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(54) Title: EXTENDABLE FILTER

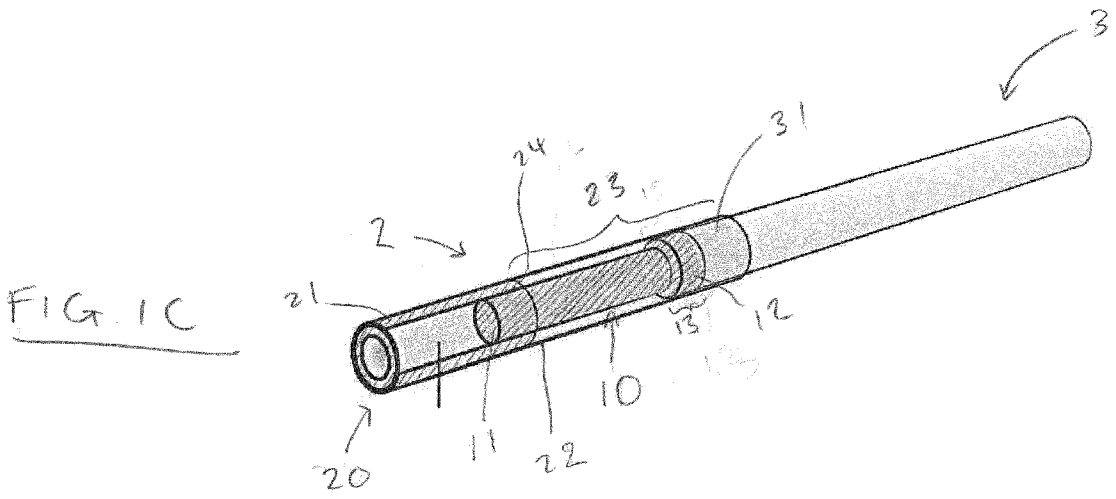

FIG. 1C

(57) Abstract: An extendable filter for an aerosol generating article is described, where the aerosol generating article includes an aerosol generating device. The filter comprises a filter plug core having a mouth end and an attachment end, the attachment end being attachable to an aerosol delivery end of the aerosol generating device. The filter further includes a tubular outer sleeve arranged to slide over the filter plug core and the aerosol generating device when attached, the tubular outer sleeve comprising a tubular filter plug. Sliding of the outer sleeve in a longitudinal direction away from the attached aerosol generating device provides an increasing extension of the outer sleeve beyond the mouth end of the filter plug core, extending the length of the extendable filter. The extendable filter thereby allows the aerosol generating article to be held further away from the aerosol generating end, thus reducing unwanted effects of the aerosol coming into contact with a user's hands.

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EXTENDABLE FILTER

The present invention relates to a filter for an aerosol generating article.

BACKGROUND

Personal hygiene and freshness is an important consideration for users of aerosol generating articles, such as cigarettes or cigars. Side stream smoke is generated at the lit end of a conventional cigarette and this can flow towards a user's fingers causing potential discolouration and a lingering smell. Similar undesirable effects are associated with other forms of aerosol generating device or articles. Cigarette holders are well known for positioning the fingers further away from the lit end of a conventional cigarette and therefore reducing the interaction between fingers and side stream smoke. However, these cigarette holders are often bulky items that are purchased separately from a packet of cigarettes. Furthermore prolonged repeated use of a cigarette holder can result in the holder itself collecting the generating aerosol and passing this to the user's hands. For these reasons it is not always convenient or possible to use a cigarette holder, and an object of the present invention is to address this issue.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, there is provided an extendable filter for an aerosol generating article which comprises an aerosol generating device, the filter comprising: a filter plug core having a mouth end and an attachment end, the attachment end comprising a collar of increased diameter and being attachable to an aerosol delivery end of the aerosol generating device; and a tubular outer sleeve arranged to slide over the filter plug core and the aerosol generating device when attached, the tubular outer sleeve comprising a tubular filter plug; wherein sliding of the outer sleeve in a longitudinal direction away from the attached aerosol generating device provides an increasing extension of the outer sleeve beyond the mouth end of the filter plug core, extending the length of the extendable filter.

By sliding the outer sleeve of the extendable filter in a longitudinal direction away from the attached aerosol generating device, the filter may be held at a position further away from the vapour generating end of the aerosol generating article (i.e. the lit end of a conventional cigarette) and therefore the unwanted effects of the

aerosol coming into contact with the hands are significantly reduced. The extendable filter may be provided as a constituent part of the aerosol generating article which is disposed of after the aerosol generating device is depleted, such that a fresh filter is used with each new aerosol generating article.

The provision of a collar of increased diameter at the attachment end of the filter plug core significantly increases the strength of the attachment to the aerosol generating device. In particular, the provision of a collar allows for attachment to the aerosol generating device using tipping or wrapping paper to provide a secure connection. Preferably the diameter of the collar is equal to the diameter of the aerosol generating device. Preferably the collar is arranged to directly abut, i.e. remain in contact with, the aerosol generating device when attached to the aerosol generating device. In this way, it is ensured that a generated vapour passes through the collar of the filter plug.

Preferably the filter plug core is shaped to provide the collar of increased diameter at the attachment end. Preferably the filter plug core is an integral filter plug core, i.e. it is formed by an integral piece of filter plug material. In some embodiments the collar provides a mechanical stop to restrict movement of the tubular outer sleeve away from the attached aerosol generating device.

The “longitudinal direction” refers to a direction substantially aligned with the longitudinal axis of the extendable filter and attached aerosol generating device, that is, the axis aligned between the mouth end and opposing, vapour generating end of the device.

The aerosol generating device may be a tobacco tube, or equivalently a “tobacco rod”, such as those forming part of a conventional cigarette. The aerosol generating device may equally be an electronic cigarette such as a device which generates an aerosol by heating a liquid or heating without burning an aerosol generating substance.

The “aerosol delivery end” is the end of the aerosol generating device which connects to the filter, that is the end through which an aerosol, generated within the aerosol generating device, passes through to the filter.

The tubular filter plug and the filter plug core may comprise any material having properties suitable to filter the specific aerosol generated by the aerosol generating device to which the filter is attached. For example the filter plugs may comprise a fibrous material such as fibrous acetate. The filter plug core may also be referred to as the "inner core" of the filter herein.

Preferably the tubular outer sleeve further comprises: a rigid plug wrap. The rigid plug wrap may add structural strength to the filter. Preferably the rigid plug wrap is sufficiently rigid to be self-supporting, in particular, it is strong enough such that it can extend freely from one end of the tubular filter plug and support itself. The rigid plug wrap may be provided by one or more layers of paper such as tipping paper used in conventional cigarettes.

Preferably the tubular filter plug is arranged to slide over the inner filter plug core; and the rigid plug wrap is attached around the circumference of the tubular filter plug and extends longitudinally from one end of the tubular filter plug to form a tubular extension which slides over the attached aerosol generating device during longitudinal movement of the outer sleeve. In this way, as the tubular filter plug slides over the filter plug core the tubular extension simultaneously slides over the connection point between the filter and the aerosol generating device and the aerosol generating device itself. It therefore conceals the join between the filter and the aerosol generating device and provides enhanced structural stability to the extendable filter. Furthermore, the sliding connection between the tubular filter plug and filter plug core provides a strong, mechanically stable coupling which facilitates extension of the filter but minimises the risk of the filter becoming detached.

Preferably the filter plug core is attached to the aerosol generating device with a first layer of tipping paper and the rigid plug wrap is arranged to slide over the first layer of tipping paper.

In some examples the internal diameter of the tubular filter plug is less than the outer diameter of the collar such that longitudinal movement of the outer sleeve towards the aerosol generating device is limited by contact between the tubular filter plug and the collar. The collar provides a strong connection point between the filter

and aerosol generating device and provides a mechanical stop to which the tubular filter plug abuts, regulating the degree of movement of the tubular filter plug relative to the aerosol generating article to a desired amount. The collar preferably has a diameter which is equal to or just greater than the diameter of the attached aerosol generating device.

Preferably, the length of the filter plug core from the mouth end to the collar is equal to the length of the tubular filter plug such that, when the tubular filter plug contacts the collar, the mouth end of the filter plug core is flush with a mouth end of the tubular outer sleeve. In this way, the tubular filter plug and filter plug core are aligned in the retracted configuration. This further ensures the filter is as compact as possible when in the retracted configuration.

Preferably the tubular outer sleeve comprises a mechanical stop arranged to meet an opposing mechanical stop on the filter plug core such that longitudinal movement of the sleeve away from the attached aerosol generating device is limited by contact between the opposing mechanical stops. This prevents the filter inadvertently becoming detached from the aerosol generating device. Preferably the mechanical stops provide a resistance to motion sufficient that the user needs to apply an increased force to overcome the mechanical stops such that this does not occur during normal extension of the filter.

In examples of the invention where the tubular outer sleeve comprises a rigid plug wrap arranged to slide over the aerosol generating device when attached, the mechanical stop on the outer sleeve may be provided by the end of the rigid plug wrap being folded inwards to provide a return edge which meets the mechanical stop on the filter plug core. This provides a reliable and cost effective means to provide the mechanical stop. In such examples of the invention the mechanical stop on the inner filter plug core is provided by a region of increased diameter near the attachment end. The region of increased diameter may correspond to the collar.
The mechanical stops may be arranged such that the maximum extension of the filter is between 5mm and 30mm, preferably between 15mm and 25mm or more preferably approximately 20mm. Extensions in this range mean that the extended aerosol generating device provides sufficient displacement from the vapour generating end to significantly reduce the unwanted effects of the vapour coming

into contact with the user's hands. When the invention is applied to a tobacco tube in a conventional cigarette it means the extendable cigarettes are appropriately sized to fit in a conventional cigarette pack, before being extended when used.

In alternative examples of the invention, a mechanical stop may be provided by an outwardly folded end portion of tipping paper which surrounds the aerosol generating device. The outwardly folded end portion may be folded back on itself so as to provide a return edge which meets the inwardly folded portion of the rigid plug wrap to restrict longitudinal movement of the outer sleeve.

The rigid plug wrap may comprise one or more of a cellulosic material, a natural or synthetic polymer material or a combination thereof.

In a further aspect of the invention there is provided an aerosol generating article comprising an aerosol generating device and an extendable filter according to any preceding claim attached to an aerosol delivery end of the aerosol generating device.

The aerosol generating device may comprise a charge of an aerosol generating material, preferably in a fluid, a pulverulent, a solid form or a combination thereof. The aerosol generating material may comprise tobacco.

BRIEF DESCRIPTION OF THE DRAWINGS

Embodiments of the invention will now be described, by way of example only, with reference to the accompanying drawings, in which:

Figures 1A to 1C schematically illustrate an extendable filter according to the present invention in use attached to an aerosol generating article;

Figures 2A and 2B illustrate means to limit the range of movement of the extendable filter of the present invention;

Figure 3A shows a conventional cigarette; and

Figures 3B and 3C shows the extendable filter according to the present invention attached to a conventional tobacco tube in a retracted and extended configuration.

DETAILED DESCRIPTION

Figures 1A to 1C show the extendable filter 2 for an aerosol generating article 1 comprising an aerosol generating device 3. As shown most clearly in Figure 1C, which illustrates the internal structure of the extendable filter 2, the filter 2 includes a filter plug core 10 having a mouth end 11 and an attachment end 12. The attachment end 12 is attachable to the aerosol delivery end 31 of the aerosol generating device 3. The extendable filter also includes a tubular outer sleeve 20 which is arranged to slide over both the filter plug core 10 and the aerosol generating device 3 when attached. The tubular outer sleeve 20 comprises a tubular filter plug 21 in the form of a hollow tube of filter material. By sliding the outer sleeve 20 in a longitudinal direction away from the attached aerosol generating device 3, in a direction corresponding to arrow 40 shown in Figure 1a, the outer sleeve 20 slides over the filter plug core 10 providing an increasing extension of the outer sleeve 20 beyond the mouth end 11 of the filter plug core 10, extending the length of the extendable filter 2. In this way the aerosol generating article 1 may be held by a user at a position near the end of the extended tubular sleeve 20, providing an increased distance between the users fingers and the lit end of the smoking article 1. Any effects associated with smoke coming into contact with the fingers, such as discolouration and the lingering smell of the aerosol generated, are thereby reduced.

In the examples of the figures, the aerosol generating device 3 is a conventional tobacco rod which forms the standard part of a conventional cigarette, comprising a cylindrical paper wrap containing dried tobacco which is lit at one end in order for the generated smoke to be inhaled through the opposite end. The filter plug core 10 of this example is similarly cylindrical in shape with a slightly reduced diameter relative to the tobacco rod 3. The attachment end 12 of the filter plug core 10 may comprise a collar 13 having a greater diameter matching that of the tobacco rod 3. The attachment end 12 may be connected to the tobacco rod 3 using tipping paper as known from conventional cigarettes.

As shown in Figure 1C, when attached, the filter plug core 10 is axially aligned with the tobacco rod 3, extending longitudinally away from the attached aerosol delivery end 31 of the aerosol generating device 3. As described above, the tubular outer sleeve 20 comprises a tubular filter plug 21 comprising a tubular wall 21 of filter material which defines a cylindrical inner cavity which has an internal diameter such that the tubular outer sleeve 20 may slide over the cylindrical filter plug core 10. The tubular outer sleeve 20 also includes a rigid plug wrap 22 which is wrapped around the circumference of the tubular filter plug 21 and has a longitudinal length greater than that of the tubular filter plug 21 such that it extends from one end of the tubular filter plug 21 to form a tubular extension 22 which extends longitudinally in the direction of the attached tobacco rod 3. In this way, as the tubular filter plug 21 slides over the inner filter plug core 11, the extending filter plug wrap 22 forming the tubular extension 23, slides over the attached tobacco rod 3.

The tubular outer sleeve 20 therefore comprises a substantially rigid tubular plug wrap 22 extending for the totality of the length of the tubular outer sleeve 20 and an internal tubular filter plug 21, to which the tubular filter plug is attached, which extends from a mouth end of the sleeve 20 along a portion of the length of the sleeve 20. The remaining length of the rigid plug wrap 22 therefore extends freely from one end of the tubular filter plug 21 as the tubular extension 23.

The effect of the sliding movement of the filter 2 is illustrated between Figures 1a and 1b. Figure 1a shows a fully retracted configuration in which the tubular outer sleeve 20 overlaps the filter plug core 10 and the attached aerosol generating device (in this case the tobacco rod) 3. In particular, the tubular filter plug 21 is fully sleeved on the filter plug core 10, such that the filter plug core 10 and tubular filter plug are fully overlapped with their respective mouth ends aligned. In this arrangement the tubular extension 23 of the rigid plug wrap 22 extends over the join between the filter plug core 10 and the tobacco rod 3 and extends over the tobacco rod 3 to reach approximately half way between the attachment end (aerosol delivery end) 31 of the tobacco rod and the distal end (the end which is lit) of the tobacco rod 3.

As a user applies a force in direction 40, shown in Figure 1A, to move the tubular outer sleeve 2 away from the attached tobacco tube 3, the tubular outer sleeve 20 moves over the inner filter plug core 10 such that the tubular filter plug 21 of the outer sleeve 2 increasingly protrudes from the mouth end 11 of the inner core 10 to provide an increasing length of the aerosol generating device by reducing the overlap between the tubular outer sleeve 2 and the combined filter plug core 10 and attached tobacco tube 3. The aerosol generating article 1 can therefore be stored in the retracted configuration illustrated in Figure 1A, for example in an array of such aerosol generating articles held in a conventional cigarette pack, and it can be extended into the configuration shown in Figure 1B when a user wants to light the article to use it.

The extendable filter 2 according to the present invention may include a number of features to limit the longitudinal movement of the tubular outer sleeve 20 in both directions along the longitudinal axis of the aerosol generating article. Firstly, to limit movement of the tubular outer sleeve 20 towards and over the attached tobacco rod 3, the filter plug core 10 includes a collar 13, i.e. a region of increased diameter 13 at the attachment end 12, which is connected to the tobacco rod 3. Because the outer diameter of the 13 is greater than the internal diameter of the tubular filter plug 21, when the tubular outer sleeve 2 is moved towards and over the attached tobacco rod 3 the distal end 24 of the tubular filter plug 21 meets an opposing face of the collar 13 of the filter plug core 10. Contact between the opposing surfaces of the collar 13 of the filter plug core 10 and the opposing face 24 of the tubular filter plug 20 prevents any further movement of the tubular outer sleeve 20 towards and over the tobacco rod 3. Preferably, as shown in the examples, the outer diameter of the collar 13 is similar to the outer diameter of the tubular filter plug 21 such that the collar13 at the attachment end of the filter plug core 12 and the tubular filter plug 21 are flush along their longitudinal edges when brought into contact. In other words, the difference in diameter between the collar 13 and the remainder of the tubular filter plug core 10 is approximately equal to the thickness of the tubular filter plug 21.

In the example of the figures, further features are included to limit longitudinal movement of the tubular outer sleeve 20 in a direction away from the attached tobacco rod 3 (the direction shown by arrow 40 in Figure 1A). Figure 2A shows a longitudinal cross section through the aerosol generating article 1 with the extendable filter 2 in a fully extended position. In this configuration, the tubular filter plug 21 is moved in a direction away from the attached tobacco rod such that it overhangs the mouth end 11 of the filter plug core 10 with minimal overlap with the internal filter plug core. Preferably this degree of overlap is sufficient to ensure the tubular filter plug 21 remains supported by and axially aligned with the filter plug core 10.

To prevent further extension of the tubular outer sleeve 20, which could result in the tubular filter plug 21 becoming detached from the filter plug core 10, a mechanical stop configuration may be provided to limit further movement. In the example of Figures 2A and 2B a mechanical stop is provided on the tubular outer sleeve 20 by a fold 25 in the distal end of the rigid plug wrap 21 wherein the end of the plug wrap 22 is folded inwardly to bend back on itself to form a mechanical stop 25. In particular, the end of the tubular extension 25 of the rigid plug wrap 21 is bent inwards and folded back on itself to form a portion which has twice the thickness of the remainder of the plug wrap 21. The end of the inwardly folded portion 25 of the rigid plug wrap 21 is configured to meet an opposing mechanical stop to prevent further movement in direction 40. In the example of Figure 2B, this is provided by an outwardly folded portion of the paper wrapping the tobacco rod 3. In particular, the cylindrical wrap of paper 32 which encircles the tobacco rod 3 may be folded outwardly and back on itself at the end of the tobacco rod where it's connected to the inner filter plug core 10. By folding the paper wrap 32 outwards in this way to form mechanical stop 33, the end of this outwardly folded portion 33 meets the opposing inwardly folded portion 25 of the rigid plug wrap such that when these two ends 25, 33 meet further movement of the tubular outer sleeve 20 away from the tobacco rod 3 in direction 40 if limited and can only be overcome by significant force. In this way, a user is prevented from inadvertently removing the extendable filter 2 from the aerosol generating article 1 when applying a force to extend the filter 2.

The present invention therefore provides a smoking article 1 which can be stored in a retracted configuration as shown in Figure 3B but can be extended into an extended configuration shown in Figure 3C allowing the proximal end of a filter to be further extended away from the smoking end of the article 1. The smoking article is preferably configured such that in the collapsed, restricted configuration shown in Figure 3B it has the same length as a conventional aerosol generating article such as a cigarette or heat-not-burn stick, as illustrated in Figure 3A. Preferably in the retracted configuration of Figure 3B the mouth end 11 of the filter plug core 10 is aligned with the mouth end 26 of the tubular filter plug. This is achieved by ensuring the length of the tubular filter plug is substantially equal to the length of the main body of the filter plug core 10 – the latter being, the length between the mouth end 11 of the filter plug core and the face of the region of increased diameter 13 of the filter plug core 10. Preferably the mechanical stops, 25, 33 are arranged such that the maximum extension of the filter is approximately 20 mm, as shown in Figure 3C.

In this way, an aerosol generating article 1 could be stored in the conventional manner, for example in the conventional pack of cigarettes 4 in a confined, retracted configuration and can be extended by a user into an extended configuration in which the mouth end of the extendable filter 2 is positioned at an increased distance from the smoke or aerosol generating end of the smoking article such that the influence of side stream smoke on the users hands is reduced overcoming the above described disadvantages of the prior art.

The examples illustrated in the figures show the application of the invention to a conventional cigarette in which the filter 2 is constructed from conventional filter material to provide the extending filter but it will be appreciated that the invention could equally be applied to other types of aerosol generating devices, for example heat not burn devices or electronic cigarettes.

CLAIMS

1. An extendable filter for an aerosol generating article which comprises an aerosol generating device, the filter comprising:

a filter plug core having a mouth end and an attachment end, the attachment end comprising a collar of increased diameter and being attachable to an aerosol delivery end of the aerosol generating device; and

a tubular outer sleeve arranged to slide over the filter plug core and the aerosol generating device when attached, the tubular outer sleeve comprising a tubular filter plug; wherein

sliding of the outer sleeve in a longitudinal direction away from the attached aerosol generating device provides an increasing extension of the outer sleeve beyond the mouth end of the filter plug core, extending the length of the extendable filter.

2. The extendable filter of claim 1 wherein the tubular outer sleeve further comprises:

a rigid plug wrap.

3. The extendable filter of claim 2 wherein:

the tubular filter plug is arranged to slide over the inner filter plug core; and

the rigid plug wrap is attached around the circumference of the tubular filter plug and extends longitudinally from one end of the tubular filter plug to form a tubular extension which slides over the attached aerosol generating device during longitudinal movement of the outer sleeve.

4. The extendable filter of claim 3 wherein

the internal diameter of the tubular filter plug is less than the outer diameter of the collar such that longitudinal movement of the outer sleeve towards the aerosol generating device is limited by contact between the tubular filter plug and the collar.

5. The extendable filter of claim 4 wherein the length of the filter plug core from the mouth end to the collar is equal to the length of the tubular filter plug such that, when the tubular filter plug contacts the collar, the mouth end of the filter plug core is flush with a mouth end of the tubular outer sleeve.

6. The extendable filter of any preceding claim wherein the tubular outer sleeve comprises a mechanical stop arranged to meet an opposing mechanical stop on the filter plug core such that longitudinal movement of the sleeve away

from the attached aerosol generating device is limited by contact between the opposing mechanical stops.

7. The extendable filter of claim 6 wherein the tubular outer sleeve comprises a rigid plug wrap arranged to slide over the aerosol generating device when attached and the mechanical stop on the outer sleeve is provided by the end of the rigid plug wrap being folded inwards to provide a return edge which meets the mechanical stop on the filter plug core.

8. The extendable filter of claim 6 or 7 wherein the mechanical stop on the inner filter plug core is provided by a region of increased diameter near the attachment end.

9. The extendable filter of any of claims 6 to 8 wherein the mechanical stops are arranged such that the maximum extension of the filter is approximately 20mm.

10. The extendable filter of any of claims 2 to 9 wherein the rigid plug wrap comprises one or more of a cellulosic material, a natural or synthetic polymer material or a combination thereof.

11. An aerosol generating article comprising an aerosol generating device and an extendable filter according to any preceding claim attached to an aerosol delivery end of the aerosol generating device.

12. The aerosol generating article of claim 11 wherein the collar of the filter plug core is attached to the aerosol generating device.

13. An aerosol generating article according to claim 11 or claim 12, wherein the aerosol generating device comprises a charge of an aerosol generating material, preferably in a fluid, a pulverulent, a solid form or a combination thereof.

14. An aerosol generating article according to claim 13, wherein the aerosol generating material comprises tobacco.

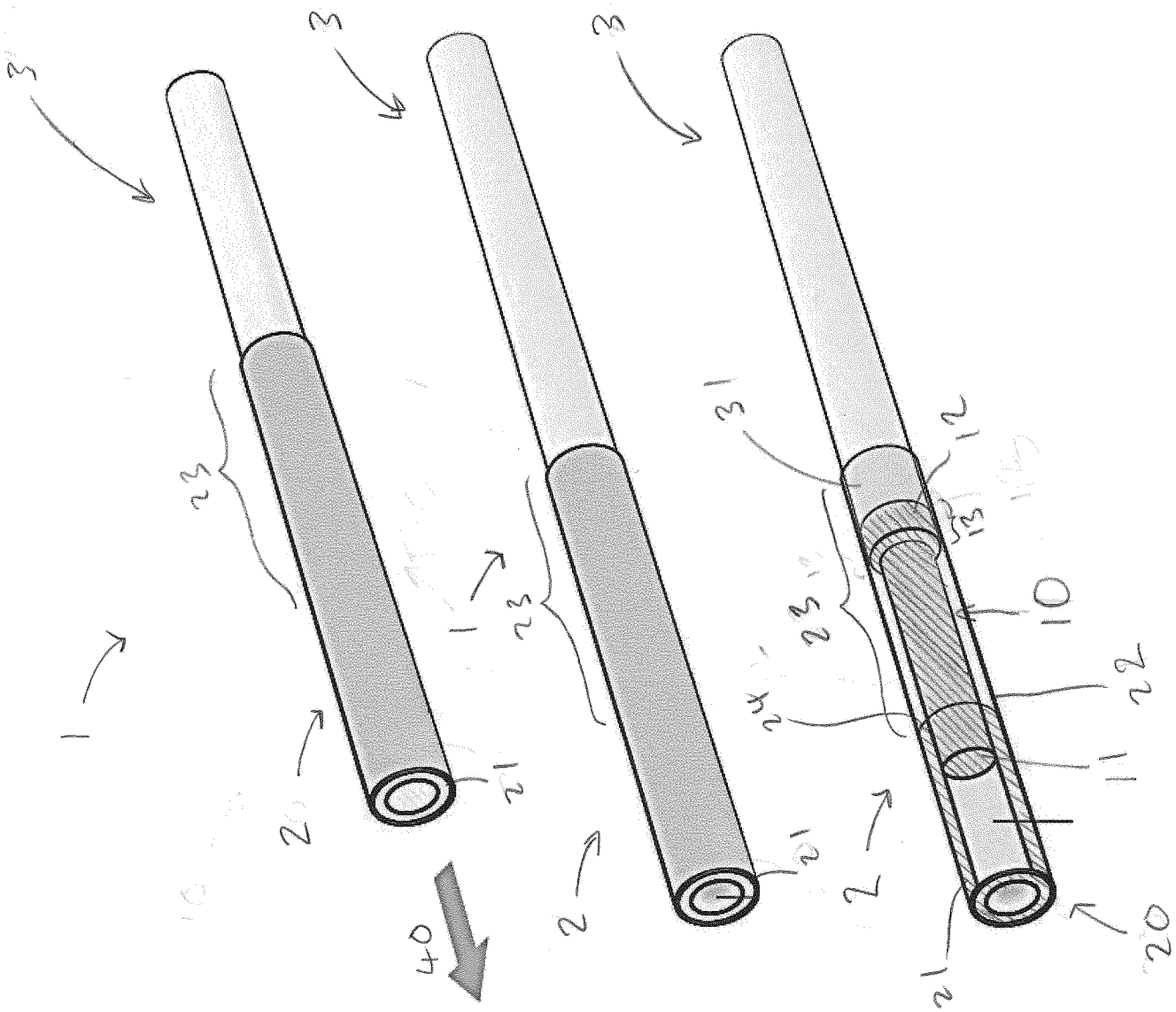

FIG. 1A

FIG. 1B

FIG. 1C

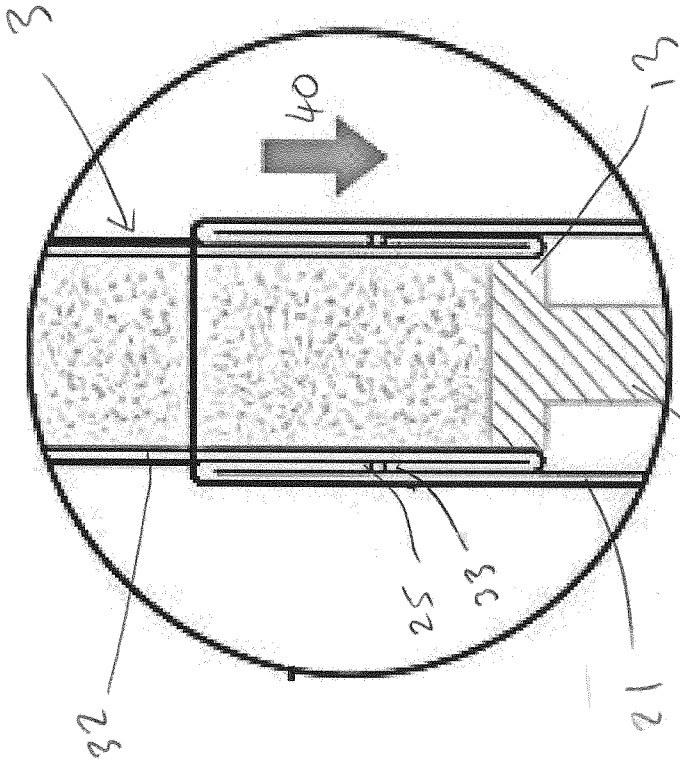

FIG. 2B

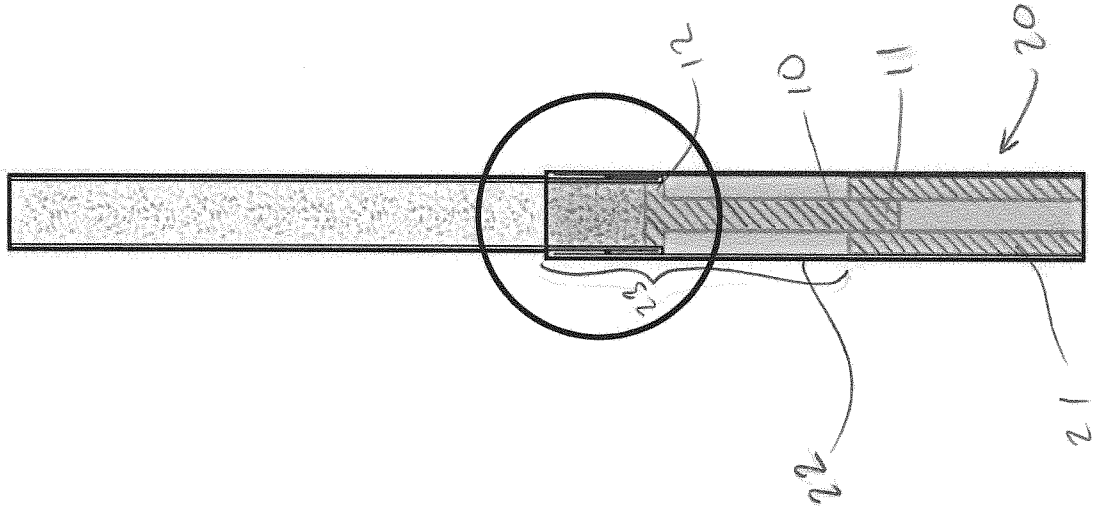

FIG 2A

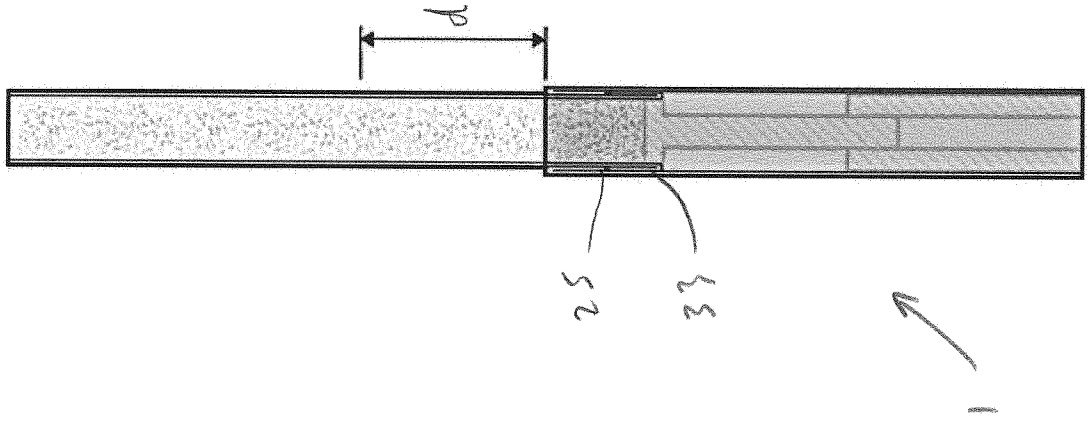

FIG 3C

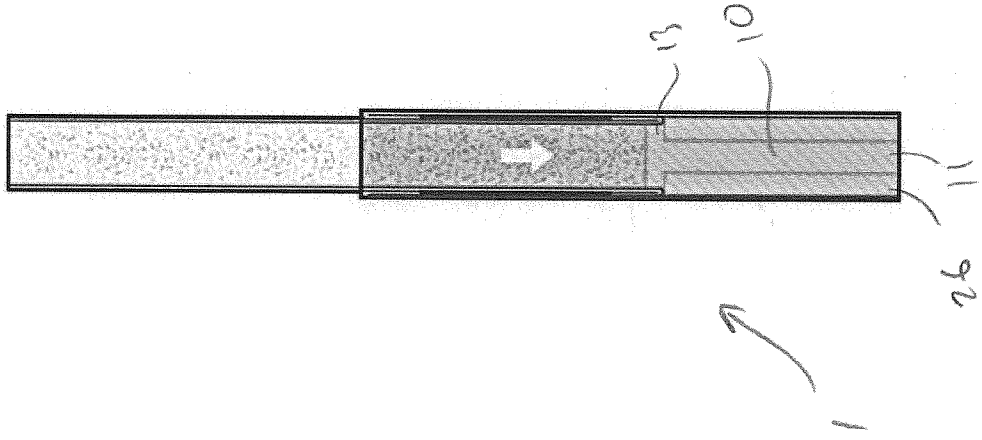

FIG 3B

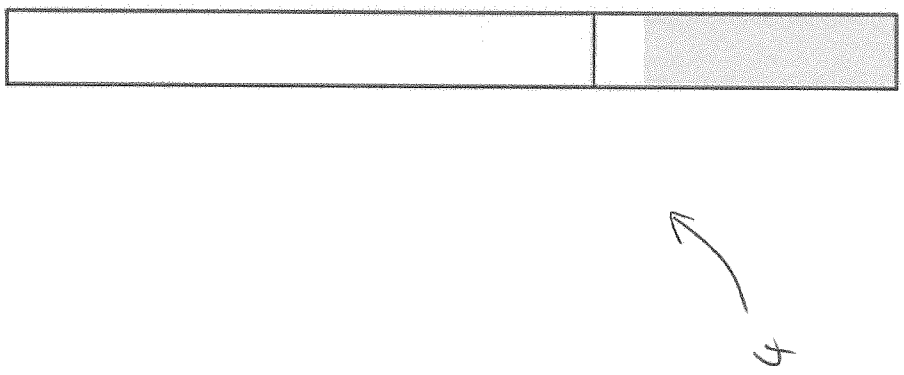

FIG 3A

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2020/061549

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24D1/04 A24D3/04
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A24D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y	DE 42 06 510 A1 (REEMTSMA H F & PH [DE]) 16 September 1993 (1993-09-16) the whole document	1-5,9-14 1-3,6-8, 11-14

Y	WO 2011/121328 A2 (BRITISH AMERICAN TOBACCO CO [GB] ET AL.) 6 October 2011 (2011-10-06) page 17, line 26 - page 18, line 24; figures 14a, 14b	6-8

Y A	WO 2011/121325 A1 (BRITISH AMERICAN TOBACCO CO [GB] ET AL.) 6 October 2011 (2011-10-06) page 9, line 32 - page 12, line 29; figures 9a-11	1-3,6-8, 11-14 4,5

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

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Date of the actual completion of the international search	Date of mailing of the international search report
25 June 2020	16/07/2020

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Caballero Martínez

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2020/061549

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