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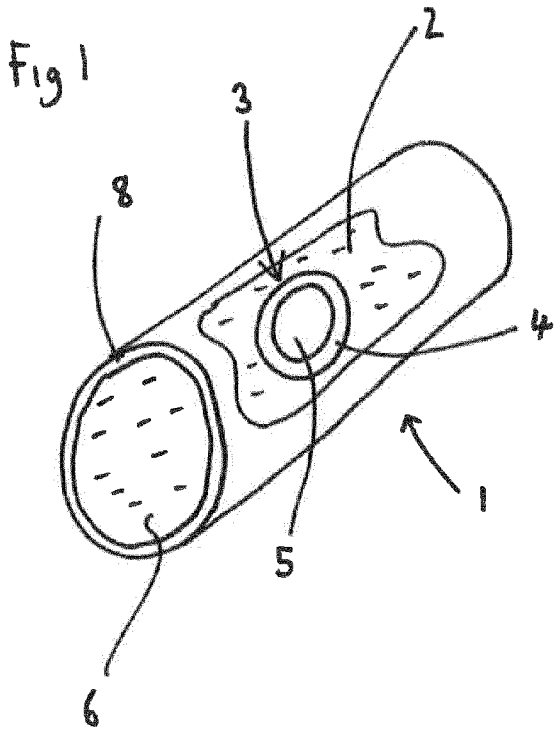

(57) Abstract: A tobacco smoke filter or filter element comprising: a longitudinally extending core of tobacco smoke filtering material; a receptacle for a first additive; and a further additive located on and/or in the tobacco smoke filtering material; wherein the further additive is applied to the tobacco smoke filtering material as a solution comprising the further additive dissolved in a plasticiser.

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Tobacco Smoke Filter

The present invention relates to tobacco smoke filters for smoking articles such as cigarettes, in particular filters which include one or more (e.g. flavour containing) frangible capsules.

Tobacco smoke filters which include a frangible capsule, or a plurality of frangible capsules, are well-known. These capsules contain an additive (typically a liquid flavouring agent) and the smoker applies pressure to the filter to break the capsule therein in order to release the flavouring agent. The smoker would usually break the capsule immediately prior to smoking, although he may choose to break it at any stage of the smoking process (or not at all). Such capsule filter products are consequently known as 'flavour-on-demand', indicating that the smoker chooses when, and if, he requires the release of flavour contained within the capsule. However, the most common type of capsule product – a filter with a single capsule - suffers from the disadvantage that the smoker either has to choose between no flavour (when the capsule is intact) or a large dose of flavour (when the capsule is ruptured). This can be overcome by applying a flavour (typically menthol) to the filter in addition to that in the capsule, so that the initial product is flavoured and the rupturing of the capsule then either provides a flavour boost or a change of flavour. Applying flavour to the filter also provides a greater aroma when the pack is opened.

A disadvantage with adding flavours to a capsule filter is that there can be an interaction with the capsule causing it to weaken or prematurely fail. This is the case when propylene glycol is used as the solvent for the flavouring agent. Tests showed a reduction of around 40% in the crush strength of a typical capsule used in cigarette filters after immersion in propylene glycol for one hour and there was also a higher variability in crush strength after immersion. Propylene glycol is the most commonly used solvent for menthol crystals, for example as a 70:30 mix of menthol crystals: propylene glycol. However, as discussed above, propylene glycol does degrade certain capsule shell materials - e.g. causing a reduction in shelf-life. Accordingly, propylene glycol is considered unsuitable for use with capsule filters.

Another means of adding menthol to a filter is to apply molten menthol to the filter. Suitable equipment for this purpose is available from SPI Developments or Köhl Group. In such equipment, menthol crystals are taken above their melting temperature and then injected into the filter by means of fluid pressure, gravity or compressed air. However, recrystallization of the menthol from the molten state leads to undesirable changes within the capsule. It is also possible to apply molten menthol to the plugwrap of a capsule filter, but this is limited to low application levels (c. 0.2mg/linear mm) due to the absorbency

characteristics of the plugwrap. Accordingly, it is desirable to add menthol to a filter containing a capsule, or plurality of capsules, in such a way that does not make use of propylene glycol, avoids stability issues associated with molten menthol and can provide high levels of menthol addition in order to give the user a high initial menthol taste sensation without the necessity of having to rupture the capsule.

According to the present invention there is provided a tobacco smoke filter or filter element comprising:

a longitudinally extending (e.g. substantially cylindrical) core of tobacco smoke filtering material;

a receptacle (e.g. a capsule, e.g. a frangible capsule) for a first additive [e.g. a (first) flavouring agent]; and

a further additive [e.g. (further) flavouring agent] located on and/or in the tobacco smoke filtering material;

wherein the further additive [e.g. (further) flavouring agent, e.g. menthol] is applied to the tobacco smoke filtering material as a solution comprising the further additive [e.g. (further) flavouring agent] dissolved in a plasticiser.

The filter or filter element may include plasticiser in an amount which is 4 to 20% by weight of the tobacco smoke filtering material, for example 8 to 20% by weight of the tobacco smoke filtering material, for example 9 to 20% by weight of the tobacco smoke filtering material, for example 9 to 19% by weight of the tobacco smoke filtering material, for example 9 to 17% by weight of the tobacco smoke filtering material.

Preferably, the filter or filter element includes plasticiser in an amount which is 4 to 17% by weight of the tobacco smoke filtering material, for example 9 to 17% by weight of the tobacco smoke filtering material.

The applicants have found that the problems above may be overcome by dissolving menthol (e.g. natural menthol crystals or synthetic menthol) in triacetin, or other plasticiser which does not adversely affect receptacle (capsule) integrity, and then applying this solution, e.g. by spraying or injecting, onto or into a filter containing a frangible capsule, or plurality of frangible capsules. The applicants method/filter allows high flavour (e.g. menthol) loading on the filtering material (which gives the user a high initial flavour/menthol taste sensation without their having to rupture the capsule), while avoiding problems associated with the stability of molten menthol, and also avoiding reagents (e.g. propylene glycol) which weaken/destroy the capsule.

According to the present invention in a further aspect there is provided a tobacco smoke filter or filter element comprising:

a longitudinally extending (e.g. substantially cylindrical) core of tobacco smoke

filtering material;

a receptacle (e.g. a capsule, e.g. a frangible capsule) for a first additive [e.g. a (first) flavouring agent];

a further additive [e.g. (further) flavouring agent] located on and/or in the tobacco smoke filtering material; and

a plasticiser; wherein the plasticiser is present in an amount which is 4 to 20% by weight of the tobacco smoke filtering material, for example 4 to 17% by weight of the tobacco smoke filtering material, for example 9 to 17% by weight of the tobacco smoke filtering material.

The filter or filter element may include plasticiser in an amount which is 4 to 20% by weight of the tobacco smoke filtering material, for example 8 to 20% by weight of the tobacco smoke filtering material, for example 9 to 20% by weight of the tobacco smoke filtering material, for example 9 to 19% by weight of the tobacco smoke filtering material, for example 9 to 17% by weight of the tobacco smoke filtering material.

Preferably, the filter or filter element includes plasticiser in an amount which is 4 to 17% by weight of the tobacco smoke filtering material, for example 9 to 17% by weight of the tobacco smoke filtering material.

According to the present invention in a further aspect there is provided a tobacco smoke filter or filter element comprising:

a longitudinally extending core of tobacco smoke filtering material;

a receptacle for a first flavouring agent;

a further flavouring agent located on and/or in the tobacco smoke filtering material; and

a plasticiser; wherein the plasticiser is present in an amount which is 8 to 20% by weight of the tobacco smoke filtering material, for example 9 to 20% by weight of the tobacco smoke filtering material, for example 9 to 17% by weight of the tobacco smoke filtering material.

The applicants have found that filters and filter elements according to aspects of the invention are capable of carrying a high load of flavouring agent and plasticiser, without degrading the receptacle (e.g. capsule). Thus, according to aspects of the invention it is possible to add flavouring agent (e.g. menthol) to a filter containing a capsule, or plurality of capsules, while avoiding use of propylene glycol and avoiding stability issues associated with molten menthol. Filters and filter elements according to aspects of the invention may provide high levels of menthol addition in order to give the user a high initial menthol taste sensation without the necessity of having to rupture the capsule.

The longitudinally extending (e.g. substantially cylindrical) core comprises tobacco

smoke filtering material. The tobacco smoke filtering material may be, for example, any of those materials (usually filamentary, fibrous, web or extruded) which are conventionally employed for tobacco smoke filter manufacture. The tobacco smoke filtering material may be, for example, natural or synthetic filamentary tow, e.g. of cotton or plastics such as polyethylene or polypropylene, or cellulose acetate filamentary tow. It may comprise, for example, natural or synthetic staple fibres, cotton wool, a web material such as paper (usually creped), an (e.g. synthetic) non-woven material, and/or an extruded material (e.g. starch, synthetic foams, extruded foams).

Preferably, the filtering material is cellulose acetate (e.g. in the form of a filamentary tow). The filtering material may be cellulose acetate to which a plasticiser has (already) been applied (e.g. plasticised filamentary tow). Triacetin is, as is well known in the art, typically applied to cellulose acetate filters as a plasticiser (e.g. at around 6-8% w/w). Triacetin may be applied to cellulose acetate as normal (i.e. without menthol dissolved therein) to plasticize the filter, preferably via a separate step within the same in-line process. In other words, it is preferred that a plasticiser (triacetin) is applied to the cellulose acetate in two stages. In one stage the plasticiser (triacetin) is applied to the cellulose acetate alone, to plasticise the cellulose acetate. In another stage both plasticiser and flavouring agent are applied to the cellulose acetate, as a solution of flavouring agent in the plasticiser, to load the flavouring agent on to the filtering material (plasticised cellulose acetate), according to the invention. It is also possible to add the menthol to the plasticiser triacetin (albeit at a lower concentration level of menthol in the triacetin) and apply the plasticiser to the cellulose acetate (to plasticise it) in a single operation, but this is less preferred.

Preferably the receptacle (e.g. a capsule, e.g. a frangible capsule) for the first additive is located in (e.g. is fully enclosed within) the longitudinally extending (e.g. substantially cylindrical) core. Preferably the receptacle is a capsule, for example a frangible capsule. Frangible or breakable capsules for filters are well known in the art. The frangible or breakable capsule may include a frangible/breakable outer layer or shell which surrounds the (first) additive [e.g. a (first) flavouring agent]. The (first) additive [e.g. a (first) flavouring agent] may be in the form of a liquid, such that the additive is held within the outer layer/shell (e.g. within an enclosure defined by the inner surface of the outer layer/shell). The outer layer/shell of the capsule may comprise gelatin. The outer layer/shell may comprise one or more of gelatin, gellan gum, agar, an alginate, a carrageenan, a pectin, arabic gum, ghatti gum, pullulan gum, mannan gum or modified starch. The thickness of the outer layer (shell) of the capsule may be 10-500 microns, preferably 30-150 microns, more preferably 50-80 microns. The outer diameter of the

capsule may be 2 to 8 mm, for example 3 to 7 mm, for example 3 to 5 mm, for example 3.5 to 4.5 mm.

Preferably the first additive is a (first) flavouring agent. Preferably the first additive is in the form of a liquid. The (first) flavouring agent may be any flavouring agent known for use in tobacco smoke filters or filter elements. For example, the flavouring agent may be menthol, spearmint, peppermint, nutmeg, cinnamon, clove, lemon, chocolate, peach, strawberry, vanilla etc. The first additive [e.g. (first) flavouring agent] may contain nicotine or a salt or derivative thereof. Preferably the (first) flavouring agent is menthol.

The filter or filter element comprises a further additive [e.g. (further) flavouring agent] located (e.g. disposed, e.g. dispersed) on and/or in the tobacco smoke filtering material. Preferably the further additive is a (further) flavouring agent. The further flavouring agent may be any flavouring agent known for use in tobacco smoke filters or filter elements. For example, the further flavouring agent may be menthol, spearmint, peppermint, nutmeg, cinnamon, clove, lemon, chocolate, peach, strawberry, vanilla etc. The further additive [e.g. (further) flavouring agent] may contain nicotine or a salt or derivative thereof. Preferably the further flavouring agent is menthol. The first and further flavouring agents may be the same or different.

The further additive [e.g. (further) flavouring agent] is applied to the tobacco smoke filtering material as a solution comprising the further additive [e.g. (further) flavouring agent] dissolved in a plasticiser. The plasticiser may be any plasticiser, for example any plasticiser which is known for use with a tobacco smoke filtering material. Preferably the plasticiser is triacetin. Preferably the solution comprises further additive [e.g. (further) flavouring agent] dissolved in the plasticiser (e.g. triacetin) wherein the concentration of plasticiser (e.g. triacetin) in the solution is 5% to 40%, preferably 10% to 30%, more preferably 20% (plasticiser).

The filter may further comprise a wrapper engaged around the longitudinally extending (e.g. substantially cylindrical) core. The wrapper may be a paper, e.g. plugwrap paper and may be coated to minimise absorption of liquids released from the ruptured capsule, as is well-known in the prior art. The wrapper may include a still further (e.g. third) flavouring agent located thereon, which may be any flavouring agent known for use in tobacco smoke filters or filter elements (e.g. the flavouring agent may be menthol, spearmint, peppermint, nutmeg, cinnamon, clove, lemon, chocolate, peach, strawberry, vanilla etc.).

A filter according to the invention may be used on its own e.g. as a single segment filter. Such filters are well known in the art. A filter element according to the invention may be used as a segment, for example the mouth end segment, of a multi-segment filter, e.g. a

dual, triple, or other multiple filter. A filter element according to the invention may be used as another e.g. upstream segment, of a multi-segment filter - for example the tobacco end segment, middle segment etc. of a multi-segment filter, e.g. a dual, triple, or other multiple filter. Multi-segment filters are well known in the art. The other elements of the multi-segment filter – e.g. those which are not according to the invention - may comprise activated carbon or other particulate additive(s), flavouring agent(s) etc.. Filters according to the invention, or filters incorporating a filter element according to the invention, may be used (made, sold) as stand-alone filters for later inclusion in a cigarette, for example for use by smokers who assemble their own cigarettes (that is as a roll-your-own product).

The tobacco smoke filter or filter element may be of length 12 to 40 mm, e.g. 15 to 35 mm, e.g. 20 to 30 mm.

The tobacco smoke filter (or filter element) may be of circumference 14 to 28 mm, for example 16 to 26mm, for example 16 to 17 mm or 24 to 25 mm.

In a filter cigarette according to the invention, a filter of the invention (or a filter which includes a filter element of the invention) is joined to a wrapped tobacco rod with one end of the filter towards the tobacco. The filter may be joined to the wrapped tobacco rod by ring tipping [which engages around just the adjacent ends of the (wrapped) filter and rod to leave much of the filter wrap exposed], for example transparent ring tipping. The filter may be joined by a full tipping overwrap (which engages around the full filter length and the adjacent end of the tobacco rod). The full tipping overwrap may be transparent.

The filter, filter element or filter cigarette according to the invention may be ventilated by methods well known in the art, e.g. by use of a pre-perforated or air-permeable wrapper, and/or laser perforation of the wrapper and, if present, tipping overwrap. A ventilating full tipping overwrap may likewise be inherently air-permeable or provided with ventilation holes, and in ventilated products where both outer wrapper and tipping overwrap are present ventilation through the overwrap will usually (and preferably) be in register with that through the plugwrap. Ventilation holes through the filter outer wrapper, or through a tipping overwrap, or through both simultaneously, may be made by laser perforation during filter or filter cigarette production, as is well known in the art.

According to the invention in a further aspect there is provided a multiple rod comprising a plurality (e.g. 2, 4, 6 etc.) of filters (or filter elements) as described above and/or herein integrally joined end-to-end in a mirror image relationship.

According to the present invention in a further aspect, there is provided a method of making a tobacco smoke filter or filter element [e.g. tobacco smoke filter or filter element comprising a longitudinally extending (e.g. substantially cylindrical) core of tobacco smoke filtering material; a receptacle (e.g. a capsule, e.g. a frangible capsule) for a first additive

[e.g. a (first) flavouring agent] located in (e.g. fully enclosed within) the longitudinally extending (e.g. substantially cylindrical) core; and a further additive [e.g. (further) flavouring agent] located on and/or in the tobacco smoke filtering material;] the method comprising the steps of:

(a) continuously advancing, longitudinally, a train of tobacco smoke filtering material (e.g. a train of tobacco smoke filtering material to which a plasticiser (e.g. triacetin) has been applied);

(b) applying a solution comprising a further additive [e.g. (further) flavouring agent] dissolved in a plasticiser (e.g. triacetin) to the advancing tobacco smoke filtering material;

(c) inserting receptacles (e.g. capsules, e.g. a frangible capsules) for a first additive into the advancing tobacco smoke filtering material (to which the additive has been applied), at (e.g. predetermined, e.g. longitudinally spaced) locations along the (e.g. advancing) train of tobacco smoke filtering material;

(d) gathering and securing the advancing tobacco smoke filtering material around the receptacles to form a continuous product rod comprising a longitudinally extending (e.g. substantially cylindrical) core of tobacco smoke filtering material engaged around the (e.g. longitudinally spaced) receptacles; and

(d) cutting the resulting continuous product rod.

The solution may be applied to the advancing tobacco smoke filtering material by, for example, spraying or injecting the solution. The solution is preferably applied directly to the filtering material by a spray nozzle within the stuffer jet assembly (as is well-known in the prior art) to evenly distribute the solution over a wide area of filter material. The spraying may take place in-line immediately before capsules are inserted into the filtering material (again using methods well-known in the prior art).

The further additive [e.g. (further) flavouring agent] is applied to the tobacco smoke filtering material as a solution comprising the further additive [e.g. (further) flavouring agent] dissolved in a plasticiser. The plasticiser may be any plasticiser, for example any plasticiser which is known for use with a tobacco smoke filtering material. Preferably the plasticiser is triacetin. Preferably the solution comprises further additive [e.g. (further) flavouring agent] dissolved in the plasticiser (e.g. triacetin) wherein the concentration of plasticiser (e.g. triacetin) in the solution is 5% to 40%, preferably 10% to 30%, more preferably 20% plasticiser.

The tobacco smoke filtering material may be, for example, any of those materials (usually filamentary, fibrous, web or extruded) which are conventionally employed for tobacco smoke filter manufacture. The tobacco smoke filtering material may be, for example, natural or synthetic filamentary tow, e.g. of cotton or plastics such as

polyethylene or polypropylene, or cellulose acetate filamentary tow. It may comprise, for example, natural or synthetic staple fibres, cotton wool, a web material such as paper (usually creped), an (e.g. synthetic) non-woven material, and/or an extruded material (e.g. starch, synthetic foams, extruded foams).

Preferably, the filtering material is cellulose acetate (e.g. in the form of a filamentary tow). The filtering material may be cellulose acetate to which a plasticiser has (already) been applied (e.g. plasticised cellulose acetate). Triacetin is, of course, typically applied to cellulose acetate filters as a plasticiser (e.g. at around 6-8% w/w). Triacetin may be applied to cellulose acetate as normal (i.e. without menthol dissolved therein) to plasticize the filter, preferably via a separate step within the same in-line process. In other words, it is preferred that a plasticiser (triacetin) is applied to the cellulose acetate in two stages. In one (e.g. first) stage the plasticiser (e.g. triacetin) is applied to the cellulose acetate alone, to plasticise the cellulose acetate. In the other (e.g. second) stage both plasticiser (e.g. triacetin) and flavouring agent are applied to the cellulose acetate, as a solution of flavouring agent in the plasticiser, to load the flavouring agent on to the filtering material (plasticised cellulose acetate), according to the invention. It will be appreciated that the plasticisers used in the first and second stages may be the same or different. For a two stage application, the plasticiser may be applied in the first stage in an amount which is 3 to 12% by weight of the tobacco smoke filtering material. In other words, the tobacco smoke filtering material may be tobacco smoke filtering material to which a plasticiser has been applied in an amount which is 3 to 12% by weight of the tobacco smoke filtering material. In the second stage, the solution comprising further additive [e.g. (further) flavouring agent, e.g. menthol] dissolved in plasticiser (e.g. triacetin) is applied such that the additional plasticiser (in the solution) is applied to the tobacco smoke filtering material in an amount which is 1 to 5% by weight of the tobacco smoke filtering material. It will be understood that application of a plasticiser:menthol solution which includes plasticiser at a concentration of 40%, such that the plasticiser (in the solution) is applied to the tobacco smoke filtering material in an amount which is 1% by weight of the tobacco smoke filtering material, gives a minimum menthol loading of 1.5 % by weight of tow in the finished filter. Application of a solution which includes plasticiser at a concentration of 20%, such that the plasticiser (in the solution) is applied to the tobacco smoke filtering material in an amount which is 5% by weight of the tobacco smoke filtering material, gives a (theoretical) maximum menthol loading of 25%. Thus, for a 15mm length tip x 25mm circumference filter tip, for which the tow weight would be expected to be in the range 60-110mg, it is possible to obtain a menthol loading of around 2.5 – 22.5 mg/tip.

It is also possible to add the menthol to the plasticiser triacetin (albeit at a lower

concentration level of menthol in the triacetin) and apply the plasticiser to the cellulose acetate (to plasticise the cellulose acetate) in a single operation, but this is less preferred. In this, less preferred, example, the solution comprises further additive [e.g. (further) flavouring agent] dissolved in the plasticiser (e.g. triacetin) wherein the concentration of plasticiser (e.g. triacetin) in the solution is 50% to 95%, preferably 60% to 90%, more preferably around 70% plasticiser. This would allow a 3mg menthol loading on 60mg tow with the desired minimum 5% menthol level.

The present invention will now be illustrated with reference to the following Examples and the attached drawing in which **FIGURE 1** illustrates a view, part cut away, of a filter according to an example of the invention.

Figure 1 shows an example of a tobacco smoke filter 1 according to an example of the invention. Tobacco smoke filter 1 includes a longitudinally extending, cylindrical, core 2 of length 30mm and circumference around 25 mm. The core 2 comprises a filamentary tow of cellulose acetate tobacco smoke filtering material having 3 denier per filament and 35,000 total denier which has been plasticised with triacetin (at around 6- 8%w/w), as is well known in the art. The core 2 includes a spherical frangible capsule 3 of diameter 4 mm fully enclosed within the longitudinally extending, cylindrical, core 2. The frangible capsule 3 includes a frangible/breakable outer layer or shell 4 of gelatin which surrounds a first additive, first flavouring agent, in the form of a menthol solution 5. The menthol solution 5 is held within the outer layer/shell 4 within an enclosure defined by the inner surface of the outer layer/shell. This kind of capsule construction is well known in the art.

The core 2 includes a further additive, further flavouring agent, in the form of menthol 6 which is dispersed on and in the tobacco smoke filtering material. The menthol 6 is applied to the tobacco smoke filtering material as a solution comprising the menthol dissolved in triacetin (plasticiser), wherein the concentration of plasticiser (e.g. triacetin) in the solution is 20%, by the method set out below. The filter includes plasticiser in a total amount which is about 9 to 11% by weight of the tobacco smoke filtering material.

The filter includes a wrapper 8 of paper which is engaged around the core 2 and held in place by a lapped and stuck seam, as is well known in the art.

The filter 1 may be joined to a wrapped tobacco rod (not shown) with the upstream end of the core 2 towards the tobacco, to form a filter cigarette. The filter 1 may be joined to the wrapped tobacco rod by ring tipping [which engages around just the adjacent ends of the (wrapped) filter and rod to leave much of the wrapper 8 exposed], by methods which are well known in the art. In an alternative embodiment, the filter may be joined by a full tipping overwrap (which engages around the full filter length and the adjacent end of the tobacco rod).

The filter or filter element of Figure 1 may be made by an adaptation of conventional methods and apparatus for making capsule filters, for example using an adapted version of the method and apparatus described in US2005/007049. Capsule filters are generally made using a rod-forming unit together with a capsule insertion unit, both of which are known. The capsule insertion unit is capable of placing objects (e.g. frangible capsules 3) at predetermined intervals within a longitudinally advancing continuous length of filter material (e.g. cellulose acetate tow) which is supplied from a source such as a storage bale. The filter material is supplied from the bale and processed using a filter material processing unit (as is well known) and plasticised using a plasticiser unit (as is also well known) to form e.g. plasticised cellulose acetate tow. The continuous length of filter material (e.g. plasticised cellulose acetate tow) is pulled through a block by the action of the rod-forming unit and individual capsules are inserted at predetermined intervals within the web of filter material (by the capsule insertion unit) within the rod-forming unit. The filter material is directed into a gathering means of the rod-forming unit, as is well known. The gathering means can have a tongue and horn configuration, a gathering funnel configuration, stuffer or transport jet configuration, or the like, and is adapted for use according to the invention as set out below. The gathering means provides for further gathering, compaction, conversion or formation of the cylindrical composite from block into an essentially cylindrical (i.e., rod-like) shape whereby the continuously extending strands or filaments of cellulose acetate tow extend essentially along the longitudinal axis of the cylinder so formed. The filter material, which has been compressed into a cylindrical composite, is fed into a wrapping mechanism, which includes endless garniture conveyer belt or other garniture means, as is well known. The wrapping mechanism provides a strip of plugwrap paper to the outer surface of the cylindrical composite in order to produce a continuous wrapped rod, the product rod. The product rod, a continuous length of filter material which has capsules incorporated therein at predetermined, spaced intervals, is passed through the rod-forming unit thereby forming a continuous rod, which can be subdivided by severing means into a plurality of rods which are collected and processed in the known manner.

Thus, according to this example of the invention, a train of tobacco smoke filtering material in the form of plasticised cellulose acetate filtering material is continuously advanced, longitudinally, into the rod forming unit, and the capsule insertion unit is used to insert frangible capsules including menthol into the advancing tobacco smoke filtering material at predetermined, longitudinally spaced, locations along the advancing train of tobacco smoke filtering material. A solution comprising menthol dissolved in triacetin [the solution having a concentration of triacetin of 20%] is applied to the advancing tobacco

smoke filtering material by a spray nozzle within the gathering means [e.g. stuffer jet assembly – adaptation of the gathering means in this way would be readily understood and achieved by the person skilled in the art] of the rod forming unit, the spraying taking place in-line immediately before the capsules are inserted into the filtering material by the capsule insertion unit. The advancing tobacco smoke filtering material is gathered around the capsules by the rod former to form a continuous product rod comprising a longitudinally extending substantially cylindrical core of tobacco smoke filtering material engaged around the capsules. The continuous product rod is wrapped (by conventional means), and the wrapper secured in place using a lapped and stuck seam. The resulting continuous product rod is then cut by methods known in the art.

The applicants have found that known problems associated by inclusion of menthol in capsule filters above may be overcome by dissolving menthol (e.g. natural menthol crystals or synthetic menthol) in triacetin, or other plasticiser which does not adversely affect receptacle (capsule) integrity, and then applying this solution, e.g. by spraying or injecting, onto or into a filter containing a frangible capsule, or plurality of frangible capsules. The applicants method/filter allows high flavour (e.g. menthol) loading on the filtering material (which gives the user a high initial flavour/menthol taste sensation without their having to rupture the capsule), while avoiding problems associated with the stability of molten menthol, and also avoiding reagents (e.g. propylene glycol) which weaken/destroy the capsule.

Claims

1. A tobacco smoke filter or filter element comprising:
a longitudinally extending core of tobacco smoke filtering material;
a receptacle for a first additive; and
a further additive located on and/or in the tobacco smoke filtering material;
wherein the further additive is applied to the tobacco smoke filtering material as a solution comprising the further additive dissolved in a plasticiser.

2. A tobacco smoke filter or filter element according to claim 1 wherein the receptacle is a frangible capsule.

3. A tobacco smoke filter or filter element according to claim 1 or claim 2 wherein the tobacco smoke filtering material comprises a natural or synthetic filamentary tow, e.g. of cotton or plastics such as polyethylene or polypropylene, or cellulose acetate filamentary tow, natural or synthetic staple fibres, cotton wool, a web material such as paper (usually creped), an (e.g. synthetic) non-woven material, and/or an extruded material (e.g. starch, synthetic foams, extruded foams).

4. A tobacco smoke filter or filter element according to any preceding claim wherein the plasticiser is triacetin.

5. A tobacco smoke filter or filter element according to any preceding claim wherein the first additive is a first flavouring agent.

6. A tobacco smoke filter or filter element according to any preceding claim wherein the first additive is a first flavouring agent selected from menthol, spearmint, peppermint, nutmeg, cinnamon, clove, lemon, chocolate, peach, strawberry, vanilla.

7. A tobacco smoke filter or filter element according to any preceding claim wherein the further additive is a further flavouring agent.

8. A tobacco smoke filter or filter element according to any preceding claim wherein the further additive is a first flavouring agent selected from menthol, spearmint, peppermint, nutmeg, cinnamon, clove, lemon, chocolate, peach, strawberry, vanilla.

9. A tobacco smoke filter or filter element according to any preceding claim wherein the further additive is applied to the tobacco smoke filtering material as a solution comprising the further additive dissolved in the plasticiser wherein the concentration of plasticiser in the solution is 5% to 40%, preferably 10% to 30%, more preferably 20% plasticiser.

10. A tobacco smoke filter or filter element according to any preceding claim further comprising a wrapper engaged around the longitudinally extending core.

11. A tobacco smoke filter or filter element according to any preceding claim which includes plasticiser in an amount which is 4 to 17% by weight of the tobacco smoke filtering material, for example 9 to 17% by weight of the tobacco smoke filtering material.

12. A tobacco smoke filter or filter element comprising:

a longitudinally extending core of tobacco smoke filtering material;

a receptacle for a first additive;

a further additive located on and/or in the tobacco smoke filtering material; and

a plasticiser;

wherein the plasticiser is present in an amount which is 4 to 20% by weight of the tobacco smoke filtering material, for example 4 to 17% by weight of the tobacco smoke filtering material, for example 9 to 17% by weight of the tobacco smoke filtering material.

13. A tobacco smoke filter or filter element comprising:

a longitudinally extending core of tobacco smoke filtering material;

a receptacle for a first flavouring agent;

a further flavouring agent located on and/or in the tobacco smoke filtering material; and

a plasticiser;

wherein the plasticiser is present in an amount which is 8 to 20% by weight of the tobacco smoke filtering material, for example 9 to 20% by weight of the tobacco smoke filtering material, for example 9 to 17% by weight of the tobacco smoke filtering material.

14. A tobacco smoke filter or filter element substantially as hereinbefore described with reference to Figure 1.

15. A filter cigarette comprising a filter according to any preceding claim, or a filter including a filter element according to any preceding claim, joined to a wrapped tobacco rod with one end of the filter towards the tobacco.

16. A multiple rod comprising a plurality of filters or filter elements according to any of claims 1 to 14 integrally joined end-to-end in a mirror image relationship.

17. A method of making a tobacco smoke filter or filter element, the method comprising the steps of:
(a) continuously advancing, longitudinally, a train of tobacco smoke filtering material;
(b) applying a solution comprising a further additive dissolved in a plasticiser to the advancing tobacco smoke filtering material;
(c) inserting receptacles for a first additive into the advancing tobacco smoke filtering material, at locations along the train of tobacco smoke filtering material;
(d) gathering and securing the advancing tobacco smoke filtering material around the receptacles to form a continuous product rod comprising a longitudinally extending core of tobacco smoke filtering material engaged around the receptacles; and
(d) cutting the resulting continuous product rod.

18. A method according to claim 17 in which the solution is applied to the advancing tobacco smoke filtering material by spraying or injecting the solution.

19. A method according to claim 17 or 18 in which the solution comprises further additive dissolved in the plasticiser wherein the concentration of plasticiser in the solution is 5% to 40%, preferably 10% to 30%, more preferably 20% plasticiser.

20. A method according to claim 17, 18 or 19 comprising a step (a) of continuously advancing, longitudinally, a train of tobacco smoke filtering material to which a plasticiser has been applied.
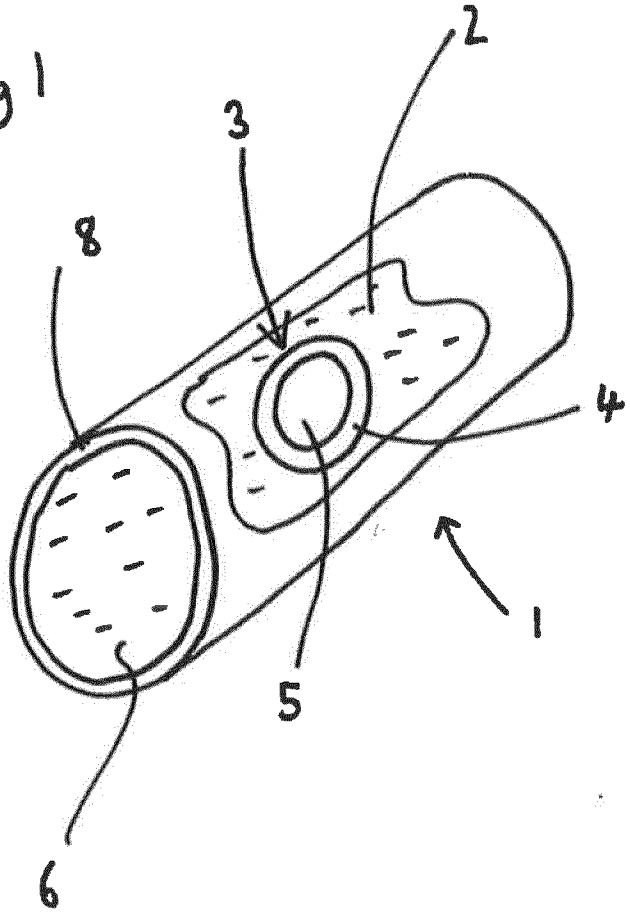
Fig 1