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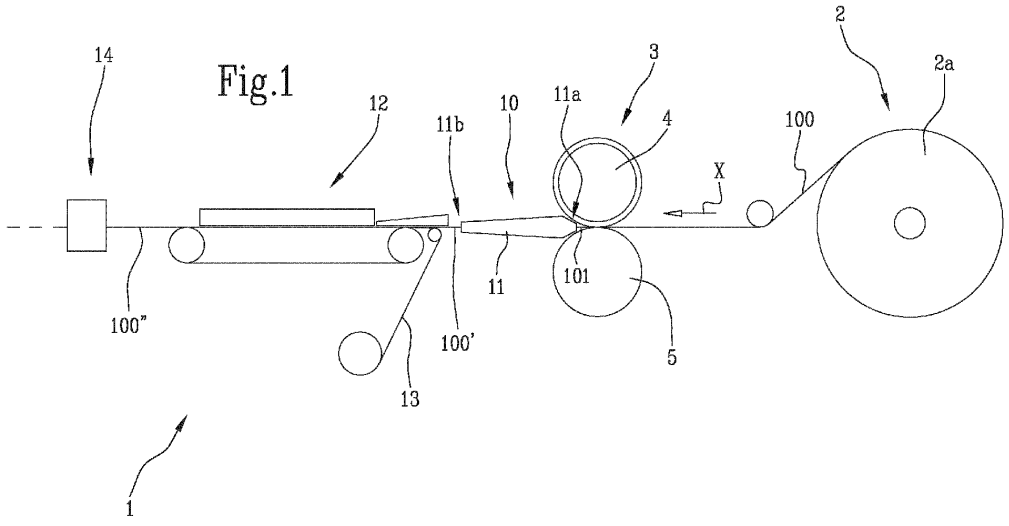
(54) MACHINE AND METHOD FOR MAKING ROD-SHAPED SMOKING ARTICLES

(57) This invention relates to a machine for making rod-shaped smoking articles (1), comprising: unwinding means (2) for unwinding a web (100) of material for the tobacco industry; first cutting means (3) configured to receive and cut the web (100) so as to create a plurality of longitudinal strips (101) making a plurality of longitudinal, broken cutting lines (102) in such a way that two longitudinal strips (101) which are transversely adjacent each other are connected to each other by at least one joining portion (103). Provided are gathering and conveying means (10) configured to gather and convey the longitudinal strips (101) in order to create at least one continuous stream (100'); a garniture tongue (12) configured to make at least one continuous rod (100") comprising a plurality of longitudinal strips (101); and second cutting means (14) for cutting the continuous rod (100") into a plurality of rod-shaped smoking articles.

Fig.1



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Description

[0001] This invention relates to a machine and method for making rod-shaped articles for smoking (hereinafter "rod-shaped smoking articles").

[0002] In particular, the rod-shaped smoking articles referred to herein are articles made from a web of material for the tobacco industry such as, for example: tobacco-based material (reconstituted, pre-treated, homogenized or cast-leaf tobacco), filter paper material or PLA. These articles can be used in the tobacco industry to make traditional filter cigarettes, that is, cigarettes which can be smoked by burning the end of the cigarette opposite the filter, or electronic cigarettes such as, for example: heat not burn, electronic-cig, mixed electronic-cig and tobacco.

[0003] Known in the art are crimping systems, as described in document WO 2016/071267 A1, designed to create corrugations on the web which can subsequently be compacted to create a longitudinal stream containing the crimped web; it was found, however, that the articles made according to this solution are not uniformly compacted but tend to become loose.

[0004] In other systems, a web of material for the tobacco industry is cut lengthways into longitudinal strips which are then gathered and wrapped in a web of paper to form a continuous rod containing a plurality of longitudinal strips placed side by side. It is then possible to obtain a plurality of articles from the rod, each comprising a plurality of longitudinal strips placed side by side.

[0005] For example, document US 4,889,143 describes a machine and a method for making rod-shaped smoking articles where two webs of material for the tobacco industry are unwound from rolls and fed to a cutting station configured to cut the webs into strips. The strips thus obtained are then gathered and sent to a garniture conveyor to make a continuous rod of material for the tobacco industry which can be cut to obtain a plurality of rod-shaped articles.

[0006] The Applicant found, however, that in the prior art methods, the step of gathering the strips following the step of cutting them may be difficult, often on account of jams and interruptions of the production process.

[0007] The Applicant also found that in the prior art machines, high speed and/or local non-uniformity of the materials and/or possible cutting imprecision, due for example to worn cutting means, may cause the strips at the gathering means, downstream of the cutting station, to be torn transversely, thus becoming separated from the remaining strips which continue along their path.

[0008] The articles obtained according to the teachings of the prior art may thus be non-uniform because some of the strips are missing.

[0009] Moreover, some of the strips may fall out of the tips of an article on account of ineffective cohesion between adjacent strips in the article. In this context, the technical purpose which forms the basis of this invention is to propose a machine and a method for making rod-shaped smoking articles to overcome one or more of the above mentioned drawbacks of the prior art.

[0010] More specifically, this invention has for an aim to provide a machine for making rod-shaped smoking articles and which is capable of making longitudinal strips which allow reducing the risk of entanglement and jamming.

[0011] A further aim of this invention is to provide a method for making rod-shaped smoking articles and which allows improving the efficiency and effectiveness of the production process by reducing or eliminating the risk of entanglement, tearing and jamming.

[0012] The technical purpose indicated and the aims specified are substantially achieved by a machine and a method for making rod-shaped smoking articles, comprising the technical features described in one or more of the appended claims.

[0013] In particular, this invention provides a machine for making rod-shaped smoking articles, comprising:

- unwinding means for unwinding at least one roll of web of material for the tobacco industry, where the web is adapted to be unwound along a longitudinal feed direction;
- first cutting means for cutting the web, located downstream of the unwinding means and configured to receive and cut the web in such a way as to create a plurality of longitudinal strips along the longitudinal feed direction, where the first cutting means comprise at least a first roller and a second roller acting in conjunction with each other and configured to create the plurality of longitudinal strips on the web sliding between the rollers;
- gathering and conveying means configured to gather and convey the longitudinal strips from the first cutting means to create at least one continuous stream;
- a garniture tongue configured to receive the continuous stream and to progressively wrap it in a paper web to make at least one continuous rod, where the continuous rod comprises a plurality of longitudinal strips;
- second cutting means for cutting the continuous rod, located downstream of the garniture tongue and configured to cut the continuous rod into a plurality of rod-shaped smoking articles.

[0014] Advantageously, the first cutting means according to this invention are configured to make a plurality of longitudinal, broken cutting lines in such a way that two longitudinal strips which are transversely adjacent each other relative to the longitudinal feed direction remain connected to each other by at least one joining portion.

[0015] Thanks to this invention, therefore, each longitudinal strip is connected at least to the longitudinal strip adjacent to it so that it is easier for them to be gathered and conveyed without tearing and without causing machine jams.

[0016] Advantageously, the shape of the longitudinal

strips gives the smoking article a compact, cohesive filling; the presence of the joining portions guarantees the integrity of the strips while they are being processed and prevents detachment of each strip from the others.

[0017] The invention also provides a method for making rod-shaped smoking articles, comprising the following steps:

- unwinding at least one roll of web of material for the tobacco industry along a longitudinal feed direction;
- cutting the web in such a way as to create a plurality of longitudinal strips along the longitudinal feed direction;
- gathering and conveying the longitudinal strips to make a continuous stream;
- forming at least one continuous rod by progressively wrapping the continuous stream in a paper web;
- cutting the at least one continuous rod into a plurality of rod-shaped smoking articles.

[0018] Advantageously, the step of cutting the web comprises making a plurality of longitudinal, broken cutting lines in such a way that two longitudinal strips which are transversely adjacent each other relative to the longitudinal feed direction remain connected to each other by at least one joining portion.

[0019] In other words, making a plurality of longitudinal, broken cutting lines makes it possible to define stretches by which the longitudinal strips are joined to each other in such a way that after they have been cut and while they are being gathered and conveyed, the strips do not get entangled or jammed in the machine and in such a way that the longitudinal strips made in this way are less subject to tearing since each strip is urged along by the one adjacent to it.

[0020] The dependent claims, which are incorporated herein by reference, correspond to different embodiments of the invention.

[0021] Further features and advantages of this invention are more apparent in the detailed description below, with reference to a preferred, but non-exclusive embodiment of a machine for making rod-shaped smoking articles, as illustrated in the accompanying drawings, in which:

- Figure 1 is a functional diagram of a machine for making rod-shaped smoking articles according to this invention;
- Figure 2 is a schematic front view of the first cutting means of the machine of Figure 1;
- Figures 2A-2H and 3A-3H are schematic enlarged views of a detail B from Figure 2, showing possible embodiments of the first cutting means of the machine according to this invention, in a non-operating and an operating configuration, respectively;
- Figures 4A, 4B and 4D are schematic perspective views of possible embodiments of broken cutting lines made on the web by the first cutting means according to this invention;
- Figure 4C shows an enlarged detail from Figure 4B;
- Figures 5A-5G show schematic plan views of possible embodiments of a longitudinal strip according to this invention; and
- Figures 6A-6B are, respectively, a schematic front view and a schematic plan view of an alternative embodiment of the gathering and conveying means according to this invention.

[0022] With reference to the accompanying drawings, the numeral 1 denotes in its entirety a machine for making rod-shaped smoking articles and hereinafter referred to simply as machine 1.

[0023] The machine 1 comprises unwinding means 2 for unwinding at least one roll 2a of web 100 of material for the tobacco industry such as, for example, tobacco based material, filter paper or PLA.

[0024] The web 100 is adapted to be unwound along a longitudinal feed direction, indicated by the arrow X in Figure 1.

[0025] Downstream of the unwinding means 2, the machine 1 preferably comprises one or more systems for adjusting the tension of the web 100 (for example, an unwinding feedback sensor) and/or one or more systems, not illustrated, for centring the web 100.

[0026] The machine 1 comprises first cutting means 3 for cutting the web 100, located downstream of the unwinding means 2, and configured to receive and cut the web 100 in such a way as to create a plurality of longitudinal strips 101 along the longitudinal feed direction "X".

[0027] The first cutting means 3 comprise at least a first roller 4 and a second roller 5 acting in conjunction with each other and configured to create the plurality of longitudinal strips 101 on the web 100 sliding between the rollers 4, 5.

[0028] Advantageously, the first cutting means 3 are configured to make a plurality of longitudinal, broken cutting lines 102, in such a way that two longitudinal strips 101 which are transversely adjacent each other relative to the longitudinal feed direction "X" remain connected to each other by at least one joining portion 103, as illustrated in Figures 4A-4D.

[0029] In other words, as illustrated in the detail 4C from Figure 4B, the joining portion 103 is defined by an ideal surface of web 100 lying in the thickness of the web 100 and connecting two adjacent longitudinal strips 101 and is interposed between consecutive cut portions 102' of a broken cutting line 102 along the longitudinal feed direction.

[0030] Figures 4A-4D show some embodiments of portions of web 100 on which longitudinal strips 101 obtainable with this invention have been made.

[0031] In particular, in Figures 4A-4C, the longitudinal strips 101 between a first edge 100a of the web 100 and a second edge 100b of the web 100 are connected by joining portions 103 disposed along at least one ideal orientation lines "Y" transverse to the longitudinal feed

direction "X"; more specifically the ideal orientation lines "Y" in Figure 4A are perpendicular to the longitudinal feed direction "X", while the ideal orientation lines "Y" in Figure 4B are diagonal.

[0032] In Figure 4D, on the other hand, the joining portions 103 transverse to the longitudinal feed direction "X" are alternated with broken cutting lines 102.

[0033] With reference to Figure 2, preferably at least one between the first roller 4 and the second roller 5 comprises a plurality of cutting discs 6, preferably rotary (alternatively, they may be fixed, while the roller 4, 5 rotates) and the first cutting means 3 are configured in such a way as to vary the distance between the cutting profile of each cutting disc 6 and the web 100 during rotation of the cutting discs 6, so as to make in the cut a break which defines the joining portion 103.

[0034] It should be noted that in the example shown in Figure 2, only the first roller 4 is provided with cutting discs 6, whilst the second cutting disc 5 is "plain": that is to say, it has a substantially flat surface, without grooves or other cutting discs 6.

[0035] In a possible embodiment, the first cutting means 3 are configured to move the cutting discs 6 between a distal position, where the cutting discs 6 are not in contact with the web 100, and a cutting position, where the cutting discs 6 are in contact to create longitudinal cut segments 102' alternated with the joining portions 103. In other words, the cutting discs 6 can be moved translationally towards or away from the web 100.

[0036] Alternatively, in another embodiment of the first cutting means 3, each cutting disc 6 has a cutting profile which, along its circumferential extension, has at least one angular stretch with an increased diameter such as to cut the web 100 as the cutting disc 6 rotates, thereby making a longitudinal cut segment 102', and at least one angular stretch with a reduced diameter, not illustrated in the accompanying drawings, such as not to cut the web 100 as the cutting disc 6 rotates, so that the web 100 defines the at least one joining portion 103. In other words, the cutting discs 6 have beaks in their cutting profiles so each disc 6 does not make an uninterrupted cut in the web 100 and instead defines a joining portion 103 in the zone which is not cut.

[0037] The angular, reduced diameter stretches of the cutting disc 6 may be disposed according to different angular combinations in such a way as to cut the web 100 according to cutting patterns like those illustrated in Figures 4A-4D.

[0038] The embodiments shown in Figures 4B and 4D, for example, are obtainable using first cutting means 3 whose angular, reduced diameter stretches are angularly offset from each other.

[0039] Still more preferably, the angular, reduced diameter stretches may be angularly offset from each other in such a way that, as the cutting discs 6 rotate, at least one joining portion 103 of the web 100 is defined in each transverse section of the web 100, as in the example embodiment shown in Figure 4B. Advantageously, therefore, each transverse cross section of the articles is provided with at least one joining portion 103 capable of effectively holding the longitudinal strips 101 together cohesively.

[0040] According to this invention, each cutting disc 6 is preferably configured to make longitudinal strips 101 whose edges are defined by straight or wavy or zig-zag cut segments 102' alternated with at least one joining portion 103.

[0041] Advantageously, cut segments 102' with wavy or zig-zag edges allow improving the cohesion between the longitudinal strips 101 during subsequent processes so as to prevent material from falling out of the tips of the articles.

[0042] Furthermore, still more preferably, each cutting disc 6 has a straight or wavy or zig-zag cutting profile.

[0043] Figures 5A-5D illustrate some embodiments of longitudinal strips 101 obtainable using the first cutting means 3 just described, whilst Figures 2A-2E and 3A-3E illustrate some embodiments of cutting rollers 4, 5 used to obtain the longitudinal strips 101.

[0044] As shown in Figures 2A, 3A, the first roller 4 is provided with cutting discs 6 whose cutting profiles are straight, whilst the second roller 5 has grooves 5a adapted to receive the cutting profiles of the cutting discs 6 of the first roller 5. The longitudinal strips 101 obtainable with this configuration of the rollers 4, 5 are, for example, of the type illustrated in Figure 5A.

[0045] In Figures 2B, 3B, the first roller 4 is provided with cutting discs 6 whose cutting profiles are straight, whilst the second roller 5 is plain.

[0046] The longitudinal strips 101 obtainable with this configuration of the rollers 4, 5 are, for example, of the type illustrated in Figure 5A.

[0047] In Figures 2C, 3C, the first roller 4 is provided with cutting discs 6 whose cutting profiles are wavy or zig-zagged, whilst the second roller 5 is plain. The longitudinal strips 101 obtainable with this configuration of the rollers 4, 5 are, for example, of the type illustrated in Figures 5B-5D. However, based on the geometry of the cutting discs 6, it is also possible to obtain longitudinal strips 101 of the type illustrated in Figures 5C and 5D.

[0048] In Figures 2D, 3D, both the first roller 4 and the second roller 5 are provided with cutting discs 6 whose cutting profiles are straight. The longitudinal strips 101 obtainable with this configuration of the rollers 4, 5 are, for example, of the type illustrated in Figure 5A.

[0049] Figures 2E and 3E illustrate an alternative embodiment of the first cutting means 3 where, preferably, the first roller 4 is provided with cutting discs 6 having a planar cutting profile, substantially defining a toothed edge, whilst the second roller 5 is provided with grooves 5a shaped to match the toothed edge of the discs 6 of the first roller 4 so that the web 100, during operation, is cut by shearing. The longitudinal strips 101 obtainable with this configuration of the rollers 4, 5 are, for example, of the type illustrated in Figure 5A.

[0050] Preferably, also, the machine 1 comprises

means 7 for making a plurality of longitudinal easy folding zones 104 in such a way that each longitudinal strip 101 has at least one easy folding zone 104.

[0051] Advantageously, the easy folding zones 104 allow improving the step of gathering and conveying the longitudinal strips 101 which can be folded more easily so as to make rod-shaped smoking articles which are more compact and cohesive, with better filling uniformity.

[0052] Advantageously, the easy folding zones 104 allow weakening the structure of the material so it can be folded more easily during the subsequent step of gathering.

[0053] In a possible embodiment not illustrated in the accompanying drawings, the forming means 7 for making a plurality of easy folding zones 104 can be disposed upstream of the first cutting means 3.

[0054] However, with reference to the embodiments illustrated in Figures 2F-2H and 3F-3H, the forming means 7 for making a plurality of longitudinal easy folding zones 104 are located on at least one between the first roller 4 and the second roller 5 and comprise at least one between:

- a plurality of crimping discs 8 configured to compress the web 100 in such a way that each easy folding zone 104 has at least one longitudinal crimp;
- a plurality of reduced diameter scoring discs 9 configured to partly cut the thickness of the web 100 in such a way that each easy folding zone 104 has at least one longitudinal score line.

[0055] It should be noted that the expression "reduced diameter" is used to mean that the diameter of the reduced diameter scoring discs 9 is smaller than the diameter of the cutting discs 6.

[0056] Preferably, also, the cutting discs 6 are alternated with the crimping discs 8 and/or with the reduced diameter scoring discs 9, so that each longitudinal strip 101 comprises at least one crimp or one longitudinal score line.

[0057] As shown in particular in Figures 2F, 3F, the first roller 4 is provided with cutting discs 6 whose cutting profiles are straight, whilst the second roller 5 is provided with crimping discs 8 which are offset relative to the cutting discs 6 so as to make longitudinal strips 101 of the type shown in Figure 5E, where the easy folding zones 104 made on the underside of the web 100 create longitudinal strips 101 which have a triangular cross section and which are easy to fold.

[0058] As shown in particular in Figures 2G, 3G, the first roller 4 is provided with cutting discs 6 whose cutting profiles are straight, with alternately interposed crimping discs 8, whilst the second roller 5 is of the plain type so as to make longitudinal strips 101 of the type shown for example in Figure 5F, where each longitudinal strip 101 has two easy folding zones 104 made on the top side of the web 100 to facilitate folding of the longitudinal strips 101 themselves.

[0059] As shown in particular in Figures 2H, 3H, the first roller 4 is provided with cutting discs 6 whose cutting profiles are straight, with two alternately interposed reduced diameter scoring discs 9, whilst the second roller 5 is of the plain type so as to make longitudinal strips 101 of the type shown for example in Figure 5G, where each longitudinal strip 101 has one longitudinal easy folding zone 104 made on the top side of the web 100 to facilitate folding of the longitudinal strips 101 themselves.

[0060] Thanks to this invention, therefore, it is possible to make longitudinal strips 101 of various shapes and sizes which are advantageously connected to each other by at least one joining portion 103.

[0061] With reference to Figure 1, the machine 1 according to the invention also comprises gathering and conveying means 10 configured to gather and convey the longitudinal strips 101 from the first cutting means 3 to create at least one continuous stream 100'.

[0062] Advantageously, the joining portions 103 facilitate the step of gathering and conveying the longitudinal strips 101 by significantly reducing the risk of the longitudinal strips 101 falling out as the web 100 moves forward, since each longitudinal strip 101 is connected to the one adjacent to it.

[0063] Preferably, the gathering and conveying means 10 comprise at least one funnel-shaped member 11 having an infeed cross section 11a suitable for receiving the longitudinal strips 101 and an outfeed cross section 11b suitable for expelling the continuous stream 100' formed as the longitudinal strips 101 are fed through the funnel-shaped member 11.

[0064] Still more preferably, the gathering and conveying means 10 comprise at least two funnel-shaped members 11 horizontally juxtaposed or at least partly superposed.

[0065] With reference to the embodiment illustrated in Figures 6A and 6B, the gathering and conveying means 10 comprise three funnel-shaped elements 11: two below, juxtaposed horizontally; and one above, partly superposed on the two below.

[0066] Advantageously, that way, the longitudinal strips 101 to be gathered and conveyed can be distributed in a simple and ordered manner in order to avoid entanglement.

[0067] The machine 1 may preferably also comprise suction means, not illustrated, associated with the gathering and conveying means 10 and configured to facilitate gathering of the longitudinal strips 101 by sucking them towards the outfeed section 11b.

[0068] Downstream of the gathering and conveying means 10, the machine 1 comprises a garniture tongue 12 configured to receive the continuous stream 100' and to progressively wrap it in a paper web 13 to make at least one continuous rod 100". The continuous rod comprises a plurality of longitudinal strips 101 made using the first cutting means 3 according to this invention.

[0069] Downstream of the garniture tongue 12, the machine then comprises second cutting means 14 for cutting

the continuous rod 100" and configured to cut the continuous rod 100" into a plurality of rod-shaped smoking articles, not illustrated in the accompanying drawings

[0070] Preferably, the machine 1 comprises at least one device (not illustrated) for applying an additive (for example a liquid or metal particles) on the web 100 and/or on the longitudinal strips 101.

[0071] The additive may be applied in liquid or spray form or dispersed as granules/flakes. The additive may have a flavouring effect (for example, vanilla, menthol, etc.) or a filtering effect (for example, activated carbon, sepiolite, silica gel, etc.) or it may contribute to the creation of aerosols and vapours (for example, glycerine, etc.) or improve the flowability of the materials to facilitate gathering and formation of the rod (for example, oils, water, alcohol, glycerine, etc.) or, in the case of metal particles, it may be capable of heating the tobacco by an electromagnetic induction effect.

[0072] Preferably, the machine 1 may comprise a device (not illustrated in the accompanying drawings) for reducing the electrostatic charge of the material for the tobacco industry, more preferably located upstream of the first cutting means 3.

[0073] Preferably, the machine 1 may comprise at least one detecting sensor (not illustrated in the accompanying drawings) configured to detect jamming and/or breaks in the longitudinal strips 101, more preferably located between the first cutting means 3 and the gathering and conveying means 10.

[0074] For example, the detecting sensor may be an optical sensor (vision system, standard or diffuse photocells), an acoustic sensor (ultrasonic) or a capacitive sensor.

[0075] In an alternative embodiment, the detecting sensor may be located downstream of the garniture tongue 12 and be configured to detect the density of the continuous rod 100".

[0076] According to a further aspect of it, this invention provides a method for making rod-shaped smoking articles, comprising the following steps:

- unwinding the roll 2a of web 100 of material for the tobacco industry along a longitudinal feed direction "X";
- cutting the web 100 so as to create a plurality of longitudinal strips 101 along the longitudinal feed direction "X", making a plurality of longitudinal, broken cutting lines (102) in such a way that two longitudinal strips (101) which are transversely adjacent each other relative to the longitudinal feed direction "X" are connected to each other by at least one joining portion 103.
- gathering and conveying the longitudinal strips 101 to make a continuous stream 100';
- forming the continuous rod 100" by progressively wrapping the continuous stream 100' in the paper web 13;
- cutting the continuous rod 100" into a plurality of rod-shaped smoking articles.

[0077] Advantageously, this method allows making compact, cohesive smoking articles where, besides the joining portions 103, the shape of the longitudinal strips 101 and/or the easy folding zones 104 also contribute to improving the efficiency of the production process and the quality of the end product.

[0078] Also part of the invention is a rod-shaped smoking article comprising a plurality of longitudinal strips 101 obtained from a web 100 of material for the tobacco industry, where the longitudinal strips 101 extend longitudinally in the rod-shaped smoking article and are wrapped in a paper web 13, and where each longitudinal strip 101 is connected to the transversely adjacent longitudinal strip 101 by at least one joining portion 103.

[0079] This invention achieves the preset aims, overcoming the disadvantages of the prior art, by providing the user with a machine for making rod-shaped smoking articles by making longitudinal strips 101 capable of improving rod filling uniformity, and with a method which can improve the efficiency of the production process.

[0080] The rod-shaped smoking article according to this invention is thus uniformly filled, well compacted and cohesive and free of problems due to material falling out of the tips and which can advantageously be used to make high-quality products.

Claims

1. A machine for making rod-shaped smoking articles (1), comprising:

- unwinding means (2) for unwinding at least one roll (2a) of web (100) of material for the tobacco industry; the web (100) being adapted to be unwound along a longitudinal feed direction (X);
- first cutting means (3) for cutting the web (100), located downstream of the unwinding means (2) and configured to receive and cut the web (100) in such a way as to create a plurality of longitudinal strips (101) along the longitudinal feed direction (X), the first cutting means (3) comprising at least a first roller (4) and a second roller (5) acting in conjunction with each other and configured to create the plurality of longitudinal strips (101) on the web (100) sliding between the rollers (4, 5);
- gathering and conveying means (10) configured to gather and convey the longitudinal strips (101) from the first cutting means (3) to create at least one continuous stream (100');
- a garniture tongue (12) configured to receive at least one continuous stream (100') and to progressively wrap it in a paper web (13) to make at least one continuous rod (100"), the at least one continuous rod (100") comprising a plurality

of longitudinal strips (101);
- second cutting means (14) for cutting the at least one continuous rod (100"), located downstream of the garniture tongue (12) and configured to cut the at least one continuous rod (100") into a plurality of rod-shaped smoking articles;

the machine (1) being **characterized in that** the first cutting means (3) are configured to make a plurality of longitudinal, broken cutting lines (102), in such a way that two longitudinal strips (101) which are transversely adjacent each other relative to the longitudinal feed direction (X) remain connected to each other by at least one joining portion (103).

2. The machine (1) according to claim 1, wherein at least one between the first roller (4) and the second roller (5) comprises a plurality of cutting discs (6), preferably rotary, the first cutting means (3) being configured in such a way as to vary the distance between the cutting profile of each cutting disc (6) and the web (100) during rotation of the cutting discs (6) so as to make a break which defines the at least one joining portion (103) in the cutting line.

3. The machine (1) according to claim 2, wherein the first cutting means (3) are configured to move the cutting discs (6) between a distal position, where the cutting discs (6) are not in contact with the web (100), and a cutting position, where the cutting discs (6) are in contact with the web (100), thereby creating longitudinal cut segments (102') alternated with the at least one joining portion (103).

4. The machine (1) according to claim 2, wherein each cutting disc (6) has a cutting profile which, along its circumferential extension, has at least one angular stretch with an increased diameter such as to cut the web (100) as the cutting disc (6) rotates, thereby making a longitudinal cut segment (102'), and at least one angular stretch with a reduced diameter such as not to cut the web (100) as the cutting disc (6) rotates, so that the web (100) defines the at least one joining portion (103).

5. The machine (1) according to claim 4, wherein the angular stretches with reduced diameter are angularly offset from each other.

6. The machine (1) according to claim 5, wherein the angular stretches with reduced diameter are angularly offset from each other in such a way that at least one joining portion (103) is defined in each transverse section of the web (100) as the cutting discs (6) rotate.

7. The machine (1) according to any one of claims 2 to 6, wherein each cutting disc (6) is configured to make longitudinal strips (101) whose edges are defined by straight or wavy or zig-zag segments (102') alternated with at least one joining portion (103).

8. The machine (1) according to claim 7, wherein each cutting disc (6) has a straight or wavy or zig-zag cutting profile.

9. The machine (1) according to any one of the preceding claims, wherein the machine (1) comprises means (7) for making a plurality of longitudinal easy folding zones (104) in such a way that each longitudinal strip (101) has at least one easy folding zone (104).

10. The machine (1) according to claim 9, wherein the means (7) for making a plurality of longitudinal easy folding zones (104) are located on at least one between the first roller (4) and the second roller (5) and comprise at least one between:

- a plurality of crimping discs (8) configured to compress the web (100) in such a way that each easy folding zone (104) has at least one longitudinal crimp;
- a plurality of reduced diameter scoring discs (9) configured to partly cut the thickness of the web (100) in such a way that each easy folding zone (104) has at least one longitudinal score line.

11. The machine (1) according to claims 2 and 9, wherein the cutting discs (6) are alternated with the crimping discs (8) and/or with the reduced diameter scoring discs (9), so that each longitudinal strip (101) comprises at least one crimp or one score line.

12. The machine (1) according to claim 1, wherein the gathering and conveying means (10) comprise at least one funnel-shaped member (11) having an infeed cross section (11a) suitable for receiving the longitudinal strips (101) and an outfeed cross section (11b) suitable for expelling the continuous stream (100') formed as the longitudinal strips (101) are fed through the funnel-shaped member (11), the gathering and conveying means (10) preferably comprising at least two funnel-shaped members (11) horizontally juxtaposed or at least partly superposed.

13. The machine (1) according to claim 1, wherein the machine (1) comprises suction means associated with the gathering and conveying means (10) and configured to facilitate gathering the longitudinal strips (101).

14. The machine (1) according to claim 1, comprising at least one device for applying an additive on the web (100) and/or on the longitudinal strips (101) - for ex-

ample a liquid or metal particles.

15. The machine (1) according to claim 1, comprising a device for reducing the electrostatic charge of the material for the tobacco industry, preferably located upstream of the first cutting means (3).

16. The machine (1) according to claim 1, comprising at least one detecting sensor configured to detect jamming and/or breaks in the longitudinal strips (101), the at least one detecting sensor being preferably located between the first cutting means (3) and the gathering and conveying means (10).

17. A method for making rod-shaped smoking articles, comprising the following steps:

- unwinding at least one roll (2a) of web (100) of material for the tobacco industry along a longitudinal feed direction (X);
- cutting the web (100) in such a way as to create a plurality of longitudinal strips (101) along the longitudinal feed direction (X),
- gathering and conveying the longitudinal strips (101) to make a continuous stream (100');
- forming at least one continuous rod (100") by progressively wrapping the continuous stream (100') in a paper web (13);
- cutting the at least one continuous rod (100") into a plurality of rod-shaped smoking articles;

the method being **characterized in that** the step of cutting the web (100) comprises making a plurality of longitudinal, broken cutting lines (102), in such a way that two longitudinal strips (101) which are transversely adjacent each other relative to the longitudinal feed direction (X) remain connected to each other by at least one joining portion (103).

18. A rod-shaped smoking article comprising a plurality of longitudinal strips (101) obtained from a web (100) of material for the tobacco industry, wherein the longitudinal strips (101) extend longitudinally in the rod-shaped smoking article and are wrapped in a paper web (13); each longitudinal strip (101) being connected by at least one joining portion (103) to the longitudinal strip (101) which is transversely adjacent to it.

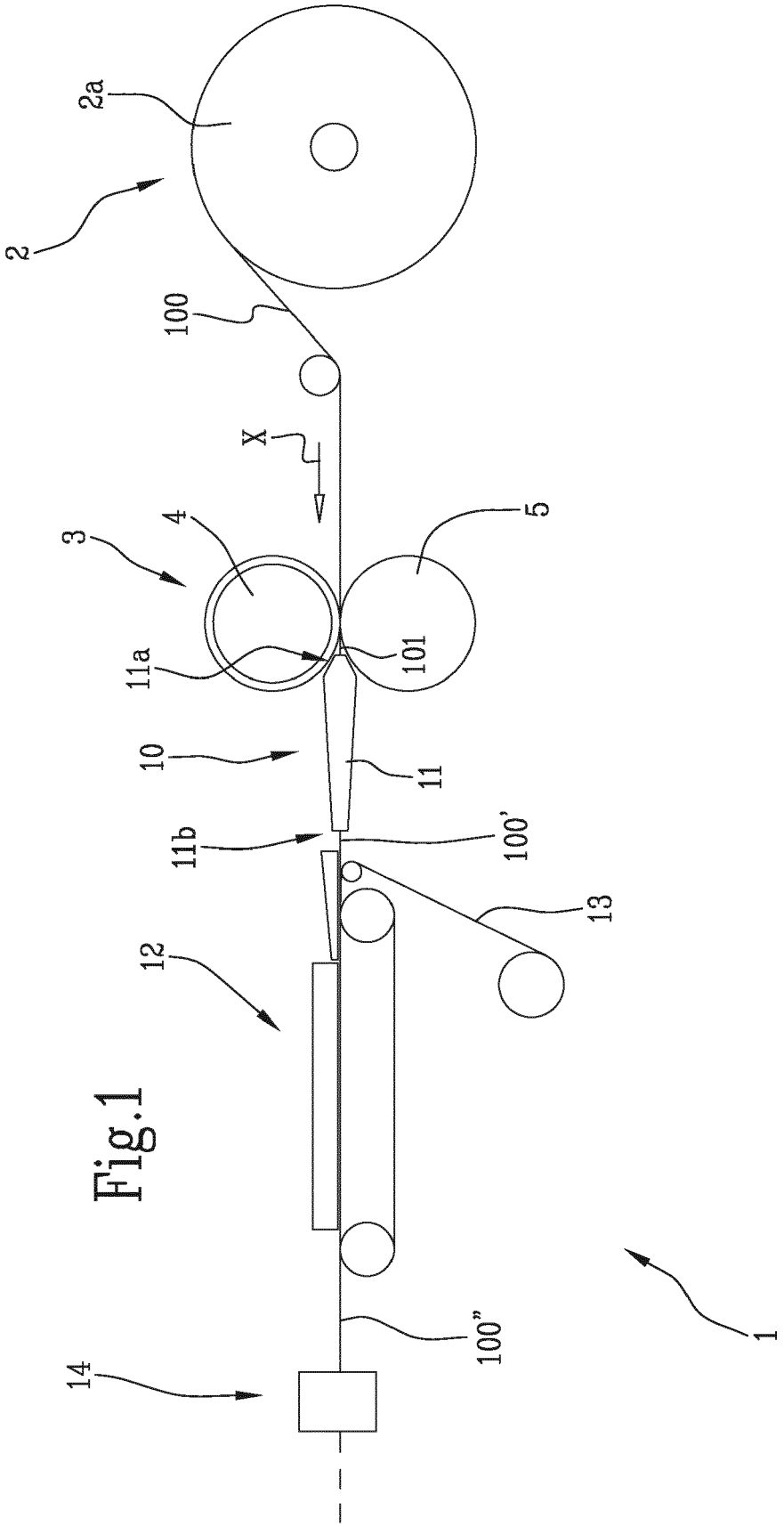


Fig.1

Fig.2

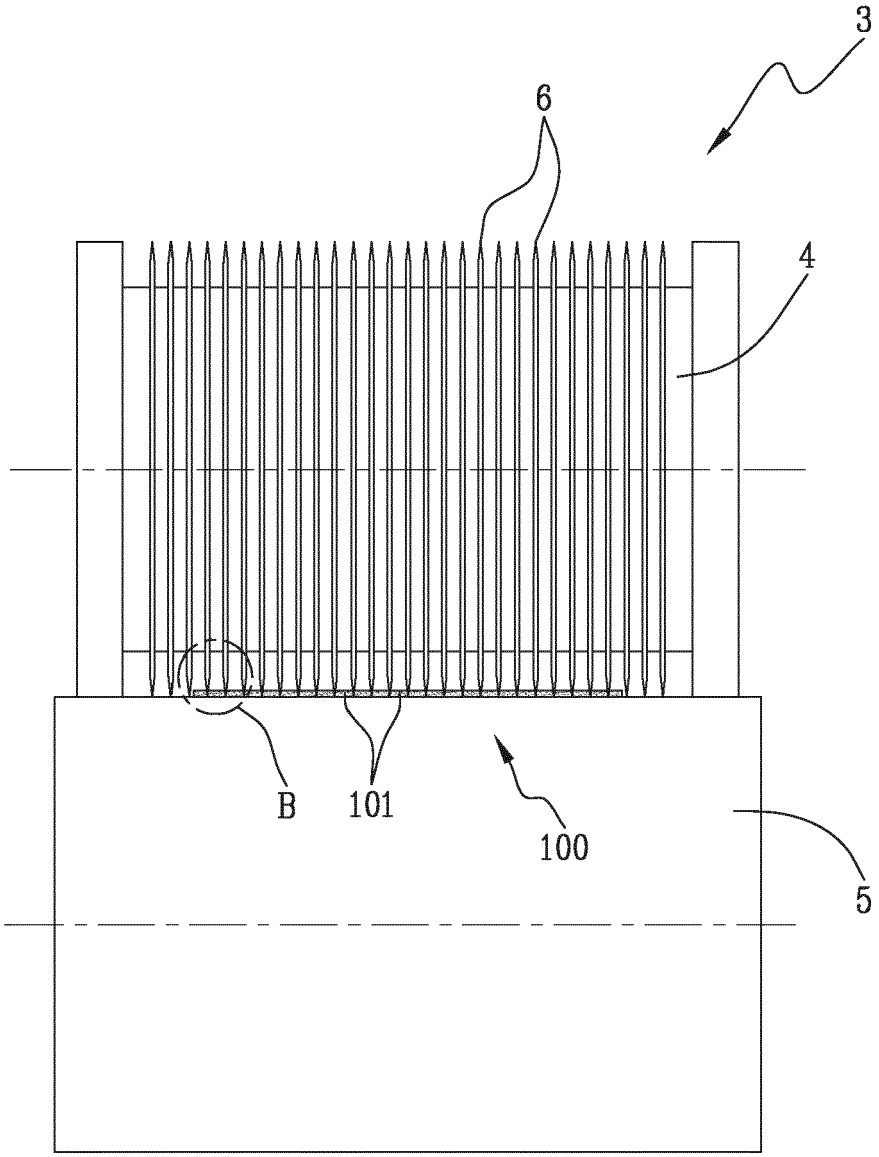


Fig.2A

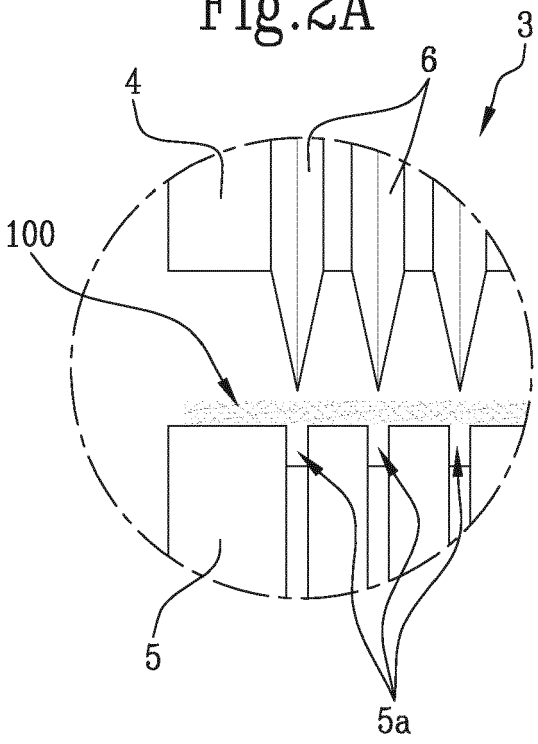


Fig.3A

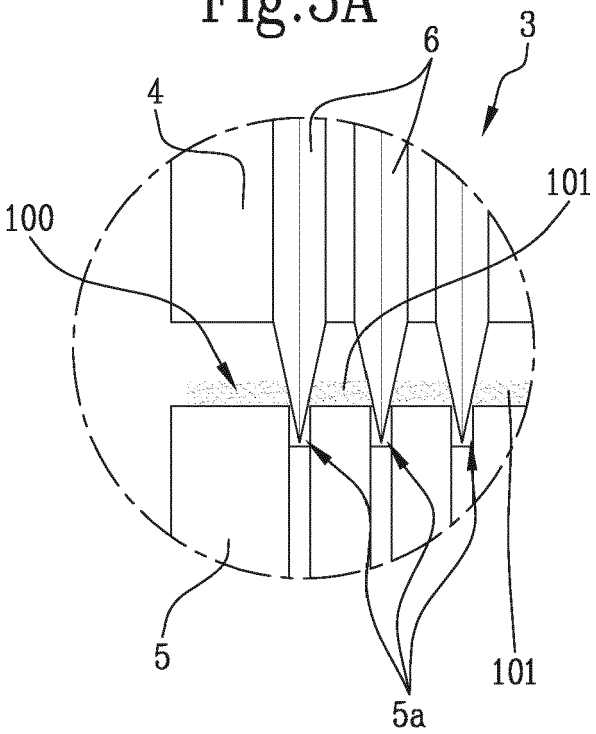


Fig.2B

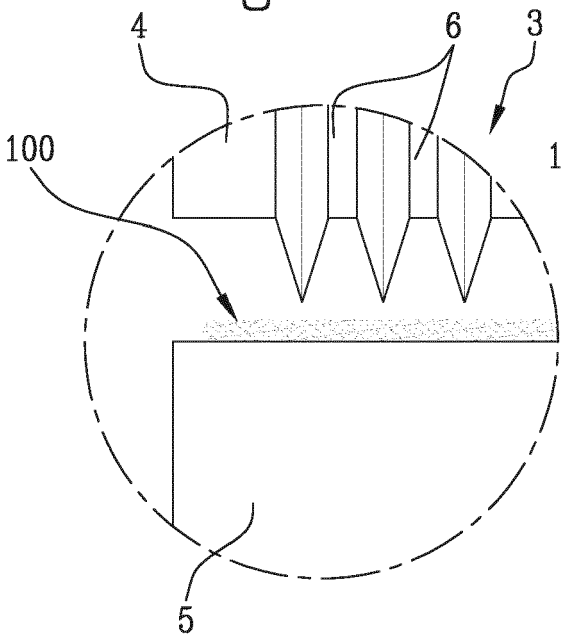


Fig.3B

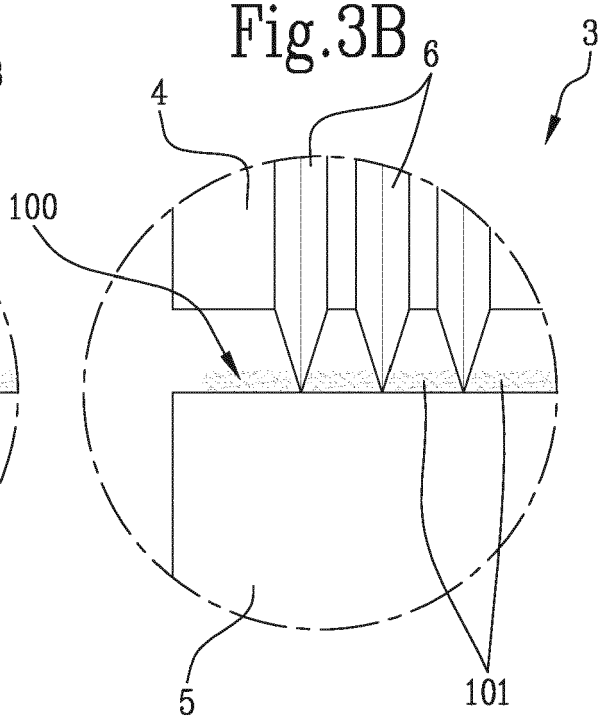


Fig.2C

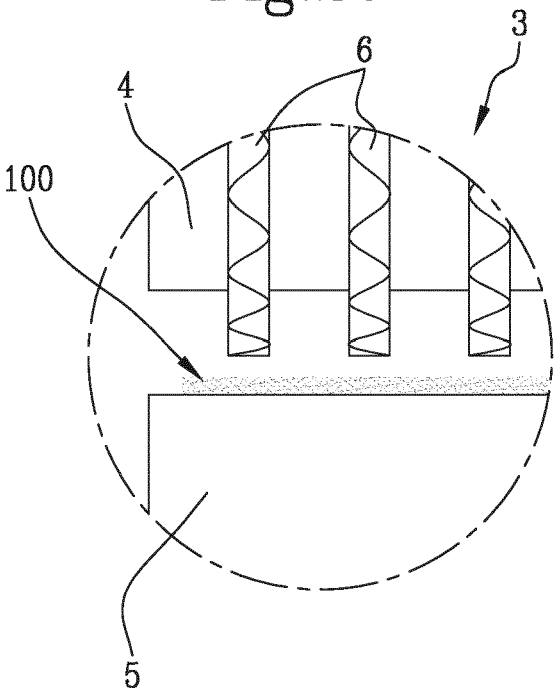


Fig.3C

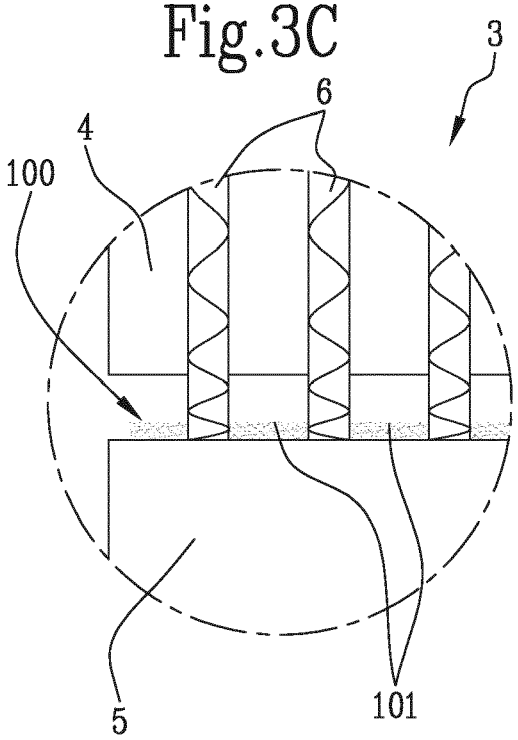


Fig.2D

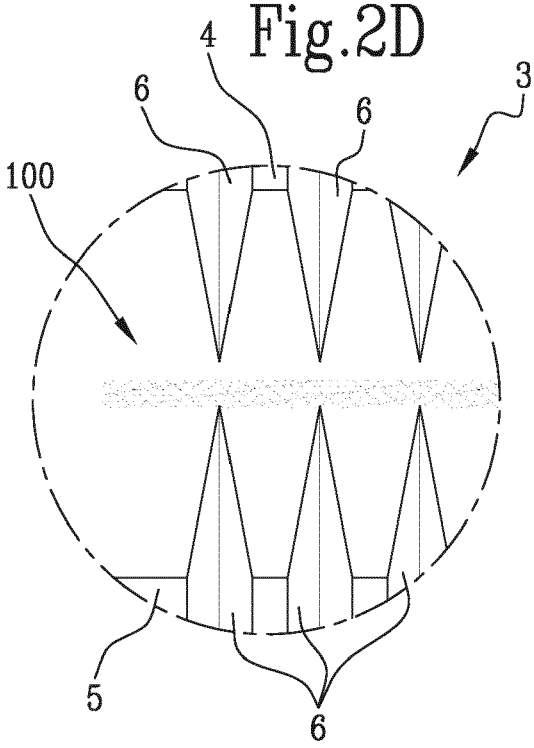


Fig.3D

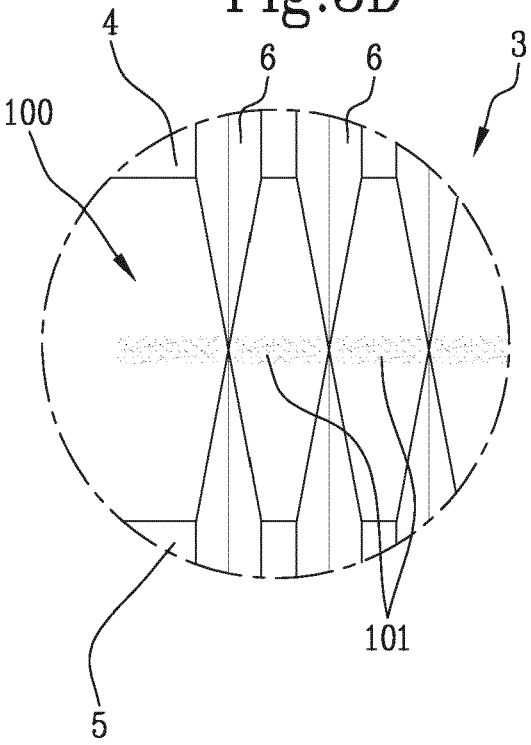
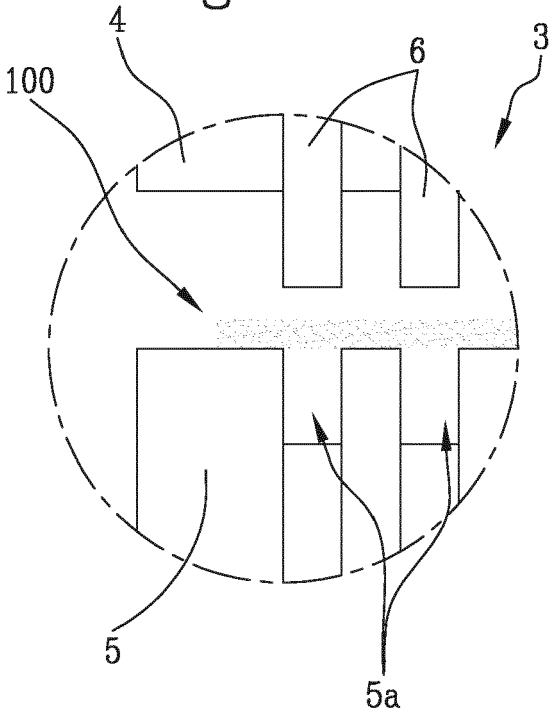


Fig.2E



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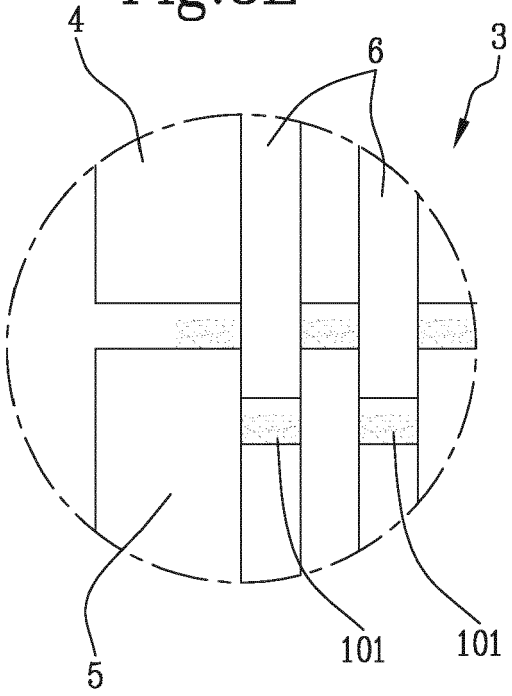


Fig.2F

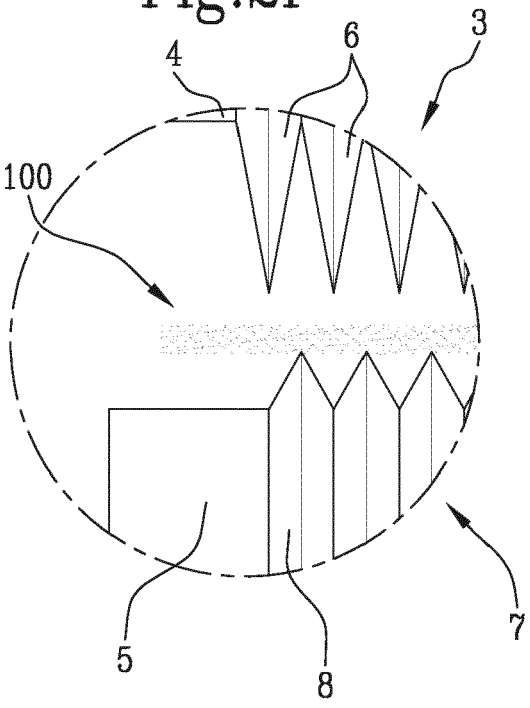


Fig.3F

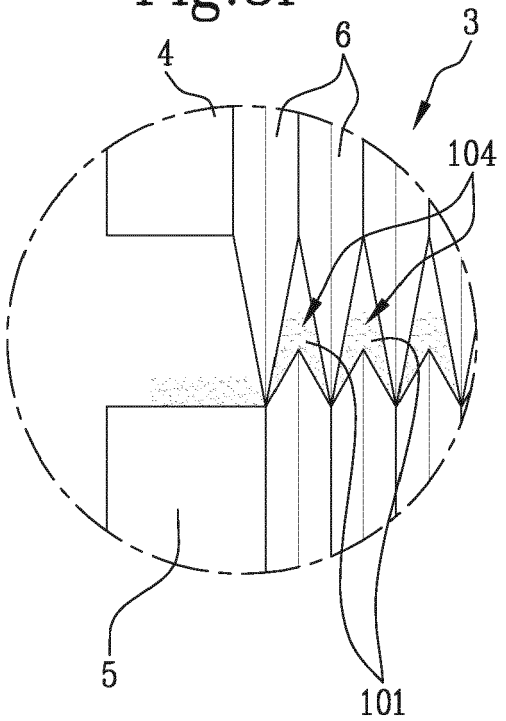


Fig.2G

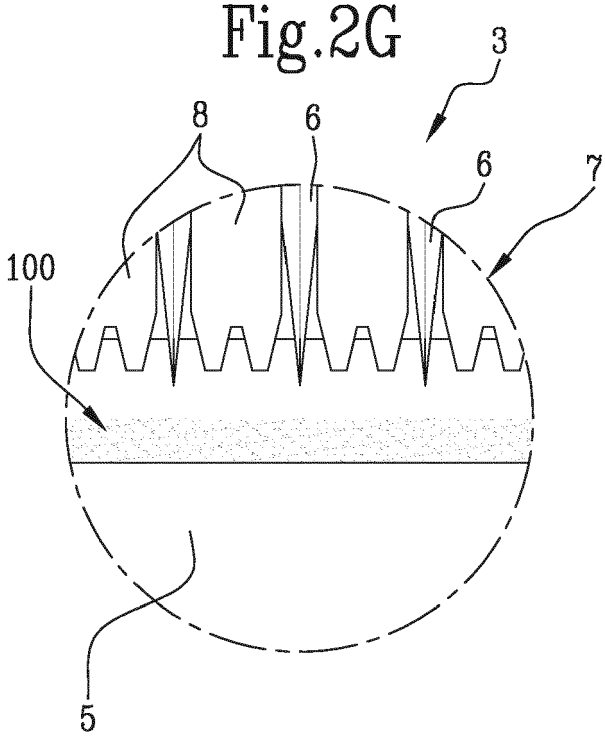


Fig.3G

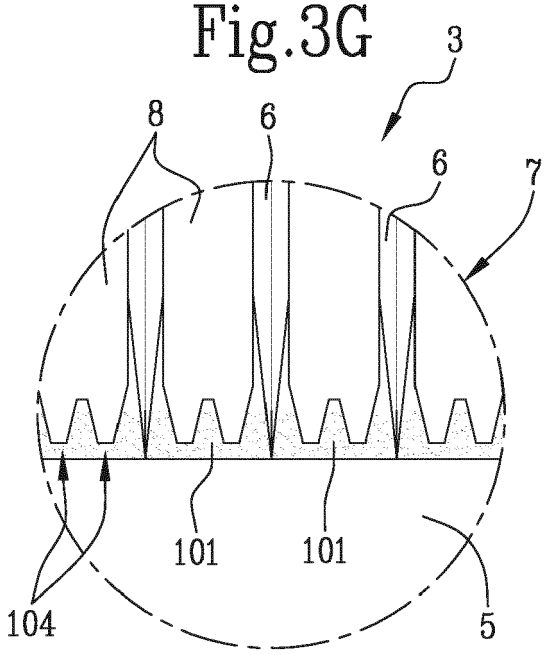


Fig.2H

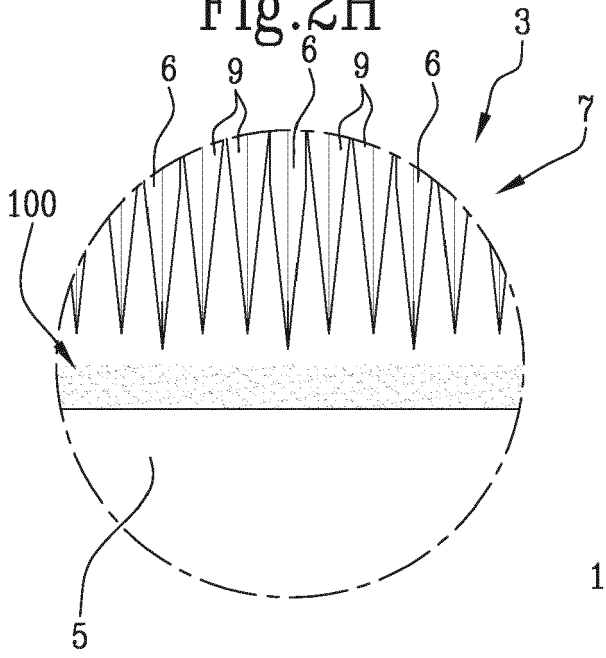
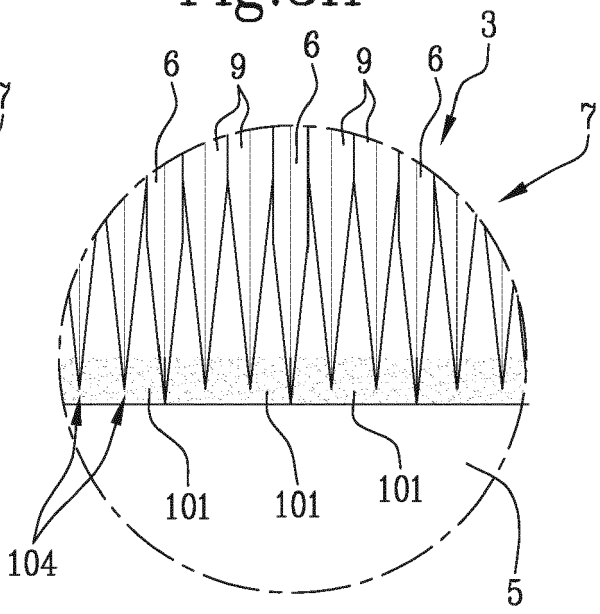


Fig.3H



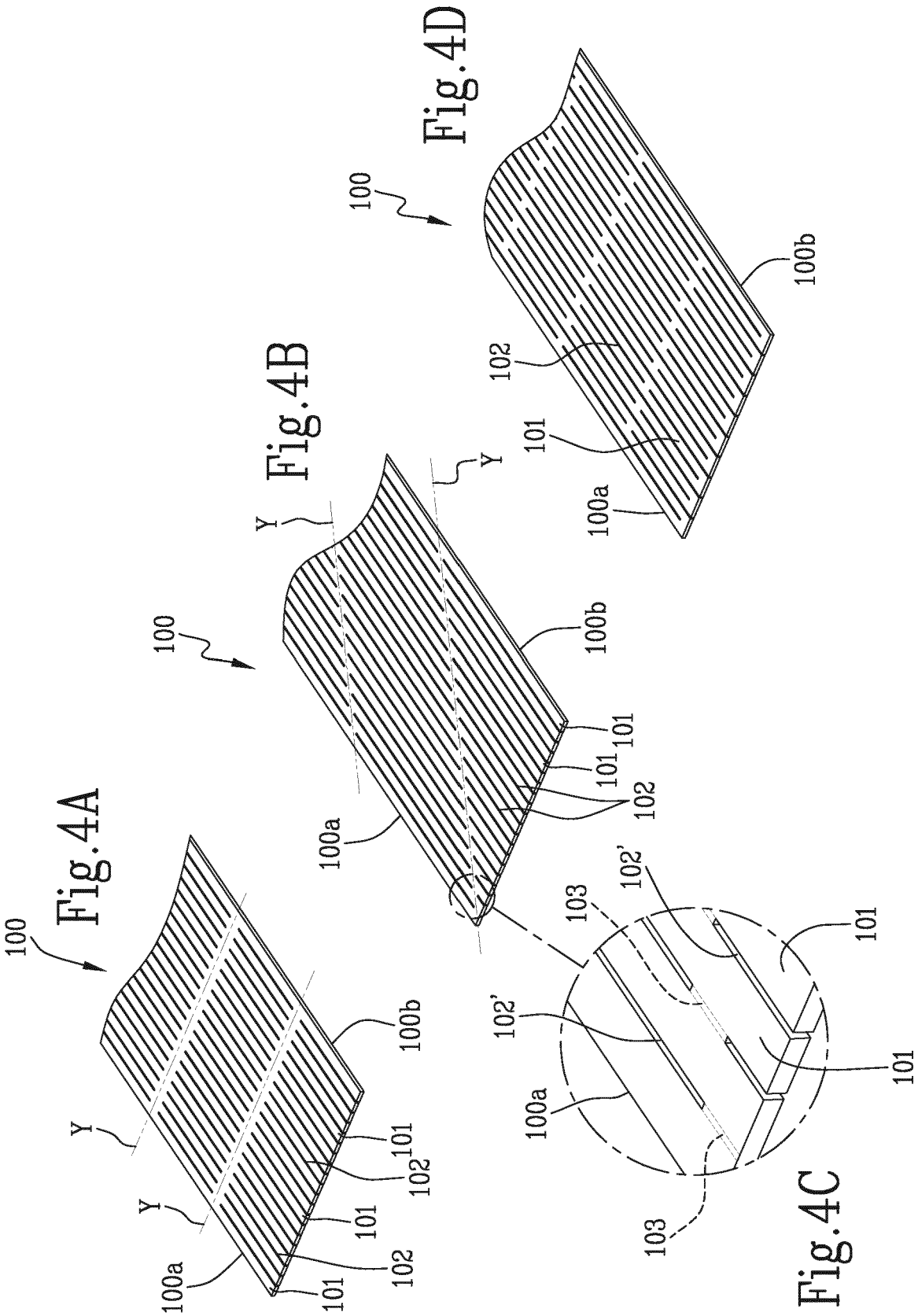


Fig.4A

Fig.4B

Fig.4C

Fig.4D

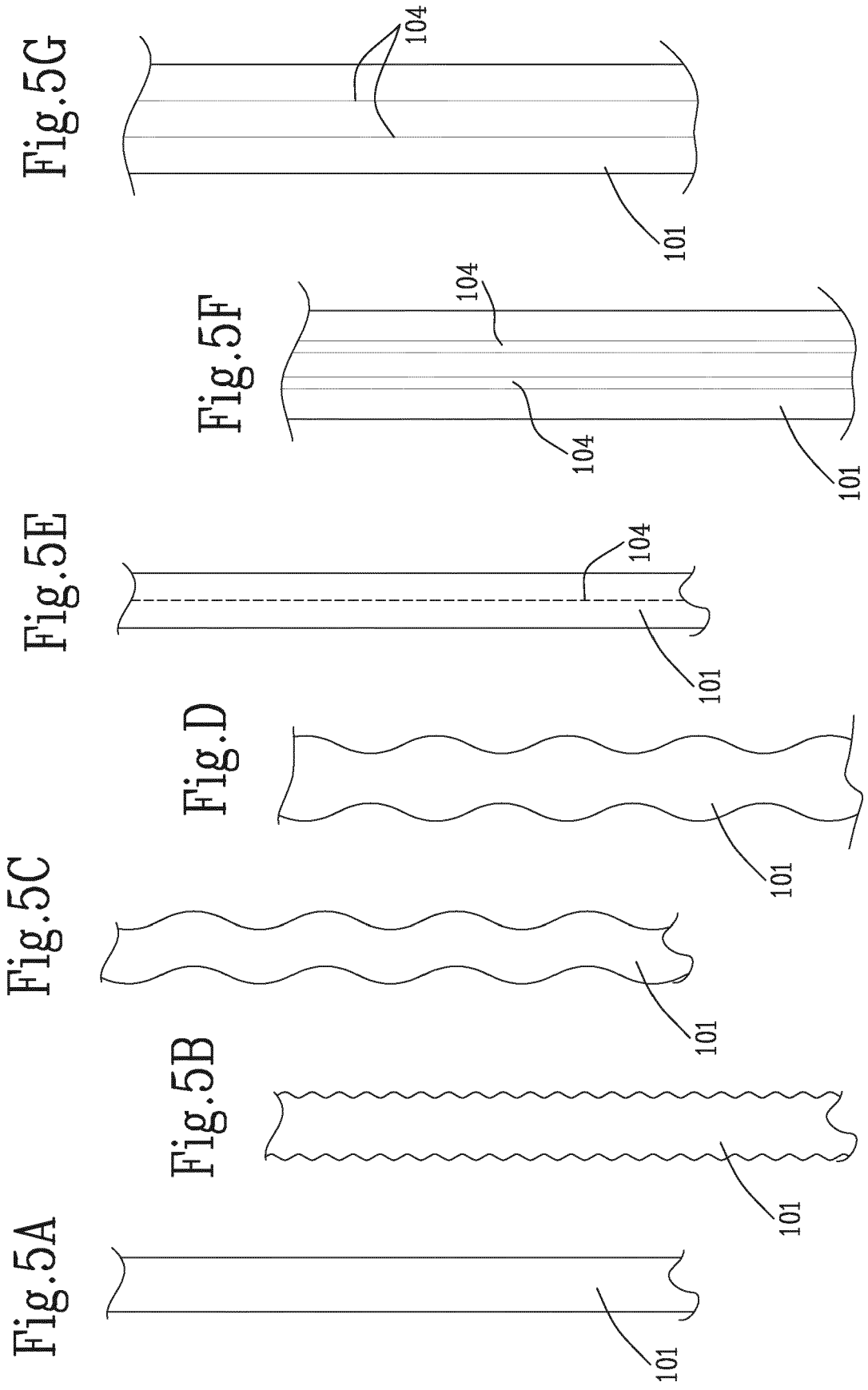


Fig.5G
104
101
Fig.5F
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Fig.5E
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Fig.D
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Fig.5C
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Fig.5B
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Fig.5A
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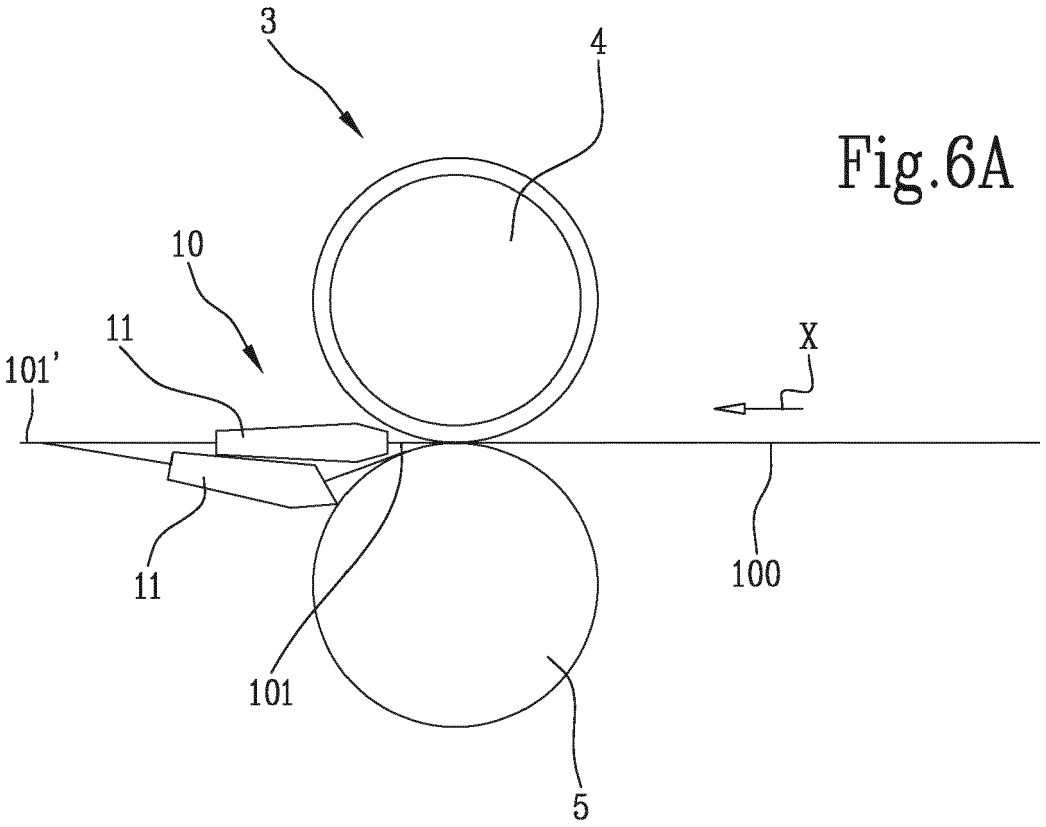

Fig.6A

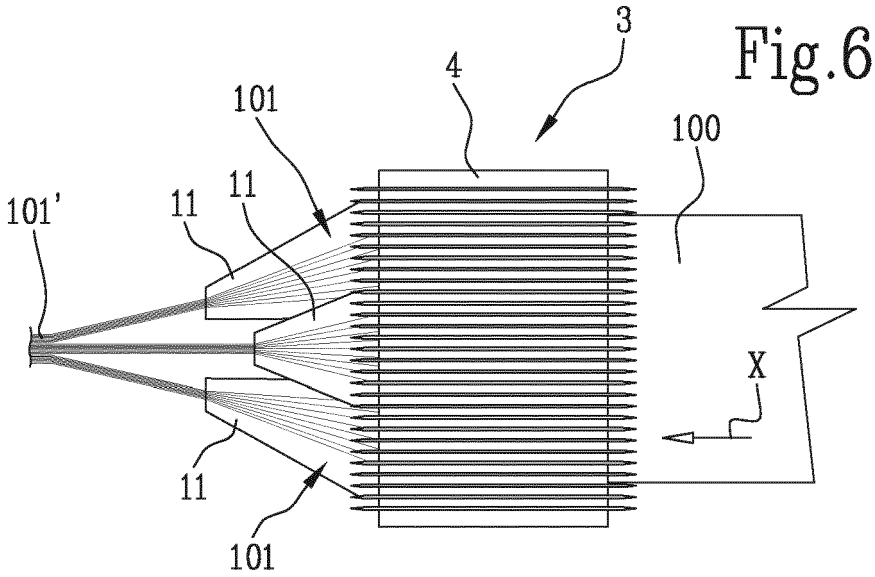

Fig.6B

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- WO 2016071267 A1 **[0003]**
- US 4889143 A **[0005]**