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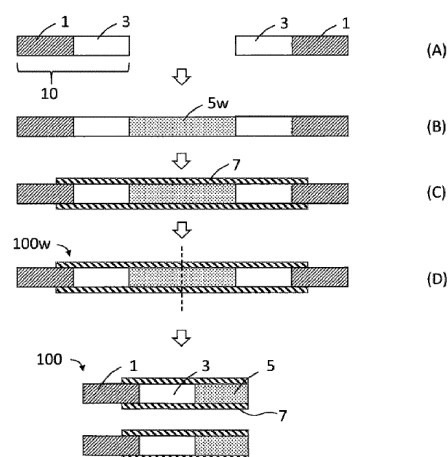
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(54) **PRODUCTION METHOD FOR SMOKING ARTICLE**

(57) Provided is a method of manufacturing a smoking article that has a tobacco rod, a cooling segment, and a filter segment, including (A) preparing a pair of tobacco segments each of which includes the tobacco rod and the cooling segment in contact with the end of the tobacco rod and placing the tobacco segments via a gap to align the longitudinal axes of the tobacco segments; (B) 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 of either of the tobacco segments, thereby preparing a composite segment; (C) integrating the composite segment by wrapping in one tipping paper to obtain a double-length smoking article; and (D) cutting the double-length smoking article in the central part in the longitudinal direction.

Fig. 2



Description

TECHNICAL FIELD

[0001] The present invention relates to a method of manufacturing a smoking article. 5

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 manufacturing method including: step 1 of placing a cooling part at each end of a tobacco rod and joining by wrapping in a first tipping paper; step 2 of cutting in the central part of the tobacco rod in the longitudinal direction to form a pair of tobacco rod/cooling part segments; step 3 of placing the segments via a gap and placing a filter segment in the gap; and step 4 of joining the tobacco rod/cooling part segments placed at both ends of the filter segment by wrapping in a second tipping paper. 10

CITATION LIST 25

PATENT LITERATURE

[0003] PTL 1: Japanese Unexamined Patent Application Publication (Translation of PCT Application) No. 2015-536678 30

SUMMARY OF INVENTION

TECHNICAL PROBLEM 35

[0004] Since a plurality of steps of joining with a tipping paper are included, the method described in PTL is more likely to damage rods. In view of this, an object of the present invention is to provide a method of efficiently manufacturing a smoking article. 40

SOLUTION TO PROBLEM

[0005] The inventors resolved the above-mentioned problem by performing once a step of joining with a tipping paper. In other words, the above-mentioned problem is resolved by the present invention below. 45

[0006] [Embodiment 1] A method of manufacturing a smoking article that has a tobacco rod, a cooling segment, and a filter segment, including 50

- (A) preparing a pair of tobacco segments each of which includes the tobacco rod and the cooling segment in contact with the end of the tobacco rod and placing the tobacco segments via a gap to align the longitudinal axes of the tobacco segments; 55
- (B) 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 of either of the tobacco segments, thereby preparing a composite segment; (C) integrating the composite segment by wrapping in one tipping paper to obtain a double-length smoking article; and (D) cutting the double-length smoking article in the central part in the longitudinal direction.

[0007] [Embodiment 2] The method according to Embodiment 1, where a step of A includes

- (A1) placing a pair of the tobacco rods via a gap to align the longitudinal axes of the tobacco rods; 15
- (A2) preparing a double-length cooling segment, which has a double length of the cooling segment, and placing the double-length cooling segment in the gap such that both ends of the double-length cooling segment come into contact with the end of either of the tobacco rods; and
- (A3) cutting the double-length cooling segment in the central part in the longitudinal direction and separating, thereby placing a pair of the tobacco segments via a gap to align the longitudinal axes of the tobacco segments. 20

[0008] [Embodiment 3] The method according to Embodiment 1, where a step of A includes

- (A1) placing a pair of the tobacco rods via a gap to align the longitudinal axes of the tobacco rods; 35
- (A2') preparing a separable double-length cooling segment, which has a double length of the cooling segment and is cut in the central part in the longitudinal direction, and placing the double-length cooling segment in the gap such that both ends of the double-length cooling segment come into contact with the end of either of the tobacco rods; and
- (A3') separating the double-length cooling segment in the central part, thereby placing a pair of the tobacco segments via a gap to align the longitudinal axes of the tobacco segments. 40

[0009] [Embodiment 4] The method according to Embodiment 1, where a step of A includes

- (A1) placing a pair of the tobacco rods via a gap to align the longitudinal axes of the tobacco rods; and 55
- (A2'') preparing a pair of the cooling segments and placing the cooling segments such that either ends of the respective cooling segments come into contact with the ends of the tobacco rods and the other ends are set apart from each other, thereby placing a pair of the tobacco segments via a gap to align the longitudinal axes of the tobacco segments.

[0010] [Embodiment 5] The method according to any of Embodiments 1 to 4, where the filter segment includes an acetate filter and a center hole filter.

[0011] [Embodiment 6] The method according to any of Embodiments 1 to 5, where the smoking article includes the tobacco rod, the cooling segment, and the filter segment in this order toward the downstream direction.

[0012] [Embodiment 7] The method according to any of Embodiments 1 to 6, where the tobacco rod has a diameter larger than a neighboring member.

[0013] [Embodiment 8] The method according to Embodiment 7, where the tobacco rod has a diameter 0.05 to 0.15 mm larger than the neighboring member.

[0014] [Embodiment 9] The method according to Embodiment 7, where the tobacco rod has a diameter 0.5 to 2.5% larger than the neighboring member.

[0015] [Embodiment 10] The method according to any of Embodiments 1 to 9, where a member neighboring the tobacco rod has stiffness higher than the tobacco rod.

[0016] [Embodiment 11] The method according to any of Embodiments 1 to 10, where the cooling segment includes a paper tube having a plurality of holes in the circumferential direction.

[0017] [Embodiment 12] The method according to Embodiment 11, 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.

[0018] [Embodiment 13] The method according to any of Embodiments 1 to 12, where

a step of C 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.

[0019] [Embodiment 14] A smoking article including a tobacco rod, a cooling segment, and a filter segment, where the tobacco rod has a diameter larger than a neighboring member.

[0020] [Embodiment 15] The smoking article according to Embodiment 14, where the tobacco rod has a diameter 0.05 to 0.15 mm larger than the neighboring member.

[0021] [Embodiment 16] The smoking article according to Embodiment 14, where the tobacco rod has a diameter 0.5 to 2.5% larger than the neighboring member.

[0022] [Embodiment 17] The smoking article according to any of Embodiments 14 to 16, where a segment neighboring the tobacco rod has stiffness higher than the tobacco rod.

ADVANTAGEOUS EFFECTS OF INVENTION

[0023] According to the present invention, it is possible to provide a method of efficiently manufacturing a smoking article.

BRIEF DESCRIPTION OF DRAWINGS

[0024]

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 illustrates another embodiment of step A in the manufacturing method of the present invention.

Fig. 5 illustrates a further embodiment of step A in the manufacturing method of the present invention.

Fig. 6 is a view for illustrating a measurement method for stiffness.

Fig. 7 illustrates an embodiment of an apparatus for performing the manufacturing method of the present invention.

Fig. 8 illustrates an embodiment of step C.

Fig. 9 illustrates embodiments of step C.

DESCRIPTION OF EMBODIMENTS

[0025] 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

[0026] 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

[0027] 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.

[0028] 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.

[0029] 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. 6, the amount depressed is $d = D_s - D_d$ and the stiffness is defined by the following formula. The same applies to other members.

$$\text{Stiffness (\%)} = D_d/D_s \times 100$$

(2) Cooling Segment

[0030] 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

[0031] 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), a filter segment 5 is preferably composed of a plurality of members, and more 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 the 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

[0032] 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.

[0033] 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 pre-

pared using a bleaching agent, such as an oxidant or a reductant.

[0034] 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.

[0035] The lower limit of the basis weight of a paper wrapper is preferably 30 g/m² or more, more preferably 35 g/m² or more, and further preferably 40 g/m² or more. The upper limit is preferably 65 g/m² or less and more preferably 50 g/m² or less. Meanwhile, the lower limit of the basis weight of a tipping paper is preferably 20 g/m² or more, more preferably 25 g/m² or more, and further preferably 30 g/m² or more. The upper limit is preferably 50 g/m² or less, more preferably 45 g/m² or less, and further preferably 40 g/m² or less. The basis weight can be measured by the method specified in JIS P 8124.

2. Manufacturing Method

[0036] 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.

(1) Step A

[0037] In this step, a pair of tobacco segments 10 each of which includes a tobacco rod 1 and a cooling segment 3 in contact with the end of the tobacco rod are prepared and placed via a gap to align the longitudinal axes of the tobacco segments. The distance between the tobacco segments is preferably the length of a double-length filter segment 5w used in the next step. Step A is performed in any appropriate manner but is preferably preformed through the following steps (Fig. 3);

- (A1) a step of placing a pair of tobacco rods 1 via a gap to align the longitudinal axes of the tobacco rods;
- (A2) a step of preparing a double-length cooling segment 3w, which has a double length of the cooling segment 3, and placing the double-length cooling segment 3w in the gap such that both ends of the double-length cooling segment 3w come into contact with the end of either of the tobacco rods 1; and
- (A3) a step of cutting the double-length cooling segment 3w in the central part in the longitudinal direction and separating, thereby placing a pair of the tobacco segments 10 via a gap to align the longitudinal axes of the tobacco segments.

[0038] 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. 7. One drum preferably has one function rather than a plurality of functions since defect generation can be suppressed in high-speed manufacture. For example, step A1 can be performed in the first unit 81 of Fig. 7 where 81f is a feeder for tobacco rods 1, 81p is a picking-up drum, and 81s is a separating drum. A pair of tobacco rods 1 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 tobacco rods 1 are passed to the separating drum 81s and separated in a holding section while being transferred. In each unit, one or a plurality of drums may have a feeding, receiving, transferring, or separating function.

[0039] Step A2 can be performed in the second unit 82 of Fig. 7 where 82f is a feeder for a double-length cooling segment 3w, 82t is a transfer drum, 82p is a picking-up drum, and 82a is a receiving drum. The pair of the tobacco rods 1 placed via a gap are passed in this state to the transfer drum 82t. Meanwhile, a double-length cooling segment 3w 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 cooling segment 3w is placed in the gap between the pair of the separately placed tobacco rods 1 such that both ends of the double-length cooling segment 3w come into contact with the end of either of the tobacco rods 1.

[0040] Step A3 can be performed in the third unit 83 of Fig. 7 where 83c is a cutter drum, 83c' is a cutter, and 83s is a separating drum. A segment including the pair of the tobacco rods 1 at either end of the double-length cooling segment 3w 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 cooling segment 3w. Subsequently, the segment is passed to the separating drum 83s and placed via a gap.

[0041] Moreover, step A is preferably performed through the following steps (Fig. 4);

- (A1) a step of placing a pair of tobacco rods 1 via a gap to align the longitudinal axes of the tobacco rods;
- (A2') a step of preparing a separable double-length cooling segment 3w', which has a double length of the cooling segment 3 and is cut in the central part in the longitudinal direction, and placing the double-length cooling segment 3w' in the gap such that both ends of the double-length cooling segment 3w' come into contact with the end of either of the tobacco rods 1; and
- (A3') a step of separating the double-length cooling segment 3w' in the central part, thereby placing a pair of the tobacco segments 10 via a gap to align the longitudinal axes of the tobacco segments.

[0042] Since this method uses, in step A2', the double-length cooling segment 3w' cut in advance, there is an

advantage that cutting failure can be avoided even if the cooling segment is formed from a hard-to-cut material. In addition, by using the double-length segment cut in advance, there is also an advantage that the entire length of a machine for performing this method can be shortened.

[0043] Further, step A is preferably performed through the following steps (Fig. 5);

(A1) a step of placing a pair of tobacco rods 1 via a gap to align the longitudinal axes of the tobacco rods; and

(A2") a step of preparing a pair of cooling segments 3 and placing the cooling segments such that either ends of the respective cooling segments come into contact with the ends of the tobacco rods 1 and the other ends are set apart from each other, thereby placing a pair of the tobacco segments 10 via a gap to align the longitudinal axes of the tobacco segments.

[0044] Since the distance between the tobacco rods is long in step A1, the number of times the tobacco rods are moved can be reduced in this method. Consequently, there is an advantage that the damage to tobacco rods can be avoided during high-speed manufacture or the like.

[0045] Step A has an advantage, in addition to the foregoing, that the height of an apparatus body can be reduced in an apparatus for performing this method since cutting is performed after placing each member. For example, when cutting is performed before placing a member in the above-described apparatus, it is necessary to provide a drum for cutting the member above a drum for transferring the member. As a result, the apparatus body becomes high since a cutting drum needs to be added in the height direction of the apparatus. Meanwhile, since cutting is performed after placing each member, step A can reduce the height of an apparatus body.

(2) Step B

[0046] 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 5w come into contact with the end of either of the tobacco segments 1, thereby preparing a composite segment.

[0047] This step can be performed in the fourth unit 84 of Fig. 7. In the figure, 84f is a feeder for a double-length filter segment 5w, 84p is a picking-up drum, and 84a is a receiving drum. The segments prepared in the third unit 83 are passed to the receiving drum 84a. Meanwhile, a double-length filter segment 5w fed from the feeder 84f is passed to a holding section provided on the circumferential surface of the picking-up drum 84p and then passed to the receiving drum 84a. On this occasion, the double-length filter segment 5w is placed in the gap be-

tween 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.

(3) Step C

[0048] 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.

[0049] 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 with 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.

[0050] This step can be performed in the fifth unit 85 of Fig. 7. In the figure, 85f is a feeder for a tipping paper 7, 85t is a transfer drum, 85r is a rolling drum, and 85h 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 85t and then passed to the rolling drum 85r. Meanwhile, part of the tipping paper 7 fed from the feeder 85f is attached to the circumferential surface of the segment on the rolling drum 85r, thereby forming a precursor 92 (see Fig. 8). 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 85r through suction

or the like and transferred to the gap formed between the rolling drum 85r and the rolling hand 85h. 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. 8).

[0051] 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 85r and the rolling hand 85h are flat, excessive contact arises between these surfaces and the tobacco rod 1 (Fig. 9 (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 85r or rolling hand 85h surface that faces the tobacco rod 1 as illustrated in Figs. 9 (2) and (3). Although Figs. 9 (2) and (3) illustrate embodiments in which a depression is provided on the rolling hand 85h, a depression may be provided on the rolling drum 85r or both the rolling drum and the rolling hand. The depth of the depression (T in Figs. 9(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. 9, 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 D

[0052] 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.

[0053] This step can be performed in the sixth unit 86 of Fig. 7. In the figure, 86c is a cutter drum, 86c' is a cutter, and 86a is a receiving drum. The double-length smoking article 100w is passed to the cutter drum 86c 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 86a, separated, and isolated as products.

[0054] 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.

EXAMPLES

[Example 1]

[0055] The following members were prepared.

[0056] Tobacco rod of 7.0 mm in diameter and 20.0 mm in length (from Japan Tobacco Inc.)

[0057] Double-length paper tube of 6.9 mm in diameter and 40.0 mm in length as a cooling segment

[0058] 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 filters (8.0 mm)

[0059] Tipping paper of 24.0 mm × 80.0 mm

[0060] A pair of tobacco rods were placed via a gap to align the longitudinal axes of the tobacco rods (step A1). Into the gap, a double-length paper tube was inserted (step A2). On this occasion, both ends of the double-length cooling segment were in contact with the end of either of the tobacco rods. The double-length cooling segment was cut in the central part in the longitudinal direction and separated, thereby placing a pair of tobacco segments via a gap to align the longitudinal axes of the tobacco segments (step A3). Into the gap, a double-length filter segment was inserted. On this occasion, both ends of the double-length filter segment were in contact with the end of either the paper tube (step B). A composite segment thus obtained was integrated by wrapping in one tipping paper to obtain a double-length smoking article (step C). The double-length smoking article was cut in the central part in the longitudinal direction to yield two smoking articles (step D).

REFERENCE SIGNS LIST

[0061]

1	Tobacco rod
3	Cooling segment
3w	Double-length cooling segment
3w'	Separable double-length cooling segment
5	Filter segment
5w	Double-length filter segment
51	Acetate filter
53	Center hole filter
7	Tipping paper
10	Tobacco segment
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
 84f Feeder
 84p Picking-up drum
 84a Receiving drum
 85 Fifth unit
 85f Tipping paper feeder
 85t Transfer drum
 85r Rolling drum
 85h Rolling hand
 86 Sixth unit
 86c Cutter drum
 86c' Cutter
 86a 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 tobacco rod, a cooling segment, and a filter segment, comprising

(A) preparing a pair of tobacco segments each of which includes the tobacco rod and the cooling segment in contact with the end of the tobacco rod and placing the tobacco segments via a gap to align the longitudinal axes of the tobacco segments;

(B) 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 of either of the tobacco segments, thereby preparing a composite segment;

(C) integrating the composite segment by wrapping in one tipping paper to obtain a double-length smoking article; and

(D) cutting the double-length smoking article in the central part in the longitudinal direction.

2. The method according to Claim 1, wherein a step of A includes

(A1) placing a pair of the tobacco rods via a gap to align the longitudinal axes of the tobacco rods; (A2) preparing a double-length cooling segment, which has a double length of the cooling segment, and placing the double-length cooling segment in the gap such that both ends of the

double-length cooling segment come into contact with the end of either of the tobacco rods; and (A3) cutting the double-length cooling segment in the central part in the longitudinal direction and separating, thereby placing a pair of the tobacco segments via a gap to align the longitudinal axes of the tobacco segments.

3. The method according to Claim 1, wherein a step of A includes

(A1) placing a pair of the tobacco rods via a gap to align the longitudinal axes of the tobacco rods; (A2') preparing a separable double-length cooling segment, which has a double length of the cooling segment and is cut in the central part in the longitudinal direction, and placing the double-length cooling segment in the gap such that both ends of the double-length cooling segment come into contact with the end of either of the tobacco rods; and (A3') separating the double-length cooling segment in the central part, thereby placing a pair of the tobacco segments via a gap to align the longitudinal axes of the tobacco segments.

4. The method according to Claim 1, wherein a step of A includes

(A1) placing a pair of the tobacco rods via a gap to align the longitudinal axes of the tobacco rods; and (A2'') preparing a pair of the cooling segments and placing the cooling segments such that either ends of the respective cooling segments come into contact with the ends of the tobacco rods and the other ends are set apart from each other, thereby placing a pair of the tobacco segments via a gap to align the longitudinal axes of the tobacco segments.

5. The method according to any of Claims 1 to 4, wherein the filter segment includes an acetate filter and a center hole filter.

6. The method according to any of Claims 1 to 5, wherein the smoking article includes the tobacco rod, the cooling segment, and the filter segment in this order toward the downstream direction.

7. The method according to any of Claims 1 to 6, wherein the tobacco rod has a diameter larger than a neighboring member.

8. The method according to Claim 7, wherein the tobacco rod has a diameter 0.05 to 0.15 mm larger than the neighboring member.

9. The method according to Claim 7, wherein the tobacco rod has a diameter 0.5 to 2.5% larger than the neighboring member.
10. The method according to any of Claims 1 to 9, wherein a member neighboring the tobacco rod has stiffness higher than the tobacco rod. 5
11. The method according to any of Claims 1 to 10, wherein the cooling segment includes a paper tube having a plurality of holes in the circumferential direction. 10
12. The method according to Claim 11, 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. 15
13. The method according to any of Claims 1 to 12, wherein 20
 - a step of C 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 25
 - 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. 30
14. A smoking article comprising a tobacco rod, a cooling segment, and a filter segment, wherein the tobacco rod has a diameter larger than a neighboring member. 35
15. The smoking article according to Claim 14, wherein the tobacco rod has a diameter 0.05 to 0.15 mm larger than the neighboring member. 40
16. The smoking article according to Claim 14, wherein the tobacco rod has a diameter 0.5 to 2.5% larger than the neighboring member. 45
17. The smoking article according to any of Claims 14 to 16, wherein a segment neighboring the tobacco rod has stiffness higher than the tobacco rod. 50

55

Fig. 1

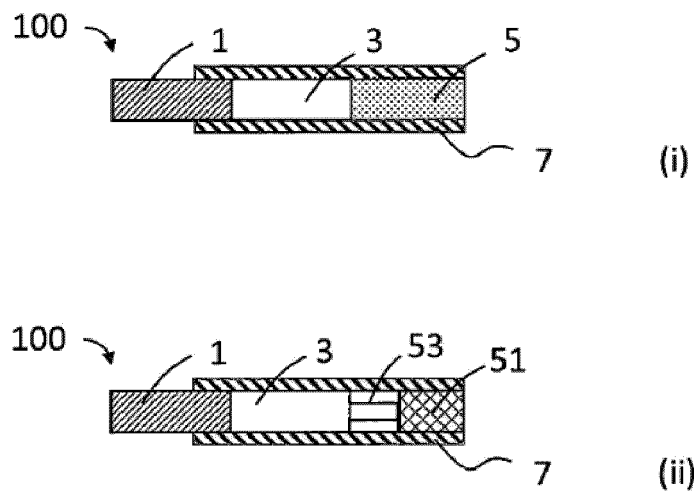


Fig. 2

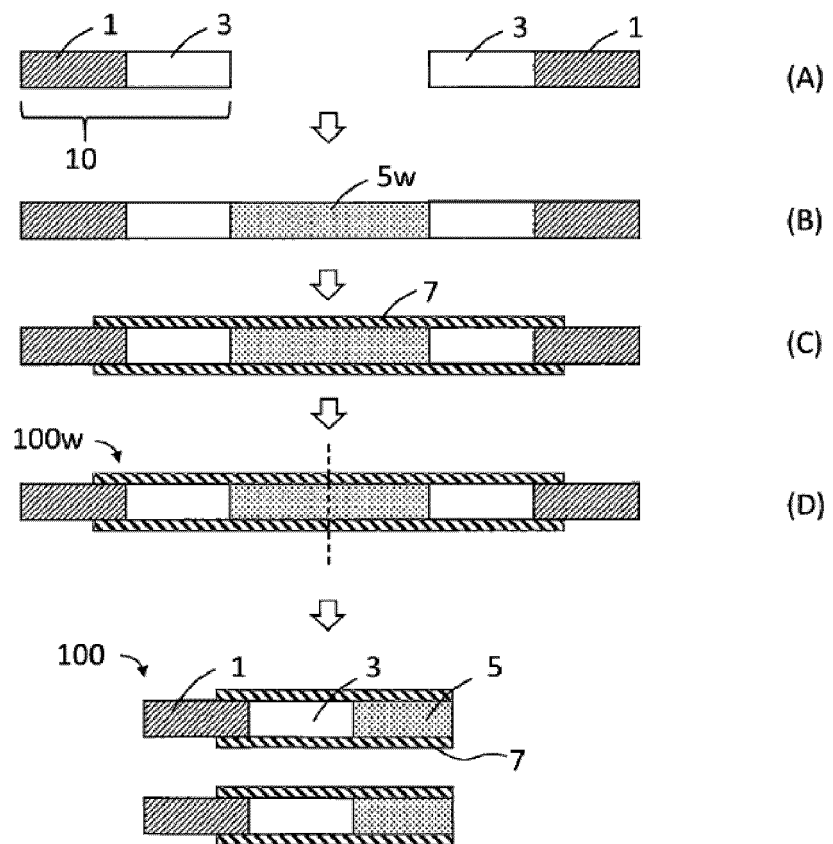


Fig. 3

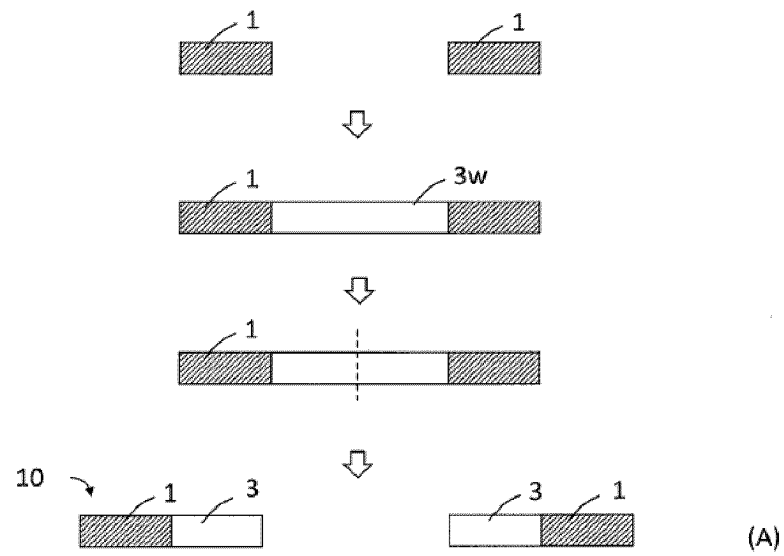


Fig. 4

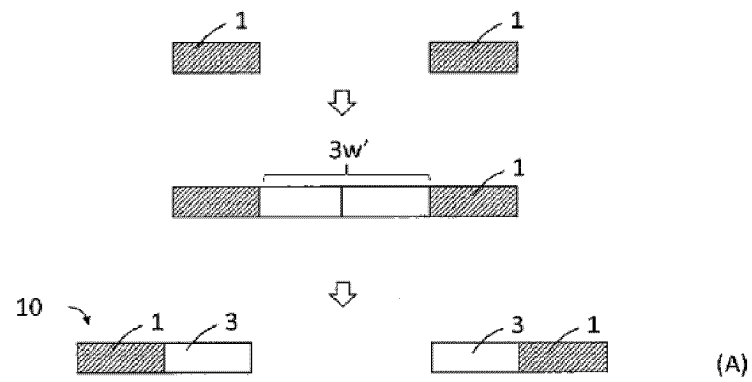


Fig. 5

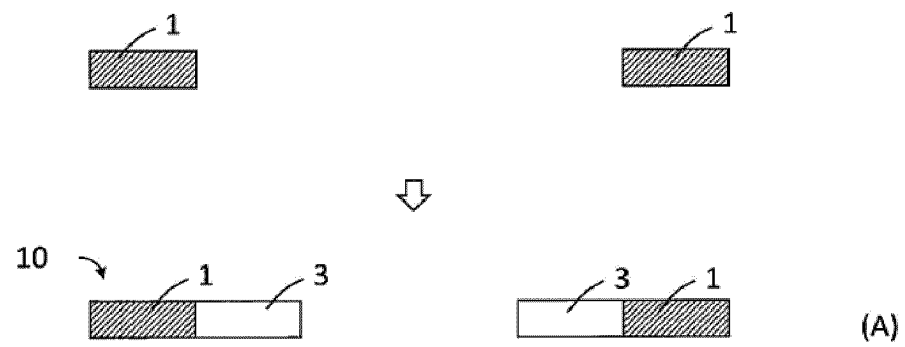


Fig. 6

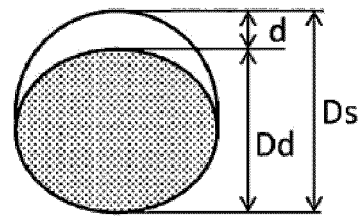


Fig. 7

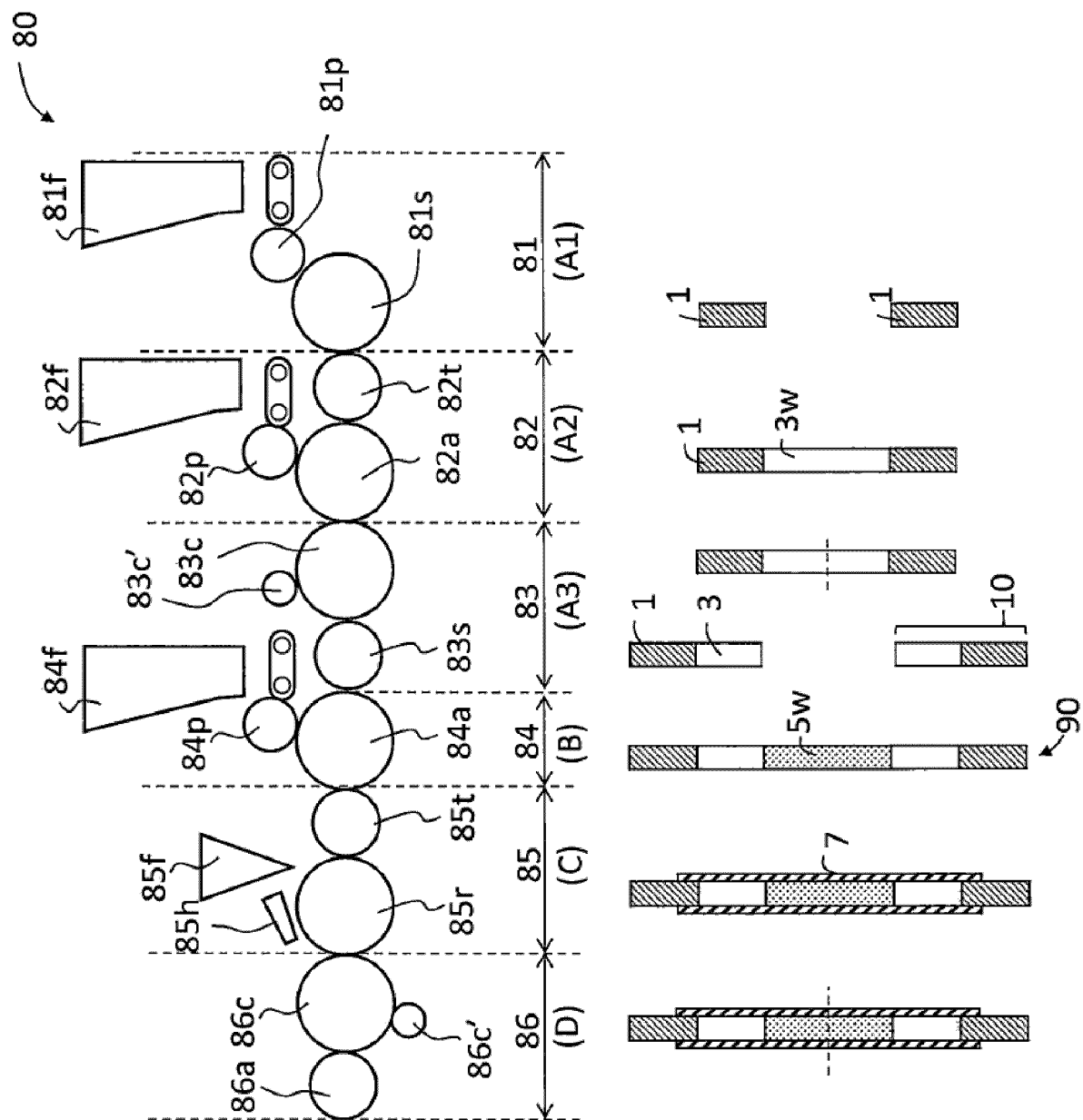


Fig. 8

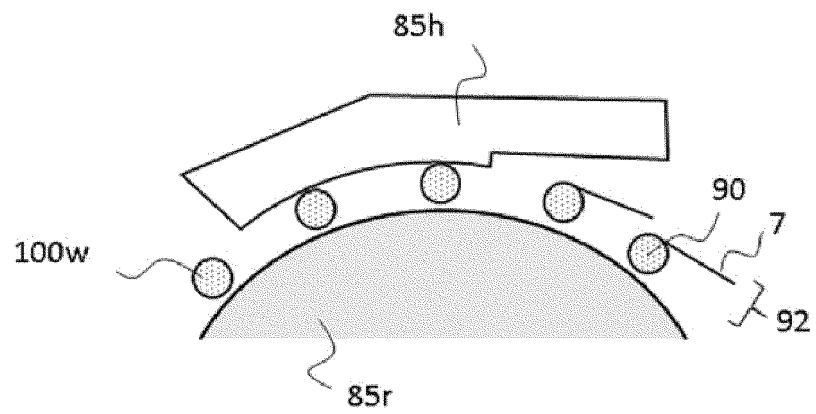
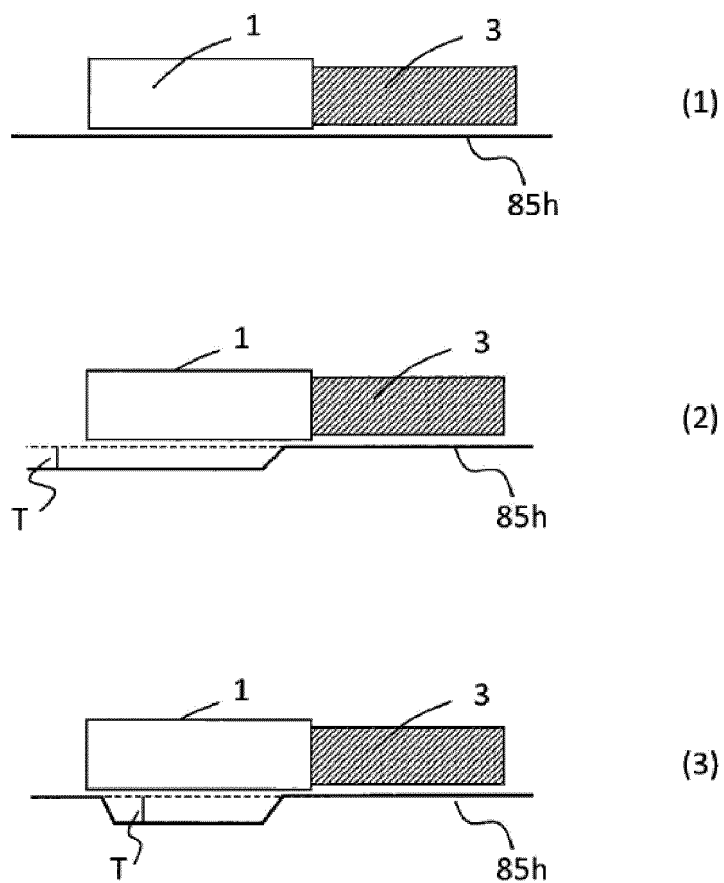


Fig. 9



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2018/037320

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	1-13
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	1-17

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

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search
16.11.2018Date of mailing of the international search report
27.11.2018Name and mailing address of the ISA/
Japan Patent Office
3-4-3, Kasumigaseki, Chiyoda-ku,
Tokyo 100-8915, Japan

Authorized officer

Telephone No.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/037320

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2002-176965 A (JAPAN TOBACCO INC.) 25 June 2002, paragraphs [0003], [0017]-[0022], fig. 1-4 (Family: none)	7-9, 13-17
A	US 3384094 A (MOLINS, Desmond Walter) 21 May 1968, column 1, line 45 to line 65, column 2, line 5, to line 54, fig. 1-7 & GB 1088503 A & DE 1277093 B & FR 1428865 A	1-13
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	1-13
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	1-13

Form PCT/ISA/210 (continuation of second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP2018/037320

Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

[see extra sheet]

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

INTERNATIONAL SEARCH REPORT

International application No. PCT/JP2018/037320
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5 (continuation of Box No. III)

10 The invention in claim 1 and the invention in claim 14 both relate to a smoking article which comprises a tobacco rod, a cooling segment, and a filter segment, and in that sense share the same feature. However, such a feature is so well-known that it is not necessary to provide any example thereof, and thus is not a feature that makes a contribution over the prior art (i.e., special technical feature).

15 Therefore, this application includes at least the following two inventions:

(1) An invention relating to a smoking article manufacturing method including the steps specified by A to D (claims 1-13); and

20 (2) An invention relating to a smoking article in which the diameter of the tobacco rod is greater than the diameter of adjacent members (claims 14-17).

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- JP 2015536678 PCT [0003]
- JP 2016523565 PCT [0029]