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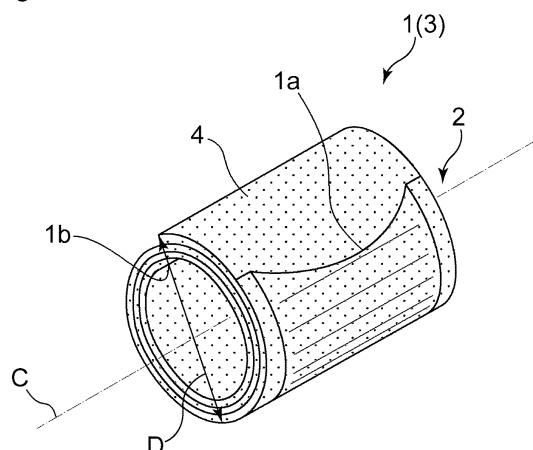
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(54) **HAIR HOLDER, METHOD FOR MANUFACTURING HAIR HOLDER, AND HAIR TREATMENT METHOD USING HAIR HOLDER**

(57) A hair holder (1) includes a tubular body (2) constructed in such a manner that a hair bundle (H) is insertable from an opening (1a) at one end toward an opening (1b) at the other end. The hair holder (1) has a longitudinal direction (X) and a width direction (Y). The hair holder (1) is constructed in such a manner that the hair holder can be rolled up along the longitudinal direction (X). The hair holder (1) includes a first sheet (21) to be located on an inner side in the rolled-up state, and a second sheet (22) to be located on an outer side. One or both of the two sheets (21, 22) satisfies at least one of condition (1) or (2) below: (1) the sheet includes a polyester-based nonwoven fabric, and the sheet's storage modulus E' in dynamic viscoelasticity measured at 100°C at a frequency of 1 Hz is 50 MPa or greater; or (2) the sheet includes a polyester-based nonwoven fabric, and the sheet's storage modulus E' in dynamic viscoelasticity measured at 150°C at a frequency of 1 Hz is 19.2 MPa or greater.

Fig. 2



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Description

Technical Field

[0001] The present application claims the benefit of priority from International Application No. PCT/JP2019/031729 filed August 9, 2019. The entire disclosure of International Application No. PCT/JP2019/031729 is incorporated herein by reference.

[0002] The present invention relates to a hair holder, a method for manufacturing the hair holder, and a hair treatment method using the hair holder.

Background Art

[0003] Hair holders used for applying curls to hair bundles are known in the art. Applicant has previously proposed a hair holder including a tubular body constructed in such a manner that a hair bundle is insertable therethrough (Patent Literature 1).

[0004] Patent Literature 2, relating to a technology separate from a hair holder, discloses that a polyester film can be provided with good heat resistance in cases where the storage modulus in dynamic viscoelasticity, as measured under predetermined conditions, is greater than a predetermined value.

[0005] Applicant has also proposed a hair holder wherein a reinforcement member is provided to a tubular body through which a hair bundle is to be inserted (Patent Literature 3).

[0006] Patent Literature 4, relating to a technology separate from a hair holder, discloses that heat resistance can be improved by heating amorphous polyethylene terephthalate, which has a low crystallization degree, with superheated water vapor to thereby increase the crystallization degree.

Citation List

Patent Literature

[0007]

Patent Literature 1: WO 2019/131734
 Patent Literature 2: US 2018/044507A1
 Patent Literature 3: JP 2005-246040A
 Patent Literature 4: JP 2012-245700A

Summary of Invention

[0008] The present invention relates to a hair holder comprising a tubular body which has a first opening located at one end and a second opening located at the other end. The tubular body is constructed in such a manner that a hair bundle is insertable from the first opening toward the second opening. The hair holder has a longitudinal direction and a width direction orthogonal to the longitudinal direction. Preferably, in one embodiment, the hair holder is constructed in such a manner that the hair holder can be rolled up along the longitudinal direction. Preferably, in one embodiment, the hair holder includes a first sheet to be located on an inner side in a state where the hair holder is rolled up, and a second sheet to be located on an outer side in a state where the hair holder is rolled up. Preferably, in the hair holder of the invention, one or both of the first sheet and the second sheet satisfies at least one of condition (1) or (2) below:

(1) the sheet includes a polyester-based nonwoven fabric, and the sheet's storage modulus E' in dynamic viscoelasticity measured at 100°C at a frequency of 1 Hz is 50 MPa or greater.

(2) the sheet includes a polyester-based nonwoven fabric, and the sheet's storage modulus E' in dynamic viscoelasticity measured at 150°C at a frequency of 1 Hz is 19.2 MPa or greater.

[0009] The present invention also relates to a method for manufacturing a hair holder including a tubular body being constructed in such a manner that a hair bundle is insertable from an opening at one end toward an opening at the other end and being in a rolled-up state.

[0010] Preferably, in one embodiment, the hair holder includes a first sheet located on an inner side in the rolled-up state and a second sheet located on an outer side, wherein one or both of the first sheet and the second sheet includes a polyester-based nonwoven fabric.

[0011] Preferably, in one embodiment, the method for manufacturing a hair holder includes a roll-up step of rolling up

the hair holder.

[0012] Preferably, in one embodiment, the method for manufacturing a hair holder includes a heating step of applying heat of 120°C or higher while retaining the rolled-up state of the hair holder.

[0013] The present invention also relates to a method for treating hair employing the aforementioned hair holder.

[0014] Preferably, in one embodiment, the method includes inserting a hair bundle into the hair holder, and then rolling up the hair holder.

[0015] Preferably, in one embodiment, the method includes heating the hair bundle to 80°C or higher while retaining the rolled-up state of the hair holder.

[0016] Other features of the present invention are disclosed through the claims and the following description.

Brief Description of Drawings

[0017]

[Fig. 1] Fig. 1 illustrates a front view (a) and a rear view (b) illustrating an embodiment of a hair holder of the present invention.

[Fig. 2] Fig. 2 is a perspective view illustrating a hair bundle holding body of the hair holder illustrated in Figs. 1(a) and 1(b).

[Fig. 3] Figs. 3(a) to 3(c) are diagrams sequentially illustrating steps for applying a curly shape to a hair bundle by using the hair holder illustrated in Figs. 1(a) and 1(b).

[Fig. 4] Fig. 4(a) is a graph showing a relationship between the storage modulus E' in dynamic viscoelasticity measured at 100°C at a frequency of 1 Hz and heat resistance evaluation for the respective hair holders obtained in the Examples and Comparative Examples, and Fig. 4(b) is a graph showing a relationship between the storage modulus E' in dynamic viscoelasticity measured at 150°C at a frequency of 1 Hz and heat resistance evaluation for the respective hair holders obtained in the Examples and Comparative Examples.

Description of Embodiments

[0018] In the present Description, in cases where an upper limit value or a lower limit value of a numerical value, or upper and lower limit values of a range, is/are defined, the upper limit value and lower limit value themselves are to be included. Further, it is to be construed that the Description describes, even if not explicitly stated, all numerical values/numerical ranges equal to or below an upper limit value of a numerical value, or equal to or above a lower limit value, or within a range between upper and lower limit values.

[0019] In the present Description, "a," "an," etc., are construed to mean "one or more."

[0020] From the above and below disclosure of the present Description, it is understood that various modifications and/or alterations of the present invention are possible. It should thus be understood that the present invention is workable within the technical scope based on the recitations of the present scope of claims, even with embodiments that are not explicitly described in the present Description.

[0021] The entire disclosure of each of the aforementioned Patent Literatures is incorporated herein by reference.

[0022] To apply a firm curly shape to a hair bundle, heat may be applied while retaining a hair holder in a rolled-up state. The hair holder disclosed in Patent Literature 1, however, is not intended for application of heat while being retained in its rolled-up state. The document describes nothing about using the hair holder stably in a temperature range (100°C to 150°C) used for permanent waving by applying heat.

[0023] The polyester film disclosed in Patent Literature 2 is used for an electrical insulating sheet, an adhesive sheet, etc., and is different from a hair holder in terms of technical field. The document discloses the storage modulus in dynamic viscoelasticity measured at 100°C, but does not disclose the storage modulus measured at 150°C. In the field of polymeric materials, it is known that changes occur in the physical properties of resin at the resin's glass transition point, melting point, etc. Thus, in cases where the glass transition point, melting point, etc., exist in a range between 100°C and 150°C, the resin's physical properties may change drastically, and the storage modulus at 100°C may not necessarily be in a proportional relationship with the storage modulus at 150°C. The document neither discloses nor suggests anything about problems specific to hair holders used for permanent waving performed by applying heat of 100°C or higher, nor about methods for solving such problems. Further, although the document discloses the use of polyester for a film, it discloses nothing about the use of polyester for a nonwoven fabric.

[0024] The hair holder disclosed in Patent Literature 3 is not intended for application of heat while being retained in its rolled-up state. The hair holder disclosed therein involves issues concerning the hair holder's spontaneous roll-up force, and is not intended for application of heat while being retained in its rolled-up state. The document describes nothing about applying heat of a predetermined temperature or higher in a method for manufacturing the hair holder.

[0025] Patent Literature 4 discloses a heat-resistant transparent container formed by using amorphous polyethylene

terephthalate, which belongs to a different technical field from hair holders. The amorphous polyethylene terephthalate sheet disclosed in the document is not used as-is in the form of a sheet, but is heated and completely molten to manufacture a container, and thus belongs to a different technical field from hair holders. The document describes that the container exhibits transparency and heat resistance as a result of drawing the sheet and thermally fixing the same by heating it to 130°C to 200°C. In the field of polymeric materials, it is known that drawing of a transparent polymeric film creates, within the film, fibrils and voids oriented in the stress directions, which causes crazing, or whitening, because the refractive index of the void/fibril portions is different from that of other portions. It is thought that the technology disclosed in Patent Literature 4 is for suppressing crazing. The document, however, neither describes nor suggests anything about problems specific to hair holders provided with sheets including nonwoven fabrics. To begin with, the sheet constituting the hair holder of the present invention is a nonwoven fabric, and therefore transparency is not required. Further, the document neither describes nor suggests anything about the curling/waving effect, which is specific to hair holders for applying firm curls to hair bundles.

[0026] The present invention relates a hair holder capable of maintaining its rolled-up state even when heat is applied while the hair holder is retained in a rolled-up state, and a hair treatment method using the same.

[0027] The present invention also relates to a method for manufacturing such a hair holder.

[0028] A hair holder according to the present invention will be described below according to preferred embodiments thereof with reference to the drawings.

[0029] The hair holder of the invention is used for applying a curly shape to a hair bundle.

[0030] The hair holder of the invention is primarily used for treating hair on the human head.

[0031] Figs. 1(a) and 1(b) illustrate an embodiment of a hair holder of the invention.

[0032] The hair holder 1 illustrated in Figs. 1(a) and 1(b) includes a tubular body 2 constructed in such a manner that a hair bundle H is insertable from an opening 1a at one end toward an opening 1b at the other end. The hair holder 1 has a longitudinal direction X and a width direction Y orthogonal to the longitudinal direction X.

[0033] Typically, the hair holder 1 includes two sheets-i.e., a first sheet 21 and a second sheet 22-forming an outer surface of the hair holder 1. The two sheets 21, 22 extend in the longitudinal direction X.

[0034] Typically, the hair holder 1 has a flat shape in which the two sheets 21, 22 are layered on one another.

[0035] The first sheet 21 is to be located on the inner side in a state where the hair holder 1 is rolled up, whereas the second sheet 22 is to be located on the outer side in a state where the hair holder is rolled up.

[0036] The hair holder 1 includes: a pair of lateral-side joined portions 24, 24 formed by joining the first sheet 21 and the second sheet 22; and a tubular portion 26 located between the pair of lateral-side joined portions 24, 24. The pair of lateral-side joined portions 24, 24 is formed at the respective lateral side edge portions along the hair holder 1's longitudinal direction X.

[0037] The tubular portion 26 is constructed in such a manner that a hair bundle H is insertable therethrough between the opening 1a at one end and the opening 1b at the other end in the longitudinal direction X. The hair holder 1's longitudinal direction X corresponds to the direction in which the hair bundle H is inserted.

[0038] From the viewpoint of preventing peeling from the joined portions at the time of heating to perform hair treatment, it is preferable that the lateral-side joined portions 24, 24 are formed by sewing with a sewing machine etc., which has a higher joining strength than fusion-bonding such as heat sealing etc.

[0039] In the embodiment illustrated in Figs. 1(a) and 1(b), both lateral side edge portions along the hair holder 1's longitudinal direction X are parallel to one another. Instead, the lateral side edge portions do not have to be parallel to one another. In such cases, it is preferable that the width between the lateral side edge portions becomes gradually wider from the opening 1a at one end toward the opening 1b at the other end. Stated differently, it is preferable that, in a planar view, the hair holder 1 has a shape that widens from the opening 1a at one end toward the opening 1b at the other end.

[0040] Preferably, the hair holder 1 is constructed in such a manner that it can be rolled up along the longitudinal direction X. Preferably, the hair holder 1 is constructed in such a manner that it rolls up automatically. Instead, the hair holder 1 may be constructed in such a manner that it is rolled up manually.

[0041] An example of an automatically rolling-up construction may include a construction wherein the hair holder 1 is initially rolled up in a state where no tension is applied in the longitudinal direction X to the hair holder 1, and after the hair holder 1 is stretched out and a hair bundle is inserted therethrough and then the stretched-out state is released, the hair holder 1 rolls up spontaneously together with the hair bundle.

[0042] Such a construction can be achieved by making one or both of the two sheets 21, 22 constituting the hair holder 1 from a shape memory sheet that remembers the rolled-up state of the hair holder 1.

[0043] The shape memory sheet may be made, for example, by bonding together films having different thermal contraction rates.

[0044] As illustrated in Figs. 1(a) and 1(b), the hair holder 1 includes an extension portion 4 on the opening 1a side. The extension portion is formed by the first sheet 21 extending outward in the longitudinal direction X from the tubular body 2. The extension portion 4 is formed integrally with the first sheet 21. Providing the hair holder 1 with the extension

portion 4 enables a hair bundle to be inserted into the tubular portion 26 more easily. The extension portion 4 may be formed by a sheet separate from the first sheet 21. Alternatively, the hair holder 1 does not have to include an extension portion.

[0045] Preferably, the hair holder 1 includes a fixing member 5 for retaining the hair holder's rolled-up state.

[0046] Preferably, the fixing member 5 is arranged on the outer surface of the extension portion 4.

[0047] Preferably, the fixing member 5 is detachably engageable to the outer surface of the second sheet 22.

[0048] In the hair bundle holding body 3, the fixing member 5 is arranged so as to oppose a portion of the outer surface of the second sheet 22, and is joined to a portion of the outer surface. In this way, the hair holder 1 can be maintained in the form of the hair bundle holding body 3.

[0049] Examples of the fixing member may include a sheet engagement member, a joining member, etc. Examples of the sheet engagement member may include a snap fastener, a male member of a mechanical fastener, etc. Examples of the joining member may include a magnet, an adherend-selective adhesive tape that joins only with specific substances.

[0050] After a hair bundle has been inserted from the opening 1a toward the opening 1b, the rolled-up state of the hair holder 1 is accomplished by rolling up the hair holder together with the hair bundle. Hereinbelow, the hair holder 1 in a rolled-up state is also referred to as a hair bundle holding body 3.

[0051] Fig. 2 illustrates an example of a hair bundle holding body 3. In the hair bundle holding body 3 illustrated in the figure, the opening 1b is located on the center axis C side. By applying heat to the hair bundle in the state illustrated in the figure, curls can be applied to the hair bundle.

[0052] Inventors have diligently studied means capable of maintaining a rolled-up state even when heat is applied while the hair holder is retained in its rolled-up state. As a result, Inventors have found that the form of the hair bundle holding body 3 can be maintained, even when heat is applied thereto, by using, for one or both of the two sheets 21, 22, a sheet including a polyester-based nonwoven fabric and whose storage modulus E' in dynamic viscoelasticity is equal to or greater than a predetermined value. Polyester starts to soften with an increase in temperature and its storage modulus E' decreases. However, by subjecting the sheet to heat treatment in advance to improve heat resistance and increase storage modulus E' , deformation of the polyester-based nonwoven fabric can be suppressed, and the hair bundle holding body 3's rolled-up state can be maintained during heating. Storage modulus E' is a physical property representing elastic characteristics. With a greater storage modulus E' at high temperatures, polyester maintains its glass state and does not transition to a viscoelastic state; thus, the polyester-based nonwoven fabric can maintain its shape. That is, the polyester-based nonwoven fabric can maintain its rolled-up state. Since the polyester-based nonwoven fabric can maintain its rolled-up state even when heat is applied thereto due to its high storage modulus E' , the polyester-based nonwoven fabric is able to remember the shape of the hair bundle holding body 3 while maintaining its rolled-up state, even when it is cooled in this state. Thus, even after being used once, it can still maintain a shape suitable for rolling up hair.

[0053] Further, Inventors have found that the aforementioned sheet has excellent durability and can be used repeatedly.

[0054] The present invention uses the aforementioned sheet, which satisfies such conditions, for one or both of the two sheets 21, 22.

[0055] From the viewpoint of making the aforementioned effect more significant, it is preferable that one of the first sheet 21 and the second sheet 22 is a sheet that satisfies at least one of: the following numerical range for storage modulus E' in dynamic viscoelasticity measured at 100°C at a frequency of 1 Hz; or the following numerical range for storage modulus E' measured at 150°C at a frequency of 1 Hz. It is more preferable that both sheets 21, 22 satisfy both the following numerical range for storage modulus E' measured at 100°C at a frequency of 1 Hz (also referred to hereinafter as "condition (1)"), and the following numerical range for storage modulus E' measured at 150°C at a frequency of 1 Hz (also referred to hereinafter as "condition (2)").

[0056] The temperatures for the storage modulus E' are defined at 100°C and 150°C because the temperature range employed for a heated permanent-waving treatment is typically from 100°C to 150°C, and thus it is thought appropriate to define the storage modulus E' at 100°C and 150°C in order to stably use the hair holder of the invention within the aforementioned temperature range.

[0057] In the hair holder of the invention, the high storage modulus E' of the hair holder's sheet(s) contributes to both enabling: (i) the hair holder to be maintained in a rolled-up state even when heat is applied while the hair holder is retained in its rolled-up state; and (ii) the hair holder to be used repeatedly.

[0058] From the viewpoint of favorably maintaining the rolled-up state at high temperatures for applying firm curls/waves, it is even preferable that the first sheet 21 satisfies the following numerical range for the storage modulus E' measured at 150°C at a frequency of 1 Hz.

[0059] From the viewpoint of favorably maintaining the rolled-up state at relatively low temperatures giving consideration to burden on the hair, it is even preferable that the second sheet 22 satisfies the following numerical range for the storage modulus E' measured at 100°C at a frequency of 1 Hz.

[0060] Of the first sheet 21 and the second sheet 22, it is preferable that at least the first sheet 21, which is located on the inner side in the rolled-up state, satisfies both the conditions (1) and (2), and more preferable that both sheets

21, 22 satisfy both the conditions (1) and (2).

[0061] From the viewpoint of favorably maintaining the rolled-up state at relatively low temperatures giving consideration to burden on the hair, it is preferable that, in the condition (1), the storage modulus E' in dynamic viscoelasticity measured under the condition of 100°C at a frequency of 1 Hz is preferably 50 MPa or greater, more preferably 70 MPa or greater, even more preferably 90 MPa or greater.

[0062] In the condition (1), the higher the upper limit value of the storage modulus E' measured at 100°C at a frequency of 1 Hz is, the more preferable it is from the viewpoint of heat resistance, but from the viewpoint of softness, the upper limit value is preferably 200 MPa or less, more preferably 100 MPa or less, even more preferably 96.5 MPa or less.

[0063] In the condition (1), the storage modulus E' measured at 100°C at a frequency of 1 Hz is preferably from 50 to 200 MPa, more preferably from 70 to 200 MPa, even more preferably from 90 to 200 MPa.

[0064] From the viewpoint of favorably maintaining the rolled-up state at high temperatures for applying firm curls/waves, it is preferable that, in the condition (2), the storage modulus E' in dynamic viscoelasticity measured under the condition of 150°C at a frequency of 1 Hz is preferably 19.2 MPa or greater, more preferably 20 MPa or greater, further preferably 30 MPa or greater, even more preferably 35 MPa or greater, further more preferably 40 MPa or greater.

[0065] In the condition (2), the higher the upper limit value of the storage modulus E' measured at 150°C at a frequency of 1 Hz is, the more preferable it is from the viewpoint of heat resistance, but from the viewpoint of softness, the upper limit value is preferably 80 MPa or less, more preferably 50 MPa or less, even more preferably 45 MPa or less.

[0066] In the condition (2), the storage modulus E' measured at 150°C at a frequency of 1 Hz is preferably from 19.2 to 80 MPa, more preferably from 20 to 80 MPa, even more preferably from 30 to 80 MPa, further more preferably from 40 to 80 MPa.

[0067] The storage modulus E' in conditions (1) and (2) is measured according to the following method. The temperature for measuring the storage modulus E' has been set to 100°C or 150°C as a result of measuring the temperature of the sheet forming the hair holder 1's innermost surface (about 150°C)-i.e., the surface that contacts a perm rod internally provided with an electrothermal heater-and the temperature of the sheet forming the outermost surface (about 100°C), when the heating temperature was set to 150°C, which is typically employed for performing hair treatment while heating the hair holder by using a perm rod internally provided with an electrothermal heater.

Method for Measuring Storage Modulus E' in Dynamic Viscoelasticity:

[0068] A dynamic viscoelasticity system (DMS6100 from SII NanoTechnology Inc.) is used. A 10-mm wide, 20-mm long rectangular sample is cut out from each of the first sheet 21 and the second sheet 22. These rectangular samples are subjected to measurement at a frequency of 1 Hz in tensile mode while raising the temperature from 20°C to 300°C at a rate of 10°C per minute, to find the storage modulus E' at 100°C and 150°C.

[0069] Of the two sheets 21, 22, one of the sheets may be constituted only by a polyester-based nonwoven fabric, or may include a polyester-based nonwoven fabric and a nonwoven fabric made from fibers of another type of polymer. From the viewpoint of allowing the rolled-up state to be maintained easily and also from the viewpoint of adjustment of the heating temperature in the roll-up step, it is preferable that both sheets 21, 22 are constituted only by a polyester-based nonwoven fabric.

[0070] The polyester-based nonwoven fabric may contain fibers of a polyester including, as repeating units, an ester of an aromatic dicarboxylic acid and a saturated aliphatic alcohol.

[0071] Examples of such polyesters may include polyethylene terephthalate, polytrimethylene terephthalate, polybutylene terephthalate, polyethylene naphthalate, polybutylene naphthalate, etc. One type of fiber may be used singly, or two or more types may be used in combination. Alternatively or additionally, conjugate fibers containing two or more types of the aforementioned polyesters may be used.

[0072] Among the above, from the viewpoint of excellent heat resistance, it is preferable to use a nonwoven fabric including fibers containing polyethylene terephthalate.

[0073] The polyester-based nonwoven fabric may be constituted only by polyester fibers, or may include polyester fibers and fibers made from another type of polymer. Preferably, the polyester-based nonwoven fabric is constituted only by polyester fibers.

[0074] In cases where the polyester-based nonwoven fabric includes fibers containing polyethylene terephthalate, it is even preferable that the fibers containing polyethylene terephthalate include an amorphous portion. In this way, even better heat resistance and softness can be imparted to the hair bundle holding body 3. Whether or not there is an amorphous portion is verified by the following method. An "amorphous portion" is a portion wherein the polymer's orientation or interval is nonuniform.

Method for Verifying Presence/Absence of Amorphous Portion:

[0075] A differential scanning calorimeter "PYRIS Diamond DSC" from PerkinElmer, Inc. is used. A 6.9-mg sample is

taken out from the hair holder. The sample is enclosed in an aluminum closed-type cell and the cell is set to the device's holder. The temperature is raised from 25°C to 300°C at a rate of 10°C per minute, to measure the heat quantity. It is known that, at the glass transition point, a change occurs in heat quantity in accordance with the temperature rise. So, the presence/absence of a glass transition point is determined based on the change in heat quantity, and thereby the presence/absence of an amorphous portion is evaluated. The glass transition point is a physical property specific to an amorphous region of a resin; a glass transition point is typically observed in amorphous polyesters, but is also observed in cases where a crystalline polyester includes an amorphous region.

[0076] Whether or not one of the two sheets 21, 22 includes a nonwoven fabric can be determined by observation with a microscope. Whether or not the fibers used in the nonwoven fabric are polyester fibers can be analyzed by infrared absorption spectrometry using FT-IR. The type of polyester fiber can be identified by the nuclear magnetic resonance method or pyrolytic analysis, and measurement can be performed according to the method described in the following document.

[0077] Toshinori ANDO and one other, "Examination of effective analysis methods for discrimination of polytrimethylene terephthalate", Reports of the Central Customs Laboratory, Vol. 59, Central Customs Laboratory, Ministry of Finance, December 2019, pp. 119-126, Internet.

[Math. 1]

< U R L : https://www.customs.go.jp/ccl_search/info_search/organics/r_59_14_j.pdf >

[0078] From the viewpoint of imparting even better heat resistance and softness to the hair bundle holding body 3, it is preferable that, in one of the two sheets 21, 22, no exothermic peak in differential scanning calorimetry is observed within a range from 125°C to 1700°C.

[0079] From the viewpoint of imparting heat resistance, it is preferable that no exothermic peak is observed preferably within a range of 110°C or higher, more preferably 100°C or higher.

[0080] From the viewpoint of imparting softness, it is preferable that no exothermic peak is observed preferably within a range of 200°C or lower, more preferably 300°C or lower.

[0081] From the viewpoint of imparting both heat resistance and softness, it is further preferable that, in both sheets 21, 22, no exothermic peak is observed within the aforementioned range.

[0082] In this temperature range, polyester resin may undergo crystallization. So, "no exothermic peak is observed within this temperature range" means that the polyester has a high degree of crystallization. The exothermic peak is measured according to the method described further below.

[0083] From the viewpoint of imparting even better heat resistance and softness to the hair bundle holding body 3, it is preferable that, in one of the two sheets 21, 22, an endothermic peak in differential scanning calorimetry is observed within a range from 100°C to 220°C.

[0084] From the viewpoint of imparting heat resistance, it is preferable that the aforementioned endothermic peak is observed preferably within a range of 145°C or higher, more preferably 170°C or higher, even more preferably 180°C or higher.

[0085] From the viewpoint of imparting heat resistance and softness, it is preferable that, in both sheets 21, 22, the aforementioned endothermic peak is observed within the aforementioned range.

[0086] The endothermic peak is ascribable to the thermal hysteresis of a polyester-based resin.

[0087] From the viewpoint of imparting heat resistance and softness, it is preferable that, as regards the endothermic peak, the amount of heat absorption calculated from the area of the endothermic curve within the range from 100°C to 220°C is preferably from 0.1 to 10 J/g, more preferably from 0.5 to 5 J/g.

[0088] Particularly, from the viewpoint of imparting heat resistance and softness, it is preferable that, as regards the endothermic peak, the amount of heat absorption calculated from the area of the endothermic curve within the range from 120°C to 220°C is preferably from 0.1 to 10 J/g, more preferably from 0.5 to 5 J/g.

[0089] The endothermic peak is measured according to the following method.

Method for Measuring Exothermic Peak and Endothermic Peak:

[0090] A differential scanning calorimeter "PYRIS Diamond DSC" from PerkinElmer, Inc. is used. A 6.9-mg sample is taken out from the hair holder. The sample is enclosed in an aluminum closed-type cell and the cell is set to the device's holder. The temperature is raised from 25°C to 300°C at a rate of 10°C per minute, to measure the heat quantity.

[0091] It is preferable that the polyester-based nonwoven fabric partially includes embossed portions for fixing the constituent fibers together. Providing embossed portions is effective in suppressing the amount of deformation, upon application of external force, not only in the hair holder 1's non-heated state, but also in the hair holder 1's heated state.

[0092] Examples of nonwoven fabrics including embossed portion may include spunbonded nonwoven fabrics obtained by spunbonding, embossed fabrics made using an embossing roller, etc.

[0093] From the viewpoint of maintaining rigidity as a hair holder and also achieving good absorptivity of permanent waving agents, it is preferable that the polyester-based nonwoven fabric has a basis weight of preferably 50 g/m² or greater, more preferably 70 g/m² or greater, even more preferably 90 g/m² or greater.

[0094] From the viewpoint of achieving good roll-up properties while achieving good permeability of permanent waving solutions, it is preferable that the basis weight is preferably 300 g/m² or less, more preferably 200 g/m² or less, even more preferably 150 g/m² or less.

[0095] The basis weight is preferably from 50 to 300 g/m², more preferably from 70 to 200 g/m², even more preferably from 90 to 150 g/m².

[0096] The planar-view shape of the embossed portion is not particularly limited, and may be, for example, circular, polygonal, elliptic, etc.

[0097] From the viewpoint of achieving good permeability of permanent waving agents, it is preferable that the area per each embossed portion is preferably 0.01 mm² or greater, more preferably 0.1 mm² or greater, even more preferably 0.8 mm² or greater.

[0098] From the viewpoint of achieving good absorptivity of permanent waving agents, it is preferable that the aforementioned area is preferably 5 mm² or less, more preferably 2 mm² or less, even more preferably 1 mm² or less.

[0099] The aforementioned area is preferably from 0.01 to 5 mm², more preferably from 0.1 to 2 mm², even more preferably from 0.8 to 1 mm².

[0100] From the viewpoint of achieving good permeability of permanent waving agents, it is preferable that the embossed ratio, which is the ratio of the total area found by summing up respective areas of the embossed portions within a 10×10 mm region in the nonwoven fabric, is preferably 10% or greater, more preferably 15% or greater, even more preferably 25% or greater.

[0101] From the viewpoint of achieving good absorptivity of permanent waving agents, it is preferable that the aforementioned embossed ratio is preferably 50% or less, more preferably 35% or less.

[0102] The aforementioned embossed ratio is preferably from 10% to 50%, more preferably from 15% to 35%, even more preferably from 25% to 35%.

[0103] The dimensions etc. of the hair holder 1 can be determined as appropriate depending on hair length, the location where curls are to be formed, the amount of the hair bundle to be inserted, etc., and are preferably within the following ranges.

[0104] From the viewpoint of reliably holding the hair bundle and applying curls/waves to the hair bundle, it is preferable that the length L1 (see Fig. 1(b)) of the hair holder 1 in the longitudinal direction X is preferably 50 mm or greater, more preferably 100 mm or greater.

[0105] From the viewpoint of allowing the hair bundle to extend through the tubular body easily, it is preferable that the length L1 is preferably 400 mm or less, more preferably 350 mm or less.

[0106] The length L1 is preferably from 50 to 400 mm, more preferably from 100 to 350 mm. The length L1 of the hair holder 1 in the longitudinal direction X is the total length of the extension portion 4 and the tubular body 2 in the longitudinal direction X.

[0107] From the viewpoint of reliably holding the hair bundle and applying curls/waves to the hair bundle, it is preferable that the length L2 (see Fig. 1(b)) of the tubular body 2 in the longitudinal direction X is preferably 45 mm or greater, more preferably 90 mm or greater.

[0108] From the viewpoint of allowing the hair bundle to extend through the tubular body easily, it is preferable that the length L2 is preferably 300 mm or less, more preferably 275 mm or less.

[0109] The length L2 is preferably from 45 to 300 mm, more preferably from 90 to 275 mm.

[0110] From the viewpoint of allowing the hair bundle to extend through the tubular body easily, it is preferable that the length W1 (see Fig. 1(b)) of the hair holder 1 in the width direction Y is preferably 25 mm or greater, more preferably 30 mm or greater.

[0111] From the viewpoint of suppressing the hair bundle from spreading inside the tubular body to thereby apply curls/waves uniformly, it is preferable that the length W1 is preferably 200 mm or less, more preferably 150 mm or less.

[0112] The length W1 is preferably from 25 to 200 mm, more preferably from 30 to 150 mm.

[0113] From the viewpoint of allowing the hair bundle to extend through the tubular body easily, it is preferable that the length W2 (see Fig. 1(b)), in the width direction Y, of the opening 1b at the other end is preferably 10 mm or greater, more preferably 20 mm or greater.

[0114] From the viewpoint of suppressing the hair bundle from spreading inside the tubular body to thereby apply curls/waves uniformly, it is preferable that the length W2 is preferably 195 mm or less, more preferably 145 mm or less.

[0115] The length W2 is preferably from 10 to 195 mm, more preferably from 20 to 145 mm.

[0116] The outer diameter D (see Fig. 2) of the hair bundle holding body 3 is not particularly limited, and can be set as appropriate depending on the amount of the hair bundle, the length of the hair bundle, etc. From the viewpoint of

workability at the time of roll-up, it is preferable that the outer diameter D is preferably 10 mm or greater, more preferably 15 mm or greater.

[0117] From the viewpoint of favorably applying a curly shape to a hair bundle, it is preferable that the outer diameter D is preferably 60 mm or less, more preferably 50 mm or less.

[0118] The outer diameter D is preferably from 10 to 60 mm, more preferably from 15 to 50 mm.

[0119] The outer diameter D is the maximum length on a cross section in the radial direction orthogonal to the center axis direction of the hair holder 1 that has been rolled up and formed into a roll shape. The maximum length is measured by excluding regions in the roll-shaped tubular body 2 that have risen up, where the layers of the tubular body 2 do not contact/overlap one another.

[0120] In cases of using a hair treatment agent at the time of applying a curly shape to the hair bundle H, the type of hair treatment agent is not particularly limited, and any agent can be used discretionarily, such as a commercially available permanent waving agent, etc. A permanent waving agent typically includes a first agent containing a reductive substance such as a thioglycolic acid salt, cysteine, etc., and a second agent containing an oxidizing substance such as a bromic acid salt, hydrogen peroxide, etc.

[0121] Next, a method for manufacturing a hair holder according to the present invention will be described.

[0122] First, two rectangular sheets are prepared. Of the two sheets, one or both of the sheets is/are preferably a polyester-based nonwoven fabric.

[0123] Next, preferably, the two sheets are layered on top of each other by placing one sheet on the other sheet, and the sheets' lateral sides, which extend along the longitudinal direction, are integrated.

[0124] Preferably, the method then includes a roll-up step (also referred to hereinafter as "first step") in which the integrated sheets are rolled up.

[0125] Preferably, the method then includes a heating step (also referred to hereinafter as "second step") in which heat treatment is performed under the following conditions while retaining the rolled-up state.

[0126] From the viewpoint of imparting a storage modulus E' of 50 MPa or greater at 100°C at a frequency of 1 Hz, in the second step, it is preferable to apply heat of 120°C or higher, and more preferably apply heat of 140°C or higher, while retaining the aforementioned rolled-up state.

[0127] Further, from the viewpoint of imparting a storage modulus E' of 19.2 MPa or greater at 150°C at a frequency of 1 Hz, in the second step, it is preferable to apply heat of 160°C or higher, and more preferably apply heat of 180°C or higher, while retaining the aforementioned rolled-up state.

[0128] The heat to be applied in the second step is preferably 300°C or lower, more preferably 250°C or lower, from the viewpoint of performing heat treatment without causing the polyester-based nonwoven fabric to melt or thermally deform.

[0129] The application of heat in the second step may be performed in a dry state, or a method of immersion in an oil bath may be adopted. Note that, in cases of employing an oil bath for heating, the oil needs to be removed after heating.

[0130] From this viewpoint, it is preferable to apply heat to the hair holder in its rolled-up state by employing superheated vapor heated to a temperature equal to or above the boiling point. By employing superheated vapor, the heating time is faster compared to heating in a dry state, and productivity is improved compared to heating with an oil bath. On the other hand, heating in a dry state is preferable compared to heating with an oil bath or superheated vapor from the viewpoint that it does not require a step for removing oil, water, etc., after heating and is thus favorable in terms of workability.

[0131] The superheated vapor is typically superheated water vapor.

[0132] In cases of heating with an oil bath or superheated vapor, it is preferable that the heating time for applying heat is preferably within 1 minute, more preferably within 45 seconds. From the viewpoint of reliably imparting the aforementioned storage modulus E' to the hair holder, it is preferable to perform heating for at least 20 seconds.

[0133] In cases of heating in a dry state, it is preferable that the heating time for applying heat is preferably within 60 minutes, more preferably within 30 minutes. From the viewpoint of reliably imparting the aforementioned storage modulus E' to the hair holder, it is preferable to perform heating for at least 55 minutes.

[0134] The roll-up step and the heating step may be performed in different locations and/or may be performed with a time interval therebetween. From the viewpoint of improving productivity of the hair holder, it is preferable to perform the roll-up step and the heating step consecutively, without interposing another step therebetween.

[0135] Next, with reference to Fig. 3, a hair treatment method using the hair holder of the invention will be described.

[0136] The hair treatment method preferably includes a step (a) of inserting a hair bundle H into the tubular portion 26 of the hair holder 1.

[0137] The hair treatment method preferably includes a step (b) of rolling up the hair holder 1 together with the hair bundle H inserted into the tubular portion 26, to thereby form a hair bundle holding body 3 in a rolled-up state.

[0138] The hair treatment method preferably includes a step (c) of heating the hair bundle holding body 3.

[0139] The hair of the hair bundle H is preferably hair on the human head.

[0140] In the hair treatment method of the present invention, in the step (c), the hair bundle H can be heated to 80°C

or higher while being retained in a rolled-up state. In the hair holder 1, one or both of the two sheets 21, 22 has/have a storage modulus E' that is equal to or above the aforementioned value. Thus, even when heated, for example, to 80°C or higher, the form of the hair bundle holding body 3 can be maintained. As a result, a firm curly shape can be imparted to the hair bundle H.

[0141] In addition, the hair holder 1 has excellent durability and can be used repeatedly.

[0142] From the viewpoint of imparting an even firmer curly shape to the hair bundle H, it is preferable to heat the hair bundle H in a state applied with a permanent waving agent. Usually, when a hair holder is used with a permanent waving agent applied thereto, the hair holder may deform due to the effect of the permanent waving agent and heat, which may make it impossible to maintain the hair holder's rolled-up state or may result in an increase in the outer diameter D. In contrast, using the hair holder 1 of the invention can achieve such effects as that deformation of the hair holder, which may be caused by the effect of the permanent waving agent and heat, is suppressed, and the hair holder can be used repeatedly.

[0143] The hair holder 1 is designed such that, even when heated to a temperature higher than 80°C, or 90°C or higher, or even 100°C or higher, during the treatment step, the rolled-up state can be retained and durability is not impaired.

[0144] In cases of heating the hair bundle H in a state applied with a permanent waving agent, it is preferable that the hair holder is heated to 80°C or higher using an electrothermal heater. Usually, in cases where a hair holder is heated with an electrothermal heater, the electrothermal heater is removed after the permanent waving treatment. In contrast, the hair holder of the invention can achieve such effects as that the electrothermal heater can be removed not only after the permanent waving treatment, but at a discretionary timing.

[0145] In cases of heating with a perm rod internally provided with an electrothermal heater, it is preferable that, of the two sheets 21, 22, the first sheet 21, which is located on the inner side when rolled up and contacts the perm rod, is a sheet having a storage modulus E' equal to or above the aforementioned value.

[0146] The hair holder of the invention is not limited to the foregoing embodiments, and modifications can be made as appropriate, so long as they do not depart from the gist of the invention.

[0147] For example, the surface of a sheet constituting the tubular body 2 may have projections and depressions by being subjected to embossing etc., or may be flat.

Examples

[0148] The present invention will be described in further detail below according to Examples. The scope of the present invention, however, is not limited to the following Examples.

[0149] Examples 1 to 6 and Comparative Examples 1 to 4:

For the two sheets constituting the hair holder, "Smash (registered trademark)" from Asahi Kasei Corporation was used. This sheet is a nonwoven fabric including polyethylene terephthalate as material fibers and made by spunbonding. The basis weight of the nonwoven fabric was 100 g/m². The area per each embossed portion was 0.8 mm², and the embossed ratio was 30%. This sheet was used to prepare the hair holder having the shape illustrated in Figs. 1(a) and 1(b). The length L1 was 300 mm, the tubular body's length L2 was 250 mm, the tubular body's length W1 was 86 mm, and the length W2 of the opening at the other end was 76 mm. Next, the hair holder was rolled up such that the outer diameter D was 26 mm, and while retaining this state, heat of respective temperatures shown in Table 1 below was applied, to prepare the respective hair holders of the Examples and Comparative Examples. In all of the Examples and Comparative Examples, heat was applied in a dry state. In all of the Examples and Comparative Examples, the heat was applied for 20 minutes.

[0150] For each of the hair holders of the Examples and Comparative Examples, the storage modulus E' , the presence/absence of an amorphous portion, and the exothermic peak and endothermic peak were measured according to the aforementioned methods. The results are shown in Table 1 below.

[0151] As regards performance evaluation, heat resistance was evaluated for the hair holders of the Examples and Comparative Examples. Heat resistance was evaluated according to the following evaluation criteria. The evaluation results are shown in Table 1 below and Figs. 4(a) and 4(b). If evaluation is to be performed in a state where hair is actually inserted in the hair holder, it is difficult to prepare hair samples in which the pieces of hair to be inserted have the identical diameter, hardness, etc. Therefore, instead of evaluating hair holders with hair inserted therethrough, the heat resistance of each hair holder was evaluated according to the following method. It can be judged that, if the heat resistance of the hair holder is high, the rolled-up state of the hair holder, having hair inserted therethrough, can be maintained and also the hair holder can be used repeatedly.

[0152] Evaluation of Heat Resistance:

The hair holder was rolled up so that its outer diameter was 26 mm, and heat of 140°C was applied for 15 minutes to the hair holder in the rolled-up state. Then, the outer diameter of the hair holder was measured. The ratio of change in outer diameter was found according to the following equation (1), and the value was employed as a yardstick to evaluate heat resistance. The smaller the value of the ratio of change in outer diameter, the higher the heat resistance.

Ratio of change in outer diameter (%)

$$= ((\text{Outer diameter after heating (mm)} - 26 \text{ (mm)}) / 26 \text{ (mm)}) \times 100 \quad (1)$$

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[0153] It should be noted that, in cases where the end portion on the opening 1a side as illustrated in Fig. 2 separates from the rolled-up hair holder after heating and the end portion no longer depicts an arc, then that portion is excluded when measuring the outer diameter after heating.

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[Table 1]

	Unit	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6	Comparative Example 1	Comparative Example 2	Comparative Example 3	Comparative Example 4
Temperature applied in rolled-up state	°C	125	145	165	185	205	155	85	105	115	100
Storage modulus E' at 100°C, 1 Hz	MPa	57.2	64.9	97.0	96.2	93.5	90.1	25.8	31.0	34.2	28.1
Storage modulus E' at 150°C, 1 Hz	MPa	19.2	20.3	37.3	41.2	40.1	31.2	18.2	19.1	19.0	17.2
Presence/absence of amorphous portion	-	Present	Present	Present	Present	Present	Present	Present	Present	Present	Present
Temperature of occurrence of exothermic peak	°C	-	-	-	-	-	-	117	118	-	118
Temperature of occurrence of endothermic peak	°C	128	150	171	190	210	160	-	-	-	-
Heat resistance evaluation	-	34.6%	26.9%	15.4%	11.5%	7.7%	15.4%	-	53.8%	38.5%	53.8%

[0154] The results of Table 1 clearly show that the hair holders of Examples 1 to 6 have a small ratio of change in outer diameter and good heat resistance compared to the hair holders of Comparative Examples 1 to 4.

[0155] Further, the results shown in Fig. 4(a) clearly show that the slope of the ratio of change in outer diameter changes greatly when the storage modulus E' at 100°C at a frequency of 1 Hz is 50 MPa or greater, and the ratio of change in outer diameter tends to stabilize. Similarly, the results shown in Fig. 4(b) clearly show that the slope of the ratio of change in outer diameter changes greatly when the storage modulus E' at 150°C at a frequency of 1 Hz is 19.2 MPa or greater, and the ratio of change in outer diameter tends to stabilize.

[0156] Particularly, the results show that the hair holders of Examples 3 to 6, wherein the storage modulus E' at 150°C at a frequency of 1 Hz is 30 MPa or greater, have especially good heat resistance. Thus, the hair holders of Examples 1 to 6 can be expected to be able to maintain the hair holders' rolled-up state even when heat is applied while retaining the rolled-up state, and thereby impart a firm curly shape to a hair bundle.

Industrial Applicability

[0157] The hair holder according to the present invention can maintain its rolled-up state, even when heat is applied thereto while being retained in its rolled-up state.

Claims

1. A hair holder comprising a tubular body wherein:

the tubular body has a first opening located at one end and a second opening located at the other end;
the tubular body is constructed in such a manner that a hair bundle is insertable from the first opening toward the second opening;
the hair holder has a longitudinal direction and a width direction orthogonal to the longitudinal direction;
the hair holder is constructed in such a manner that the hair holder can be rolled up along the longitudinal direction;
the hair holder comprises

a first sheet to be located on an inner side in a state where the hair holder is rolled up, and
a second sheet to be located on an outer side in a state where the hair holder is rolled up; and

one or both of the first sheet and the second sheet satisfies at least one of condition (1) or (2) below:

(1) the sheet includes a polyester-based nonwoven fabric, and the sheet's storage modulus E' in dynamic viscoelasticity measured at 100°C at a frequency of 1 Hz is 50 MPa or greater.

(2) the sheet includes a polyester-based nonwoven fabric, and the sheet's storage modulus E' in dynamic viscoelasticity measured at 150°C at a frequency of 1 Hz is 19.2 MPa or greater.

2. The hair holder according to claim 1, wherein the first sheet satisfies the condition (2).

3. The hair holder according to claim 1 or 2, wherein the second sheet satisfies the condition (1).

4. The hair holder according to any one of claims 1 to 3, wherein the storage modulus E' in dynamic viscoelasticity measured at 100°C at a frequency of 1 Hz is 70 MPa or greater.

5. The hair holder according to any one of claims 1 to 4, wherein the storage modulus E' in dynamic viscoelasticity measured at 100°C at a frequency of 1 Hz is 90 MPa or greater.

6. The hair holder according to any one of claims 1 to 5, wherein the storage modulus E' in dynamic viscoelasticity measured at 100°C at a frequency of 1 Hz is 200 MPa or less, preferably 100 MPa or less, more preferably 96.5 MPa or less.

7. The hair holder according to any one of claims 1 to 6, wherein the storage modulus E' in dynamic viscoelasticity measured at 150°C at a frequency of 1 Hz is 20 MPa or greater, preferably 30 MPa or greater, more preferably 35 MPa or greater, even more preferably 40 MPa or greater.

8. The hair holder according to any one of claims 1 to 7, wherein the storage modulus E' in dynamic viscoelasticity

measured at 150°C at a frequency of 1 Hz is 80 MPa or less, preferably 50 MPa or less, more preferably 45 MPa or less.

9. The hair holder according to any one of claims 1 to 8, wherein, in the one or both of the first sheet and the second sheet, no exothermic peak in differential scanning calorimetry is observed within a range from 125°C to 170°C, and of preferably 110°C or higher, more preferably 100°C or higher, and of preferably 200°C or lower, more preferably 300°C or lower.

10. The hair holder according to any one of claims 1 to 9, wherein, in the one or both of the first sheet and the second sheet, an endothermic peak in differential scanning calorimetry is observed within a range from 100°C to 220°C, and of preferably 145°C or higher, more preferably 170°C or higher, even more preferably 180°C or higher.

11. The hair holder according to any one of claims 1 to 10, wherein the polyester-based nonwoven fabric includes a fiber containing polyethylene terephthalate.

12. The hair holder according to claim 11, wherein the fiber containing polyethylene terephthalate includes an amorphous portion.

13. The hair holder according to any one of claims 1 to 12, wherein the polyester-based nonwoven fabric partially includes embossed portions.

14. The hair holder according to claim 13, wherein the polyester-based nonwoven fabric is a spunbonded nonwoven fabric.

15. The hair holder according to claim 13 or 14, wherein an area per each of the embossed portions is from 0.01 to 5 mm², and preferably 0.1 mm² or greater, more preferably 0.8 mm² or greater, and preferably 2 mm² or less, more preferably 1 mm² or less.

16. The hair holder according to any one of claims 13 to 15, wherein an embossed ratio, which is a total area found by summing up respective areas of the embossed portions within a 10×10 mm region in the polyester-based nonwoven fabric, is from 10% to 50%, and preferably 15% or greater, more preferably 25% or greater, and preferably 35% or less.

17. The hair holder according to any one of claims 1 to 16, wherein the polyester-based nonwoven fabric has a basis weight of from 50 to 300 g/m², and preferably 70 g/m² or greater, more preferably 90 g/m² or greater, and preferably 200 g/m² or less, more preferably 150 g/m² or less.

18. A method for manufacturing a hair holder including a tubular body wherein:

the tubular body is constructed in such a manner that a hair bundle is insertable from an opening located at one end toward an opening located at the other end and which is in a rolled-up state;

the hair holder includes a first sheet located on an inner side in the rolled-up state and a second sheet located on an outer side;

one or both of the first sheet and the second sheet is made from a polyester-based nonwoven fabric; and the method comprises

a roll-up step of rolling up the hair holder, and

a heating step of applying heat of 120°C or higher while retaining the rolled-up state of the hair holder.

19. The method for manufacturing a hair holder according to claim 18, wherein, in the heating step, heat of 140°C or higher is applied.

20. The method for manufacturing a hair holder according to claim 18, wherein, in the heating step, heat of 160°C or higher is applied.

21. The method for manufacturing a hair holder according to claim 18, wherein, in the heating step, heat of 180°C or higher is applied.

22. The method for manufacturing a hair holder according to any one of claims 18 to 21, wherein, in the heating step, heat of 300°C or lower, preferably 250°C or lower, is applied.

23. The method for manufacturing a hair holder according to any one of claims 18 to 22, wherein the roll-up step and the heating step are performed consecutively.

24. The method for manufacturing a hair holder according to any one of claims 18 to 23, wherein the polyester-based nonwoven fabric partially includes embossed portions.

25. The method for manufacturing a hair holder according to any one of claims 18 to 24, wherein the polyester-based nonwoven fabric includes a fiber containing polyethylene terephthalate.

26. The method for manufacturing a hair holder according to claim 25, wherein the fiber containing polyethylene terephthalate includes an amorphous portion.

27. A method for treating hair employing the hair holder according to any one of claims 1 to 17, comprising:

inserting a hair bundle into the hair holder;
rolling up the hair holder; and
heating the hair bundle to 80°C or higher while retaining the rolled-up state of the hair holder.

28. The method for treating hair according to claim 27, wherein the heating is performed in a state where a permanent waving agent is applied to the hair bundle.

29. The method for treating hair according to claim 28, wherein the heating is performed by using an electrothermal heater.

30. The method for treating hair according to any one of claims 27 to 29, wherein the hair is hair on human head.

Fig. 1(a)

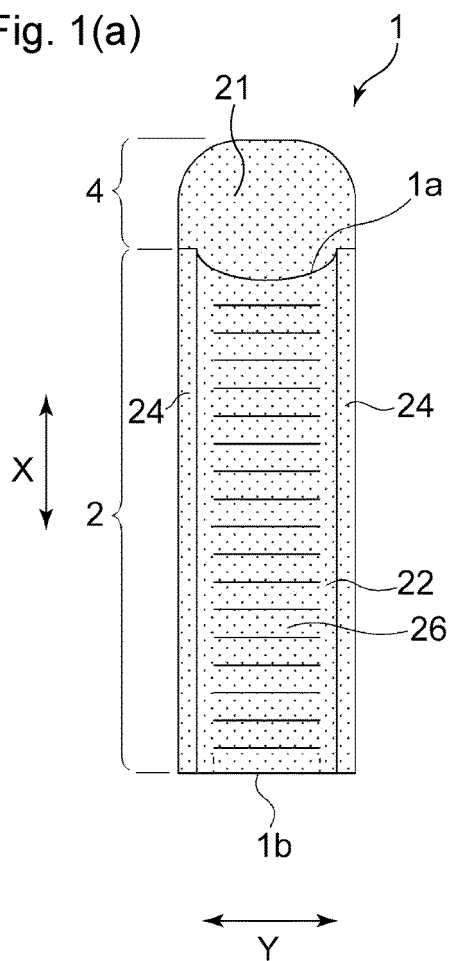


Fig. 1(b)

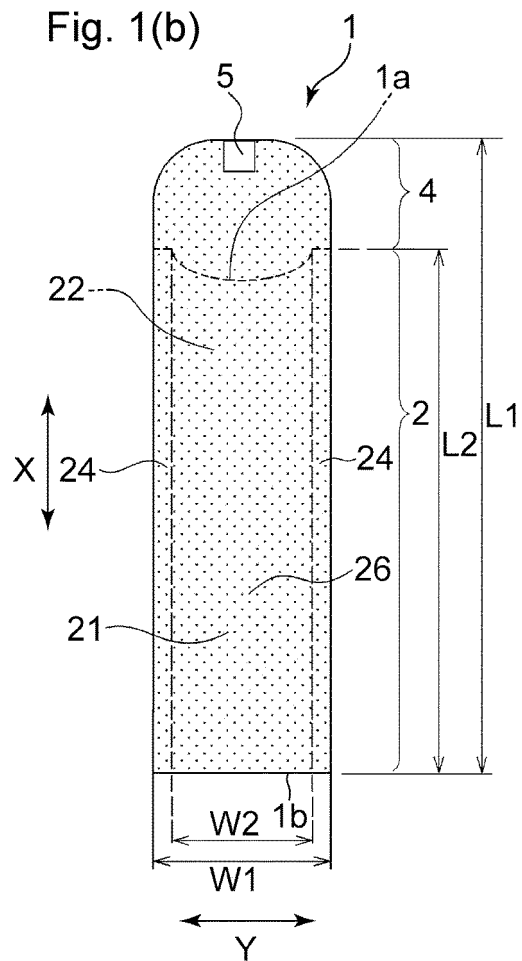


Fig. 2

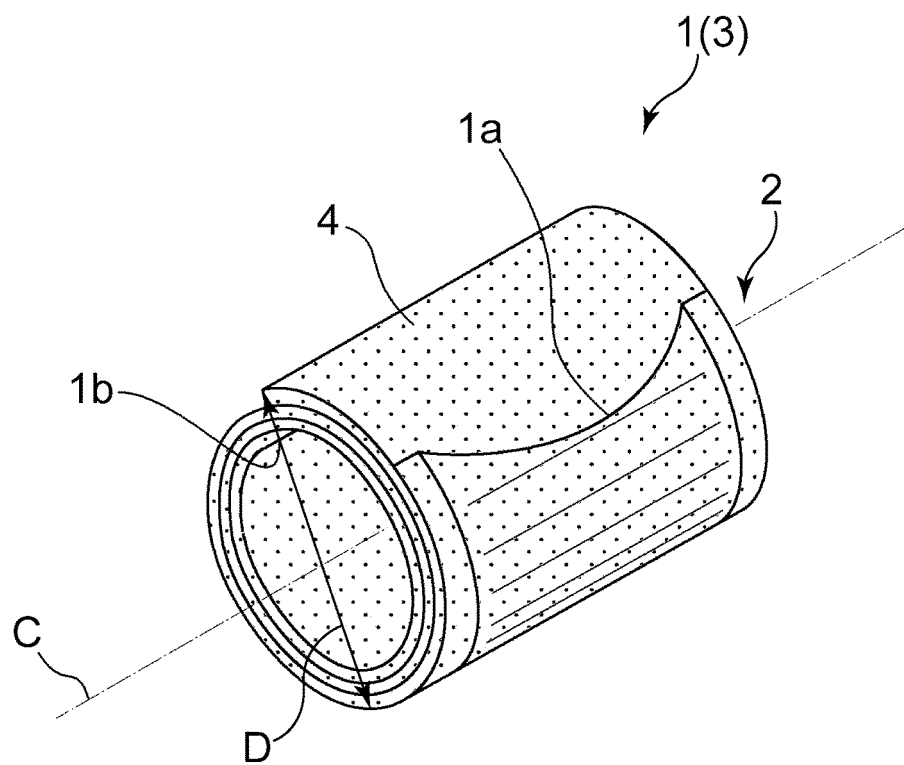


Fig. 3(a)

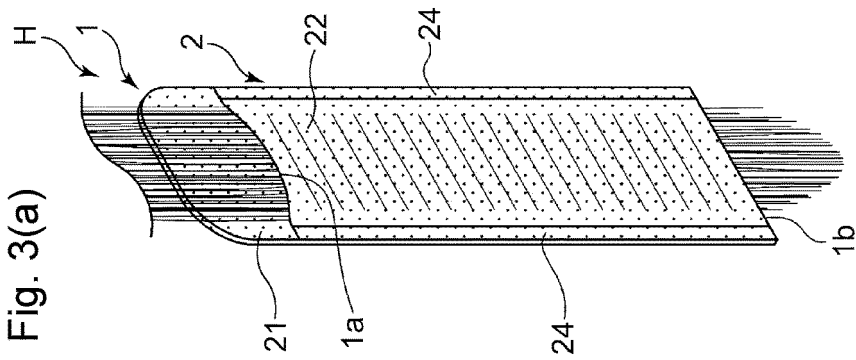


Fig. 3(b)

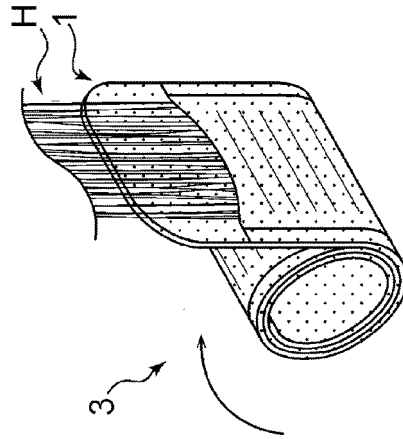


Fig. 3(c)

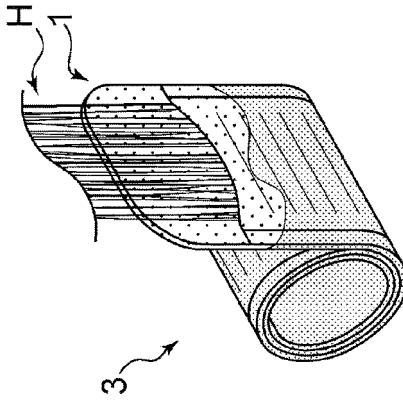


Fig. 4(a)

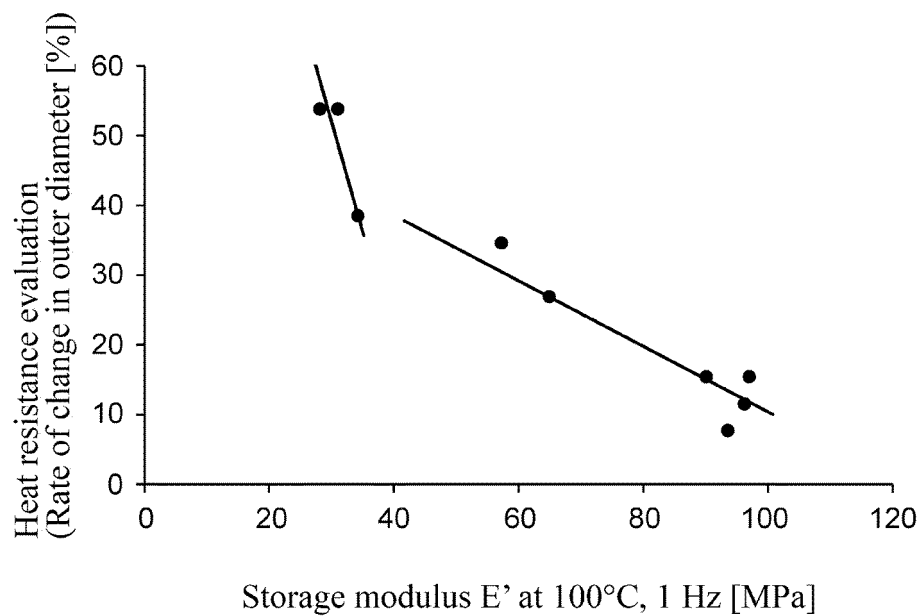
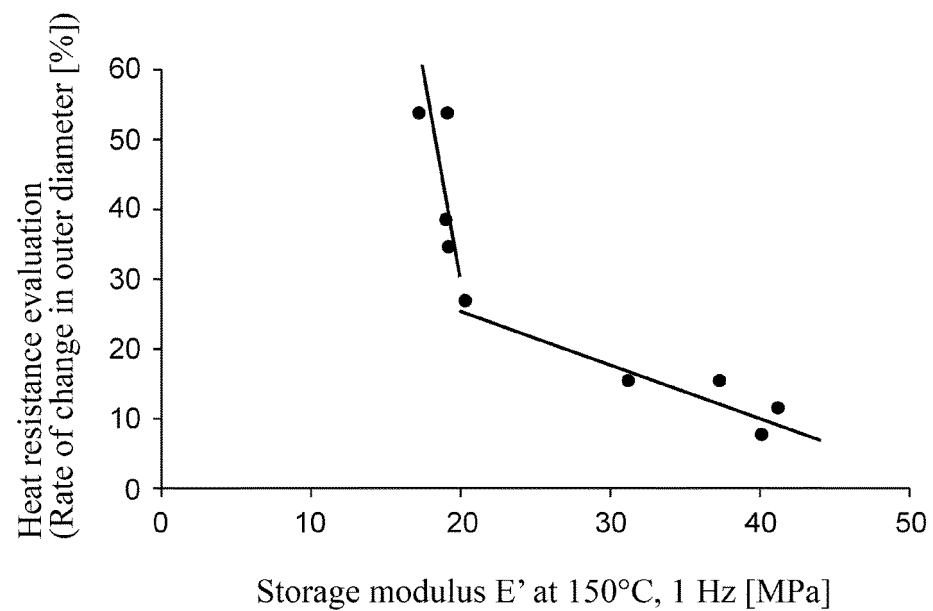


Fig. 4(b)



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2020/029828

A. CLASSIFICATION OF SUBJECT MATTER

A45D 2/18 (2006.01) i

FI: A45D2/18

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)

A45D2/18

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 1971-2020

Registered utility model specifications of Japan 1996-2020

Published registered utility model applications of Japan 1994-2020

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.
Y	WO 2019/131734 A1 (KAO CORP.) 04.07.2019 (2019-07-04) paragraphs [0008]-[0044], fig. 1-5	1-17, 27-30
Y	WO 2016/139992 A1 (TORAY INDUSTRIES, INC.) 09.09.2016 (2016-09-09) paragraph [0044]	1-17, 27-30
Y	JP 2005-246040 A (KAO CORP.) 15.09.2005 (2005-09-15) paragraphs [0010]-[0037], fig. 1-9	12-30
Y	JP 2005-218735 A (KAO CORP.) 18.08.2005 (2005-08-18) paragraphs [0013]-[0022], fig. 1	13-17, 27-30
Y	JP 2006-68368 A (KAO CORP.) 16.03.2006 (2006-03-16) paragraphs [0018]-[0019]	13-17, 27-30
Y	JP 2012-245700 A (NAKAMOTO PACKS CO., LTD.) 13.12.2012 (2012-12-13) paragraphs [0012]-[0046]	18-30
A	US 2016/0367002 A1 (KRASZEVISKI, Paul a Joyce) 22.12.2016 (2016-12-22) entire text, all drawings	1-30



Further documents are listed in the continuation of Box C.



See patent family annex.

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"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
01 October 2020 (01.10.2020)Date of mailing of the international search report
13 October 2020 (13.10.2020)Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application no.

PCT/JP2020/029828

Patent Documents referred in the Report	Publication Date	Patent Family	Publication Date
WO 2019/131734 A1	04 Jul. 2019	(Family: none)	
WO 2016/139992 A1	09 Sep. 2016	US 2018/0044507 A1 paragraph [0050]	
JP 2005-246040 A	15 Sep. 2005	(Family: none)	
JP 2005-218735 A	18 Aug. 2005	US 2007/0065489 A1 paragraphs [0049]- [0060], fig. 1	
JP 2006-68368 A	16 Mar. 2006	(Family: none)	
JP 2012-245700 A	13 Dec. 2012	(Family: none)	
US 2016/0367002 A1	22 Dec. 2016	(Family: none)	

REFERENCES CITED IN THE DESCRIPTION

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