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(54) **TOW BAND FOR HEATED CIGARETTE FILTER, AND TOW BAND PACKAGING ARTICLE FOR HEATED CIGARETTE FILTER**

(57) A band for a filter for a heated tobacco product according to the present disclosure contains cellulose acetate fibers that are crimped and a plasticizer for plas-

ticizing the cellulose acetate fibers, and the content of the plasticizer is a value in a range from 8 mass% to 12 mass%.

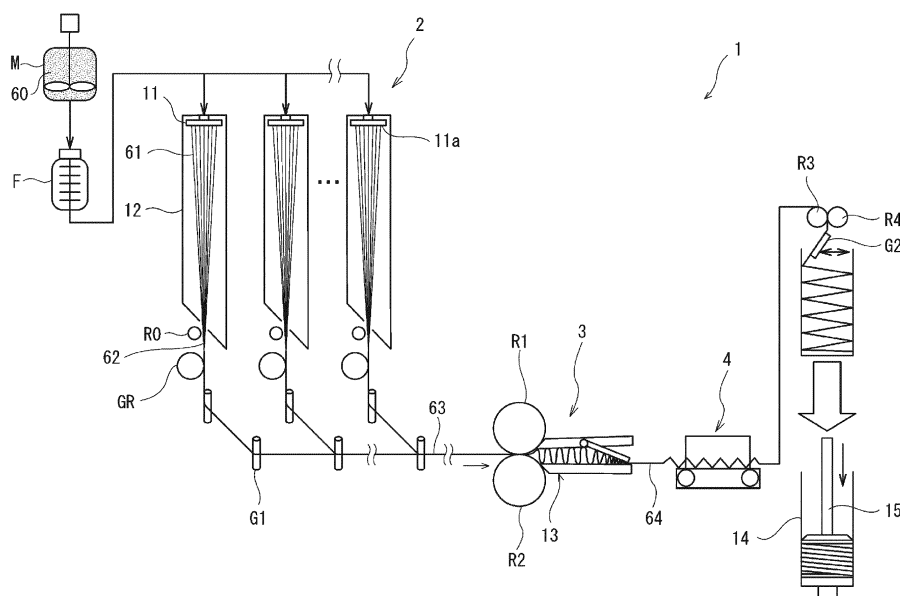


FIG. 1

Description

Technical Field

5 **[0001]** The present disclosure relates to a band for a filter for a heated tobacco product and a band packaged article for a filter for a heated tobacco product.

Background Art

10 **[0002]** In the present specification, terms defined as described below are used.

[0003] TD: An abbreviation for total denier, which refers to the denier (the number of grams per 9000 m) of a band or of a plurality of filaments of one bundle.

[0004] FD: A denier per fiber (filament denier), which refers to the denier (the number of grams per 9000 m) of a single fiber. The denier per fiber may also be referred to as a single fiber denier.

15 **[0005]** Filament: A continuous long fiber. In particular, the term filament refers to a single fiber extruded from a spinneret hole of a spinneret.

[0006] Spinneret hole (orifice): A hole formed in a spinneret of a cabinet, and from which a filament is extruded (spun).

[0007] Band: A product formed by layering yarns, which are an assembly of filaments (single fibers) extruded from each spinneret of a plurality of cabinets. A plurality of yarns is layered, the TD is set to a predetermined numerical value, and an end is formed. This end is then crimped. The crimped end (assembly of filaments) is called a band. That is, the band has a TD and a crimp-index. The band is packed in a bale form.

[0008] Filter (tip): A product through which an aerosol generated by an aerosol-generating article containing a tobacco component passes during smoking of a heated tobacco product. The filter is configured, for example, by rolling a winding paper around an outer circumference of a molded article with a predetermined filtration material formed into a cylindrical shape.

[0009] Water vapor permeability: The mass in terms of grams of the amount of water vapor that is transmitted through an object (for example, a sheet or film) per square meter (m²) of surface area in 24 hours (5 g/m²/day). The water vapor permeability is defined in item 3.1 of the JIS K 7129-1:2019 standard. The conditions for measuring water vapor permeability as stipulated in this standard include a temperature of 40°C and a humidity of 90% RH.

30 **[0010]** A heated tobacco product that is smoked using an aerosol generated by heating an aerosol-generating article are known. As the aerosol-generating article, for example, a filter for a heated tobacco product, in which the filter is produced using a band containing crimped fibers may be used. Examples of such fibers include cellulose acetate fibers that are crimped, like those disclosed in Patent Documents 1 and 2.

[0011] In order to obtain a good smoke flavor, the aerosol of the aerosol-generating article is preferably not excessively filtered. For this reason, for example, a band containing cellulose acetate fibers having a relatively large FD as compared with an ordinary cigarette filter is used in the filter for a heated tobacco product. Through this, abundant fiber gaps through which the aerosol flows are formed in the filter for a heated tobacco product. The band is, for example, formed into a bale shape, compressed, and packaged, and then used for producing a filter for a heated tobacco product.

40 Citation List

Patent Document

[0012]

45 Patent Document 1: JP 2008-504453 T

Patent Document 2: JP H05-179528 A

50 Summary of Invention

Technical Problem

[0013] The band generates stress by being compressed at packaging. Due to this stress, the cellulose acetate fibers having a large FD and present in the band are cracked. As a result, fly, which is fragments of fibers and fluff, is generated. The fly may be present in the filter and may reduce the filter quality. This issue of the occurrence of fly due to compression of the band is significant, for example, in a band that contains cellulose acetate fibers having a relatively large FD and that is used in a filter for a heated tobacco product.

[0014] In view of the above, an object of the present disclosure is to prevent, in a case in which a filter for a heated tobacco product is produced using a band containing cellulose acetate fibers that are crimped, and even in a case in which the FD of the fibers is relatively large, a deterioration in the quality of the filter for a heated tobacco product due to fly generated by compression of the band during packaging.

Solution to Problem

[0015] Through examinations conducted by the inventors of the present disclosure, the inventors confirmed that when a band containing cellulose acetate fibers that are crimped contains an appropriate amount of a plasticizer in a range from 8 mass% to 12 mass% at compressing and packaging, the amount of fly generated by compression can be reduced. The present disclosure is based on such knowledge.

[0016] That is, a band for a filter for a heated tobacco product according to one aspect of the present disclosure contains cellulose acetate fibers that are crimped and a plasticizer that plasticizes the cellulose acetate fibers, and the content of the plasticizer is in a range from 8 mass% to 12 mass%.

[0017] According to the above configuration, since the band contains an appropriate amount of a plasticizer in a range from 8 mass% to 12 mass%, the cellulose acetate fibers contained in the band are plasticized and less likely to be damaged. Therefore, for example, even when a stress is generated in the compressed band during packaging, the cellulose acetate fibers in the band are not easily damaged. Through this, even when the FD of the cellulose acetate fibers is relatively large, the occurrence of fly due to compression of the band during packaging can be reduced. This can prevent the quality of the filter for a heated tobacco product from deteriorating due to fly.

[0018] Water may be contained as the plasticizer, and the water content may be in a range from 8 mass% to 12 mass%. By using as a plasticizer at such a content, the band can be appropriately plasticized. As a result, the occurrence of fly resulting from the compression and damage of the band can be more satisfactorily prevented.

[0019] The plasticizer may include at least one selected from the group consisting of a glycerin ester plasticizer, a citrate ester plasticizer, an adipic acid plasticizer, a phthalic acid plasticizer, acetone, and diethylene glycol. Through this, the choices for the plasticizer can be increased. As a result, the degree of freedom in designing the band can be improved.

[0020] The FD of the cellulose acetate fibers may be in a range from 10 to 30. Through such feature, the FD of the cellulose acetate fibers can be set to a relatively large value, and fiber gaps in the band can be abundantly ensured. This can appropriately prevent the filter for a heated tobacco product, in which the filter is produced using this band, from excessive filtering of the aerosol during smoking. Therefore, the quality of the filter can be prevented from deteriorating due to fly generated by compression of the band at packaging, and a filter for a heated tobacco product having excellent smoke flavor can be produced.

[0021] A degree of substitution of the cellulose acetate fibers may be in a range from 2.0 to 2.7, for example.

[0022] According to another aspect of the present disclosure, a band packaged article for a filter for a heated tobacco product includes: any of the bands described above, the band formed in a sheet shape; and a wrapping material arranged to wrap at least a portion of the band, and water vapor permeability of the wrapping material is in a range of 5 g/m²/day or less.

[0023] According to the above configuration, at least a portion of the band is wrapped with a wrapping material having a water vapor permeability set to a value in the above range. As a result, a decrease in the water content of the band over time can be prevented. Therefore, the effect of plasticizing the cellulose acetate fibers in the band by the moisture contained in the band can be stably maintained. Thus, for example, even when the band wrapped by the wrapping material is compressed and packaged, the generation of fly by the band can be prevented for a long period of time. As a result, the band enables production of a filter for a heated tobacco product, with stable quality.

[0024] The wrapping material is disposed in a manner that the wrapping material wraps the entire outer surface of the band, and the water vapor permeability of the wrapping material may be in a range of 2 g/m²/day or less. According to the band packaged article having such a configuration, the water content of the band can be stably maintained. Therefore, the generation of fly due to compression of the band at packaging can be prevented for an even longer period of time.

Advantageous Effects of Invention

[0025] According to each aspect of the present disclosure, in a case in which a filter for a heated tobacco product is produced using a band containing cellulose acetate fibers that are crimped, a deterioration in the quality of the filter for a heated tobacco product due to fly caused by compression of the band at packaging can be prevented, even in a case in which the FD of the fibers is relatively large.

Brief Description of Drawings

[0026]

FIG. 1 is a schematic view of a cellulose acetate band production apparatus according to an embodiment.
 FIG. 2 is a diagram illustrating a cellulose acetate band packaged article for a filter for a heated tobacco product according to an embodiment.
 FIG. 3 is a diagram illustrating a cellulose acetate band packaged article for a filter for a heated tobacco product according to a modified example of the embodiment.
 FIG. 4 is a schematic view of a production apparatus for a filter for a heated tobacco product according to an embodiment.
 FIG. 5 is a cross-sectional view of a heated tobacco product according to an embodiment.
 FIG. 6 is a graph showing a relationship between the number of days after production of a CA band and the fly generation amount.

Description of Embodiments

[0027] An embodiment will be described with reference to the drawings. As used herein, "smoking" refers to smoking a heated tobacco product unless otherwise indicated. That is, smoking refers to heating and smoking an aerosol-generating article containing a tobacco component without igniting the aerosol-generating article. In addition, "mass%" described herein means a "weight percentage (wt.%) " rather than a "mass percentage".

Cellulose Acetate Band Production Apparatus

[0028] FIG. 1 is a schematic view of a cellulose acetate (hereinafter, also referred to as "CA") band production apparatus 1. The CABand production apparatus 1 continuously spins CA fibers 61, which are long fibers, by dry spinning. Using the CA fibers 61, the CABand production apparatus 1 produces a CA band 64. The CA band 64 is a band for a filter for a heated tobacco product. As described below in detail, the CA band 64 of the present embodiment includes crimped CA fibers 61 and a plasticizer that plasticizes the CA fibers 61. In the CA band 64, the content of the plasticizer is in a range from 8 mass% to 12 mass%. Accordingly, the CA band 64 is less likely to be damaged even when compressed during packaging. Therefore, the occurrence of fly is prevented both when the CA band 64 is compressed and packaged and when the packaged CA band 64 is fed out to produce a filter for a heated tobacco product. The CA band production apparatus 1 includes a mixer M, a filtering device F, a spinning unit 2, an application roll R0, a godet roll GR, a crimping apparatus 3, and a drying apparatus 4.

[0029] In the CA band production apparatus 1, a spinning dope 60 containing a solvent and a CA such as cellulose diacetate is used. In the spinning dope 60 of the present embodiment, CA flakes are dissolved in an organic solvent and water serving together as the solvent. The spinning dope 60 of the present embodiment contains a plasticizer that plasticizes the CA fibers 61. In the present embodiment, water also serves as a plasticizer. Also, as one example, the content of titanium oxide in the spinning dope 60 is set to a value in a range from 0 mass% to 0.01 mass%. That is, the spinning dope 60 does not substantially contain titanium oxide.

[0030] The spinning dope 60 is passed through the mixer M and then filtered by the filtering device F. The spinning dope 60 that has passed through the filtering device F is supplied to a spinneret 11 arranged on a spinning cabinet 12 of the spinning unit 2. The spinning dope 60 is extruded from a plurality of spinneret holes 11a of the spinneret 11. The peripheral edge shape of the spinneret hole 11a is triangular as one example, but may be a shape other than triangular, such as circular. The shape and opening size of the spinneret hole 11a is appropriately set according to the specifications of the CA fibers 61 to be spun.

[0031] The spinning dope 60 extruded from the spinneret holes 11a comes into contact with hot air supplied into the spinning cabinet 12 from the outside. The spinning dope 60 is dried by volatilization of some of the solvent. As a result, solid CA fibers 61 are formed. A plurality of CA fibers 61 that have passed through each spinning cabinet 12 are bundled to form a yarn 62. A lubricant or the like is then applied by the application roll R0, after which the yarn 62 is wound by the godet roll GR. The yarn 62 is then wound by a predetermined winding apparatus. A plurality of the yarns 62 are collected or layered. As a result, an end (tow) 63, which is a flat assembly of the yarns 62, is formed. The end 63 has a predetermined TD. The end 63 is conveyed to the crimping apparatus 3.

[0032] The crimping apparatus 3 includes a pair of nip rolls R1, R2 and a stuffing box 13. A nip pressure is applied to the end 63 by the pair of nip rolls R1, R2, after which the end 63 is pushed into the stuffing box 13. As a result, the plurality of CA fibers 61 in the end 63 are crimped to produce the CA band 64.

[0033] The CA band 64 is dried by the drying apparatus 4. The content of water in the CA band 64 is adjusted by adjusting the degree of dryness of the CA band 64 using the drying apparatus 4. The CA band 64 that has passed

through the drying apparatus 4 is then collected and passed through a nip point between conveyance rolls R3 and R4. Subsequently, the CA band 64 is introduced, in the shape of a bale, into a packaging container 14 by a compression apparatus 15 while being guided by a guide G2. The CA band 64 is compressed inside the packaging container 14 to form a CA band deposit 65. As one example of forming the CA band deposit 65, the bale-shaped CA band 64 is compressed in one direction (here, the vertical direction) while being folded back a plurality of times in the horizontal direction. As will also be described below, a CA band packaged article (bale) 20 is produced by the CA band deposit 65.

[0034] The TD and FD of the CA band 64 may be set as appropriate. Since the CA band 64 of the present embodiment is used in a filter for a heated tobacco product, the FD is set to a relatively large value to facilitate passage of the aerosol of the aerosol-generating article. As one example, the FD of the CA band 64 is set to a value in a range from 10 to 30. In another example, the FD of the CA band 64 is preferably in a range from 12 to 30, and is more preferably in a range from 12 to 20.

[0035] Moreover, in one example, the degree of substitution (degree of acetyl substitution) of the CA fibers 61 in the CA band 64 is in a range from 2.0 to 2.7. As one example, the lower limit value of the degree of substitution of the CA fibers 61 is preferably 2.1, and is more preferably 2.3. By setting the degree of substitution of the CA fibers 61 within this numerical range, when the CA band 64 is spun, the solubility of the CA in a solvent such as acetone that is used at spinning fibers for a filter can be improved. Therefore, excellent spinning processability of the CA fibers 61 is achieved. In addition, this solubility can be favorably maintained by setting the upper limit value of the degree of substitution of the CA fibers 61 to 2.7. Moreover, for example, good biodegradability can be imparted to the CA band 64 by setting the degree of substitution of the CA fibers 61 to 2.0 or higher. In addition, by setting the degree of substitution of the CA fibers 61 to 2.3 or higher, in a case in which a filter for a heated tobacco product is produced using the CA band 64, the smoke flavor of the heated tobacco product can impart a feeling close to that of smoking a cigarette that is a combustion type smoking article that is ignited and smoked. Therefore, a good smoke flavor of the heated tobacco product can be provided.

[0036] The degree of substitution of the CA fibers 61 can be calculated, for example, in accordance with a method for measuring the combined acetic acid as specified in ASTM:D-817-91 (test methods for cellulose acetate, etc.). Furthermore, the content of titanium oxide in the CA band 64 of the present embodiment is set to a value in a range from 0 mass% to 0.01 mass% by using the abovementioned spinning dope 60. That is, the CA band 64 contains substantially no titanium oxide. The content of titanium oxide in the CA band 64 may be 0.

[0037] Here, the CA band 64 contains the crimped CA fibers 61 and a plasticizer that is contained at an amount in a range from 8 mass% to 12 mass% and plasticizes the CA fibers 61. The CA band 64 of the present embodiment includes water as the plasticizer. As an example, the water content of the CA band 64 is from 8 mass% to 12 mass%.

[0038] Herein, the water content of the CA band 64 refers to a value determined by quickly weighing a collected sample of the CA band 64 of a predetermined weight (100 g), calculating the water content using the following equation 1, and then averaging the calculated values of four samples. The atmospheric environment at the location of the weighing and drying apparatuses is, for example, a temperature of $20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and a relative humidity of $65\% \pm 5\%$, but the CA band 64 is not subjected to humidity control in an environment with these temperature and relative humidity requirements.

[Equation 1]

$$\text{Water content } S_w \text{ (mass\%)} \text{ of CA band} = 100 \times (M_0 - M_1)/M_1$$

[0039] Here, M_0 represents a numeric value determined by weighing the mass (100 g) of the collected CA band 64. M_1 represents the mass (absolute dry mass) when the collected CA band 64 is dried by a dryer for two hours in an atmosphere having a temperature of 105°C .

[0040] The CA band 64 may contain a plasticizer other than water. In this case, a known plasticizer can be used as the plasticizer. The CA band 64 includes, as a plasticizer other than water, for example, at least one selected from the group consisting of a glycerin ester plasticizer, a citrate ester plasticizer, an adipic acid plasticizer, a phthalic acid plasticizer, acetone, and diethylene glycol.

[0041] Examples of the glycerin ester plasticizer include a lower fatty acid ester of glycerin, or in other words, an ester compound of glycerin and a fatty acid having from 2 to 4 carbons. The fatty acid having 2 carbon atoms is acetic acid. The fatty acid having 3 carbon atoms is propionic acid. The fatty acid having 4 carbon atoms is butyric acid. In the glycerin ester plasticizer, two or three of the three hydroxyl groups of glycerin may be esterified by the same fatty acid. Moreover, in the glycerin ester plasticizer, all three hydroxyl groups of the glycerin may be esterified by different fatty acids. Glycerin ester plasticizers are non-toxic and easily biodegraded. As such, the load on the environment is small.

[0042] When the fatty acid is acetic acid, examples of the glycerin ester plasticizer with three hydroxyl groups of glycerin esterified with acetic acid include triacetin. Moreover, when the abovementioned fatty acid is acetic acid, examples of the glycerin ester plasticizer with two hydroxyl groups esterified with acetic acid include diacetin. Among the glycerin ester plasticizers described above, triacetin (glycerol tris-acetate), with all three hydroxyl groups of glycerin esterified

with acetic acid (in other words, acetylated), is particularly preferred. Triacetin is a component recognized as safe for humans even when ingested. Triacetin is also easily biodegraded, and thus has a small environmental load. In addition, the CA fibers 61 produced by adding triacetin exhibit improved biodegradability as compared with a case in which triacetin is not added. Concerns about triacetin impairing the smoke flavor of tobacco are minimal.

[0043] The triacetin should be of high purity but is not strictly required to be of a high purity. The content of triacetin in the glycerin ester plasticizer may be, for example, 80 mass% or greater, or 90 mass% or greater, of the glycerin ester plasticizer. In addition, for example, monoacetin and/or diacetin may be contained as the remainder of the glycerin ester plasticizer.

[0044] The citrate ester plasticizer is produced by condensation of citric acid with an alcohol. Such an alcohol may be a monohydric alcohol or a polyhydric alcohol that is dihydric or higher. Specific examples of the citrate ester plasticizer include citrates such as acetyl triethyl citrate, acetyl tributyl citrate, isodecyl citrate, isopropyl citrate, triethyl citrate, triethylhexyl citrate, and tributyl citrate.

[0045] Specific examples of the adipic acid plasticizer include adipates such as dimethyl adipate, dibutyl adipate, diisostearyl adipate, diisodecyl adipate, diisononyl adipate, diisobutyl adipate, diisopropyl adipate, diethylhexyl adipate, dioctyl adipate, dioctyldodecyl adipate, dicapryl adipate, and dihexyldodecyl adipate.

[0046] Examples of the phthalic acid plasticizer include phthalates such as ethyl phthalate, methyl phthalate, diaryl phthalate, diethyl phthalate, diethylhexyl phthalate, dioctyl phthalate, dibutyl phthalate, and dimethyl phthalate.

[0047] Here, the CA band 64 contains a plasticizer at a content value in a range from 8 mass% to 12 mass%, but the plurality of CA fibers 61 in the CA band 64 are not dissolved and integrated with each other. In other words, the plurality of CA fibers 61 in the CA band 64 are not bonded to each other.

[0048] As described above, when the CA band 64 includes an appropriate amount of a plasticizer at content amount in a range from 8 mass% to 12 mass%, the CA fibers 61 included in the CA band 64 are plasticized and become less susceptible to damage. Therefore, for example, even if stress is generated in the compressed CA band 64 during packaging, the CA fibers 61 in the CA band 64 are less likely to be damaged. Accordingly, even when the FD of the CA fibers 61 is relatively large, the occurrence of fly due to compression of the CA band 64 during packaging can be reduced. This can prevent the quality of the filter for a heated tobacco product from deteriorating due to fly can be prevented.

[0049] The CA band 64 of the present embodiment contains water as the plasticizer, and the water content is in a range from 8 mass% to 12 mass%. By using water at such a content as the plasticizer, the CA band 64 can be appropriately plasticized. As a result, the occurrence of fly resulting from the compression and damage of the CA band 64 can be more satisfactorily prevented.

[0050] Moreover, the plasticizer contained in the CA band 64 of the present embodiment includes at least one selected from the group consisting of a glycerin ester plasticizer, a citrate ester plasticizer, an adipic acid plasticizer, a phthalic acid plasticizer, acetone, and diethylene glycol. Through this, the choices for the plasticizer can be increased. As a result, the degree of freedom in designing the CA band 64 can be improved.

CA Band Packaged Article

[0051] FIG. 2 is a diagram illustrating a CA band packaged article (hereinafter, referred to as a "bale") 20 for a filter for a heated tobacco product according to an embodiment. As illustrated in FIG. 2, the bale 20 includes the CA band deposit 65 (the CA band 64 formed in a sheet shape), wrapping materials 22 and 23 (an upper wrapping material 22 and a lower wrapping material 23) that wrap the CA band deposit 65, a paperboard material 21 superimposed and disposed on the outer surfaces (for example, outer surfaces including the lower surface, the upper surface, and the side surfaces) of the CA band deposit 65 with the wrapping materials 22 and 23 interposed therebetween, and a binding band B integrally binding the CA band deposit 65, the wrapping materials 22 and 23, and the paperboard material 21 from the outside of the paperboard material 21. The wrapping materials 22 and 23 are also referred to as interior materials.

[0052] The CA band deposit 65 is formed in a rectangular parallelepiped shape as one example. The CA band deposit 65 has an approximate mass ranging, for example, from several hundred kilograms (500 kg as an example) to one ton (1000 kg). As an example, the wrapping materials 22 and 23 are resin sheets such as low density polyethylene (LDPE). The wrapping materials 22 and 23 may be, for example, composite sheets in which two strips made of a resin such as polyethylene (PE) are crossed and bonded to a resin sheet such as biaxially oriented polypropylene (OPP). The wrapping materials may also be composed of three or more separate sheets. This case can use two sheets, one of which was for covering the lower surface of the CA band deposit 65 and the other of which was for covering the upper surface of the CA band deposit 65, and one sheet for mainly covering, all together, the four side surfaces of the CA band deposit 65. When a plurality of heat-weldable sheets is used for the wrapping materials, for example, all surfaces of the CA band deposit 65 are covered by the wrapping materials, after which the overlapping portions of the sheets may be heat-welded.

[0053] In the bale 20, the water vapor permeability of the wrapping materials 22 and 23 is set to a value in a range of 5 g/m²/day or less. Through this, the amount of moisture contained in the CA band 64 in the bale 20 is maintained over a long period of time. As one example, in the bale 20 of the present embodiment, the overlapping portions of the sheets

of the wrapping materials 22 and 23 are not tightly sealed.

[0054] A ratio $X1/X2$ (kg/m^2) of the mass (weight) $X1$ (kg) of the bale 20 to the surface area $X2$ (m^2) of the bale 20 is, for example, in a range from 60 to 110. As an example, the ratio $X1/X2$ is preferably in a range from 64 to 100, more preferably in a range from 70 to 95, still more preferably in a range from 80 to 95, and most preferably in a range from 85 to 95. The ratio $X1/X2$ can be set by adjusting the packing density of the bale 20. For example, when the ratio $X1/X2$ is set to a value of 60 or higher, the surface area $X2$ can be suppressed in relation to the mass $X1$ of the bale 20. As a result, the content of the plasticizer in the bale 20 can be easily maintained over time even after the storage period of the bale 20 has elapsed. Further, for example, by setting the ratio $X1/X2$ to a value of 110 or less, failure such as breakage of the CA band 64 when the CA band 64 is fed out from the bale 20 can be reduced.

[0055] As another example, an optimum mode of the bale 20 is a combination in which the ratio $X1/X2$ is set to a value in a range from 64 to 95 (more preferably in a range from 64 to 87) and the water vapor permeability of the wrapping materials 22 and 23 is set to a value in a range from $2 \text{ g}/\text{m}^2/\text{day}$ or less. In the bale 20 of the present embodiment, the content of the plasticizer in the CA band 64 is higher than that in a normal bale. Therefore, it is preferable to consider the ratio $X1/X2$ of the bale 20.

[0056] According to the above-described configuration, at least a portion of the CA band 64 is wrapped with the wrapping materials 22 and 23 in which the water vapor permeability is set to a value in the above-described range. Accordingly, a decrease in the water content of the CA band 64 over time can be suppressed. Thus, the effect provided by plasticizing the CA fibers 61 in the CA band 64 by the moisture contained in the CA band 64 can be stably maintained. Therefore, for example, even when the CA band 64 wrapped by the wrapping materials 22 and 23 is compressed and packaged, the occurrence of fly of the CA band 64 can be prevented for a long period of time. As a result, a filter for a heated tobacco product can be produced with stable quality using this CA band 64.

[0057] FIG. 3 is a diagram illustrating a bale 25 for a filter for a heated tobacco product according to a modified example of the embodiment. In the bale 25, the entire surface of the CA band deposit 65 is covered by a wrapping material 26. The CA band deposit 65 is internally sealed by the wrapping material 26. In the bale 25, the wrapping material 26 is arranged to wrap the entire outer surface of the CA band 64. The water vapor permeability of the wrapping material 26 is in a range from $2 \text{ g}/\text{m}^2/\text{day}$ or less. According to the bale 25 having such a configuration, the water content of the CA band 64 can be stably maintained. Therefore, the generation of fly due to compression of the CA band 64 at packaging can be prevented for an even longer period of time.

Filter Production Apparatus

[0058] FIG. 4 is a schematic view of a production apparatus 5 for a filter (tip) for a heated tobacco product according to an embodiment. As illustrated in FIG. 4, the filter production apparatus 5 includes a first filament opening unit BJ1, a guide G4, a second filament opening unit BJ2, pretensioning rolls R5, R6, first filament opening rolls R7, R8, second filament opening rolls R9, R10, a third filament opening unit BJ3, a plasticizer application apparatus 51, conveyance rolls R11, R12, a transport jet 52, a winding tube section 53, and a cutting apparatus 56.

[0059] In the filter production apparatus 5, the bale 20 is opened, and the CA band 64 moved upward from the CA band deposit 65 is guided by the guide G3. Subsequently, the CA band 64 is opened in the width direction by a gas in the first filament opening unit BJ1. Next, the CA band 64 is guided by the guide G4 and conveyed to the second filament opening unit BJ2. The CA band 64 is then opened further in the width direction by a gas in the second filament opening unit BJ2. Subsequently, the CA band 64 is sequentially inserted between the pretensioning rolls R5 and R6, between the first filament opening rolls R7 and R8, and between the second filament opening rolls R9 and R10. As a result, the CA band 64 is opened in the conveyance direction.

[0060] The CA band 64 that has passed between the second filament opening rolls R9 and R10 is opened further in the width direction by a gas in the third filament opening unit BJ3. Next, a plasticizer for molding the filter is applied to the CA band 64 by the plasticizer application apparatus 51. The CA band 64 that has passed through the plasticizer application apparatus 51 is inserted between the conveyance rolls R11 and R12. A plasticizer for molding is applied to the CA band 64 by the plasticizer application apparatus 51, and thereby the plurality of CA fibers 61 are bonded. As a result, a three-dimensional network structure is formed by the plurality of CA fibers 61. Subsequently, the CA band 64 is introduced into the transport jet 52 and carried into the winding tube section 53 by a jet stream.

[0061] In the winding tube section 53, the CA band 64 is wound and molded into a cylindrical shape. As a result, a filter material 66 including the CA band 64 and molded into a cylindrical shape is formed. In addition, a winding paper 69 is guided toward the filter material 66. The filter material 66 is conveyed in the winding tube section 53, and the winding paper 69 is wound and fixed around the outer periphery of the filter material 66.

[0062] The cutting apparatus 56 cuts the filter material 66 to a predetermined dimension. Thereby, a plug (rod) 67 is produced. The plug 67 is further cut to thereby produce a filter 68, which is a filter for a heated tobacco product. The filter 68 is provided with the filter material 66 including the CA band 64, and the winding paper 69 that is wound around the outer periphery of the filter material 66.

[0063] As described above, in the CA band 64 included in the filter 68, the amount of fly generated by compression during packaging is minimal. Therefore, the amount of fly mixed in the filter 68 is reduced. Accordingly, the filter 68 has a stable quality. Moreover, the filter 68 is not excessively packed with the CA band 64. The amount of CA band 64 packed in the filter 68 is appropriately set. Through this, the filter 68 has a relatively low pressure drop suited for a filter for a heated tobacco product. Moreover, in the present embodiment, the CA fibers 61 included in the filter 68 have an FD in a range from 10 to 30, and are relatively thick. Therefore, the filter 68 exhibits good hardness even without increasing the packing amount of the CA band 64.

Heated Tobacco Product

[0064] FIG. 5 is a cross-sectional view of a heated tobacco product 80 according to one embodiment. The heated tobacco product 80 is provided with a unit 81 and a replaceable cartridge 82. As an example, the unit 81 includes an enclosure 83, a heating unit 87 that heats the cartridge 82, a power supply 84 that is a drive source, a display unit 85, an operation unit 88, and a control unit 86 that controls the display unit 85 and the heating unit 87.

[0065] The cartridge 82 is an aerosol-generating article. The cartridge 82 includes the base member 70, a hollow member 71, a coolant 72, and a tip 73. As an example, the cartridge 82 is molded into a cylindrical shape. The hollow member 71, the coolant 72, and the tip 73 are integrally wound from a winding paper 74 in a state of being arranged side by side in the longitudinal direction. The cartridge 82 is inserted into an insertion port 81a formed at the other longitudinal end of the unit 81. In the cartridge 82, the hollow member 71 and/or the coolant 72 includes the CA band 64. Thereby, the material of the cartridge 82 can be standardized. An example of a known aerosol-generating article is the "Heat Stick" (trade name) aerosol generating article available from Philip Morris Products S.A. for use with "iQOS" heated tobacco products.

[0066] The base member 70 contains a tobacco component that can be vaporized by heating. The tobacco component of the base member 70 is vaporized by being heated by the heating unit 87. The base member 70 of the present embodiment also contains a flavor component such as nicotine that can be vaporized by heating. The hollow member 71 is disposed between the base member 70 and the coolant 72. The hollow member 71 is formed into a cylindrical shape. The hollow member 71 is configured such that a component generated by heating the base member 70 passes through the hollow member 71. The hollow member 71 functions as a separator that separates the base member 70 and the coolant 72. The hollow member 71 prevents the cartridge 82 from being compressed in the longitudinal direction and the base member 70 from being crushed when the cartridge 82 is inserted into the unit 81 through the insertion port 81a. The hollow member 71 may contain other materials such as polypropylene. The coolant 72 generates an aerosol (liquid) by cooling and aggregating a gas component from the base member 70 that has passed through the hollow member 71. The coolant 72 includes, for example, a band-like sheet body wound in the circumferential direction of the cartridge 82 or a band-like sheet body finely folded with folds each extending in the longitudinal direction of the cartridge 82. In the coolant 72, a circulation path for the aerosol is formed by gaps in the sheet body.

[0067] The tip 73 filters a part of the component that has passed through the coolant 72. The tip 73 is the filter 68. The tip 73 is disposed on the cartridge 82 on the side opposite the base member 70. The tip 73 is held in the user's mouth when the heated tobacco product 80 is in use. The tip 73 filters the aerosol having passed through the coolant 72.

[0068] Smoking comfort of the heated tobacco product is preferably close to the smoking comfort of, for example, a cigarette that is a combustion-type smoking article that is lighted and smoked. To achieve this, similar to a filter that is used in the abovementioned combustion-type cigarette, the tip 73 includes the CA band 64 in which the plurality of CA fibers 61 are crimped. Since the amount of fly that is mixed in is small, the tip 73 has stable quality. Therefore, the heated tobacco product 80 can stably provide good smoke flavor.

[0069] Moreover, the FD of the CA fibers 61 included in the tip 73 of the present embodiment is in a range from 10 to 30. Accordingly, the FD of the CA fibers 61 can be set to a relatively large value, and the fiber gaps in the CA band 64 can be amply ensured. Therefore, in the tip 73 produced using the CA band 64, excessive filtering of the aerosol can be appropriately prevented. Thus, a deterioration in the quality of the tip 73 due to fly generated by compression of the CA band 64 at packaging can be prevented, and a tip 73 excelling in smoke flavor can be produced.

Confirmation Test 1

[0070] Next, a confirmation test 1 will be described. In this test, CA bands of Sample Nos. 1 to 5 presented below were produced. The CA bands 64 of Sample Nos. 1 to 4 correspond to examples. The CA band of Sample No. 5 corresponds to a comparative example. The content of titanium oxide in each of the CA bands of Sample Nos. 1 to 5 was set to a value in a range from 0 mass% to 0.01 mass%. That is, these CA bands contained substantially no titanium oxide. Note that the present disclosure is not limited to the examples of Sample Nos. 1 to 4, 6, and 7 described below.

Sample No. 1

[0071] A spinning dope 60 was prepared by dissolving CA flakes (29 mass%) of cellulose diacetate having a degree of substitution of 2.47 in an organic solvent (a mixture of acetone and water). To extrude the spinning dope 60, a total of fifteen spinnerets 11 having 88 spinneret holes 11a with a peripheral edge shape of an equilateral triangle (side length of 154 μm) were prepared. Through this, the cross-sectional shape of the spun CA fiber 61 was set to a Y shape. The extrusion amount of the spinning dope 60 from the spinneret holes 11a and the rotation speeds of the winding apparatus and the pair of nip rolls R1 and R2 of the crimping apparatus 3 were adjusted, and thereby the FD of the CA fibers 61 was set to 19.2, and the TD of the CA band 64 was set to 27000. Furthermore, the nip pressure of the nip rolls R1 and R2 at crimping the end 63, the depth of crimping of the CA fibers 61 by pushing the end 63 into the stuffing box 13, and a peak-to-valley distance of the crimped CA fibers 61 were adjusted, and thereby the crimp ratio of the CA band 64 calculated by the following equation 2 was set to 40%. The crimp ratio is an index representing the stretch ratio of the band. In addition, the drying time for drying, with the drying apparatus 4, the CA band 64 that had passed through the crimping apparatus 3 was adjusted. As a result, a CA band 64 of Sample No. 1 in which the content of water after production was set to 8.0 mass% was produced. The CA band 64 contained only water as a plasticizer.

[Equation 2]

$$\text{Crimp Ratio (\%)} = [(L1 - L0)/L0] \times 100$$

[0072] Here, L0 is the length of the CA band when a load of 250 g is applied to the CA band having a length of 250 mm in a direction in which the crimp of the CA fibers is stretched. L1 is the length of the CA band when a load of 2500 g is applied to the CA band having a length of 250 mm in a direction in which the crimp of the CA fibers is stretched.

Sample No. 2

[0073] The crimp ratio was set to 35%. Moreover, the drying time was adjusted, and thereby, the water content of the CA band 64 after production was set to 10.0 mass%. A CA band 64 of Sample No. 2 was produced on the basis of the same production conditions and specifications as those of Sample No. 1 with the exception of the changes indicated above.

Sample No. 3

[0074] To extrude the spinning dope 60, a total of fifteen spinnerets 11 having 145 spinneret holes 11a with a peripheral edge shape of an equilateral triangle (side length of 118 μm) were prepared. Through this, the cross-sectional shape of the spun CA fibers 61 was a Y shape. The FD of the CA fibers 61 was set to 11.8, and the TD of the CA band 64 was set to 25700. The crimp ratio of the CA band 64 was set to 56%. Moreover, the drying time was adjusted, and thereby, the water content of the CA band 64 after production was set to 10.0 mass%. A CA band 64 of Sample No. 3 was produced on the basis of the same production conditions and specifications as those of Sample No. 1 with the exception of the changes indicated above.

Sample No. 4

[0075] A spinning dope 60 was prepared by dissolving 29 mass% of CA flakes of cellulose diacetate having a degree of substitution of 2.40 and 1 mass% of glycerin diacetate as a plasticizer other than water in an organic solvent (a mixture of acetone and water). To extrude the spinning dope 60, a total of sixteen spinnerets 11 having 88 spinneret holes 11a with a peripheral edge shape of an equilateral triangle (side length of 154 μm) were prepared. Through this, the cross-sectional shape of the spun CA fibers 61 was a Y shape. The FD of the CA fibers 61 was set to 19.2, and the TD of the CA band 64 was set to 27000. The crimp ratio of the CA band 64 was set to 48%. Moreover, the drying time was adjusted, and thereby the content of water in the CA band 64 after production was set to 6.0 mass%, and the concentration of glycerin diacetate as a plasticizer was set to 3.0 mass%. A CA band 64 of Sample No. 4 was produced on the basis of the same production conditions and specifications as those of Sample No. 1 with the exception of the changes indicated above.

Sample No. 5

[0076] The crimp ratio of the CA band was set to 45%. Moreover, the drying time was adjusted, and thereby the water

content of the CA band after production was set to 6.0 mass%. A CA band of Sample No. 5 was produced on the basis of the same production conditions and specifications as those of Sample No. 1 with the exception of the changes indicated above.

[0077] Next, plugs (rods) were produced by a filter production apparatus 5 (the "KDF-2" winding apparatus available from Hauni Maschinenbau AG) using the CA bands of Sample Nos. 1 to 5. The nip pressure of the pretensioning rolls R5 and R6 was set to 0.5 bar. A speed ratio $V2/V1$ of a rotation speed $V2$ of the second filament opening rolls R9 and R10 to a rotation speed $V1$ of the first filament opening rolls R7 and R8 was set to 1.4. Further, a speed ratio $V3/V2$ of a rotation speed $V3$ of the conveyance rolls R11 and R12 to the rotation speed $V2$ was set to 1.48.

[0078] Here, when the plug was produced, the CA fibers of the CA band for a filter for a heated tobacco product were formed into a cylindrical shape. In order to maintain the shape of the plug, a three dimensional network structure of the plurality of CA fibers was formed in the plug by the plasticizer. Therefore, in this test, a plasticizer P (triglycerin acetate), which is different from the plasticizer contained in the CA band introduced into the filter production apparatus, was uniformly sprayed and applied onto the CA band by the plasticizer application apparatus 51 for the purpose of molding a plug. The application amount of the plasticizer P was 7 mass% of the total weight of the CA band.

[0079] In Sample Nos. 1 to 5, the circumferential length of the plug was set to 22.5 mm, and the length dimension of the plug was set to 120 mm. In Sample Nos. 1, 2, 4, and 5, the packing amount (net tow weight) of the CA band in the plug was set to 0.5 g/rod. In Sample No. 3, the packing amount (net tow weight) of the CA band 64 in the plug was set to 0.47 g/rod.

[0080] During the production of the plugs of Sample Nos. 1 to 5, the amount of fly generated per 15 minutes was measured. To measure the fly generation amount, the fly remaining inside the box accommodating the rolls R7 to R10 was collected by a suctioning apparatus (air sucker) and weighed on a scale.

[0081] In addition, during production of the plugs of Sample Nos. 1 to 5, whether the plugs could be continuously produced for one hour without cleaning the inside of the box accommodating the rolls R7 to R10 was examined. The results are indicated in Table 1.

Table 1

Sample	No. 1	No. 2	No. 3	No. 4	No. 5
FD of CA fibers	19.2	19.2	11.8	19.2	19.2
TD of CA band	27000	27000	25700	27000	27000
Plasticizer (water) content (mass%) in CA band during plug production	8.3	9.7	10	6	5.8
Plasticizer (other than water) content (mass%) in CA band during plug production	0	0	0	3	0
Plasticizer content (total amount) (mass%) of CA band during plug production	8.3	9.7	10	9	5.8
Fly generation amount (mg/15 min) during plug production	65	55	20	20	505
Ability to implement continuous winding	Yes	Yes	Yes	Yes	No

[0082] As indicated in Table 1, in all of Sample Nos. 1 to 4, it was confirmed that the fly generation amount during plug production was significantly reduced in comparison to Sample No. 5. With Sample Nos. 1 to 4, continuous winding of the plug was possible within the scope in which the test was carried out. On the other hand, with Sample No. 5, the fly generation amount during plug production was large, and the plug was not able to be continuously wound (produced). With Sample Nos. 1 to 4, it is conceivable that the CA band 64 that was produced, compressed, and packaged was appropriately plasticized by the water that was used as a plasticizer, and thereby the generation of fly due to stress caused by compression was appropriately prevented.

[0083] FIG. 6 is a graph showing the relationship between the number of days after production of the CA bands of Sample Nos. 1, 2, and 5 and the fly generation amount. The fly generation amount shown in FIG. 6 was measured by the same method as that used to measure the values shown in Table 1. As illustrated in FIG. 6, it was confirmed that the fly generation amount of the CA band of Sample No. 5 increased as the number of days increased from immediately after production. It was also confirmed that because the CA bands 64 of Sample Nos. 1 and 2 contained the crimped CA fibers 61 and a plasticizer whose content was in a range from 8 mass% to 12 mass% and which plasticized the CA fibers 61, the fly generation amount immediately after production was stably maintained even after the passage of 400 days from the time of production.

Confirmation Test 2

[0084] Next, a confirmation test 2 will be described. In this test, Sample Nos. 6 to 8, which are the CA band packaged articles described below, were produced and used.

Sample No. 6

[0085] The CA band 64 (500 kg) of Sample No. 2 was compressed and packaged to produce a CA band deposit 65 (having a rectangular parallelepiped shape with a length of 97 cm, a width of 120 cm, and a height of 90 cm). Two sheets (length of 1600 mm $\times$ width of 1800 mm), one of which was for mainly covering the lower surface of the CA band deposit 65 and the other of which was for mainly covering the upper surface of the CA band deposit 65, and one sheet (900 mm $\times$ 5000 mm) for mainly covering, all together, the four side surfaces of the CA band deposit 65 (all the sheets were made of LDPE and had a thickness of 150 μ m) were prepared as the wrapping materials 22 and 23. The entire surface of the CA band deposit 65 was covered with these three sheets. Subsequently, a hot plate of a heat sealer heated to 120°C was pressed against the overlapping portions of each sheet from above. As a result, the sheets were welded. In this manner, a bale 20 of Sample No. 6 corresponding to the embodiment was produced with the water vapor permeability of the wrapping materials 22 and 23 set to 3 g/m²-day. In the bale 20, the overlapped portions of the sheets were not tightly sealed, and the paperboard material 21 and the binding band B were not provided.

Sample No. 7

[0086] Next, a CA band 64 (500 kg) of Sample No. 2 was compressed and packaged to produce a CA band deposit 65 (having a rectangular parallelepiped shape with a length of 97 cm, a width of 120 cm, and a height of 90 cm). In addition, two sheets (length of 1600 mm $\times$ width of 1800 mm), one of which was for mainly covering the lower surface and the other of which was for mainly covering the upper surface of the CA band deposit 65, and one sheet (900 mm $\times$ 5000 mm) for mainly covering, all together, the four side surfaces of the CA band deposit 65 were prepared as the wrapping materials 22 and 23. As the wrapping materials 22 and 23, a composite sheet (total thickness of 150 μ m) was used in which two strips made of PE each having a thickness of 25 μ m were crossed and bonded to a sheet made of biaxially oriented polypropylene (OPP) and having a thickness of 100 μ m.

[0087] The entire surface of the CA band deposit 65 was covered with three of the composite sheets in a manner in which the CA band deposit 65 was not exposed. Subsequently, the lower surface, the upper surface, and the side surfaces of the CA band deposit 65 were covered with a 2 mm thick paperboard material (slip sheet) 21 with the three sheets interposed therebetween. Next, a polyethylene terephthalate (PET) band having a width of 15 mm and a thickness of 0.2 mm was used as a binding band B. The rectangular parallelepiped CA band deposit 65, the composite sheets, and the paperboard material 21 were bound and fixed by a plurality of the PET bands. At this time, a plurality of the PET bands including three in the longitudinal direction, six in the lateral direction, and two in the height direction, were arranged to be orthogonal to each other, and the binding and fixing were carried out. In this manner, a bale 20 of Sample No. 7 corresponding to the embodiment was produced with the water vapor permeability of the wrapping materials 22 and 23 set to 1 g/m²-day. The overlapping portions of the composite sheets in the bale 20 were not tightly sealed.

Sample No. 8

[0088] The CA band (500 kg) of Sample No. 2 was compressed and packaged to produce a CA band deposit (having a rectangular parallelepiped shape with a length of 97 cm, a width of 120 cm, and a height of 90 cm). In addition, two sheets (length of 1600 mm $\times$ width of 1800 mm), one of which was for mainly covering the lower surface and the other of which was for mainly covering the upper surface of the CA band deposit, and one sheet (900 mm $\times$ 5000 mm) mainly covering, all together, the four side surfaces of the CA band deposit (all the sheets were made of LDPE and had a thickness of 100 μ m) were prepared as the wrapping materials. The entire surface of the CA band deposit was covered with these three sheets in a manner in which the CA band deposit was not exposed. Subsequently, the lower surface, the upper surface, and the side surfaces of the CA band deposit were covered with a 2 mm thick paperboard material (slip sheet) with the three sheets interposed therebetween. Next, a PET band having a width of 15 mm and a thickness of 0.2 mm was used as a binding band. The rectangular parallelepiped CA band deposit, the various sheets, and the paperboard material were bound and fixed by a plurality of the PET bands. At this time, a plurality of the PET bands including three in the longitudinal direction, six in the lateral direction, and two in the height direction, were arranged to be orthogonal to each other, and the binding and fixing were carried out. In this manner, a bale of Sample No. 8 was produced with the water vapor permeability of the wrapping materials set to 10 g/m²-day. In the bale of Sample No. 8, the overlapping portions of the sheets were not tightly sealed.

[0089] Next, the bales of Sample Nos. 6 to 8 were stored for six months in an indoor storage facility (average air

temperature: 20°C, average humidity: 75% RH). Each bale was then unwrapped, and the water content of the CA band was measured. In addition, using the CA bands immediately after the packages of Sample Nos. 6 to 8 were opened, plugs were produced by the same production method described in Confirmation Test 1. During the production of the plugs of Sample Nos. 6 to 8, the amount of fly generated per 15 minutes was measured. To measure the fly generation amount, the fly remaining inside the box accommodating the rolls R7 to R10 was collected by an air sucker and weighed on a scale. In addition, during production of the plugs of Sample Nos. 6 to 8, whether the plugs could be continuously produced for one hour without cleaning the inside of the box accommodating the rolls R7 to R10 was examined. The test results are listed in Table 2.

Table 2

Sample	No. 6	No. 7	No. 8
FD of CA fibers	19.2	19.2	19.2
TD of CA band	27000	27000	27000
Wrapping material configuration	LDPE (150 μm thick)	Laminate of OPP (100 μm thick) and two PE cloths (total thickness of 50 μm)	LDPE (100 μm thick)
Packaging method	Packaged by welding together three pieces of wrapping material	Packaged using three pieces of wrapping material	Packaged using three pieces of wrapping material
Wrapping material water vapor permeability ($\text{g}/\text{m}^2/\text{day}$)	3	1	10
Plasticizer (water) content (mass%) in CA band immediately before packaging	9.7	9.7	9.7
Plasticizer (water) content (mass%) in CA band 6 months after packaging	9	8.2	6.5
Fly generation amount ($\text{mg}/15$ min) during plug production	95	75	350
Ability to implement continuous winding	Yes	Yes	No

[0090] As indicated in Table 2, it was confirmed that in Sample Nos. 6 and 7, six months after packaging of the CA band 64, the decrease in water content in the CA band compared to when the CA band 64 was first packaged was better suppressed than in Comparative Example 2. In addition, it was also confirmed that in Sample Nos. 6 and 7, the amount of fly generated in producing the plug 67 was significantly reduced as compared with Comparative Example 2. In Sample Nos. 6 to 8, the CA band deposit 65 was not tightly sealed by the wrapping materials 22 and 23. Therefore, with regard to Sample Nos. 6 and 7, it is conceivable that the decrease in the water content and the amount of fly generation can be further reduced when the CA band deposit 65 is more tightly sealed by the wrapping materials, as with the modified example.

[0091] Each of the configurations, methods, combinations thereof, or the like of the embodiment is merely an example, and additions, omissions, replacements, and other changes to the configurations may be made as appropriate without departing from the spirit of the present disclosure. The present disclosure is not limited by the embodiment and is limited only by the claims. Each aspect disclosed in the present specification can be combined with any other feature disclosed herein.

[0092] The method of causing the CA band 64 to contain the plasticizer for preventing the occurrence of fly is not limited to the method of adding the plasticizer to the spinning dope 60. For example, the plasticizer may be applied to the spinning dope 60 extruded from the spinneret 11. In this case, the plasticizer may be applied to the CA fibers by, for example, the application roll R0. The plasticizer may also be applied to the CA fibers 61 between the godet roll GR and the crimping apparatus 3.

Reference Signs List

[0093]

- 5 20, 25 Bale (band packaged article for filter for heated tobacco product)
 22, 23, 26 Wrapping material
 64 CA band (band for filter for heated tobacco product)
 73 Tip (filter for heated tobacco product)
 80 Heated tobacco product

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Claims

- 15 1. A band for a filter for a heated tobacco product, the band comprising:
 cellulose acetate fibers that are crimped; and
 a plasticizer for plasticizing the cellulose acetate fibers,
 wherein a content of the plasticizer is in a range from 8 mass% to 12 mass%.
- 20 2. The band for a filter for a heated tobacco product according to claim 1, wherein
 the band comprises water as the plasticizer, and
 a content of the water is in a range from 8 mass% to 12 mass%.
- 25 3. The band for a filter for a heated tobacco product according to claim 1 or 2, wherein the plasticizer comprises at
 least one selected from the group consisting of a glycerin ester plasticizer, a citrate ester plasticizer, an adipic acid
 plasticizer, a phthalic acid plasticizer, acetone, and diethylene glycol.
- 30 4. The band for a filter for a heated tobacco product according to any one of claims 1 to 3, wherein a denier per fiber
 (FD) of the cellulose acetate fibers is in a range from 10 to 30.
5. The band for a filter for a heated tobacco product according to any one of claims 1 to 4, wherein a degree of
 substitution of the cellulose acetate fibers is in a range from 2.0 to 2.7.
- 35 6. A band packaged article for a filter for a heated tobacco product, the band packaged article comprising:
 the band described in any one of claims 1 to 5, the band formed in a sheet shape; and
 a wrapping material arranged to wrap at least a portion of the band,
 wherein a water vapor permeability of the wrapping material is in a range of 5 g/m²/day or less.
- 40 7. The band packaged article for a filter for a heated tobacco product according to claim 6, wherein
 the wrapping material is arranged to wrap the entire outer surface of the band; and
 the water vapor permeability of the wrapping material is in a range of 2 g/m²/day or less.

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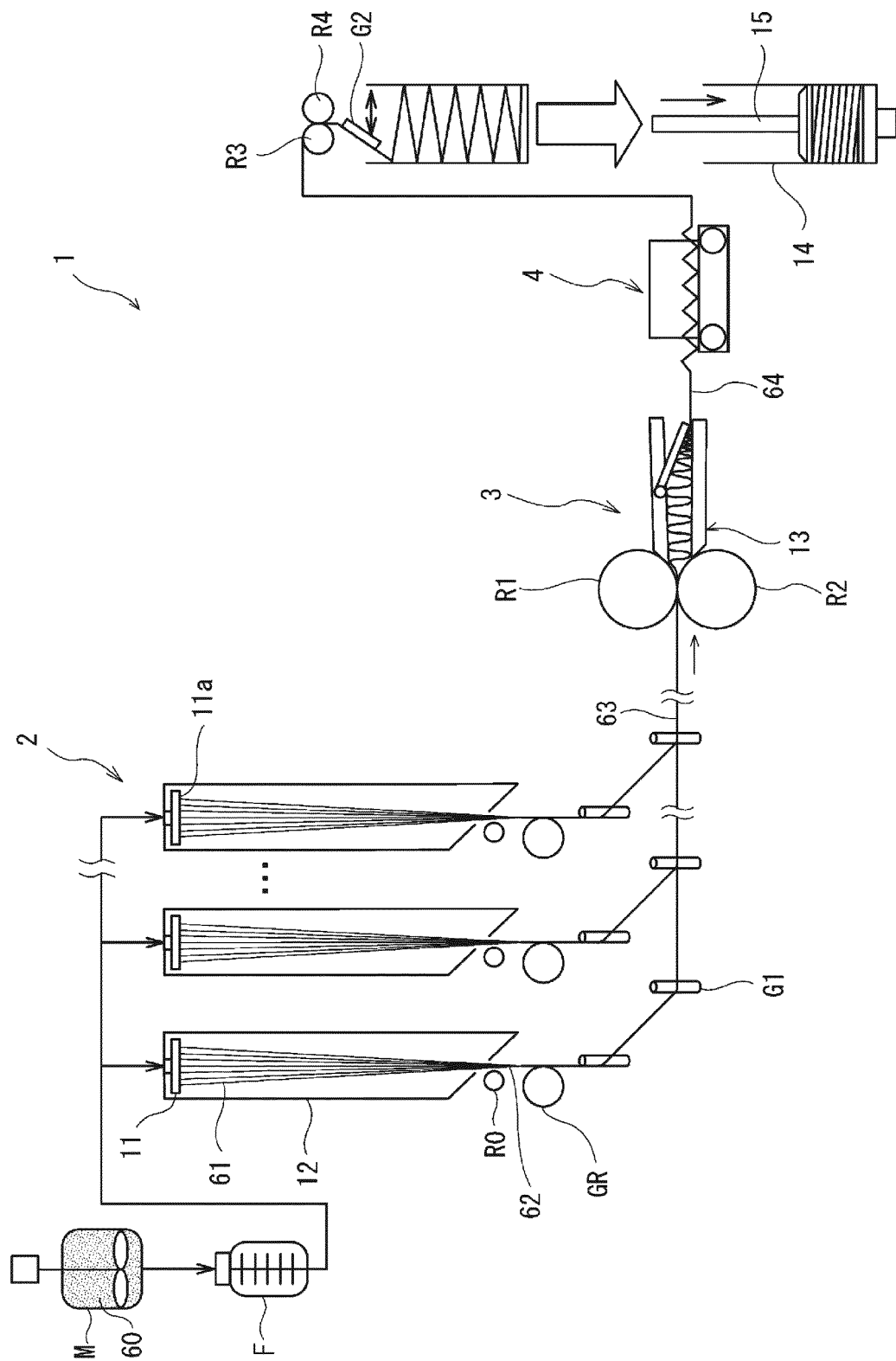


FIG. 1

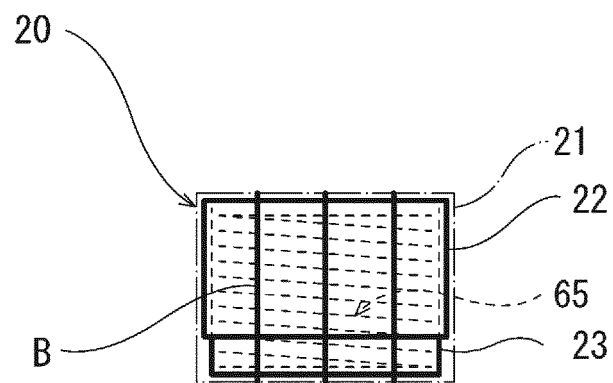


FIG. 2

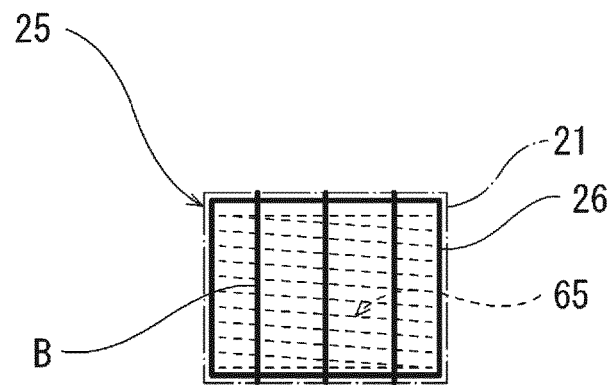


FIG. 3

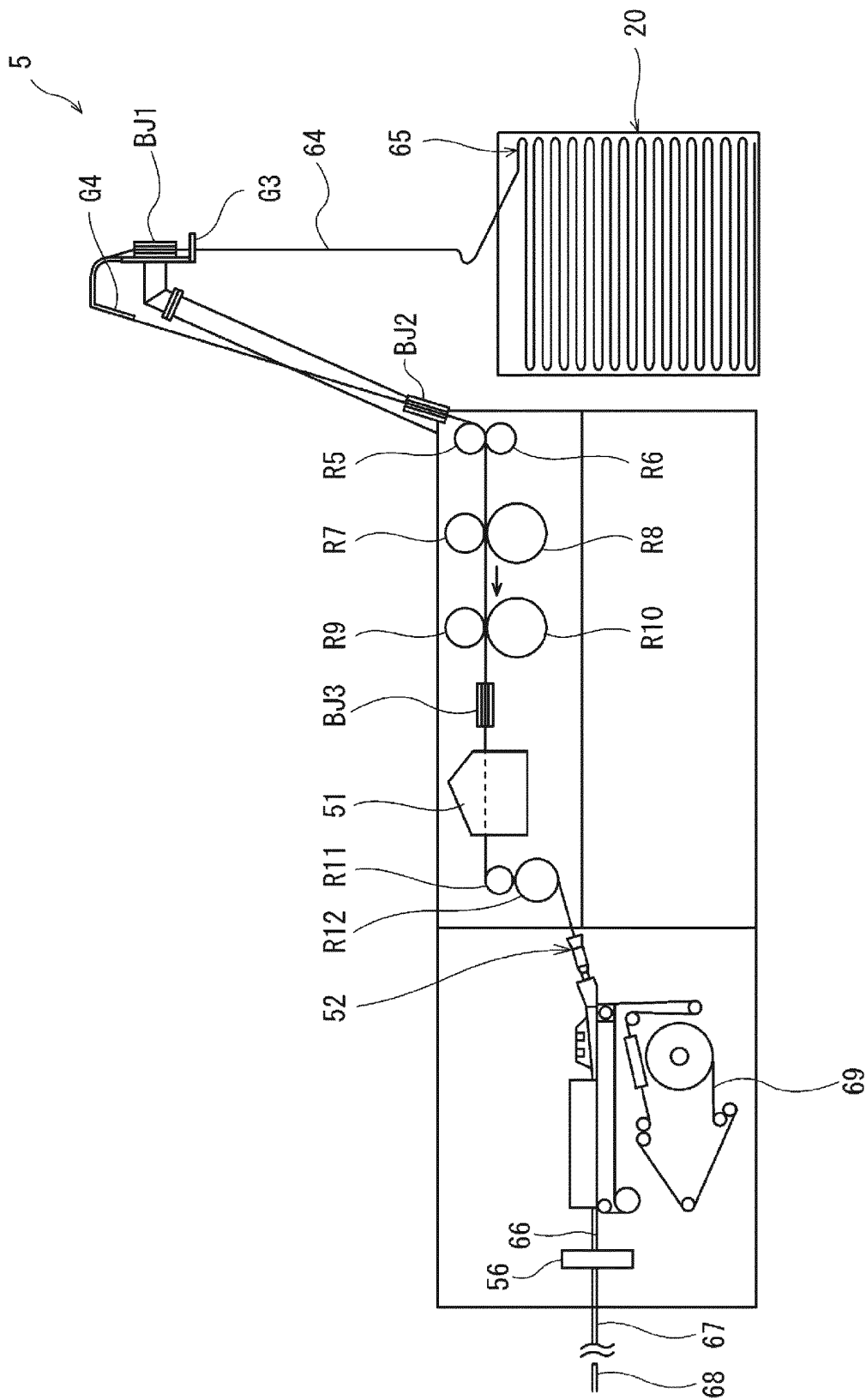


FIG. 4

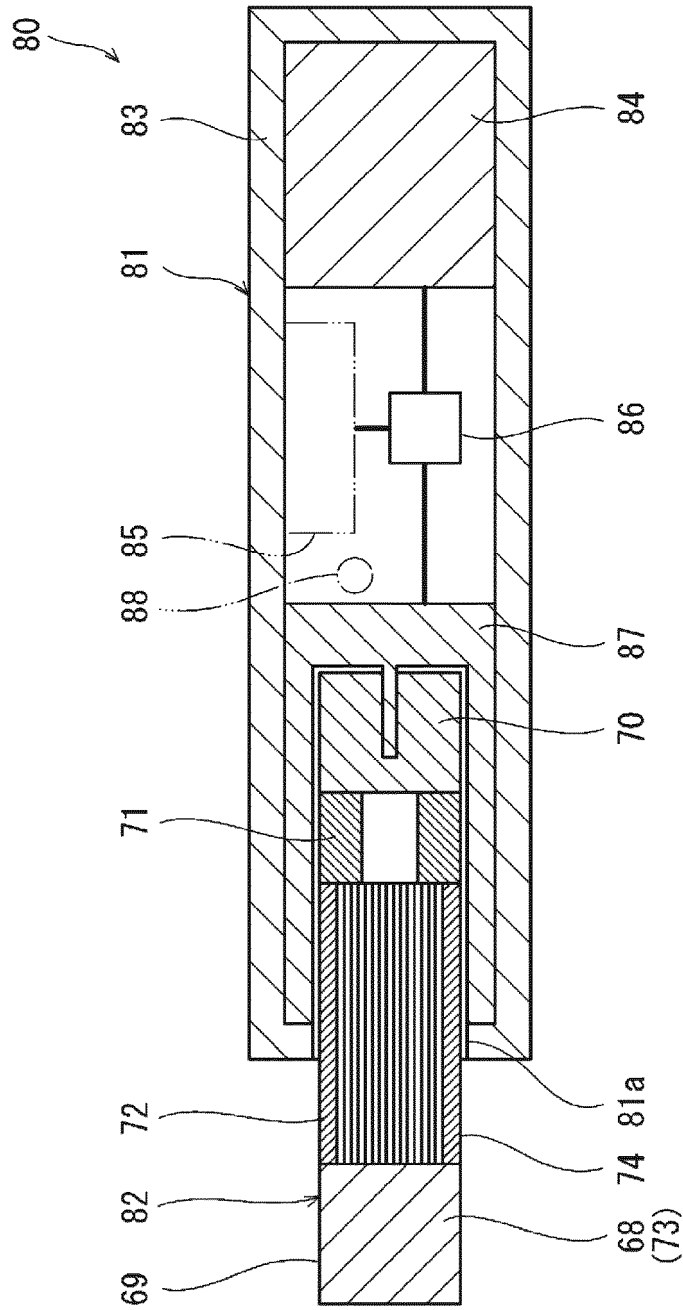


FIG. 5

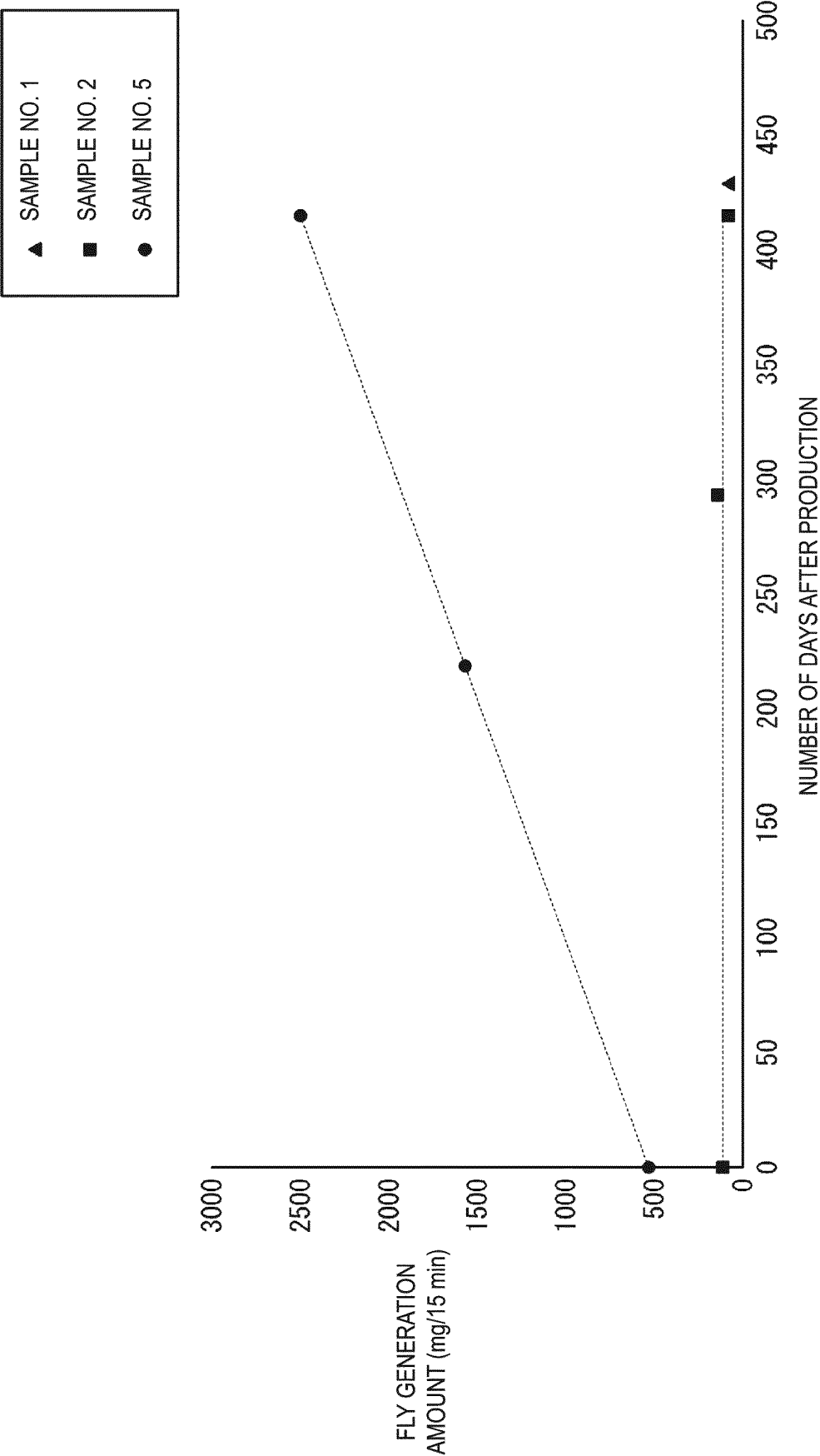


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2021/043005

A. CLASSIFICATION OF SUBJECT MATTER

A24D 3/06(2006.01)i; A24F 40/20(2020.01)i
FI: A24D3/06; A24F40/20

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)

A24D3/06; A24F40/20

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 1971-2021
Registered utility model specifications of Japan 1996-2021
Published registered utility model applications of Japan 1994-2021

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	JP 2021-513864 A (ACETATE INTERNATIONAL LLC) 03 June 2021 (2021-06-03) in particular, see claims, paragraphs [0018], [0041]-[0043], [0077], fig. 1	1-5
Y	in particular, see claims, paragraphs [0018], [0041]-[0043], [0077], fig. 1	6-7
Y	JP 2019-070217 A (DAICEL CORP) 09 May 2019 (2019-05-09) in particular, see paragraph [0050], fig. 1-2	6-7
Y	CN 107326460 A (FUNING AOYANG TECHNOLOGY CO., LTD.) 07 November 2017 (2017-11-07) in particular, see paragraph [0026]	6-7

☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"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
"A" document defining the general state of the art which is not considered to be of particular relevance	"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
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"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	

Date of the actual completion of the international search

23 December 2021

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Name and mailing address of the ISA/JP

Japan Patent Office (ISA/JP)
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Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/JP2021/043005

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Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
JP	2021-513864	A	03 June 2021	WO	2019/165084	A1	in particular, see claims 1-15, paragraphs [0018], [0042]-[0045], [0079], fig. 1
				US	2020/0397039	A1	
				CN	111757678	A	
JP	2019-070217	A	09 May 2019	KR	10-2019-0040885	A	
CN	107326460	A	07 November 2017	(Family: none)			

Form PCT/ISA/210 (patent family annex) (January 2015)

REFERENCES CITED IN THE DESCRIPTION

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- JP H05179528 A [0012]