these, however, polyester resins are ideal as makeup brush bristle materials as they have appropriate rigidity and durability as well as excellent extrudability, twistability, taperability, etc. Among the foregoing, preferably the resin consists of one or two or more types selected from polytrimethylene terephthalate, polyethylene terephthalate, polybutylene terephthalate, polylactic acid, and other polyester resins. Furthermore, it consists, more preferably, of one or two or more types selected from polytrimethylene terephthalate (PTT), polyethylene terephthalate (PET), and polybutylene terephthalate (PBT), as these have appropriate flexibility and elasticity. The synthetic resin monofilament under the present invention may contain heat-proofing agent, weather-proofing agent, plasticizer, colorant, and other commonly used additives to the extent that the object of the present invention is not hindered.

[0032] The makeup brush proposed by the present invention is characterized in that it uses, at least partially, the makeup brush bristle material proposed by the present invention or makeup brush bristle material assembly proposed by the present invention. To be more specific, preferably 10 percent by weight or more, or more preferably 20 percent by weight or more, or yet more preferably 25 percent by weight or more, or most preferably 30 percent by weight or more, of all makeup brush bristle materials of the makeup brush proposed by the present invention is accounted for by the makeup brush bristle material proposed by the present invention or makeup brush bristle material assembly proposed by the present invention.

[0033] The makeup brush proposed by the present invention can demonstrate performance superior to makeup brushes using natural animal hair in terms of uptake and release properties with respect to powder or liquid cosmetics, and it can also have softness to the touch and flexibility close to makeup brushes using natural animal hair, when 10 percent by weight or more but no more

than 100 percent by weight of all makeup brush bristle materials is accounted for by the makeup brush bristle material proposed by the present invention or makeup brush bristle material assembly proposed by the present invention. In particular, the makeup brush proposed by the present invention can demonstrate the effects of the present invention fully when 30 percent by weight or more of all makeup brush bristle materials is accounted for by the makeup brush bristle material proposed by the present invention or makeup brush bristle material assembly proposed by the present invention.

[0034] The makeup brush proposed by the present invention, for the balance thereof not using the makeup brush bristle material proposed by the present invention or makeup brush bristle material assembly proposed by the present invention, can use makeup brush bristle materials constituted by nylon fibers, polyester fibers, and other synthetic fibers.

[0035] Also, with the makeup brush proposed by the present invention, preferably the tip of the synthetic resin monofilament is processed so that it has a narrow tip part having a tapered shape. Furthermore, it is more preferable that this narrow tip part having a tapered shape is processed so that it branches. Processing the tip part this way improves the softness to the touch when a cosmetic is applied, thus achieving an excellent feel close to natural animal hairs.

<Method for Manufacturing Makeup Brush Bristle Material>

[0036] Next, an example of how the makeup brush bristle material proposed by the present invention is manufactured, is explained.

[0037] As for the synthetic resin monofilament that constitutes the makeup brush bristle material, a polyester resin or other synthetic resin in pellet or powder form is mixed under agitation, together with additives, if necessary, until uniform dispersion, after which the mixture is supplied to the hopper of an extrusion-type spinning machine and the synthetic resin mixture that has melted under heating is extruded from a nozzle having a cocoon shape corresponding to the cross-section shape of the bristle material proposed by the present invention, and then spun from the spinneret and drawn in three stages under heating to be stretched four to five times, to manufacture a synthetic resin monofilament whose cross-section has a cocoon shape.

[0038] Such synthetic resin monofilaments are twisted by the number of times mentioned above, after which the synthetic resin monofilaments that have been twisted together are heated at a temperature equal to or below the melting point of the synthetic resin, and thus thermally set. The thermal setting period, which varies depending on the temperature, is approx. 5 minutes at 185°C, for example. This way, the twisted structure is fixed and the shape stabilizes against any effects of the use environment. Then, the thermally-set synthetic resin monofila-

ments are cut to a prescribed length, such as a length of 25 mm or more, for example, or preferably a length in a range of 50 mm or more but no more than 100 mm.

[0039] The cut synthetic resin monofilaments may have a tapered narrow tip part formed at the tip, if necessary. To do this, a hydrolysis-promoting catalyst is added to a strong alkali solution (such as an aqueous sodium hydroxide solution), and after the mixture has been held under a certain temperature condition, the cut synthetic resin monofilaments are immersed in it from the tip to near the center part. After having been immersed for a prescribed period of time, the synthetic resin monofilaments are pulled up, and their tip becomes narrowed in a tapered shape, forming a pointed narrow tip part. When obtained by this method, the synthetic resin monofilaments have a virtually clean tapered narrow tip part. Also, by setting an appropriate immersion period, the constricted portion of the cocoon shape representing the cross-section of the synthetic resin monofilaments will melt, and a makeup brush bristle material with a narrow tip part whose tip is split into two sharp-pointed branches can be obtained. This method is ideal because a makeup brush bristle material with a branched narrow tip part can be formed with ease. The length of this narrow tip part should be set in a range of 1 to 30 mm according to the purpose of use or application, while the length of the branched portion should be set in a range of 0.1 to 20 mm.

[0040] Next, this bundle of synthetic resin monofilaments is washed in water and dried. Then, the bundle of synthetic resin monofilaments is combed and twisted together, into a single makeup brush bristle material.

[0041] The makeup brush bristle material thus obtained has a specific cross-section shape and a helical structure, as shown in FIG. 4, because the cross-section of the monofilaments in the direction orthogonal to the axis of the fiber has a cocoon shape and also because thermally-set twist marks are left behind. Additionally, when this is alkaline-treated, a makeup brush bristle material with a branched narrow tip part, as shown in FIG. 5, can be obtained.

[0042] Furthermore, dyeing treatment may be given, as necessary. For the dye, any dispersive dye may be used; however, one with a weather fastness of level 5 or above is preferred because it will cause less discoloration or fading when the makeup brush is used. Also, while any known dyeing carrier agent may be combined with the dye, preferably high-pressure dyeing is performed that requires no dyeing carrier agent. Also, carbon black or any of various types of pigments, etc., may be added to the manufacturing material for monofilament. This not only saves dye when dyeing, but it may even render dyeing unnecessary depending on the application, which is desirable.

<Makeup Brush Bristle Material Assembly>

[0043] The makeup brush bristle material assembly proposed by the present invention is a mixed assembly

of S-twisted and Z-twisted makeup brush bristle materials. Using a makeup brush bristle material assembly in which S-twisted and Z-twisted makeup brush bristle materials are mixed to produce a makeup brush allows the bristle materials at the tip of its application part to flow in random directions so that powder or liquid cosmetics can be trapped or retained by a uniform amount, which is desirable. A makeup brush can have its application part twisted in a certain direction and permanently bent depending on the usage or use habit of its user; when S-twisted and Z-twisted materials are mixed, however, such permanent bending does not occur easily and the durability of the makeup brush improves further, which is ideal.

[0044] Preferably the makeup brush bristle material assembly proposed by the present invention consists of S-twisted makeup brush bristle materials and Z-twisted makeup brush bristle materials mixed at a ratio of 4:6 to 6:4. When a makeup brush bristle material assembly with a 4:6 to 6:4 mix ratio is used as an application part of a makeup brush, the application part as formed will have more void parts inside and thus create a three-dimensional feel, functioning more like an applicator that uses natural animal hair and allowing powder or liquid cosmetics to be applied uniformly. Furthermore, preferably S-twisted makeup brush bristle materials and Z-twisted makeup brush bristle materials are mixed roughly uniformly. This "mixed roughly uniformly" refers to a state where S-twisted makeup brush bristle materials and Z-twisted makeup brush bristle materials are dispersed without sticking together with their own kinds and localizing. For example, it is a state where S-twisted makeup brush bristle materials and Z-twisted makeup brush bristle materials are placed roughly alternately across nearly the entire application part of the makeup brush, with a Z-twisted makeup brush bristle material placed next to an S-twisted makeup brush bristle material, and an S-twisted makeup brush bristle material placed next to the Z-twisted makeup brush bristle material. When S-twisted makeup brush bristle materials and Z-twisted makeup brush bristle materials are mixed roughly uniformly, the adjacent makeup brush bristle materials are prevented from being closely packed in a manner contacting each other, which allows void parts to be formed easily between the makeup brush bristle materials and a fluffy, highly voluminous makeup brush can be formed as a result.

[0045] Also, preferably the application part of the makeup brush constituted by S-twisted makeup brush bristle materials and Z-twisted makeup brush bristle materials mixed roughly uniformly, has a bristle density of 0.3 g/cm³ to 0.5 g/cm³. When the bristle density in the application part of the makeup brush is within the aforementioned range, the application part will have a three-dimensional feel, with its tip flaring and growing voluminous, to function more like an applicator that uses natural animal hair and become suitable for applying powder or liquid cosmetics.

<Method for Manufacturing Makeup Brush>

[0046] An example of how the makeup brush is manufactured, which uses the makeup brush bristle material or makeup brush bristle material assembly proposed by the present invention as obtained by the aforementioned manufacturing method, etc., is explained.

[0047] Makeup brush bristle materials, including the makeup brush bristle material or makeup brush bristle material assembly proposed by the present invention accounting for at least a part, or preferably 10 percent by weight or more, or more preferably 20 percent by weight or more, or yet more preferably 25 percent by weight or more, or most preferably 30 percent by weight or more, of all makeup brush bristle materials, are introduced into a brush-ear forming jar and, under vibration, an ear part with a raised center is formed according to the interior shape of the jar, after which the formed ear part is inserted into a cylindrical ferrule provided at the tip of a makeup brush handle part, to obtain a makeup brush.

[0048] The makeup brush proposed by the present invention is ideal for uniformly applying powder or liquid cosmetics, and can be utilized as various types of makeup brushes, such as liquid brush, lip brush, nailcare brush, foundation brush, powder brush, shadow brush, cheek brush, highlighting brush, concealer brush, etc. Among others, the makeup brush proposed by the present invention is particularly suitable for so-called blurring—a technique to apply a powder cosmetic by spreading it thinly on the skin surface demonstrating excellent performance when used as a face brush, cheek brush, highlighting brush, eyeshadow brush, or other shadow brush that often requires such application technique.

Examples

[0049] The present invention is explained below using examples; however, it should be noted that the scope of art of the present invention is not limited by these examples.

<Manufacturing Examples of Makeup Brush Bristle Materials and Makeup Brushes According to Present Invention>

(Makeup Brush A)

[0050] Sixty polytrimethylene terephthalate monofilaments having a cocoon cross-section shape (equivalent to long diameter $a = 156 \mu\text{m}$, depression width $b = 100 \mu\text{m}$, short diameter $c = 56 \mu\text{m}$, depression diameter $d = 25 \mu\text{m}$), including those twisted in the direction of letter S (S-twisted monofilaments) and others twisted in the direction of letter Z (Z-twisted monofilaments) for 80 T/m (turns/meter) using a twisting machine, were steam-treated at 120°C for 40 minutes to set the twists, to obtain S-twisted and Z-twisted makeup brush bristle material

assemblies with a wavelength width of 11 mm. Next, the S-twisted and Z-twisted monofilaments in the makeup brush bristle material assemblies were mixed at a ratio of 1:1 and held together, to create a fiber bundle of 4 cm in diameter, which was then wrapped with paper for protection. This fiber bundle was cut to a length of 8 cm, into a round bar of 4 cm in diameter and 8 cm in length. Furthermore, an aqueous solution consisting of 100 g/L of sodium hydroxide and 6 g/L of quaternary amine (product name: DYK-1125, manufactured by Ipposha Oil Industries Co., Ltd.) was prepared and one end of the fiber bundle was immersed in the solution and treated at 130°C for 130 minutes, after which the tapered fiber bundle was dyed and then combed, with a comb running through the twists, and placed in a concave jar with the bristle tips facing down, and vibrated to align the bristle shape, to create Makeup Brush A.

(Makeup Brush B)

[0051] Makeup Brush B was created in the same manner as described in the aforementioned manufacturing example of "Makeup Brush A," except that 60 polytrimethylene terephthalate monofilaments having a cocoon cross-section shape (equivalent to long diameter $a = 126 \mu\text{m}$, depression width $b = 76 \mu\text{m}$, short diameter $c = 54 \mu\text{m}$, depression diameter $d = 46 \mu\text{m}$), including those twisted in the direction of letter S (S-twisted monofilaments) and others twisted in the direction of letter Z (Z-twisted monofilaments) for 80 T/m (turns/meter) using a twisting machine, were used.

(Comparative Example Brush)

[0052] A comparative example brush was created in the same manner as described in the aforementioned manufacturing example of "Makeup Brush A," except that sixty $75\text{-}\mu\text{m}$ (0.075-mm: corresponding to "fiber diameter") polytrimethylene terephthalate monofilaments, including those twisted in the direction of letter S (S-twisted monofilaments) and others twisted in the direction of letter Z (Z-twisted monofilaments) for 80 T/m (turns/meter) using a twisting machine, were used.

<Use Performance Evaluation of Makeup Brushes 1: Evaluation of Powder Uptake Property>

[0053] A test was conducted to evaluate the powder uptake property (catching property) of the makeup brush proposed by the present invention. Under the present invention, powder uptake property (catching property) indicates ease of attachment of powder cosmetics to the makeup brush.

(Test Samples)

[0054] Makeup Brushes A, B and Comparative Example Brush manufactured in the aforementioned manufac-

turing examples, as well as a commercially available goat hair (Sokouhou) makeup brush regarded highly by consumers as an animal hair makeup brush of finest quality, were evaluated for powder uptake property (catching property) with respect to a powder cosmetic (Integrate Mineral Glow Pressed Powder, manufactured by Shiseido Co., Ltd.), using a surface property tester (product name: TRILAB Handy Rub Tester Type TL701, manufactured by Trinity-Lab Inc.).

(Test Method)

[0055] A circular container (diameter: 5.5 cm) filled with powder cosmetic was attached roughly vertically to the contactor of the aforementioned surface property tester using a double-sided tape. Each test sample was installed on the rotating table so that the ear part of the makeup brush, being the test sample, would contact the surface of the powder cosmetic roughly at right angles, and was fixed horizontally to the test table.

[0056] The ear part of the makeup brush was swept 10 times over the surface of the powder cosmetic (speed: 6 rpm, radius of rotation: 100 mm, angle of rotation: 90 degrees), to let the ear part of the makeup brush pick up the powder cosmetic.

[0057] The powder uptake property (catching property) of each test sample was evaluated by measuring the weight of the makeup brush before the test and also after the end of the test, and taking the weight difference as the amount of powder taken up (content) in 10 sweeps.

[0058] It should be noted that, if a given makeup brush was unused, the makeup brush was swept 10 times over the surface of the powder cosmetic according to the aforementioned test method to take up the powder cosmetic, and then swept over a tissue paper to release the powder cosmetic until nothing attached to the tissue paper, and used as a test sample.

[0059] The test was conducted twice, and the average value of each test sample is shown in FIG. 6.

[0060] The results in FIG. 6 confirm that Makeup Brushes A, B constituted by makeup brush bristle materials conforming to the present invention took up approx. 2.6 to 3.4 times more powder than Comparative Example Brush whose bristle material cross-section shape is a circle. It is also confirmed that they took up approx. 1.3 to 1.8 times more powder than the commercially available goat hair makeup brush.

[0061] These evaluation results clearly show that the makeup brush bristle material proposed by the present invention demonstrates synergistic effects from a combination of two unique three-dimensional shapes including twists and a specific cross-section shape, and that it can be made into a makeup brush offering excellent powder uptake property.

<Use Performance Evaluation of Makeup Brushes 2: Evaluation of Powder Releasing Property>

[0062] A test was conducted to evaluate the powder release property (releasing property) of the makeup brush proposed by the present invention. Under the present invention, powder release property (releasing property) indicates ease of discharge of powder cosmetics from the makeup brush onto the application surface.

(Test Samples)

[0063] Makeup Brush A and the commercially available goat hair (Sokouhou) makeup brush--the same samples used in "Use Performance Evaluation of Makeup Brushes 1" mentioned above--were used. Goat hair makeup brushes, especially those (Sokouhou) made with flexible, less-worn raw hairs from the neck and chest, take up a lot of powder cosmetic and also offer good releasing property and thus are highly regarded by consumers as makeup brushes capable of handling different situations, from applying foundations, blushes, etc., over wide areas, to applying eyeshadows in detailed portions.

(Preparation for Evaluation Test of Powder Releasing Property)

[0064] Each test sample was installed on the rotating table so that the ear part of each makeup brush, being the test sample, would contact, roughly at right angles, the surface of the powder cosmetic (Integrate Mineral Glow Pressed Powder, manufactured by Shiseido Co., Ltd.) fixed horizontally on the test table, and was fixed vertically to the test table top.

[0065] The ear part of each makeup brush was swept over the surface of the powder cosmetic (speed: 6 rpm, radius of rotation: 100 mm, angle of rotation: 90 degrees), to let the ear part of each makeup brush pick up the powder cosmetic by roughly 0.01 g.

[0066] While Makeup Brush A according to the present invention was able to take up 0.01 g of the powder cosmetic in five sweeps, the goat hair (Sokouhou) makeup brush could not take up 0.01 g of the powder cosmetic until it was swept 15 times.

[0067] These results, too, confirm that Makeup Brush A constituted by makeup brush bristle materials conforming to the present invention exhibited exceptional powder cosmetic uptake property (catching property) compared to the goat hair (Sokouhou) makeup brush.

(Evaluation Test of Powder Releasing Property)

[0068] As the application surface, a makeup sponge was attached to a cylindrical table (diameter: 47 mm). Each test sample was installed on a jig and fixed so that the ear part of the makeup brush that had picked up the powder cosmetic, being the test sample, would contact the surface of the makeup sponge roughly at right angles.

[0069] The ear part of the makeup brush was moved 5, 10, 15, and 20 times (speed: 6 rpm, radius of rotation: 100 mm) relative to the application surface, to apply the powder cosmetic to the application surface.

[0070] The powder releasing property of each test sample was evaluated by measuring the weight of the makeup brush after moving it five, 10, 15 and 20 times to obtain, from the weight difference compared to the makeup brush before the evaluation test, the amount of powder released after each number of movements, and then dividing this amount of released powder by the amount of cosmetic that had been taken up before the evaluation test to calculate the powder releasing ratio (%).

[0071] The test was conducted three times, and the average value of powder releasing ratio (%) of each test sample is shown in FIG. 7.

[0072] The results in FIG. 7 clearly show that Makeup Brush A constituted by makeup brush bristle materials conforming to the present invention had better release property (releasing property) and, in particular, 1.2 times better initial release property (releasing property) after five applications from the start of test, compared to the goat hair (Sokouhou) makeup brush known to offer good uptake and release properties with respect to powder cosmetics. Excelling in this initial release property (releasing property) means that the makeup brush only needs to be brushed against the skin several times to apply cosmetics, indicating that excellent functionality can be achieved with ease when point make up cosmetics such as blushes, eyeshadows, and the like are used, which is a great advantage for a makeup brush.

[0073] These results of "Use Performance Evaluation of Makeup Brushes 2" clearly show that the makeup brush bristle material proposed by the present invention would demonstrate synergistic effect from a combination of two unique three-dimensional shapes including twists and a specific cross-section shape, and thus could be made into a makeup brush offering better powder uptake property (catching property) than the goat hair (Sokouhou) makeup brush and capable of taking up a lot of cosmetic with ease, and that it could further be made into a makeup brush that demonstrates exceptional effects also in terms of powder release property (releasing property), particularly initial powder release property (releasing property), to quickly and reliably release the cosmetic that has been taken up.

[0074] As it has excellent performance in both uptake property (catching property) and release property (releasing property), the makeup brush bristle material proposed by the present invention can be made into a makeup brush that provides great ease of use for the user in that, for example, such brush allows liquid or powder cosmetics to be used without leaving unused wastage and, in addition, minimizes concerns over color mixing with other liquid or powder cosmetics.

Industrial Field of Application

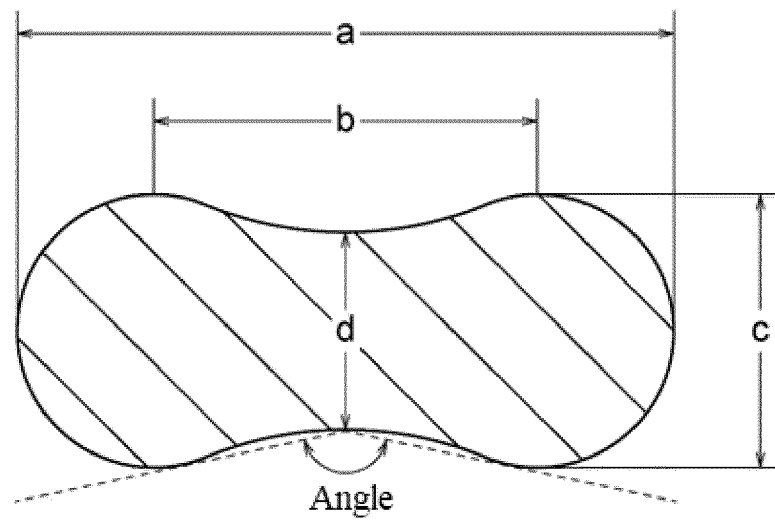
[0075] The makeup brush bristle material proposed by the present invention, as it has two unique three-dimensional shapes including twists, i.e., S-twists and Z-twists, and a specific cocoon cross-section shape, demonstrates synergistic effects from a combination of the respective three-dimensional shapes and achieves uptake and release properties with respect to powder or liquid cosmetics that are greatly superior to natural animal hairs. In particular, its excellent initial release property (releasing property) allows the makeup brush bristle material to be used favorably as a makeup brush, because the cosmetic that has been taken up can be quickly applied to the skin.

[0076] Furthermore, by having a narrow tip part having a tapered shape, the makeup brush bristle material offers both softness to the touch and flexibility comparable to natural animal hairs.

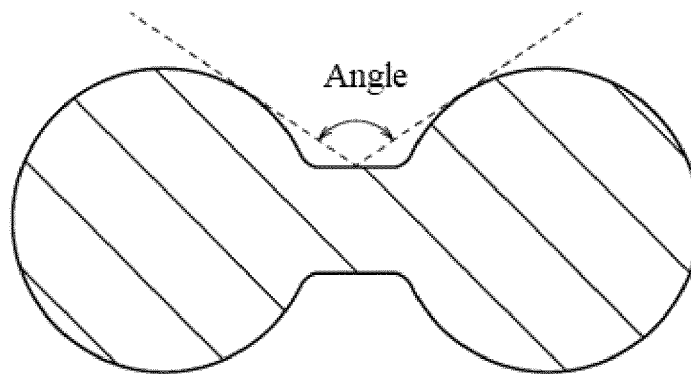
Claims

1. A makeup brush bristle material constituted by S-twisted or Z-twisted monofilaments made of a synthetic resin, **characterized in that** a cross-section of the monofilaments in a direction orthogonal to an axis of fiber has a cocoon shape.
2. The makeup brush bristle material according to claim 1, **characterized in that** the monofilament has a narrow tip part having a tapered shape.
3. The makeup brush bristle material according to claim 2, **characterized in that** the narrow tip part having a tapered shape is branched.
4. The makeup brush bristle material according to any one of claims 1 to 3, **characterized in that** the synthetic resin is a polyester resin.
5. The makeup brush bristle material according to claim 4, **characterized in that** the polyester resin consists of one or two or more types selected from polytrimethylene terephthalate, polyethylene terephthalate, and polybutylene terephthalate.
6. A makeup brush bristle material assembly constituted by a mixed assembly of S-twisted and Z-twisted monofilaments made of a synthetic resin, **characterized in that** a cross-section of the monofilaments in a direction orthogonal to an axis of fiber has a cocoon shape.
7. A makeup brush **characterized by** using, at least partially, the makeup brush bristle material according to any one of claims 1 to 5 or the makeup brush bristle material assembly according to claim 6.

[FIG. 1]

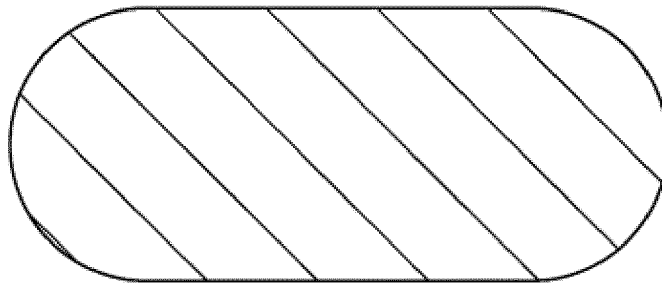


[FIG. 2]

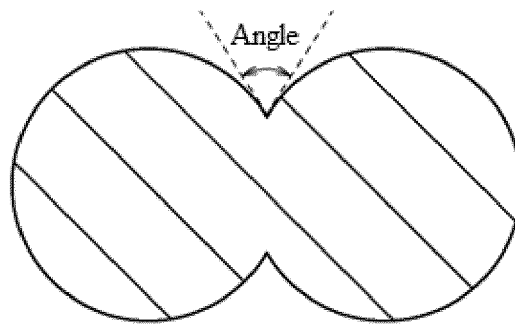


[FIG. 3]

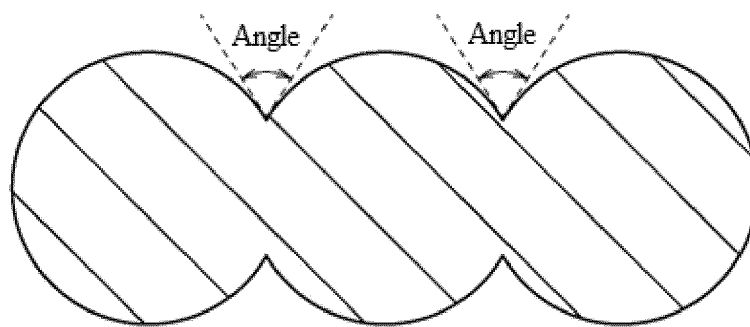
(A)



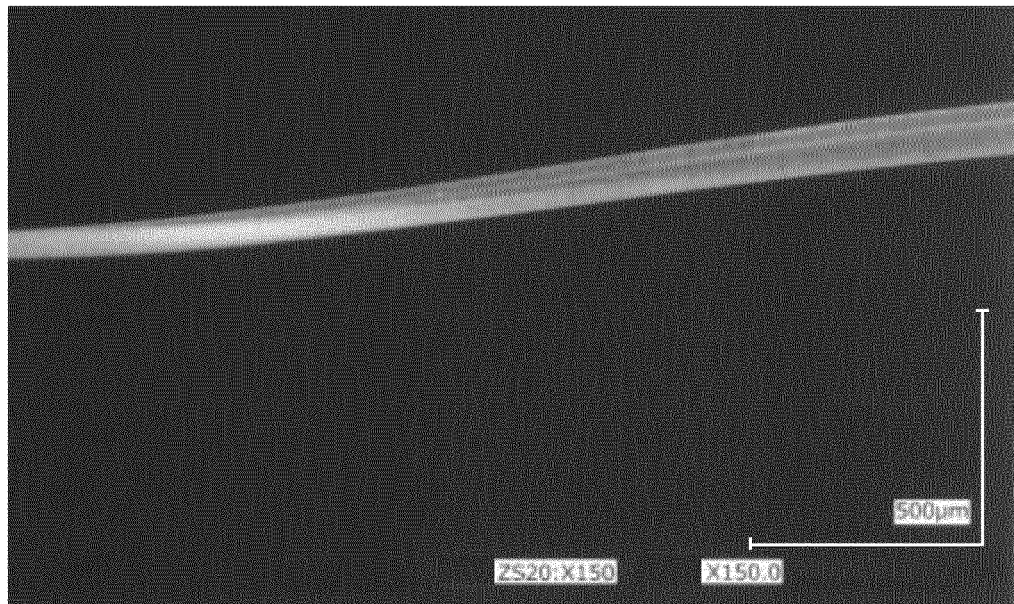
(B)



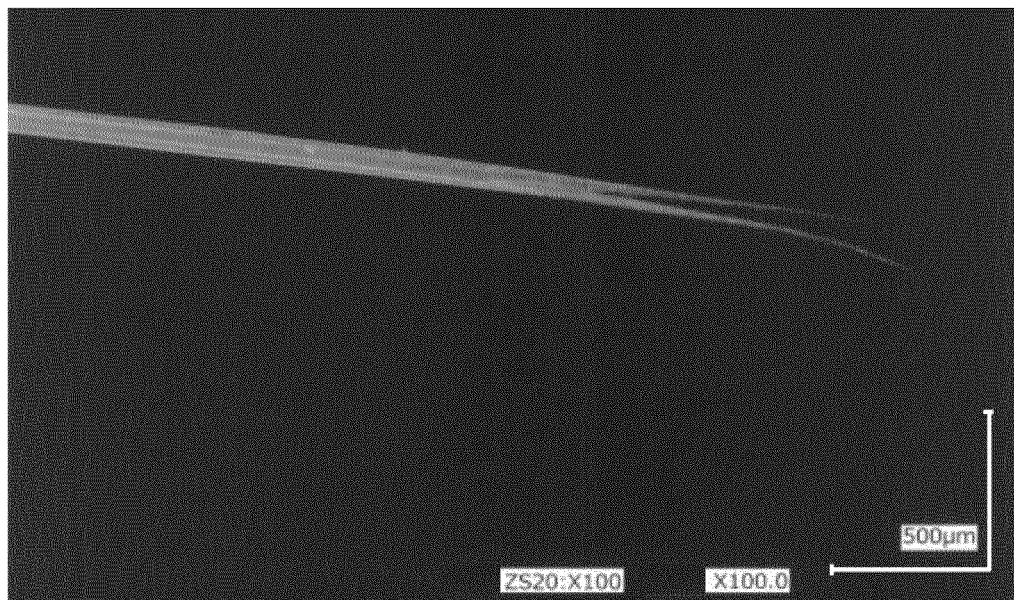
(C)



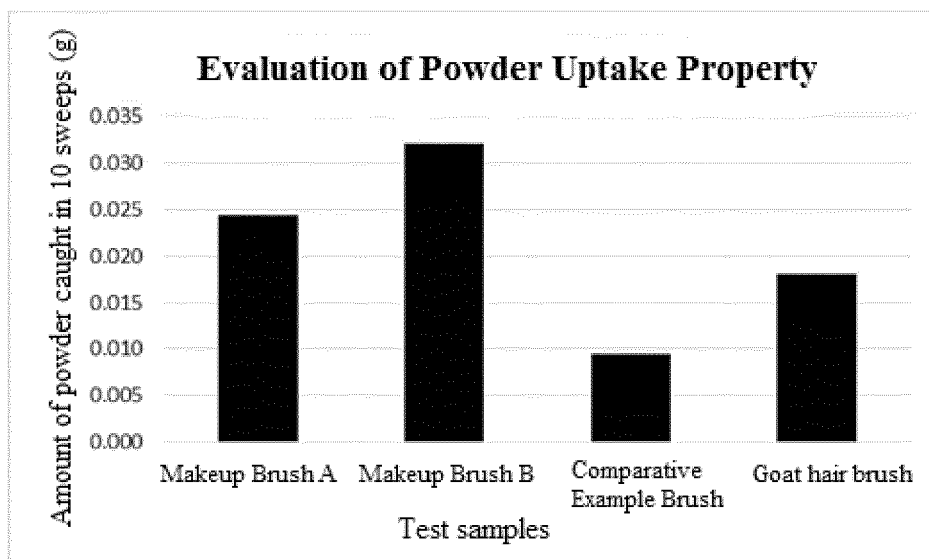
[FIG. 4]



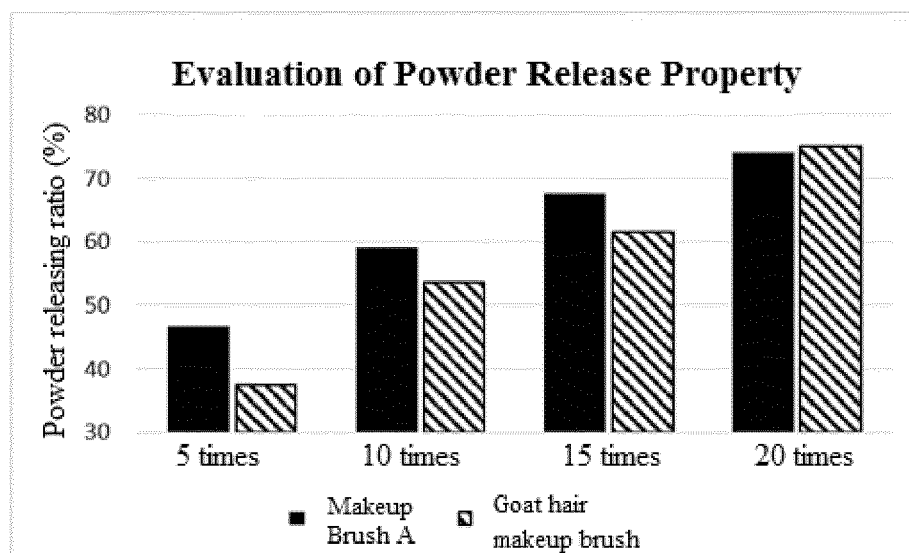
[FIG. 5]



[FIG. 6]



[FIG. 7]



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/044472

A. CLASSIFICATION OF SUBJECT MATTER

Int.Cl. A46D1/00 (2006.01) i

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)

Int.Cl. A46D1/00, A45D33/00

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

Published examined utility model applications of Japan 1922-1996

Published unexamined utility model applications of Japan 1971-2019

Registered utility model specifications of Japan 1996-2019

Published registered utility model applications of Japan 1994-2019

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	JP 3482383 B2 (L'OREAL) 22 December 2003, paragraphs [0003]-[0005], [0009]-[0010], [0022], [0029], [0046]-[0050], fig. 10, 24 & US 6280113 B1, column 1, lines 19-45, column 2, lines 7-28, column 3, lines 56-60, column 4, lines 50-57, column 9, lines 25-28, column 10, lines 26-28, 40-46, 55-59, fig. 10, 24 & EP 1070462 A1 & FR 2796531 A1 & CN 1290504 A	1, 6 2-5, 7
Y	JP 2007-260199 A (TORAY MONOFILAMENT CO., LTD.) 11 October 2007, paragraphs [0010], [0021], [0023], [0028]-[0029], [0034], [0037]-[0039], fig. 2(1) (Family: none)	1-7

☐	Further documents are listed in the continuation of Box C.	☐	See patent family annex.
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "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 04 February 2019 (04.02.2019)		Date of mailing of the international search report 12 February 2019 (12.02.2019)	
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan		Authorized officer	
		Telephone No.	

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/044472

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2007-135964 A (TORAY MONOFILAMENT CO., LTD.) 07 June 2007, paragraphs [0005], [0020], [0022]-[0025], [0028], fig. 1 (Family: none)	2-5, 7
Y	JP 2015-6227 A (TORAY MONOFILAMENT CO., LTD.) 15 January 2015, paragraphs [0001], [0067], fig. 1-4 (Family: none)	1-7
Y	JP 5228191 B2 (NAKAMURA, Kenji) 03 July 2013, paragraphs [0001], [0013]-[0039], fig. 1-6 (Family: none)	6-7
A	JP 2652235 B2 (L'OREAL) 10 September 1997, column 5, lines 29-34, column 8, lines 3-6, fig. 2-3 & US 4927281 A, column 3, lines 15-21, column 4, lines 63-67, fig. 2-3 & EP 329505 A1 & FR 2627068 A1	1-7

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REFERENCES CITED IN THE DESCRIPTION

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- JP 2003245133 A [0005]
- JP 2009201794 A [0005]