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

(11) **EP 4 176 736 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
10.05.2023 Bulletin 2023/19

(21) Application number: **21216128.5**

(22) Date of filing: **20.12.2021**

(51) International Patent Classification (IPC):
A24D 3/06 *(2006.01)* ***A24D 3/14*** *(2006.01)*
A24D 3/16 *(2006.01)* ***A24D 3/04*** *(2006.01)*

(52) Cooperative Patent Classification (CPC):
A24D 3/068; A24D 3/061; A24D 3/14; A24D 3/16; A24D 3/163; A24D 3/166; A24D 3/04

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

(30) Priority: **08.11.2021 GB 202115989**

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(54) ACTIVE PAPER

(57) A multi-segment filter comprising a first and second filter segment; wherein the first filter segment comprises a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material with additive (e.g., a particulate additive, e.g., activated carbon) applied thereto; and wherein the second filter segment comprises a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material or other biodegradable (e.g., non-cellulose acetate) filtering material.

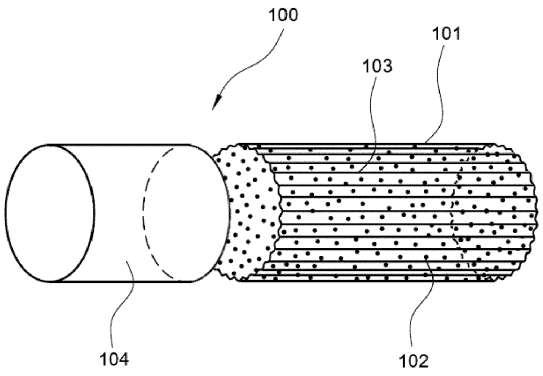

Figure 1

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Description

INTRODUCTION

[0001] The present invention provides a multi-segment filter for use with a smoking article such as a cigarette, tobacco heating product or a heat-not-burn product.

BACKGROUND

[0002] Filters or filter elements for smoking articles such as cigarettes, tobacco heating products or heat-not-burn products may be manufactured from a number of different materials. Presently, 98% of commercial cigarette filters comprise an amount of cellulose acetate (source: Euromonitor International). However, cellulose acetate is not biodegradable and as a result smoking articles comprising cellulose acetate may persist in the environment for many years. Due to this, and in consideration of new EU legislation coming into force by 2021 (aimed at reducing the use of single-use plastics such as cellulose acetate in filters), there is increasing interest in filters or filter elements that do not comprise single-use plastics and are biodegradable.

[0003] An alternative filtration material to cellulose acetate is paper. Filters comprising paper as the filtering material are well known in the art. Paper filters offer a number of advantages over cellulose acetate filters in terms of enhanced biodegradability and higher filtration efficiencies at a given pressure drop. However, they also have a number of disadvantages compared to cellulose acetate filters, for example they may have a deleterious effect on the taste of the cigarette and reduced filter firmness. Further, paper filters typically have poor retention of gas phase constituents in the smoke or vapour.

[0004] It is therefore desirable to provide a filter for a smoking article (e.g. a cigarette, a tobacco heating product, a heat-not-burn product) which has improved biodegradability compared to conventional materials such as cellulose acetate and provides acceptable filtration properties, particularly in relation to gas phase constituents in the smoke or vapour.

SUMMARY OF THE INVENTION

[0005] According to the present invention there is provided a multi-segment filter comprising a first and second filter segment; wherein the first filter segment comprises a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material with additive (e.g., a particulate additive, e.g., activated carbon) applied thereto; and wherein the second filter segment comprises a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material or other biodegradable (e.g., non-cellulose acetate) filtering material.

[0006] The paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material of the first and/or second filter segment of the present invention is biodegradable and has an enhanced biodegradability compared to cellulose acetate. Therefore, the present invention provides a multi-segment filter of enhanced biodegradability, and thus is more environmentally friendly and is more in line with EU legislation.

[0007] The term "biodegradable" refers to the filtering material, filter segment or multi-segment filter being able to exhibit a biodegradation of at least 90% after 6 months under controlled composting conditions (see IS014855-1 Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions - Method by analysis of evolved carbon dioxide).

[0008] Preferably the biodegradable filtering material, filter segment or multi-segment filter is "readily biodegradable". The phrase "readily biodegradable" refers to the filtering material, filter segment or multi-segment filter being able to disintegrate rapidly and completely biodegrade when immersed in water. Preferably the filtering material, filter segment or multi-segment filter has the 'Ready Biodegradability' level of biodegradability as measured according to OECD 301B 'Ready Biodegradability' method (modified Sturm test), which is well known in the art. The phase "readily biodegradable" will here be understood to mean 'Ready Biodegradability' level of biodegradability.

[0009] The applicants have found that a multi-segment filter (e.g., for a smoking article such as a cigarette, a tobacco heating product, a HNB product) that comprises a first and second filter segment; wherein the first filter segment comprises a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material with additive (e.g., a particulate additive, e.g., activated carbon) applied thereto; and wherein the second filter segment comprises a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material or other biodegradable (e.g., non-cellulose acetate) filtering material provides excellent filtration performance while also being biodegradable.

[0010] In an example, the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material (with additive applied thereto) of the first filter segment is gathered into rod form and secured in place (e.g., by a lapped and stuck seam as is known in the art) with a wrapper (e.g., a paper wrapper, e.g., a plug wrap) engaged

around the rod.

[0011] The wrapper may be a paper (e.g., a plugwrap) of basis weight from 25 to 140 gsm, e.g., a paper (e.g., plugwrap) of basis weight from 40 to 120 gsm, e.g., a paper (e.g., plugwrap) of basis weight from 50 to 100 gsm, e.g., a paper (e.g., plugwrap) of basis weight from 60 to 80 gsm, e.g., a paper (e.g., plugwrap) of basis weight of 70 gsm.

[0012] The wrapper (e.g., a paper wrapper, e.g., a plugwrap) may be non-porous. Alternatively, the wrapper (e.g., a paper wrapper, e.g., a plugwrap) may be ventilated or air permeable, with an air permeability of from 0 to 32,000 Coresta units.

[0013] The additive may be a particulate additive. The particulate additive may be activated carbon (e.g., activated carbon granules), zeolite, ion exchange resin (e.g., a weakly basic anion exchange resin), sepiolite (e.g., sepiolite granules), silica gel, alumina, molecular sieve, carbonaceous polymer resins and diatomaceous earths. The particulate additive may be a mixture of two or more of these additives.

[0014] The inclusion of a particulate additive (e.g., activated carbon) in a filter or a filter segment of a multi-segment filter may remove (i.e., adsorb) gas phase constituents in the smoke or vapour of the smoking article and consequently improve the filtration performance of the filter.

[0015] Advantageously, the applicants have found that the inclusion of a particulate additive (e.g., activated carbon), applied to the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material, improves the filtration performance of the multi-segment filter of the invention in comparison to a standard active acetate filter (i.e., activated carbon on cellulose acetate tow) and in comparison to filters comprising paper impregnated with activated carbon (e.g., carbon impregnated paper). Without wanting to be bound by theory, it is thought that an amount of the plasticiser present in cellulose acetate filters (i.e., for fibre bonding and to increase filter firmness) is absorbed by the activated carbon (or other particulate additive). This reduces the capacity of the particulate additive to absorb gas phase constituents in the smoke or vapour and consequently the filtration efficiency may be decreased. Thus, the absence of plasticiser and/or other additives (e.g., adhesive, binder or polymer) which may be adsorbed by the particulate additive may result in an improved filtration performance of the multi-segment filter of the present invention.

[0016] The particulate additive may be of mesh size in the range 12 to 90. Preferably, the particulate additive is of mesh size 30/70 or mesh size 40/60. It will be readily understood that mesh size is defined as the number of openings in one square inch of a screen. Further, it will be appreciated that mesh size 30/70 means particles that are smaller than 30 mesh and larger than 70 mesh and mesh size 40/60 means particles that are smaller than 40 mesh and larger than 60 mesh. The applicants have found particulate additives of mesh size 30/70 are particularly suitable for application to paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material whilst also providing desirable adsorption properties (i.e., to adsorb gas phase constituents).

[0017] The particulate additive may be embedded into the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material. In an example, particulate additive may be embedded into the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material without the use of adhesive and/or binder and/or a polymer.

[0018] The applicants have found that by embedding a particulate additive (e.g., activated carbon) into the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material, rather than e.g., impregnating the particulate additive into the paper pulp or using carbon impregnated paper, they can achieve higher additive loading and consequently improved filtration performance. Further, the applicants have found that embedding the particulate additive may prevent the particles from discharging and falling out of place during use of the multi-segment filter (e.g., in a smoking article) thus providing a more enjoyable experience for the smoker.

[0019] The particulate additive may include a flavourant e.g., menthol, peppermint, fruit, berry, vanilla, chocolate, coffee etc. In an example, the additive may be sepiolite granules to which a menthol flavourant has been applied.

[0020] The additive may be a liquid additive. The liquid additive may remove (i.e., adsorb) gas phase constituents in the smoke or vapour of the smoking article and consequently improve the filtration performance of the multi-segment filter. Alternatively, the liquid additive may be a flavour enhancing additive. The flavour enhancing additive may be any known in the art, for example an additive which reduces the "paper taste" (e.g., menthol, peppermint, fruit, berry, vanilla, chocolate, coffee etc. with a suitable carrier e.g., propylene glycol, vegetable glycerine, medium-chain triglyceride (MCT) oil, other oils).

[0021] The inclusion of a flavour enhancing additive may overcome the "paper taste" sensation typically associated with paper filters and when used in a smoking article (e.g., a cigarette, e.g., a tobacco heating product, e.g., a HNB product) may provide sensory characteristics similar to those from cellulose acetate filtered smoking articles.

[0022] The additive loading may be from 1 to 6 mg/mm (e.g., 1 mg/mm, e.g., 2 mg/mm, e.g., 3 mg/mm, e.g., 4 mg/mm, e.g., 5 mg/mm, e.g., 6 mg.mm). Preferably the additive loading is 5 mg/mm.

[0023] The paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material of the first and/or second filter segment may be paper (in any form) which is conventionally used in filters for smoking articles. The paper may be, for example, standard paper, non-woven paper, airlaid paper, carbon impregnated paper (i.e., for higher additive loading) or cellulose/lyocell/viscose based paper. The paper may be a non-woven paper made

with non-plastic plant based fibres (e.g., flax, hemp, jute, sisal, abaca, coconut, bamboo, starch or wood pulp) or a blend of these materials.

[0024] The applicants have found that standard or non-woven paper filtering materials are particularly suitable for the first and/or second filter segment because they have excellent filtration properties while also being biodegradable. Further, the applicants have found that they can achieve parity on additive loading when the additive is applied to standard paper or non-woven paper compared to when the additive is applied to standard cellulose acetate filters.

[0025] Further, multi-segment filters of the invention which comprise a second filter segment comprising a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material or other biodegradable (e.g., non-cellulose acetate) filtering material may have higher retention of tar, nicotine and gas phase constituents in the smoke or vapour than standard cellulose acetate filters or filters comprising cellulose acetate.

[0026] The paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material of the first and/or second filter segment may be comprised of multiple (i.e., more than one) sheets of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material.

[0027] The paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material of the first and/or second filter segment may be embossed. The applicants have found that they can achieve a high additive loading and consequently good filtration performance when additive is applied to embossed sheets of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material. Further, applying additive to embossed sheets of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material may prevent any additive discharging and falling out during use of the multi-segment filter. Without wanting to be bound by theory, it is thought that the embossed surface of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material may provide suitable surface characteristics for the additive to attach onto. Thus, the embossed surface may help to achieve high additive loading with minimal additive fall-out.

[0028] The applicants have also found that embossed paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material with additive applied thereto is straightforward to gather into rod form and form a evenly gathered rod paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material.

[0029] The first and/or second filter segment may comprise a capsule or capsules (e.g. a frangible capsule) with an additive contained therein. The additive may be a particulate additive such as activated carbon (see above). The capsule(s) may contain a variety of media - e.g., a flavourant and/or a liquid, solid or other material additive e.g., to aid smoke filtration. The use of capsules is well known in the art.

[0030] The second filter segment may comprise a longitudinally extending hollow tube of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) material.

[0031] Preferably the length of the first and/or second filter segment is from 10 to 40 mm, e.g., from 12 to 35 mm, e.g., from 15 to 30 mm, e.g., from 18 to 25 mm.

[0032] Preferably the length of the multi-segment filter is from 10 to 50 mm, e.g., from 12 to 40 mm, e.g., from 15 to 30 mm, e.g., from 18 to 24 mm.

[0033] Preferably the circumference of the multi-segment filter is from 14 to 30 mm, e.g., from 16 to 25 mm, e.g., from 24 to 25 mm.

[0034] Preferably the multi-segment filter has 'Ready Biodegradability' level of biodegradability as measured according to OECD 301B 'Ready Biodegradability' method (modified Sturm test).

[0035] The first filter segment and the second filter segment may be abutted together end-to-end.

[0036] The multi-segment filter may comprise a wrapper (e.g., a paper wrapper, e.g., a plug wrap) engaged around the first filter segment and second filter segment, wherein the wrapper joins the first filter segment and second filter segment together in longitudinally spaced or abutting alignment.

[0037] The wrapper may be a paper (e.g., a plugwrap) of basis weight from 25 to 140 gsm, e.g., a paper (e.g., plugwrap) of basis weight from 40 to 120 gsm, e.g., a paper (e.g., plugwrap) of basis weight from 50 to 100 gsm, e.g., a paper (e.g., plugwrap) of basis weight from 60 to 80 gsm, e.g., a paper (e.g., plugwrap) of basis weight of 70 gsm.

[0038] The wrapper (e.g., a paper wrapper, e.g., a plugwrap) may be non-porous. Alternatively, the wrapper (e.g., a paper wrapper, e.g., a plugwrap) may be ventilated or air permeable, with an air permeability of from 0 to 32,000 Coresta units.

[0039] It will be appreciated that the multi-segment filter according to the present invention may comprise one or more discrete further segments (e.g., of a HNB mouthpiece, e.g., filter elements). The multi-segment filter construction could be two, three, four or more discrete segments. The discrete further segments may be (e.g., cylindrical) plugs of filtering material (e.g., paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material) as described above which may include capsules, carbon, CPS, tubes, acetate, paper, menthol etc. and/or a (e.g., cylindrical) rod of tobacco (e.g., any form of tobacco(including reconstituted tobacco)).

[0040] In an example, the multi-segment filter according to the present invention may comprise a first, second and third filter segment; wherein the first filter segment comprises a longitudinally extending (e.g., substantially cylindrical)

core of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material with additive (e.g., a particulate additive, e.g., activated carbon) applied thereto; wherein the second filter segment comprises a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material or other biodegradable (e.g., non-cellulose acetate) filtering material; and wherein the third filter segment comprises a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material or other biodegradable (e.g., non-cellulose acetate) filtering material.

[0041] It will be appreciated that the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material (with additive applied thereto) of the first filter segment may be gathered into rod form and secured in place (e.g., by a lapped and stuck seam as is known in the art) with a wrapper (e.g., a paper wrapper, e.g., a plug wrap) engaged around the rod, as described above. Further, it will be appreciated that the first, second and third filter segments may be joined together in longitudinally spaced or abutting alignment by a wrapper, engaged around the first, second and third filter segments. The first filter segment may be abutted end-to-end with the second filter segment at one end and abutted end-to-end with the third filter segment at the other end. Alternatively, the second filter segment may be abutted end-to-end with the first filter segment at one end and abutted end-to-end with the third filter segment at the other end.

[0042] According to the present invention there is provided a smoking article (e.g., a cigarette, e.g., a tobacco heating product, e.g., a HNB product) comprising a multi-segment filter as herein described and claimed below, or a multi-segment filter comprising a multi-segment filter as herein described and claimed below, joined to a wrapped tobacco rod (i.e., by a tipping paper) with one end of the multi-segment filter facing towards the tobacco rod.

[0043] Preferably, the first filter segment of the multi-segment filter faces the tobacco rod, and the second filter segment is the mouth-end segment. This configuration may prevent any additive discharging and falling out during use of the smoking article thus providing a more enjoyable experience for the smoker.

[0044] It will be appreciated that the smoking article (e.g., a cigarette, e.g., a tobacco heating product, e.g., a HNB product) may comprise one or more discrete further segments (e.g., of a HNB mouthpiece, e.g., filter elements) as described above.

[0045] The present invention will now be described in further detail by reference to the attached Figures in which:

Figure 1 shows a schematic view of a multi-segment filter according to an embodiment of the invention;

Figure 2 shows a schematic view of a multi-segment filter according to an embodiment of the invention;

Figure 3 shows a schematic view of a smoking article according to the invention which includes a multi-segment filter according to an embodiment of the invention;

Figure 4 shows a schematic view of a smoking article according to the invention which includes a multi-segment filter according to an embodiment of the invention;

[0046] Figure 1 illustrates a schematic view of a multi-segment filter 100 which is of length 30 mm and circumference 24 mm and comprises two segments 101 and 104. Segment 101 comprises a longitudinally extending core of embossed airlaid non-woven paper 103 with embedded activated carbon granules 102 (4.9 mg/mm) and is of length 20 mm and circumference 24 mm. Segment 104 abuts segment 101 and comprises a longitudinally extending core of hemp paper 104 and is of length 10 mm and circumference 24 mm.

[0047] Figure 2 shows a schematic view of a multi-segment filter 200 which is of length 30 mm and circumference 24 mm and comprises two segments 201 and 204. Segment 201 is of length 20 mm and circumference 24 mm and comprises a longitudinally extending core of embossed airlaid non-woven paper 203 with embedded activated carbon granules 202 (4.9 mg/mm) and a wrapper 205 of basis weight 100 gsm engaged around the core. Segment 204 abuts segment 201 and comprises a longitudinally extending core of hemp paper 204 and is of length 10 mm and circumference 24 mm. Segment 204 is joined to segment 201 by wrapper 207 (not shown) of paper plugwrap of basis weight 120 gsm engaged around both segments.

[0048] Figure 3 and Figure 4 show a schematic view of cigarette 300 which is of length 100 mm and circumference 24 mm. Cigarette 300 comprises a cylindrical plug 306 of reconstituted tobacco and multi-segment filter 200, as shown in Figure 2. Plug 306 of reconstituted tobacco is of length 70 mm and circumference 24 mm and is abutted and joined to multi-segment filter 200 at the end of segment 201 by a tipping paper (not shown).

[0049] It will be appreciated that the multi-segment filters 100 and 200 may be made by methods known in the art.

Example 1

[0050] The biodegradability of the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate

containing) filtering material of the first and/or second filter segment of the multi-segment filter of the present invention was compared with the biodegradability of a known cellulose acetate filter.

[0051] The biodegradability was measured according to IS014855-1 Determination of the ultimate aerobic biodegradability of plastic materials under controlled composting conditions - Method by analysis of evolved carbon dioxide. The test provides a measure of the biodegradability of a material (expressed as a percentage) over a 180 day period under optimal oxygen, temperature and moisture conditions. Table 1 shows the biodegradability results for a Mono-Acetate filter, an airlaid paper filter (Genia), a wood pulp paper filter and a hemp paper filter compared to a standard cellulose acetate (CA) filter rod when tested according to the method of IS014855-1. Filters were purchased or made according to methods known in the art.

Table 1

Filter	Mono-Acetate	Wood Pulp Paper (100%)	Hemp Paper (100%)	Genia (Airlaid)
Length (mm)	108	108	108	108
Circumference (mm)	24.2	24.2	24.2	24.2
Plug wrap (gsm)	27	27	27	27
Hardness (%)	90	88	89	88.5
Plasticizer (%)	6.3	-	-	-
Biodegradation % compared to CA reference after 180 days	87.2	99.5	95.6	94.1

[0052] Table 1 shows that wood pulp paper and hemp paper have the highest biodegradability of all the filtering materials. Further, the airlaid paper (Genia) also demonstrates good biodegradability compared to CA. Table 1 also shows that filters comprising wood pulp paper, hemp paper and airlaid paper (Genia) also have comparable hardness (i.e., firmness) compared to a Mono Acetate filter.

[0053] Thus the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material of the first and/or second filter segment of the multi-segment filter of the present invention are biodegradable and degrade faster and more extensively than cellulose acetate.

Claims

1. A multi-segment filter comprising a first and second filter segment;

wherein the first filter segment comprises a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material with additive (e.g., a particulate additive, e.g., activated carbon) applied thereto; and
wherein the second filter segment comprises a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material or other biodegradable (e.g., non-cellulose acetate) filtering material.

2. A multi-segment filter according to claim 1 wherein the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material of the first filter segment is gathered into rod form and secured in place with a wrapper (e.g., a paper, e.g., a plug wrap) engaged around the rod.

3. A multi-segment filter according to claim 2 wherein the wrapper is a paper (e.g., a plugwrap) of basis weight from 25 to 140 gsm, e.g., a paper (e.g., plugwrap) of basis weight from 40 to 120 gsm, e.g., a paper (e.g., plugwrap) of basis weight from 50 to 100 gsm, e.g., a paper (e.g., plugwrap) of basis weight from 60 to 80 gsm, e.g., a paper (e.g., plugwrap) of basis weight of 70 gsm and/or wherein the wrapper is non-porous.

4. A multi-segment filter according any of claims 2 to 3 wherein the wrapper is ventilated or air permeable, with an air permeability of 0 to 32,000 Coresta units.

5. A multi-segment filter according to any preceding claim wherein the additive is a particulate additive.

6. A multi-segment filter according to claim 5 wherein the particulate additive is activated carbon (e.g., activated carbon granules), zeolite, ion exchange resin (e.g., a weakly basic anion exchange resin), sepiolite (e.g., sepiolite granules), silica gel, alumina, molecular sieves, carbonaceous polymer resin, a diatomaceous earth, or a mixture of two or more of these additives and/or the particulate additive is of mesh size in the range 12 to 90 (e.g., mesh size 30/70, e.g., mesh size 40/60) and/or the particulate additive is embedded into the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material.

7. A multi-segment filter according to any preceding claim wherein the additive loading is from 1 to 6 mg/mm (e.g., 1 mg/mm, e.g., 2 mg/mm, e.g., 3 mg/mm, e.g., 4 mg/mm, e.g., 5 mg/mm, e.g., 6 mg.mm).

8. A multi-segment filter according to any preceding claim wherein the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material of the first and/or second filter segment is standard paper, non-woven paper, airlaid paper, carbon impregnated paper (i.e., for higher additive loading) or cellulose/lyocell/viscose based papers and/or the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material of the first and/or second filter segment is a non-woven paper made with non-plastic plant based fibres (e.g., flax, hemp, jute, sisal, abaca, coconut, bamboo, starch or wood pulp) or a blend of these materials.

9. A multi-segment filter according to any preceding claim wherein the paper filtering material and/or other biodegradable (e.g., non-cellulose acetate containing) filtering material of the first filter segment is embossed and/or wherein the first and/or second filter segment comprises a capsule or capsules (e.g. a frangible capsule) with an additive contained therein.

10. A multi-segment filter according to any preceding claim wherein the multi-segment filter has 'Ready Biodegradability' level of biodegradability as measured according to OECD 301B 'Ready Biodegradability' method (modified Sturm test).

11. A multi-segment filter according to any preceding claim wherein the first filter segment and the second filter segment are abutted together end-to-end and/or the multi-segment filter comprises a wrapper engaged around the first filter segment and second filter segment, wherein the wrapper joins the first filter segment and second filter segment together in longitudinally spaced or abutting alignment.

12. A multi-segment filter according to any preceding claim comprising one or more discrete further segments.

13. A smoking article (e.g., a cigarette, e.g., a tobacco heating product, e.g., a HNB product) comprising a multi-segment filter according to any preceding claim, or a multi-segment filter comprising a multi-segment filter according to any preceding claim, joined to a wrapped tobacco rod (i.e., by a tipping paper) with the end of the first filter segment facing towards the tobacco rod.

14. A multi-segment filter comprising a first, second and third filter segment;
the first filter segment comprising:

a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material with additive (e.g., a particulate additive, e.g., activated carbon) applied thereto; and
the second filter segment comprising:

a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material or other biodegradable (e.g., non-cellulose acetate) filtering material and a capsule or capsules (e.g. a frangible capsule) with an additive contained therein; and
the third filter segment comprising a tube.

15. A multi-segment filter comprising a first, second and third filter segment;
the first filter segment comprising:

a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material and/or other biodegradable (e.g., non-cellulose acetate) filtering material with additive (e.g., a particulate additive, e.g., activated carbon) applied thereto; and
the second filter segment comprising:

a longitudinally extending (e.g., substantially cylindrical) core of paper filtering material or other biodegradable (e.g., non-cellulose acetate) filtering material; and
the third filter segment comprising a tube.

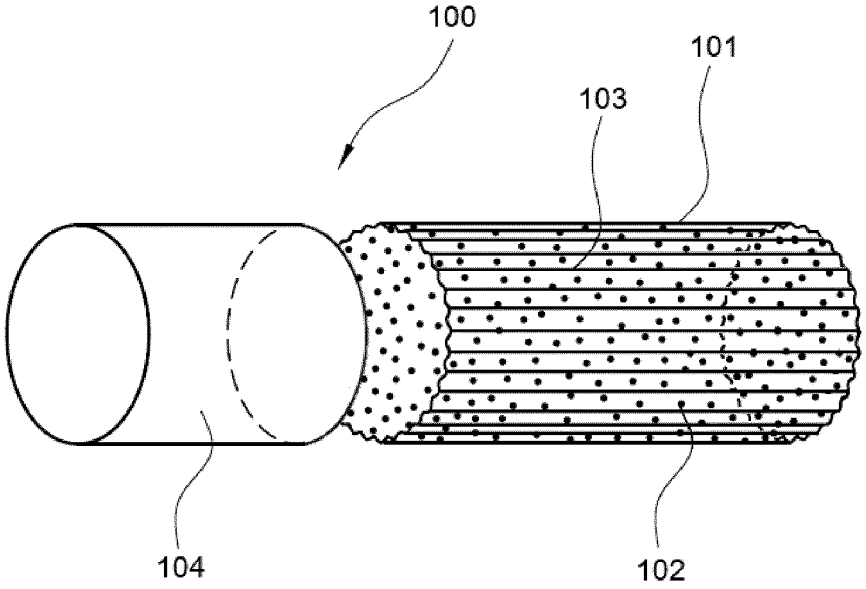

Figure 1

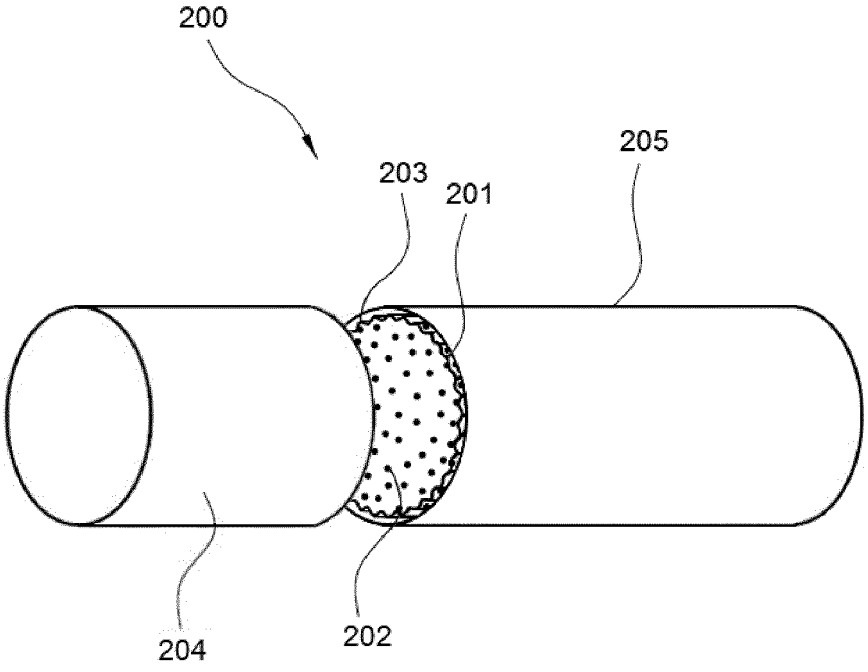

Figure 2

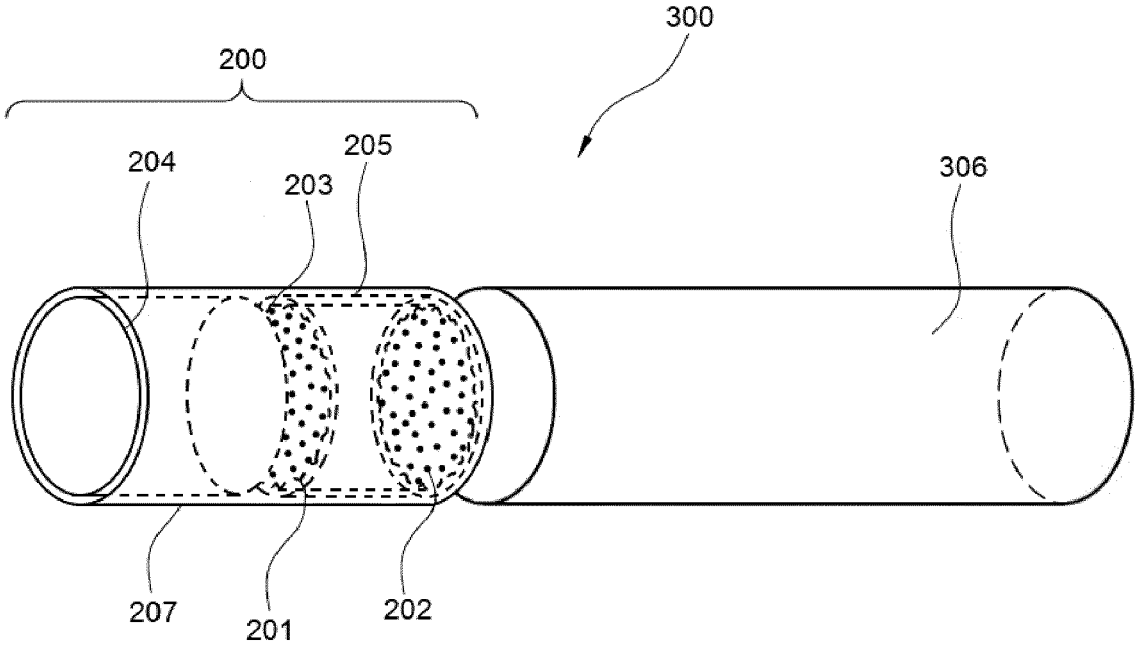

Figure 3

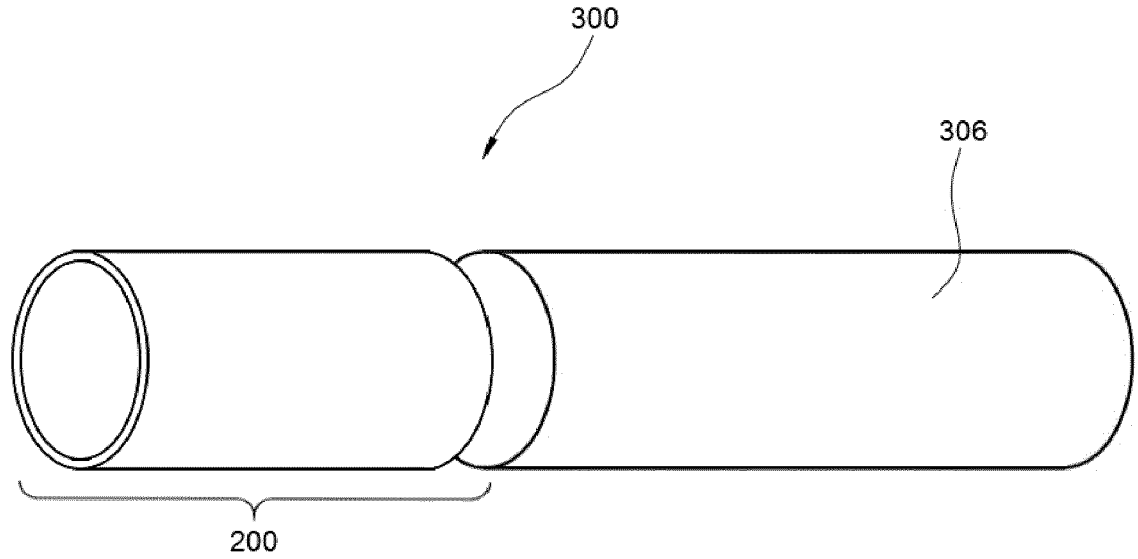

Figure 4

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Application Number
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 May 2022	Dimoula, Kerasina

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