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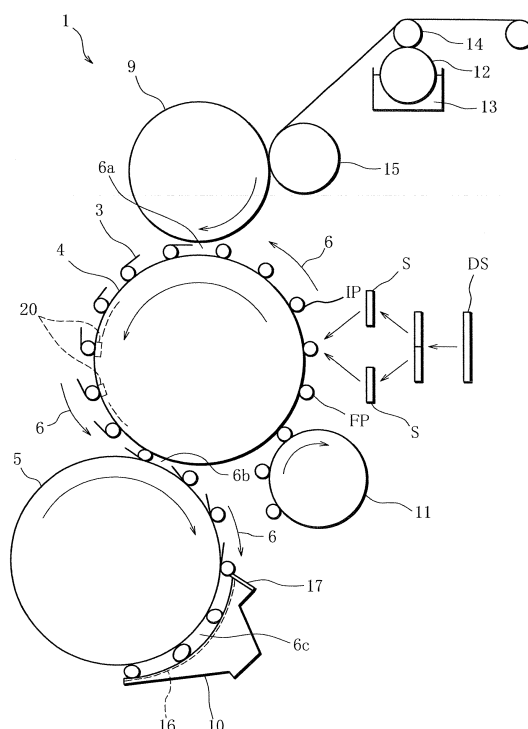
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(54) **FILTER MOUNTING DEVICE**

(57) A filter tip attachment has a conveying path (6) configured to convey an intermediate product (IP); a first conveying drum (4) configured to convey the intermediate product (IP) while holding the intermediate product (IP); a second conveying drum (5) configured to receive the intermediate product (IP) from the first conveying drum (4) and to convey the intermediate product (IP) in the circumferential direction of the second conveying drum (5); a supply drum (9) configured to distribute a tip paper (3) and attach the head edge of the tip paper (3) to the intermediate product (IP); and a guide member (10) provided adjacent to the second conveying drum (5) along the circumferential direction of the second conveying drum (5) and configured to wind the tip paper (3) around the intermediate product (IP) by rolling the intermediate product (IP) while being in contact with the guide member (10), wherein the conveying path (6) is configured such that diameter enlarged sections, which have a diameter enlarged along the conveying path (6), are provided in portions (6a, 6b, 6c) where the conveying path (6) is narrower than the diameter of the filter plug (FP), the portions (6a, 6b, 6c) corresponding with a position where a capsules (2) is enclosed in a filter plug (FP).

FIG. 1



Description

Technical Field

[0001] The present invention relates to a filter tip attachment.

Background Art

[0002] As is known in the art, a filter tip attachment forms an intermediate product by arranging a filter plug between two cigarettes, and then wraps the intermediate product in a tip paper to form a double filter cigarette (see, for example, Patent Document 1). As shown in Patent Document 1, the intermediate product is made to pass through passages between various drums and between drums and members in the process of winding the tip paper around the intermediate product. At this time, in some cases, gaps defining the passage are smaller than the diameter of the filter, so that the filter is made to pass through the passage while being compressed.

[0003] However, in the case of a capsule-in filter, the capsule may be broken when passing through the narrow passage. It is also considered to cope with this problem by reducing the size of the capsule. However, when the size of the capsule is reduced, the amount of perfume in the capsule is limited. Especially in the case of a very thin cigarette, the size of the capsule is extremely reduced to make it difficult to enable a sufficient amount of flavor to be enclosed in the capsule. Further, also in the case of a hollow filter, when the filter is made to pass through the narrow passage, the filter may be compressed so that the shape of the hollow portion of the filter is deformed.

Prior Art Document

Patent Document

[0004] Patent Document 1: Japanese Patent Laid-Open No. 2002-176965

Summary of the Invention

Problems to be solved by the Invention

[0005] The present invention is to provide a filter tip attachment which is capable of, when a filter is attached to a cigarette by using a tip paper, preventing damage of a capsule enclosed in the filter or preventing deformation of a hollow portion of the filter.

Means for Solving the Problems

[0006] The present invention is to provide a filter tip attachment configured to form an intermediate product of a double filter cigarette by arranging a filter plug between two cigarettes, and then to form the double filter

cigarette by winding around the intermediate product, a connection paper with an adhesive applied to one surface thereof. The filter tip attachment comprises a conveying path configured to convey the filter plug or the intermediate product, or to convey a preprocessed product or a post-processed product before or after processing of the filter plug or the intermediate product, wherein the conveying path is configured such that a diameter enlarged section having a diameter enlarged at a position along the conveying path is provided in a portion where the conveying path is narrower than the diameter of the filter plug or the intermediate product, or the diameter of the preprocessed product or the post-processed product before or after processing of the filter plug or the intermediate product.

[0007] Further, the filter tip attachment further includes: a first conveying drum configured to convey the intermediate product in the circumferential direction of the first conveying drum while holding the intermediate product; a second conveying drum forming the conveying passage and configured to receive the intermediate product from the first conveying drum and to convey the intermediate product in the circumferential direction of the second conveying drum; a supply drum arranged to be adjacent to the first conveying drum and configured to distribute a tip paper and to attach the head edge of the tip paper to the intermediate product conveyed along the first conveying drum; and a guide member arranged to be adjacent to the second conveying drum along the circumferential direction of the second conveying drum and configured to enable the tip paper to be wound around the intermediate product where the intermediate product is rolled in contact with the guide member.

[0008] Preferably, the diameter enlarged section is a recess formed at a holding section at which the intermediate product is held by the first conveying drum.

[0009] Preferably, the diameter enlarged section is a groove formed on the guide member along the circumferential direction of the second conveying drum facing the guide member.

[0010] Preferably, the groove has chamfered sections formed by chamfering side wall upper portions of the groove along the longitudinal direction of the groove.

[0011] Preferably, a capsule is enclosed in the filter plug, and the diameter enlarged section is provided so as to correspond to the position at which the capsule is enclosed.

[0012] Further, the filter tip attachment further includes a hopper in which the preprocessed product is accommodated, and is configured such that the conveying path is formed between a pair of upper and lower sets of a plurality of conveying rollers for sending out the preprocessed product to the hopper, and the diameter enlarged section is formed on the conveying rollers, respectively.

Advantageous Effects of the Invention

[0013] According to the present invention, the diameter

enlarged section, which has a diameter enlarged along the conveying passage and at a position where the capsule is enclosed, is provided in a portion where the conveying passage is narrower than the diameter of the filter plug, and hence it is possible to prevent that the capsule enclosed in the filter plug is crushed while being conveyed through the conveying path narrower than the diameter of the filter plug. The conveying path is intentionally formed to be narrow in order that the function of the manufacturing process is exhibited by compressing the intermediate product. However, the diameter enlarged section is formed along the conveying path and at the position where the capsule is enclosed, and hence other portions of the intermediate product are made to pass through the narrow conveying path by being compressed as usual. Therefore, the function of the manufacturing process in the narrow conveying passage is not lowered.

[0014] Further, in the case where a recess is formed, as the diameter enlarged section, at the holding section at which the intermediate product is held by the first conveying drum, when performing a process of conveying the intermediate product while compressing the intermediate product in the state where the intermediate product is held by the first conveying drum, the capsule is made to slightly enter the recess and hence is prevented from being crushed and broken.

[0015] Further, in the case where a groove formed on the guide member along the circumferential direction of the second conveying drum facing the guide member is used as the diameter enlarged section, the intermediate product is rolled while being compressed between the second conveying drum and the guide member, so that the capsule can be prevented from being broken when the tip paper is wound around the intermediate product. That is, when the intermediate product is rolled, the capsule is moved along the groove, the portion of the capsule is not compressed, and hence the capsule is not crushed and broken.

[0016] Further, the groove has chamfered sections formed by chamfering its side wall upper portions along the longitudinal direction of the groove, and hence, when the intermediate product is rolled, the formation of a wrinkle and an indentation of the chip paper can be prevented by the edge of the groove.

Brief Description of the Drawings

[0017]

FIG. 1 is a schematic view of a filter tip attachment according to the present invention.

FIG. 2 is a schematic plan view showing a state where a groove serving as diameter enlarging sections are provided at a guide member.

FIG. 3 is a sectional view of the groove of FIG. 2.

FIG. 4 is a schematic view of a holding unit.

FIG. 5 is a sectional view taken along line A-A in FIG. 4.

FIG. 6 is a schematic view showing a state where a diameter enlarging sections are provided on a supply drum.

FIG. 7 is a schematic view of a filter tip attachment according to the present invention.

FIG. 8 is a schematic view of conveying rollers.

Mode for Carrying out the Invention

[0018] A filter tip attachment 1 according to the present invention is configured such that an intermediate product IP for a double filter cigarette is formed by arranging, between two cigarettes S, a filter plug FP with capsules 2 enclosed therein (see FIG. 2), and such that a tip paper 3 with an adhesive applied to one surface thereof is then wound around the intermediate product IP, to thereby form the double filter cigarette. Specifically, as shown in FIG. 1, the filter tip attachment 1 includes a conveying path 6 defined along circumferences of a first conveying drum 4 and a second conveying drum 5. The conveying path 6 is a passage through which the intermediate product is conveyed. The first conveying drum 4 forms an upstream portion of the conveying path 6, and the second conveying drum 5 forms a downstream portion of the conveying path 6.

[0019] The first conveying drum 4 is also referred to as a swash plate drum. The first conveying drum 4 is formed by arranging, on the outer circumference thereof, a plurality of holding units 8, each of which is provided with a suction groove 7 for sucking the intermediate product IP while accommodating therein a part of the intermediate product IP (see FIG. 4). Each of the intermediate products IP is accommodated in the holding unit 8, and conveyed in the circumferential direction of the first conveying drum 4. The second conveying drum 5, which is also referred to as a rolling drum, receives the intermediate product IP from the first conveying drum 4 and conveys the intermediate product IP in the circumferential direction of the second conveying drum 5. Holding grooves, each of which can receive therein the intermediate product IP along the axis direction of the product IP, are formed on the outer peripheral surface of the second conveying drum 5, and the intermediate products IP are conveyed along with the holding grooves.

[0020] A supply drum 9 is arranged so as to be adjacent to the first conveying drum 4. A tip paper as an example of a connection paper is distributed from the supply drum 9, and the head edge of the tip paper is attached to the intermediate product IP conveyed along the first conveying drum 4. On the other hand, a guide member 10 is arranged so as to be adjacent to the second conveying drum 5 along the circumferential direction of the second conveying drum 5. The guide member 10 rolls the intermediate product IP in cooperation with the second conveying drum 5, to wind the tip paper around the intermediate product.

[0021] Processes for actually winding the tip paper around the intermediate product IP by using the filter tip

attachment 1 having the above-described structure will be described in order. A double cigarette DS having a length of two cigarettes and manufactured by known means is cut into two single cigarettes S in the process of conveying the double cigarette DS. Thereafter, the two single cigarettes S are separated from each other in the axis direction thereof, so that a cigarette group is formed.

[0022] On the other hand, a filter rod manufactured by known means is cut into the filter plugs FP, so that the one filter plug FP has a length of two filter tips each having the length for one filter cigarette. The filter tip in this case is a capsule-in filter, and the capsule 2 is enclosed in the filter tip. The capsule 2 can be enclosed by using known means. The filter plugs FP are subjected to grading processing and then arrayed in one row in the conveying direction and thereafter are supplied to the first conveying drum (swash plate drum) 4 through an acceleration drum 11.

[0023] In the cigarette group described above, a gap, in which the filter plug FP can be received, is provided between the two single cigarettes S of the cigarette group, and the cigarette group is successively supplied to the first conveying drum 4 while the gap is held. When the cigarette groups is supplied to the first conveying drum 4, the cigarette groups is aligned with one of the filter plugs FP. The first conveying drum 4 is provided, on both sides thereof, with a pair of floating disks (not shown) when viewed in the direction of rotation. According to the rotation of the first conveying drum 4, the two cigarettes S of the cigarette group are sandwiched between the floating disks on both sides, so that the gap between the two single cigarettes S is reduced in the axis direction. Thereby, the intermediate product IP of the double filter cigarette, in which the filter plug FP is located between the two single cigarettes S, is formed.

[0024] On the other hand, a web W of the chip paper is unwound from a chip paper roll (not shown). The web W is guided to the supply drum (coke drum) 9. An adhesive (glue) is applied to one surface of the web W upstream of the supply drum 9. Specifically, an adhesive roller 12 is arranged upstream of the supply drum 9, and the adhesive roller 12 is rotated in a state where a lower half thereof is dipped in an adhesive liquid 13. A transfer roller 14 is arranged on the adhesive roller 12 so as to be in rolling contact with the adhesive roller 12. The adhesive adhering to the outer peripheral surface of the adhesive roller 12 is transferred to the outer peripheral surface of the transfer roller 14 so that an adhesive layer having a predetermined thickness is formed on the outer peripheral surface of the transfer roller 14. According to the passing of the web, the transfer roller 14 is rotated in rolling contact with the one surface of the web W, so that the adhesive is applied to the one surface of the web W according to a predetermined application pattern.

[0025] The supply drum 9 has a suction surface on the outer periphery thereof and is rotated while holding the web W on the suction surface. A bladed drum 15 is arranged adjacent to the supply drum 9. The bladed drum

15 is provided with many knives (not shown) on the outer periphery thereof. These knives are arranged at a fixed interval and rotated in synchronization with the supply drum 9 according to the rotation of the bladed drum 15. By the rotating knives, the web W is cut into the tip papers 3 on the suction surface of the supply drum 9.

[0026] As shown in FIG. 6, the supply drum 9 is further rotated while sucking and holding the cut tip papers 3 by using suction holes 22, and supplies each of the tip papers 3 to each of the intermediate products IP on the first conveying drum 4. It should be noted that a gap between the supply drum 9 and the first conveying drum 4 is defined as an attachment passage 6a. The head edge of the tip paper 3 is stuck to the outer surface of the intermediate product IP and is conveyed along the outer peripheral surface of the first conveying drum 4 together with the intermediate product IP. It should be noted that the supply drum 9 is formed by arranging, in the circumferential direction thereof, a plurality of suction areas 23 in each of which a plurality of the suction holes 22 used for sucking one tip paper 3 are formed. These suction areas 23 are connected to each other by connection sections 25. In the state where the tip papers 3 are respectively stuck to the intermediate products IP, the intermediate products IP are transferred from the first conveying drum 4 to the second conveying drum (rolling drum) 5. It should be noted that a gap between the first conveying drum 4 and the second conveying drum 5 is defined as a transfer passage 6b. The intermediate product IP is conveyed between the second conveying drum 5 and the guide member 10 according to the rotation of the second conveying drum 5.

[0027] The guide member 10 is extended along the direction of rotation of the second conveying drum 5. It should be noted that a rolling passage 6c of the intermediate product IP is defined between the outer periphery of the second conveying drum 5 and the guide member 10, and the rolling passage 6c is curved along the outer periphery of the second conveying drum 5. The intermediate product IP is made to pass through the rolling passage 6c, and thereby the tip paper 3 is wound around the intermediate product IP, so that a double filter cigarette is manufactured.

[0028] Here, in the conveying path 6, there exists a portion narrower than the diameter of the filter plug FP conveyed as a part of the intermediate product IP. For example, it is necessary that, in the attachment passage 6a, the intermediate product IP is slightly compressed in the radial direction to be fixed at the attachment position to some extent, and that, in the transfer passage 6b, the intermediate product IP is compressed to some extent in the radial direction so that the position of the intermediate product IP is fixed to ensure the transfer of the intermediate product IP. Further, it is necessary that, in the rolling passage 6c, the intermediate product IP is rolled while being compressed to some extent in the radial direction, so that the tip paper is surely wound around the intermediate product IP. In the filter tip attachment 1, a diameter

enlarged section, which has a diameter enlarged across the conveying path 6 and at a position where the capsule 2 is enclosed, is provided in the portions of the conveying passage 6 (for example, the attachment passage 6a, the transfer passage 6b, the rolling passage 6c), respectively. That is, when attention is directed to the capsule 2, the conveying locus of the capsule 2 pass through the diameter enlarged sections.

[0029] When the diameter enlarged sections are provided, it is possible to prevent that the capsule 2 enclosed in the filter plug FP is crushed while being conveyed through the narrowed conveying path 6. The narrow conveying passages (for example, the attachment passage 6a, the transfer passage 6b, and the rolling passage 6c) are intentionally formed so that the function of the manufacturing process involves compressing the intermediate product IP. However, the diameter enlarged sections are arranged along the conveying path 6 and at the positions where the enclosed capsules 2 pass through, and hence the other portions of the intermediate product IP are made to pass through the narrow conveying path while being compressed as usual. For this reason, the function of the manufacturing process in the narrow conveying passages is not lowered. It should be noted that the portions where the diameter enlarged sections are provided are not limited to the attachment passage 6a, the transfer passage 6b, and the rolling passage 6c described above, and a diameter enlarged section may be further provided at any portion where the conveying path 6 is narrower than the diameter of the filter plug FP. The value of increase in the diameter of the diameter enlarged section as compared with the other sections is set to 0.1 mm to 3.0 mm and more preferably to 0.3 mm to 1.5 mm.

[0030] In the following, specific examples of the diameter enlarged section will be described.

[0031] As shown in FIG. 2, one of the diameter enlarged sections is a groove 16 formed on the side surface of the rolling passage 6c of the guide member 10. The groove 16 is formed along the circumferential direction of the second conveying drum 5 facing the guide member 10. That is, the groove 16 is formed along the conveying direction T of the conveying path 6. When, as shown by the virtual line of FIG. 2, the intermediate product IP is conveyed along the conveying path 6, the groove 16 is formed at the position corresponding to the capsule 2 enclosed in the filter plug FP. By providing the groove 16 as the diameter enlarged section, it is possible to prevent that the capsule 2 is broken when the intermediate product IP is rolled while being compressed between the second conveying drum 5 and the guide member 10, and thereby the tip paper 3 is wound around the intermediate product IP. That is, while the intermediate product IP is rolled through the rolling passage 6c, the capsule 2 is moved along the groove 16. Therefore, the capsule 2 is not compressed and hence is not crushed and broken. It should be noted that, on the inlet of the guide member 10 as viewed in the conveying direction, a kicking bar 17 for causing the intermediate product IP to be rolled is

provided so as to project into the rolling passage 6c. The groove 16 is also provided on the kicking bar 17. A part of the other surface of the guide member 10 has a processed section 18 subjected to knurl processing, and hence grip force of the processed section 18 is increased.

[0032] As shown in FIG. 3, the groove 16 has chamfered sections 19 formed by chamfering the upper portions of the side walls of the groove 16 along the longitudinal direction of the groove 16. Especially, it is preferred that the upper portion of the side wall of the groove 16 is chamfered so as to have a round edge as shown in FIG. 3. When the chamfered sections 19 are formed in this way, it is possible to prevent by the edges of the groove 16 that, while the intermediate product IP is rolled through the rolling passage 6c, a wrinkle and an indentation are formed on the tip paper 3.

[0033] As another example of the diameter enlarged section, there is recesses 20 formed on the first conveying drum 4 as shown in FIG. 4. More specifically, the recesses 20 are provided at each of the holding units 8 provided at intervals in the circumferential direction of the first conveying drum 4. When the intermediate product IP is conveyed by the first conveying drum 4 as described above, the intermediate product IP is conveyed in a state where a part of the intermediate product IP is accommodated in the suction groove 7, and the recesses 20 are provided at the positions corresponding to the capsules 2 in the state where the part of the intermediate product IP is accommodated in the suction groove 7. It should be noted that the intermediate product IP is held by being sucked from a suction port 21 provided at the bottom portion of the suction groove 7. According to such recesses 20, when the process of conveying the intermediate product IP is performed while the intermediate product IP is compressed in the state of being held by the first conveying drum 4 (for example, when the process of attaching the head edge of the tip paper in the attachment passage 6a, or the transfer process in the transfer passage 6b is performed), the capsules 2 are made to slightly enter the recesses 20, respectively, and thereby the capsules 2 can be prevented from being crushed and broken. Further, both head and tail of the recesses 20 are made to extend from the suction groove 7 in the circumferential direction. The recesses 20 are formed to extend in this way, and thereby it is possible to prevent that the capsules 2 are crushed at the edge of the suction groove 7 at the time when the intermediate product IP is left from the suction groove 7 (or when the intermediate product IP is received into the suction groove 7).

[0034] Further, in the process of attaching the tip head edge of the tip paper in the attachment passage 6a, recesses (diameter enlarged section) 24 may also be provided on the supply drum 9 in order to further prevent the damage of the capsules 2 together with the recesses 20 provided on the first conveying drum as described above. In this case, the recesses 24 are provided at the locations where the capsules 2 are positioned at the time when the cut-sucked tip paper 3 is stuck to the intermediate

product IP during conveying along the first conveying drum 4. Thereby, the capsules 2 can be more surely protected. It should be noted that the recesses 24 may be provided only on the supply drum 9 without providing the recesses 20 on the first conveying drum 4.

[0035] It should be noted that the shapes of the diameter enlarged section of the groove 16 and the recess 20 described above are not limited to the illustrated shapes, and may be formed into any shape as long as, at the position corresponding to the capsule 2 in the conveyance path, the passage is expanded. Further, the position at which the diameter enlarged section is provided is also not limited to the illustrating position, and may be provided on the second conveying drum 5 or may be provided on both the guide member 10 and the second conveying drum 5. That is, the position where the diameter enlarged section, which can receive therein the capsule 2, is provided is not limited, as long as the diameter enlarged section is provided at the position where the capsule 2 is conveyed. Further, in the above-described embodiment, the position of the diameter enlarged section is described by taking, as an example, the case where the diameter enlarged section is provided so as to correspond to the position where the capsule 2 is enclosed. However, the same effect can be obtained, for example, when a filter plug having a hollow portion in a part thereof is used, and the diameter enlarged section is provided at the position corresponding to the hollow portion.

[0036] The filter tip attachment 1 according to the present invention further includes a hopper 26, and the like, in addition to the example of FIG. 1 described above. Double filter plugs DFP, each having a length of two filter plugs FP described above, are supplied to the hopper 26. A filter cutting drum 27 is arranged at a lower portion of the hopper 26, and the double filter plugs DFP are moved one by one along the direction of rotation of the filter cutting drum 27. The double filter plug DFP is cut in half on the filter cutting drum 27, and are formed into two filter plugs FP. Therefore, the double filter plug DFP is an example of a preprocessed product to be processed as the filter plug FP.

[0037] The filter plugs FP are transferred, as they are, to a grading drum 28, so that the positions of the two filter plugs FP formed by cutting the double filter plug DFP by the filter cutting drum 27 are shifted back and forth in the advancing direction of the filter plugs FP. Then, the filter plugs FP are transferred, as they are, to a shifting drum 29, and the filter plugs FP, which are shifted back and forth in the advancing direction thereof, are respectively brought to the center of the shifting drum 29 so as to be arrayed in a row.

[0038] Then, the filter plugs FP are transferred to an accelerating drum 30, so that the speed of the filter plugs FP in the advancing direction is increased. Then, the filter plugs FP are transferred to the acceleration drum 11 described above. Subsequently, the filter plugs FP are conveyed along the conveying path shown in FIG. 1.

[0039] The drums 27 to 30 described above are rotated

in the direction of solid line arrows shown in FIG. 7, and the filter plug FP (double filter plug DFP) is also moved in the direction of dotted line arrows shown in FIG. 7 while the drums 27 to 30 are rotated. The diameter enlarged sections as shown in FIG. 2 to FIG. 5 are provided at the positions corresponding to the capsules or the hollow portions in the filter plug FP, so as to prevent that the capsules or the hollow portions are crushed, broken and deformed at the time when the filter plug FP is moved along the outer peripheral surfaces of the drums 27 to 30. In this way, the diameter enlarged sections described above can not only be provided at the conveying path on which the tip paper is wound around the intermediate product IP, but also be applied to the drums 27 to 30 which are provided at the transferring path for transferring the filter plug FP (double filter plug DFP). As an example of the diameter enlarged section, it is considered, for example, to form a groove on the drum surface.

[0040] On the other hand, before the double filter plug DFP is supplied to the hopper 26, the double filter plug DFP is made to pass between a pair of upper and lower conveying rollers 31 (as shown by arrow B of FIG. 7) each including three rollers. At this time, the double filter plug DFP is transferred in a state that the double filter plug DFP is arranged in parallel with the longitudinal direction of the conveying roller 31. The gap between the upper and lower conveying rollers 31 is set to be smaller than the diameter of the double filter plug DFP. Since the passage between the upper and lower conveying rollers 31 is also configured as a conveying passage of the double filter plug DFP, and since the gap of the conveying passage is smaller than the diameter of the double filter plug DFP, it is necessary to prevent that the capsules or the hollow portions, which are provided in the double filter plug DFP, are crushed, broken or deformed. In order to prevent the crushing, breakage and deformation, the diameter enlarged sections described above can be provided on the conveying rollers 31, respectively.

[0041] Specifically, the gap of the portion in which the diameter enlarged section is provided is increased by 0.1 mm to 3.0 mm as compared with the gap between the upper and lower conveying rollers 31 (the gap of the conveying passage). More preferably, the gap may be increased by 0.7 mm to 2.8 mm. When the increased range of the gap is smaller than this range, the capsules or the hollow portions in the double filter plug DFP may be crushed to be broken and deformed. On the contrary, when the increased range of the gap is larger than this range, the double filter plug DFP may be improperly transferred or may cause clogging. It should be noted that the diameter enlarged section may be provided on both the upper and lower conveying rollers 31 or may be provided only on one of the upper and lower conveying rollers 31.

[0042] As an example of the diameter enlarged sections provided on the conveying rollers 31, it is possible to use grooves 32 provided on the conveying rollers 31 as shown in FIG. 8. As shown in FIG. 8, the gap of the

conveying passage defined by the gap between the upper and lower conveying rollers 31 is set smaller as compared with the diameter of the double filter plug DFP. In the double filter plug DFP, four capsules 2 are provided at an interval in the longitudinal direction of the double filter plug DFP. The grooves 32 are formed in the portions in which each of the capsules 2 is arranged, and thereby the capsules 2 are prevented from being crushed by the conveying rollers 31. It should be noted that, even in the case of the hollow filter in which hollow portions are provided instead of the capsules 2, the hollow portions can be protected by the grooves 32.

[0043] Further, also in a conveying path configured to convey post-processed products, such as filter cigarettes (not shown) obtained by further cutting the double filter cigarette around which the above-described tip paper 10 is wound, it is also possible to provide diameter enlarged sections formed by expanding the portion through which the capsule 2 or the hollow portion is made to pass.

[0044] Specifically, as shown in FIG. 7, the double filter cigarette formed on the second drum 5 is transferred to a decelerating drum 33. This decelerating drum 33 is configured to reduce the rotation speed of subsequent drums in order to stabilize the work (for example, quality inspection work) performed on each of various drums to which the double filter cigarette is transferred. Then, the double filter cigarette is transferred to a final cutting drum 34. On the final cutting drum 34, the double filter cigarette is cut at the center thereof to be formed into two filter cigarettes (post-processed products).

[0045] The filter cigarettes are further transferred to a cigarette separating drum 35, so that the positions of the filter cigarettes are adjusted. Then, the filter cigarettes are transferred to an end scanner drum 36, and the inspection of defective products is performed. The inspection here includes a loose end inspection and a end face inspection which are performed for checking, for example, the filling degree of shredded tobacco, and the like. Then, the filter cigarettes are further transferred to an inspection drum 37 and are further inspected. Here, an inspection, such as, for example, a quality inspection for checking breakage of the wrapping paper, is performed.

[0046] Thereafter, the filter cigarettes are further transferred to various drums and are made to pass between the drums at each transfer. Also in a conveying path formed between the subsequent drums, diameter enlarged sections for preventing the capsule 2 or the hollow portion from being crushed can be provided in addition to the conveying path formed on the drums 33 to 37 described above.

Explanation of Reference Signs

[0047]

- 1 Filter tip attachment
- 2 Capsule
- 3 Tip paper

- 4 First conveying drum
- 5 Second conveying drum
- 6 Conveying path
- 6a Attachment passage
- 5 6b Transfer passage
- 6c Rolling passage
- 7 Suction groove
- 8 Holding unit
- 9 Supply drum
- 10 10 Guide member
- 11 Acceleration drum
- 12 Adhesive roller
- 13 Adhesive liquid
- 14 Transfer roller
- 15 15 Bladed drum
- 16 Groove (diameter enlarged section)
- 17 Kicking bar
- 18 Processed section
- 19 Chamfered section
- 20 20 Recess (diameter enlarged section)
- 21 Suction port
- 22 Suction hole
- 23 Suction unit
- 24 Recess (diameter enlarged section)
- 25 25 Connection section
- 26 Hopper
- 27 Filter cutting drum
- 28 Grading drum
- 29 Shifting drum
- 30 30 Accelerating drum
- 31 Conveying roller
- 32 Groove
- 33 Decelerating drum
- 34 Final cutting drum
- 35 35 Cigarette separating drum
- 36 End scanner drum
- 37 Inspection drum

Claims

1. A filter tip attachment configured to form an intermediate product of a double filter cigarette by arranging a filter plug between two cigarettes, and then to form the double filter cigarette by winding around the intermediate product, a connection paper with an adhesive applied to one surface thereof, the filter tip attachment comprising a conveying path configured to convey the filter plug or the intermediate product, or to convey a preprocessed product or a post-processed product obtained before or after processing of the filter plug or the intermediate product, wherein a diameter enlarged section having a diameter enlarged at a position along the conveying path is provided in a portion where the conveying path is narrower than the diameter of the filter plug or the intermediate product, or the diameter of the preproc-

essed product or the post-processed product before or after processing of the filter plug or the intermediate product.

rollers for sending out the preprocessed product to the hopper, and the diameter enlarged section is formed on the conveying rollers.

2. The filter tip attachment according to claim 1, further comprising:
 - a first conveying drum forming the conveying path and configured to convey the intermediate product in a circumferential direction of the first conveying drum while holding the intermediate product; 10
 - a second conveying drum forming the conveying path and configured to receive the intermediate product from the first conveying drum and to convey the intermediate product in a circumferential direction of the second conveying drum; 15
 - a supply drum arranged to be adjacent to the first conveying drum and configured to distribute a tip paper and to attach a head edge of the tip paper to the intermediate product conveyed along the first conveying drum; and 20
 - a guide member arranged to be adjacent to the second conveying drum along the circumferential direction of the second conveying drum and configured to enable the tip paper to be wound around the intermediate product, where the intermediate product is rolled in contact with the guide member. 25
3. The filter tip attachment according to claim 2, wherein the diameter enlarged section is a recess formed at a holding section where the intermediate product is held by the first conveying drum. 30
4. The filter tip attachment according to claim 2, wherein the diameter enlarged section is a groove formed on the guide member along the circumferential direction of the second conveying drum facing the guide member. 35
5. The filter tip attachment according to claim 4, wherein the groove includes chamfered sections formed by chamfering side wall upper portions of the groove along the longitudinal direction of the groove. 40
6. The filter tip attachment according to claim 2, wherein a capsule is enclosed or a hollow portion is formed in the filter plug, and the diameter enlarged section is provided so as to correspond to the position at which the capsule is enclosed or the hollow portion is formed. 45
7. The filter tip attachment according to claim 1, further comprising a hopper configured to accommodate therein a preprocessed product, wherein the conveying path is formed between a pair of upper and lower sets of a plurality of conveying 50

FIG. 1

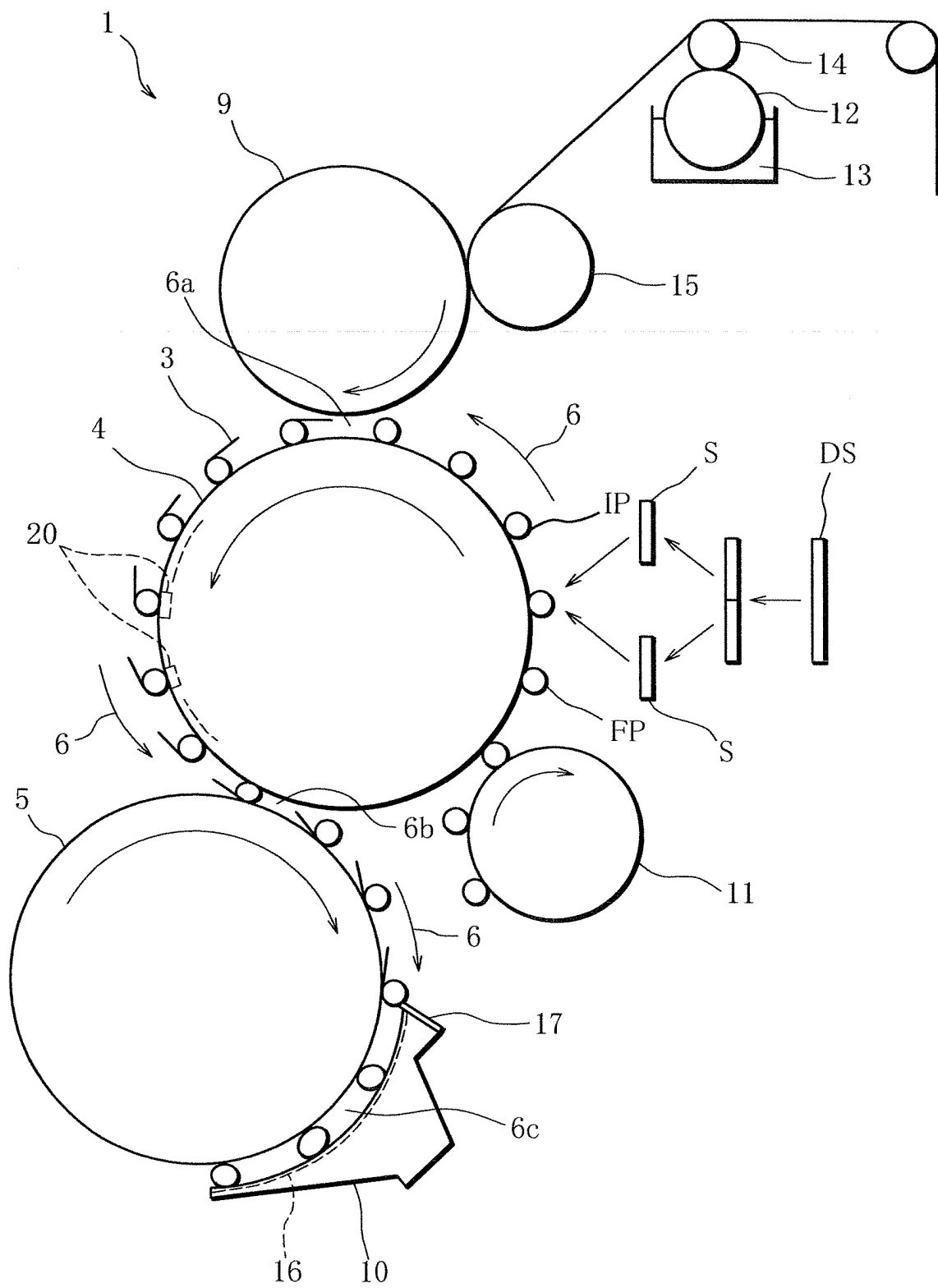


FIG. 2

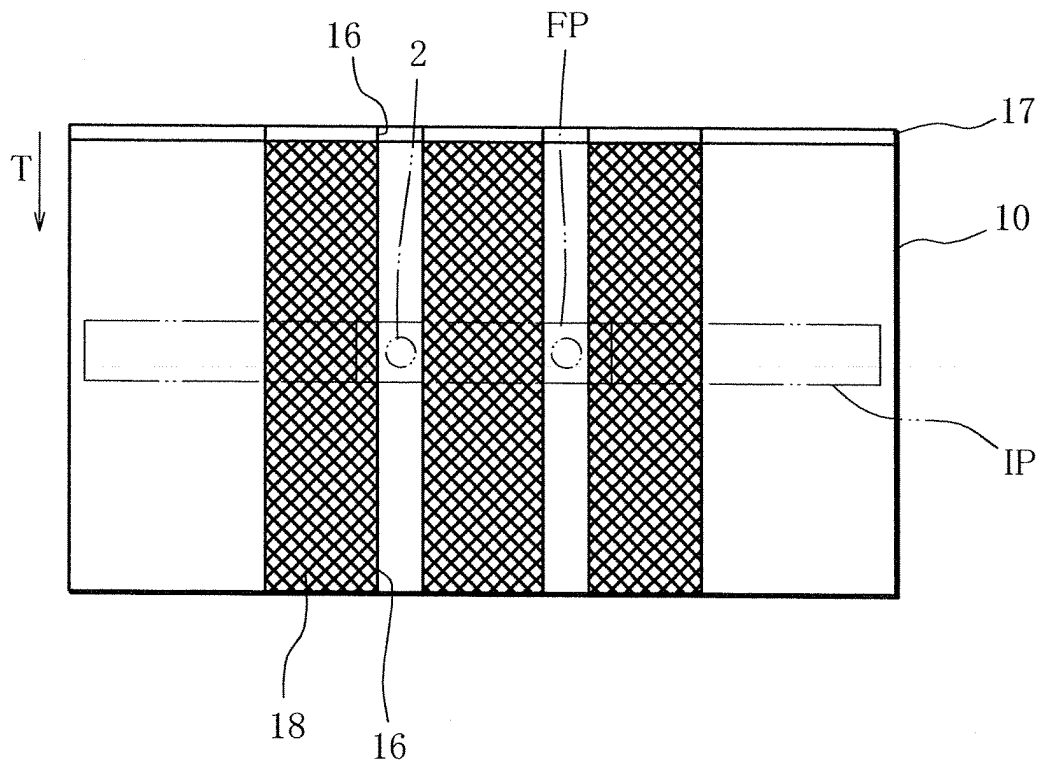


FIG. 3

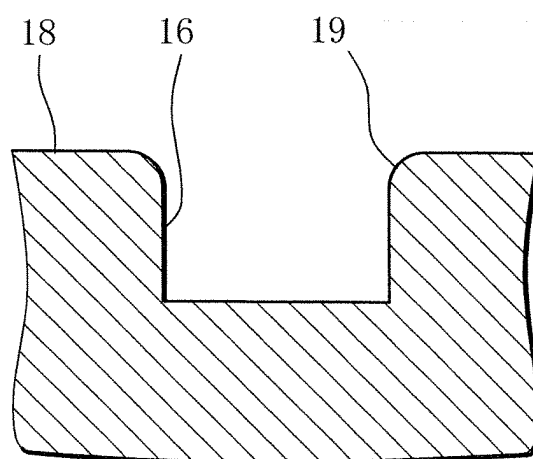


FIG. 4

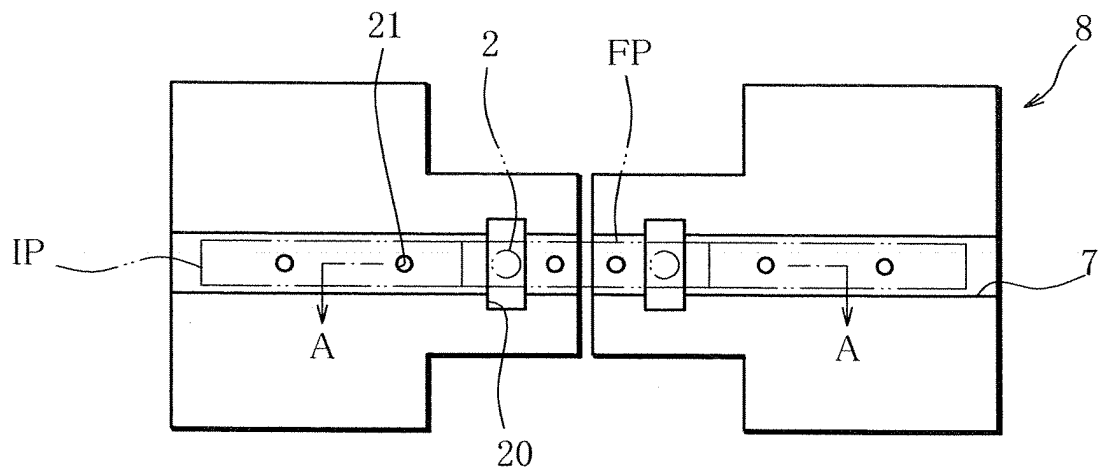


FIG. 5

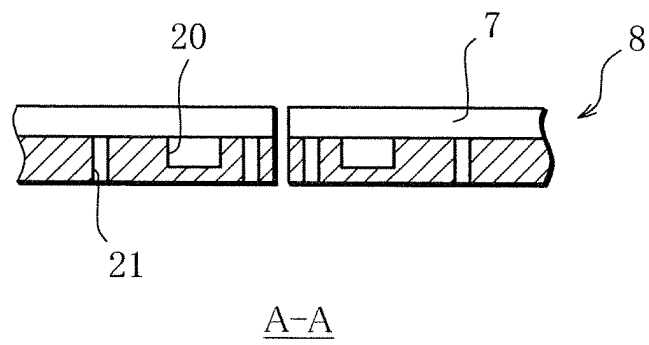


FIG. 6

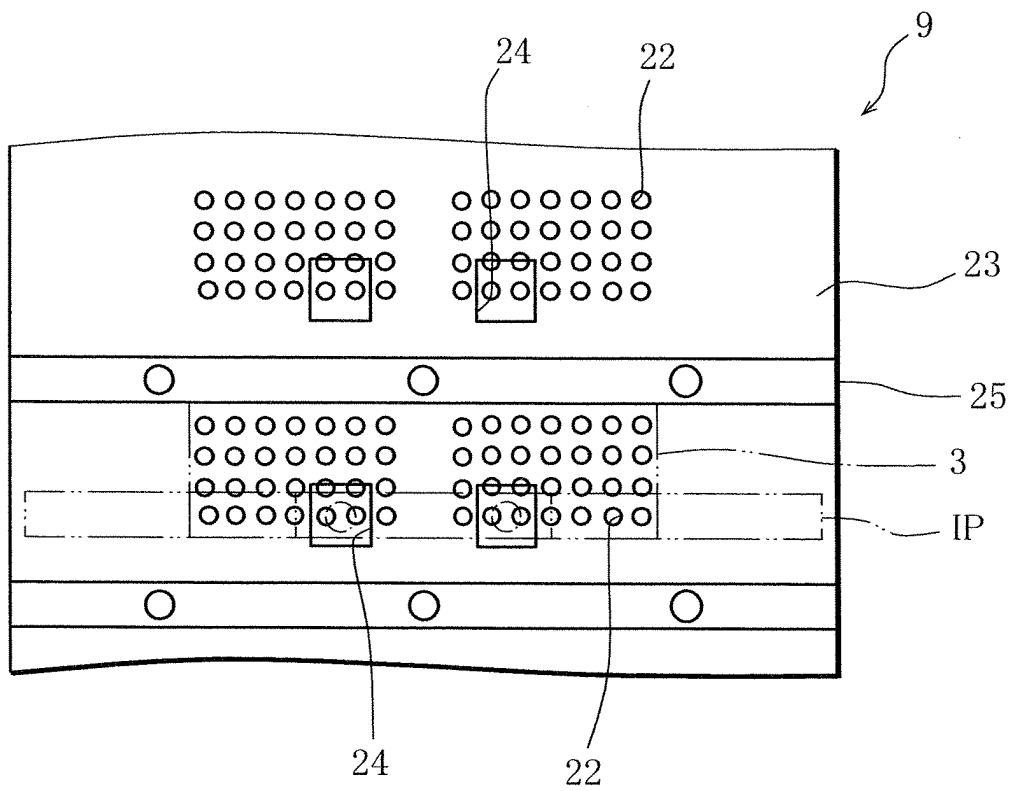


FIG. 7

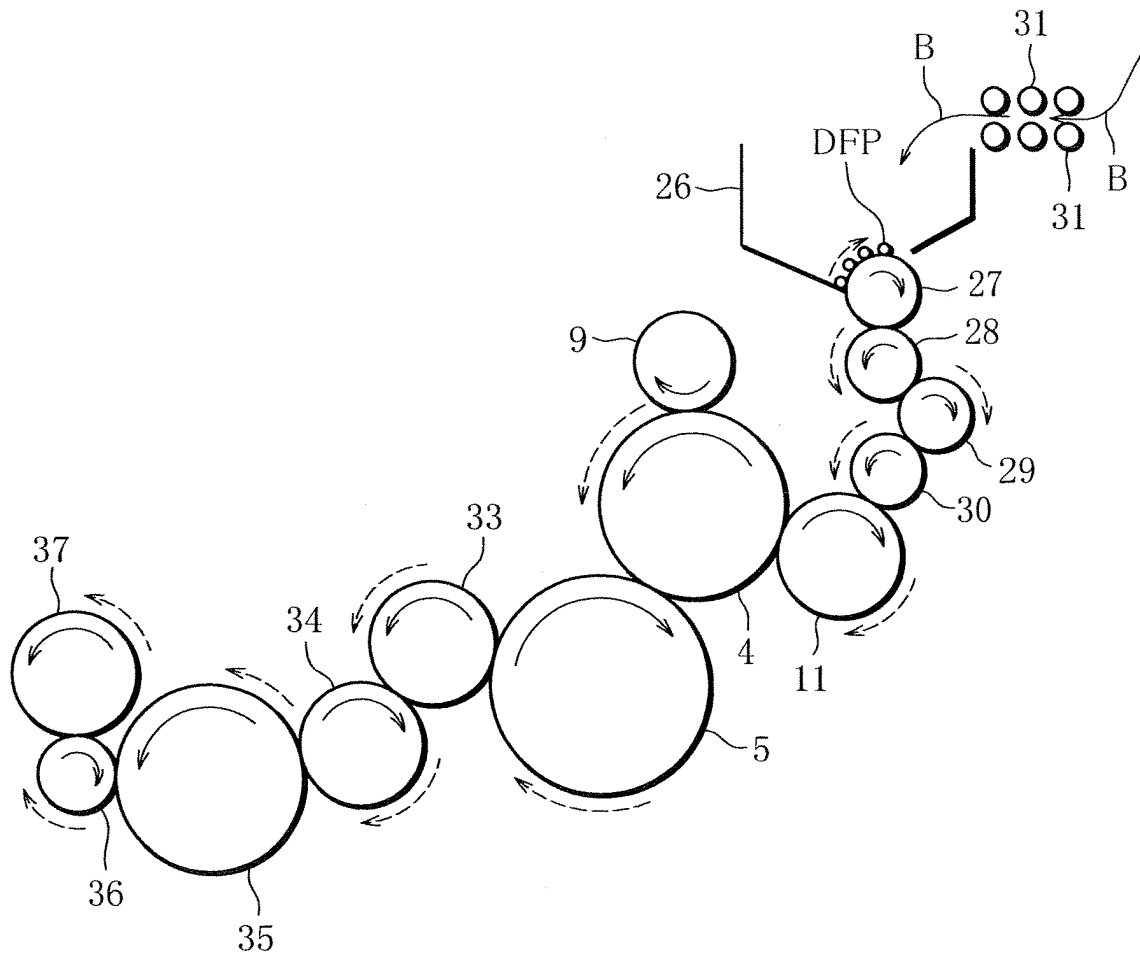
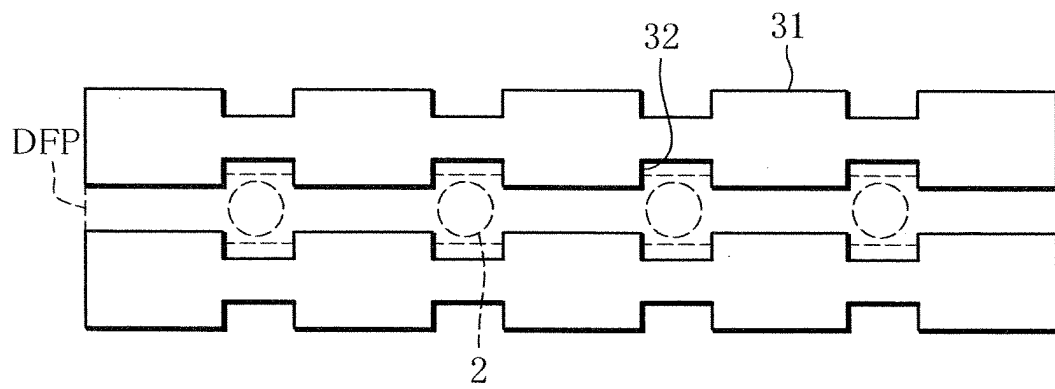


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/058073

A. CLASSIFICATION OF SUBJECT MATTER

A24D3/04(2006.01)i, A24C5/39(2006.01)i, A24D3/06(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)

A24D3/04, A24C5/39, A24D3/06

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

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2013

Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

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.
A	JP 05-221417 A (Japan Tobacco Inc.), 31 August 1993 (31.08.1993), entire text; all drawings (Family: none)	1-7
A	JP 2005-058232 A (Hauni Maschinenbau AG.), 10 March 2005 (10.03.2005), entire text; all drawings & EP 1504684 A1 & DE 502004000612 D & AT 326874 T & CN 1579267 A	1-7
A	JP 2002-176965 A (Japan Tobacco Inc.), 25 June 2002 (25.06.2002), entire text; all drawings (Family: none)	1-7

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

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"&" document member of the same patent family

Date of the actual completion of the international search
12 June, 2013 (12.06.13)Date of mailing of the international search report
25 June, 2013 (25.06.13)Name and mailing address of the ISA/
Japanese Patent Office

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Patent documents cited in the description

- JP 2002176965 A [0004]