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(54) Title of the Invention: **An additive release assembly, a filter, a smoking article and a method of manufacturing**
Abstract Title: **Additive release assembly for smoking filter**

(57) An additive release assembly for a smoking article 10 comprises a plurality of components 15 forming a unitary structure, wherein at least one of the components comprises additive. The assembly is configured to release additive on application of pressure to the smoking article. The plurality of components 15 are preferably retained as a unitary structure by an outer encapsulation 17. More than one unitary structures may be provided (figure 2). In a further aspect, one or more components (38; figure 3) is/are surrounded by first and second outer encapsulations (37, 35; figure 3). Alternatively, the unitary structure may be provided by a large additive containing component (67; figure 6) covered with smaller additive containing components (65; figure 6). The components may be substantially the same size (as shown and figure 7, for example) or may be of different sizes (figures 6 and 8). Additive may also be included within the outer encapsulation(s).

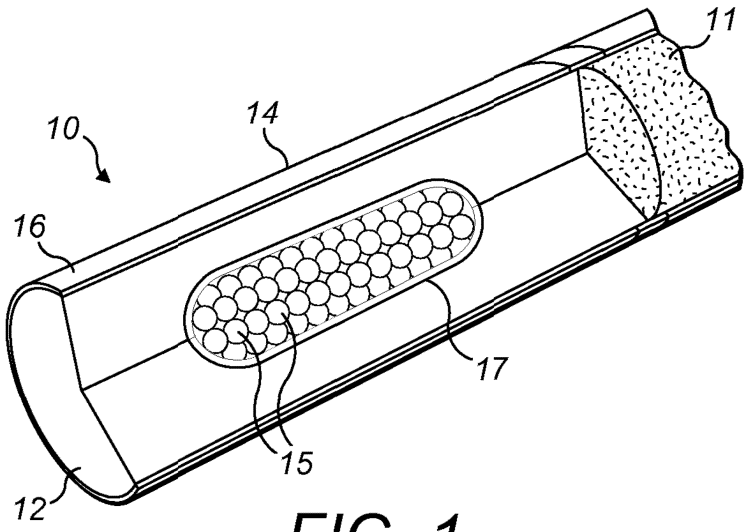

FIG. 1

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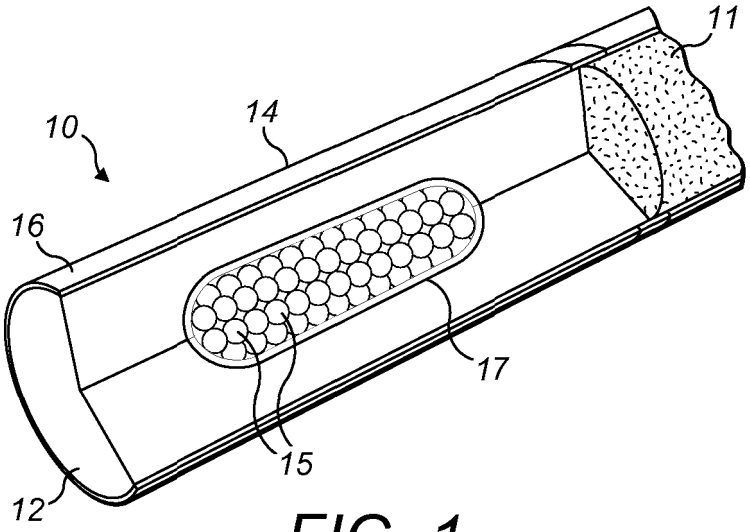

FIG. 1

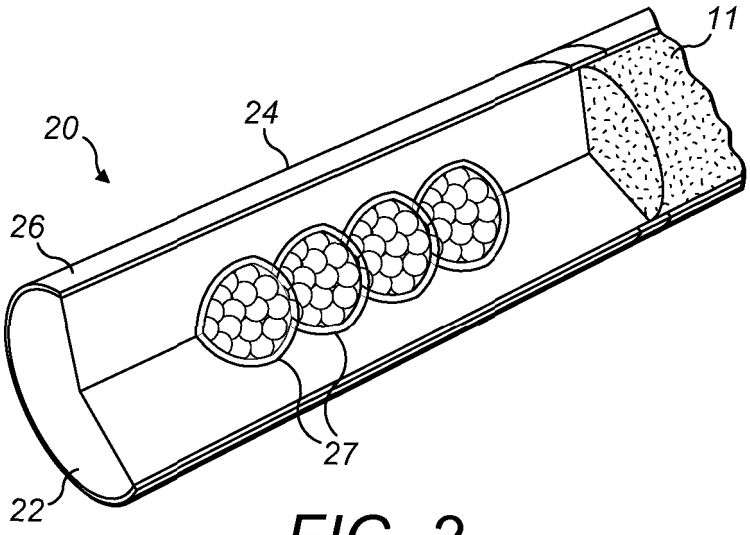

FIG. 2

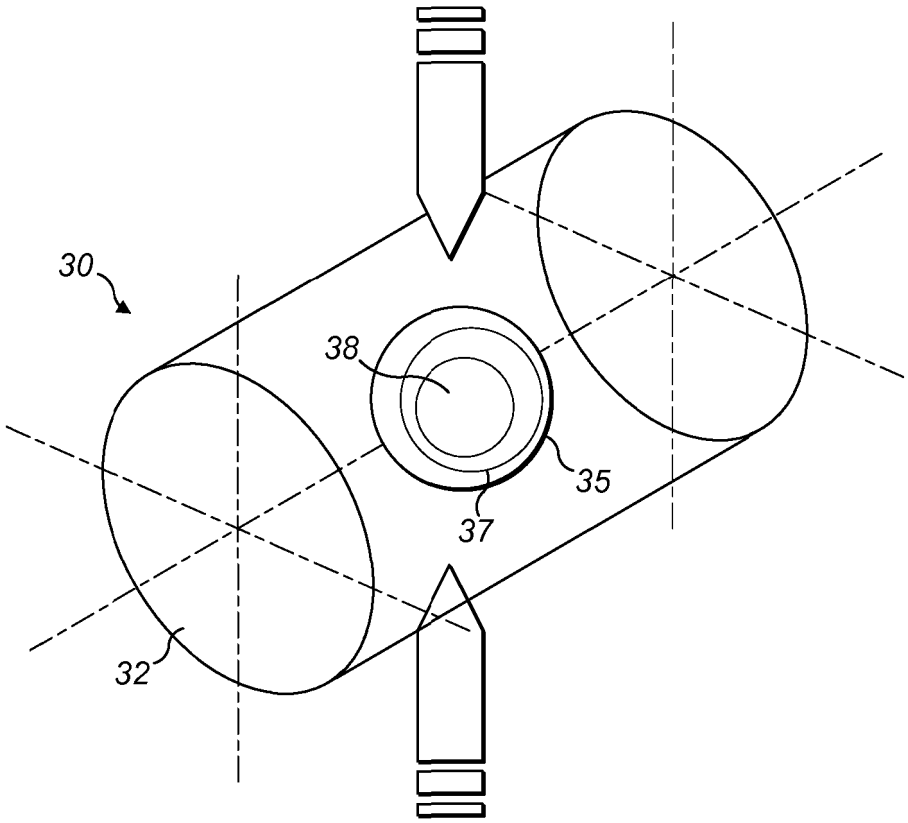

FIG. 3

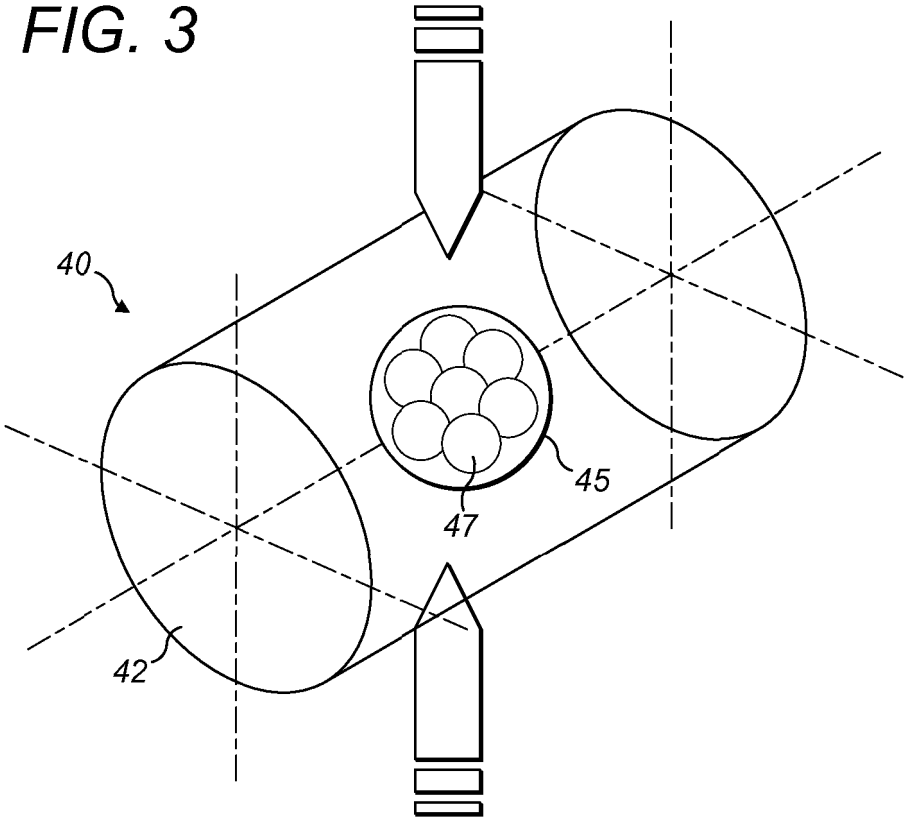

FIG. 4

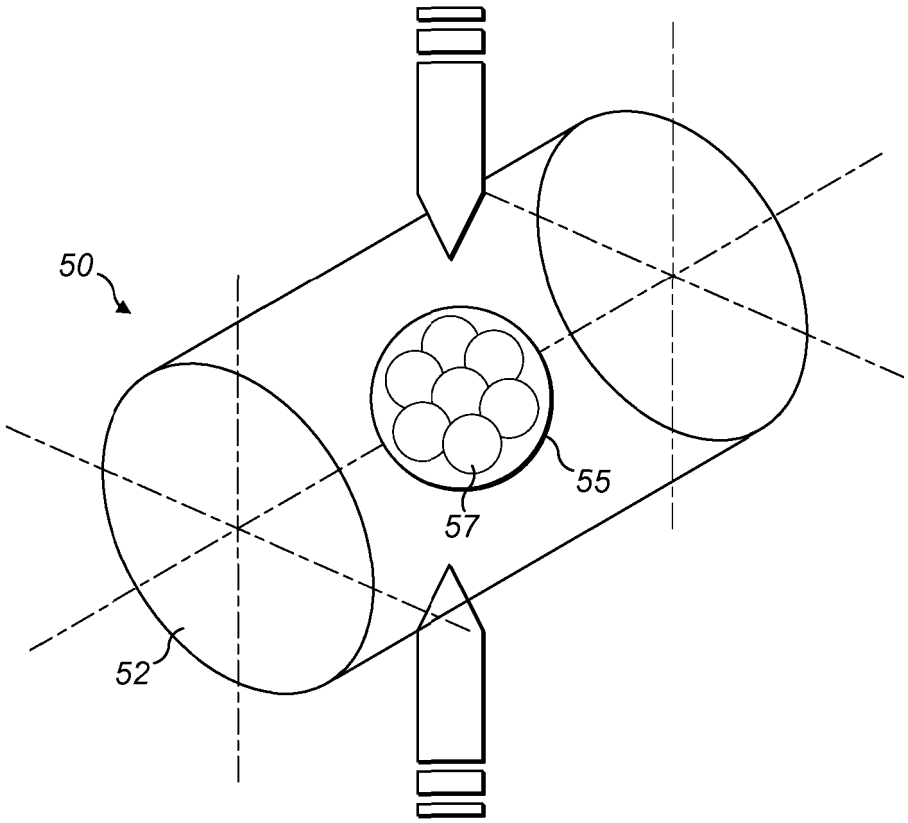

FIG. 5

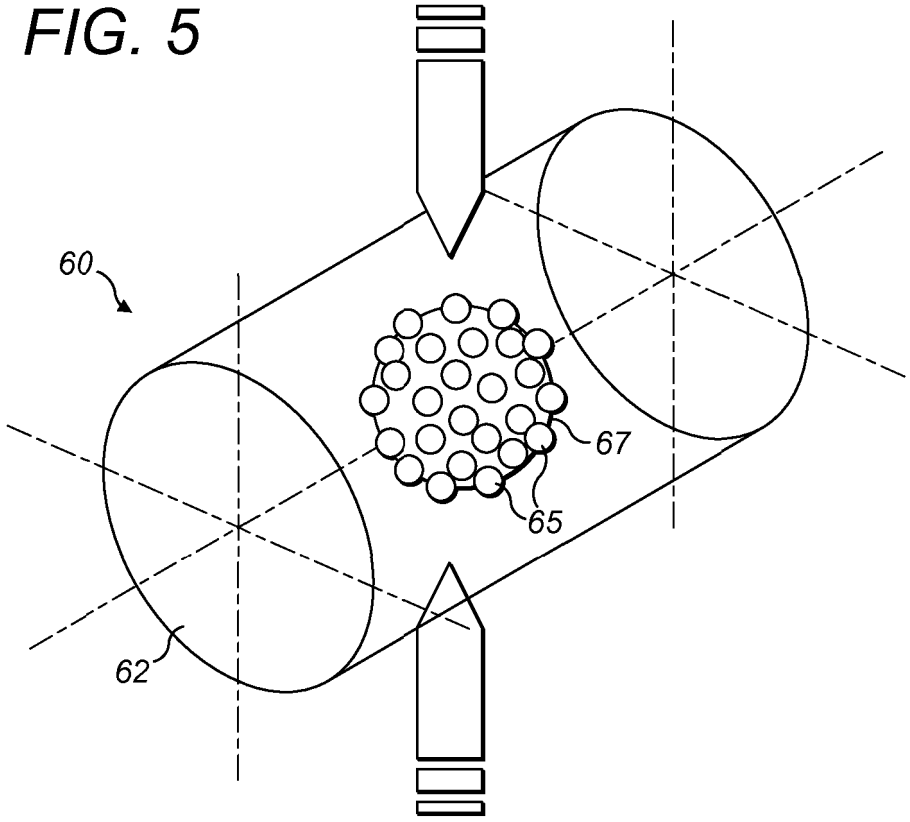

FIG. 6

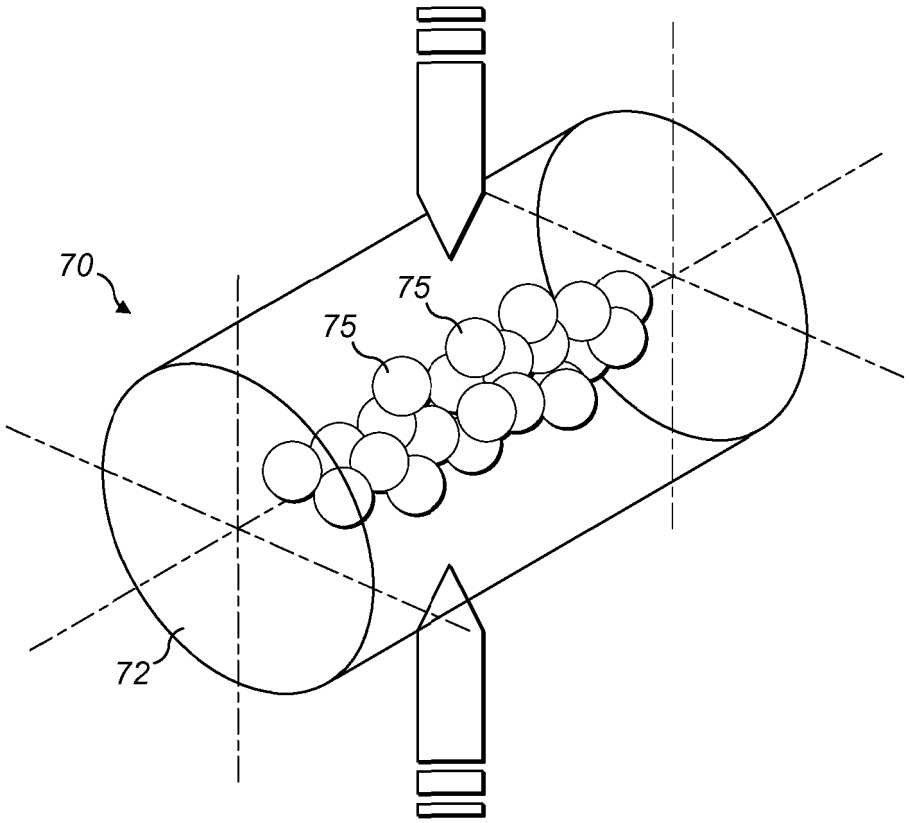

FIG. 7

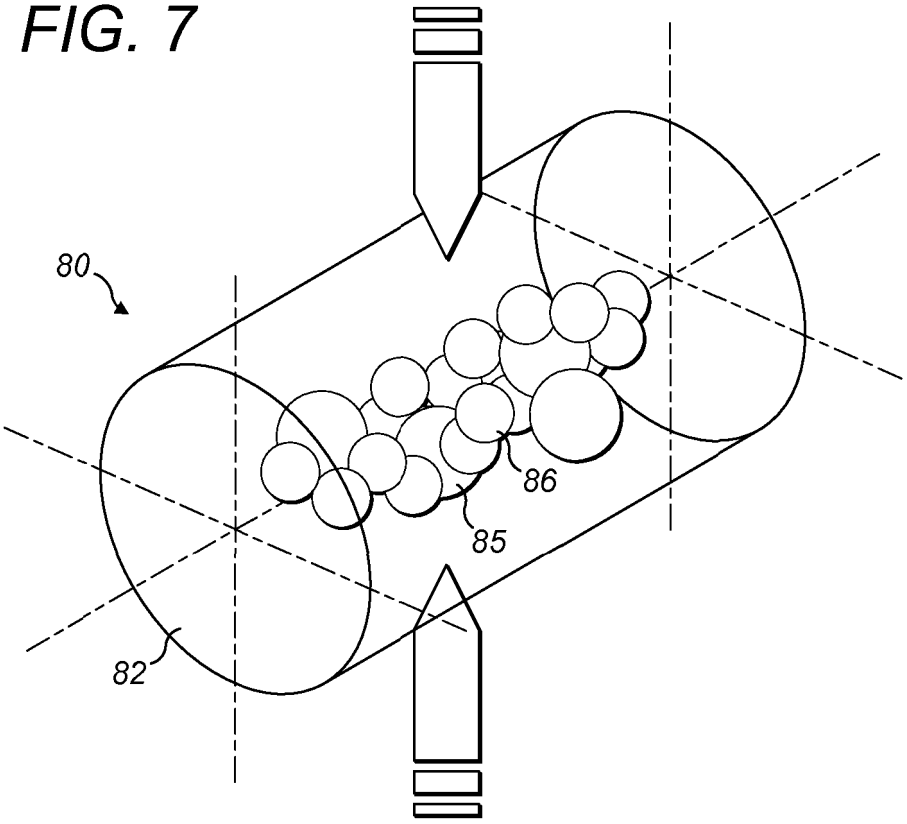

FIG. 8

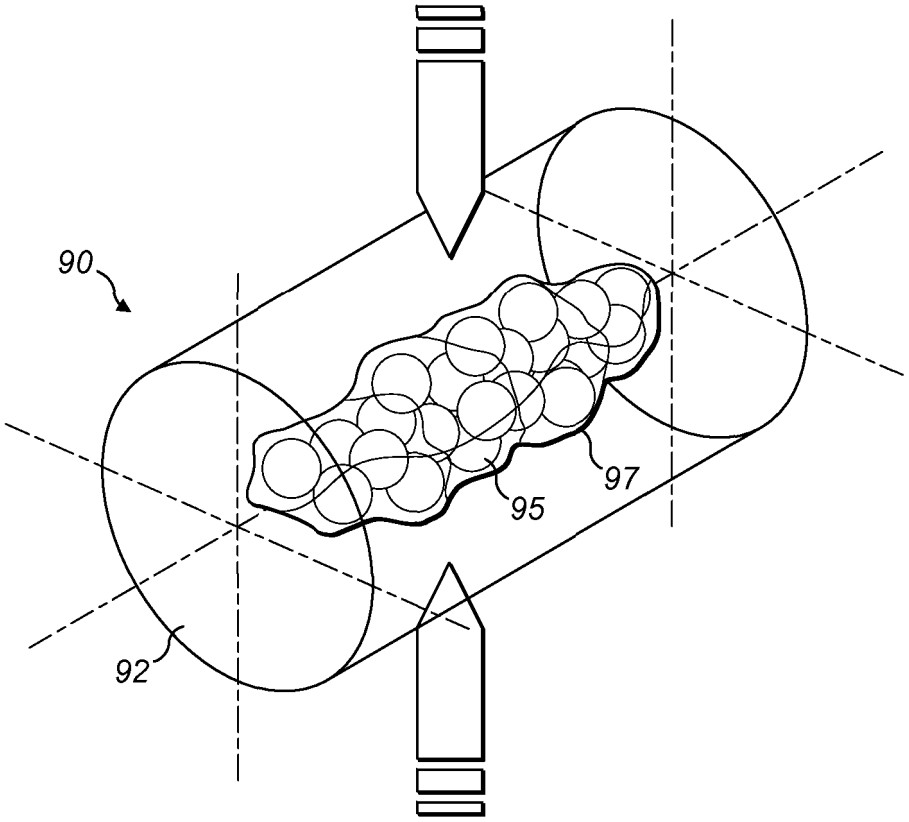

FIG. 9

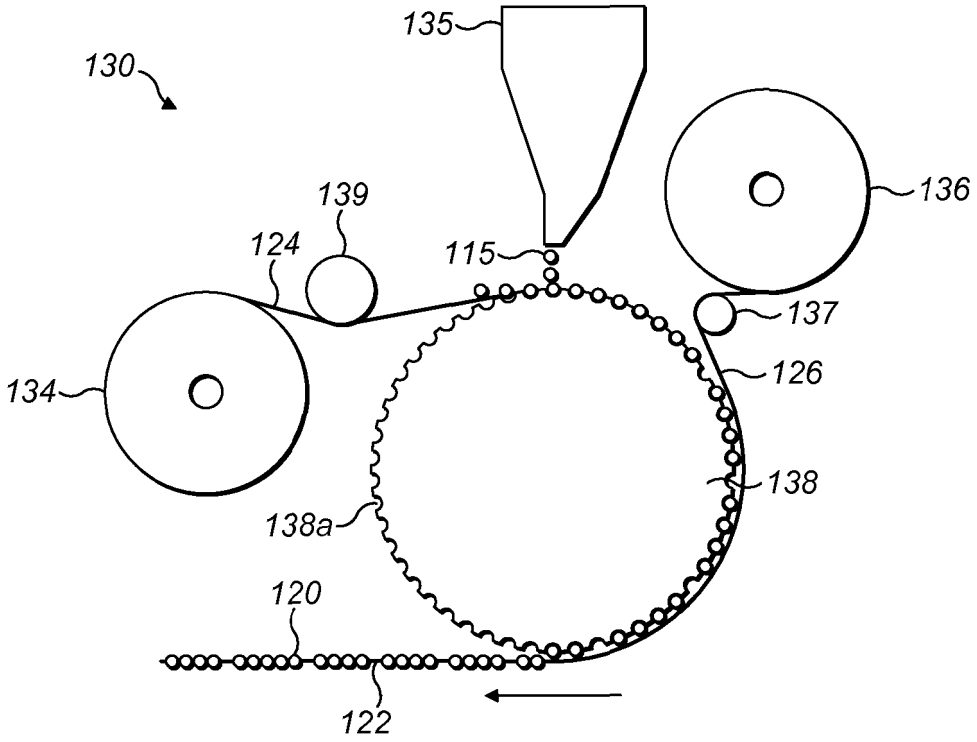

FIG. 10

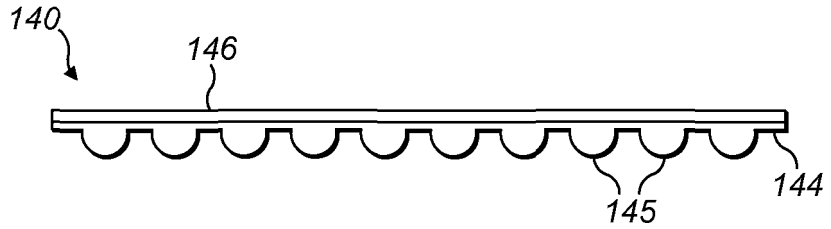

FIG. 11

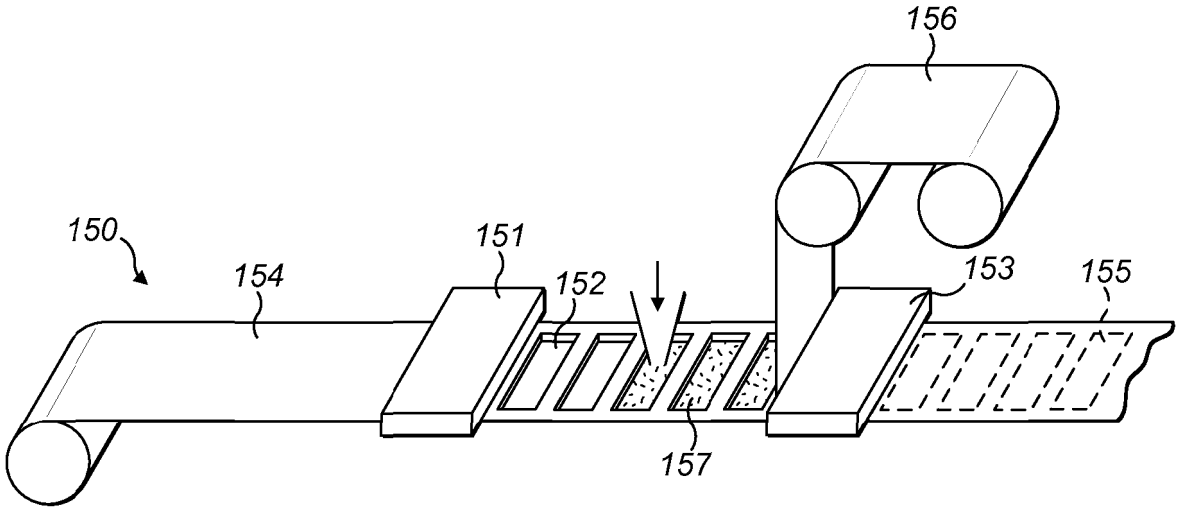

FIG. 12

An additive release assembly, a filter, a smoking article and a method of manufacturing

Description

The present invention relates to an additive release assembly. The present invention also relates to a filter for a smoking article comprising an additive release assembly, and a smoking article comprising an additive release assembly, and a method of manufacture.

As used herein, the term "smoking article" includes smokable products such as cigarettes, cigars and cigarillos whether based on tobacco, tobacco derivatives, expanded tobacco, reconstituted tobacco or tobacco substitutes and also heat-not-burn products (i.e. products in which flavour is generated from a smoking material by the application of heat without causing combustion of the material). Typically, smoking articles are provided with a filter removing constituents from the gaseous flow.

It is known to provide a frangible capsule containing a flavourant such as menthol, or water, inside the filter of a smoking article. By applying pressure to the outside of the filter, the smoker may break the capsule therein and release the flavourant. Thus, a smoker wishing to add flavour to the inhaled gaseous flow may do so by simply squeezing the filter.

Individual breakable capsules having a flavourant therein and methods of manufacture thereof are known *per se* and are described in, for example, WO 2007 / 010407.

The capsule is broken in a single action to release all of the contained flavourant.

Broadly in accordance with the present invention, there is provided an assembly for treating smoke in a smoking article comprising a plurality of components arranged in a unitary structure, wherein at least one of the components contains an additive,

and the assembly is configured to release the additive into, or expose the additive to, the surrounding region on the application of pressure.

The provision of a plurality of components arranged in a unitary structure provides the release or exposure of the additive to the surrounding environment in a controlled manner, or improves insertion into a smoking article. For example, with an appropriate configuration for the assembly, the additive may be released in a plurality of separate doses.

More specifically, the present invention provides, in a first aspect, an additive release assembly for a smoking article, comprising: a plurality of components arranged in a unitary structure, wherein at least one of the components comprises additive, and the assembly is configured to release additive on application of pressure.

Preferably, one or more components comprise one or more outer encapsulation(s) surrounding one or more additive release components.

Preferably, the outer encapsulation is configured to selectively allow release of additive on application of pressure.

Thus, a unitary structure provides for improved insertion of additive release components, in combination with providing selectable release of additive or other advantages.

The present invention further provides an additive release assembly for a smoking article, comprising: an outer membrane surrounding one or more additive release components, wherein the one or more additive release components are configured to selectively release additive.

Preferably, the outer membrane is frangible, or the outer membrane is porous to the additive.

The present invention further provides an additive release assembly for a smoking article, comprising a substrate having a cellular structure, wherein the cellular structure comprises additive releasable on application of pressure.

The present invention further provides an additive release assembly for a smoking article, comprising a plurality of additive release components connected together to form a unitary structure, wherein each additive release component is configured to selectively release additive.

The present invention further provides, in a second aspect, a filter for a smoking article comprising the additive release assembly as described in any embodiment.

The present invention further provides, in a third aspect, a smoking article comprising the additive release assembly as described in any embodiment.

The present invention further provides, in a fourth aspect, a method of manufacturing an additive release assembly, comprising: forming one or more additive release components, and forming an outer encapsulation around the one or more additive release components.

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

Figure 1 shows a cut-away perspective view of a smoking article according to a first embodiment of the present invention;

Figure 2 shows a cut-away perspective view of a smoking article according to a second embodiment of the present invention;

Figure 3 shows a schematic perspective view of a filter for a smoking article according to a third embodiment of the present invention;

Figure 4 shows a schematic perspective view of a filter for a smoking article according to a fourth embodiment of the present invention;

Figure 5 shows a schematic perspective view of a filter for a smoking article according to a fifth embodiment of the present invention;

Figure 6 shows a schematic perspective view of a filter for a smoking article according to a sixth embodiment of the present invention;

Figure 7 shows a schematic perspective view of a filter for a smoking article according to a seventh embodiment of the present invention;

Figure 8 shows a schematic perspective view of a filter for a smoking article according to a eighth embodiment of the present invention;

Figure 9 shows a schematic perspective view of a filter for a smoking article according to a ninth embodiment of the present invention;

Figure 10 shows a side elevation view of an apparatus for forming an additive release unit according to the present invention;

Figure 11 shows a side elevation view of an additive release unit according to the present invention; and

Figure 12 shows a perspective view of a further embodiment of an additive release unit according to the present invention during manufacture, and an apparatus for manufacturing the additive release unit.

Figure 1 shows a smoking article according to a first embodiment of the present invention. The smoking article 10 comprises a source of smokable material, which is preferably tobacco, in the form of a cylindrical tobacco rod 11. A filter 14 is coaxially attached to the tobacco rod 11. The filter 14 is covered by a covering layer

16. The covering layer is a sheet material wrapped around the filtration material, and forming an exterior of the filter 14. The covering layer 16 may connect the filter 14 to the tobacco rod 11, and may be formed of a paper material, e.g. tipping paper.

The filter comprises one or more additive release assemblies, and preferably, a single additive release assembly. The additive release assembly comprises an outer encapsulation 17 containing one or more additive release components 15, preferably, a plurality of additive release components. The additive release components are arranged to interact with one or more further components, in particular, an outer encapsulation 17. The one or more additive release components are located within the outer encapsulation 17 which surrounds and encapsulates the plurality of additive release components 15. The outer encapsulation 17 preferably has an outer wall or shell defining an elongate, tubular, exterior surface. The outer encapsulation 17 may be a hollow cylindrical tube encapsulating the additive release components 15.

The additive release component is any component capable of storing an additive in a non-operative condition, and selectively releasing the additive to modify the smoke of the smoking article. Preferably, the additive is selectively released by compression of a selected one or more additive release components. The additive release component can only release additive into the filtration material after the outer encapsulation is ruptured. The additive release component is preferably in the form of a capsule. The outer encapsulation is preferably also in the form of a capsule, which contains the capsule comprising additive. The outer encapsulation is configured to selectively allow release of the additive into the surrounding part of the smoking article, i.e. a positive step is required by the user for the outer encapsulation to release the additive. Preferably, the additive is selectively released by the step of compression of the outer encapsulation. The outer shell of the outer encapsulation is preferably frangible on compression, and breaks or ruptures to allow full release of the additive.

The filter 14 comprises filtration material 12 surrounded by a porous sheet material, preferably a porous paper, e.g. plug wrap. The filtration material 12 preferably comprises a homogenous filtration material, for example, cellulose acetate tow as is conventionally known. The term "homogenous" is used to mean that the filtration material is substantially uniform throughout the filter, and in particular, is uniform in a radial direction through the filtration material. The outer encapsulation 17 is located within the filtration material.

The additive release components, preferably capsules 15, contain additive contents as a fluid, preferably a liquid. The outer encapsulation and additive release components may be deformed or ruptured by inward radial pressure from a user, which releases all or part of the additive contents. The additive contents in the additive release component 15 may be a flavourant, for example a menthol solution, or may be water. The outer encapsulation 17 comprises an outer wall. The additive release component 15 comprises an outer wall or shell and an inner volume filled with the fluid. The additive can be selectively released by the user of the smoking article into the adjacent filtration material 12 by squeezing the outside of the filter to deform or rupture the outer walls of the outer encapsulation and one or more additive release component. Each of the additive release components 15 is configured to release the additive contents as a single dose. The additive release components 15 are preferably dimensioned as micro-capsules, e.g. having a diameter less than 1mm, or "powder" or "granules", having a diameter of from 100μm to 500μm, or less than 100μm. The outer encapsulation may contain between 30 and 70 such "granules", and preferably approximately 50. The additive release components may be any form of encapsulated additive (e.g. flavourant). Alternatively, the outer encapsulation may comprise one or more additive release components. For example, the outer encapsulation may contain only a single additive release component, three additive release components, or 10 additive release components. The additive release components are dimensioned to fit within the outer encapsulation, and contain the required amount of additive. The following types of additive release components are examples, and any suitable method of manufacture or construction may be used.

In a first type of additive release component, the outer shell is preferably frangible on compression, and breaks or ruptures to allow full release of the additive. Alternatively, each additive release component is configured to release the additive contents in a plurality of discrete deliveries. The outer wall or shell may be formed of gelatin, hydroxypropyl methylcellulose (HPMC) or any suitable material. Each additive release component can independently release additive, and so the plurality of additive release component may release additive in a plurality of discrete deliveries.

In a second type of additive release component 15, the additive release component 15 comprises an outer shell which is resiliently deformable. The outer shell functions as a single part, wherein the material of the outer shell is deformable. The outer shell may be formed from one part, or two (or more) parts sealed together. Preferably an outer shell formed from two parts is configured to rupture at a weakened region, for example along a longitudinal or circumferential seam joining the two parts, which opens under pressure to define a slit. The outer shell contains the additive, preferably flavourant or water, in an inner volume, i.e. hollow cavity. The outer shell surrounds and encapsulates the additive, and does not initially contain an aperture.

Regardless of the number of parts from which it is made, the outer shell may be configured to rupture in a predetermined area, over only part of the surface area, and preferably rupture to form one or more slits or apertures, when compressed. Preferably, the outer shell defines a single slit (or a line of weakening that opens under pressure to form a single slit) which preferably extends longitudinally. The additive release component 15 is configured to release only a part of the contents through the slit when the additive release component 15 is compressed. The resiliently deformable additive release component 15 returns to its original shape, when the compression of the additive release component 15 ceases. On return to its original shape, the slit defined by the additive release component 15 effectively closes, and no further contents are released from the additive release component 15. On a further compression, the additive release component 15 deforms such that the resilient slit opens, and a further discrete delivery of the contents is released.

In general, the outer shell may be configured to define an outlet having any shape, and is not limited to the slit described. For example, the outlet may be a pin-hole, or a region of weakening that opens to form an outlet under pressure. Alternatively, the outlet may not form in a pre-determined area, but may form on any part of the outer shell when a force is applied. The location of the outlet may depend on the exact force applied, and any inherent (i.e. not controlled) variation in the thickness of the outer shell.

In a third type of additive release component 15, the additive release component 15 comprises an outer shell which is deformable. The outer wall is preferably plastically deformable, such that a deformation is maintained after the deforming force ceases. The outer shell contains the additive, preferably flavourant or water, in an inner volume. The outer shell surrounds the additive, and does not initially contain an aperture. The outer shell is configured to rupture in a predetermined area over only a part of the surface, and preferably rupture to form one or more slits or apertures of other shapes e.g. pin-holes, when compressed. Preferably, the outer shell defines a single slit, which preferably extends longitudinally. The outer shell functions as a single part, wherein the material of the outer shell is deformable. The outer shell may be formed from one part, or two (or more) parts sealed together. Preferably an outer shell formed from two parts is configured to rupture along a longitudinal seam joining the two parts to define a slit. The additive release component 15 is configured to release only a part of the contents through the slit when the additive release component 15 compressed. The resiliently deformable additive release component 15 does not return towards its original shape, when the compression of the additive release component 15 ceases. The additive release component and/or additive is configured such that no further contents are released from the additive release component 15. On a further compression, the additive release component 15 deforms further such that a further discrete delivery of the contents is released.

The aperture may be formed by a slit valve. For example, the outer wall may be provided with a narrow slit, which substantially prevents additive from exiting when

the additive release component is not compressed On compression of the additive release component, the deformation of the outer wall and/or pressure of the additive causes the slit to open, and additive to be ejected. The slit valve closes when the compression ceases, allowing for a plurality of discrete deliveries.

Alternatively, the outer encapsulation 17 may not contain a plurality of discrete additive release components. The outer encapsulation 17 may contain a substrate. The substrate may be an open cell substrate, defined as a porous matrix. The substrate may be an open cell foam. The additive is contained as a fluid within the substrate. The substrate is preferably a body of absorbent material impregnated with the additive. The substrate is configured to be progressively compressible and configured to release at least a part, and preferably only a part, of the additive contents when partly compressed. The additive is distributed within the substrate, and preferably, absorbed by the substrate. The substrate is preferably formed of a filtration material, for example, cellulose acetate. The filtration material may be in the form of a known tow of filtration material suitable as a filter. The outer encapsulation retains the additive within the substrate, prior to rupturing of the outer encapsulation. The outer encapsulation is preferably frangible, and does not inhibit release of the additive once ruptured. The substrate may be at least partially resiliently deformable and may at least partially return towards original shape, when the compression of the substrate ceases. In the partial expansion of the substrate following release of the compressive force, the substrate may re-absorb a part of the released additive. References to release of the additive are intended to refer to the net release of additive after the compressive force has ended. On a further partial compression, the substrate releases a further discrete delivery of the contents.

Alternatively, the additive release assembly comprises a closed cell substrate. The closed cell substrate defines a matrix having a plurality of small cavities which contain additive. The cavities are closed by the material, retaining the additive until selective release. The closed cell substrate may be a closed cell foam. On application of a compressive force, the closed cell substrate is configured to release additive.

The compressed substrate develops cracks and/or openings, which allow release of the additive. The substrate preferably plastically deforms on compression.

The open or closed cell substrate, being a cellular structure, may contain additive in the form of a fluid (including a powder of a solid material), which may flow out of the substrate and immediately modify the smoke or filtration properties as applicable. Alternatively, the additive in the substrate may be encapsulated. The closed or open cell substrate may contain encapsulated additive, i.e. additive release components. The additive release components are configured to release additive on compression, which may be simultaneously with release from the substrate, or in a subsequent action. The open cell substrate may not have an outer encapsulation when containing encapsulated additive, or the open cell substrate may have both an outer encapsulation and contain additive release components. The cavities defined by the cellular structure may be considered as components containing additive.

The substrate may be formed by extrusion of the material containing the additive. The extruded closed cell substrate is then cut to a suitable length.

The closed cell substrate does not require an outer shell to retain the additive, and so may form the additive release assembly without an outer shell. Alternatively, the additive release component may comprise the closed cell substrate encapsulated in an outer shell, e.g. a frangible outer shell.

Alternatively, the substrate may be fibrous, e.g. formed of cellulose acetate fibres, with additive dispersed therein as droplets or as microcapsules. The droplets or microcapsules are preferably distributed within the matrix or fibres. The microcapsules are preferably attached to the one or more threads or fibres, which are formed (compressed) into a three-dimensional substrate. The substrate is optionally surrounded by a frangible, elastically deformable or plastically deformable outer shell. The substrate is preferably configured such that the additive can be released in a plurality of discrete deliveries, preferably by a plurality of separate compressions. This differs from a conventional capsule having a frangible outer shell, in which all the additive is released at once when the outer shell is ruptured.

Alternatively, any type of the additive release component may comprise a substrate within the outer shell. The additive is distributed within the substrate. The substrate is preferably an open cell material, which is compressible and configured to release only a part of the additive contents when partially compressed. The substrate is preferably formed of a filtration material, for example, cellulose acetate tow. The substrate may be at least partially resiliently deformable, contained within a plastically deformable outer wall which prevents the substrate from expanding when compression ceases. Alternatively, the open cell substrate may actuate or follow a resilient outer wall at least partially towards its original shape when compression ceases. Alternatively, the open cell substrate may not resiliently return towards to its original size, and may plastically deform when compressed.

The outer encapsulation 17 may comprise an outer wall which is frangible, resiliently deformable or plastically deformable, as described above for the additive release components. The outer encapsulation may have the same or different type of outer wall than the additive release components, in any combination.

The outer encapsulation allows a large number of small additive release components to be easily located in a defined area of the smoking article. In addition, having two (or more) separate encapsulations around the additive increases protection of the additive. The additive release components may contain different types of additive in a unitary structure. For example, the additive release components may contain different flavourants, additives with different properties or functions. The additive release assembly may provide for multiple activation, i.e. a plurality of discrete doses. The additive release assembly may also provide for improved dosing and metering. A single, larger, assembly is easier to insert into a filter or smoking article than a plurality of smaller additive release components. In particular, the larger additive release assembly is easier to pick up, insert, and locate correctly within the filter or smoking article. For a large number of additive release components within an outer encapsulation, the single additive release assembly allows the additive release components to be measured by volume, not by counting individual additive release components. The dose is set, and contained in the additive release assembly,

prior to insertion in the smoking article, allowing weighing or other checks to ensure the correct quantity of additive is included. Some or all of the advantages may be applicable to any embodiment of the present invention.

Figure 2 shows a second embodiment of smoking article 20 according to the present invention. The smoking article 20 comprises a source of smokable material, which is preferably tobacco, in the form of a cylindrical tobacco rod 11. A filter 24 is coaxially attached to the tobacco rod 11. The filter 24 comprises filtration material 22 surrounded by a porous sheet material, preferably a porous paper, e.g. plug wrap.

The filter comprises one or more additive release assembly, and preferably, a plurality of additive release assemblies. The additive release assemblies each comprise an outer encapsulation 27 containing one or more additive release components 25, preferably in the form of capsules, and preferably a plurality of additive release components. The additive release components 25 may be of any type described above. The additive release components are located within a plurality of outer encapsulations 27. Each outer encapsulation 27 comprises an outer wall surrounding the additive release components. The outer encapsulations 27 are preferably substantially spherical. The outer encapsulations 27 are preferably arranged centrally within the filtration material in a longitudinally extending line. Preferably, the filter 14 comprises at least three outer encapsulations 27, and more preferably, four outer encapsulations 27. The outer encapsulations 27 may be of any type described. The outer encapsulation allows a large number of small additive release components 25 to be easily located in a defined area of the smoking article. Alternatively, the plurality of additive release assemblies comprise an open cell substrate or a closed cell substrate of any kind, as described above. The plurality of outer encapsulations or substrates each comprises a separate unitary structure, with each unitary structure comprising a plurality of components.

The filter 20 is covered by a covering layer 26. The covering layer is a sheet material wrapped around the filtration material, and forming an exterior of the filter 20. The covering layer 26 may connect the filter 20 to the tobacco rod 11, and may be formed of a paper material, e.g. tipping paper. The covering layer 26 may

optionally be at least partially transparent. The covering layer may define one or more transparent windows. The transparent area of the covering layer allows viewing of the outer encapsulations 25.

Figure 3 shows a third embodiment of a filter 30. The filter 30 comprises one or more additive release assembly, and preferably, a single additive release assembly. The additive release assembly comprises a first outer encapsulation 35 containing a second outer encapsulation 37 located within filtration material 32. The first outer encapsulation 35 comprises an outer wall, as described for the outer encapsulation above. The first outer encapsulation 35 surrounds the second outer encapsulation 37. The second outer encapsulation 37 comprises an outer wall, as described for the outer encapsulation above. The second outer encapsulation 37 surrounds one or more additive release components 38. Preferably, the second outer encapsulation 37 surrounds a single additive release component 38. The assembly comprises a unitary structure.

Preferably, the second outer encapsulation 37 contains the additive release component 38 and also contains additive, in addition to the additive in the additive release component 38. The second outer encapsulation 37 is also an additive release component, such that rupture of the second outer encapsulation 37 releases the additive. The first outer encapsulation 35 preferably also comprise additive releasable by rupturing the first outer encapsulation, and so may also be considered as an additive release component.

The additives in two or more of the additive release component 38, first outer encapsulation 35 and second outer encapsulation 37 may mix in the filter 30. The additives may be different additives or the same additive. When the additives are different additives, the mixed additives may react to generate a new additive. In particular, the mixed additives may be effervescent. The effervescence may increase the surface area on which additive is arranged, providing for increased delivery of the additive.

The additive release component 38 contains an additive, and is configured to release all or a part of the additive contents when compressed. The additive release component 38 may be configured to provide one or more discrete deliveries of the additive contents, and may be configured according to any type of additive release component described. The filter 30 may form part of a smoking article when attached to a source of smokable material.

The additive release component 38, first outer encapsulation 35 and second outer encapsulation 37 may be of the same or different shapes. Preferably, the additive release component 38, first outer encapsulation 35 and second outer encapsulation 37 have the same shape, which is a sphere. In particular, the outer walls of the additive release component 38, first outer encapsulation 35 and second outer encapsulation 37 have an exterior surface which is spherical, of different diameters to contain the component or additive inside.

The outer wall of the first outer encapsulation 35 is preferably a frangible outer wall, surrounding the and second outer encapsulation 37 until ruptured, e.g. by a compression. The first outer encapsulation 35 is configured to break initially, prior to breaking of the third additive release component 38 and second outer encapsulation 37. The first outer encapsulation 35 is configured to break on compression without transmitting a compressive force to the second outer encapsulation 37 which would break the second outer encapsulation 37.

The second outer encapsulation 37 may then be ruptured, followed by rupturing of the additive release component 38. The independent and consecutive rupturing of the outer walls of the additive release component 38, first outer encapsulation 35 and second outer encapsulation 37 provides for an indexed release of additive.

The outer wall of the first outer encapsulation 35 is described as frangible. Alternatively, the outer wall of the first outer encapsulation 35 is deformable, resiliently or plastically, to allow the additive release component 38 and second outer encapsulation 37 to be compressed and ruptured within the first outer encapsulation 35. The outer walls of the additive release component 38, first outer

encapsulation 35 and second outer encapsulation 37 may be compressed to allow release of additive consecutively or simultaneously. Simultaneous crushing allows release of two separate additives, which are not desired separately, but which cannot be stored together.

Figure 4 shows a fourth embodiment of filter 40. The filter 40 comprises one or more additive release assembly, and preferably, a single additive release assembly. The additive release assembly comprises an outer encapsulation 45 located within filtration material 42. The outer encapsulation 45 comprises an outer wall, as described for the outer encapsulation above. The outer encapsulation 45 surrounds one or more additive release components 47. Preferably, the outer encapsulation 45 surrounds a plurality of additive release components 47. The assembly comprises a unitary structure.

The outer encapsulation 45 may contain the additive release components 47 and additive, substantially as described with respect to Figure 3. The outer encapsulation 45 is also an additive release component, such that rupture of the outer encapsulation allows release of additive. Alternatively, the outer encapsulation 45 only contains the additive release component 47, which contain the additive.

The additives in two or more of the additive release components 47 may mix in the filter 40. The additives may be different additives or the same additive. When the additives are different additives, the mixed additives may react to generate a new additive. The additives may react and/or mix with further additives or substances already in the filter. The different additives may also provide a variation in the combination of additives which are released, when only some of the additive release components 47 have released additive. In particular, when the additives are two or more flavourants, the combined effective flavourant in the filter will depend on which additive release components 47 are ruptured.

The additive release components 47 may alternatively comprise open cell substrate, without an encapsulation. Additive is contained within the open cell substrate, and optionally, around the open cell substrates within the outer encapsulation. Rupture

of the outer encapsulation allows an immediate release of additive, followed by a slow release of additive from the open cell substrate.

A smoking article or smoking article filter may comprise two or more additives, each carried within a separate additive release component. This arrangement may be suitable, for example, when the two or more additives chemically react, or where the additives are subject to oxidation, diffusion, or other means of loss of intensity over time.

Embodiments of the invention may be configured to comply with applicable laws and/or regulations, such as, by way of non-limiting example, regulations relating to flavours, additives, emissions, constituents, and/or the like. For example, the invention may be configured such that a smoking article implementing the invention is compliant with applicable regulations before and after release of one or more additives. In embodiments where one or more additives reacts with other additives and/or substances, the resulting substance complies with applicable laws and/or regulations.

Figure 5 shows a fifth embodiment of filter 50. The filter 50 comprises one or more additive release assembly, and preferably, a single additive release assembly. The additive release assembly comprises an outer encapsulation 57 located within filtration material 52. The outer encapsulation 55 comprises an outer wall, as described for the outer encapsulation above. The outer encapsulation 55 surrounds one or more additive release components 57. Preferably, the outer encapsulation 55 surrounds a plurality of additive release component 57. The outer encapsulation 55 and additive release components 57 are substantially as described above, in particular, with respect to Figure 4.

The additive contained in the additive release components 57 affects filtration properties of the filter 50 when released. In particular, the additive is an adsorbent, for example, carbon. The carbon may be in the form of activated charcoal. The additive improves filtration efficiency of particular smoke constituents when released. The assembly comprises a unitary structure.

The additive release components 57 comprise an outer wall surrounding the additive. The outer wall isolates the additive from the filtration material until the additive is required. The isolation of the additive avoids interactions between the additive (e.g. carbon) and filtration material, which interactions may negatively affect the additive and/or filtration material.

The carbon could be in the form of spherical beads enclosed in a capsule. Rupture of the outer wall exposes the carbon to the surrounding atmosphere, where the carbon may modify properties of smoke e.g. by adsorption. The term "release" is intended to include exposure of the additive to the atmosphere, instead of or in addition to physical release and movement out of an encapsulation. The term "release" indicates that the additive is active, and can have an effect on the smoking article. Whilst encapsulated the additive is dormant, and does not have an effect.

Figure 6 shows a sixth embodiment of filter 60. The filter 60 comprises one or more additive release assembly, and preferably, a single additive release assembly. The additive release assembly comprises a first additive release component 67 located within filtration material 62. The first additive release component 67 comprises an outer wall, as described for the outer encapsulation above. The outer wall of the first additive release component 67 contains a first additive.

The additive release assembly further comprises a plurality of second additive release components 65 located on an exterior surface of the first additive release component 67. The second additive release components 65 are affixed to an exterior surface of the outer wall of the first additive release component 67. The second additive release components 65 at least partially surround the first additive release component 67. The second additive release components 65 contain a second additive. The first additive release component 67 and second additive release components 65 are additive release components as described above, of the same construction type or different construction types.

The first additive release component 67 is preferably substantially larger than the second additive release components 65. The first additive release component 67 and second additive release components 65 may be spherical, such that the diameter of the first additive release component 67 may be significantly larger than the diameters of the second additive release components 65. Preferably, the first additive release component 67 has a diameter which is at least five times greater than the diameters of the attached second additive release components 65.

The first additive release component 67 may have an exterior diameter within the range 1.5 – 4.5 mm, and more preferably less than 3.5mm, or between 2 to 3mm. The second additive release components 65 are preferably micro-capsules, having a diameter of less than approximately 1mm, and optionally less than 0.5mm, or less than 0.2mm, or less than 0.1mm.

The first additive release component 67 is configured to release the contained first additive with application of a lower compressive force than required to release additive from some or all of the second additive release components 65. Application of a compression force therefore ruptures the first additive release component 67. Further applications of compressive force ruptures at least some of the second additive release components 65 to release the second additive. Thus, the outer wall of the first additive release component 67 is configured to release further additive by applying a force after the first additive release component 67 has been crushed. The outer wall of the ruptured additive release component may provide a reaction surface against which further additive release component can be crushed. Alternatively, the first additive release component requires a higher force to rupture than the second additive release components 65.

The plurality of second additive release components 65 are configured to require a plurality of applications of force to rupture all of the second additive release components 65. The amount of the additive released can be selected by the number (and/or strength) of applications of force. The assembly defines a unitary structure.

The first additive and second additive may be the same additive, or may be different additives. In addition, the plurality of second additive release components may comprise one or more different additives. The different additives may be different types of additives. For example, the additives may be selected from the one or more types: flavourants (e.g. menthol, peppermint), cooling agents providing a cooling sensation (e.g. menthol), or smoke modifying agents (e.g. water, charcoal).

Figure 7 shows a seventh embodiment of filter 70. The filter 70 comprises one or more additive release assembly, and preferably, a single additive release assembly. The additive release assembly comprises a plurality of additive release components 75 located within filtration material 72. The additive release components 75 comprise an outer wall, as described for any type of additive release components above. The outer wall of the additive release components 75 contains an additive. The additive release components 75 are configured to release the additive on application of a compressive force to the filter 70. The additive release components 75 form a unitary structure.

The plurality of additive release components 75 are arranged in close proximity to at least one other additive release component 75. Preferably, each additive release component 75 is in contact with at least one other additive release component 75. The additive release components 75 may be affixed to each other, e.g. with adhesive, or may be adjacent without being affixed.

Preferably, all of the additive release components 75 are substantially identical, i.e. have the same size and contain the same additive. The additive release components 75 are arranged substantially centrally within the cross-section of the filter 70, and are surrounded laterally by filtration material. The plurality of joined additive release components 75 extend longitudinally, and preferably over the majority of the length of the filter 70.

On application of a compressive force, at least one of the additive release components 75 is ruptured and releases the contained additive. The outer wall of a ruptured additive release component 75 may still be attached to an additive release

component 75 containing additive. Further applications of a compressive force to the filter may provide further release of additive. Thus, the outer wall of ruptured additive release components 75 is configured to release further additive by applying a further force. The outer wall of the ruptured additive release component provides a reaction surface against which further additive release component can be crushed. At least one of the additive release components may be considered as a 'further component', which provides a reaction surface to a connected additive release component. The connected plurality of additive release components define a unitary structure.

The plurality of additive release components 75 are configured to require a plurality of applications of force to rupture all of the additive release components 75. The number and longitudinal extend means that a user will generally not release additive from all of the additive release components simultaneously. The amount of the additive released can be selected by the number (and/or strength) of applications of force.

Figure 8 shows an eighth embodiment of filter 80. The filter 80 comprises one or more additive release assembly, and preferably, a single additive release assembly. The additive release assembly comprises a plurality of first additive release components 85 located within filtration material 82. The additive release components 85 comprise an outer wall, as described for the additive release components above. The first additive release components 85 contain a first additive. The additive release components 85 are configured to release the first additive on application of a compressive force to the filter 80.

The additive release assembly further comprises a plurality of second additive release components 86 located within the filtration material 82. The second additive release components 86 comprise an outer wall, as described for the additive release components above. The additive release components 86 contains a second additive. The additive release components 86 are configured to release the second additive on application of a compressive force to the filter 80.

The plurality of first and second additive release components 85,86 are arranged in close proximity to at least one other first or second additive release component 85,86. Preferably, each first and second additive release component 85,86 is in contact with at least one other additive release component 85,86. The additive release components 85 may be affixed to each other, e.g. adhesive, or adjacent with being affixed. A first or second additive release component 85,86 may be attached to one or more first additive release component 85 and/or second additive release component 86.

The first additive is preferably different to the second additive. The difference is greater than a typical range of sizes of the components. Releasing the first and second additive generates a mixture of the first and second additives in the filter. The first additive release components 85 may be larger than the second additive release component 86, as shown. Alternatively, the first and second additive release components may be the same size, or the second additive release component may be larger.

The first additive and second additive may be the same additive, or may be different additives. The different additives may be different types of additives. For example, the additives may be selected from the one or more types: flavourants (e.g. menthol, peppermint), cooling agents providing a cooling sensation (e.g. menthol), or smoke modifying agents (e.g. water, charcoal).

The force required to rupture the first additive release component may be different to the force required to rupture the second additive release component. For example, the first additive release component may require a lower force to rupture than the second additive release component. Thus, an initial low force may release only, or mostly, first additive. Subsequent application of a higher force may release only, or mostly, second additive.

The additive release components 85,86 are arranged substantially centrally within the cross-section of the filter 80, and are surrounded laterally by filtration material.

The plurality of joined additive release components 85,86 extend longitudinally, and preferably over the majority of the length of the filter 80.

On application of a compressive force, at least one of the first and/or second additive release components 85,86 is ruptured and releases the contained additive. The outer wall of a ruptured additive release component 85,86 may still be attached to an additive release component 85,86 containing additive. Further applications of a compressive force to the filter may provide further release of additive. Thus, the outer wall of ruptured additive release components 85,86 is configured to release further additive by applying a further force. The outer wall of the ruptured additive release component provides a reaction surface against which further additive release component can be crushed. The connected plurality of additive release components define a unitary structure.

The plurality of additive release components 85,86 are configured to require a plurality of applications of force to rupture all of the additive release components 85,86. The amount and type of the additive released can be selected by the number (and/or strength) of applications of force.

Figure 9 shows a ninth embodiment of filter 90. The filter 90 comprises one or more additive release assembly, and preferably, a single additive release assembly. The additive release assembly comprises a plurality of additive release components 95 located within filtration material 92. The additive release components 95 comprise an outer wall, as described for the additive release components above. The first additive release components 95 contain an additive. The additive release components 95 are configured to release the additive on application of a compressive force to the filter 90. The additive release components 95 may be substantially identical, as described with respect to Figure 8. Alternatively, the additive release components 95 may comprises first and second types containing a first additive and different second additive, as described with respect to Figure 9.

The additive release assembly further comprises an outer encapsulation 97 located within the filtration material 92. The outer encapsulation 92 comprises an outer

wall. The outer encapsulation 97 surrounds one or more additive release components 95. Preferably, the outer encapsulation 97 surrounds a plurality of additive release component 95. The additive release components 95 are retained within a specified volume in the filtration material 92 by the outer encapsulation 92. The outer encapsulation 97 substantially reduces or eliminates movement of the additive release components 95 during compression of the additive release components 95.

The outer encapsulation 97 is preferably permeable to the additive contained in the additive release components 97. The outer encapsulation 97 may be a mesh or permeable membrane. The outer encapsulation 97 does not need to be ruptured in order for the additive to be released. Instead, the outer encapsulation 97 allows the additive release components 95 to be ruptured to release additive. The outer encapsulation 97 may be flexible to allow compression of the additive release components 95. The connected plurality of additive release components and outer encapsulation define a unitary structure.

Alternatively, the outer encapsulation 97 may be impermeable until ruptured, as described for the outer encapsulation described with respect to Figure 4.

The additive release components and/or outer encapsulations of any embodiment may be formed by any suitable method. Figures 10 to 12 illustrate possible apparatuses, methods and constructions of the additive release assembly of any embodiment, in particular Fig 2. With reference to Figure 10, the additive release assemblies may be connected by a web, which allows for improved handling and insertion. Additive release assemblies and connected web is referred to as an additive release component unit 120. The unit 120 comprising a plurality of additive release assemblies may be inserted into a filter for a smoking article, or the unit may be cut to comprise only one additive release assemblies in each filter. The web 122 comprises a first layer 124 and a second layer 126. The first layer 124 is an elongate laminar strip of sheet material which extends around a first side of the capsules 115. The second layer 126 is an elongate laminar strip of sheet material which extends around a second side of the capsules 115. One or both of the first and second layers

124,126 are preferably formed of a porous material, which allows the fluid released by rupturing the capsules 115 to pass through the porous one or both of the first and second layers 124,126. The first and second layers 124,126 are preferably formed of paper. The first and second layers 124,126 do not retain the fluid, and do not form part of the capsules 115 which retain the fluid.

The first and second layers 124,126 are separate pieces of sheet material, which are unconnected prior to attachment to the capsules 115. The first and second layers 124,126 are preferably laminated together. The lamination comprises a major surface of the first layer 124 being affixed to a major surface of the second layer 126, preferably with an adhesive.

Figure 10 shows an apparatus 130 for manufacturing an additive release assembly unit 120 according to a method of the present invention. The additive release assembly unit 120 comprises a plurality of connected release assemblies. The apparatus 130 comprises a first bobbin 134 for storing an elongate strip of the first layer 124, as previously described. The first layer 124 is led onto a rotating carousel 138 via a tensioning roller 139. The carousel 138 has an exterior surface comprising a plurality of receptacles 138a. The first layer 124 extends into the receptacles 138a.

The apparatus 130 further comprises a hopper 135 for storing a plurality of additive release assemblies 115. The hopper 135 is configured to dispense individual additive release assemblies 115 into each receptacle 138a of the carousel 138. Each additive release assembly 115 is located on the first layer 124 in the receptacle 138a.

The apparatus 130 further comprises a second bobbin 136 for storing an elongate strip of the second layer 126, as previously described. The second layer 126 is led onto the rotating carousel 138 via a tensioning roller 137. The second layer 126 extends over the receptacles 138a, and so overlies the additive release assemblies 115 and first layer 124 in the receptacles 138a.

Each receptacle 138a is sequentially provided with the first layer 124, an additive release assembly 115 and the second layer 126 in that order. Preferably, the carousel

138 rotates (clockwise as shown) adjacent to the static first and second bobbins 134,136 and hopper 135 in order to receive the assemblies of the additive release assemblies unit in the correct order. The first and second layers 124,126, and optionally the additive release assemblies 115, are provided with adhesive by one or more adhesive applicators (not shown). The first and second layers 124,126, and optionally the additive release assemblies 115, are preferably adhered together on the carousel.

The formed additive release assembly unit 120 is drawn from the carousel 120 as a plurality of additive release assembly units 120 connected by the continuous first and second layers 124,126 forming the web 122. The longitudinal spacing between a last additive release assembly 115 and a first additive release assembly 15 in consecutive additive release assembly units 120 is preferably larger than the longitudinal spacing between additive release assemblies 115 in the same additive release assembly unit 120. In particular, the web 122 has an extended length between additive release assembly units 120 without an additive release assembly 115. This arrangement of additive release assemblies 115 is provided by the hopper 135 dispensing the additive release assemblies 115 for an additive release assembly unit at a first interval, and in particular, into consecutive receptacles 138a. After dispensing the additive release assemblies 114 for one additive release assembly unit, the hopper 135 is configured to dispense the next additive release assembly after a second interval, which is greater than the first interval. Preferably, the second interval is twice the first interval, such that one receptacle 138a is left empty between additive release assembly units.

One or more filters are formed comprising one or more additive release assemblies and filtration material. The connected additive release assemblies are drawn along with filtration material into a cylindrical form. The cylinder of filtration material with the connected additive release assemblies is then wrapped in a porous sheet material (e.g. plugwrap) to form a filter. The filter may be formed as a continuous rod which is then cut laterally to provide the required number of additive release assemblies in each filter.

Figure 11 shows a plurality of additive release assembly units 140 according to a further embodiment of the present invention. An additive release assembly unit 140 comprises a plurality of discrete additive release assemblies 145. Each additive release assembly 145 preferably comprises a hemispherical shell for containing additive release components, for example, containing a flavourant or water. The additive release assemblies 145 are integrally formed with a web connecting the additive release assemblies 145 together. The additive release assemblies are longitudinally spaced in the web, as described above. The web comprises a first layer 144 which is integrally formed with the additive release components 145, and in particular, is integrally formed with the hemispherical shells. The first layer 144 is in the form of an elongate strip of material which is porous or non-porous to the contained additive in the additive release components. The web further comprises a second layer 146. The second layer 146 is in the form of an elongate strip of material which is porous or non-porous to the additive. The first and second layers 144,146 provide the outer encapsulation of the additive release assemblies 145.

The first and second layers 144,146 are separate pieces of sheet material, which are unconnected prior to attachment to form the additive release assemblies 115. The first and second layers 144,146 are preferably laminated together. The lamination comprises a major surface of the first layer 144 being affixed to a major surface of the second layer 146, preferably with an adhesive.

The first and second layers 144,146 define the outer encapsulation shells between them, and contain the additive release component contents. The first and second layers 144,146 are preferably formed of cellulose acetate.

The additive release components unit 140 is manufactured by providing the laminar first layer 144 with a plurality of recesses formed therein, preferably in the form of hemispheres. The fluid contents are dispensed into each recess, which forms part of an additive release component 145. The second layer 146 is applied to the first layer 144, over an open side of the recesses. The second layer 146 completes the additive release component 145, and seals the fluid within the additive release component.

The second layer 146 is affixed to the first layer, preferably by lamination over their whole surfaces which are in contact.

Figure 12 shows a process and apparatus 150 for forming additive release assemblies 155, which are similar to the additive release assemblies 145 described with respect to Figure 11. The additive release assemblies 155 are substantially rectangular in plan view. The process described is also applicable to the hemispherical additive release assemblies 145 described with respect to Figure 11.

The process 150 comprises providing a laminar first layer of sheet material 154, substantially as described above. The first layer 154 has recesses formed by a forming unit 151. The forming unit 151 preferably forms the recesses 152 by thermo-forming. The recesses 152 are filled with additive release components 157 containing additive. A laminar second layer of sheet material 156 is located on top of the first layer 154, and covering the recesses 152. The second layer 156 is affixed to the first layer 154 to form a lamination. The second layer 156 is preferably affixed by sealing unit 153 forming a heat seal between the first and second layers. An outer encapsulation is defined by the first and second layers. A continuous unit of additive release assemblies 155 is drawn from the output of the apparatus.

The additive release components may be capsules having an outer shell, containing additive fluid (liquid or powder) in an interior cavity. The outer shell of each additive release component is frangible to release all of the additive on application of pressure.

The filter may comprise a reaction surface against which the additive release component can be urged, in order to facilitate release of additive. In particular, the additive release components may be located on a periphery of the filter. The radially adjacent filtration material may provide a reaction surface against which the additive release component can be urged. Preferably, the filtration material may be relatively hard (e.g. by containing an increased amount of plasticiser) to form the reaction surface, and may have a hardness on the Filtrona scale of more than 90%. The additive release components may be located within the filtration material, or may be

located in a cavity adjacent to the filtration material. The cavity may be formed by an elongate inner rod of filtration material, which one or two annular outer sections of filtration material surround. A covering layer forming an exterior of the filter is attached to one or both of the outer sections of filtration material, and spaced from the inner rod to define a cavity. Preferably, the inner rod is harder than the annular outer sections, optionally by containing more plasticiser.

Alternatively, each additive release component may release its additive contents in a plurality of discrete doses, preferably actuated by a plurality of separate applications of pressure. This type of additive release component may comprise a resiliently or plastically deformable outer shell, preferably configured to release additive through a slit formed in a pre-determined area. Alternatively, this type of additive release components may comprise a porous absorbent substrate having an open cell structure (e.g. open cell foam), in which the additive is contained. The substrate may be at least partially resiliently deformable. The substrate is surrounded by an outer shell to retain the additive, which may be frangible, resiliently deformable, plastically deformable, or a thin coating. The substrate may form discrete additive release components, or may be in the form of an annulus in the first filter section. Alternatively, this type of additive release component may comprise a porous matrix containing the additive in discrete cavities and having a closed cell structure (e.g. closed cell foam), which is plastically deformable to release the additive.

The additive release components may be individually attached to the filter or substrate. Alternatively, the additive release components may be connected by a web, and may be connected between laminated strips of sheet material. Alternatively, the strips of sheet material may form the additive release components, such that the additive release components do not have a separate outer shell, and the strips of sheet material contain the additive.

The additive release components have been described as manually manipulated to release the additive. Alternatively, a movable part may be configured such that movement of the movable part around an exterior of the smoking article releases additive from at least one of the additive release components. The movement is

preferably sliding or rotation, by a ring or C-shaped clip, over an external surface of the filter. The filter may provide a reaction surface, against which the additive release components are urged by the movable part. The additive release components may be located in one or more grooves, extending circumferentially, longitudinally or helically. Alternatively, the movable part comprises a covering layer defining two adjacent surfaces, wherein the additive release components are located between the adjacent surfaces such that relative movement of the adjacent surfaces of the covering layer releases additive from at least one of the additive release components.

The additive release components have been described as spherical. Alternatively, the additive release components may be elongate, with a longitudinal axis extending parallel to a longitudinal axis of the filter. The elongate additive release component preferably has a circular or elliptical cross-section, and contain more additive than an additive release component of the same diameter. The elongate additive release component preferably has a maximum lateral extent of less than 3.5mm, or less than 3mm, or from 2mm to 3mm. Alternatively, or in addition, the elongate additive release component may have a radial cross-sectional area which is less than 50% of the radial cross-sectional area of the smoking article, and optionally, less than 40% or less than 30%. Such an additive release component is optimised for use in a small diameter smoking article, e.g. having a diameter of 5mm to 6mm, or 6mm to 7mm.

The additive released from the additive release components has been described as being entrained by ventilating air and/or gaseous flow from the tobacco rod. Alternatively, flow containing additive may be selectively released from the filter. The filter comprises a selecting means, preferably in the form of a movable element, preferably rotatable, at a mouthpiece end of the filter. The selecting means, at least a part of which is movable in relation to the first and second flow paths, is configured to select a first flow path, a second flow path, or optionally, an adjustable proportion of the first and second flow paths. The first flow path may correspond to an annular, radially outer flow path, and the second flow path may correspond to a radially inner flow path within the first flow path. Alternatively, first and second half-cylindrical filter parts respectively define the first and second

flow paths, the first and second filter parts arranged together to form a cylindrical filter part. The additive may be initially encapsulated within one or more additive release components (i.e. capsules), prior to being selectively released.

The additive release component is preferably located in a filter, within filtration material. Alternatively, the additive release component may be located in a tobacco rod. Alternatively, the additive release component may be located in a separate section of the smoking article, not surrounded by filtration material. For example, the additive release component may be located in a separate section located between the tobacco rod and filter.

The additive release components may be formed of gelatine, or other additive release component types may be used in combination with a filter of the present invention. For example, an additive release component may be manufactured by a known co-extrusion process. In the co-extrusion process, two fluids may be extruded together so that an additive release component is created by surface tension.

The additive release components may be manufactured by a known co-extrusion process, for an additive release component size of 500μm to 10 mm. In the co-extrusion process, two fluids may be extruded together so that an additive release component is created by surface tension.

The shell fluid may be a warm gelatin solution, and liquid contents, e.g. menthol, are respectively delivered under pressure from separate tanks into a two-fluid nozzle. The shell fluid and liquid contents flow from a nozzle where they form droplets in a carrier fluid, the droplets having an outer shell of shell fluid and an inner core of liquid contents. A cooling mechanism is provided to cool and solidify the shell fluid. Alternatively, the shell material may be alginate, agar-agar, gum arabicum, latices or waxes.

Alternatively, the additive release components may be formed by any suitable process for encapsulating a liquid. For example, the additive release components

may be formed by interfacial polymerisation, which may produce an additive release component size of 0.2μm to a few millimetres. The shell may be made of a polymer, for example, polyester, polyamide, polyurea, polyurethane, or a biodegradable polymer e.g. protein, polysaccharides or oligosaccharides.

Alternatively, the additive release components may be formed by complex coacervation, which may produce a particle size of 10μm to a few millimetres. The additive release component may be made from gelatine and gum arabic.

Alternatively, the additive release components may be formed by single extrusion, which may produce a particle size of 200μm to a few millimetres. The additive release component shell may be made from alginate, chitosan, carrageenan, cellulose derivatives, or waxes.

Alternatively, the additive release components may be formed by melt extrusion, which may produce a particle size of 300μm to a few millimetres. The additive release component shell may be made from gelatine, sugars, maltodextrins, corn syrup, food polymers or modified starches.

Alternatively, the additive release components may be formed by melt injection, which may produce a particle size of 200μm to a few millimetres. The additive release component shell may be made from carbohydrate materials, e.g. sucrose, glucose syrups and modified starches.

Alternatively, the additive release components may be formed by a spray drying microencapsulation process, which may produce a particle size of 10μm to a few millimetres. The additive release component shell may be made from polysaccharides (starch, alginate, agar, pectin, carrageenan, gums), proteins (gelatine, casein), fats and fatty acids, cellulose derivatives, lipids (waxes, shellac, carnuba or beeswax).

Any materials for the additive release components or filter must be safe to use, and are subject to regulatory approval.

Any of the features described in any embodiment may be used in combination with any other features of any other embodiment.

Claims

1. An additive release assembly for a smoking article, comprising:

a plurality of components arranged in a unitary structure, wherein at least one of the components comprises additive, and

the assembly is configured to release additive on application of pressure.

2. The additive release assembly as claimed in claim 1 wherein one or more components comprise one or more outer encapsulation(s) surrounding one or more additive release components.

3. The additive release assembly as claimed in claim 2 wherein the outer encapsulation is configured to selectively allow release of additive on application of pressure.

4. The additive release assembly as claimed in claim 3 wherein the outer encapsulation comprises an outer shell containing one or more additive release components, wherein the outer shell is deformable or frangible to allow release of additive.

5. The additive release assembly as claimed in claim 2 wherein the outer encapsulation is permeable to the additive.

6. The additive release assembly as claimed in any one of claims 2 to 5 wherein the outer encapsulation comprises a first outer encapsulation and a second outer encapsulation,

wherein the first outer encapsulation surrounds the second outer encapsulation, and the second outer encapsulation surrounds the one or more additive release components.

7. The additive release assembly as claimed in claim 6 wherein the second outer encapsulation comprises an outer wall configured to surround the one or more of the additive release components having a first additive, wherein the second outer

encapsulation further contains a second additive, wherein the second outer encapsulation is configured to selectively allow release of the second additive.

8. The additive release assembly as claimed in any one of claims 2 to 7 wherein the outer encapsulation is elongate or spherical.

9. The additive release assembly as claimed in any one of the preceding claims wherein a said component comprises an outer encapsulation having a frangible outer shell, and one or more further said components is contained within the outer encapsulation, and comprises a frangible outer shell containing additive.

10. The additive release assembly as claimed in any one of the preceding claims wherein the plurality of components comprise one or more additive release components substantially connected to one or more additive release components.

11. The additive release assembly as claimed in claim 10 wherein the one or more additive release components comprise an outer shell, and optionally, the outer shell of a said additive release component provides a reaction surface against which a further additive release component is compressible to release additive.

12. The additive release assembly as claimed in claim 10 or 11 wherein the one or more of the components is one or more additive release components having a size different than one or more additive release components in contact.

13. The additive release assembly as claimed in claim 12 wherein the one of the components is a single additive release component having a size substantially greater than a plurality of additive release components affixed to an exterior surface thereof.

14. The additive release assembly as claimed in any one of the preceding claims wherein the one or more additive release components comprise one or more first additive release components containing a first additive, and one or more second

additive release components containing a second additive which is different to the first additive.

15. The additive release assembly as claimed in claim 14 wherein the first additive is configured to react with the second additive when mixed.

16. The additive release assembly as claimed in any one of the preceding claims wherein the additive release components comprise an outer shell containing the additive.

17. The additive release assembly as claimed in any one of the preceding claims wherein the additive in the one or more additive release components is a flavourant or water.

18. The additive release assembly as claimed in any one of the preceding claims wherein an outer encapsulation surrounds components configured to affect filtration, and preferably, the components are carbon, and/or optionally, the material is a solid material.

19. The additive release assembly as claimed in any one of the preceding claims wherein the additive release assembly is configured to release a plurality of discrete deliveries of additive.

20. The additive release assembly as claimed in any one of the preceding claims wherein the additive release assembly is configured to release only a part of the contained additive on each of a plurality of compressions.

21. The additive release assembly as claimed in 1 wherein a said component comprises a substrate,

wherein the substrate defines a closed cell structure or an open cell structure, wherein the cell structure comprises a plurality of spaces defining components containing additive.

22. The additive release assembly as claimed in any one of the preceding claims comprising a plurality of unitary structures, each containing additive.

23. An additive release assembly for a smoking article, comprising:
an outer membrane surrounding one or more additive release components, wherein the one or more additive release components are configured to selectively release additive.

24. The additive release assembly as claimed in claim 23 wherein the outer membrane is frangible, or the outer membrane is porous to the additive.

25. An additive release assembly for a smoking article, comprising a substrate having a cellular structure, wherein the cellular structure comprises additive releasable on application of pressure.

26. An additive release assembly for a smoking article, comprising a plurality of additive release components connected together to form a unitary structure, wherein each additive release component is configured to selectively release additive.

27. A filter for a smoking article comprising the additive release assembly as claimed in any one of the preceding claims.

28. A smoking article comprising the additive release assembly as claimed in any one of claims 1 to 26.

29. A method of manufacturing an additive release assembly, comprising:
forming one or more additive release components, and
forming an outer encapsulation around the one or more additive release components.

30. An additive release assembly substantially as hereinbefore described with reference to any one of the drawings.

Application No:	GB1108028.0	**Examiner:**	Dr Steven Chadwell
Claims searched:	1-22; 27, 28 and 30 in part	**Date of search:**	4 October 2011

Patents Act 1977: Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1-4, 6, 8-21, 27 & 28 at least	EP 0292949 A2 (JAPAN TOBACCO) see whole document
X	1-4, 6, 8-14, 16-21, 27 & 28 at least	WO 03/009711 A1 (KIM) see figure 4 and page 7 lines 19-26 in particular
X	1-4, 6, 8-11, 14, 16-21, 27 & 28	US 2009/277465 A1 (KARLES et al) see figures 7A and 8, and paragraphs [0078]-[0080], [0088] and [0090] in particular
X	1-4, 6, 8-11, 14, 16-21, 27 & 28 at least	US 2008/163877 A1 (ZHUANG et al) see figure 3 and paragraph [0024] in particular
X	1-4, 6, 8-11, 16-21, 27 & 28 at least	US 2009/288669 A1 (HUTCHENS) see figures 2 and 3D, and paragraphs [0027], [0045], [0054] and [0077] in particular
X	1-4, 6, 8-11, 16-21, 27 & 28	US 3530861 A (CARTY) see whole document
X	1-4, 6, 8-11, 16, 18, 21, 27 & 28 at least	GB 1133885 A (HOMBURGER) see whole document

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC[X] :

Worldwide search of patent documents classified in the following areas of the IPC

A24D

The following online and other databases have been used in the preparation of this search report

WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
A24D	0003/06	01/01/2006
A24D	0003/04	01/01/2006

Application No:	GB1108028.0	**Examiner:**	Dr Steven Chadwell
Claims searched:	23 and 24; 27, 28 and 30 in part	**Date of search:**	8 February 2012

Patents Act 1977
Further Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	23, 24, 27 & 28	NL 1017166 C2 (BRON) see the figure, the EPODOC abstract and also WPI Abstract Accession No. 2002-730281 [79]
X	23, 24, 27 & 28	GB 1133885 A (HOMBURGER) see whole document
X	23, 24, 27 & 28	US 2009/288669 A1 (HUTCHENS) see paragraph [0055]

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International Classification:

Subclass	Subgroup	Valid From
A24D	0003/06	01/01/2006
A24D	0003/04	01/01/2006

Application No: GB1108028.0 **Examiner:** Dr Steven Chadwell

Claims searched: 25; 27, 28 and 30 in part **Date of search:** 8 February 2012

Patents Act 1977
Further Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	25, 27 & 28	GB 1255306 A (H-2-O FILTER) see whole document
X	25, 27 & 28	GB 1252395 A (H-2-O FILTER) see whole document, especially figure 3
X	25, 27 & 28	US 2009/288669 A1 (HUTCHENS) see figure 2 and paragraphs [0027] and [0076]
X	25, 27 & 28	US 2009/277465 A1 (KARLES et al) see figure 8 and paragraph [0090]
X	25, 27 & 28	US 3602231 A (DOCK) see whole document
X	25, 27 & 28	WO 03/009711 A1 (KIM) see figure 6 and page 8 lines 16-25

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&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

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A24D

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WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
A24D	0003/06	01/01/2006
A24D	0003/04	01/01/2006

Application No:	GB1108028.0	**Examiner:**	Dr Steven Chadwell
Claims searched:	26; 27, 28 and 30 in part	**Date of search:**	8 February 2012

Patents Act 1977
Further Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	26, 27 & 28	US 2009/288669 A1 (HUTCHENS) see paragraph [0055]
X	26, 27 & 28	US 2008/163877 A1 (ZHUANG et al) see figure 3 in particular
X	26, 27 & 28	US 2009/277465 A1 (KARLES et al) see figure 7A and paragraphs [0078]-[0080]
X	26, 27 & 28	WO 03/009711 A1 (KIM) see figure 4 and page 7 lines 19-26
X	26, 27 & 28	GB 1133885 A (HOMBURGER) see whole document

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Worldwide search of patent documents classified in the following areas of the IPC

A24D

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WPI, EPODOC

International Classification:

Subclass	Subgroup	Valid From
A24D	0003/06	01/01/2006
A24D	0003/04	01/01/2006