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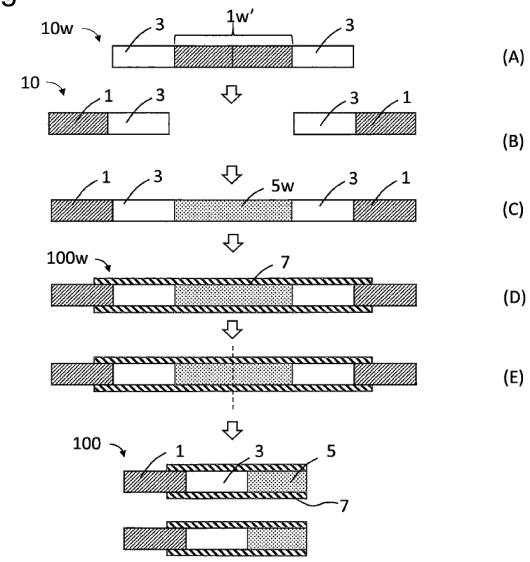
(54) PRODUCTION METHOD FOR SMOKING ARTICLE

(57) Provided is a method of manufacturing a smoking article that has a filter segment and a tobacco segment containing a tobacco rod and a cooling segment, including (A) preparing a double-length tobacco segment containing a double-length tobacco rod that has a double length of the tobacco rod and that is separable in the central part in the longitudinal direction and two cooling segments in contact with either end of the double-length tobacco rod; (B) separating the double-length tobacco segment in the central part to prepare a pair of separate tobacco segments and inverting the tobacco segments, thereby placing the tobacco segments via a gap to position the tobacco rod sections outside, align the longitudinal axes of the tobacco segments, and allow the cooling segments to face each other; (C) preparing a double-length filter segment, which has a double length of the filter segment, and placing the double-length filter segment in the gap such that both ends of the double-length filter segment come into contact with the end on the cooling segment side of either of the tobacco segments, thereby preparing a composite segment; (D) integrating the composite segment by wrapping in one tipping paper to produce a double-length smoking article, which has a double length of the smoking article; and (E) cutting the double-length smoking article in the central part in the longitudinal direction to yield smoking articles.

Fig. 2



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Description

TECHNICAL FIELD

[0001] The present invention relates to a method of manufacturing a smoking article.

BACKGROUND ART

[0002] A smoking article, such as a cigarette, that includes a tobacco rod, a cooling segment, and a filter segment has conventionally been manufactured using a plurality of tipping papers. For example, Patent Literature (PTL) 1 discloses a method of manufacturing a smoking article by wrapping a plurality of members in a plurality of tipping papers. Specifically, PTL 1 discloses a method of arranging, adjacent to each other, a polylactic acid filter, a hollow filter, and a tobacco rod in this order; wrapping these components in a second tipping paper; arranging a mouthpiece filter adjacent to the polylactic acid filter end of the resulting wrapped member; and wrapping these components in a first tipping paper. Here, gaps formed at joints between members cause air leakage or the like. In view of this, the method is characterized in that the polylactic acid filter is not completely covered with the second tipping paper, thereby providing an uncovered portion in the end of the polylactic acid filter.

CITATION LIST

PATENT LITERATURE

[0003] PTL 1: WO 2017/081144

SUMMARY OF INVENTION

TECHNICAL PROBLEM

[0004] The method described in PTL 1 needs to closely control the size of tipping papers and hence has constraints on manufacture. In particular, the inventors found in the method of PTL 1 that when a smoking article is manufactured through a step of inverting the member wrapped in the second tipping paper, the manufacture is extremely difficult unless the size of tipping papers is fairly precisely controlled. In addition, when a plurality of steps of joining with a tipping paper are involved, rods are more likely to be damaged. In view of the above, an object of the present invention is to provide a method of efficiently manufacturing a smoking article.

SOLUTION TO PROBLEM

[0005] The inventors resolved the above-mentioned problems by performing once a step of joining with a tipping paper. In other words, the above-mentioned problems are resolved by the present invention below.

[0006] [Embodiment 1] A method of manufacturing a smoking article that has a filter segment and a tobacco segment containing a tobacco rod and a cooling segment, including

(A) preparing a double-length tobacco segment containing a double-length tobacco rod that has a double length of the tobacco rod and that is separable in the central part in the longitudinal direction and two cooling segments in contact with either end of the double-length tobacco rod;
(B) separating the double-length tobacco segment in the central part to prepare a pair of separate tobacco segments and inverting the tobacco segments, thereby placing the tobacco segments via a gap to align the longitudinal axes of the tobacco segments and allow the cooling segments to face each other;
(C) preparing a double-length filter segment, which has a double length of the filter segment, and placing the double-length filter segment in the gap such that both ends of the double-length filter segment come into contact with the end on the cooling segment side of either of the tobacco segments, thereby preparing a composite segment;
(D) integrating the composite segment by wrapping in one tipping paper to produce a double-length smoking article, which has a double length of the smoking article; and
(E) cutting the double-length smoking article in the central part in the longitudinal direction to yield smoking articles.

[0007] [Embodiment 2] The method according to Embodiment 1, where a step of A further includes adding a flavor to the double-length tobacco rod.

[0008] [Embodiment 3] The method according to Embodiment 1 or 2, where a step of A further includes wrapping the double-length tobacco rod in a wrapper.

[0009] [Embodiment 4] The method according to any of Embodiments 1 to 3, where the wrapper is a paper containing a flavor.

[0010] [Embodiment 5] The method according to any of Embodiments 1 to 4, where a step of A is a step of preparing a double-length tobacco segment containing a double-length tobacco rod, which has a double length of the tobacco rod, and two cooling segments in contact with either end of the double-length tobacco rod and cutting the double-length tobacco segment in the central part in the longitudinal direction, thereby preparing a double-length tobacco segment.

[0011] [Embodiment 6] The method according to any of Embodiments 1 to 5, where the filter segment includes an acetate filter and a center hole filter.

[0012] [Embodiment 7] The method according to any of Embodiments 1 to 6, where the smoking article includes the tobacco rod, the cooling segment, and the filter segment in this order toward the downstream direction.

[0013] [Embodiment 8] The method according to any of Embodiments 1 to 7, where the tobacco rod has a diameter larger than a neighboring member.

[0014] [Embodiments 9] The method according to Embodiment 8, where the tobacco rod has a diameter 0.05 to 0.15 mm larger than the neighboring member.

[0015] [Embodiment 10] The method according to Embodiment 8, where the tobacco rod has a diameter 0.5 to 2.5% larger than the neighboring member.

[0016] [Embodiment 11] The method according to any of Embodiments 1 to 10, where a member neighboring the tobacco rod has stiffness higher than the tobacco rod.

[0017] [Embodiment 12] The method according to any of Embodiments 1 to 11, where the cooling segment includes a paper tube having a plurality of holes in the circumferential direction.

[0018] [Embodiment 13] The method according to Embodiment 12, where the cooling segment includes a paper tube; and the method further includes forming a plurality of holes in the circumferential direction of the paper tube by laser processing.

[0019] [Embodiment 14] The method according to any of Embodiments 1 to 13, where

a step of D is a step performed by preparing a precursor in which part of the tipping paper is attached to a circumferential surface of the composite segment, placing the precursor between a rolling drum and a rolling hand that is provided facing a circumferential surface of the rolling drum, and rotating the precursor on the circumferential surface of the rolling drum; and

the rolling drum or the rolling hand has, in a portion facing a section of the tobacco rod, a depression for forming a gap from the section of the tobacco rod.

ADVANTAGEOUS EFFECTS OF INVENTION

[0020] According to the present invention, it is possible to provide a method of efficiently manufacturing a smoking article.

BRIEF DESCRIPTION OF DRAWINGS

[0021]

Fig. 1 schematically illustrates smoking articles.

Fig. 2 illustrates an embodiment of the manufacturing method of the present invention.

Fig. 3 illustrates an embodiment of step A in the manufacturing method of the present invention.

Fig. 4 is a view for illustrating a measurement method for stiffness.

Fig. 5 illustrates an embodiment of an apparatus for performing the manufacturing method of the present invention.

Fig. 6 illustrates an embodiment of step B.

Fig. 7 illustrates an embodiment of step D.

Fig. 8 illustrates embodiments of step D.

DESCRIPTION OF EMBODIMENTS

[0022] The present invention relates to a method of manufacturing a smoking article that includes a tobacco rod, a cooling segment, and a filter segment. Hereinafter, the present invention will be described in detail. In the present invention, the expression "X to Y" includes the lower and the upper limits of X and Y.

1. Smoking Article

[0023] A smoking article of the present invention includes a tobacco rod, a cooling segment, and a filter segment. Fig. 1 (i) illustrates an embodiment of the smoking article of the present invention. In the figure, 100 is a smoking article, 1 is a tobacco rod, 3 is a cooling segment, 5 is a filter segment, and 7 is a tipping paper.

(1) Tobacco Rod

[0024] A tobacco rod is an almost cylindrical member for generating smoking flavor components contained in tobacco raw materials and includes tobacco filler and a paper wrapper wrapped therearound. The tobacco filler is not limited, and tobacco shreds or tobacco sheets, for example, may be used therefor. Specifically, tobacco shreds prepared by cutting dry tobacco leaves into a width of 0.8 to 1.2 mm may be packed inside a paper wrapper. Alternatively, those prepared by uniformly pulverizing dry tobacco leaves into an average particle size of about 20 to 200 μm, forming into sheets, and cutting the sheets into a width of 0.8 to 1.2 mm may be packed inside a paper wrapper. Moreover, such sheets may be gathered, folded, or spirally rolled without cutting and packed inside a paper wrapper. Further, such sheets may be cut into strips and packed inside a paper wrapper concentrically or with the longitudinal direction of the strips aligned parallel to the longitudinal direction of a tobacco rod.

[0025] The tobacco rod 1 may generate an aerosol upon heating. To promote the generation of an aerosol, it is preferable to add an aerosol source, such as glycerol, propylene glycol, 1,3-butanediol, or other polyols, to the tobacco filler. The amount of an aerosol source to be added is preferably 5 to 50 weight% and more preferably 10 to 30 weight% based on the dry weight of the tobacco filler. In addition, the tobacco rod may contain a flavor, such as menthol. The length of the tobacco rod 1 is not limited but is preferably 15 to 25 mm. The diameter is also not limited but is preferably 6.5 to 7.5 mm. Meanwhile, when a neighboring member has stiffness higher than the tobacco rod, the tobacco rod preferably has a diameter larger than the neighboring member. As a result, deformation of the tobacco rod can be suppressed. In this view, the tobacco rod has a diameter preferably 0.5 to 2.5% larger and more preferably 1.0 to 2.0% larger

than the neighboring member. In actual dimension, the tobacco rod preferably has a diameter about 0.05 to 0.15 mm larger than the neighboring member. Exemplary neighboring members include a cooling segment and a filter segment.

[0026] The term "stiffness" in the present invention means the resistance of a member to deformation as disclosed in paragraphs [0010] to [0014] of Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2016-523565. Stiffness can be obtained from a change in diameter before and after applying a load F on the side surface of a tobacco rod. When the diameter of a tobacco rod before applying a load F is denoted by Ds and the diameter after applying the load is denoted by Dd as in Fig. 4, the amount depressed is d = Ds - Dd and the stiffness is defined by the following formula. The same applies to other members.

$$\text{Stiffness (\%)} = Dd/Ds \times 100$$

(2) Cooling Segment

[0027] A cooling segment is a member for cooling an aerosol and smoking flavor components generated in the tobacco rod 1. The cooling segment 3 may be a hollow paper tube. The paper tube is preferably made of cardboard having stiffness higher than paper wrappers and a tipping paper. The paper tube may be provided with holes (ventilation holes). A plurality of holes are preferably formed along the circumference of the paper tube. In view of efficient operations, such holes are preferably formed by laser processing of a finished smoking article. Moreover, to enhance heat exchange efficiency, gathered sheets may be packed inside the cooling segment 3. Although the dimensions of the cooling segment 3 are not limited, the length is preferably 15 to 25 mm and the diameter is preferably 5.5 to 7.5 mm Meanwhile, when a member neighboring the cooling segment 3 has stiffness lower than the cooling segment 3, the cooling segment 3 has a diameter preferably 0.5 to 2.5% smaller and preferably 1.0 to 2.0% smaller than the neighboring member. When the cooling segment 3 includes a paper tube made of cardboard, the segment generally has stiffness higher than a tobacco rod.

(3) Filter Segment

[0028] A filter segment is a member including a filter. As the filter, a publicly known filter member, such as an acetate filter or a paper filter, may be used. A paper filter is a paper-filled filter prepared by creasing paper through processing with a crepe roller or the like and by rolling the paper using a plug wrapper. An acetate filter is a filter filled with cellulose acetate fibers. As illustrated in Fig. 1 (ii), the filter segment 5 preferably includes a filter 51 and a center hole filter 53. The center hole filter may be a space provided in the central part of an acetate filter, for example. The length of the filter segment 5 is not limited but is preferably 10 to 20 mm. When both a center hole filter and an acetate filter are arranged as a filter segment, the order is not limited. Moreover, individual members may be wrapped in each filter inner wrapper and joined with a filter outer wrapper. The diameter of the filter segment is not limited but is preferably almost the same as those of other segments excluding a tobacco rod. As a result, tearing and creasing of a tipping paper can be suppressed.

(4) Tipping Paper

[0029] The term "tipping paper" refers to a paper used for joining two or more of a tobacco rod, a cooling segment, and a filter segment. Meanwhile, the term "paper wrapper" refers to a paper for wrapping individual members that constitute a tobacco rod, a cooling segment, or a filter segment. For example, when a filter segment includes a center hole filter and an acetate filter as in the foregoing, a paper for wrapping the center hole filter and a paper for wrapping the acetate filter are each paper wrapper.

[0030] Exemplary base paper for a tipping paper and paper wrappers includes, but is not limited to, paper using cellulose fibers. Such cellulose fibers may be either derived from plants or chemically synthesized, or may be a mixture thereof. Exemplary plant-derived fibers include pulp of flax fibers, wood fibers, or seed fibers, for example. Such pulp may be colored unbleached pulp. However, from a viewpoint of obtaining white clean appearance, it is preferable to use bleached pulp, which is prepared using a bleaching agent, such as an oxidant or a reductant.

[0031] For a typical paper wrapper for cigarettes, a citric acid alkali metal salt or the like is used as a common burning chemical (combustion aid, for example) that can affect the spontaneous combustion rate of the paper wrapper. In the present invention, a heating-type smoking article but not a combustion-type is preferable. In this case, since the combustion of a paper wrapper is unnecessary, the paper wrapper need not contain a burning chemical.

[0032] The lower limit of the basis weight of a paper wrapper is preferably 30 g/m^2 or more, more preferably 35 g/m^2 or more, and further preferably 40 g/m^2 or more. The upper limit is preferably 65 g/m^2 or less and more preferably 50 g/m^2 or less. Meanwhile, the lower limit of the basis weight of a tipping paper is preferably 20 g/m^2 or more, more preferably 25 g/m^2 or more, and further preferably 30 g/m^2 or more. The upper limit is preferably 50 g/m^2 or less, more preferably 45 g/m^2 or less, and further preferably 40 g/m^2 or less. The basis weight can be measured by the method specified in JIS P 8124.

2. Manufacturing Method

[0033] The outline of the present process is illustrated

in Fig. 2. In the figure, "w" indicates "double-length." For example, 5w represents a double-length filter segment. The manufacturing method of the present invention can be performed using any appropriate apparatus but is preferably performed using, for example, an apparatus that includes a plurality of drums and that feeds each member from above as illustrated in Fig. 5. One drum preferably has one function rather than a plurality of functions since defect generation can be suppressed in high-speed manufacture. Hereinafter, each step will be described using such an apparatus as an example. In each unit, one or a plurality of drums may have a feeding, receiving, transferring, or separating function.

(1) Step A

[0034] This step prepares a double-length tobacco segment 10w containing a double-length tobacco rod 1w' that has a double length of the tobacco rod 1 and that is separable in the central part in the longitudinal direction and two cooling segments 3 in contact with either end of the double-length tobacco rod. This step may be performed by preparing a double-length tobacco segment containing a double-length tobacco rod 1w, which has a double length of the tobacco rod, and two cooling segments 3 in contact with either end of the double-length tobacco rod and by cutting the double-length tobacco segment in the central part in the longitudinal direction. For example, this step can be performed in the first unit 81 to the third unit 83 of Fig. 5 where 81f is a feeder for cooling segments 3, 81p is a picking-up drum, and 81s is a separating drum. A pair of cooling segments 3 fed from the feeder 81f are passed to a holding section provided on the circumferential surface of the picking-up drum 81p. Subsequently, the pair of the cooling segments 3 are passed to the separating drum 81s and separated in a holding section while being transferred.

[0035] In the second unit 82, 82f is a feeder for a double-length tobacco rod 1w, 82t is a transfer drum, 82p is a picking-up drum, and 82a is a receiving drum. The pair of the cooling segments 3 placed via a gap are passed in this state to the transfer drum 82t. Meanwhile, a double-length tobacco rod 1w fed from the feeder 82f is passed to a holding section provided on the circumferential surface of the picking-up drum 82p and then passed to the receiving drum 82a. On this occasion, the double-length tobacco rod 1w is placed in the gap between the pair of the separately placed cooling segments 3 such that both ends of the double-length tobacco rod 1w come into contact with the end of either of the cooling segments 3.

[0036] In the third unit 83, 83c is a cutter drum, 83c' is a cutter, and 83s is a separating drum. A segment including the pair of the cooling segments 3 at the ends of the double-length tobacco rod 1w is passed to the cutter drum 83c and cut with the cutter 83c' in the central part in the longitudinal direction of the double-length tobacco rod 1w.

[0037] In this step, the double-length tobacco rod 1w or a separable double-length tobacco rod 1w' may be wrapped in a wrapper. A wrapper is a sheet-like member, and the examples include paper and polymer sheets. Exemplary paper includes publicly known paper, such as tipping paper, and exemplary polymer sheets include biodegradable polymer sheets, such as a polylactic acid sheet. For example, when wrapped in a decorated wrapper, a smoking article decorated in the upstream portion can be provided (see Fig. 3 (2)). Moreover, a flavor may be added to the double-length tobacco rod 1w or the separable double-length tobacco rod 1w'. For example, when the double-length tobacco rod 1w or the like is wrapped in a flavor-containing wrapper, a smoking article containing a flavor in the upstream portion can be provided (see Fig. 3 (1)). Such a flavor is not limited, and a publicly known flavor, such as menthol, may be used. The amount to be added is also not limited and may be set to a publicly known amount. In Fig. 3, F is a portion added with a flavor, and F' is a paper containing a flavor. As just described, this step can functionalize the upstream portion of a smoking article to be manufactured.

(2) Step B

[0038] In this step, the double-length tobacco segment 1w is separated in the central part to prepare a pair of separate tobacco segments 10 and the tobacco segments are inverted, thereby placing the tobacco segments via a gap to position the tobacco rod 1 sections outside, align the longitudinal axes of the tobacco segments, and allow the cooling segments 3 to face each other. This step can be performed in the fourth unit 84 of Fig. 5 where 84i and 84i' are inverting drums. With reference to Fig. 6, the mechanism of inversion will be described. A guide G on the inverting drum 84i is a holding section for the tobacco segment 10 and is provided in a rotatable manner around one corner on the drum. The tobacco segment 10 held in the guide G illustrated with a dotted line is moved to the solid-line position through the rotation of the guide G as the inverting drum 84i rotates. Subsequently, the tobacco segment 10 is passed to a guide G' illustrated with a dotted line on the inverting drum 84i'. The guide G' slides on the inverting drum 84i' to the solid-line position where the distance between the pair of the tobacco segments 10 is a desirable value. The pair of the tobacco segments 10 are thus inverted.

(3) Step C

[0039] In this step, a double-length filter segment 5w, which has a double length of the filter segment 5, is prepared and placed in the gap such that both ends of the double-length filter segment come into contact with the end on the cooling segment 3 side of either of the tobacco segments 10, thereby preparing a composite segment. This step can be performed in the fifth unit 85 of Fig. 5. In the figure, 85f is a feeder for a double-length filter segment 5w, 85p is a picking-up drum, and 85a is a receiving

drum. The segments prepared in the preceding step are passed to the receiving drum 85a. Meanwhile, a double-length filter segment 5w fed from the feeder 85f is passed to a holding section provided on the circumferential surface of the picking-up drum 85p and then passed to the receiving drum 85a. On this occasion, the double-length filter segment 5w is placed in the gap between the pair of the separately placed tobacco segments 10 such that both ends of the double-length filter segment 5w come into contact with the end of either of the tobacco segments 10, thereby forming a composite segment 90.

(4) Step D

[0040] In this step, the composite segment is integrated by wrapping in one tipping paper 7 to obtain a double-length smoking article 100w. As the tipping paper, any paper common in the field concerned can be used. The tipping paper may be coated with a publicly known adhesive. As a result, the composite segment in the separable state is integrated into the inseparable state. On this occasion, the tipping paper 7 need not cover the entire range of the tobacco rods 1. When the length of the tobacco rod 1 is denoted by X, the region covered with the tipping paper 7 is preferably a region extending from the bonding face between the tobacco rod 1 and the cooling segment 3 to the position of 0.2X to 0.4X in the longitudinal direction of the tobacco rod 1. When the region covered with the tipping paper 7 falls within this range, there is an advantage that thermal conductivity can be enhanced in the case of heating the tobacco rod 1 from the outside.

[0041] In conventional methods, every time when a certain segment is prepared by combining a plurality of members, the segment is wrapped in a tipping paper. Consequently, a plurality of tipping papers are needed in conventional methods. In contrast, a composite segment is wrapped in one tipping paper in the present invention. Accordingly, it is possible to avoid steps formed on a product due to the use of a plurality of tipping papers, thereby reducing the occurrence of defects in manufacture.

[0042] This step can be performed in the sixth unit 86 of Fig. 5. In the figure, 86f is a feeder for a tipping paper 7, 86t is a transfer drum, 86r is a rolling drum, and 86h is a rolling hand. A rolling drum is a drum having a holding section that is for holding a member on the circumferential surface and that enables a segment or another member to rotate on its central axis in the longitudinal direction. A rolling hand is a means that is disposed facing the circumferential surface of the rolling drum and that is for forming a gap of a constant distance from the circumferential surface. The composite segment 90 is passed to the transfer drum 86t and then passed to the rolling drum 86r. Meanwhile, part of the tipping paper 7 fed from the feeder 86f is attached to the circumferential surface of the segment on the rolling drum 86r, thereby forming a precursor 92 (see Fig. 7). The precursor 92 includes the tipping paper 7 attached, like a flag, to the composite segment 90. In other words, part of the tipping paper 7 is attached to the circumferential surface of the composite segment 90 while leaving the remainder free. The precursor 92 is fixed to the holding section on the circumferential surface of the rolling drum 86r through suction or the like and transferred to the gap formed between the rolling drum 86r and the rolling hand 86h. While passing through this gap, the entire circumferential surface of the precursor 92 is wrapped in the tipping paper 7 to form a double-length smoking article 100w (see Fig. 7).

[0043] As in the foregoing, the tobacco rod 1 preferably has a diameter larger than the neighboring cooling segment 3 in the present invention. In this case, if the surfaces of the rolling drum 86r and the rolling hand 86h are flat, excessive contact arises between these surfaces and the tobacco rod 1 (Fig. 8 (1)). This results in a problem of falling fillings from the leading end under the impact on the tobacco rod 1. In addition, the difference in circumference causes twisting, thereby developing defects, such as creases, in a product. For these reasons, it is preferable in the present invention to form a gap from the tobacco rod 1 by providing a depression on the rolling drum 86r or rolling hand 86h surface that faces the tobacco rod 1 as illustrated in Figs. 8 (2) and (3). Although Figs. 8 (2) and (3) illustrate embodiments in which a depression is provided on the rolling hand 86h, a depression may be provided on the rolling drum 86r or both the rolling drum and the rolling hand. The depth of the depression (T in Figs. 8 (2) and (3)) is appropriately adjusted and is preferably 0.05 to 0.15 mm. Such a depression need not be provided on the entire surface that faces the tobacco rod 1. As illustrated in Fig. 8, a depression may be provided on part of the surface that faces the tobacco rod 1. Meanwhile, to reliably attach a tobacco rod to another member by using a tipping paper, a depression is preferably absent near the boundary between these two members.

(4) Step E

[0044] In this step, the double-length smoking article 100w is cut in the central part in the longitudinal direction. Through this step, a pair of smoking articles 100 can be manufactured. This step may further include aligning two smoking articles 100 in the same direction by inverting either of the smoking articles 100.

[0045] This step can be performed in the seventh unit 87 of Fig. 5. In the figure, 87c is a cutter drum, 87c' is a cutter, and 87a is a receiving drum. The double-length smoking article 100w is passed to the cutter drum 87c and cut in the central part in the longitudinal direction to form smoking articles 100. The smoking articles 100 are passed to the receiving drum 87a, separated, and isolated as products.

[0046] In the present invention, even when a member having a smaller diameter than a tobacco rod is placed neighboring the tobacco rod, it is possible to avoid failure,

such as jams during rolling, and consequently to perform satisfactory rolling. Moreover, the present invention is also advantageous in terms of costs since one tipping paper is used. Further, conventional methods that use a plurality of tipping papers need a measure of providing steps on drums, for example, since steps are formed on smoking articles. In contrast, the manufacturing method of the present invention does not need such a measure.

[Example 1]

[0047] The following members were prepared.
[0048] Double-length tobacco rod of 7.0 mm in diameter and 40.0 mm in length (from Japan Tobacco Inc.)
[0049] Paper tube of 6.9 mm in diameter and 20.0 mm in length as a cooling segment
[0050] Double-length filter segment of 6.9 mm in diameter consisting of a center hole filter (8.0 mm)/a double-length acetate filter (14.0 mm)/a center hole filter (8.0 mm)
[0051] Tipping paper of 24.0 mm × 80.0 mm
[0052] A separable double-length tobacco segment was obtained by placing each paper tube at both ends of a double-length tobacco rod that is separable in the central part in the longitudinal direction (step A). The separable double-length tobacco segment was separated in the central part to prepare a pair of separate tobacco segments, and the tobacco segments were inverted to be placed via a gap (step B). On this occasion, the tobacco rod sections were positioned outside and the longitudinal axes of the tobacco segments were aligned. A double-length filter segment was placed in the gap such that both ends of the double-length filter segment come into contact with the end on the cooling segment side of either of the tobacco segments to obtain a composite segment (step C). The composite segment was integrated by wrapping in one tipping paper to obtain a double-length smoking article, which has a double length of a smoking article (step D). The double-length smoking article was cut in the central part in the longitudinal direction to yield two smoking articles (step E).

REFERENCE SIGNS LIST

[0053]

1 Tobacco rod

1w Double-length tobacco rod
1w' Separable double-length tobacco rod
3 Cooling segment
5 Filter segment
5w Double-length filter segment
51 Acetate filter
53 Center hole filter
7 Tipping paper
10 Tobacco segment
F Flavor-added portion
F' Portion wrapped in flavor-containing paper
80 Manufacturing apparatus
81 First unit
81f Feeder
81s Separating drum
82 Second unit
82f Feeder
82t Transfer drum
82p Picking-up drum
82a Receiving drum
83 Third unit
83c Cutter drum
83c' Cutter
84 Fourth unit
84i Inverting drum
84'i Inverting drum
85 Fifth unit
85f Feeder
85p Picking-up drum
85a Receiving drum
86 Sixth unit
86f Tipping paper feeder
86t Transfer drum
86r Rolling drum
86h Rolling hand
87 Seventh unit
87c Cutter drum
87c' Cutter
87a Receiving drum
90 Composite segment

92 Precursor
100 Smoking article
100w Double-length smoking article

Claims

1. A method of manufacturing a smoking article that includes a filter segment and a tobacco segment containing a tobacco rod and a cooling segment, comprising

(A) preparing a double-length tobacco segment containing a double-length tobacco rod that has a double length of the tobacco rod and that is separable in the central part in the longitudinal direction and two cooling segments in contact with either end of the double-length tobacco rod;
(B) separating the double-length tobacco segment in the central part to prepare a pair of separate tobacco segments and inverting the tobacco segments, thereby placing the tobacco segments via a gap to align the longitudinal axes of the tobacco segments and allow the cooling segments to face each other;
(C) preparing a double-length filter segment, which has a double length of the filter segment,

and placing the double-length filter segment in the gap such that both ends of the double-length filter segment come into contact with the end on the cooling segment side of either of the tobacco segments, thereby preparing a composite segment;
(D) integrating the composite segment by wrapping in one tipping paper to produce a double-length smoking article, which has a double length of the smoking article; and
(E) cutting the double-length smoking article in the central part in the longitudinal direction to yield smoking articles.

2. The method according to Claim 1, wherein a step of A further includes adding a flavor to the double-length tobacco rod.

3. The method according to Claim 1 or 2, wherein a step of A further includes wrapping the double-length tobacco rod in a wrapper.

4. The method according to any of Claims 1 to 3, wherein the wrapper is a paper containing a flavor.

5. The method according to any of Claims 1 to 4, wherein a step of A is a step of preparing a double-length tobacco segment containing a double-length tobacco rod, which has a double length of the tobacco rod, and two cooling segments in contact with either end of the double-length tobacco rod and cutting the double-length tobacco segment in the central part in the longitudinal direction, thereby preparing a double-length tobacco segment.

6. The method according to any of Claims 1 to 5, wherein the filter segment includes an acetate filter and a center hole filter.

7. The method according to any of Claims 1 to 6, wherein the smoking article includes the tobacco rod, the cooling segment, and the filter segment in this order toward the downstream direction.

8. The method according to any of Claims 1 to 7, wherein the tobacco rod has a diameter larger than a neighboring member.

9. The method according to Claim 8, wherein the tobacco rod has a diameter 0.05 to 0.15 mm larger than the neighboring member.

10. The method according to Claim 8, wherein the tobacco rod has a diameter 0.5 to 2.5% larger than the neighboring member.

11. The method according to any of Claims 1 to 10, wherein a member neighboring the tobacco rod has stiffness higher than the tobacco rod.

12. The method according to any of Claims 1 to 11, wherein the cooling segment includes a paper tube having a plurality of holes in the circumferential direction.

13. The method according to Claim 12, wherein the cooling segment includes a paper tube; and the method further comprises forming a plurality of holes in the circumferential direction of the paper tube by laser processing.

14. The method according to any of Claims 1 to 13, wherein
a step of D is a step performed by preparing a precursor in which part of the tipping paper is attached to a circumferential surface of the composite segment, placing the precursor between a rolling drum and a rolling hand that is provided facing a circumferential surface of the rolling drum, and rotating the precursor on the circumferential surface of the rolling drum; and
the rolling drum or the rolling hand has, in a portion facing a section of the tobacco rod, a depression for forming a gap from the section of the tobacco rod.

Fig. 1

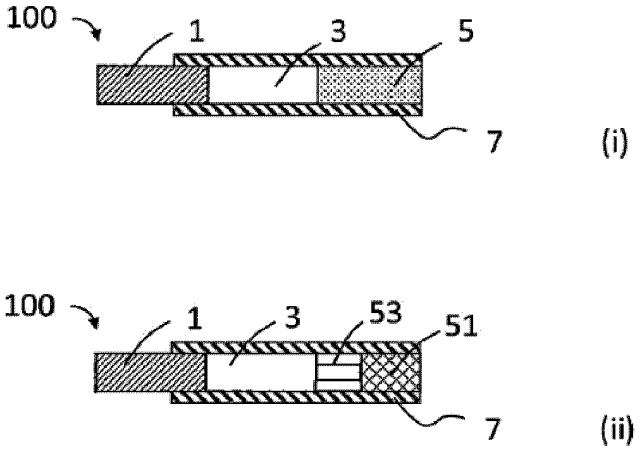

100
1
3
5
7
(i)
100
1
3
53
51
7
(ii)

Fig. 2

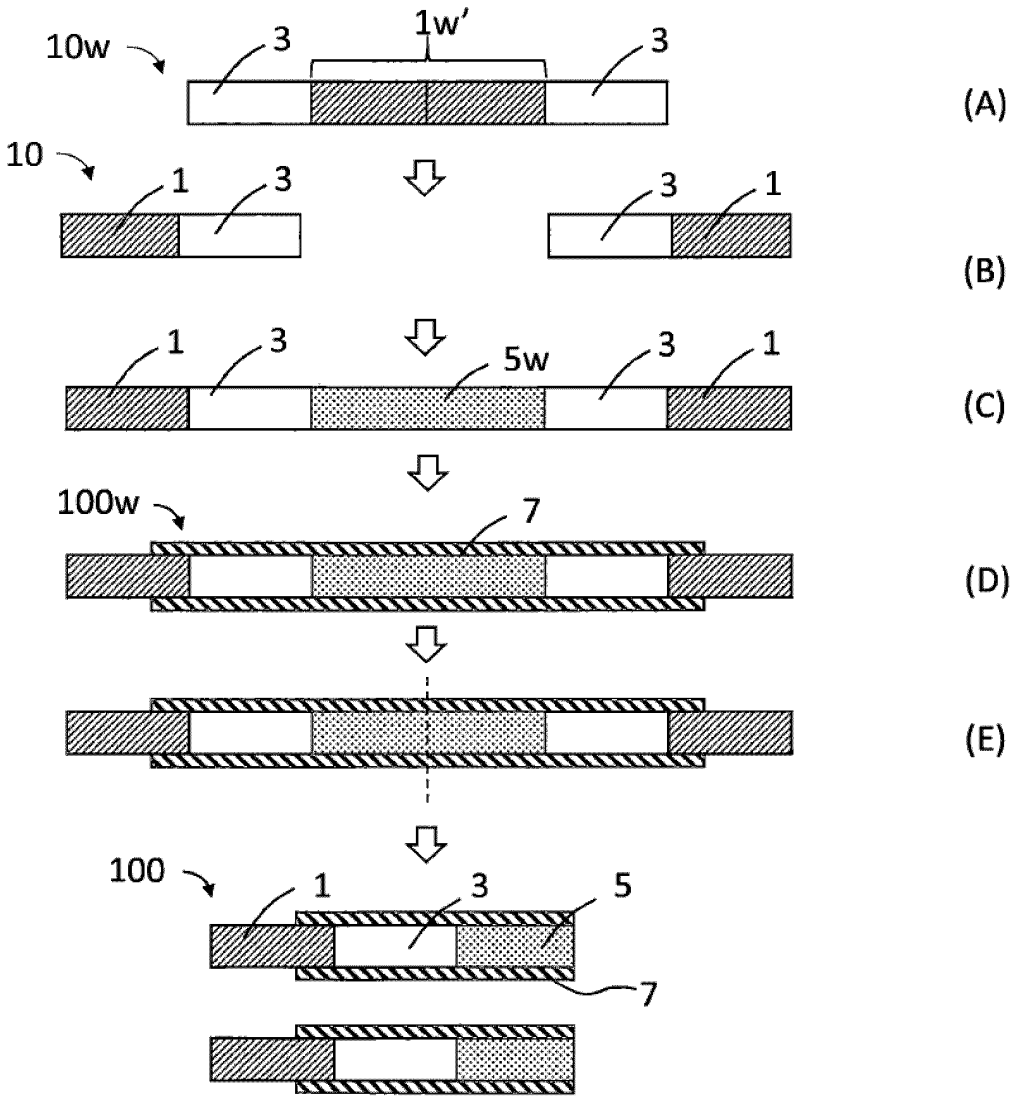

10w
3
1w'
3
(A)
10
1
3
3
1
(B)
1
3
5w
3
1
(C)
100w
7
(D)
(E)
100
1
3
5
7

Fig. 3

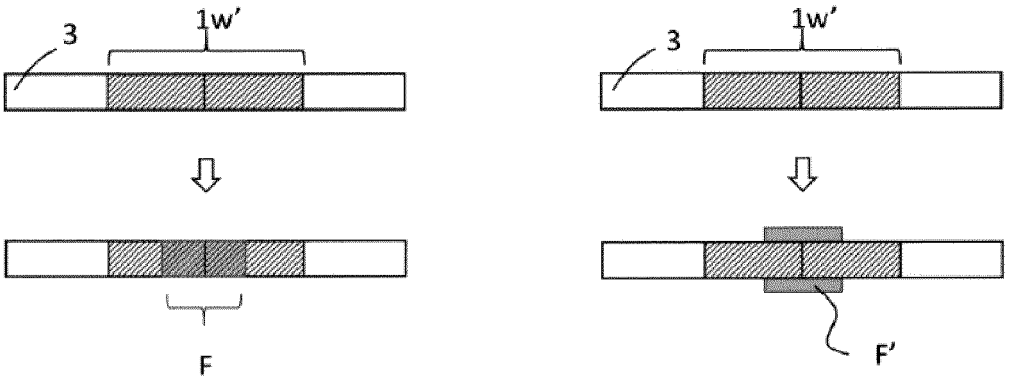
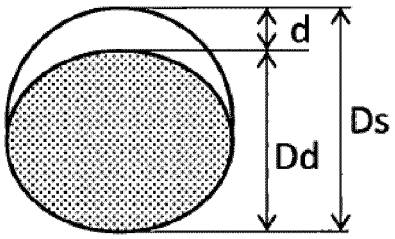
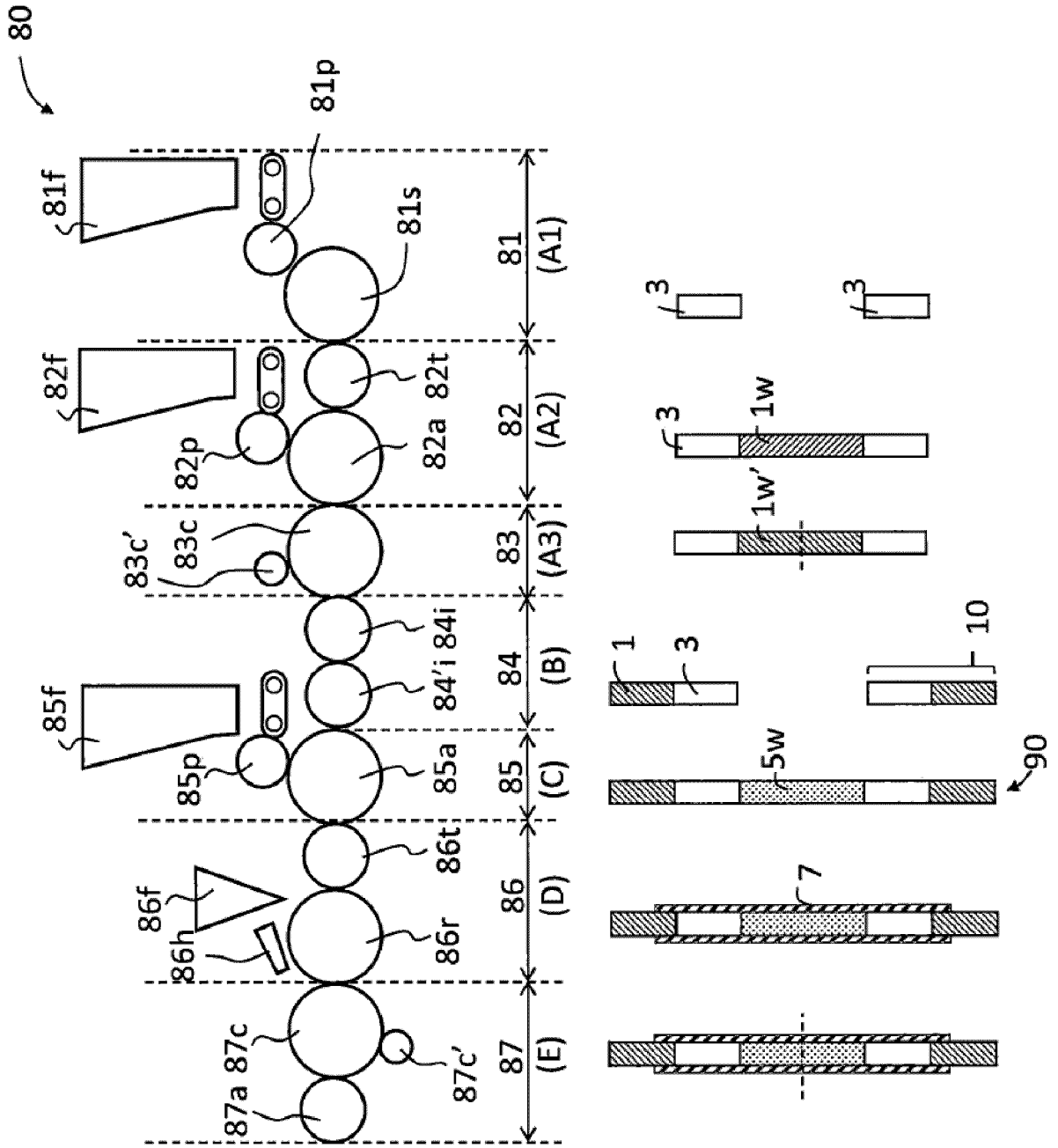


Fig. 4

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81s
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82p
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82t
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(A2)
83c'
83c
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(A3)
85f
85p
84'i
84i
84
(B)
85a
85
(C)
86f
86h
86t
86r
86
(D)
87a
87c
87c'
87
(E)
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1w
1w'
1
10
5w
90
7

Fig. 5

Fig. 6

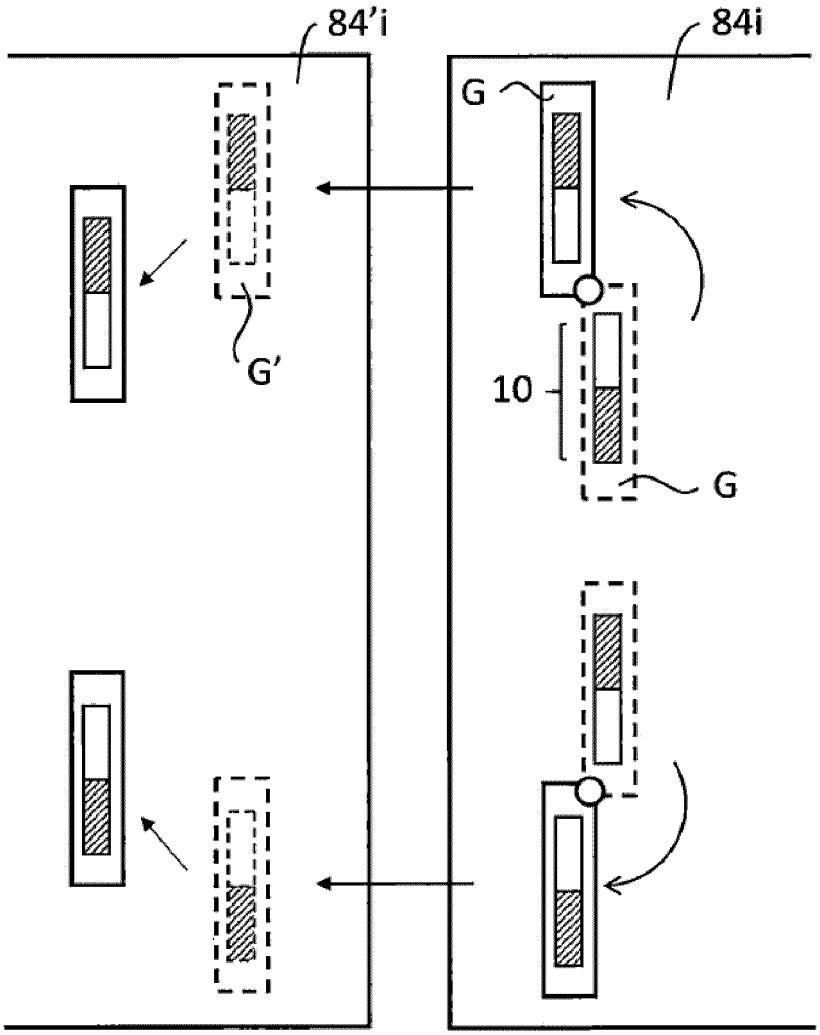


Fig. 7

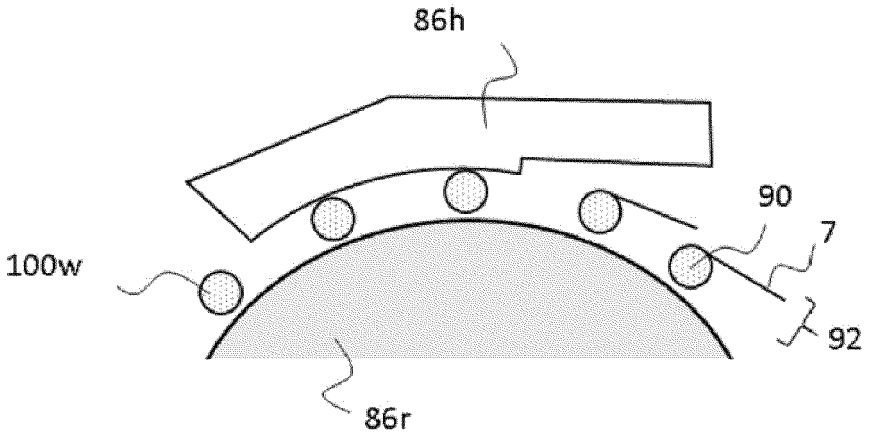
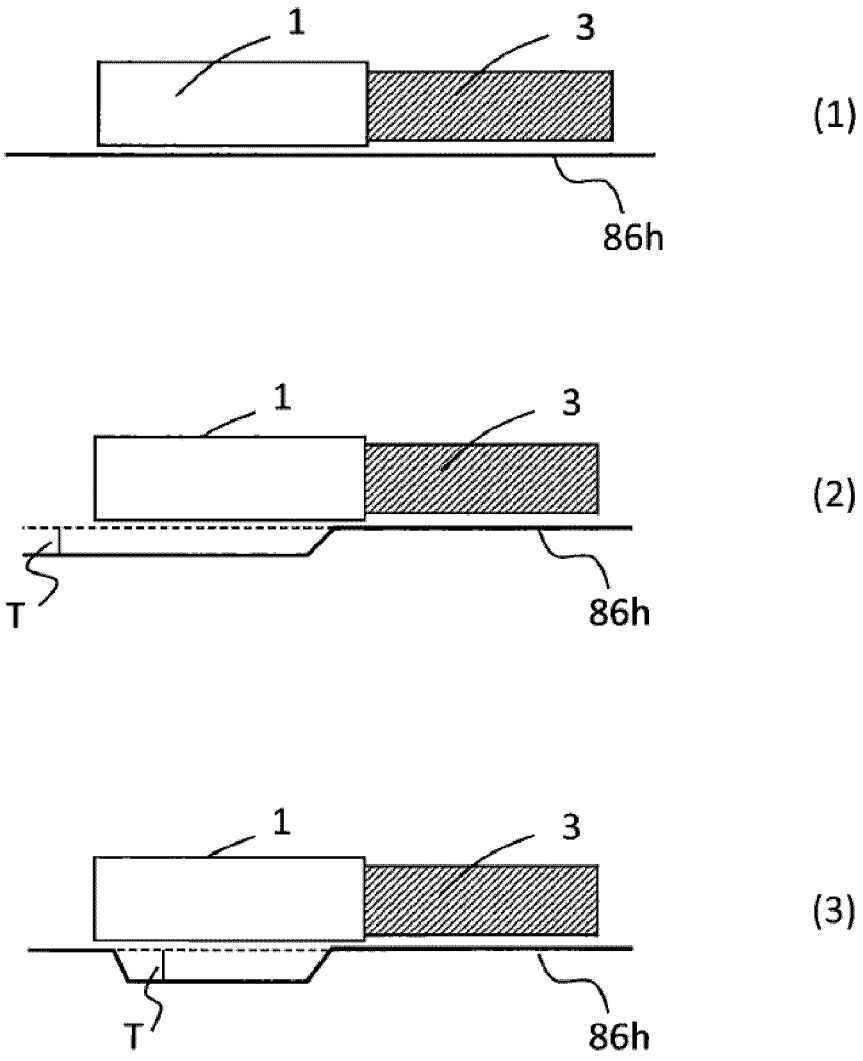


Fig. 8



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/037334

A. CLASSIFICATION OF SUBJECT MATTER
Int. Cl. A24C5/52(2006.01)i

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int. Cl. A24C5/00-5/60, A24D3/00-3/18

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	1971-2018
Registered utility model specifications of Japan	1996-2018
Published registered utility model applications of Japan	1994-2018

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	JP 7-165 A (PHILIP MORRIS PRODUCTS INC.) 06 January 1995, paragraphs [0015]-[0021], [0038]-[0042], fig. 3 & US 5425383 A, column 2, line 38 to column 3, line 15, column 7, line 41 to column 8, line 34, fig. 3 & EP 588555 A1 & DE 69316811 C	1-14
Y	JP 2010-508864 A (PHILIP MORRIS PRODUCTS S.A.) 25 March 2010, paragraphs [0005], [0012] & US 2007/0235050 A1, paragraphs [0042], [0047] & WO 2007/110650 A1 & EP 2007233 A1 & KR 10-2009-0008277 A & CN 101442917 A	1-14

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
19.11.2018	27.11.2018
Name and mailing address of the ISA/ Japan Patent Office 3-4-3, Kasumigaseki, Chiyoda-ku, Tokyo 100-8915, Japan	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/037334

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2016/143128 A1 (JAPAN TOBACCO INC.) 15 September 2016, paragraphs [0021]-[0027], fig. 3, 7 & EP 3231300 A1, paragraphs [0027]-[0033], fig. 3, 7	1-14
Y	GB 2259847 A (MOLINS PLC) 31 March 1993, column 4, line 37 to column 5, line 15, fig. 1, 2 (Family: none)	1-14
Y	JP 2002-176965 A (JAPAN TOBACCO INC.) 25 June 2002, paragraphs [0003], [0017]-[0022], fig. 1-4 (Family: none)	8-10, 14
A	US 3384094 A (MOLINS, Desmond Walter) 21 May 1968, column 1, lines 45-65, column 2, line 5-54, fig. 1-7 & GB 1088503 A & DE 1277093 B & FR 1428865 A	1-14
A	JP 63-3782 A (JAPAN TOBACCO INC.) 08 January 1988, page 4, lower left column, line 20 to lower right column, line 19, page 17, upper left column, line 5 to lower right column, line 13, fig. 10 & US 4815481 A, column 14, line 25 to column 15, line 31, fig. 10 & EP 250727 A1 & DE 3776819 A	1-14
A	JP 2015-532837 A (G.D SOCIETA' PER AZIONI) 16 November 2015, entire text, all drawings & US 2015/0289559 A1 & WO 2014/064655 A2 & EP 2911536 A2 & CN 104754963 A	1-14

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REFERENCES CITED IN THE DESCRIPTION

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- WO 2017081144 A **[0003]**
- JP 2016523565 W **[0026]**