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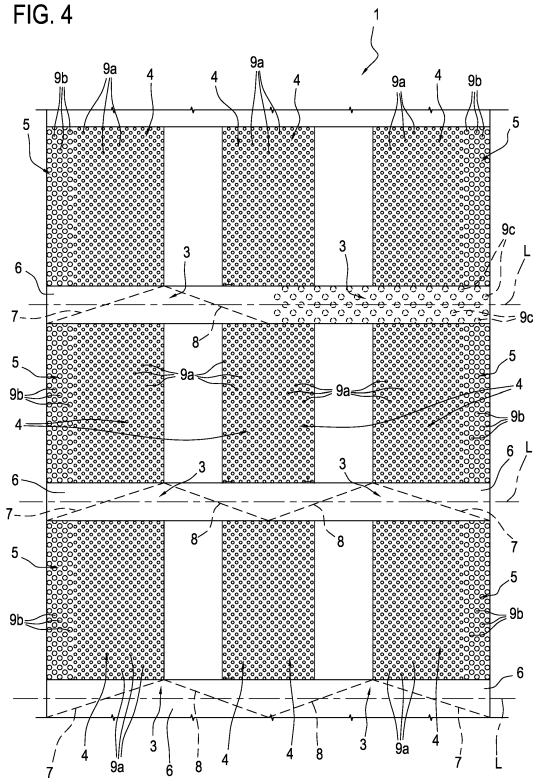
(54) Adhesive applicator roller

(57) An adhesive applicator roller (1) for applying adhesive to a continuous web (W) of paper used in the tobacco processing industry has on its cylindrical outside surface (2) at least a first zone (3) for collecting the adhesive, a second zone (4) for collecting the adhesive and a third zone (5) for collecting the adhesive; The applicator roller (1) comprises on its cylindrical outside surface (2) a groove (6) which extends along a generator of the cylindrical surface (2) and which defines the first collecting zone (3); the groove (6) applies the adhesive to the web (W) at a first region (105) of the web (W) substantially at a predetermined cutting line (L) thereof.

FIG. 4



EP 2 850 954 A2

Description

[0001] This invention relates to an adhesive applicator roller designed in particular for cigarette making machines and the like.

[0002] The invention also relates to an adhesive applicator device comprising the adhesive applicator roller, a smokers' article and a process for making the smokers' article.

[0003] More precisely, this invention relates to an adhesive applicator or "gumming" roller for an adhesive applicator device of the type with a single roller, preferably used in a machine of the type known as "filter tip attachment" machine for applying a layer of adhesive substance on a continuous web of paper which is subsequently cut into pieces or patches used to connect filters to respective cigarette sticks.

[0004] The adhesive applicator device essentially comprises, besides the roller, a distributor which spreads the adhesive on the roller, and a tank or container for supplying the adhesive to the distributor and located under the applicator roller.

[0005] A prior art example of a substantially cylindrical applicator roller has on its outside cylindrical surface a plurality of cavities for collecting and retaining the adhesive to be applied to the paper web.

[0006] As is known, the volume and distribution of the cavities on the surface of the roller, also known as the "mapping" of the cavities, are determined by the quantity of adhesive to be applied on distinct zones of the paper web.

[0007] These zones of the paper are, for example, those where the web is cut or those by which the filter and the cigarette stick are joined to each other or that corresponding to the longitudinal edge of the patch after being closed to define the cigarette.

[0008] In effect, prior art rollers in their different forms have three distinct zones on them to collect and spread different quantities of glue.

[0009] The adhesive is applied to the paper web in the form of drops. Then, once the piece of paper has been placed on the part it is to adhere to, for example the filter or the cigarette stick, the drops are spread out to form a discrete layer of adhesive.

[0010] One drawback of prior art rollers is due to the fact that, given the required volume of each drop of adhesive, the proportion between the area of the inlet opening and the depth of each cavity causes relatively long drops to be formed, also considering a factor which expresses the absorption of the glue by the paper.

[0011] If the drops are relatively very long, they may lead to unwanted dirtying, for example when the web with the adhesive on it is cut into pieces. in particular, the drops may dirty the blades used to cut the paper web, making them less effective in cutting the paper. Moreover, when the semifinished cigarettes are rolled, the glue drops may be squeezed out and smeared onto parts of the paper patch which should remain permeable, thus preventing the finished cigarettes from being properly aerated.

[0012] In this context, the main technical purpose of this invention is to propose an adhesive applicator roller which is free of the above mentioned drawbacks.

[0013] The aim of the invention is to provide an adhesive applicator roller which reduces the risk of dirtying parts of the patch, of the cigarette or of the filter tip attachment machine with adhesive.

[0014] A further aim of the invention is to provide a roller having predetermined zones for collecting and applying distinct quantities of adhesive.

[0015] The technical purpose and aims specified are substantially achieved by an adhesive applicator device according to claim 1.

[0016] Further features of the invention and its advantages are more apparent in the non-limiting description below, with reference to a preferred but non-exclusive embodiment of a adhesive applicator roller, as illustrated in the accompanying drawings, in which:

- Figure 1 illustrates an adhesive applicator roller according to this invention in a schematic perspective view;
- Figure 2 is a schematic front view, with some parts cut away for greater clarity, of the applicator roller of Figure 1 in an operating configuration;
- Figure 3 is a schematic perspective view of a cigarette made using the roller shown in the preceding figures;
- Figure 4 is a plan view of a detail of one embodiment of the roller of Figures 1 and 2;
- Figure 5 is a schematic plan view of a detail of a paper web treated using the roller of the preceding figures.

[0017] With reference in particular to Figure 1, the numeral 1 denotes an adhesive applicator roller, or "gumming" roller, according to this invention for applying adhesive to a web of paper or the like.

[0018] The roller 1 is designed to be used in tobacco processing machines for making smokers' articles such as, for example, cigarettes, a preferred embodiment of which is illustrated in Figure 3, labelled 100. The article 100 is substantially cylindrical and has a main direction of extension D.

[0019] The article 100 comprises a filter element or filter 101 and a cigarette stick 102 aligned with the filter element 101 along the main direction of extension D,

[0020] A patch 103 is wrapped around the filter element 101 and part of the cigarette stick 102.

[0021] The patch 103 is attached by an adhesive - for example, glue - to the filter 101 and to the cigarette stick 102 and causes the two to be connected to each other. The adhesive is distributed on an inside face of the patch 103, as will become clearer as this description continues.

[0022] With reference in particular to Figure 5, it may be observed that each patch 103 is obtained in substan-

tially known manner as a piece of a continuous web W, for example of paper, cut along a predetermined cutting line L transversal to the main direction of extension of the web W.

[0023] In the example illustrated, a pair of patches 103 connected to each other are obtained in known manner each time the web W is cut. The reference label L1 indicates a dashed line representing a cutting line along which each pair of patches 103 is cut when the corresponding coupled cigarettes 100 are divided into two.

[0024] Cutting the patches 103 from the web W along the lines L is done in a filter tip attachment machine by means of a cutting system of substantially known type equipped with respective cutting blades. With reference to Figures 3 and 5, it may be observed that the aforementioned inside face of the patch 103, labelled 104 in Figure 5, has a first region 105 extending along a generator of the smokers' article 100 at the cutting line L.

[0025] The region 105 is attached by a first quantity of adhesive per unit area both to the filter 101, in particular at a free end thereof, and to the cigarette stick 102, and extends substantially along the direction of extension D of the cigarette 100.

[0026] The inside face of the patch 103 has a second region 106, preferably attached by a second quantity of adhesive per unit area to the filter element 101.

[0027] The inside face of the patch 103 has a third region 107, extending along a directrix of the smokers' article 100 and attached by a third quantity of adhesive per unit area both to the filter 101 and to the cigarette stick 102.

[0028] The region 107, or joining region, in particular, extends at a joining zone where the filter 101 is joined to the cigarette stick 102.

[0029] The patch 103 in general and the region 107 in particular determine the connection of the filter 101 to the corresponding cigarette stick 102.

[0030] Preferably, the aforementioned first quantity of adhesive per unit area is greater than or equal to the aforementioned second quantity of adhesive per unit area and is obtained as a uniform distribution of adhesive in the region 105.

[0031] Advantageously, the third quantity of adhesive per unit area, provided in the third region 107, or joining region, is greater than or equal to the quantity of adhesive per unit area present in the regions 105 and 106.

[0032] This maximizes the quality of the cigarette 100, whose patch 103 is securely glued to the filter 101 and to the stick 102 at the region 107. The quantities of adhesive are measured per unit area so as to consider, in practice, the density of the adhesive in the distinct regions 105, 106 and 107 of the patch 103.

[0033] Preferably, the patch 103 is glued to the filter 101 and/or to the cigarette stick 102 by at least two distinct adhesive densities.

[0034] In other words, in a first embodiment, the region 105 and the region 106 have the same quantity of adhesive per unit area, whilst the region 107 has a greater quantity per unit area.

[0035] In a second embodiment, the region 105 has a quantity of adhesive per unit area which is greater than that in the region 106 and the region 107 has a quantity of adhesive per unit area which is greater than that in the regions 105 and 106.

[0036] As stated, the aforementioned preferred distributions of adhesive on the patch 103 are obtained by means of the applicator roller 1.

[0037] With reference in particular to Figures 1 and 4, it may be observed that the applicator roller 1 has an axis of rotation R and a substantially cylindrical outside surface 2.

[0038] The surface 2 has a first zone 3 for collecting and applying the adhesive to the web W.

[0039] The first collecting zone 3 applies the adhesive to the part of the web W corresponding to the region 105 of the patch 103.

[0040] The zone 3 extends on the surface 2 along a generator of the surface 2 itself, that is, parallel to the axis of rotation R.

[0041] The surface 2 has a second zone 4 for collecting and applying the adhesive to the web W.

[0042] The second collecting zone 4 applies the adhesive to the part of the web W corresponding to the region 106 of the patch 103.

[0043] The surface 2 has a third zone 5 for collecting and applying the adhesive to the web W.

[0044] The third collecting zone 5 applies the adhesive to the part of the web W corresponding to the region 107 of the patch 103.

[0045] The zone 5 extends on the surface 2 along a directrix of the surface 2 itself.

[0046] The collecting zones 3, 4, 5 are repeated on the surface 2 in such a way that the adhesive applied to the web W defines a succession of pairs of patches 103 which will subsequently be cut from the web W and separated from each other.

[0047] For simplicity, reference is hereinafter made to only one set of zones 3, 4, 5 since all the zones are respectively the same.

[0048] The roller 1 comprises adhesive collecting and retaining means located in the first zone 3, in the second zone 4 and in the third zone 5 for receiving and transferring the adhesive to the continuous web W of paper which, as schematically illustrated in Figure 2, is movable along a feed direction V.

[0049] According to this invention, the adhesive collecting and retaining means in the first zone 3 are embodied by a groove or channel or crease 6 which extends along a generator of the roller surface 2, that is, parallel to the axis of rotation R.

[0050] The groove 6 is preferably made by routing the outside surface 2 of the roller 1.

[0051] As mentioned, the adhesive collected by the groove 6 is applied to the web W substantially at the cutting line L, also shown in Figure 4, in the region 105.

[0052] In a preferred embodiment, schematically rep-

resented by dashed lines in Figure 4, the applicator roller 1 has at least one pair of slits 7, 8 in the groove 6.

[0053] The slits 7 and 8 are transversal to each other and allow the groove 6 to be cleaned better.

[0054] The collecting and retaining means in the second and third zones 4, 5 comprise a plurality of cavities 9a, 9b formed in the surface 2 of the roller 1 in the second zone 4 and in the third zone 5.

[0055] The cavities 9a, 9b are substantially in the form of distinct cups distributed along the surface 2 in the respective zone 4, 5.

[0056] The cavities 9a are preferably in the form of spherical caps with circular base of footprint or diameter "N" and depth "K".

[0057] The cavities 9b are preferably in the form of spherical caps with circular base of footprint or diameter "S" and depth "P".

[0058] In order to apply to the web W the required quantities of adhesive per unit area in the different regions 105, 106 and 107, the groove 6 and the cavities 9a, 9b are of suitable size.

[0059] In one embodiment, the groove 6 has a capacity per unit area which is greater than the capacity per unit area of the cavities 9a in the second zone 4.

[0060] Thus, the zone 3 collects a first quantity of adhesive per unit area which will be applied in the region 105 and which is greater than a second quantity of adhesive per unit area which is collected by the cavities 9a in the second zone 4 and which will be applied in the region 106.

[0061] In one embodiment, the groove 6 has a capacity per unit area which is equal to the capacity per unit area of the cavities 9a in the second zone 4.

[0062] Thus, the first zone 3 collects the same quantity of adhesive per unit area as the zone 4 and, accordingly, the same quantity of adhesive per unit area will be applied in the regions 105 and 106.

[0063] Preferably, the cavities 9b in the third zone 5 have a capacity per unit area which is greater than the capacity per unit area of the cavities 9a in the zone 4 and of the groove 6 of the zone 3.

[0064] Preferably, the greater capacity of the cavities 9b compared to the cavities 9a is obtained with spherical caps whose footprint "S" is greater than the footprint "N" and whose depth "P" is greater than the depth "K".

[0065] The cavities 9b are accordingly illustrated schematically as being larger than the cavities 9a.

[0066] Looking in more detail at the groove 6, it may be observed that the groove has the shape of a parallelepiped.

[0067] Preferably, the groove 6 has a depth of between 1 hundredth of a millimetre and 10 hundredths of a millimetre, measured along a radius of the applicator roller 1.

[0068] In one embodiment, the groove has a depth of between 3 hundredths of a millimetre and 6 hundredths of a millimetre, measured along a radius of the roller 1.

[0069] Generally speaking, the machining depth corresponding to the depth of the groove 6 is less than the depths "K" and "P" of the cavities 9a and 9b.

[0070] In an alternative embodiment, the groove 6 is substituted for cavities 9c which define the first collecting zone 3.

[0071] The depth of the cavities 9c is preferably much smaller than the depths "K" and "P" of the cavities 9a and 9b.

[0072] The footprint or diameter of the cavities 9c is preferably much larger than the footprints or diameters "N" and "S" of the cavities 9a and 9b. The cavities 9c are shown, for example, by dashed lines in a part of Figure 4 in place of the groove 6.

[0073] In practice, the use of relatively shallow cavities 9c with a relatively large footprint in the first zone 3, tends, in mathematical and geometrical terms, to replicate the groove 6.

[0074] The applicator roller 1 is preferably part of an adhesive applicator device of the "single roller" type.

[0075] Basically, an applicator device of this kind, not illustrated because it is of substantially known type and described, for example, in document EP0534664, comprises a container for the adhesive, a disc for collecting a certain quantity of adhesive from the container and a distributor for spreading the adhesive on the roller 1.

[0076] The distributor is associated with the collecting disc and comprises a system for picking up from the collecting disc a portion of the quantity of adhesive collected by the disc and transferring it to the roller 1. The applicator roller 1 is generally coaxial with the collecting disc and is associated with the distributor to receive at least part of the adhesive present in the distributor.

[0077] The distributor comprises a distributing system for spreading the adhesive on the applicator roller 1, in particular in the zones 3, 4, 5, which receive it in the respective collecting and retaining means. The roller 1 allows implementing a process, of which a generic step is schematically illustrated in Figure 2, for making smokers' articles with a tobacco processing machine and which comprises a step of applying the adhesive to the continuous web W by means of the applicator roller 1 itself.

[0078] The process comprises a step of applying a substantially uniform layer of adhesive in the region 105 by means of the collecting zone 3. The uniform layer of adhesive is obtained preferably by means of the groove 6 or, alternatively, by means of the cavities 9c described above.

[0079] It should be noted that, generally speaking the working thickness in the distinct zones of the patch 103 depends on the absorption coefficient of the paper of the web W.

[0080] In practice, not all the adhesive collected by the roller 1 and placed on the web W is used to glue the patch 103 to the filter 101 and to the cigarette stick 102 but only the portion that is not absorbed by the material the web is made of.

[0081] Since the absorption coefficient of the web W is substantially constant, however, this coefficient is, for

simplicity, considered as the same for all the distinct regions.

[0082] The invention described above brings important advantages.

[0083] The application of a continuous layer in the region 105 at the cutting line L allows obtaining the required quantity of adhesive per unit area while limiting the thickness of the adhesive layer.

[0084] That way, the cutting system, in particular the blades, remain cleaner than in prior art solutions, where the layer of adhesive in the cutting zone was made up of separate but relatively long drops.

[0085] The groove formed in the roller tends to retain less glue or, generally speaking, the quantity of glue retained is better quantifiable and it is therefore easier to design the roller as a function of the required quantity of glue to be applied to the paper.

Claims

1. An adhesive applicator roller for applying adhesive to a continuous web (W) of paper used in the tobacco processing industry, the applicator roller having a cylindrical outside surface (2) with at least a first zone (3) for collecting the adhesive, a second zone (4) for collecting the adhesive and a third zone (5) for collecting the adhesive, the applicator roller comprising adhesive collecting and retaining means (6, 9a, 9b, 9c) located in the first zone (3), in the second zone (4) and in the third zone (5) for receiving and transferring the adhesive to the continuous web (W) of paper,
the applicator roller being **characterized in that** the adhesive collecting and retaining means (6, 9a, 9b, 9c) comprise at least one groove (6) on the cylindrical outside surface (2), extending along a generator of the cylindrical outside surface (2) and defining the first collecting zone (3), the web (W) having adhesive applied to it by the groove (6) in a first region (105) thereof, substantially at a predetermined cutting line (L) thereof.

2. The applicator roller according to claim 1, wherein the groove (6) has a capacity per unit area which is greater than the capacity per unit area of the collecting and retaining means (9a) in the second zone (4), the first zone (3) collecting a first quantity of adhesive per unit area which is greater than a second quantity of adhesive per unit area collected by the collecting and retaining means (9a) in the second zone (4).

3. The applicator roller according to claim 1, wherein the groove (6) has a capacity per unit area which is equal to the capacity per unit area of the collecting and retaining means (9a) in the second zone (4), the first zone collecting a first quantity of adhesive per unit area which is equal to a second quantity of adhesive per unit area collected by the collecting and retaining means (9a) in the second zone (4).

4. The applicator according to any one of the preceding claims, wherein the collecting and retaining means (9b) in the third zone (5) have a capacity per unit area which is greater than or equal to the capacity per unit area of the collecting and retaining means (6) in the first zone (3), the third zone (5) extending along a directrix of the cylindrical surface (2), the web (W) having adhesive applied to it by the third zone (5) in an area (107) thereof preferably intended for connecting a filter element (101) to a corresponding cigarette stick (102).

5. The applicator roller according to any one of the preceding claims, wherein the collecting and retaining means (6, 9a, 9b) comprise a plurality of discrete cavities (9a, 9b) formed in the second zone (4) and in the third zone (5).

6. The applicator roller according to any one of claims 1 to 5, wherein the applicator roller has at least one slit (7, 8) in the groove (6).

7. The applicator roller according to claim 6, wherein the applicator roller has, in the groove, a second slit (7, 8), transversal to the first slit.

8. The applicator roller according to any one of the preceding claims, wherein the groove (6) has a depth of between 1 hundredth of a millimetre and 10 hundredths of a millimetre, measured along a radius of the applicator roller.

9. The applicator roller according to claim 8, wherein the groove (6) has a depth of between 3 hundredths of a millimetre and 6 hundredths of a millimetre, measured along a radius of the applicator roller.

10. An adhesive applicator device for applying adhesive to a continuous web of paper for the tobacco processing industry, the applicator device comprising a container for the adhesive; a collecting disc for collecting a quantity of adhesive from the container; an adhesive distributor, associated with the collecting disc and comprising pickup means for picking up from the collecting disc a portion of the quantity of adhesive, the applicator device comprising
an adhesive applicator roller (1) coaxial with the collecting disc and associated with the distributor to receive at least part of the adhesive present in the distributor, the distributor comprising a distributing system for spreading the adhesive on the applicator roller (1), the applicator device being **characterized in that** the applicator roller (1) is made according to any one of claims 1 to 9.

11. A substantially cylindrical smokers' article having a main direction of extension (D) and comprising
a filter element (101),
a cigarette stick (102) aligned with the filter element (101) along the main direction of extension (D),
a patch (103) wrapped at least partly around the filter element (101) and the cigarette stick (102) and connecting the filter element (101) to the cigarette stick (102), the patch (103) being cut from a continuous web (W) along a cutting line (L) and attached to the filter element (101) and the cigarette stick (102) by means of an adhesive spread on an inside face (104) of the patch (103),
the inside face (104) of the patch (103) having at least a first region (105) extending along a generator of the smokers' article at the cutting line (L), a second region (106), a third region (107) extending along a directrix of the smokers' article at a join where the filter element (101) is connected to the cigarette stick (102), the first region (105), the second region (106) and the third region (107) being attached to the filter element (101) and/or to the cigarette stick (102) by a first quantity of adhesive per unit area, a second quantity of adhesive per unit area and a third quantity of adhesive per unit area, respectively, the smokers' article being **characterized in that** the first quantity of adhesive in the first region (105) is greater than or equal to the second quantity of adhesive in the second region (106).

12. The smokers' article according to claim 11, wherein the third quantity of adhesive per unit area in the third region (107) is greater than the first and the second quantity of adhesive per unit area.

13. A process for making smokers' articles (100) according to claim 11 or 12 with a tobacco processing machine, comprising a step of applying adhesive to the continuous web (W) through the agency of an applicator roller (1) according to any one of claims 1 to 9, **characterized in that** it comprises a step of applying a uniform layer of adhesive in the first region (105).

FIG. 1

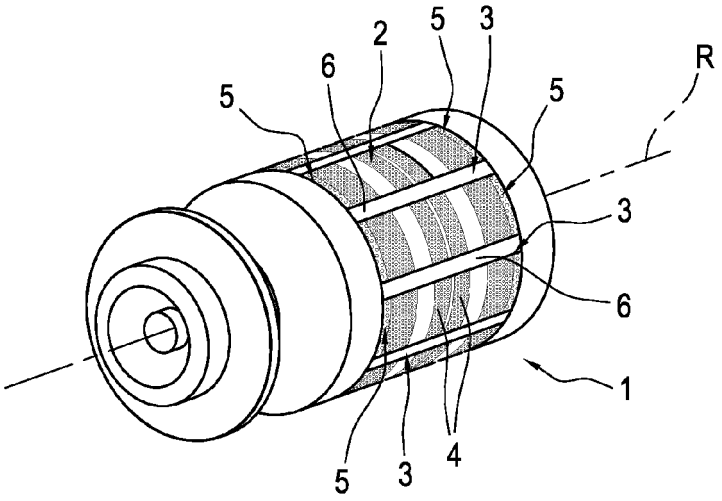


FIG. 2

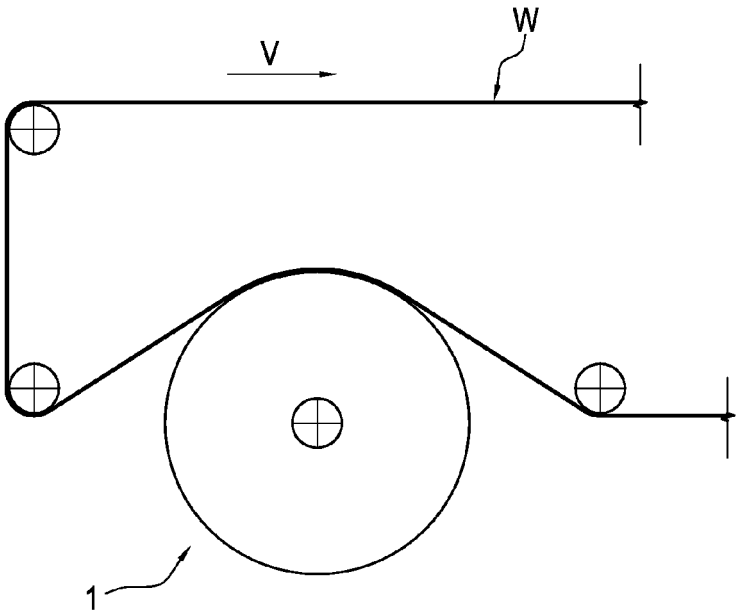


FIG. 3

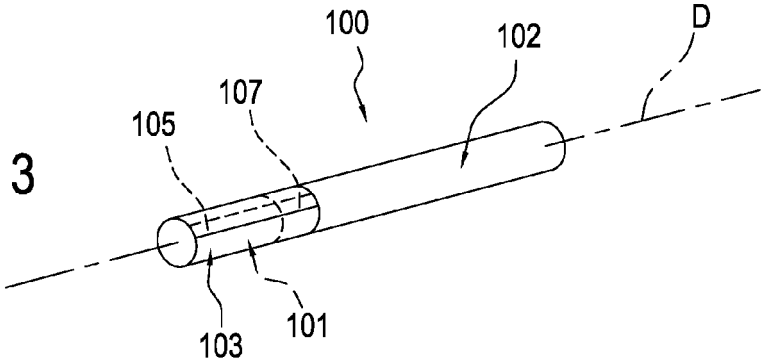


FIG. 4

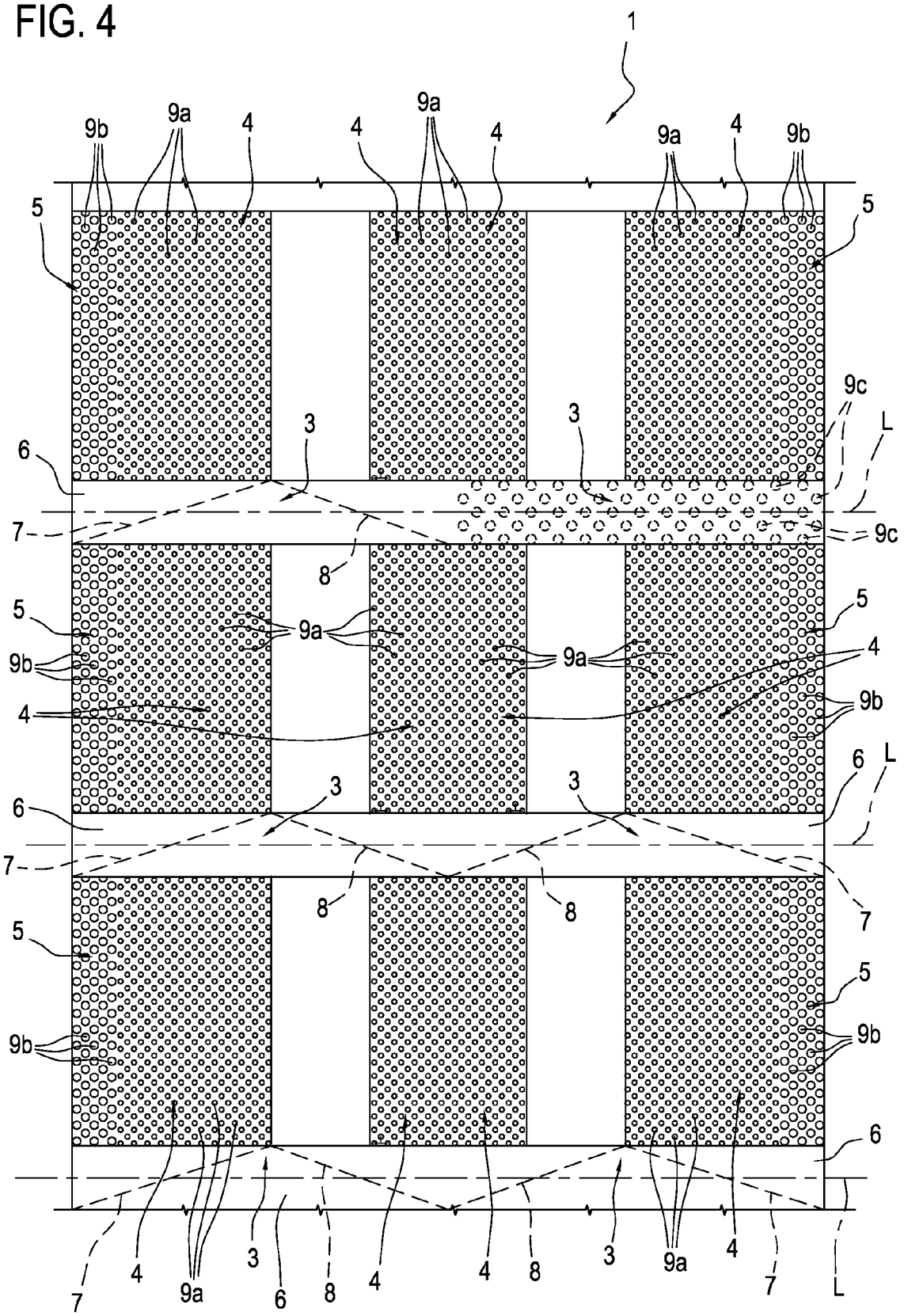
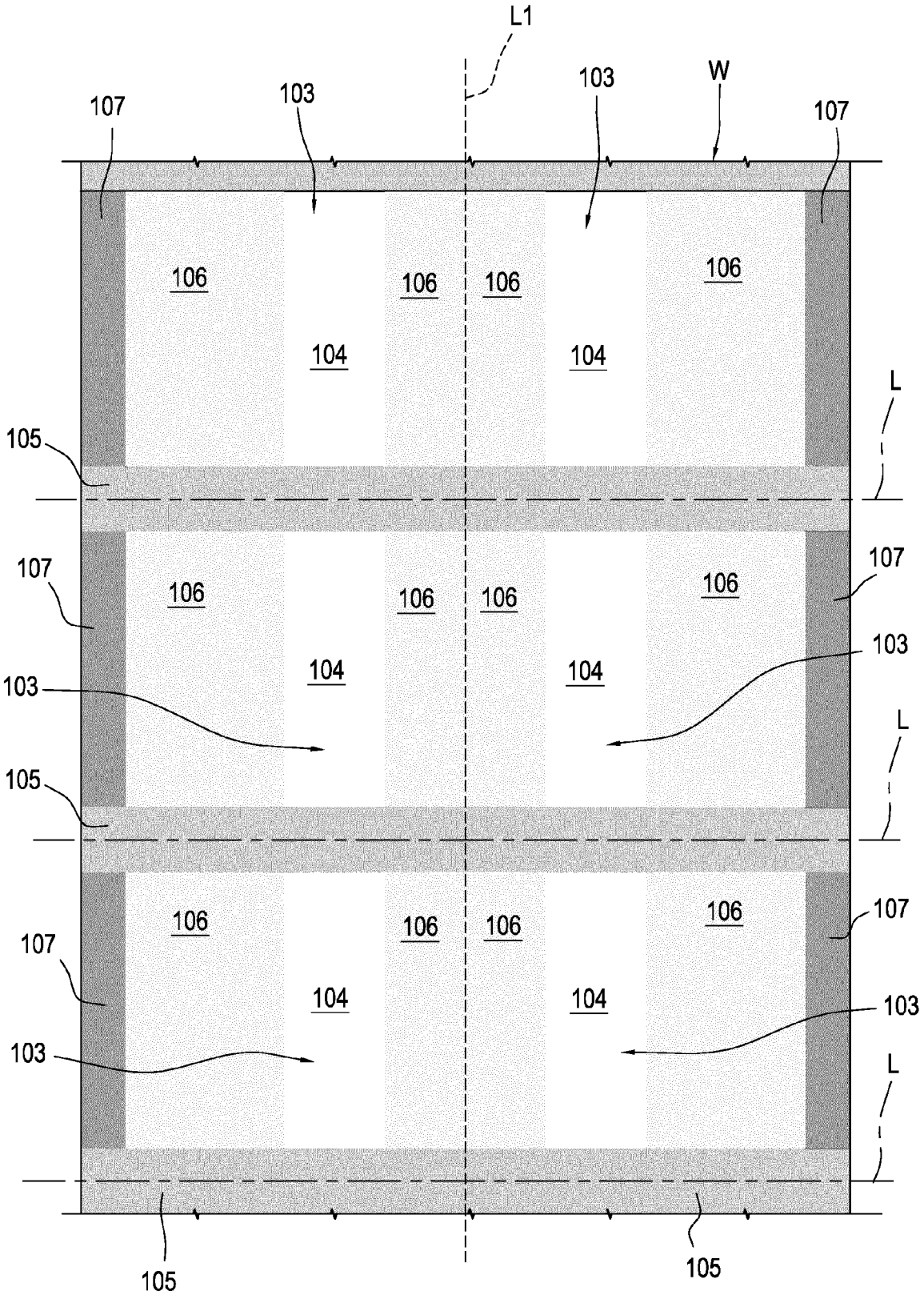


FIG. 5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REFERENCES CITED IN THE DESCRIPTION

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