

(19)



(11)

EP 3 116 333 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:

19.12.2018 Bulletin 2018/51

(51) Int Cl.:

A24D 3/04 (2006.01)

(86) International application number:

PCT/EP2015/053418

(21) Application number: **15704818.2**

(22) Date of filing: **18.02.2015**

(87) International publication number:

WO 2015/135723 (17.09.2015 Gazette 2015/37)

(54) **FILTER ELEMENT FOR A SMOKING ARTICLE**

FILTERELEMENT FÜR EINEN RAUCHARTIKEL

ÉLÉMENT DE FILTRE POUR ARTICLE À FUMER

(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**

(30) Priority: **11.03.2014 EP 14158737**

(43) Date of publication of application:

18.01.2017 Bulletin 2017/03

(73) Proprietor: **JT International SA**

1202 Geneva (CH)

(72) Inventors:

• **NAGAI, Nobuo**
L-2380 (LU)

• **OKUNO, Hiroshi**

Yokohama, Kanagawa 227-0063 (JP)

(74) Representative: **Gill Jennings & Every LLP**

The Broadgate Tower

20 Primrose Street

London EC2A 2ES (GB)

(56) References cited:

EP-A1- 2 368 448 WO-A1-2013/045915

US-A- 4 570 649 US-A- 4 646 763

US-A- 4 649 944 US-A- 4 687 009

EP 3 116 333 B1

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

Description

[0001] The present invention relates to a filter element for a smoking article. In particular, the present invention relates to a filter element which enables a user to vary the ratio of tobacco smoke to air inhaled by providing a mechanism by varying the pressure drop across the filter.

[0002] Filter elements for smoking articles are, of course, well known. It is also well known to provide filter elements that have means for varying the ratio of tobacco smoke to air inhaled by a user by providing a mechanism to the user to vary the pressure drop across the filter. Examples of such configurations are shown in US4646763, US4649944, US4570649 or WO 2013/079645, for example. Such configurations allow for variations of the ventilation level of the filter, therefore of the smoke intensity and tar delivery of the smoking articles, between a maximum tar delivery in a first state and a second tar delivery in a second state.

[0003] Whilst such known filter elements have some benefits in that they allow a user control over the smoke intensity, they also have a number of disadvantages. In particular, the level of control of the user is restricted because the variation of air dilution is relatively limited. The level of control is particularly restricted if a user wants to vary the filter between two ventilated states of the smoking articles, i.e. two reduced tar delivery states.

[0004] The present invention seeks to provide a filter element which improves control of the smoke intensity by a user, enabling the user to vary the pressure drop across the filter between reduced tar delivery states whilst still ensuring that a cost effective filter element is provided.

[0005] To that aim, the present invention provides a filter element for a smoking article, the filter element comprising: at least one plug of filter material surrounded by a substantially air permeable plug wrap, wherein the plug of filter material comprises at least two segments being longitudinally aligned and rotatably mounted about a common longitudinal axis, at least one of the segments comprising at least one perforation formed in the substantially air permeable plug wrap; and a wrapping material surrounding at least one portion of the substantially air permeable plug wrap, the wrapping material comprising a first part attached to a first of the two segments of the plug of filter material and a second part attached to the second segment of the plug of filter material, and comprising at least one aperture formed therein, the first and second parts of the wrapping material and first and second segments of the plug of filter material being arranged such that the respective at least one perforation of the substantially air permeable plug wrap and the at least one aperture of the wrapping material can be superimposed upon rotation of one of the segments of the plug of filter material about the common longitudinal axis to vary the filter ventilation; wherein each of the at least one perforation has a first length and each of the at least one aperture has a second length different to the first

length.

[0006] The filter element according to the present invention therefore includes a combination of aligning slots, respectively referred to as perforations and apertures, and a substantially air permeable or porous plug wrap for allowing air flow into the filter. Importantly, using this combination of aligning slots and porous plug wrap allows for a relatively small variation of air dilution, which results in an improved stability and fine tuning of the variable filter product. Advantageously, this enables the manufacture of cigarettes having variable taste strength and tar deliveries, by providing a filter element adjustable between two ventilated cigarette configurations.

[0007] The at least one perforation may be formed in the second segment of the filter material and the at least one aperture may be formed in the second part of the wrapping material.

[0008] Preferably, each of the at least one perforation has a first length and each of the at least one aperture has a second length. In other words, each of the perforations have the same length, while each of the apertures also have the same length (which is different from the length of the apertures), which facilitates manufacturing of the filter element.

[0009] Preferably, at least one of the segments of the filter material comprises at least three perforations spaced equidistally from each other. For example, there may be three perforations of equal length located in the same plane around a circumference of the plug wrap, at approximately 120 degrees from each other.

[0010] A further aspect of the invention relates to a smoking article comprising a filter element as previously described. Such a smoking article would typically include a tobacco rod connected to an end of the filter by the wrapping material which overlaps said end of the filter element and one end of the tobacco rod.

[0011] Preferably, the second part of the wrapping material comprising the aperture surrounds a segment of the plug of filter material including the perforation and at least part of a segment of the plug of filter material free from the at least one perforation.

[0012] The first and second parts of the wrapping material may be separated by a circumferential slit around the filter plug, while the first and second segments of the plug of filter material may be separated by a circumferential cut in a second plane perpendicular to the common longitudinal axis, and wherein the circumferential slit is located in the second plane. As such, the circumferential slit in the wrapping material corresponds to a circumferential cut in the plug of filter material, both being located in the same plane. It will be appreciated that the terms "slit" and "cut" convey the same meaning, however the different terms, referring to the wrapping and filter materials, are respectively used for the sake of clarity.

[0013] An example of the present invention, together with a method of manufacture thereof, will now be described with reference to the accompanying drawings, in which:

Figures 1 and 2 show a conventional variable flow filter for a smoking article;

Figure 3 is a cross-sectional view of a smoking article comprising a conventional variable flow filter for a smoking article;

Figures 4 and 5 are cross-sectional views of smoking articles comprising a filter element according to the present disclosure;

Figures 6A and 6B show sequences of alignment corresponding to relative positions of perforations in the porous plug wrap and slots in the tipping paper to control the amount of air that can be drawn through the combination of aligning slots and perforations; Figure 7 shows another filter element according to the present invention; and

Figure 8 is a table reproducing minimum and maximum tar deliveries obtained for five different smoking articles according to the invention.

[0014] Referring to Figure 1, a filter cigarette 1 comprises a tobacco rod 2 and a filter component 3. The filter component 3 is configured to allow adjustment of the filter ventilation by a user to adjust the taste strength of the cigarette 1. The filter component 3 comprises a plug of filter material such as cellulose acetate having a plug wrap 4 extending over its outer surface. In the known prior art filter components 3, the plug wrap 4 is substantially air impermeable.

[0015] The filter component 3 is divided into a mouth end filter segment 5 and a tobacco end filter segment 6, by a circumferential transverse cut 7, which is perpendicular to the longitudinal axis of the cigarette 1. The cut 7 is only partial throughout the diameter of the filter plug 4 so as to leave a central connecting member of filter material between the two segments 5, 6. This connecting member (not shown) advantageously acts as an axis of rotation for the segments 5, 6 relative to each other to allow variation of the filter ventilation as explained below.

[0016] At least one slit, also referred to as a perforation 8, is formed into the plug wrap 4 in the tobacco end filter segment 6. This perforation 8 allows air to be drawn in through the plug wrap 4 and into the core of the filter component 3.

[0017] To assemble the filter component 3 to the tobacco rod 2, a suitable wrapping material such as tipping paper 9 is provided and wrapped over the plug wrap 4 and filter segments 5, 6. The tipping paper 9 is comprised of two bands 10, 11 separable at a pre-cut or cut line 12. A first band 10 of the tipping paper 9 is attached, usually by gluing, to the mouth end filter segment 5 of the cigarette 1 and extends over the cut 7 between the two filter segments 5, 6 and partially over the second filter segment 6 and the perforation 8 without being attached to the second segment 6. This first tipping band 10 comprises at least one transverse slot 13 which is positioned so that it can be aligned over the perforation 8 in the second filter segment 6. A second tipping band 11 of the tipping paper 9 is attached, usually by gluing, on the remaining part of

the tobacco end segment 6 not covered by band 10 and the tobacco rod 2 to attach the filter component 3 to the tobacco rod 2.

[0018] Figure 2 shows Figure 1 when assembled with the slot 13 of first band 10 of tipping paper 9 aligned over the perforation 8.

[0019] Such configuration of the filter component 3 and tipping paper 9 makes the mouth end filter segment 5 capable of rotation around the longitudinal axis of the cigarette 1 relative to the tobacco end filter segment 6 connected to the tobacco rod 2. This varies the respective positions of the perforation 8 in the tobacco end filter segment 6 and the slot 13 in the first tipping band 10 as shown in Figure 3 in order to adjust the ventilation of the filter component 3, and hence the strength of the cigarette 1.

[0020] Figure 3 shows a cross-sectional view of the filter component 3 through the location of the perforation 8 and slot 13. From this it can be seen that relative rotation of the mouth end filter segment 5 with respect to tobacco end filter segment 6 in either direction can adjust the relative positions of the slot 13 and perforation 8 to control the amount of air that can be drawn through the combination of the slot 13 and perforation 8 and into the filter component 3 when the cigarette 1 is being smoked.

[0021] In use, the user can rotate the mouth end filter segment 5 to vary the relative locations of the slot 13 and perforation 8 and vary the ventilation for the filter component 3 varying air mixture received by a user when the tobacco rod 2 is lit. Importantly, with the conventional filter component 3, airflow can only be drawn through the combination of the slot 13 and perforation 8 and into the filter component 3, since the plug wrap 4 in the known configurations is substantially air impermeable.

[0022] Figure 4 shows a cross-sectional view of a smoking article comprising a filter element according to the present disclosure, through the location of the perforation 8 and slot 13. The smoking article according to the present invention is substantially similar in structure to that shown in Figures 1 to 3, with the exception that the plug wrap provided is substantially air permeable or porous. For example, plug wrap papers having porosities ranging from about 1300 CU to 24000 CU can be used in the smoking article of the present invention. As in Figure 3, it can be seen that relative rotation of the mouth end filter segment 5 with respect to tobacco end filter segment 6 in either direction can adjust the relative positions of the slot 13 and perforation 8 to control the amount of air that can be drawn through the combination of the slot 13 and perforation 8 and into the filter component 3 when the cigarette 1 is being smoked.

[0023] In use, the user can rotate the mouth end filter segment 5 to vary the relative locations of the slot 13 and perforation 8 and vary the ventilation for the filter component 3 varying air mixture received by a user when the tobacco rod 2 is lit. Unlike in the known case of Figure 3, however, the plug wrap 40 is porous, therefore allowing at least some airflow through the filter at all times, irre-

spective of the alignment of the slot 13 and perforation 8. Since airflow always passes through the filter element 3, the variation of air dilution obtained by the relative positions of the slot 13 and perforation 8 is smaller than in the case of Figure 3. Advantageously, this improves control of the user who is able to steadily vary the smoke intensity, i.e. the tar delivery of the smoking article between two ventilated states. It is thereby possible to vary for example the tar delivery between 0.1 mg and 8.0 mg for example. Another advantage provided by the filter of the invention is that it is possible to obtain relatively high tar delivery states (in particular above 7 mg of tar) without the need to have high pressure drop values of the smoking article 1, in particular pressure drop values of 130 mmH₂O and above. The filter and smoking article of the invention provide pressure drops of below 130 mmH₂O and preferably below 120 mmH₂O in any respective position of the slot 13 and perforation 8. This particularly reduces resistance to drawing smoke through the filter element 3 whilst a user tuned the filter to obtain high tar delivery states.

[0024] It will be understood that any plurality of perforations 8 and/or slots 13 could be provided to achieve the same function of varying the ventilation level in the filter component 3, the common principle of ventilation variation remaining identical and based on alignment/misalignment of said perforations 8 and slot 13 upon rotation of the mouth end segment 5 of the filter with respect to the tobacco end segment 6.

[0025] Preferably, the perforations 8 are of equal length and can vary from 2.00 mm to 4.5 mm, for example. In a preferred embodiment, there are three perforations 8 formed into the plug wrap 40, situated on the same plane and located at an angle θ of approximately 120 degrees from each other, as shown in Figure 5.

[0026] Figures 6A and 6B shows the variation of the airflow through the filter component 3 represented in Figure 7, using relatively small perforations 8, e.g. 2.5 mm and matching slots 13 (Figure 6A) and relatively large perforations 8, e.g. 4.0 mm and matching slots 13 (Figure 6B). Since the plug wrap 40 is porous, airflow always passes through the filter component 3, resulting in a relatively weak but permanent airflow in the case of relatively small perforations 8 and matching slots 13 (Figure 6A), and a relatively strong, permanent airflow in the case of relatively large perforations 8 and matching slots 13 (Figure 6B).

[0027] Figure 8 is a table reproducing minimum and maximum tar deliveries obtained for five different smoking articles according to the invention, with different filter structures (dual charcoal acetate or mono-acetate filters), different plug wrap porosities and different perforations sizes. The tar deliveries reproduced in that table were obtained under standard ISO smoking regime, following ISO standards for testing smoking articles (ISO 3308, ISO 4387).

[0028] An example method of manufacturing the filter according to the present disclosure will now be de-

scribed.

[0029] In a first stage there is provided filter plug-forming material that may be a material such as cellulose acetate tow in a conventional and well-known manner in the industry of cigarette filter making. A continuous filter rod is hereby obtained. This continuous rod is then surrounded with a porous plug wrap 40 to hold the acetate tow in shape and segmented to produce individual filter components 3.

[0030] Individual filter components 3 are then loaded into a conventional smoking article maker which is equipped with a processing module to assemble filter components 3 and tobacco rods 2 to form cigarettes 1. The filter components 3 are then cut transversally to form two rotatable interconnected segments 5, 6. Perforations 8 are formed in the filter components 3 by laser or blade cutting.

[0031] In some embodiments, the pre-perforated tipping paper 9 may be used. Alternatively, the tipping paper 9 may be perforated and cut or preferably pre-cut to define separation line 12 between bands 10, 11 of the tipping paper 9 and then supplied and wrapped around the filter component 3 to connect it with the tobacco rod 2 to form a cigarette product. The filter components 3 are submitted to a laser or blade cut to form simultaneously perforations 8 in the tobacco end filter segment 6 and corresponding slots 13 in the tipping paper 9. Finally, the mouth end filter segment 5 is then twisted to misalign perforations 8 and slots 13 of the filters and thereby set the cigarette products 1 at the lowest level of ventilation of the filter components 3. The finished cigarette products are then gathered to form a bundle which is then packed for sale.

Claims

1. A filter element (3) for a smoking article, the filter element (3) comprising:

at least one plug of filter material surrounded by a substantially air permeable plug wrap (40), wherein the plug of filter material comprises at least two segments (5, 6) being longitudinally aligned and rotatably mounted about a common longitudinal axis, at least one of the segments (5, 6) comprising at least one perforation (8) formed in the substantially air permeable plug wrap (40); and

a wrapping material (9) surrounding at least one portion of the substantially air permeable plug wrap (40), the wrapping material (9) comprising a first part (10) attached to a first (5) of the two segments of the plug of filter material and a second part (11) attached to the second segment (6) of the plug of filter material, and comprising at least one aperture (13) formed therein, the first and second parts (10, 11) of the wrap-

- ping material (9) and first and second segments (5, 6) of the plug of filter material being arranged such that the respective at least one perforation (8) of the substantially air permeable plug wrap (40) and the at least one aperture (13) of the wrapping material (9) can be superimposed upon rotation of one of the segments (5, 6) of the plug of filter material about the common longitudinal axis to vary the filter ventilation; **characterized in that** each of the at least one perforation (8) has a first length and each of the at least one aperture (13) has a second length different to the first length.
2. A filter element (3) according to claim 1, wherein the at least one perforation (8) is formed in the second segment (6) of the filter material and the at least one aperture (13) is formed in the second part (11) of the wrapping material (9).
 3. A filter element (3) according to any one of the preceding claims, wherein each of the at least one perforation (8) and each of the at least one aperture (13) is located in a first plane perpendicular to the common longitudinal axis.
 4. A filter element according to claim 3, wherein the at least one of the segments (5, 6) of the filter material comprises at least three perforations (8) spaced equidistally from each other.
 5. A filter element according to any preceding claim, further comprising at least one second plug of filter material comprising an adsorbent material, preferably activated charcoal.
 6. A filter element according to any preceding claim, wherein the plug wrap porosity is comprised between about 1300 CU and about 24000 CU.
 7. A smoking article (1) comprising a filter element (3) according to any of claims 1 to 6 and a tobacco rod (2) connected to an end of the filter element (3) by the wrapping material (9) overlapping said end of the filter element (3) and one end of the tobacco rod (2).
 8. A smoking article according to claim 7, having a maximum pressure drop of below 130 mmH₂O.
 9. A smoking article (1) according to claim 7 or claim 8, wherein the second part of the wrapping material (11) comprising the aperture (13) surrounds a segment (6) of the plug of filter material including the perforation (8) and at least part of a segment (6) of the plug of filter material free from the at least one perforation (8).
 10. A smoking article (1) according to any of claims 8 to
- 9, wherein the first and second parts (10, 11) of the wrapping material (9) are separated by a circumferential slit (12) around the filter plug.
11. A smoking article according to claim 10, wherein the first and second segments (5, 6) of the plug of filter material are separated by a circumferential cut (7) in a second plane perpendicular to the common longitudinal axis, and wherein the circumferential slit (12) is located in the second plane.

Patentansprüche

1. Filterelement (3) für einen Rauchartikel, wobei das Filterelement (3) umfasst:

Zumindest einen Stopfen aus Filtermaterial, der von einer im Wesentlichen luftdurchlässigen Stopfenhülle (40) umgeben ist, wobei der Stopfen aus Filtermaterial zumindest zwei Segmente (5, 6) umfasst, die longitudinal ausgerichtet und drehbar um eine gemeinsame Längsachse montiert sind, wobei zumindest eins der Segmente (5, 6) zumindest eine Perforation (8) umfasst, die in der im Wesentlichen luftdurchlässigen Stopfenhülle (40) gebildet ist; und ein Umhüllungsmaterial (9), das zumindest einen Abschnitt der im Wesentlichen luftdurchlässigen Stopfenhülle (40) umgibt, wobei das Umhüllungsmaterial (9) einen ersten Teil (10), der an ein erstes (5) der zwei Segmente des Stopfens aus Filtermaterial angebracht ist und einen zweiten Teil (11) umfasst, der an das zweite Segment (6) des Stopfens aus Filtermaterial angebracht ist, und zumindest eine darin gebildete Öffnung (13) umfasst, wobei die ersten und zweiten Teile (10, 11) des Umhüllungsmaterials (9) und erste und zweite Segmente (5, 6) des Stopfens aus Filtermaterial derartig angeordnet sind, dass die jeweilige zumindest eine Perforation (8) der im Wesentlichen luftdurchlässigen Stopfenhülle (40) und die zumindest eine Öffnung (13) des Umhüllungsmaterials (9) nach Rotation eines der Segmente (5, 6) des Stopfens aus Filtermaterial um eine gemeinsame Längsachse überlagert werden können, um die Filterventilation zu variieren;

dadurch gekennzeichnet, dass jede der zumindest einen Perforation (8) eine erste Länge aufweist und jede der zumindest einen Öffnung (13) eine von der ersten Länge verschiedene Länge aufweist.

2. Filterelement (3) nach Anspruch 1, wobei die zumindest eine Perforation (8) im zweiten Segment (6) des Filtermaterials gebildet ist und die zumindest eine

Öffnung (13) im zweiten Teil (11) des Umhüllungsmaterials (9) gebildet ist.

3. Filterelement (3) nach einem der vorhergehenden Ansprüche, wobei sich jede der zumindest einen Perforation (8) und jede der zumindest einen Öffnung (13) in einer ersten Ebene senkrecht zur gemeinsamen Längsachse befindet. 5
4. Filterelement nach Anspruch 3, wobei das zumindest eine der Segmente (5, 6) des Filtermaterials zumindest drei Perforationen (8) umfasst, die gleich weit voneinander entfernt beabstandet sind. 10
5. Filterelement nach einem vorhergehenden Anspruch, das ferner zumindest einen zweiten Stopfen aus Filtermaterial umfasst, der ein absorbierendes Material, vorzugsweise Aktivkohle, umfasst. 15
6. Filterelement nach einem vorhergehenden Anspruch, wobei die Porosität der Stopfenhülle zwischen ca. 1300 CU und ca. 24000 CU umfasst. 20
7. Rauchartikel (1), der ein Filterelement (3) nach einem der Ansprüche 1 bis 6 umfasst und ein Tabakstab (2) mit einem Ende des Filterelements (3) verbunden ist, indem das Umhüllungsmaterial (9) das Ende des Filterelements (3) und ein Ende des Tabakstabes (2) überlappt. 25
30
8. Rauchartikel nach Anspruch 7, der einen maximalen Druckabfall von unter 130 mm H₂O aufweist. 30
9. Rauchartikel (1) nach Anspruch 7 oder Anspruch 8, wobei der zweite Teil des Umhüllungsmaterials (11), der die Öffnung (13) umfasst, ein Segment (6) des Stopfens aus Filtermaterial einschließlich der Perforation (8) und zumindest Teil eines Segments (6) des Stopfens aus Filtermaterial umgibt, der frei von der zumindest einen Perforation (8) ist. 35
40
10. Rauchartikel (1) nach einem der Ansprüche 8 bis 9, wobei die ersten und zweiten Teile (10, 11) des Umhüllungsmaterials (9) durch einen Umfangsschlitz (12) um den Filterstopfen herum getrennt sind. 45
11. Rauchartikel nach Anspruch 10, wobei die ersten und zweiten Segmente (5, 6) des Stopfens aus Filtermaterial durch einen Umfangsschnitt (7) in einer zweiten Ebene senkrecht zur gemeinsamen Längsachse getrennt sind, und wobei sich der Umfangsschlitz (12) in der zweiten Ebene befindet. 50

Revendications 55

1. Un élément de filtre (3) pour un article à fumer et cet élément de filtre (3) a la composition suivante :

au moins un bloc de matériau filtrant entouré d'un enrobage relativement perméable à l'air pour ce bloc (40), et ce bloc de matériau filtrant comporte au moins deux segments (5, 6) qui sont alignés sur le plan longitudinal et tournent autour d'un axe longitudinal commun, et au moins un de ces segments (5, 6) comporte au moins une perforation (8) qui est formée dans l'enrobage relativement perméable à l'air pour ce bloc (40) et

un matériau d'enrobage (9) qui entoure au moins une partie de l'enrobage relativement perméable à l'air pour ce bloc (40), ce matériau d'enrobage (9) comportant au moins une première partie (10) rattachée au premier (5) des deux segments du bloc de matériau filtrant alors que la deuxième partie (11) est rattachée au deuxième segment (6) du bloc de matériau filtrant et comporte au moins une ouverture (13) formée dans cet élément

les première et deuxième parties (10, 11) du matériau d'enrobage (9) et les premier et deuxième segments (5, 6) du bloc de matériau filtrant sont disposés de telle sorte que la perforation respective (8), au nombre d'au moins 1, de l'enrobage relativement perméable à l'air (40) et l'ouverture (13), au nombre d'au moins 1, du matériau d'enrobage (9) peuvent se superposer en faisant tourner un des segments (5, 6) du bloc de matériau filtrant autour de l'axe longitudinal commun de façon à varier la ventilation du filtre **se caractérisant par le fait que** chacune des perforations (8), au nombre d'au moins 1, a une première longueur et que chacune des ouvertures (13), au nombre d'au moins 1, a une deuxième longueur différente de la première longueur.

2. Un élément de filtre (3), comme celui que décrit la revendication 1, si ce n'est que la perforation (8), au nombre d'au moins 1, est formée dans le deuxième segment (6) du matériau filtrant et que l'ouverture (13), au nombre d'au moins 1, est formée dans la deuxième partie (11) du matériau d'enrobage (9).
3. Un élément de filtre (3), comme celui que décrit l'une ou l'autre des revendications précédentes, si ce n'est que chacune des perforations (8), au nombre d'au moins 1, et que chacune des ouvertures (13), au nombre d'au moins 1, sont implantées dans un premier plan perpendiculaire à l'axe longitudinal commun.
4. Un élément de filtre comme celui que décrit la revendication 3, si ce n'est qu'un des segments (5, 6), au nombre d'au moins 1, du matériau filtrant comporte au moins trois perforations (8) équidistantes.
5. Un élément de filtre, comme celui que décrit l'une

ou l'autre des revendications précédentes, si ce n'est qu'il comporte en outre au moins un deuxième bloc de matériau filtrant contenant un matériau adsorbant, de préférence du charbon activé.

5

6. Un élément de filtre comme celui que décrit l'une ou l'autre des revendications précédentes, si ce n'est que la porosité de l'enrobage de bloc se situe entre 1300 et 24 000 unités Coresta (UC).

10

7. Un article à fumer (1) comportant un élément de filtre (3), comme celui que décrit l'une des revendications 1 à 6, et une tige de tabac (2) raccordée à une extrémité de l'élément de filtre (3) par le matériau d'enrobage (9) avec une saillie par rapport à ladite extrémité de l'élément de filtre (3) et une extrémité de la tige de tabac (2).

15

8. Un article à fumer, comme celui que décrit la revendication 7, si ce n'est que la chute maximale de pression est inférieure à 130 mm H₂O.

20

9. Un article à fumer (1), comme celui que décrit la revendication 7 ou la revendication 8, si ce n'est que la deuxième partie du matériau d'enrobage (11) qui fait partie de l'ouverture (13) entoure un segment (6) du bloc de matériau filtrant, y compris la perforation (8) et au moins une partie d'un segment (6) du bloc de matériau filtrant se situant à l'écart d'au moins une perforation (8).

25

30

10. Un article à fumer (1), comme celui que décrit la revendication 8 ou la revendication 9, si ce n'est que la première partie et la deuxième partie (10, 11) du matériau d'enrobage (9) sont séparées par une fente circonférentielle (12) qui fait tout le tour du bloc filtrant.

35

11. Un article à fumer, comme celui que décrit la revendication 10, si ce n'est que le premier segment et le deuxième segment (5, 6) du bloc de matériau filtrant sont séparés par une entaille circonférentielle (7) dans un deuxième plan perpendiculaire à l'axe longitudinal commun et si ce n'est que la fente circonférentielle (12) se situe dans le deuxième plan.

40

45

50

55

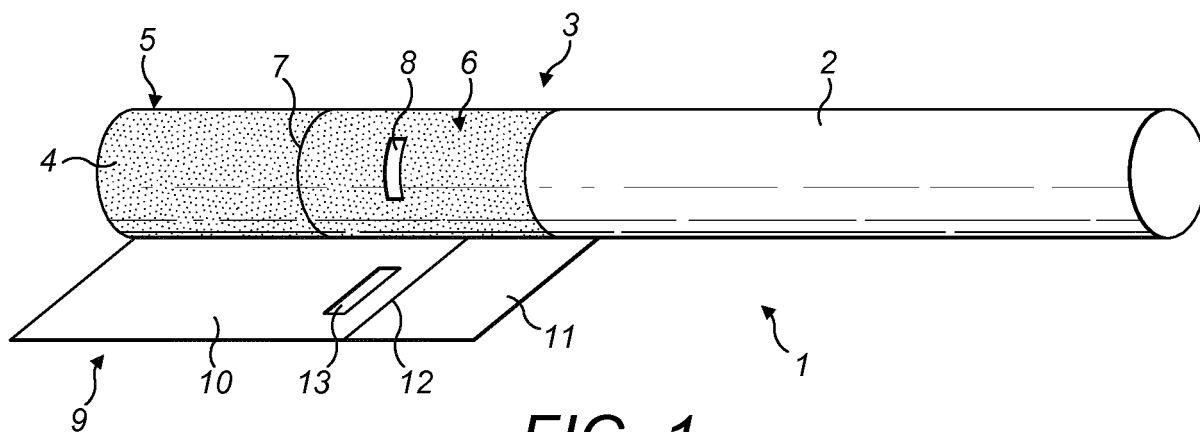


FIG. 1

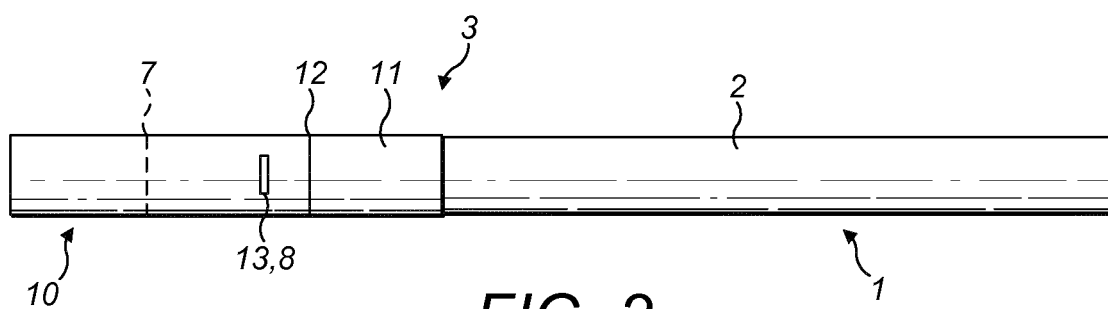


FIG. 2

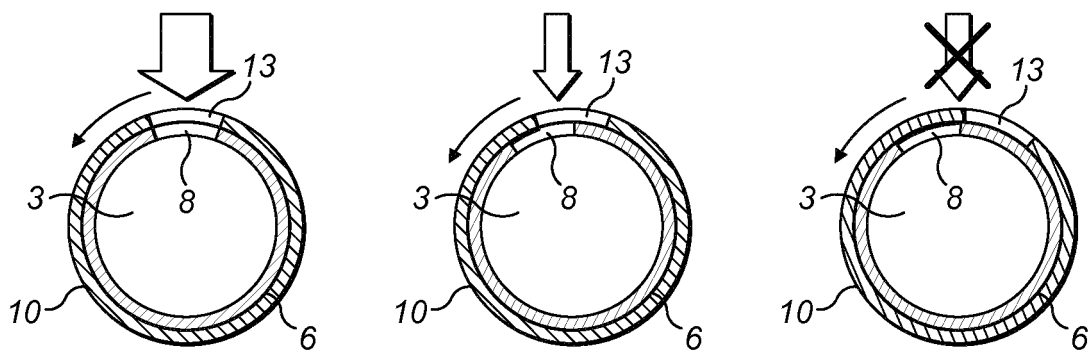


FIG. 3

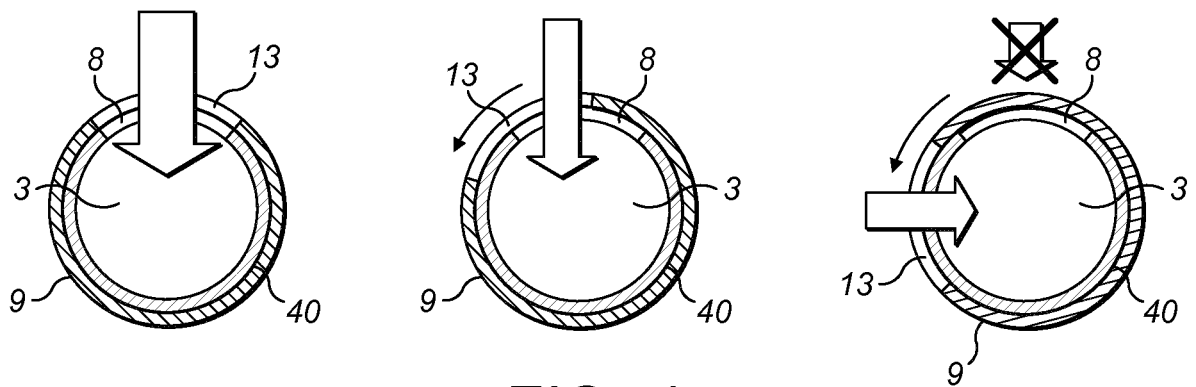


FIG. 4

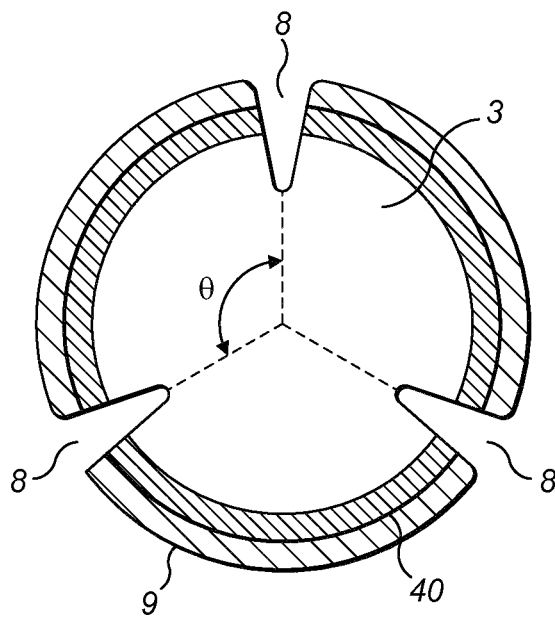


FIG. 5

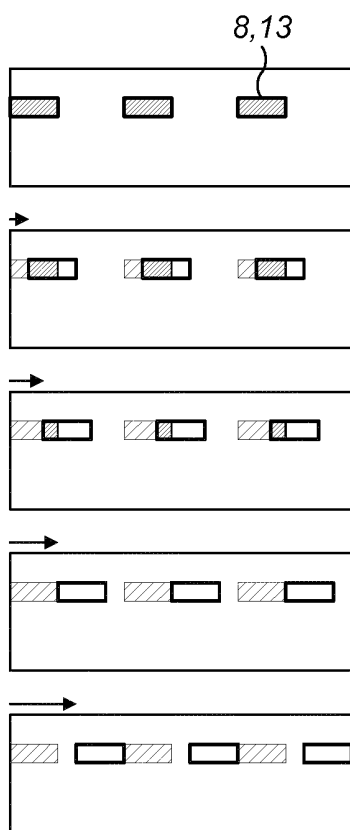


FIG. 6A

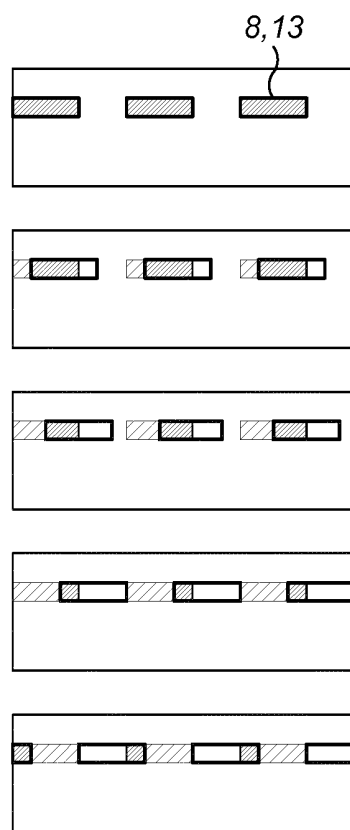


FIG. 6B

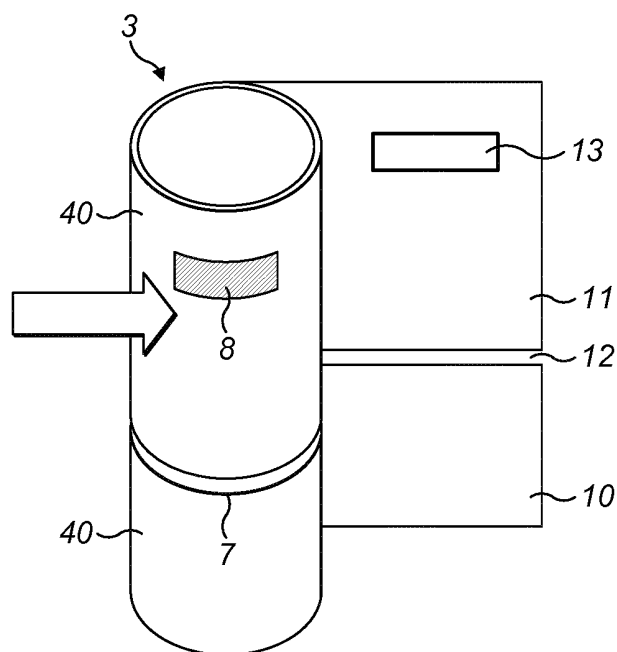


FIG. 7

Configuration n°	Filter type	N° of slits	slits length (mm)	Plug Wrap porosity	Min Tar level (mg)	Max Tar level (mg)
1	dual charcoal filter	3	4,4	20000 CU	0,3	1,7
2	dual charcoal filter (with pre-perforated tipping paper)	3	2,0	20000 CU	0,6	1,7
3	dual charcoal filter (with pre-perforated tipping paper)	3	2,0	1300 CU	4,1	7,3
4	mono-acetate	3	2,0	12000 CU	0,2	1,5
5	mono-acetate	3	2,0	24000 CU	0,1	0,6

FIG. 8

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 4646763 A [0002]
- US 4649944 A [0002]
- US 4570649 A [0002]
- WO 2013079645 A [0002]