



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
20.09.2023 Bulletin 2023/38

(51) International Patent Classification (IPC):
A24C 5/46 (2006.01) **A24C 5/00** (2020.01)
A24C 5/01 (2020.01) **A24D 1/20** (2020.01)

(21) Application number: **22162917.3**

(52) Cooperative Patent Classification (CPC):
A24D 1/20; A24C 5/007; A24C 5/01; A24C 5/46

(22) Date of filing: **18.03.2022**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME
Designated Validation States:
KH MA MD TN

(72) Inventors:
• **HATAKEYAMA, Yuki**
197022 SAINT PETERSBURG (RU)
• **OTSU, Naoto**
54294 TRIER (DE)

(74) Representative: **Plasseraud IP**
66, rue de la Chaussée d'Antin
75440 Paris Cedex 09 (FR)

(71) Applicant: **JT International SA**
1202 Geneva (CH)

(54) **COOLING SEGMENT FOR AN AEROSOL GENERATING ARTICLE**

(57) This invention relates to a cooling segment for an aerosol-generating article comprising: a multilayer paper tube (6, 7, 8), comprising at least: a first paper tube layer (6), a second paper tube layer (8), surrounding coaxially said first paper tube layer (6), wherein, said cooling segment also comprises: a glue layer (7): sandwiched between said first paper tube layer (6) and second paper tube layer (8), made of: at least one first glued zone (1, 11, 12), with a glue amount per surface above a first

threshold T1, extending along a first longitudinal portion (lp11, lp12) of said cooling segment (9), at least one lowly glued zone (2), with a glue amount per surface below a second threshold T2 which can be as low as zero, with $T2 < T1$, extending along a second longitudinal portion (lp2) of said cooling segment (9), different from said first longitudinal portion (lp11, lp12) of said cooling segment (9), having one or more hole(s) (3) made by one or more laser perforation(s).

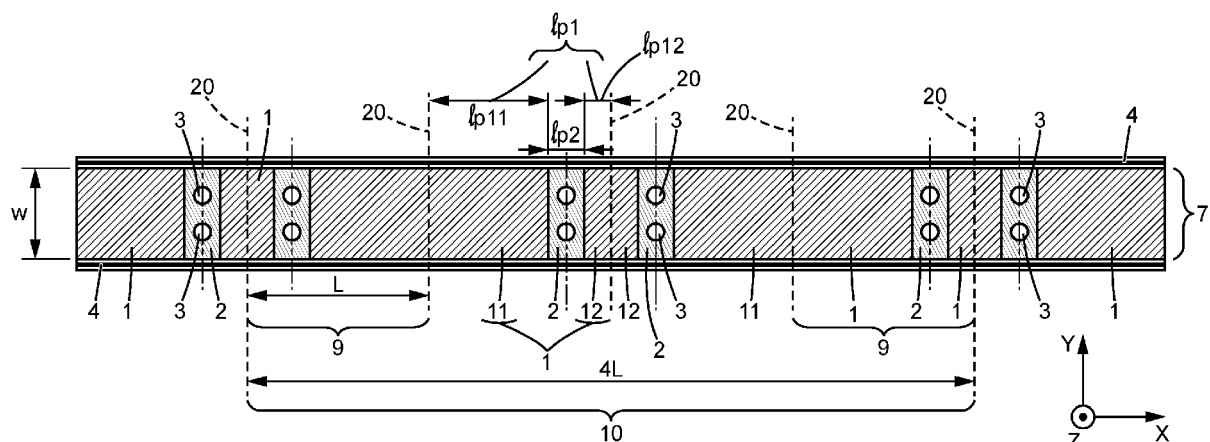


FIG. 2

Description

FIELD OF THE INVENTION

[0001] The invention relates to a cooling segment for an aerosol generating article, in particular for heat-not-burn consumable article or heat stick, as well as to a tube including several cooling segments for an aerosol generating article.

[0002] The technical field of the invention pertains more generally to the design and manufacturing of aerosol generating heat sticks or heat-not-burn aerosol generating articles (hereafter sometimes referred as "tobacco heat stick") for heat-not-burn devices, such aerosol generating articles comprising an aerosol generating substance formed as a rod wrapped in an outer concealing wrapper material. This aerosol generating substance may be a homogenized tobacco material or a reconstructed tobacco substrate or another form of tobacco-containing material such as for instance a foam or paste-like substrate.

BACKGROUND OF THE INVENTION

[0003] Reduced-risk devices have become popular alternatives to traditional tobacco products such as cigarettes. By contrast to these traditional products, which rely on combustion of tobacco, reduced-risk devices typically produce a vapor or aerosol from heating of an aerosol generating material or composition for inhalation by a user.

[0004] Heated substrate aerosol generating devices, also known as heat-not-burn devices, are one class of reduced-risk device. In a heated substrate aerosol generating device, a substrate containing tobacco or other suitable material is heated to a temperature that is sufficiently high to generate an aerosol from the material but controlled to avoid pyrolysis of constituents within the aerosol generating material or composition and thus generation of undesired by-products that are generated when the material combusts.

[0005] A typical heated substrate aerosol generating device contains a heating chamber or oven that defines a cavity adapted to receive an aerosol generating article with a charge of aerosol generating substrate to be heated. The substrate is heated inside the cavity in order to generate the desired aerosol and can be removed and replaced after use. Heated substrate aerosol generating devices are typically formed with a very compact construction to provide a handheld device that is convenient to store and carry.

[0006] A most common format of aerosol generating articles nowadays is that of a stick-shaped article, commonly known as heat stick or heat-not-burn stick, similar to that of standard cigarettes but of a different design and structure. The heat stick may comprise a cooling segment which may comprise a multilayer paper tube and which is used to reduce the temperature of the aerosol

generated by heating of a substrate before as it flows within the heat stick towards a mouthpiece thereof to be inhaled by a user. Generally, the multilayer paper tube requires adhesive or glue between the different paper layers to control the layers respective positions and provide sufficient rigidity to the multilayer paper tube such that it can undergo manufacturing constraints of the heat sticks as well as compression forces applied by users during use.

[0007] Laser perforations may be made through the different layers of the multilayer paper tube or the aerosol generating article mouthpiece, which may comprise filter material, to allow an inflow of air coming from atmosphere into the heat stick to mix with and cool the aerosol during inhalation by a user. However, when these perforations are provided in the multilayer paper tube segment of heat sticks, sticky ash, which is mixed burned paper and glue, is generated and easily accumulates during manufacturing of the heat sticks in areas of the manufacturing lines such as dust extraction system, around laser beam exit, and transportation path of the heat sticks articles. This sticky ash accumulation causes many problems on manufacturing process such as frequent maintenance of machine or equipment, and unhygienic contaminations the produces aerosol generating articles.

[0008] There's thus a need to cancel or strongly reduce the generation of sticky ashes arising from laser perforation process of the multilayer tube while allowing such perforation to be carried out in a simple and efficient way, and keeping a substantial and sufficient level of robustness of the multilayer paper tube to serve as cooling segment of a heat stick.

SUMMARY OF THE INVENTION

[0009] The object of the present invention is to alleviate at least partly the above-mentioned drawbacks.

[0010] This object is achieved with a cooling segment for an aerosol-generating article comprising: a multilayer paper tube, comprising at least: a first paper tube layer, a second paper tube layer, surrounding coaxially said first paper tube layer, wherein, said cooling segment also comprises: a glue layer: sandwiched between said first paper tube layer and second paper tube layer, made of: at least one first glued zone, with a glue amount per surface above a first threshold T1, extending along a first longitudinal portion of said cooling segment, at least one second glued zone, with a glue amount per surface below a second threshold T2 which can be as low as zero, with $T2 < T1$, extending along a second longitudinal portion of said cooling segment, different from said first longitudinal portion of said cooling segment, having one or more hole(s) made by one or more laser perforation(s). First glued zone is a highly glued zone, whereas second glued zone is either a lowly glued zone or a non-glued zone.

[0011] Cancelling or strongly reducing the amount of glue in the specific longitudinal zone of the multilayer tube where the laser perforations are to be done, signif-

icantly reduces the earlier technical problem of burnt glues by laser perforations, and provides a very simple and easy way to provide ventilation perforations into paper tube cooling segments of aerosol generating articles such as heat sticks thanks to the longitudinal alternation of glue / non glue zones rather than a radial alternation of glue / non glue zones.

[0012] Preferably, said at least one second glued zone, which may be called a lowly glued zone, with a glue amount per surface below a second threshold T2 which can be as low as zero, with $T2 < T1$, extends along a second longitudinal portion of said cooling segment, different from said first longitudinal portion of said cooling segment, has: either one hole made by a laser perforation, or several holes respectively made by laser perforations and distributed on a radial periphery of said lowly glued zone. This radial distribution of holes presents an advantage over a longitudinal distribution of holes, which is a smaller longitudinal extent of lowly glued zone, therefore leading to a more robust cooling segment.

[0013] There could also be one or two or more rows of holes distributed on a radial periphery of said second glued zone; two or more rows of holes would be longitudinally spaced apart from each other or from one another. The alignment of the radial rows could also be not exactly longitudinally aligned. There could also be, even if less preferred distribution, two or more longitudinally aligned holes, without any radial distribution of said holes.

[0014] In order to make the manufacturing process even simpler and more efficient, this object is also achieved with a tube including several cooling segments for an aerosol-generating article aligned one behind the other and to be cut out from one another, comprising: a multilayer paper tube, comprising at least: a first paper tube layer, a second paper tube layer, surrounding coaxially said first paper tube layer, wherein, said tube also comprises: a glue layer: sandwiched between said first paper tube layer and second paper tube layer, made of an alternation, along longitudinal direction of said tube, of: first glued zones, with a glue amount per surface above a first threshold T1, second glued zones, with a glue amount per surface below a second threshold T2 which can be as low as zero, with $T2 < T1$, each having one hole or more holes made by one or more laser perforation(s).

[0015] Preferably, each of said second glued zones, with a glue amount per surface below a second threshold T2 which can be as low as zero, with $T2 < T1$, extending along a second longitudinal portion of said cooling segment, different from said first longitudinal portion of said cooling segment, has: either one hole made by a laser perforation, or several holes respectively made by laser perforations and distributed on a radial periphery of said second glued zone. This radial distribution of holes presents an advantage over a longitudinal distribution of holes, which is a smaller longitudinal extent of second glued zone, therefore leading to a more robust cooling segment.

[0016] Preferably, said glue layer is made of an alternation, along longitudinal direction of said tube, of: at least 4 first glued zones, and at least 4 second glued zones.

5 **[0017]** Preferred embodiments comprise one or more of the following features, which can be taken separately or together, either in partial combination or in full combination, with any of preceding objects of the invention.

10 **[0018]** Preferably, said glue layer is made of: at least one said second glued zone longitudinally located between two said first glued zones.

[0019] Hence, the second glued zone is not located at an end of the cooling segment, thereby making this cooling segment more robust.

15 **[0020]** Preferably, said second glued zone has at least N holes respectively made by laser perforations and distributed on a periphery of said second glued zone, with N value is 2 or more, or with N value is 4 or more.

20 **[0021]** Hence, the cooling function is all the more efficient than the number of holes is high, and the cooling segment according to embodiments of the invention is all the more interesting that the number of holes is high because this could possibly create a higher amount of sticky ash during performance of laser perforations.

25 **[0022]** Preferably, a length of the second longitudinal portion of said cooling segment is less than half of a length of said cooling segment, preferably less than a quarter of the length of said cooling segment.

30 **[0023]** Hence, the longitudinal extension of the second or lowly glued zone is reduced, thereby making the cooling segment more robust.

35 **[0024]** Advantageously, a length of the first longitudinal portion of said cooling segment is more than half of the length of said cooling segment, preferably more than three quarters of the length of said cooling segment.

[0025] Preferably, the length of second longitudinal portion of said cooling segment is more than 5% of the length of said cooling segment, preferably more than 10% of the length of said cooling segment.

40 **[0026]** Hence, the longitudinal extension of the second or lowly glued zone is sufficient to reduce the risk of performing laser perforations outside the second or lowly glued zone, that is inside the first or highly glued zone, what would increase the creation of sticky ash.

45 **[0027]** Preferably, the length of said cooling segment ranges from 5 to 30mm, the length of the second longitudinal portion of said cooling segment ranges from 2 to 10mm, preferably from 3 to 8mm.

50 **[0028]** Hence, the longitudinal extension of the second or lowly glued zone is reduced, thereby making this cooling segment more robust, while simultaneously, the longitudinal extension of the second or lowly glued zone is sufficient to reduce the risk of performing laser perforations outside the lowly glued zone, that is inside the first or highly glued zone, what would increase the creation of sticky ash.

55 **[0029]** Preferably, the length of the second longitudinal portion of said cooling segment is more than the double

of a laser perforation width.

[0030] Hence, the longitudinal extension of the second or lowly glued zone is sufficient to reduce the risk of performing laser perforations outside the lowly glued zone, that is inside the first, highly glued zone, what would increase the creation of sticky ash.

[0031] Preferably, said second threshold T2 is above 0.001 mg/mm².

[0032] Hence, the amount of glue of the second, lowly glued zone is reduced still remains sufficient to somewhat improve the robustness of this cooling segment, as compared to an absolutely non glued zone.

[0033] Preferably, said second threshold T2 ranges from 0.001 to 0.006 mg/mm², preferably from 0.001 to 0.003 mg/mm². A threshold of 0.001mg/mm² corresponds to about 8.5g/500m of length.

[0034] Hence, the amount of glue reduction of the second, lowly glued zone is limited, thereby making this cooling segment more robust, while simultaneously, the amount of glue reduction of the second, lowly glued zone is sufficient to deeply reduce the creation of sticky ash during manufacturing process.

[0035] Preferably, said first threshold T1 is above 0.008 mg/mm², more preferably above 0.012 mg/mm², and preferably below 0.015mg/mm². A threshold of 0.008mg/mm² corresponds to about 68g/500m of length. A threshold of 0.011mg/mm² corresponds to about 93.5g/500m of length.

[0036] Hence, the amount of glue of the first, highly glued zone is sufficient to make this cooling segment more robust, thereby reducing risk of delamination of cooling segment in the course of time or as resulting from a bump.

[0037] Preferably, T1 > 2 T2, or T1 > 4 T2, or T1 > 10 T2.

[0038] Hence, the difference of amount of glue between the second, lowly glued zone and the first, highly glued zone is sufficient to simultaneously, first make this cooling segment more robust, and second deeply reduce the creation of sticky ash during manufacturing process.

[0039] Preferably, said first, highly glued zone, extends, along said first longitudinal portion of said cooling segment, over more than half of the radial periphery of said cooling segment, preferably over the whole radial periphery of said cooling segment, said second, lowly glued zone extends, along said second longitudinal portion of said cooling segment, over more than half of the radial periphery of said cooling segment, preferably over the whole radial periphery of said cooling segment.

[0040] Hence, an even better compromise can be reached between cooling segment robustness and sticky ash creation reduction during manufacturing process.

[0041] Preferably, the cooling segment has a center part (5) filling completely inside of the first paper tube layer (6), and this center part (5) is totally void.

[0042] Hence, cooling function is improved.

[0043] Preferably, said cooling segment is cylindrical with a circular right cross-section.

[0044] Holes are through holes from outside of the

cooling segment until to void center of the cooling segment, so as to better ventilate this cooling segment.

[0045] Another object of the present invention further relates to an aerosol generating article, such as a heat-not-burn stick, comprising a cooling segment as previously described. The heat stick may comprise a tobacco-containing aerosol-generating material section, for instance rodshaped, extended by a mouthpiece attached at an end of the aerosol-generating material section with a wrapper. The heat stick may comprise a filter section, which may comprise single or multiple filter segments. Advantageously, a cooling segment according to the invention is arranged in abutment between an end of the aerosol-generating section and an end of the filter section and hold together with those with one or several wrappers.

[0046] During vaping, the tobacco-containing aerosol generating material section is heated, and inhalation takes place at the free end of the mouthpiece. The aerosol generating material may comprise homogenized tobacco material (also sometimes referred as "reconstituted tobacco"). The homogenized tobacco material may take various forms such as shreds, strips, powder, foam, sheets and combinations thereof. The homogenized tobacco material may be formed from sheet using a cast sheet process, a paper-making process or an extrusion or combinations thereof. The homogenized tobacco material usually comprises a mixture of tobacco powder and/or fibers and aerosol forming agent or humectant such as any one or more of: glycerin, propylene glycol, water. The material may further comprise a binder such as cellulose derivatives or gum and/or flavoring agents in small amounts. The aerosol generating substrate may further comprise tobacco lamina and/or cellulose fiber. The tubular wrapper is preferably a paper wrapper which is rolled and longitudinally sealed with an adhesive to form a sealed seam.

[0047] The adhesive may be for example a water based emulsion glue like EVA or PVA.

[0048] Further features and advantages of the invention will appear from the following description of embodiments of the invention, given as non-limiting examples, with reference to the accompanying drawings listed hereunder.

BRIEF DESCRIPTION OF THE DRAWINGS

[0049]

Fig. 1A shows schematically (all parts not being on the same scale, in order to better show the relative disposition of the different layers) a first cross section of an example of a cooling segment for an aerosol generating article such as a heat-not-burn stick, hereinafter heat stick, according to an embodiment of the invention, at a position of a highly glued zone. Fig. 1B shows schematically (all parts not being on the same scale, in order to better show the relative

disposition of the different layers) a second cross section of an example of a cooling segment for an aerosol generating article such as a heat-not-burn stick, hereinafter heat stick, according to an embodiment of the invention, at a position of a non-glued zone.

Fig. 1C shows schematically (all parts not being on the same scale, in order to better show the relative disposition of the different layers) a second cross section of an alternative example of a cooling segment for an aerosol generating article such as a heat-not-burn stick, hereinafter heat stick, according to an embodiment of the invention, at a position of a lowly glued zone.

Fig. 2 shows a longitudinal view (all parts being on the same scale) of an example of a tube layer with glue of a cooling segment of e-vaping heat stick according to an embodiment of the invention, this tube layer being flattened (so showing the tube layer still in a flat shape before it is wrapped to make the tubular structure).

Fig. 3 shows a longitudinal view (all parts being on the same scale) of an example of a tube layer with glue of a cooling segment of e-vaping heat stick according to an example of prior art, this tube layer being flattened (so showing the tube layer still in a flat shape before it is wrapped to make the tubular structure).

DETAILED DESCRIPTION OF THE INVENTION

[0050] Fig. 1A shows schematically (all parts not being on the same scale, in order to better show the relative disposition of the different layers) a first cross section of an example of a cooling segment for an aerosol generating article such as a heat-not-burn stick, hereinafter heat stick, according to an embodiment of the invention.

[0051] The cooling segment 9 includes at least several concentric parts which are disposed from center to radial periphery: a void center 5, a first paper tube layer 6, a glue layer 7, a second paper tube layer 8. There could be supplementary layers of paper tube and of glue, for example a supplementary glue layer surrounding second paper tube layer, and a supplementary paper layer tube surrounding this supplementary glue layer. This supplementary glue layer would have advantageously the same properties as the glue layer 6. There could also be one or more additional layers in at least another material, on at least part of the length of the cooling segment, while allowing for the laser perforations to ventilate the cooling segment. Therefore holes are through holes going through all layers from outside the cooling segment until to reaching the void center 5 of the cooling segment.

[0052] Preferably the cooling segment contains only 4 concentric layers which are: a void center 5, a first paper tube layer 6, a glue layer 7, a second paper tube layer 8. First paper tube layer 6 is then also called inner paper layer tube 6. Second paper tube layer 8 is then also called

outer paper layer tube 8.

[0053] The center 5 is void so that the air can circulate freely within this void center 5 while entering this void center 5 by holes 3 extending radially and made by laser perforations as explained in more detail on figure 2.

[0054] The glue layer 7 in this first cross section is a highly glued layer.

[0055] Fig. 1B shows schematically (all parts not being on the same scale, in order to better show the relative disposition of the different layers) a second cross section of an example of a cooling segment for an aerosol generating article such as a heat-not-burn stick, hereinafter heat stick, according to an embodiment of the invention, at a position of a non-glued zone.

[0056] The second cross section of this concentric structure is similar to the first cross section of the concentric structure of figure 1A, except for the glued layer 7 which is here indeed a non-glued layer 7 or a zero glue layer 7.

[0057] Fig. 1C shows schematically (all parts not being on the same scale, in order to better show the relative disposition of the different layers) a second cross section of an alternative example of a cooling segment for an aerosol generating article such as a heat-not-burn stick, hereinafter heat stick, according to an embodiment of the invention, at a position of a lowly glued zone.

[0058] The second cross section of this alternative concentric structure is similar to the first cross section of the concentric structure of figure 1A, except for the glued layer 7 which is here indeed a lowly glued layer 7, so a layer 7 with glue too but with less glue than the layer 7 of figure 1A.

[0059] Fig. 2 shows a longitudinal view (all parts being on the same scale) of an example of a tube layer with glue of a cooling segment according to an embodiment of the invention, this tube layer being flattened (so showing the tube layer still in a flat shape before it is wrapped to make the tubular structure).

[0060] It can be seen that figure 1A is a cross section at position AA on figure 2.

[0061] It can be seen that figure 1B is a cross section at position BB on figure 2.

[0062] It can be seen that figure 1C is a alternative cross section at position BB on figure 2.

[0063] The glue layer 7 is extending over at least part of the surface of a paper tube layer 4 here completely flat in the plan of the figure 2. This paper tube layer 4 can be the first paper tube layer 6 of the cooling segment 9 of both figures 1A and 1B, or of the cooling segment 9 of both figures 1A and 1C, and then, the glue layer 7 is applied on the outer surface of this first paper tube layer 6, before the second paper tube layer 8 is pressed against the glue layer 7. Alternatively, this paper tube layer 4 can be the second paper tube layer 8 of the cooling segment 9 of both figures 1A and 1B, or of the cooling segment 9 of both figures 1A and 1C, and then, the glue layer 7 is applied on the inner surface of this second paper tube layer 8, before the first paper tube layer 6 is pressed

against the glue layer 7.

[0064] Along the longitudinal axis X, there are 6 cooling segments 9 represented on figure 2. Either the paper layer 4 is cut in portions of length L after being rolled about an axis parallel to said longitudinal axis X, so as to then manufacture separately each cooling segment 9, or the paper layer 4 is cut in portions of several lengths L, for instance in portions of 4L after being rolled, so as to then manufacture simultaneously 4 cooling segments 9 longitudinally aligned one behind the other, those 4 cooling segments 9 being separated from each other afterwards by a final cutting operation. Cutting lines 20 mark the separations between the different cooling segments 9. So tubes 10 having a length 4L are in the end cut down to 4 cooling segments 9 each having a length L.

[0065] Along longitudinal axis X, there is an alternation of highly glued zones 1 and lowly glued zones 2. All lowly glued zones 2 are alike. In each cooling segment 9, a lowly glued zone 2 is arranged between two highly glued zones 11, 12 of different length each.

[0066] In each cooling segment 9, the first longitudinal portion of highly glued zone 1 has a total length $lp1$ which is the sum of $lp11 + lp12$, with $lp11$ being the length of the long highly glued zone 11 and $lp12$ being the total length of the short highly glued zone 12, whereas the second longitudinal portion of lowly glued zone 2 has a total length $lp2$. Advantageously, the length $lp11$ of the long highly glued zone 11 is longer than the total length $lp12$ of the short highly glued zone 12, preferably at least twice longer, or at least three times longer, hence allowing for the hole(s) 3 to be closer to an end of the cooling segment rather than to the middle of the cooling segment.

[0067] The total length L of the cooling segment preferably ranges from 5 to 30mm, and is advantageously about 30mm. The total length $lp12$ of the short highly glued zone 12 ranges preferably from 1 to 29mm, and ranges advantageously from 2 to 10mm, or even better from 3 to 8mm.

[0068] The width w of the paper tube layer preferably ranges from 10 to 24mm, corresponding roughly to a diameter of the cooling segment 9 ranging from 3 to 8mm. The highly glued zones 1 (11 and 12 too) and the lowly glued zones 2 are preferably extending over practically the whole width w.

[0069] One or more holes 3 are made by one or more laser perforations which are made along transversal Y axis, so that these laser perforations become radially distributed when the paper tube layer 4 is rolled so as to make a cylinder with circular right cross-section. The diameter of the holes 3 performed by the laser perforations ranges advantageously from 0.3mm to 0.5mm.

[0070] When manufacturing the paper tube layer 4 and applying the alternation of highly glued zones and lowly glued zones, the sequence of glue application is performed so that on both sides of a lowly glued zone (all these lowly glued zones having the same longitudinal length) there are respectively a long highly glued zone and a short highly glued zone, the long highly glued zone

being longer than a short highly glued zone, preferably at least 2 or at least 3 times longer. Cooling segments 9 are disposed head to tail along tube 10.

[0071] Fig. 3 shows a longitudinal view (all parts being on the same scale) of an example of a tube layer with glue of a cooling segment of e-vaping heat stick according to an example of prior art, this tube layer being flattened (so showing the tube layer still in a flat shape before it is wrapped to make the tubular structure).

[0072] There is only a single type of glued zone 1 which is a highly glued zone 1 and which extends over the whole length of all cooling segments 9. However, this cooling segment 9 presents the aforementioned drawbacks of excessive sticky ash, which is mixed burned paper and glue, which is generated, and which easily accumulates during manufacturing of the heat sticks in areas of the manufacturing lines.

[0073] The invention has been described with reference to preferred embodiments. However, many variations are possible within the scope of the invention.

Claims

1. Cooling segment for an aerosol-generating article comprising:

> a multilayer papertube (6, 7, 8), comprising at least:

- a first paper tube layer (6),
- a second paper tube layer (8), surrounding co-axially said first paper tube layer (6),

wherein, said cooling segment also comprises:

> a glue layer (7):

- sandwiched between said first paper tube layer (6) and second paper tube layer (8),
- made of:

- at least one first glued zone (1, 11, 12),

- with a glue amount per surface above a first threshold T1,
- extending along a first longitudinal portion ($lp11$, $lp12$) of said cooling segment (9),

- at least one second glued zone (2),

- with a glue amount per surface below a second threshold T2 which can be as low as zero, with $T2 < T1$,
- extending along a second longitudinal portion ($lp2$) of said cooling segment (9), different from said first longitudinal portion ($lp11$, $lp12$) of said cooling segment (9),
- having one or more hole(s) (3) made

by one or more laser perforation(s).

2. Cooling segment for an aerosol-generating article according to claim 1, wherein:

> said at least one second glued zone (2), has:

- either one hole (3) made by a laser perforation,
- or several holes (3) respectively made by laser perforations and distributed on a radial periphery of said second glued zone (2).

3. Cooling segment for an aerosol-generating article according to claim 1 or 2, wherein said glue layer (7) is made of at least one said second glued zone (2) longitudinally located between two said first glued zones (11, 12).

4. Cooling segment for an aerosol-generating article according to any of preceding claims, wherein said second glued zone (2) has at least N holes (3) respectively made by laser perforations and distributed on a periphery of said second glued zone (2), with N value is 2 or more, or with N value is 4 or more.

5. Cooling segment for an aerosol-generating article according to any of preceding claims, wherein length (lp2) of second longitudinal portion of said cooling segment (9) is less than half of length (L) of said cooling segment (9), preferably less than quarter of length (L) of said cooling segment (9).

6. Cooling segment for an aerosol-generating article according to any of preceding claims, wherein length (lp2) of second longitudinal portion of said cooling segment (9) is more than 5% of length (L) of said cooling segment (9), preferably more than 10% of length (L) of said cooling segment (9).

7. Cooling segment for an aerosol-generating article according to any of preceding claims, wherein:

> length (L) of said cooling segment (9) ranges from 5 to 30mm,

> length (lp2) of second longitudinal portion of said cooling segment (9) ranges from 2 to 10mm, preferably from 3 to 8mm.

8. Cooling segment for an aerosol-generating article according to any of preceding claims, wherein length (lp2) of second longitudinal portion of said cooling segment (9) is more than the double of a laser perforation width.

9. Cooling segment for an aerosol-generating article according to any of preceding claims, wherein said second threshold T2 is above 0.001 mg/mm².

10. Cooling segment for an aerosol-generating article

according to claim 9, wherein said second threshold T2 ranges from 0.001 to 0.006 mg/mm², preferably from 0.001 to 0.003 mg/mm².

11. Cooling segment for an aerosol-generating article according to any of preceding claims, wherein said first threshold T1 is above 0.008 mg/mm².

12. Cooling segment for an aerosol-generating article according to any of preceding claims, wherein T1 > 2 T2, or T1 > 4 T2, or T1 > 10 T2.

13. Cooling segment for an aerosol-generating article according to any of preceding claims, wherein:

> said first glued zone (1) extends, along said first longitudinal portion (lp11, lp12) of said cooling segment (9), over more than half of the radial periphery of said cooling segment (9), preferably over the whole radial periphery of said cooling segment (9),

> said second glued zone (2) extends, along said second longitudinal portion (lp2) of said cooling segment (9), over more than half of the radial periphery of said cooling segment (9), preferably over the whole radial periphery of said cooling segment (9).

14. Cooling segment for an aerosol-generating article according to any of preceding claims, wherein the cooling segment has a center part (5) filling completely inside of the first paper tube layer (6), and wherein this center part (5) is totally void.

15. Tube including several cooling segments (9) for an aerosol-generating article aligned one behind the other and to be cut out from one another, comprising:
> a multilayer paper tube (6, 7, 8), comprising at least:

- a first paper tube layer (6),
- a second paper tube layer (8), surrounding coaxially said first paper tube layer (6),

wherein, said tube also comprises:

> a glue layer (7):

- sandwiched between said first paper tube layer (6) and second paper tube layer (8),
- made of an alternation, along longitudinal direction (X) of said tube, of:

- first glued zones (1, 11, 12),

- with a glue amount per surface above a first threshold T1,

- second glued zones (2),

- with a glue amount per surface below a second threshold T2 which can be as low as zero, with $T2 < T1$,
- each having one or more hole(s) (3) made by one or more laser perforation(s).

10

15

20

25

30

35

40

45

50

55

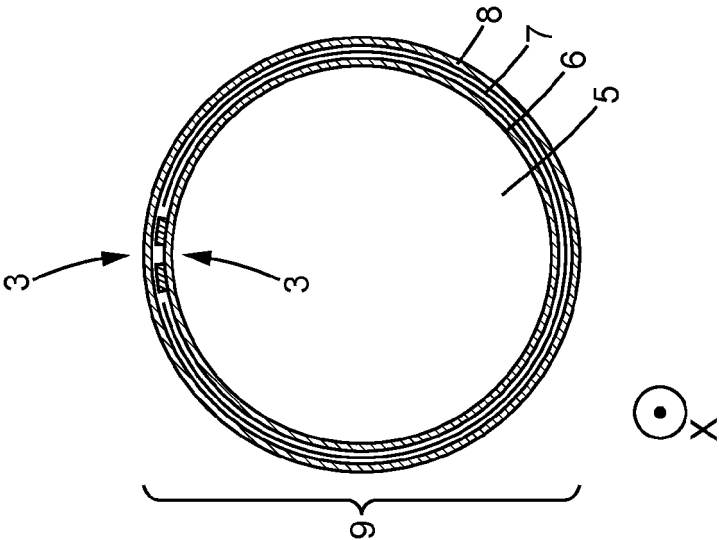


FIG. 1C

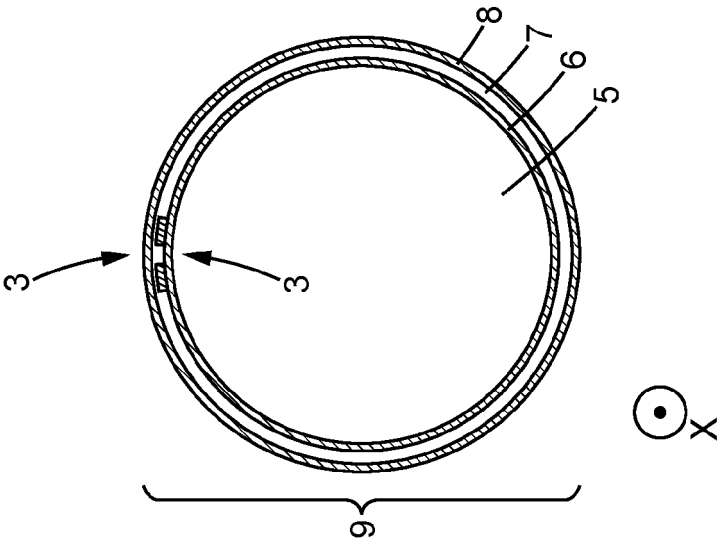


FIG. 1B

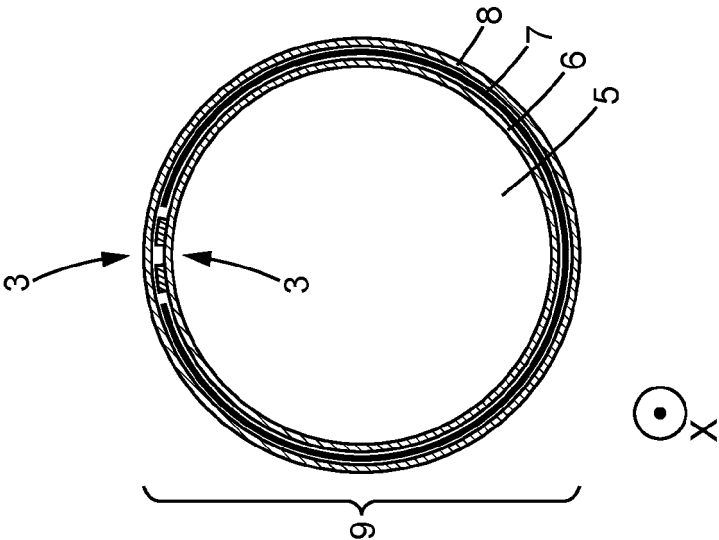


FIG. 1A

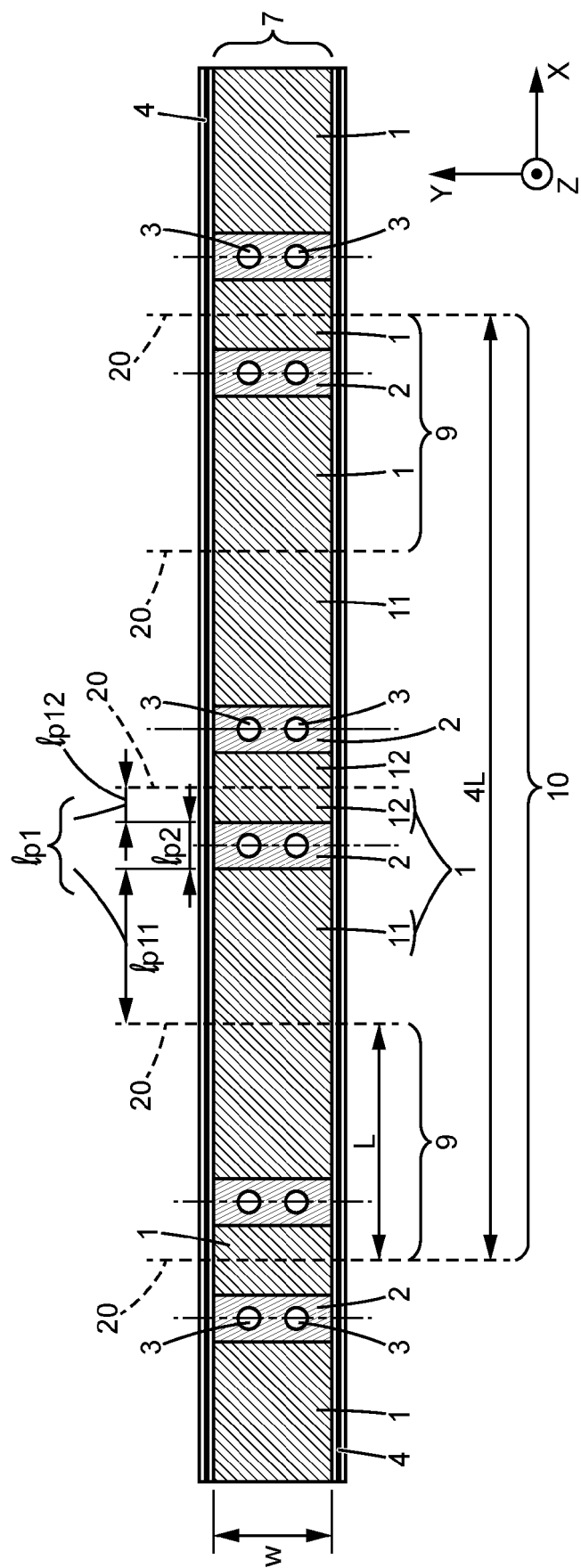


FIG. 2

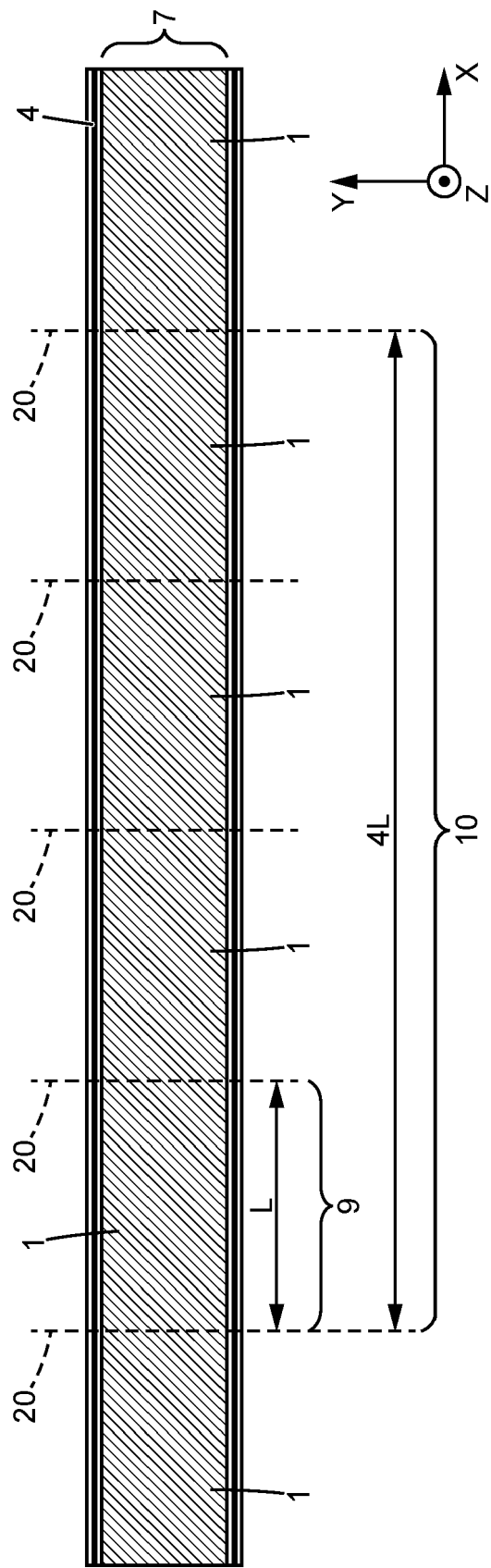


FIG. 3



EUROPEAN SEARCH REPORT

Application Number

EP 22 16 2917

5

10

15

20

25

30

35

40

45

50

55

1

EPO FORM 1503 03.82 (P04C01)

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 3 636 082 A2 (GD SPA [IT]) 15 April 2020 (2020-04-15) * paragraph [0001] - paragraph [0084]; figures 1-9 *	1-15	INV. A24C5/46 A24C5/00 A24C5/01 A24D1/20
X	WO 2013/045911 A1 (BRITISH AMERICAN TOBACCO CO [GB]) 4 April 2013 (2013-04-04) * page 12, line 1 - page 24, line 7; figures 1-9b *	1-7, 11-15	
A		8-10	
A	EP 3 861 871 A1 (JAPAN TOBACCO INC [JP]) 11 August 2021 (2021-08-11) * paragraph [0023] - paragraph [0050]; figures 1-14 *	1-15	
			TECHNICAL FIELDS SEARCHED (IPC)
			A24C A24D B31C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 August 2022	Examiner Espla, Alexandre
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

EP 22 16 2917

5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

26-08-2022

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 3636082	A2	15-04-2020	NONE
WO 2013045911	A1	04-04-2013	NONE
EP 3861871	A1	11-08-2021	CN 112788956 A 11-05-2021
		CN 112804892 A 14-05-2021	
		EP 3861870 A1 11-08-2021	
		EP 3861871 A1 11-08-2021	
		JP 6589084 B1 09-10-2019	
		JP 7095104 B2 04-07-2022	
		JP 2022088633 A 14-06-2022	
		JP WO2020070874 A1 15-02-2021	
		JP WO2020071089 A1 07-10-2021	
		KR 20210069096 A 10-06-2021	
		RU 2761947 C1 14-12-2021	
		TW 202021484 A 16-06-2020	
		US 2021212357 A1 15-07-2021	
		WO 2020070874 A1 09-04-2020	
		WO 2020071089 A1 09-04-2020	