(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 3 120 717 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.01.2017 Bulletin 2017/04

(51) Int Cl.:
A24D 1/02 *(2006.01)* ***A24D 3/04*** *(2006.01)*
A24D 3/06 *(2006.01)*

(21) Application number: **15178234.9**

(22) Date of filing: **24.07.2015**

(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:
MA

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

(72) Inventor: **ONO, Hiroyoshi**
L1617 Luxemburg City (LU)

(74) Representative: **Gill Jennings & Every LLP**
The Broadgate Tower
20 Primrose Street
London EC2A 2ES (GB)

(54) SMOKING ARTICLE

(57) A smoking article is provided comprising a rod of aerosol generating material (3) and a filter element (5) attached to an end of the rod of aerosol generating material (3) by means of a tipping paper (7) such that the rod and filter element extend along a longitudinal axis. The filter element comprises a cavity (9) containing an additive (11) and is at least partially surrounded by substantially transparent or semi-transparent wrapper (13) such that the additive in the cavity is visible through the wrapper (13). The tipping paper (7) comprises at least two cut-out windows (15) arranged to allow light to enter the cavity (9) in the filter element from at least two different directions perpendicular to the longitudinal axis. The additive (11) fills between about 10 to about 60% of the cavity.

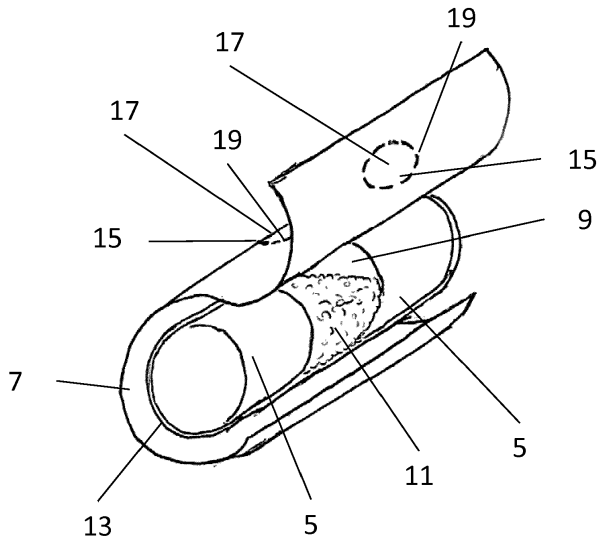

Fig. 4

EP 3 120 717 A1

Description

Background to the Invention

[0001] The invention relates to a smoking article, such as a filter cigarette. Filter cigarettes commonly consist of a rod of tobacco filler wrapped in a paper tube attached in an end-to-end fashion along a longitudinal axis to a filter component by means of a tipping paper. The filter component may comprise one or several plugs of filter material such as cellulose acetate, occasionally combined with additives such as absorbent or flavourant materials embedded in the filter material matrix or inserted in the cavity delimited between plugs of a filter material in a known plug-space-plug configuration, for example.

[0002] There exists a consumer demand for smoking articles possessing innovative features that enhance the user experience and level of interaction between the products and their users, beyond the simple act of smoking. Accordingly, filter cigarettes which allow users to view additives inserted in a cavity delimited between filter plugs have been proposed. These typically involve filling the filter cavity with the additives and providing a view of the additives through a transparent window in the tipping paper adjacent to the cavity. However, the benefits of such cigarettes are limited owing to the additive within the cavity being less visible than is desired. It is often difficult for a user to discern the presence of anything within the cavity since the window typically will provide an unclear, poorly illuminated view of some indistinguishable material. This is particularly the case in dark environments or conditions where the level of ambient light is lower.

[0003] There is therefore a need to provide a cigarette, or smoking article, which offers users the opportunity to better visualise the interior of a filter cavity within.

Summary of the Invention

[0004] In accordance with the invention there is provided a smoking article comprising a rod of aerosol generating material and a filter element attached to an end of the rod of aerosol generating material by means of a tipping paper such that the rod and filter element extend along a longitudinal axis, the filter element comprising a cavity containing an additive and being at least partially surrounded by substantially transparent or semi-transparent wrapper such that the additive in the cavity is visible through the wrapper and the tipping paper comprising at least two cut-out windows arranged to allow light to enter the cavity in the filter element from at least two different directions perpendicular to the longitudinal axis, wherein the additive fills between about 10 to about 60% of the cavity.

[0005] The smoking article, which may typically be a filter cigarette, thus comprises a cavity within the filter that is only partially filled with an additive, and which is both rendered visible by, and illuminated through, multiple windows spaced out around the tipping paper so as to allow light to pass through at different angles. The at least two-cut out windows allow a user of the smoking article to see through a transparent or semi-transparent plug wrap within the tipping paper into a cavity into the filter. This arrangement, in combination with the volume of the filling content of the cavity being limited to 60%, and preferably 20-50%, allows light from outside the smoking article to be effectively reflected onto the additive within the cavity. This renders the cavity and the additive therein more visible than was possible with the prior art, and thus provides a better interaction between the user and the product.

[0006] Within the framework of this application, a "transparent" wrapper should be understood as a wrapper made of a material or element through which light can pass, and which also enables a user, in particular a human, to more or less clearly discern and identify objects placed behind such a material or element. That is, light passes through such a material or element essentially without the light being scattered. A "semi-transparent" wrapper, in the context of this application, should be understood as allowing a user to discern and identify objects behind such wrapper at least to some degree. However, it should be understood that the degree of transparency can vary from one semi-transparent material to another, and that the term "semi-transparent", as it is used here, is not intended to restrict the degree of transparency to a particular numerical value. Therefore, a transparent wrapper may be understood to be a particular case of a semi-transparent wrapper, having a high degree of transparency. However, wrapper made of materials being semi-transparent and having a degree of transparency substantially less than the degree of transparency of a fully transparent material are contemplated in the present application as well.

[0007] The limiting of the proportion of the cavity volume that is occupied to less than 60% provides the additional advantage that the additive, which may for example comprise granules of smoke altering substances, may move around inside the cavity when the smoking article is moved or shaken by a user. In this way the invention further provides better product interaction by enabling a user to recognise the presence of the additive within the cavity by orderable, as well as visual means.

[0008] The cut-out windows are typically arranged around the circumference of the wrapper with an angular separation about the longitudinal axis of at least 90 degrees. This angular separation may be defined as the minimum separation between two edges of two of the cut-out windows. This angular separation refers to the spacing of the windows as defined by an angle in a plane that is perpendicular to the longitudinal axis of the smoking article. It is also preferable that the windows be overlapping, if not aligned, along a direction parallel to the longitudinal axis.

[0009] The tipping paper may comprise cut-out windows which are separated by angles less than 90 de-

grees, however arrangements wherein the angular separation between windows is maximised are preferable, since they allow the range of angles from which ambient light may enter the cavity to illuminate the interior to be maximised. Similarly, in arrangements having three or four windows, the optimal angular separation between adjacent windows will be approximately 60 degrees and 90 degrees, respectively. The optimal separation between windows will vary according to the angular extent of each of the windows. In any of these embodiments, variants may be configured wherein the windows are separated by a range of angles between 90 degrees and approximately 180 degrees, or the maximum separation as appropriate for the number of windows.

[0010] Typically the additive contained within the cavity fills between about 20% to 50% of the cavity. Thus, the portion of the cavity volume that is not occupied by the additive ranges between about 50% and 80%, which provides the advantageous interior illumination and visibility of the invention, and allows the movement of the additive within the cavity to be orderable to a user when the additive is shifted or shaken around inside the cavity.

[0011] Typically, the additive comprises a smoke altering substance.

[0012] Typically the additive comprises at least one of a breakable flavour capsule, a breakable water capsule, a particulate absorbent or a natural flavourant in particulate or bulk form. The inclusion of smoke altering substances which enhance the smoke generated within the rod of aerosol generating material prior to its inhalation by a user in a smoking article that provides improved user visibility and detectability of the additive serve to improve the user interaction with the product.

[0013] Typically the additive is coloured. Preferably, the colour of the additive will be chosen such that the additive is more clearly visible within the cavity. Appropriate selections may therefore include bright or vivid colours, or colours that are complimentary to or contrast with the colouring of the tipping paper material in which the windows are cut and which therefore surround the window through which the additive is viewed.

[0014] Preferably, the additive comprises luminescent material, in particular photoluminescent material. Thus the additive may contain a substance or a pigment that emits light or radiation of a given wavelength as a result of being exposed to incident radiation typically of a shorter wavelength.

[0015] Such luminescence may further increase the visibility of the additive within the cavity.

[0016] Typically the at least two cut-outs have a regular shape. Thus the two or more cut-out windows may have a shape that may be easily cut into the tipping paper, thereby reducing the cost of manufacture.

[0017] Preferably, the shape of the cut-outs has rotational or reflectional symmetry. Such shapes may also be easily and efficiently cut into the tipping paper by an industrial manufacturing process. Furthermore, the cut-out windows which each have reflectional symmetry with respect to a line parallel to the longitudinal axis of the smoking article will necessarily be aligned with one another when located on opposite sides of the tipping paper. This alignment may provide improved visibility by allowing ambient light to pass into a window and out of a window unimpeded.

[0018] More preferably, the at least two cut-outs have the same shape. This feature, in addition to providing increased visibility overall by virtual of the two windows in a smoking article having corresponding shapes as noted above, also results in the level of visibility being uniform between all windows in a tipping paper.

[0019] Typically the surface area of each of the cut-outs is between about 10 to 80 mm^2. Such a range includes windows which are sufficiently large to allow an amount of light into and out of the tipping paper so as to render the cavity clearly visible to a user, while not exceeding a size that comprises the rigidity or structural integrity of the tipping paper tube and increasing the risk of the smoking article suffering damage during manufacture, transport or use.

[0020] More preferably, the surface area of each cut-out is comprised between about 15 to 45 mm^2. Windows configured to have a size in this range optimally provide the above noted advantages.

[0021] Preferably, the cut-outs have a same surface area. Configuring the windows to each have the same surface area ensures that no window permits a greater amount of light to enter or exit the cavity than any other window. Thus, it is ensured that each window is sufficiently large to allow an optimal amount of light, entering the cavity via the windows, to propagate out of each window and be visible to a user.

[0022] Typically, the cut-outs are located in symmetrical positions with respect to the longitudinal axis. This symmetry may comprise rotational symmetry, such as having two, three or more windows equally spaced around the circumference of the tipping paper and located the same distance along the length of the smoking article. The windows may also be located in reflectionally symmetrical positions with respect to the longitudinal axis, which form an arrangement also result in rotational symmetry, such as having windows located diametrically opposite each other. As noted above, the alignment of windows, such as that which would result from the symmetrical window arrangements, result in the windows being advantageously positioned over the cavity so as to provide the best possible degree of visibility.

[0023] The cut-out windows may be pre-cut in the tipping paper and closed by removal of panels before use of the smoking article. The windows may, for example, be pre-cut during manufacture, and subsequently covered by sheets or panels of paper or other material, which may be adhered to the tipping paper region surrounding each of the windows and may be removed by a user to uncover each of the windows. Alternatively, the windows may be pre-cut in the form of dashed lines of perforations in paper defining the edges of the windows, thus resulting

in windows which are closed or covered by the portion of tipping paper within each perforated line until the region, or panel is pulled by a user so as to remove it and reveal the window.

[0024] Typically, the removable panels are formed of tearable parts of the tipping paper noted therein over the cavity by a line of perforations. Perforating the paper to define the windows as described above may provide windows located above the cavity and protected by removable closures.

Brief Description of the Drawings

[0025] Examples of the present invention will now be described, with reference to the accompanying drawings, in which:

Figure 1 shows a portion of an example smoking article according to the invention including internal detail of the filter end.

Figure 2 shows cross sections of the filter ends of a smoking article according to the invention and of two smoking articles according to the prior art.

Figure 3 shows a portion of the tipping paper of an example smoking article according to the invention.

Figure 4 illustrates the construction of part of an example smoking article according to the invention.

Description of Embodiments

[0026] With reference to Figure 1, a smoking article 1 according to the present invention is illustrated by a detail diagram showing the internal features of the filter end of the article. The article comprises a rod of aerosol generating material 3, partially shown, for example containing natural and/or reconstituted tobacco. In the present example the rod of aerosol generating material is surrounded by a paper tube 8 (partially shown) which consists of a cigarette paper wrapped around the rod so as to contain the smokable filler material therein. The smoking article also comprises a filter element 5, which in the presently illustrated example is arranged such that a cavity 9 exists between two separate filter plugs 5a, 5b composed of filter material such as cellulose acetate, and held together in a plug-space-plug configuration by means of a transparent, alternatively semi-transparent, inner wrapper 13. The filter plugs 5a, 5b may equally comprise other suitable materials such as papers, rayon and charcoal. Alternative arrangements in which the filter element 5 of the smoking article 1 contains a single filter plug with one or more cavities formed within it are also contemplated. Further alternative arrangements may comprise three or more filter plugs with cavities defined between them. The filter element 5 is surrounded by tipping paper 7, via which an end of the filter element 5 is attached to an end of the rod of aerosol generating material 3 by adhering the tipping paper 7 over the paper tube 8.

[0027] The cavity 9 defined between the filter plugs 5a, 5b contains an additive 11, which may or may not comprise a smoke altering substance. Examples of smoke altering substances may include breakable flavour capsules, breakable water capsules, a particulate adsorbent material or a natural flavouring in particulate or bulk form. The additive may be coloured or may comprise some colouring material or pigment. The additive may also be vividly coloured or comprise luminescent material, such that it exhibits luminescence when exposed to external light or other electromagnetic radiation.

[0028] The additive 11 within the cavity 9 is visible from outside the smoking article through windows 15 which are cut-out from the substantially opaque tipping paper 7. Each of the windows covers part of the transparent inner wrapper 13 in a region overlying the cavity 9, said transparent inner wrapper containing the additive particles 11 within the cavity 9 without obscuring the view of the cavity interior provided by the windows 15 in the tipping paper 7. The transparent inner wrapper 13 is wrapped around the filter element 5 to envelop both the filter plugs 5a, 5b and the cavity 9. The tipping paper 7 is adhered over the transparent inner wrapper 13 as well as the paper tube 8.

[0029] The illustrated example provides the user with a clear view of the additive within the cavity owing to the advantageous arrangement of windows 15, which allows light to enter the cavity in the filter element from at least two different directions perpendicular to the longitudinal axis defined by the length of the cigarette, as well as the space within the cavity 9 which is unoccupied by additive, and thus allows this light to be reflected and propagated within and out of the windows, as a result of the cavity being only partly filled with the additive. The cavity of the present example is approximately half filled with additive 11. Therefore the unoccupied half of the cavity volume defines a chamber into which ambient light from outside of the smoking article may enter, unimpeded by the typically opaque additive, so as to illuminate the surface of the volume of additive which interfaces with the chamber, this being visible to a user through either of the windows. It will be understood that this advantageous visibility is achieved by filling the cavity with additive to various degrees. The cavity may contain less or more additive than that depicted, which would result in the windows being covered to a lesser and a greater degree, respectively. The advantages of the presence of a greater quantity of additive are offset by the improved visibility achieved by filling the cavity with additive to a lesser extent, and an optimal arrangement which balances these advantages may be obtained by filling between approximately 10% to 60% of the cavity 9 with additive 11. A more preferable range of the proportion of the cavity volume filled with additive is between 20% and 50%.

[0030] Figure 2 further illustrates the advantage of the present invention over the prior art. The figure shows a cross section of the mouth end of each of three smoking articles A, B and C. Figure 2c depicts a cross section through a smoking article similar to that depicted in Figure

1. The cavity 9 is approximately half filled with additive 11, and tipping paper 7 comprises two cut-out windows 15 located diametrically opposite one another and covered by transparent film 13.

[0031] Light passes through this transparent wrapper 13, into the cavity 9 and the additive within the cavity is thereby illuminated so that it may be easily viewed by a user.

[0032] The smoking article C provides improved illumination, and therefore increased visibility, with respect to each of the smoking articles depicted at Figures 2a and 2b. Smoking article A comprises only one window 15, and a cavity 9 that is almost entirely filled with additive particles 11. Such arrangements are known in the prior art, and are intended to offer users a view of the smoke altering additive, in this case granules, held in the cavity between filter elements 5. However, this configuration results in the surface of the window 15 appearing, from outside the smoking article, to be entirely filled with a static, opaque wall of additive 11, thus making it difficult for a user to distinguish the presence of objects within the cavity.

[0033] The smoking article of Figure 2b addresses this problem by having the cavity 9 only partially filled with the additive 11, as per the present invention. This smoking article now presents the problem that the single window 15 allows insufficient light from outside the smoking article into the cavity to illuminate the additive such that they are easily visible to a user. This issue is asserted in environments where ambient light levels are low. The present invention, illustrated at Figure 2c solves this problem, in addition to the over filling issue illustrated at Figure 2a, by the addition of at least a second window 15 which allows the additive 11 in the partially filled cavity 9 to be illuminated from multiple angles, and allows a greater amount of light to pass into the cavity.

[0034] The illumination of the additive 11 from multiple angles is achieved by the placement of the cut-out windows 15 within the tipping paper 7. The article of Figure 2 comprises two circular holes located at opposite sides of the curved face of the cylinder of the tipping paper 7. Thus, the cut-out windows 15 are located in symmetrical positions with respect to the longitudinal axis defined by the length of the smoking article. Figure 3 illustrates a portion of an alternative example tipping paper configuration according to the invention. The figure shows a section of a tipping paper, without the filter plugs, the additive, or the remainder of the smoking article. In the present example, as with the previous example, the windows 15 are cut into the paper 7 such that they are at opposite sides of the smoking article and thus allow light to enter the cavity 9 from opposite directions. It is this angular separation, indicated by the arrow in the figure, between windows that provides the multi-angle illumination and improved visibility.

[0035] It will be understood that any aperture, when exposed to non-collimated light, will allow light to pass therethrough over a range of directions. It will also be understood, however, that the arrangement of the cut-out windows comprised by the present invention is such that the direction that is central to the solid angle subtended by the light that is able to pass through one of the windows is perpendicular to the longitudinal axis of the smoking article, and the corresponding direction that is central to the range of angles over which light passes through the other window is different to that of the first.

[0036] This multi-directional illumination may be achieved by a number of variant arrangements wherein the angular separation between windows ranges between a small number of degrees and almost 180 degrees. It will be understood that, since the windows 15 have a finite non-zero size and extend around the circumference of the tipping paper, the angular separation between the edges of the windows, as is illustrated in Figure 3, cannot practically be 180 degrees in both directions. However, it is preferable that the angular separation between the centroids of the windows be 180 degrees, since this allows light to enter the cavity from two substantially opposite directions. Preferred arrangements of the cut-out windows comprise an angular separation of at least 90 degrees between the edges or the centroids of the windows.

[0037] Further variants of the invention may include more than two windows, so as to enable the interior of the cavity and the additive material to be illuminated by a greater amount of light and from more directions, thus improving the visibility of the additive further. Tipping papers having two windows and three windows both provide the advantageous effect of the invention.

[0038] The windows 15 in Figure 3 are rectangular. In addition to this configuration, and the circular windows illustrated in Figure 1, multiple variants in which differently shaped windows are selected and cut, for the purposes of better illumination, easier manufacture, design and aesthetics, are also contemplated. The two examples so far illustrated comprise windows each having a regular shape, namely rectangles and circles. Windows having other regular shapes, for instance triangular, pentagonal, hexagonal windows etc may alternatively be cut into the tipping paper 7. Further alternatives may comprise elliptical, ovoid, trapezoid, or irregularly shaped windows.

[0039] Each of the depicted examples comprises windows 15 which have both reflectional and rotational symmetry, and which have the same shape as one another. Alternatively, windows may be selected which have either one of rotational or reflectional symmetry, or which have neither. Regular shapes, and shapes having some form of symmetry are preferable, since such shapes are more easily cut into paper by industrial manufacturing processes. Additionally, the cutting of two or more identically shaped windows into the tipping paper may be more quickly and efficiently carried out in industrial manufacture than the cutting of differently shaped windows.

[0040] Windows 15 are configured to be sufficiently large to allow a user to easily view the contents of the

cavity 9. The surface area of each of the cut-outs may range between 10 mm^2 and 80 mm^2, or more preferably between 15 mm^2 and 45 mm^2. Additionally, the windows are identically sized, and therefore have the same surface area. This provides the same level of visibility through each of the windows.

[0041] Referring to Figure 4, the filter end 2 of an example smoking article according to the invention is shown partially deconstructed, in that tipping paper 7 is shown partially unwrapped and loosely surrounding the filter plugs 5 and transparent plug wrap 13 of the smoking article. The cavity 9 defined by the volume between filter plugs 5 and within the plug wrap 13 is filled up to 50% with additive 11. The tipping paper 7 comprises a strip of paper which, instead of the pre-cut, open aperture comprised by the previously illustrated examples, has cut-out windows 15 which are closed by removable panels 17 and whose perimeters are defined by lines of perforations 19. Thus, the removal panels 17 remain attached to the remainder of the tipping paper 7 by the uncut regions between perforations 19, and may be removed by a user so as to uncover the windows 15, when the smoking article is in use or at any point after its manufacture. The removable panels, which close the cut-out windows of the present example before use of the smoking article provide the underlying portion of transparent wrap 13 from damage. The tearable parts of the tipping paper, of which the removable panels 17 are formed, may be pulled out by a user, so as to tear along the line of perforations and reveal the windows into the cavity.

Claims

1. A smoking article comprising a rod of aerosol generating material and a filter element attached to an end of the rod of aerosol generating material by means of a tipping paper such that the rod and filter element extend along a longitudinal axis, the filter element comprising a cavity containing an additive and being at least partially surrounded by a substantially transparent or semi-transparent wrapper such that the additive in the cavity is visible through the wrapper and the tipping paper comprising at least two cut-out windows arranged to allow light to enter the cavity in the filter element from at least two different directions perpendicular to the longitudinal axis, wherein the additive fills between about 10 to about 60 % of the cavity.

2. A smoking article according to claim 1, wherein the cut-out windows are arranged around the circumference of the wrapper with an angular separation about the longitudinal axis of at least 90 degrees.

3. A smoking article according to claim 1 or claim 2, wherein the additive fills between about 20 to about 50 % of the cavity.

4. A smoking article according to any of the preceding claims, wherein the additive comprises a smoke-altering substance.

5. A smoking article according to claim 4, wherein the additive comprises at least one of a breakable flavour capsule, a breakable water capsule, a particulate adsorbent or a natural flavourant in particulate or bulk form.

6. A smoking article according to any of the preceding claims, wherein the additive is coloured.

7. A smoking article according to any of the preceding claims, wherein the additive comprises luminescent material, in particular photoluminescent material.

8. A smoking article according to any of the preceding claims, wherein the at least two cut outs have a regular shape.

9. A smoking article according to any of the preceding claims, wherein the shape of the cut-outs has rotational or reflectional symmetry.

10. A smoking article according to any of the preceding claims, wherein the at least two cut outs have the same shape.

11. A smoking article according to any of the preceding claims, wherein the surface area of each of the cut outs is between about 10 to 80 mm^2.

12. A smoking article according to any of the preceding claims, wherein the cut outs have a same surface area.

13. A smoking article according to any of the preceding claims, wherein the cut outs are located in symmetrical positions with respect to the longitudinal axis.

14. A smoking article according to any of claims 1 to 13, wherein the cut-out windows are pre-cut in the tipping paper and closed by removable panels before use of the smoking article.

15. A smoking article according to claim 14, wherein the removable panels are formed of tearable parts of the tipping paper delimited therein over the cavity by a line of perforations.

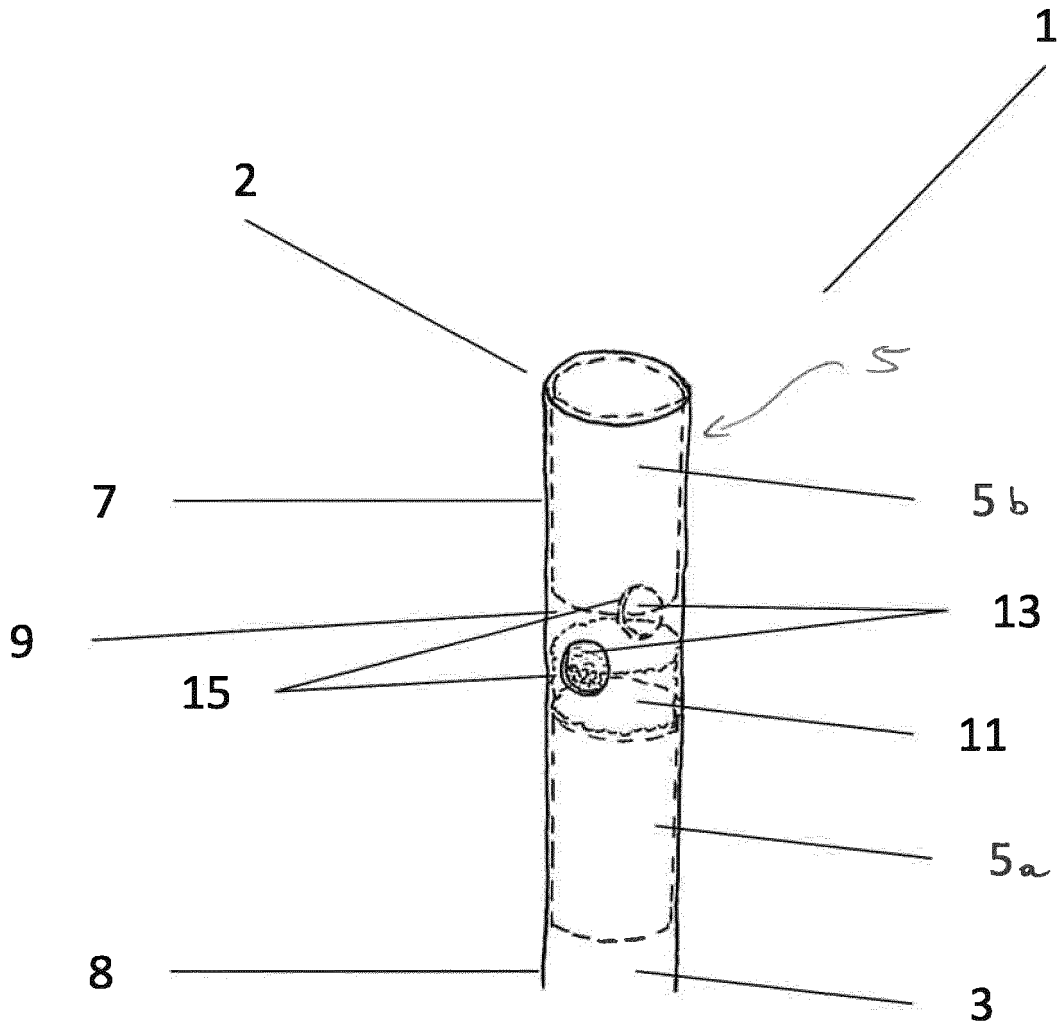

Fig. 1

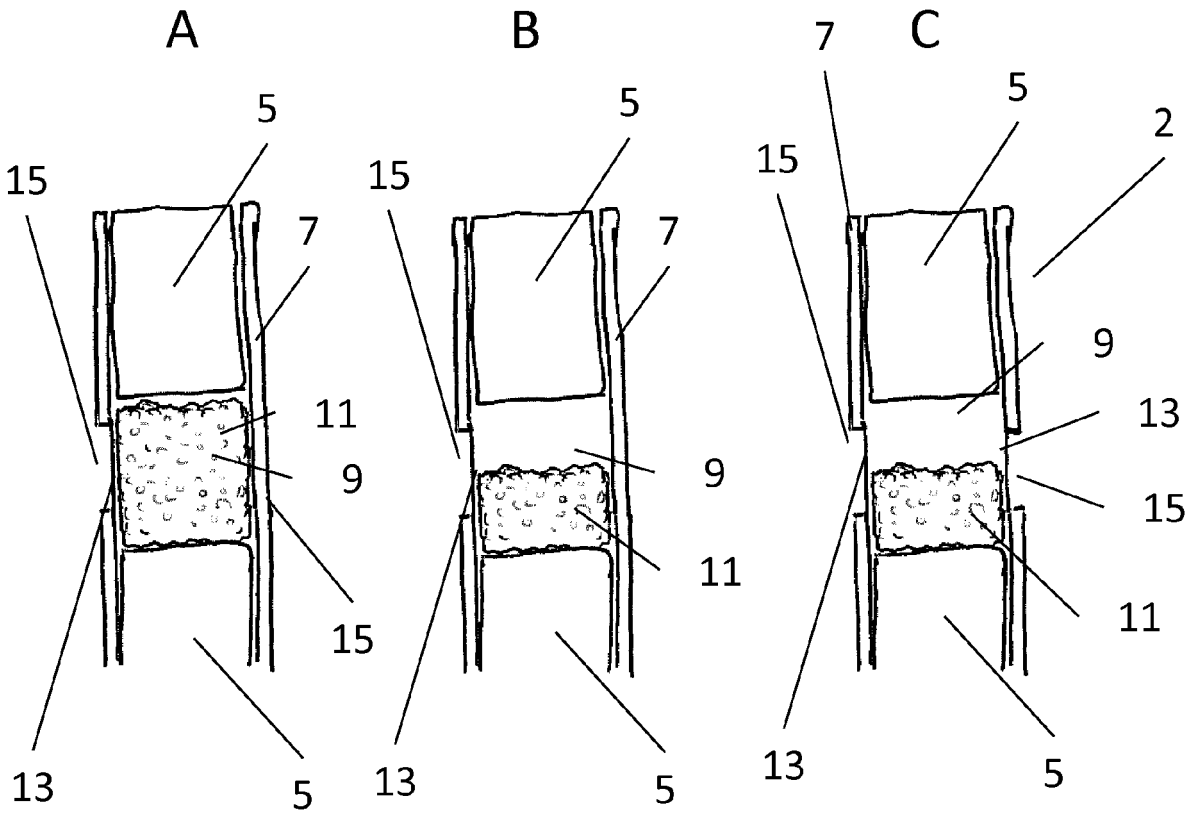

Fig. 2

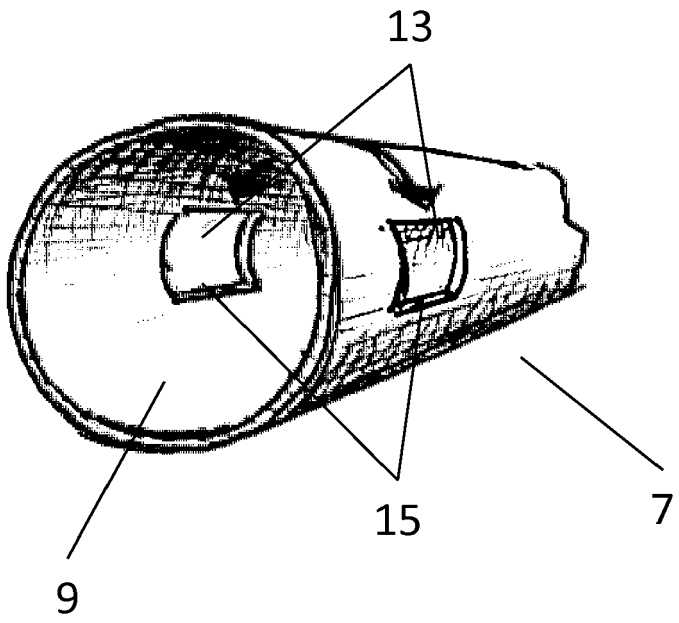

Fig. 3

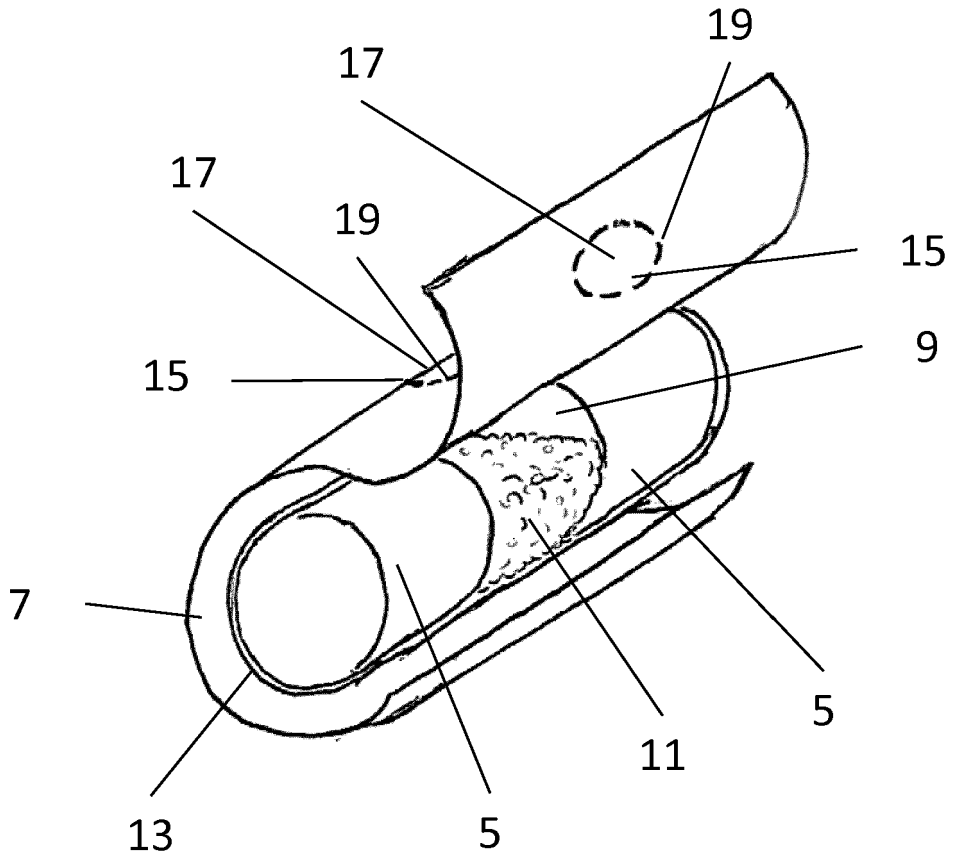

Fig. 4

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 15 17 8234

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 Y	EP 2 462 820 A1 (PHILIP MORRIS PROD [CH]) 13 June 2012 (2012-06-13) * paragraph [0014] - paragraph [0026]; figures *	1-13 14,15	INV. A24D1/02 A24D3/04 A24D3/06
X Y	WO 2013/068100 A1 (PHILIP MORRIS PROD [CH]) 16 May 2013 (2013-05-16) * page 2, line 16 - page 10, line 24; figures *	1-13 14,15	
X	CN 201 667 985 U (HUBEI CHINA TOBACCO IND CO LTD; WUHAN CITY HUANGHELOU TECHNOLOGY PARK) 15 December 2010 (2010-12-15) * abstract; claims; figures *	1-13	
X	WO 2014/086802 A2 (PHILIP MORRIS PROD [CH]) 12 June 2014 (2014-06-12) * page 7, line 11 - page 9, line 6; figures *	1-13	
Y	EP 1 252 832 A2 (HAUNI MASCHINENBAU AG [DE]) 30 October 2002 (2002-10-30) * paragraph [0031] - paragraph [0034]; figure 1f *	14,15	TECHNICAL FIELDS SEARCHED (IPC) A24D
A	WO 2010/142498 A1 (BRITISH AMERICAN TOBACCO CO [GB]; SUTTON JOSPEH PETER [GB]) 16 December 2010 (2010-12-16) * page 8, line 11 - page 9, line 12; figures *	1-15	
A	WO 2009/106374 A1 (BRITISH AMERICAN TOBACCO CO [GB]; SUTTON JOSEPH PETER [GB]) 3 September 2009 (2009-09-03) * page 8, line 21 - page 9, line 14; figures *	1-15	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	29 January 2016	Marzano Monterosso

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

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 17 8234

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.

29-01-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 2462820 A1	13-06-2012	AU 2011101752 A4	12-02-2015
		AU 2011340546 A1	04-07-2013
		CN 203709248 U	16-07-2014
		CZ 26648 U1	02-04-2014
		DK 201300106 U1	26-07-2013
		EE 01248 U1	15-10-2014
		EP 2462820 A1	13-06-2012
		ES 1135130 U	29-12-2014
		KR 20130005328 U	10-09-2013
		PL 122402 U1	21-07-2014
		RU 138230 U1	10-03-2014
		SG 191095 A1	31-07-2013
		SK 50352013 U1	06-05-2014
		UA 88174 U	11-03-2014
		WO 2012076649 A1	14-06-2012
WO 2013068100 A1	16-05-2013	AU 2012334424 A1	29-05-2014
		CN 103929987 A	16-07-2014
		EP 2775868 A1	17-09-2014
		HK 1200660 A1	14-08-2015
		JP 2014532433 A	08-12-2014
		KR 20140088564 A	10-07-2014
		RU 2014123195 A	20-12-2015
		SG 11201402051S A	27-06-2014
		US 2014311508 A1	23-10-2014
		WO 2013068100 A1	16-05-2013
CN 201667985 U	15-12-2010	NONE	
WO 2014086802 A2	12-06-2014	AU 2013354201 A1	30-04-2015
		CN 104837377 A	12-08-2015
		EP 2928329 A2	14-10-2015
		JP 2015536154 A	21-12-2015
		KR 20150091118 A	07-08-2015
		PH 12015500679 A1	18-05-2015
		TW 201438606 A	16-10-2014
		US 2015296875 A1	22-10-2015
		WO 2014086802 A2	12-06-2014
EP 1252832 A2	30-10-2002	CN 1382401 A	04-12-2002
		DE 10119820 A1	24-10-2002
		EP 1252832 A2	30-10-2002
		JP 2002335937 A	26-11-2002
		PL 353559 A1	04-11-2002
		US 2002153017 A1	24-10-2002

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 15 17 8234

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.

29-01-2016

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2010142498 A1	16-12-2010	AR 079394 A1	25-01-2012
		AU 2010257705 A1	08-12-2011
		BR PI1011859 A2	03-11-2015
		CA 2764702 A1	16-12-2010
		CN 102458162 A	16-05-2012
		EP 2440076 A1	18-04-2012
		ES 2420609 T3	26-08-2013
		JP 3194338 U	13-11-2014
		JP 2012529276 A	22-11-2012
		KR 20120027054 A	20-03-2012
		NZ 596455 A	31-05-2013
		RU 2011153783 A	20-07-2013
		SG 176057 A1	29-12-2011
		UA 103683 C2	11-11-2013
		US 2012085359 A1	12-04-2012
		WO 2010142498 A1	16-12-2010
WO 2009106374 A1	03-09-2009	AR 070494 A1	07-04-2010
		WO 2009106374 A1	03-09-2009

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82