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(54) Smoking article with ventilation tube

(57) A cigarette (50) comprises a tobacco rod (52) in axial alignment with a ventilation tube (10) having an air permeable wall (12). Filter material (58,60) is provided in the central passage of the tube. The annular rod end wall of the tube is air permeable to provide a ventilation surface (20) through which, when the cigarette is smoked, air is drawn into the tube wall and then into the filter material through the air permeable inner wall of the tube; where it mixes with mainstream smoke from the burning tobacco rod.

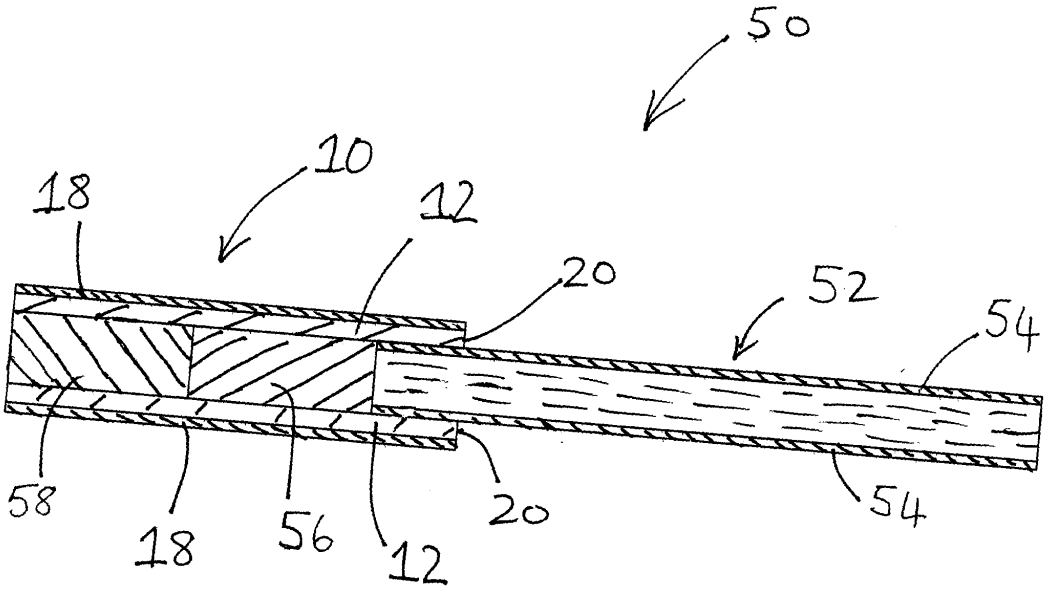

Fig. 4

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Description

[0001] The present invention relates to a ventilation tube for a smoking article. It is useful in smoking articles in which the rod of smoking material is of smaller diameter than the ventilation tube. The invention also provides a smoking article comprising such a ventilation tube.

[0002] Smoking articles, such as cigarettes, comprise a charge of smokable material, for example shredded tobacco, surrounded by a paper wrapper to form a rod of smokable material, such as the tobacco rod of a conventional cigarette. Filter cigarettes typically comprise a filter element attached to one end of the tobacco rod by means of a wrapping or tipping material. The filter element is composed of filter material wrapped by a wrapper known as a plug wrap. It is well known to provide ventilated filter cigarettes in which provision is made for admission of ambient air to dilute the mainstream smoke drawn by the smoker. Typically, ventilation is effected through a ventilation zone, for example by holes in the filter surface, the tipping material and the plug wrap. Ventilation of cigarettes may be employed to reduce the delivery of certain combustion products, such as total particulate matter (TPM) and carbon monoxide.

[0003] It has been suggested that in such ventilated filter cigarettes there is a risk of a smoker varying the delivery of the cigarette by inadvertently covering part of the ventilation zone. It is therefore desirable to provide ventilated cigarettes or other smoking articles in which this risk is reduced or eliminated.

[0004] According to the invention there is provided a smoking article comprising a rod of smokable material and a ventilation tube circumscribing an end region of the rod, which rod extends from a first, rod, end of the tube. At least part of the outer surface of the tube is air impermeable, at least part of the inner surface of the tube is air permeable, and a first one of the two annular end surfaces of the tube is air permeable. The said first annular end surface of the tube extends radially outward around the rod and is in fluid communication with the air permeable part of the inner surface of the tube. The tube comprises a wall defining a passage.

[0005] Preferably, the rod of smokable material and the ventilation tube each are of uniform circular cross-section, the outer diameter of the tube being greater than the outer diameter of the rod. In those embodiments in which the ventilation tube has a uniform circular cross-section, the entire outer surface of the tube is air impermeable.

[0006] Preferably, the rod (including the wrapper) has a diameter between about 4mm, preferably about 4.5mm, and about 7.5mm.

[0007] Preferably, the ventilation tube has an outer diameter between about 5mm, preferably 6mm, and about 8.5mm.

[0008] Also preferably, the rod of smokable material is a tobacco rod wrapped with cigarette paper. Also preferably, the rod of smoking material is disposed in a substantially coaxial recess in the first end of the tube. Also preferably, the ventilation tube contains filter material.

[0009] In one preferred embodiment, the rod of smokable extends through the whole length of the ventilation tube and comprises a wrapper having an air permeable region at least partly in register with the air permeable part of the inner surface of the tube. In other preferred embodiments, the rod extends only partially through the length of the tube.

[0010] A particularly preferred smoking article of the present invention is a cigarette comprising a tobacco rod and a ventilation tube comprising a filter element.

[0011] In use, the ventilation tube forms the mouth end of the smoking article of the invention and ambient air flows from the first annular end surface which is in fluid communication with the air permeable part of the inner surface of the ventilation tube to ventilate the smoking article.

[0012] The smoking article of the present invention allows a smoker to achieve a very good grip on cigarettes with a small diameter, such as slim and ultraslim cigarettes. To enjoy a smoking article according to the invention, the smoker puts his lips around the ventilation tube drawing mainstream smoke diluted with air.

[0013] Also according to the invention there is provided a ventilation tube for a smoking article, at least part of the outer surface of the tube being air impermeable, at least a part of the inner surface of the tube being air permeable and a first one of the two annular end surfaces of the tube being air permeable, the said air permeable part of the inner surface of the tube being in fluid communication with the first annular end surface. The second annular end surface may be air permeable or air impermeable.

[0014] A preferred ventilation tube according to the invention is a hollow, elongate, substantially cylindrical body comprising a tube wall and a central passage. The tube and the passage are preferably designed to retain a specific rod of smokable material by a friction fit. The section of the tube which received the end of the rod may be of smaller diameter than the rest of the tube; in such embodiments only part of the outer tube surface is air impermeable. In those embodiments in which the ventilation tube has a uniform circular cross-section, the entire outer surface of the tube is air impermeable. Preferably, the tube wall, the inner surface and the outer surface all are substantially cylindrical.

[0015] The inner surface of the tube may be air permeable throughout its length. Alternatively, part of the inner surface of the tube may be air impermeable. For example, the inner surface of a tube wall of an inherently air permeable material may be rendered air impermeable by the inclusion in the central passage of an air impermeable annulus or tube; in this case, the part of the inner surface which will overlie the rod of smokable material preferably remains air permeable.

[0016] Preferably, the tube length is between about 12mm and about 45mm; for preferred embodiments the

tube length is between about 20mm and about 40 mm.

[0017] Preferably the difference between the outer diameter of the tube and the diameter of the tobacco rod is at least about 2.5mm, so that the wall of the tube is at least about 1.25mm thick. Preferably, the ventilation tube has an outside diameter between about 5mm, preferably about 6mm, and about 8.5mm.

[0018] The wall of the ventilation tube may be made of an inherently air impermeable material, for example a nonporous and air impermeable thermoplastic material, or of an inherently air permeable material. Preferably the wall material is selected such as to be approved for use in food by an appropriate regulatory authority.

[0019] For a tube in which the entire wall is air impermeable, the first end of the tube is provided with at least two, preferably from 12 to 40, channels extending from the air permeable annular end surface of the tube through the wall and opening into the central passage of the tube, providing the air permeable part of the inner surface. Advantageously, the channels have a diameter of from about 0.1mm to about 0.35mm.

[0020] Preferably, the wall of the ventilation tube is air permeable and inherently porous; for example, it may be of a porous thermoplastic material. Alternatively, the tube wall may be composed of or formed from sintered metal, steel mesh, ceramic materials, heat treated cellulose acetate, non-woven materials, or fibrous materials, for example bicomponent, continuous or stable fibre media made by an extrusion or pultrusion process.

[0021] A preferred material to form the inherently porous tube wall is a thermoplastic material, more preferably a sinterable thermoplastic material. A preferred thermoplastic material to make the tube wall is a polyolefin, including, but not limited to, ethylene vinyl acetate (EVA); ethylene methyl acrylate (EMA), polyethylenes, polypropylenes, ethylene-propylene rubbers, ethylene-propylenediene rubbers, polystyrene, and mixtures and derivatives thereof. A particularly preferred polyolefin is a polyethylene. Examples of suitable polyethylenes include low density polyethylene (LDPE), linear low density polyethylene (LLDPE), high density polyethylene (HDPE), ultra-high molecular weight polyethylene (UHMWPE), and derivatives thereof.

[0022] Porous thermoplastic materials suitable for use in forming a ventilation tube of the present invention are known in the art and readily commercially available. If desired, the porous thermoplastic materials may further comprise additives such as lubricants, fillers or colorants. Advantageously, the tube is moulded from a sintered porous thermoplastic material in one continuous and contiguous piece.

[0023] Preferably, the average pore size (diameter) of the porous material used to make the tube is at least about 10μm, preferably in the range of about 50 μm to about 300 μm. Advantageously, the average pore volume or average void volume, that is the average ratio of the air volume of the porous material to the total volume of the said material is between about 40% and about 60%.

[0024] According to the present invention at least part of the outer surface of the ventilation tube is substantially air impermeable. For ventilation tubes made of an inherently porous material the outer surface has to be rendered air impermeable using suitable means and materials. Preferably, air impermeability of the outer surface is achieved by attaching an air impermeable tipping material, such as a commercially available air impermeable tipping material or rigid softboard, to the outer tube wall such that it entirely covers the outer surface of the tube and renders this surface air impermeable. The air impermeable tipping paper must have a porosity of equal to or less than $5cm^3/min.cm^2$ as measured in accordance with ISO method 2965. Preferably, the air impermeable tipping material is attached to the outer tube wall using a suitable adhesive such as glue.

[0025] Preferred smoking articles according to the present invention comprise a ventilation tube designated herein as being preferred.

[0026] In preferred smoking articles according to the present invention, the central passage through the ventilation tube incorporates a filter element which may have one or more filter segments. The filter element may comprise cellulose acetate, paper or any other filter material suitable for use in smoking articles; it may comprise charcoal or other absorbents, and it may contain flavourants or other smoke modifiers, such as smoke constituent reducing agents. The filter element may abut the tobacco rod or may be directly attached to the tobacco rod in an end-to-end relationship, advantageously by means of plug wrap. A filter of a smoking article according to the present invention may be a plug-space-plug filter, in which case one or both plugs may comprise charcoal and/or one or more other smoke modifiers. The region of the inner surface of the tube which overlies the space in a plug-space-plug filter may be air permeable, the space thereby providing an air/mainstream smoke mixing chamber. In some embodiments, the filter element stops short of one end of the ventilation tube with an air permeable annular end surface to provide a cavity for the reception of the rod of smokable material.

[0027] The invention will now be illustrated, by way of example only, with reference to the accompanying drawings, in which:

Figure 1 shows a longitudinal cross-section through a ventilation tube according to a first embodiment of the invention;

Figure 2 shows a longitudinal cross-section through a ventilation tube according to a second embodiment of the invention

Figure 3 shows an end view of a ventilation tube according to a third embodiment of the invention from the end of the tube into which a rod of smokable material will be inserted;

Figure 4 shows a longitudinal cross-section through a cigarette according to a first embodiment of the

invention;

Figure 5 shows a longitudinal cross-section through a cigarette according to a second embodiment of the invention;

Figure 6 shows a longitudinal cross-section through a cigarette according to a third embodiment of the invention; and

Figure 7 shows a longitudinal cross-section through a cigarette according to a fourth embodiment of the invention.

[0028] The embodiments of ventilated tubes and cigarettes shown in the drawings have several components in common; these have been given the same reference numerals throughout.

[0029] Figure 1 shows a first embodiment of a ventilation tube 10. The cylindrical tube 10 has a circle as its directrix and is 32mm in length. The tube wall 12 is inherently air permeable and encloses the central passage 14. As is explained later with reference to Figures 4 and 7, the central passage 14 may be partially filled with filter material, and can receive an end of a rod of tobacco or other smoking material.

[0030] The outer surface 16 of the tube wall 12 is inherently air permeable. The outer surface of the tube 10 is rendered air impermeable by a commercially available, air impermeable tipping paper 18. The first 20 and second 22 annular end surfaces of the tube 10 are air permeable. The air permeable end surfaces 20,22 are in fluid communication through the tube wall 12 with the air permeable inner surface 24 of the tube 10 and thus provide potential annular ventilation surfaces for the smoking article. To obtain a smoking article according to the present invention, a tobacco rod is inserted at either end of the ventilation tube 10.

[0031] The air permeable wall 12 of the tube 10 is made from an inherently porous high density polyethylene (HDPE), coarse type, obtainable from Porex, Porous Product Group, Germany. The HDPE has an average void volume of 55%, an average pore size of 130μm and a density of 0.46g/cm3.

[0032] In the embodiment of the cylindrical ventilation tube 30 shown in Figure 2, the tube 30 has two axially aligned portions, a first, air permeable, section 32 and a second, air impermeable section 34. The air permeable section 32 of the tube 30 has an air permeable wall 12a around the central passage 14a. Typically, the air impermeable section 34 of the tube 30 is longer than the air permeable section 32; preferably, the air permeable section is at least 12mm long. The air impermeable section 34 has an air impermeable wall 36 around the central passage 14b which forms, with the central passage 14a of the air permeable section 32, the central passage 14 of the tube 30. The two sections 32,34 are held together in axial alignment by air impermeable tipping paper 18 which renders the entire outer surface of the tube 30 air impermeable. It will be readily appreciated that since the outer surface of the air impermeable section 34 is inherently air impermeable, the tipping paper 18 need not extend all the way to the free end of the air impermeable section 34; however, it may do so if a uniform appearance to the tube 30 is desired.

[0033] The free annular end surface 20a of the air permeable section 32 of the tube 30 provides a ventilation surface. The other annular end surface 38 of the tube 30 is air impermeable and therefore does not provide a ventilation surface. The ventilation surface 20a is in fluid communication through the wall 12a of the air permeable tube section 32 with the air permeable inner surface 24a of the tube 30.

[0034] In a third embodiment of a ventilation tube 40, shown in Figure 3, the entire wall 42 of the tube 40 is of an inherently air impermeable material. The air impermeable tipping paper 18 (as shown in Figures 1 and 2) is missing. The ventilation surface 20c is provided with several ventilation channels 44 opening from the air permeable annular end surface of the tube 40, extending through the wall 42 of the tube 40 and opening into the central passage 14 to render part of the inner surface 24c of the tube 40 air permeable. Preferably, the channels 44 through the tube 40 open in the radially outer portion of the tube end surface 20c.

[0035] In a cigarette according to the present invention, as shown in Figures 4 to 6, a tobacco rod 52 (having a circle as its directrix) is inserted into the central passage 14 of the ventilation tube 10,30 so that the ventilation surface 20,20a, is disposed around the rod 52. The rod 52 may extend only a short distance into the passage 14 from the end of the tube having the ventilation surface, as shown in Figures 4 and 5. Alternatively, as shown in Figure 6, the rod 52 may extend right through the passage 14. The rod 52 consists of a column of shredded tobacco having a cut width of at least 0.3mm and wrapped in a cigarette paper 54. The increase in the diameter of the mouth end region of a cigarette or other smoking article provided with a ventilation tube according to the invention makes the ventilation tubes of the invention particularly suitable for use with tobacco rods of smaller than standard diameter; the ventilation tube may be of standard cigarette diameter which some smokers may find easier to grip comfortably than a very slim cigarette.

[0036] In the embodiment of a cigarette shown in Figure 4, a cigarette 50 comprises a rod 52 including a wrapper of cigarette paper 54 attached in axial alignment to a ventilated tube 10 of the type described with reference to Figure 1. The tube 10 has an external diameter of 7.9mm and an internal diameter 5.4mm and is 32mm in length. In the central passage 14 of the tube 10 is a first, rod end, filter segment 56 which stops short at a defined distance from the rod end of the passage to define the part of the passage 14 for reception of the rod 52. A second, mouth end, filter segment 58 is also disposed in the central passage 14 toward the mouth end thereof, adjacent the first segment 56. The second filter segment 58 does not protrude from the mouth end of the tube 10. The tobacco rod 52 is a friction fit in the passage 14.

Retention of the rod 52 may be ensured by additional means, such as a fine line of adhesive parallel to the central passage. The entire inner surface 24 of the tube 10 is air permeable.

[0037] When the cigarette 50 is smoked, ventilating air is drawn through the ventilation surface 20, through the wall 12 of the ventilation tube 10 and through the air permeable inner surface 24 of the tube and into the filter element consisting of segments 56,58 where it mixes with mainstream smoke from the burning tobacco rod 52. The air/smoke mixture passes to the smoker's mouth through the filter elements 56,58 and the tube wall 12.

[0038] In an alternative embodiment not shown, the distance by which the first, rod end, filter element 56 stops short of the rod end of the passage is greater than that required for reception of the tobacco rod 52. In that case, the space in the central passage 14 not occupied by the rod 52 provides an air/smoke mixing chamber.

[0039] The cigarette 60 shown in Figure 5 comprises a tobacco rod 52 and a ventilation tube 30 like the one described with reference to Figure 2. It further differs from the embodiment of Figure 4 in that there is no filter material in the tube 30. The tobacco rod 52 is inserted into the open end of the passage 14a (as shown in Figure 2) through the air permeable section 32 of the tube 30 at the furthest end of that section 32; the tobacco rod 52 must not extend into the passage 14b defining the air impermeable section 34 of the tube 30.

[0040] When the cigarette 60 is smoked air is drawn into the tobacco rod 52 through the ventilation surface 20a, the air permeable tube wall 12a of the air permeable section 32 of the tube 30 and the air permeable inner surface 24a of the tube 30, which surrounds the rod 52. The air/smoke mixture passes along the passage 14b through the air impermeable section 34 and into the smoker's mouth.

[0041] The tobacco rod 52 of this embodiment has a high resistance to draw (RTD), preferably at least 100mm water gauge, more preferably at least 200mm water gauge, to give a satisfactory smoking experience despite the absence of filter material from the ventilation tube 30.

[0042] In the embodiment of Figure 6, a cigarette 70 comprises a tobacco rod 52 extending wholly through a ventilation tube 10 like that described with reference to Figure 1. The tobacco rod 52 is flush with the mouth end of the ventilation tube 10 and extends through the central passage 14 and out of the other end of the ventilation tube 10, that is, the end at which the ventilation surface 20 is located. The inner surface 24 of the tube 10 is air permeable over its entire length.

[0043] The cigarette paper wrapper 56 of the tobacco rod 52 of this embodiment is a high porosity cigarette paper, having a porosity of at least about 86cm^3/min.cm^2, to facilitate air passage through the air permeable inner surface 24 of the tube 10 into the tobacco rod 52.

[0044] When the cigarette 70 is smoked, ventilation air passes through the ventilation surface 20, through the tube wall 12, the air permeable inner surface 24 of the tube 10 and the high porosity cigarette paper 56 into the tobacco rod 42 where it mixes with smoke.

[0045] In the cigarette 80 of Figure 7, the ventilation tube 82 is shorter than those of the embodiments of Figures 4, 5 and 6; it is 15mm long. The tube 82 has an air permeable wall. The tube 82 extends a short distance only beyond the tobacco rod 52, which is as already described. At the mouth side of the tube 82 is a composite filter 84, consisting of three axially aligned filter segments 84a,84b,84c wrapped together by a plug wrap 86. The composite filter 84 is attached to the tube 82 by air impermeable tipping paper 18 which also serves to render air impermeable the outer surface of the tube 82.

[0046] In the cigarette 80, the ventilation tube 82 has a rod end receiving portion 82' of smaller outer diameter than the rest of the ventilation tube 82. The thickness of the wall 12 of the smaller outer diameter portion 82' of the tube 82 is 0.5mm while the wall thickness of the larger outer diameter portion of the tube 82 is 1.5mm. The ventilation surface is provided by the air permeable annular end wall regions 20' and 20" of the ventilation tube 82 and by the outer cylindrical surface 88 of the smaller diameter portion 82' of the ventilation tube 82, which is not overwrapped by the tipping paper 18. The entire inner cylindrical surface of the ventilation tube 82 is air permeable.

[0047] The portion of the central passage 14 through the ventilation tube 82 which is not filled by the tobacco rod 52 provides an air/mainstream smoke mixing chamber.

[0048] When the cigarette 80 is smoked, air is drawn into the tobacco rod 52 and the air/mainstream smoke mixing chamber through the ventilation surfaces 20',20", 88, the ventilation tube wall 12 and the air permeable inner surface 24 of the tube 82, and smoke is drawn into the chamber through the tobacco rod 52. The air/ mainstream smoke mixture passes through the composite filter 84 and into the smoker's mouth.

[0049] It is desirable that when a smoking article according to the invention is smoked, the ventilation tube does not burn or smoulder. In order to ensure that smoking articles according to the invention are extinguished before this happens, they may be made self extinguishing, for example by the provision of an annular non-combustible band of 3mm to 5 mm in width located at a suitable distance from the ventilation tube. Alternatively, a mark may be provided on the wrapper at a suitable distance form the tube to indicate to the smoker that the smoking article should be extinguished.

[0050] The provision of a ventilation surface at a position on the smoking article remote from the smoker's mouth and fingers, and aligned substantially perpendicular to the principal axis of the smoking article, significantly reduces or eliminates the risk that the ventilation surface will be partly or wholly blocked by the smoker's mouth or fingers, thus ensuring that the intended level of ventilation is provided so that the smoking characteristics, including delivery, are those intended; there is less

variation in the smoking characteristics of similar smoking articles according to the invention and of similar conventional smoking articles.

Claims

1. A smoking article (50) (60) (70) (80) comprising a rod (52) of smokable material and a ventilation tube (10) (30) (40) (82) circumscribing an end region of the rod (52), the rod (52) extending from a first, rod, end of the tube (10) (30) (40) (82) at least part of the outer surface of the tube (10) (30) (40) (82) being air impermeable, at least part of the inner surface (24) (24a) of the tube (10) (30) (40) (82) being air permeable and a first one (20)(20a)(20c)(20',20") of the two annular end surfaces of the tube being air permeable, the said first annular end surface (20)(20a)(20c)(20',20") of the tube (10) (30) (40) (82) extending radially outward around the rod (52) and being in fluid communication with the air permeable part of the inner surface (24) (24a) of the tube (10) (30) (40) (82) .

2. A smoking article (50) (60) (70) (80) according to claim 1 or 2 in which the rod (52) and the ventilation tube (10)(30)(40)(82) are substantially circular in cross-section and in which the diameter of the first, rod, end of the ventilation tube (10) (30) (40) (82) is greater than the diameter of the mouth end of the rod (42).

3. A smoking article (50)(60)(70) according to claim 1 or 2 in which the rod (52) and the ventilation tube (10)(30)(40) are of substantially uniform cross-section throughout their lengths.

4. A smoking article (50) (60) (70) according to claims 2 and 3 in which the rod (52) has a diameter between about 4mm, preferably about 4.5mm, and about 7.5mm and the ventilation tube (10) (30) (40) has an outside diameter between about 5mm, preferably about 6mm, and about 8.5mm.

5. A smoking article (50) (60) (70) (80) according to any preceding claim in which the rod (52) is a tobacco rod wrapped in cigarette paper.

6. A smoking article (70) according to any preceding claim in which the rod (52) extends through the whole length of the ventilation tube (10) and in which the rod (42) comprises a wrapper having an air permeable region at least partly in register with the air permeable part of the wall of the inner surface (24) of the ventilation tube (10).

7. A smoking article (50) (60) (80) according to any of claims 1 to 5 in which the rod (42) extends partially through the length of the ventilation tube (10)(30)(82).

8. A smoking article (50) according to claim 7 in which the ventilation tube (10) includes filter material (56,58) within the wall (12) of the tube at the mouth side of the rod (52).

9. A smoking article (50) according to claim 8 in which the filter material does not extend to the first end of the ventilation tube (10) to provide a cavity for reception of the mouth end region of the rod (52).

10. A smoking article (50) according to claim 8 or 9 in which the filter material comprises a plurality of substantially coaxially aligned filter elements (56)(58).

11. A smoking article (50) according to claim 8, 9 or 10 in which the filter material comprises a first, rod end, filter element (56) and a second, mouth end, filter element (58).

12. A smoking article (50) according to any of claims 8 to 11 in which the filter material (56) abuts the mouth end of the rod (52).

13. A smoking article (50) according to any of claims 8 to 12 in which the air permeable part of the inner surface (24) of the ventilation tube (10) overlies an air permeable region of the filter material (56)(58).

14. A smoking article (80) according to any preceding claim further comprising filter material (84) at the mouth side of the ventilation tube (82).

15. A smoking article (80) according to claim 14 in which the filter material (84) at the mouth side of the ventilation tube (82) comprises a plurality (84a,b,c) of filter elements in substantially coaxial alignment.

16. A smoking article (90) according to any preceding claim in which a mixing chamber for, in use of the smoking article, the mixing of air and smoke, is provided in the ventilation tube (92) and in which the air permeable part of the inner surface of the ventilation tube (92) overlies the mixing chamber.

17. A smoking article (50) (60) (70) (80) according to any preceding claim in which at least a part of the air permeable part of the inner surface (24)(24a) of the ventilation tube (10)(30)(82) overlies the portion of the rod (52) of smoking material within the tube (10)(30)(82).

18. A smoking article (80) according to any preceding claim in which the first end region (82') of the ventilation tube (82) has a smaller outside diameter than the rest of the tube.

19. A smoking article (50)(70)(80) according to any of claims 1 to 18 in which the entire inner surface of the tube (10)(82) is air permeable.

20. A smoking article (70) according to any of claims 1 to 18 in which the ventilation tube (30) comprises an air permeable tube section (32) in which the tobacco rod (52) is located and an air impermeable tube section (34) in axial alignment with the air permeable tube section (32).

21. A ventilation tube (10)(30)(40)(82) for a smoking article, at least part of the substantially cylindrical outer surface of the tube (10) (30) (40) (82) being air impermeable, at least a part of the inner surface (24) (24a) of the tube (10)(30)(40)(82) being air permeable and a first one (20) (20a) (20c) (20',20") of the two annular end surfaces of the tube being air permeable, the said air permeable part of the inner surface (24) (24a) of the tube (10) (30) (40) (82) being in fluid communication with the first annular end surface (20)(20a)(20c)(20',20").

22. A ventilation tube (10) according to claim 21 further including filter material (56,58) within the wall (12) of the tube (10), the filter material stopping short of the first end of the tube to define a recess for, in use, the reception of a rod of smokable material.

23. A ventilation tube (10) according to claim 22 in which at least a part of the air permeable part of the inner surface (24) of the tube overlies an air permeable region of the filter material (56)(58).

24. A ventilation tube (10) according to claim 22 or 23 in which the filter material comprises a first filter element (56) and a second filter element (58) at least one of the said filter elements stopping short of the second end of the shell to define the recess.

25. A ventilation tube (82) according to any of claims 21 to 24 in which the first end region (82') of the ventilation tube has a smaller outside diameter than the rest of the tube.

26. A ventilation tube (10)(82) according to any of claims 21 to 25 in which the entire inner surface of the tube (10) is air permeable.

27. A ventilation tube (30) according to any of claims 21 to 25 comprising an air permeable tube section 32 in axial alignment with an air impermeable tube section 34.

28. A smoking article (50)(60)(70)(80) according to any of claims 1 to 120 or a ventilation tube (10)(30)(82) according to any of claims 21 to 27 in which at least a part (12a) of the wall (12)(12a,36) of the tube (10)(30)(82) is inherently air permeable.

29. A smoking article according to any of claims 1 to 20 or a ventilation tube (40) according to any of claims 21 to 27 in which the wall (42) of the tube is inherently air impermeable and in which at least one channel is provided in the wall (42) between the ventilation surface (20c) and the air permeable part of the inner surface (24c) of the tube.

30. A smoking article (50) (70) (80) according to any of claims 1 to 20 or a ventilation tube (10) (82) according to any of claims 21 to 27 in which the entire inner surface of the tube (10) is air permeable.

31. A smoking article (50) (60) (70) (80) comprising a ventilation tube (10)(30)(40)(82) according to any of claims 21 to 30 attached in axial alignment to a rod (52) of smokable material.

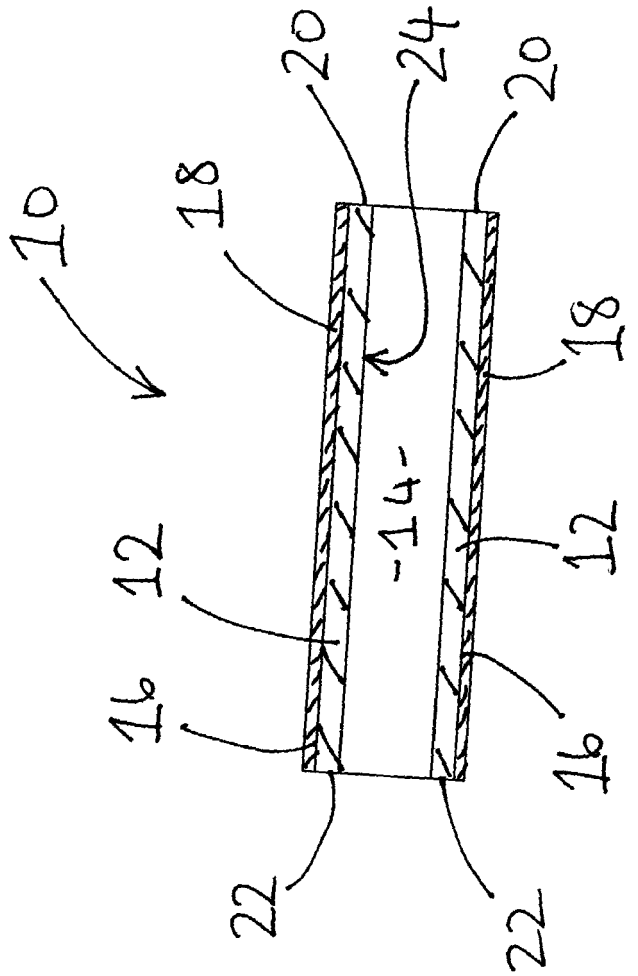

Fig. 1

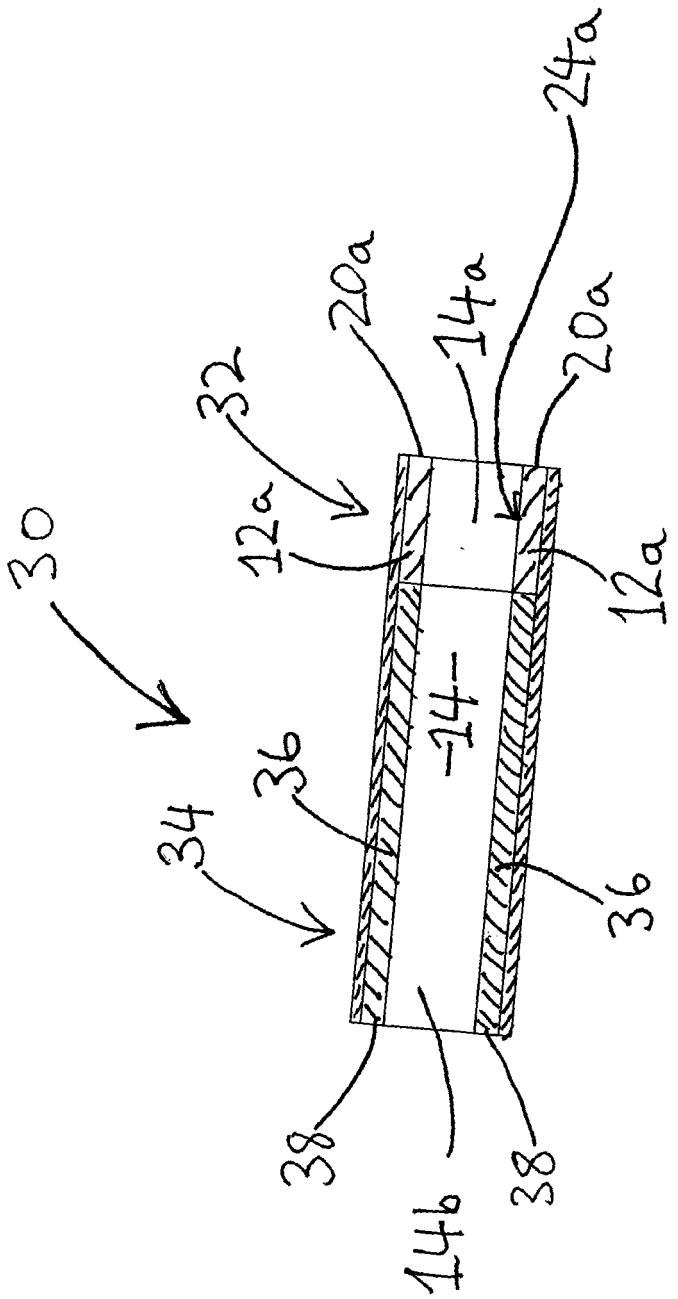

Fig. 2

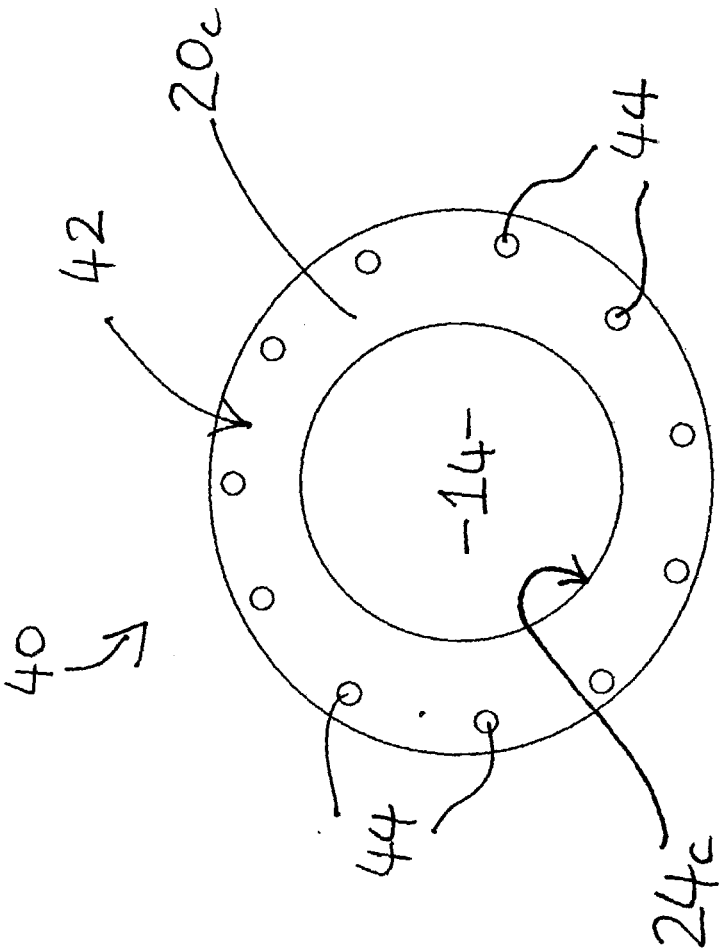

Fig.3

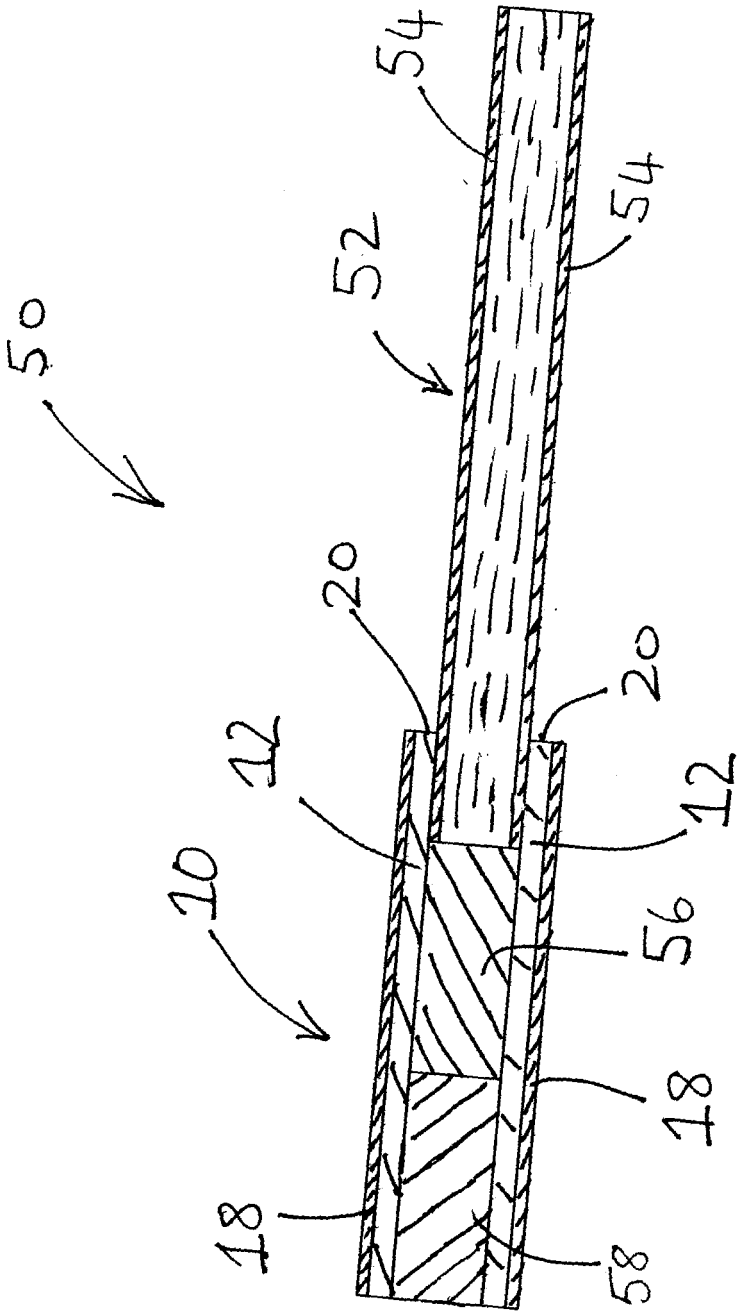

fig.4

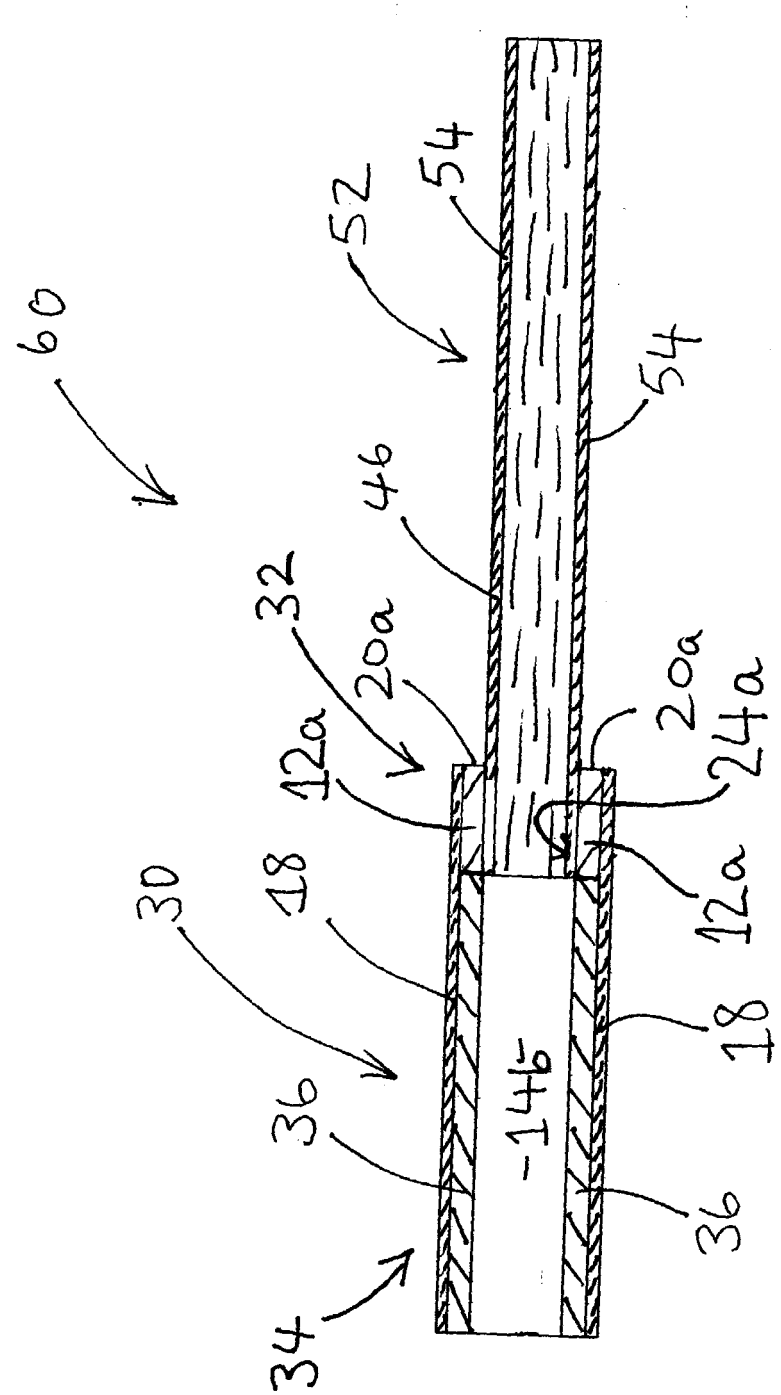

Fig. 5

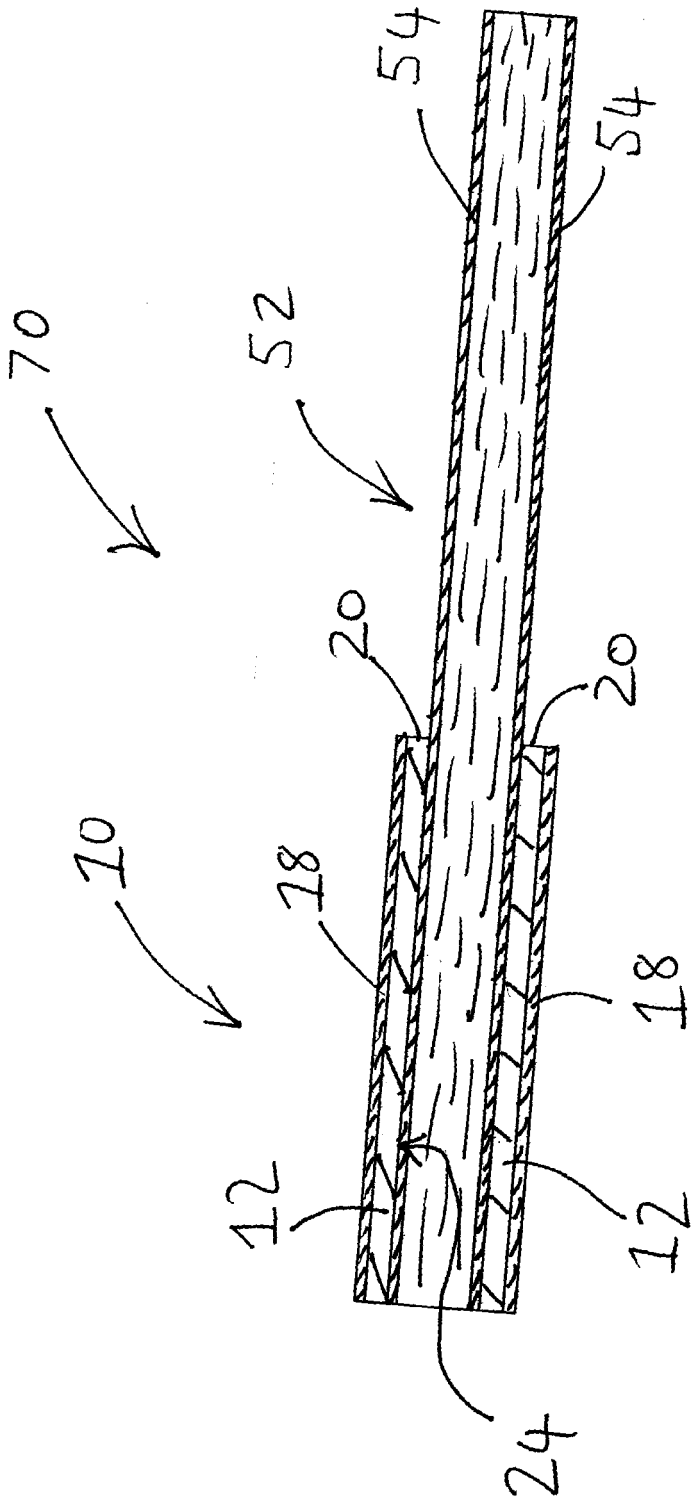

Fig. 6

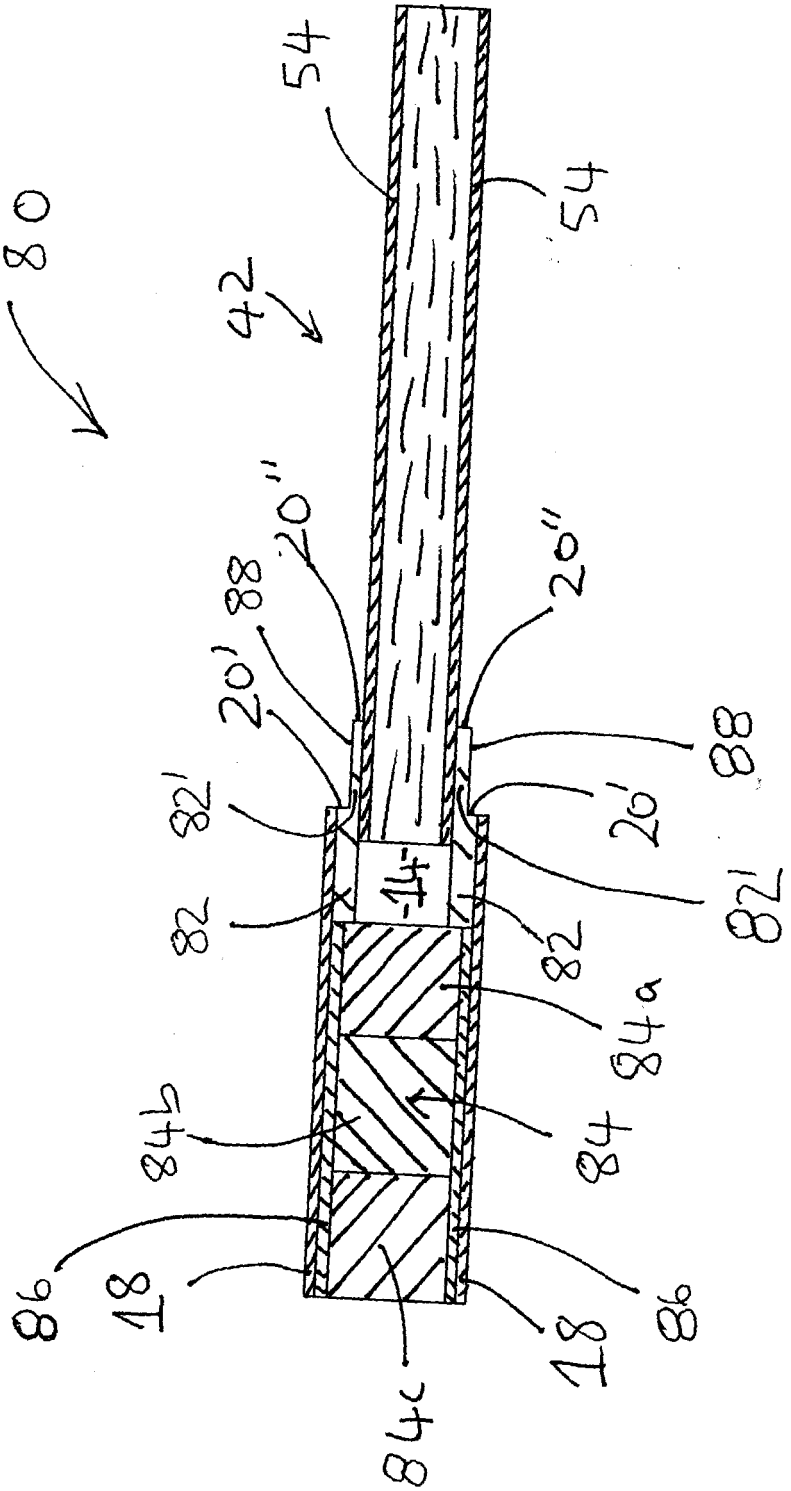

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 05 25 0558

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	US 4 498 487 A (FRATTOLILLO ET AL) 12 February 1985 (1985-02-12) * column 4, line 20 - line 28; figure 10 *	1-5,7-9, 12-14, 19, 21-23, 26,29-31	A24D1/02 A24D3/04
A	* column 2, line 55 - column 3, line 9 *		
A	* column 3, line 52 - line 60 *		
X	* column 4, line 64 - column 5, line 6; figure 14 *	10,11, 14-16,24	
A	* column 4, line 10 - line 19; figure 9 *	6	
A	* column 1, line 29 - column 2, line 19 *	17,18,20	
A	EP 0 790 007 A (R.J. REYNOLDS TOBACCO COMPANY) 20 August 1997 (1997-08-20) * sentence 33 - sentence 55 *	4	
X	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 12, 5 December 2003 (2003-12-05) & JP 2004 248570 A (JAPAN TOBACCO INC), 9 September 2004 (2004-09-09) * paragraph [0029]; figure 13 *	1-5,7-9, 12-14, 16, 21-23, 29,31	TECHNICAL FIELDS SEARCHED (Int.Cl.7) A24D
A	US 4 649 941 A (NORMAN ET AL) 17 March 1987 (1987-03-17) * column 3, line 36 - line 55; figure 1 *	4	
A	US 4 693 265 A (NORMAN ET AL) 15 September 1987 (1987-09-15) * column 2, line 17 - line 53 *	4	
A	US 4 608 999 A (JOHNSON ET AL) 2 September 1986 (1986-09-02) * the whole document *	1	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	20 July 2005	Maier, M

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 25 0558

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20-07-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4498487 A	12-02-1985	DE 3105456 A1	09-09-1982
		EP 0059040 A1	01-09-1982
		FI 820471 A ,B,	15-08-1982
		US 4631045 A	23-12-1986
EP 0790007 A	20-08-1997	US 5839449 A	24-11-1998
		BG 101152 A	30-12-1997
		CA 2195044 A1	30-07-1997
		CN 1166305 A	03-12-1997
		EP 0790007 A1	20-08-1997
		HU 9700278 A2	30-03-1998
		JP 9206056 A	12-08-1997
		PL 318153 A1	04-08-1997
		TR 9700049 A2	21-08-1997
		ZA 9700496 A	30-07-1997
JP 2004248570 A	09-09-2004	NONE	
US 4649941 A	17-03-1987	NONE	
US 4693265 A	15-09-1987	NONE	
US 4608999 A	02-09-1986	US 4362172 A	07-12-1982
		AR 226393 A1	30-06-1982
		AT 381214 B	10-09-1986
		AT 512481 A	15-02-1986
		AU 541595 B2	10-01-1985
		AU 7799781 A	10-06-1982
		BE 891267 A1	16-03-1982
		BG 38784 A3	28-02-1986
		BR 8107794 A	31-08-1982
		CA 1166922 A1	08-05-1984
		CH 646587 A5	14-12-1984
		CS 225149 B2	13-02-1984
		DE 3147531 A1	08-07-1982
		DK 530481 A ,B,	02-06-1982
		EG 17158 A	30-06-1991
		ES 271789 Y	01-04-1984
		FI 813843 A	02-06-1982
		FR 2494968 A1	04-06-1982
		GB 2088193 A ,B	09-06-1982
		HU 183713 B	28-05-1984
		IL 64443 A	31-10-1986
		IN 155466 A1	02-02-1985
		IT 1139884 B	24-09-1986
		JP 1748232 C	25-03-1993

EPO FORM P0459

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 05 25 0558

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The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

20-07-2005

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4608999 A		JP 4031664 B	27-05-1992
		JP 57122784 A	30-07-1982
		LU 83797 A1	07-05-1982
		NL 8105422 A	01-07-1982
		NO 814078 A ,B,	02-06-1982
		NZ 199096 A	31-01-1985
		NZ 206178 A	31-01-1985
		PL 234519 A1	04-07-1983
		SE 450329 B	22-06-1987
		SE 8107056 A	02-06-1982
		SU 1205747 A3	15-01-1986
		YU 280081 A1	31-10-1983
		ZA 8108318 A	24-11-1982
		ZW 29181 A1	24-02-1982

EPO FORM P0459

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