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### Heat-Not-Burn Aerosol Generating Article with Sealed Closure on Tobacco Rod

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#### Abstract

An e-vaping device tobacco heat stick includes a tobacco rod including: a first end, a second end, opposite to the first end, an external peripheral wall extending between the first end and the second end, an extension bound to the first end and including a filter, a sealed closure, fastened to the second end, including a flap including: a proximal portion bound to the second end, a distal portion, opposite to the proximal portion, an intermediate portion extending from the proximal portion to the distal portion and covering the second end, wherein: the flap distal portion is folded over a part of the tobacco rod external peripheral wall, so as to be fastened onto the part of the tobacco rod external peripheral wall.

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#### Background/Summary

## FIELD OF THE INVENTION

[0001] The invention relates to the technical field of heat-not-burn aerosol generating article (hereafter sometimes referred as “heat tobacco stick”) for heat-not-burn devices comprising an aerosol generating substance formed as a rod with a sealed closure thereon. This aerosol generating substance may be a homogenized tobacco material or a reconstructed tobacco substrate or a non-tobacco aerosolisable material such as foam.

## BACKGROUND OF THE INVENTION

[0002] 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 for inhalation by a user.

[0003] 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 not so high as to cause combustion of the material. This aerosol contains the components of the material sought by the user but not the undesired by-products of combustion that are generated when the material combusts.

[0004] A typical heated substrate aerosol generating device contains a heating chamber or oven that defines a cavity adapted to receive a stick of the substrate to be heated. The substrate is heated inside the cavity in order to generate the desired aerosol, and can be removed and replaced once the substrate is spent. Heated substrate aerosol generating devices are typically formed with a very compact construction so as to provide a hand-held device that is convenient to store and carry. The heating cavity of the device is generally narrow and deep and so difficult to access for cleaning. Moreover the cavity may remain hot for a certain period of time after vaping so making removal of hot residues not recommended.

[0005] Therefore, a sealed closure at the end of the rod of aerosol generating substrate (i.e. upstream end) prevents particles or fragments of substrate from falling in the bottom end of the heating oven of the aerosol generating device. The presence of such a sealed closure on tobacco rod reduces or removes the need for cleaning of the heating oven. This sealed closure prevents the fall of aerosol generating substrate, such as reconstituted tobacco fragments (simply referred hereafter as “tobacco”) and/or leakage or condensation of liquids or solvents (such as glycerine, water, etc.) within heating oven.

[0006] When a zero cleaning or nearly zero cleaning of the heating oven can be achieved, this is very interesting since it alleviates the burden otherwise existing on vaping users to regularly clean the heating oven when the tobacco and/or liquid (moisture or solvent) exit the tobacco rod, when this tobacco rod is inserted within the recess of the heating oven and then heated by the heater of the heating oven.

[0007] This zero cleaning is an advantage which can be obtained from a fully sealed closure implemented at the bottom end of the tobacco rod, the bottom end being the end which is the most deeply inserted within the recess of the heating oven, which preferably prevents tobacco from falling out in the bottom end of the heating oven as well as preferably helping absorbing liquids (aerosol, moisture or solvent, for instance) that would have leaked or condensate in the bottom end of the heating oven otherwise.

[0008] According to a first prior art, for example described in patent application WO 2019/123297, such a sealed closure on tobacco rod is made by a pre-formed cup which is fitted on and glued on the tobacco rod.

[0009] However, according to the invention, this first prior art presents some manufacturing added complexity because of this fully added component (the pre-formed cup) on the bottom end of the tobacco rod, as well as some lack of robustness because fastening to the tobacco rod a fully separate component. Besides, to be fastened onto the bottom end of the tobacco rod, this pre-

formed cup needs to completely surround this bottom end, thereby locally increasing the overall width or diameter of the bottom end of the tobacco rod, thereby providing a higher risk of jamming of the cup in the oven.

[0010] According to a second prior art, for example described in patent application KR20090091756 or in patent application CN 109330017, such a sealed closure on tobacco rod is made by a tubular wrap extension of the tobacco rod which is folded over and which folds are glued together on the bottom end of the tobacco rod.

[0011] However, according to the invention, this second prior art, still presents some lack of robustness because fastening the extended wrap only onto the bottom end of the tobacco rod makes it easier for this bottom end to break off from the rest of the tobacco rod, when inserted and heated in the heating oven of the heat-not-burn device. Another problem can be the presence of superimposition of unglued layers or folds at the tobacco end. The external surface of the folded wrap at the tobacco end may be uneven and some portions may not be well bound together.

[0012] According to a third prior art, an additional filter element is fastened to the bottom end of the tobacco rod. This additional filter element extends the length of the tobacco rod, adds cost and complexity, and anyway does not make the tobacco rod more robust.

#### SUMMARY OF THE INVENTION

[0013] The object of the present invention is to alleviate at least partly the above mentioned drawbacks.

[0014] More particularly, the invention aims to provide for a flap which covers not only the end of tobacco rod, but also a portion of the external peripheral wall of tobacco rod as well, thereby providing a more robust and stable sealed closure of the tobacco rod.

[0015] Indeed, this additional covering of part of the external peripheral wall of the tobacco rod provides for an additional second benefit over the first benefit of retaining the tobacco substrate in the heat tobacco stick, which is an increase of the stiffness of the heat tobacco rod, and thereby of the heat tobacco stick, along a sufficient portion of the length of the tobacco rod, thereby preventing this tobacco rod from breaking, especially preventing the bottom end of the tobacco rod to break off from the rest of the tobacco rod, avoiding that such a broken end remains in the heating oven of the device, being then rather difficult to retrieve from the recess of the heating oven.

[0016] In preferred embodiments of the invention, the fact of having this folded extension of wrap paper of the tobacco rod, in particular in a region of the stick subject to high stress and to twisting/bending efforts, will increase the overall stiffness of the bottom end of the tobacco rod. Moreover, since no additional part or wrapper element is needed, the manufacturing process remains relatively simple and the additional product cost remains reasonable.

[0017] An object of the invention is achieved with a heat-not-burn aerosol generating article comprising: a tobacco rod including: a first end, a second end, opposite to said first end, an external peripheral wall extending between said first end and said second end, an extension bound to said first end and comprising a filter, a sealed closure at said second end; the sealed closure comprising a flap including: a proximal portion bound to said second end, a distal portion, opposite to said proximal portion, an intermediate portion extending from said proximal portion to said distal portion and covering said second end, wherein: said flap distal portion is folded over a part of said tobacco rod external peripheral wall, so as to be fastened onto said part of said tobacco rod external peripheral wall.

[0018] The flap also covers a portion of the external peripheral wall of the tobacco rod means that, when the tobacco rod is cylindrical with a circular cross section, the flap not only covers the opening at the end of the cylindrical tobacco rod, but also covers part of lateral wall of cylindric tobacco rod.

[0019] It is to be noted that the width or diameter increase with this sealed closure of the tobacco rod according to the invention is lower than the width or diameter increase encountered in first prior art, with the pre-formed cup.

[0020] The proximal portion and the distal portion of the flap are named with respect to the second end of the tobacco rod, opposed to the first end of the tobacco rod on the side of the extension comprising the filter, in the configuration where the flap is extending (as in FIG. 1E) and not yet bent (FIG. 1D).

[0021] The proximal end if the flap is fixed, or even pre-fixed, first, to the second end (free end) of the tobacco rod, then the intermediate portion is fixed, and then the distal end is fixed. This succession “proximal/intermediate/distal” can be seen in the drawings (FIG. 1B for example).

[0022] The proximal portion of the flap is bound to the second end of the tobacco rod, without being bound to or folded over any part of the external peripheral wall of the tobacco rod.

[0023] The proximal portion of the flap is not folded over any part of the external peripheral wall of the tobacco rod, so as to avoid being in contact with any part of the external peripheral wall of the tobacco rod.

[0024] The object of the invention is also achieved with a tobacco rod for a heat-not-burn device tobacco heat stick, comprising: a first end, a second end, opposite to said first end, an external peripheral wall extending between said first end and said second end, a sealed closure at said second end, comprising a flap including: a proximal portion bound to said second end, a distal portion, opposite to said proximal portion, an intermediate portion extending from said proximal portion to said distal portion and covering said second end, wherein: said flap distal portion is folded over a part of said tobacco rod external peripheral wall, so as to be fastened onto said part of said tobacco rod external peripheral wall.

[0025] The object of the invention is still achieved with a heat-not-burn device including a heating oven in combination with a tobacco heat stick according to the invention.

[0026] The sealed closure may comprise either only one flap or several flaps.

[0027] The external peripheral wall extending between said first end and said second end, also preferably extends from said first end and to said second end. As an alternative, the extension may comprise a supplementary element positioned between the tobacco rod and the filter, for example a tubular element such as a paper tube.

[0028] The flap distal portion is folded over a part of said tobacco rod external peripheral wall which extends from said second end.

[0029] The flap distal portion is folded over a part of said tobacco rod external peripheral wall, so as to be preferably glued onto said part of said tobacco rod external peripheral wall.

[0030] The length of the flap distal portion is comprised between 10% and 50% of the total length of the flap (from an extremity of its proximal portion to an extremity of its distal portion), and preferably between 20% and 35% of the total length of the flap.

[0031] The flap distal portion is folded over a part of said tobacco rod external peripheral wall, which part of said tobacco rod external peripheral wall preferably has a length, along the length of the tobacco rod, of at least 3 mm (mm=millimeters), or at least 5 mm, and/or preferably of less than 2 cm (cm=centimeters), and/or less than 1 cm.

[0032] 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 precited objects of the invention.

[0033] Preferably, a first glue layer is disposed between: said flap distal portion, and said part of said tobacco rod external peripheral wall.

[0034] Hence, the sealed closure of the tobacco rod is even more robust.

[0035] Preferably, a second glue layer is disposed between: said flap intermediate portion, and said second end.

[0036] Hence, the sealed closure of the tobacco rod is even more robust.

[0037] Preferably, said sealed closure comprises a supplementary flap which is disposed between: said second glue layer, and said second end.

[0038] Hence, the sealed closure of the tobacco rod is even more robust.

[0039] Preferably, said supplementary flap includes: a proximal portion bound to said second end, a distal portion, covering only said second end but not covering any part of said tobacco rod external peripheral wall, an intermediate portion extending from said proximal portion to said distal portion and covering said second end. Advantageously, the proximal portion of this supplementary flap and the proximal portion of the flap are located at opposite sides of the width, or at diametrical opposite side, of the second end of the tobacco rod, with respect to each other.

[0040] Hence, supplementary flap is fastened to the tobacco rod in a more robust way.

[0041] Preferably, a third glue layer is disposed between said flap intermediate portion, and said second glue layer.

[0042] Hence, the sealed closure of the tobacco rod is even more robust.

[0043] Preferably, said sealed closure comprises another supplementary flap which is disposed between said third glue layer, and said second glue layer.

[0044] Hence, the sealed closure of the tobacco rod is even more robust.

[0045] Preferably, said another supplementary flap includes: a proximal portion bound to said second end, a distal portion, covering only said second end but not covering any part of said tobacco rod external peripheral wall, an intermediate portion extending from said proximal portion to said distal portion and covering said second end.

[0046] Hence, said another supplementary flap is fastened to the tobacco rod in a more robust way.

[0047] Preferably, a ratio of a first length from proximal portion to distal portion of said flap divided by a second length from proximal portion to distal portion of said supplementary flap ranges from 1.5 to 3.

[0048] Hence, the sealed closure of the tobacco rod remains robust, without becoming too bulky.

[0049] Preferably, a second length from the proximal portion to distal portion of said supplementary flap ranges from 0.3 cm to 0.7 cm.

[0050] Preferably, a first length from the proximal portion to distal portion of said flap ranges from 0.8 cm to 2 cm.

[0051] Preferably, a thickness of said flap is less than 0.5 mm, preferably less than 0.3 mm, preferably less than 0.1 mm, preferably more than 40 micrometers, and/or a thickness of said supplementary flap is less than 0.5 mm, preferably less than 0.1 mm, preferably less than 0.05 mm, preferably more than 40 micrometers.

[0052] Hence, the sealed closure of the tobacco rod remains robust, without becoming too bulky.

[0053] Preferably, said tobacco rod is cylindric with a circular cross section.

[0054] Preferably, both first and second glue layers are made as one and same pre-glued layer disposed on said flap, preferably covering said flap from the proximal portion to the distal portion of said flap.

[0055] Hence the manufacturing process is made simpler.

[0056] Preferably, said flap has a pre-cut triangular or trapezoidal shape, distal portion of said flap including a tip of said triangular or trapezoidal shape, and/or said supplementary flap has a pre-cut triangular or trapezoidal shape, distal portion of said supplementary flap including a tip of said triangular or trapezoidal shape.

[0057] Hence folding flap or flaps over the bottom end of the tobacco rod is made easier, thereby making manufacturing process easier.

[0058] As an alternative, said flap has a rectangular shape, if stretched on a plan, and/or said supplementary flap has a rectangular shape, if stretched on a plan.

[0059] Preferably, said flap is an extension of a wrapper of said tobacco rod. Preferably the flap is one piece with said wrapper of said tobacco rod. The wrapper is advantageously an external wrapper.

[0060] Alternatively, or cumulatively said supplementary flap is another extension of the external wrap of said tobacco rod. Preferably said supplementary flap is one piece with said wrapper of said tobacco rod. In particular, the proximal portion of the flap may form a folded line between the

external peripheral wall and the second end of the tobacco rod.

[0061] Hence, the sealed closure of the tobacco rod is more robust, while limiting bulkiness of the tobacco rod, and while making easier folding flap or flaps over the bottom end of the tobacco rod, thereby making easier manufacturing process.

[0062] Preferably, material of said flap and/or of said supplementary flap is paper. Preferably the wrapper of the tobacco rod and the flap and/or supplementary flap are formed a single piece of paper.

[0063] Hence, the sealed closure of the tobacco rod is even more robust.

[0064] The glue may be for example a water based emulsion glue like EVA or PVA.

[0065] Advantageously, the heat tobacco stick comprises a tobacco rod, extended by a mouthpiece. The mouthpiece includes a cooling or spacing element (e.g., a paper tube) and a filter which can include a single or multiple filter segments. During vaping, the tobacco rod is heated, and inhalation takes place at the free end of the mouthpiece. The tobacco rod contains an aerosol generating substrate and a tubular wrapper that covers the aerosol generating substrate. The aerosol generating substrate comprising homogenized tobacco material (also sometimes referred as “reconstituted tobacco”). The homogenized tobacco material may take various forms such as shreds, strips, powder, foam, sheet 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 fibres 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 fibre. The tubular wrapper is preferably a paper wrapper which is rolled and longitudinally sealed to form a sealed seam.

[0066] 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.

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## Description

### BRIEF DESCRIPTION OF THE DRAWINGS

[0067] FIG. 1A to 1E show the main manufacturing steps of a first embodiment of a tobacco rod for an e-vaping device heat tobacco stick according to the invention.

[0068] FIG. 2A to 2F show the main manufacturing steps of a second embodiment of a tobacco rod for an e-vaping device heat tobacco stick according to the invention.

[0069] FIG. 3A to 3E show the main manufacturing steps of a third embodiment of a tobacco rod for an e-vaping device heat tobacco stick according to the invention.

### DETAILED DESCRIPTION OF THE INVENTION

[0070] FIG. 1A to 1E show the main manufacturing steps of a first embodiment of a tobacco rod for a heat tobacco stick for a heat-not-burn device according to the invention. FIG. 1A is at a smaller scale than the FIGS. 1B to 1D which are at the same scale.

[0071] On FIG. 1A, there is a tobacco rod 1 extended on one side by an extension 2 including a filter 4 and on the other side by a flap 5. The tobacco rod 1 has an external peripheral wall 12 extending from its first end 11 to its second end 13. The extension 2 is bound to the first end 11 of the tobacco rod 1. The proximal portion 51 of the flap 5 is bound to the second end 13 of the tobacco rod 1. The extension may further comprise a cooling or spacing element (e.g., a paper tube) between the filter 4 and the tobacco rod 1 (not shown). Generally, the filter may comprise a single filter segment or two or more filter segments. Filter segments may include, e.g., monoacetate filter segments, hollow filter segments, charcoal filter segment, cavity segment, etc. Each segment may

be wrapped by a wrapper (generally known as “filter plug wrap”) and the segments are joined by a combining wrapper (generally known as “filter plug wrap”). The tobacco rod may be individually wrapped by a paper wrapper. The extension and the tobacco rod may also be bound by an additional paper wrapper (also known as “tipping paper”). The flap 5 has an intermediate portion 52 extending from its proximal portion 51 to its distal portion 53. The length of the flap 5 is longer than the width w or the diameter d of the tobacco rod 1 which is preferably a cylindrical rod with a circular cross section. For example, the length L5 of the flap 5 is about 10 mm and the width w or diameter d of the tobacco rod is between about 5 and 7 mm. The proximal portion 51 of the flap can be bound to the tobacco rod or the flap can be an integral extension part of the paper wrapper of the tobacco rod. In case of an integral part of the tobacco wrapper, the manufacturing process is simplified and avoid a separate element to be cut and glued to the tobacco rod in the configuration of FIG. 1A.

[0072] On FIG. 1B, a glue layer 6 is applied on the external peripheral wall 12 of the tobacco rod 1, close to second end 13 of the tobacco rod 1.

[0073] On FIG. 1C, the flap 5 is folded so that its intermediate portion 52 covers the second end 13 of the tobacco rod 1. The intermediate portion 52 of the flap 5 is pressed onto the second end 13 of the tobacco rod 1. The second end 13 of the tobacco rod 1 is fully covered by the flap 5. For this, the intermediate portion 52 is preferably large enough in the transversal direction to the folding direction so as to cover the second portion without leaving uncovered areas of the second end. The distal portion 53 of the flap 5 is protruding further than the glue layer 6 and further than the width w or diameter d of the tobacco rod 1.

[0074] On FIG. 1D, the flap 5 is further folded so that its distal portion 53 is applied on the glue layer 6, so that the distal portion 53 of the flap 5 sticks to the external peripheral wall 12 of the tobacco rod 1. The distal portion 53 of the flap 5 is pressed onto the glue layer 6 which covers part of the external peripheral wall 12 of the tobacco rod 1. The sealed closure 3, which includes the flap 5 and the glue layer 6, is bound to the second end 13 of the tobacco rod 1. The overall length increase of the heat tobacco stick is limited because only a circumferential portion of the external surface of the tobacco rod is overlapped by the flap.

[0075] FIG. 1E is an example of a possible embodiment, illustrating a 3D sketch showing the geometric shape of the flap in the space. The flap 5 presents a shape of a portion of cylinder with a circular cross section, extending the external peripheral wall 12 of the tobacco rod 1. Before the flap is rolled, i.e., when the shape of the flap is developed on a flat plane, its form is substantially rectangular but it may take other forms such as a trapezoidal or triangular shape.

[0076] FIG. 2A to 2F show the main manufacturing steps of a second embodiment of a tobacco rod for a heat tobacco stick according to the invention. FIG. 3A is at a smaller scale than the FIGS. 2B to 2E which are at the same scale. The overall structure and arrangement of the different parts (tobacco rod, extension) of the stick remain the same as the previous embodiment and so are not repeated after.

[0077] On FIG. 2A, there is a tobacco rod 1 extended on one side by an extension 2 including a filter 4 and on the other side by a flap 5 and by a first supplementary flap 7 and by a second supplementary flap 9. The tobacco rod 1 has an external peripheral wall 12 extending from its first end 11 to its second end 13. The extension 2 is bound to the first end 11 of the tobacco rod 1.

[0078] The proximal portion 51 of the flap 5 is bound to the second end 13 of the tobacco rod 1. The flap 5 has an intermediate portion 52 extending from its proximal portion 51 to its distal portion 53. The length of the flap 5 is longer than the width w or the diameter d of the tobacco rod 1 which is preferably a cylindric rod with a circular cross section.

[0079] The proximal portion 71 of the first supplementary flap 7 is bound to the second end 13 of the tobacco rod 1. The proximal portion 71 of the first supplementary flap 7 is bound to the second end 13 of the tobacco rod 1, but angularly shifted, with respect to the disc formed by the second end 13, as compared to the proximal portion 51 of the flap 5. The first supplementary flap 7 has an

intermediate portion **72** extending from its proximal portion **71** to its distal portion **73**. The length of the first supplementary flap **7** is as long as the width *w* or the diameter *d* of the tobacco rod **1** which is preferably a cylindric rod with a circular cross section. The length *L7* of the first supplementary flap **7** is shorter than the length *L5* of the flap **5**. The length *L5* of the flap **5** is about 1 cm. The length *L7* of the first supplementary flap **7** is about 0.5 cm.

[0080] The proximal portion **91** of the second supplementary flap **9** is bound to the second end **13** of the tobacco rod **1**. The proximal portion **91** of the second supplementary flap **9** is bound to the second end **13** of the tobacco rod **1**, but angularly shifted, with respect to the disc formed by the second end **13**, as compared to the proximal portion **51** of the flap **5**. The second supplementary flap **9** has an intermediate portion **92** extending from its proximal portion **91** to its distal portion **93**. The length of the second supplementary flap **9** is as long as the width *w* or the diameter *d* of the tobacco rod **1** which is preferably a cylindric rod with a circular cross section. The length *L7* of the second supplementary flap **9** is equal to the length *L7* of the first supplementary flap **7** and is shorter than the length *L5* of the flap **5**. The length *L5* of the flap **5** is about 1 cm. The lengths *L7* of the first and second supplementary flaps **7** and **9** are equal to each other, and length *L7* is preferably about 0.5 cm.

[0081] On FIG. 2B, the first supplementary flap **7** is folded so that its intermediate portion **72** and its distal portion **73** cover the second end **13** of the tobacco rod **1**. The first supplementary flap **7** is pressed onto the second end **13** of the tobacco rod **1**. The second end **13** of the tobacco rod **1** is covered fully or partly on more than half of its area by the first supplementary flap **7**. No part of the external peripheral wall **12** of the tobacco rod **1** is covered by the first supplementary flap **7**.

[0082] On FIG. 2C, a first glue layer **6** is applied on the external peripheral wall **12** of the tobacco rod **1**, close to second end **13** of the tobacco rod **1**, and a second glue layer **8** is applied on the first supplementary flap **7** which covers the second end **13** of the tobacco rod **1**. Both first glue layer **6** and second glue layer **8** can be applied within a single manufacturing step. Second glue layer **8** is applied on the whole surface of the first supplementary flap **7**.

[0083] The second supplementary flap **9** is folded so that its intermediate portion **92** and its distal portion **93** cover the second glue layer **8**. The second supplementary flap **9** is pressed onto the second glue layer **8**. The second glue layer **8** is covered fully or partly on more than half of its area by the second supplementary flap **9**. No part of the external peripheral wall **12** of the tobacco rod **1** is covered by the second supplementary flap **9**.

[0084] A third glue layer **10** is applied on the second supplementary flap **9**. Third glue layer **10** is applied on the whole surface of the second supplementary flap **9**.

[0085] On FIG. 2D, the flap **5** is folded so that its intermediate portion **52** covers the third glue layer **10** which itself covers the second supplementary flap **9**. The intermediate portion **52** of the flap **5** is pressed onto the third glue layer **10**. The distal portion **53** of the flap **5** is protruding further than the third glue layer **10** and further than the width *w* or diameter *d* of the tobacco rod **1**.

[0086] On FIG. 2E, the flap **5** is further folded so that its distal portion **53** is applied on the glue layer **6**, so that the distal portion **53** of the flap **5** sticks to the external peripheral wall **12** of the tobacco rod **1**. The distal portion **53** of the flap **5** is pressed onto the first glue layer **6** which covers part of the external peripheral wall **12** of the tobacco rod **1**. The sealed closure **3**, which includes the flap **5** and the first supplementary flap **7** and the second supplementary flap **9**, as well as the first glue layer **6** and the second glue layer **8** and the third glue layer **10**, is bound to the second end **13** of the tobacco rod **1**. Overall length increase of the heat tobacco stick is very limited.

[0087] The proximal portions of the flaps can be bound to the tobacco rod or the flaps can be integral extension parts of the paper wrapper of the tobacco rod. In case of integral parts of the tobacco wrapper, the manufacturing process is simplified and avoids separate elements to be cut and glued to the tobacco rod in the configuration of FIG. 2A.

[0088] FIG. 2F is an example of a possible embodiment, illustrating a 3D sketch showing the geometric shape and distribution of the flaps in the space. The flap **5** presents a shape of a portion



of cylinder with a circular cross section, extending the external peripheral wall **12** of the tobacco rod **1**. The first supplementary flap **7** presents a shape of a portion of cylinder with a circular cross section, extending the external peripheral wall **12** of the tobacco rod **1**. The second supplementary flap **9** presents a shape of a portion of cylinder with a circular cross section, extending the external peripheral wall **12** of the tobacco rod **1**. The flap **5**, the first supplementary flap **7** and the second supplementary flap **9**, are distributed angularly around the second end **13** of the tobacco rod **1**, preferably regularly distributed, for example at 120 degrees from one another. Advantageously, the flap **5**, the first supplementary flap **7** and the second supplementary flap **9**, are distributed along the whole periphery of the second end **13** of the tobacco rod **1**, being thereby contiguous to one another, so that practically no part of the periphery of the second end **13** of the tobacco rod **1** is void of flap. Before the flaps are rolled, i.e., when the shape of the flaps are developed on a flat plane, their individual form is substantially rectangular but it may take other forms such as a trapezoidal or triangular shape.

[0089] FIG. 3A to 3E show the main manufacturing steps of a third embodiment of a tobacco rod for a tobacco stick according to the invention. FIG. 3A is at a smaller scale than the FIGS. 3B to 3E which are at the same scale. The overall structure and arrangement of the different parts (tobacco rod, extension) of the stick remain the same as the previous embodiments and are not repeated after.

[0090] On FIG. 3A, there is a tobacco rod **1** extended on one side by an extension **2** including a filter **4** and on the other side by a flap **5** and by a supplementary flap **7**. The tobacco rod **1** has an external peripheral wall **12** extending from its first end **11** to its second end **13**. The extension **2** is bound to the first end **11** of the tobacco rod **1**.

[0091] The proximal portion **51** of the flap **5** is bound to the second end **13** of the tobacco rod **1**. The flap **5** has an intermediate portion **52** extending from its proximal portion **51** to its distal portion **53**. The length of the flap **5** is longer than the width *w* or the diameter *d* of the tobacco rod **1** which is preferably a cylindric rod with a circular cross section.

[0092] The proximal portion **71** of the supplementary flap **7** is bound to the second end **13** of the tobacco rod **1**. The proximal portion **71** of the supplementary flap **7** is bound to the second end **13** of the tobacco rod **1** on a opposite side of the second end **13** as compared to the proximal portion **51** of the flap **5**. The supplementary flap **7** has an intermediate portion **72** extending from its proximal portion **71** to its distal portion **73**. The length of the supplementary flap **7** is as long as the width *w* or the diameter *d* of the tobacco rod **1** which is preferably a cylindric rod with a circular cross section. The length *L7* of the supplementary flap **7** is shorter than the length *L5* of the flap **5**. The length *L5* of the flap **5** is about 1 cm. The length *L7* of the supplementary flap **7** is about 0.5 cm.

[0093] On FIG. 3B, the supplementary flap **7** is folded so that its intermediate portion **72** and its distal portion **73** cover the second end **13** of the tobacco rod **1**. The supplementary flap **7** is pressed onto the second end **13** of the tobacco rod **1**. The second end **13** of the tobacco rod **1** is fully covered by the supplementary flap **7**. No part of the external peripheral wall **12** of the tobacco rod **1** is covered by the supplementary flap **7**.

[0094] On FIG. 3C, a first glue layer **6** is applied on the external peripheral wall **12** of the tobacco rod **1**, close to second end **13** of the tobacco rod **1**, and a second glue layer **8** is applied on the supplementary flap **7** which covers the second end **13** of the tobacco rod **1**. Both first glue layer **6** and second glue layer **8** can be applied within a single manufacturing step. Second glue layer **8** is applied on the whole surface of the supplementary flap **7**.

[0095] On FIG. 3D, the flap **5** is folded so that its intermediate portion **52** covers the second glue layer **8** which itself covers the supplementary flap **7** which itself covers the second end **13** of the tobacco rod **1**. The intermediate portion **52** of the flap **5** is pressed onto the second glue layer **8** which covers the second end **13** of the tobacco rod **1**. The distal portion **53** of the flap **5** is protruding further than the second glue layer **8** and further than the width *w* or diameter *d* of the

tobacco rod **1**.

[0096] The proximal portions of the flaps can be bound to the tobacco rod or the flaps can be integral extension parts of the paper wrapper of the tobacco rod. In case of integral parts of the tobacco wrapper, the manufacturing process is simplified and avoid separate elements to be cut and glued to the tobacco rod in the configuration of FIG. 3A.

[0097] On FIG. 3E, the flap **5** is further folded so that its distal portion **53** is applied on the glue layer **6**, so that the distal portion **53** of the flap **5** sticks to the external peripheral wall **12** of the tobacco rod **1**. The distal portion **53** of the flap **5** is pressed onto the first glue layer **6** which covers part of the external peripheral wall **12** of the tobacco rod **1**. The sealed closure **3**, which includes the flap **5** and the supplementary flap **7**, as well as the first glue layer **6** and the second glue layer **8**, is bound to the second end **13** of the tobacco rod **1**. Overall length increase of the heat tobacco stick is very limited.

[0098] The invention has been described with reference to preferred embodiments. However, many variations are possible within the scope of the invention.

## Claims

1. A heat-not-burn aerosol generating article comprising: a tobacco rod including: a first end, a second end, opposite to said first end, and an external peripheral wall extending between said first end and said second end, an extension bound to said first end and comprising a filter, and a sealed closure at said second end, comprising a flap including: a proximal portion bound to said second end, a distal portion, opposite to said proximal portion, and an intermediate portion extending from said proximal portion to said distal portion and covering said second end, wherein: said distal portion of said flap is folded over a part of said external peripheral wall of said tobacco rod, so as to be fastened onto said part of said external peripheral wall of said tobacco rod.
2. The heat-not-burn aerosol generating article according to claim 1, wherein: a first glue layer is disposed between: said distal portion of said flap, and said part of said external peripheral wall of said tobacco rod.
3. The heat-not-burn aerosol generating article according to claim 2, wherein: a second glue layer is disposed between: said intermediate portion of said flap, and said second end.
4. The heat-not-burn aerosol generating article according to claim 3, wherein: said sealed closure further comprises a supplementary flap which is disposed between: said second glue layer, and said second end.
5. The heat-not-burn aerosol generating article according to claim 4, wherein: a third glue layer is disposed between: said flap-intermediate portion of said flap, and said second glue layer.
6. The heat-not-burn aerosol generating article according to claim 5, wherein: said sealed closure further comprises another supplementary flap which is disposed between: said third glue layer, and said second glue layer.
7. The heat-not-burn aerosol generating article according to claim 6, wherein: said supplementary flap includes: a proximal portion bound to said second end, a distal portion, covering only said second end but not covering any part of said external peripheral wall of said tobacco rod, and an intermediate portion extending from said proximal portion of said supplementary flap to said distal portion of said supplementary flap and covering said second end; and/or said another supplementary flap includes: a proximal portion bound to said second end, a distal portion, covering only said second end but not covering any part of said external peripheral wall of said tobacco rod, and an intermediate portion extending from said proximal portion of said another supplementary flap to said distal portion of said another supplementary flap and covering said second end.
8. The heat-not-burn aerosol generating article according to claim 4, wherein a ratio of a first length from said proximal portion of said flap to said distal portion of said flap divided by a second length

from said proximal portion of said supplementary flap to said distal portion of said supplementary flap ranges from 1.5 to 3.

**9.** The heat-not-burn aerosol generating article according to claim 4, wherein a second length from said proximal portion of said supplementary flap to said distal portion of said supplementary flap ranges from 0.3 cm to 0.7 cm.

**10.** The heat-not-burn aerosol generating article according to claim 1, wherein a first length from said proximal portion of said flap to said distal portion of said flap ranges from 0.8 cm to 2 cm.

**11.** The heat-not-burn aerosol generating article according to claim 4, wherein: a thickness of said flap is less than 0.2 cm, and/or a thickness of said supplementary flap is less than 0.2 cm.

**12.** The heat-not-burn aerosol generating article according to claim 3, wherein both said first and second glue layers are made as one and the same pre-glued layer disposed on said flap.

**13.** The heat-not-burn aerosol generating article according to claim 4, wherein: said flap has a pre-cut triangular or trapezoidal shape, said distal portion of said flap including a tip of said triangular or trapezoidal shape, and/or said supplementary flap has a pre-cut triangular or trapezoidal shape, said distal portion of said supplementary flap including a tip of said triangular or trapezoidal shape.

**14.** The heat-not-burn aerosol generating article according to claim 4, wherein: said flap is an extension of a wrapper of said tobacco rod, and/or said supplementary flap is another extension of said wrapper of said tobacco rod.

**15.** A tobacco rod for a heat-not-burn device tobacco heat stick, comprising: a first end, a second end, opposite to said first end, an external peripheral wall extending between said first end and said second end, and a sealed closure at said second end, comprising a flap including: a proximal portion bound to said second end, a distal portion, opposite to said proximal portion, and an intermediate portion extending from said proximal portion to said distal portion and covering said second end, wherein: said distal portion of said flap is folded over a part of said external peripheral wall of said tobacco rod, so as to be fastened onto said part of said external peripheral wall of said tobacco rod.

**16.** The heat-not-burn aerosol generating article according to claim 4, wherein: a thickness of said flap is less than 0.05 cm, and/or a thickness of said supplementary flap is less than 0.05 cm.

**17.** The heat-not-burn aerosol generating article according to claim 3, wherein both said first and second glue layers are made as one and the same pre-glued layer disposed on said flap, covering said flap from said proximal portion of said flap to said distal portion of said flap.

**18.** The heat-not-burn aerosol generating article according to claim 4, wherein: said flap is an extension of a wrapper of said tobacco rod, being one piece with said wrapper of said tobacco rod, and/or said supplementary flap is another extension of said wrapper of said tobacco rod, being one piece with said wrapper of said tobacco rod.

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