

Description

This invention relates to cigarette filter rod elements and cigarettes incorporating such filter rod elements.

It is well known that when either a smoker or a smoking machine smokes a conventional filter-tipped cigarette, the amount of 'tar' in each puff increases in each successive puff. The 'tar' yield of the last few puffs is usually several times higher than that from the first few puffs. Consequently the 'tar' in the last few puffs may be perceived by a smoker as 'too strong', and a smoker may therefore consider a cigarette as 'smoother' if the 'tar' delivery profile can be made more even.

There have been many attempts in the past to achieve an 'even' puff cigarette by modifying the filter. Mullor, U.S. Patent 2,763,267 and Clayton et al, U.S. Patent 3,809,097 proposed to use a plurality of discs to be placed inside a cigarette filter rod and placed transverse to the smoke flow. These designs, however, can only improve filtration efficiency, without any ability of evening the cigarette 'tar' profile.

Patterson, U.S. Patent 3,648,712 proposed to use a low gas permeability disc placed transversely inside an ordinary cellulose acetate filter rod. The disc is of a diameter which is 5 to 25 percent less than the diameter of the filter rod and this filter can therefore only achieve improved filtration efficiency, with no ability to even the 'tar' delivery profile.

B.A.T. GB Patent 1,339,238 proposed placing a disc of a blocking plug between a tobacco rod and an ordinary cellulose acetate filter rod. This disc has an orifice for smoke to flow through. The disadvantage of this design is that the pressure drop of the cigarette will increase to an unacceptable level as the orifice of the plug becomes clogged up at the later puffs.

Brackmann et al., U.S. Patent 3,882,877 proposed placing a disc of micro-fine fibres in between two filter rod segments. This filter is designed to increase filtration efficiency. However, it does not cause the 'tar' delivery to be more even, furthermore the pressure drop may increase to an unacceptable level at the later puffs.

Browne et al., U.S. Patents 4,460,000 and 4,469,112 proposed using a compound filter that contains a perforated barrier disc through which the whole smoke passes to a cellulose acetate filter rod segment. As the smoking process proceeds, more and more 'tar' builds up on the cellulose acetate fibres around the exit of the perforations. The disadvantage of this design is that the build-up of 'tar' near the perforations will greatly increase the flow resistance of the cigarette filter to an unacceptable level.

G.B. Patent 2 102 271 A, G.B. Patent 2 103 065 A and G.B. Patent 2 105 566 of Filtona (U.K.), proposed to employ two flow paths, i.e. the low pressure drop path which has low filtration efficiency and the high pressure drop path which has high filtration efficiency, for the smoke to flow in a filter rod. During the initial few puffs of a cigarette, the smoke tends to flow through the low pressure drop path. The smoke then switches to flow through the high pressure drop path due to the presence of a blocking mechanism on the low pressure drop path. The disadvantage of these filters is that they are very complicated and difficult to manufacture.

U.S.A. 3 685 523 shows a construction in which there is a barrier tube through which gasses flow. This barrier tube provides the entire filtering effect and no other filtering medium is provided. Thus in this construction filtering only takes place through one medium.

DE-A- 2 243 349 shows a disc of micro fine fibres. The filtering surface is therefore restricted to the diameter of the filter.

It is the objective of the present invention to provide a cigarette with a more even puff-by-puff 'tar' delivery profile and with an acceptable pressure drop by the use of a special cigarette filter.

The term "filter rod element" will be used herein to define an element which may form part of a filter rod for attachment to a cigarette, or which may itself provide the whole filter rod.

According to the present invention therefore, a cigarette filter rod element has an outer wall which surrounds an axially extending porous barrier tube to provide a space therebetween characterised in that said space is filled with a porous filtering material, said tube being made from micro-fine fibres with a diameter of between 0.5 and 10 microns and one end thereof being closed and located so that at least part of the glass flow passes continuously through the wall of the barrier tube.

Preferably the wall of the barrier tube is made of microfine fibres having a packing density of 0.05 to 0.3 and the wall thickness is between 0.05 and 2 mm.

The barrier tube can be located axially within an outer tube which provides a flow path from end to end thereof and which is provided by a plug wrap or a separate member.

According to one preferred embodiment the barrier tube can be provided with one or more flow openings each of which is in the range of 0.1 mm to 3.0 mm in diameter with a combined total area of between 0.1 mm² and 10 mm².

The invention also includes a cigarette incorporating a filter rod element as set forth above.

The invention can be performed in many ways and some embodiments will now be described by way of example and with reference to the accompanying drawings in which :

Figure 1 is a cross-sectional view of one embodiment of a filter rod element according to the present invention;

Figure 2 is a cross-sectional end view on line A-A of Figure 1;

Figure 3 is a cross-sectional view of another embodiment of a filter rod element according to the present invention;

Figure 4 is a cross-sectional view on line B-B of Figure 3;

Figure 5 is a cross-sectional view of an alternative construction of a filter rod incorporating a filter rod element according to the present invention;

Figure 6 is a cross-sectional view on line C-C of Figure 5;

Figure 7 is a cross-sectional view of another embodiment of a filter rod incorporating an element according to the present invention;

Figure 8 is a cross-sectional view on line D-D of Figure 7;

Figure 9 is a cross-sectional view of another alternative construction of a filter rod;

Figure 10 is a cross-sectional view of yet another embodiment of a filter rod element according to the present invention; and,

Figure 11 is a cross-sectional view of yet another embodiment of a filter rod element according to the present invention.

As shown in Figure 1 a cigarette filter or element according to the invention comprises a barrier tube 1 carried on a porous support in the form of a rigid and porous tube 2. The tube 2 may be a perforated tube made from a plastics material or a rigid tube made from a polymeric foam. An outer tube in the form of a plug wrap 3 is provided, the space between the barrier tube 1 and the plug wrap 3 being filled with a porous material 4 such as cellulose acetate tow or polypropylene tow, polymeric foam materials or any suitable granular materials. One or more apertures 5 situated at any convenient location are provided in the tube 1 and one end of the tube is blocked for gas flow as indicated by reference numeral 6. At the other end of the filter element the annular space between the plug wrap 3 and the tube 1 is blocked for gas flow by an annular disc as indicated by reference numeral 7. Arrows 8 indicate the direction of the smoke when it enters the filter rod element from end 9. The direction of flow of the smoke is of course reversed if it flows into the filter rod element from the other end 10.

The tube 1 is made from a layer of micro-fine fibres between 0.5 to 10 microns diameter or of a

plurality of layers of fibres, at least one layer being of micro-fine fibres of 0.5 to 10 microns in diameter. The fibres have a packing density of 0.05 to 0.3 and the thickness of the layer is between 0.05 mm and 2 mm.

As such micro-fine filter material is difficult to handle it may be convenient to make the tube from a commercially available laminate fabric known as EHP (also known as EVOLUTION, KIMGUARD) made by Kimberly-Clark U.S.A. Other similar laminates which are equally suitable are SMS, BLUE DRAPE, LX43, LX293, LX274, LX275, LX276 all made by Kimberly-Clark. These laminates comprise three layers, one of which consists of melt-blown micro-fine polypropylene fibres with a fibre diameter range from 1 micron to 8 microns, the majority being 1 to 3 microns. The other outer layers consist of coarse polypropylene fibres of around 20 microns diameter which are employed to protect the integrity of the micro-fine fibres. The three layers are point-bonded by either thermal or ultrasonic techniques or any other suitable technique and these areas may appear as square or round dots, or any other shapes arranged in a convenient or artistic pattern on the surface of the material. One grade of EHP laminate which has been tested and proved to be effective has a total thickness of 0.5 mm a total fabric weight of 60 g/m² and the three layers being approximately the same thickness. Each layer has about equal fabric weight of 20 g/m².

Such laminates can be used to manufacture the barrier tube.

The flow openings 5 are within the range of 0.1 mm to 3 mm in diameter with a combined total area of between 0.1 mm² and 10 mm².

It has been found that in certain circumstances, for example below certain lengths of tube, it is advantageous to have flow openings 5 as this prevents the micro-fine fibres in the tube becoming clogged, the flow openings allowing what is in effect a controlled leakage, thus, the micro-fine fibres inevitably become blocked without the opening and the pressure drop across the barrier tube is unacceptable. It has been found that due to the particular range of packing density and thickness of these micro-fine fibres and, below the certain length of tube provided if there is a flow opening the tube increases in filtration efficiency as the smoking proceeds without the usual high increase in the pressure drop. As the filtration efficiency of the last few puffs is markedly higher than during the earlier puffs, less "tar" is being delivered to the smoker's mouth at that stage and the smoker therefore experiences a much more even taste.

In this particular filter configuration, a cigarette filter designer is given a wide choice of variation to suit any particular filtration requirement. For exam-

ple, the filtration area of barrier tube 1 can be increased by increasing its diameter and/or axial length.

When an excessive filtration area is provided by the barrier tube 1, the dust holding capacity will correspondingly increase to an excessive level. The collected smoke particulates will therefore no longer be sufficient to cause any significant reduction of the voidage inside the micro-fine fibres, and therefore the require characteristic of increasing filtration efficiency as the filtration process proceeds will not occur. Furthermore, the filtration efficiency may be too great to maintain an adequate level of taste to the smoker. When a sufficient but not excessive filtration area is provided it is found that the provision of aperture 5 may not be necessary but the filter still has the particular characteristic of increasing its filtration efficiency as the filtration of the smoke process proceeds.

The filter configuration shown in Figures 1 and 2 may be varied in many practical ways with similar effect of increasing filter efficiency as the filtration process proceeds, and Figures 3-11 show some variations.

Figures 3 and 4 show a cigarette filter rod element which provides a whole filter rod and which comprises a plug wrap 3, conventional filter material 4 such as cellulose acetate tow or polypropylene tow, and a rigid support tube 2 placed centrally and axially along the filter rod. Tube 2 may be made of thermal plastics material and it is wrapped with a layer of fibres on its entire outer tube wall to form a barrier tube 1. Barrier tube 1 is made of micro-fine fibres or a laminate containing such fibres. One end of the wrapped tube 2 is open at end 11. The other end of wrapped tube 2 is crimped, together with barrier tube 1, to form a blocked end 12 at the end 13 of the element. This blocked end 12 functions in a similar manner to the blocking means indicated by numeral 6 in Figure 1. The wall of the support tube 2 may be porous, but if it is impervious, it is perforated with apertures 14. Apertures 5 may not be necessary if the total filtration area of barrier tube 1 is found to be sufficient. The smoke from a cigarette can enter the filter rod from either end. When the smoke enters end 13, a fraction of the smoke stream flows through material 4 and out at end 11. Another fraction of smoke flows into the tube cavity 15 through the barrier tube 1, through the aperture 14 and flows out at end 11. As explained previously, the filtration efficiency of the barrier tube 1 will increase as the filtration process proceeds, and this characteristic contributes to the graduate increase of filtration efficiency of the whole filter rod.

Figures 5 and 6 show another variation of the filter configuration shown in Figures 1 and 2. This

construction provides a dual filter rod which includes a plug wrap 20 which holds two rod segments 21 and 22 in abutment with each other. The first rod segment 22 is similar to that shown in Figures 3 and 43 and the second rod segment 21 consists of plug wrap 3, filter material 23 and a core 25 situated centrally and axially.

The material 23 may be of an impervious material or may consist of commonly used materials such as the cellulose acetate or polypropylene tow which is densely packed together but it should be impervious, or its flow resistance for gas flowing through it should be made as high as possible. When the commonly known filter materials such as the cellulose acetate or polypropylene tows are used, it should be packed at high packing density. The core 25 may be an empty channel, or be filled with material which is loosely packed so that it provides a passage for gas flow with minimum flow resistance. The diameter of the core 25 is to be either the same, or preferably smaller than the diameter of support tube 2. The core 25 is preferably aligned axially with the tube 2. As the material 23 acts as a blocking means it will function as the blocking means 7 indicated in Figure 1. The smoke flow through the filter is similar to that described with regard to Figures 1, 2, 3 and 4.

Figures 7 and 8 show another practical way of making a filter rod according to the filter rod configuration shown in Figures 1 and 2. This construction again provides a dual filter rod which includes an outer plugwrap 20 and rod segments 26 and 27. Rod segment 26 is similar to the rod segment 21 shown in Figures 5 and 6 and rod segment 27 is similar to rod segment 22 shown in Figures 5 and 6 except that the tube 2 is omitted. The barrier tube 1 is now wrapped around a core rod 28 made of any suitable porous material, preferably with minimum flow resistance to gas flow. Commonly known filter materials such as the cellulose acetate or polypropylene tow may be used. Preferably, the tow used will be the one consisting of a coarse fibre such as 5 denier per filament or larger. In addition, the filter material should be packed with a low packing density. One or more apertures 5 situated at any convenient location on the uncrimped portion of barrier tube 1 can be provided. Smoke flow through this dual filter rod is similar to that described with regard to the other embodiments.

Figure 9 shows another embodiment. This filter rod is similar to that shown in Figures 7 and 8 and the same reference numerals are used to indicate similar parts, except that there are no apertures in the barrier tube. As explained previously, the provision of the aperture 5 in barrier tube 1 may not be necessary if a sufficient but not excessive filtration area from the uncrimped portion of the barrier tube

1 has been provided.

Figure 10 shows yet another embodiment in which filter rod is similar to that shown in Figures 3 and 4 except that the support tube 2 is omitted. The barrier tube 1 is wrapped around a core rod 28 which is made of porous material similar to that shown in Figures 7 and 8. One or more apertures 5 are provided at any convenient location along the uncrimped portion of the barrier tube 1.

In Figure 11 the filter rod element is the same as that shown in Figure 10 except that there is no aperture 5 on the barrier tube 1. As explained above, the provision of the aperture 5 in barrier tube 1 may not be necessary if a sufficient but not excessive filtration area from the uncrimped portion of the barrier tube 1 has been provided.

Tip ventilation holes (not shown) may be provided to form either a tip-ventilated filter rod, or a tip-ventilated filter-tipped cigarette.

Claims

1. A cigarette filter rod element having an outer wall (3) which surrounds an axially extending porous barrier tube (1) to provide a space therebetween characterised in that said space is filled with a porous filtering material (4), said barrier tube (1) being made from micro-fine fibres with a diameter of between 0.5 and 10 microns and one end (6) (12) thereof being closed and located so that at least part of the gas flow passes continuously through the wall of the barrier tube (1).
2. A cigarette filter rod element as claimed in claim 1 characterised in that the wall of the barrier tube (1) is made of micro-fine fibres having a packing density of 0.05 to 0.3 and the wall thickness is between 0.05 and 2 mm.
3. A cigarette filter rod element as claimed in claim 1, claim 2 characterised in that said barrier tube (1) is provided with one or more flow openings (5) each of which is in the range of 0.1 mm to 3.0 mm in diameter with a combined total area of between 0.1 mm² and 10 mm².
4. A cigarette filter rod element as claimed in claim 1, claim 2 or claim 3 characterised in that said barrier tube (1) is located axially within said outer wall (3), said space providing a flow path from end to end thereof and said outer wall being provided by a plug wrap or separate member.
5. A cigarette filter rod element as claimed in claim 1, claim 2 or 3 characterised in that said barrier tube (1) located axially within said outer wall (3), and one end (7) of said space, spaced away from the closed end (6) of the barrier tube (1) is closed.
6. A cigarette filter rod element as claimed in any one of the preceding claims characterised in that the porous filtering material (4) is cellulose acetate or polypropylene tow material.
7. A cigarette filter rod element as claimed in any one of the preceding claims characterised in that said barrier tube (1) is formed from a sheet of material comprising a layer of micro-fine fibres sandwiched between layers of porous material to form a laminate.
8. A cigarette filter rod element as claimed in any one of the preceding claims characterised in that said barrier tube (1) is carried on a porous support (2).
9. A cigarette filter rod element as claimed in claim 8 characterised in that said porous support (2) is in the form of a tube.
10. A cigarette filter rod element as claimed in claim 8 characterised in that said porous support is in the form of a porous core rod (28).
11. A cigarette filter rod element as claimed in claim 10 characterised in that said core rod (28) is made of porous material with minimum flow resistance to gas flow.
12. A cigarette filter rod element as claimed in claim 11 characterised in that said core rod (28) is made from cellulose acetate or polypropylene tow.
13. A cigarette filter rod element as claimed in claim 12 characterised in that said tow consists of coarse fibres of 5 denier or larger.
14. A cigarette filter rod element as claimed in claim claims 11 to 13 characterised in that the material is packed with a low packing density.
15. A cigarette filter rod element as claimed in any one of the preceding claims characterised by being provided with tip ventilation holes.
16. A cigarette filter rod element as claimed in any one of the preceding claims comprising a first rod segment (21) formed as the element set forth in any one of the preceding claims and characterised by a second filter rod segment (22) in abutment therewith.



1 has been provided.

Figure 10 shows yet another embodiment in which filter rod is similar to that shown in Figures 3 and 4 except that the support tube 2 is omitted. The barrier tube 1 is wrapped around a core rod 28 which is made of porous material similar to that shown in Figures 7 and 8. One or more apertures 5 are provided at any convenient location along the uncrimped portion of the barrier tube 1.

In Figure 11 the filter rod element is the same as that shown in Figure 10 except that there is no aperture 5 on the barrier tube 1. As explained above, the provision of the aperture 5 in barrier tube 1 may not be necessary if a sufficient but not excessive filtration area from the uncrimped portion of the barrier tube 1 has been provided.

Tip ventilation holes (not shown) may be provided to form either a tip-ventilated filter rod, or a tip-ventilated filter-tipped cigarette.

Claims

1. A cigarette filter rod element having an outer wall (3) which surrounds an axially extending porous barrier tube (1) to provide a space therebetween characterised in that said space is filled with a porous filtering material (4), said barrier tube (1) being made from micro-fine fibres with a diameter of between 0.5 and 10 microns and one end (6) (12) thereof being closed and located so that at least part of the gas flow passes continuously through the wall of the barrier tube (1).
2. A cigarette filter rod element as claimed in claim 1 characterised in that the wall of the barrier tube (1) is made of micro-fine fibres having a packing density of 0.05 to 0.3 and the wall thickness is between 0.05 and 2 mm.
3. A cigarette filter rod element as claimed in claim 1, claim 2 characterised in that said barrier tube (1) is provided with one or more flow openings (5) each of which is in the range of 0.1 mm to 3.0 mm in diameter with a combined total area of between 0.1 mm² and 10 mm².
4. A cigarette filter rod element as claimed in claim 1, claim 2 or claim 3 characterised in that said barrier tube (1) is located axially within said outer wall (3), said space providing a flow path from end to end thereof and said outer wall being provided by a plug wrap or separate member.
5. A cigarette filter rod element as claimed in claim 1, claim 2 or 3 characterised in that said barrier tube (1) located axially within said outer wall (3), and one end (7) of said space, spaced away from the closed end (6) of the barrier tube (1) is closed.
6. A cigarette filter rod element as claimed in any one of the preceding claims characterised in that the porous filtering material (4) is cellulose acetate or polypropylene tow material.
7. A cigarette filter rod element as claimed in any one of the preceding claims characterised in that said barrier tube (1) is formed from a sheet of material comprising a layer of micro-fine fibres sandwiched between layers of porous material to form a laminate.
8. A cigarette filter rod element as claimed in any one of the preceding claims characterised in that said barrier tube (1) is carried on a porous support (2).
9. A cigarette filter rod element as claimed in claim 8 characterised in that said porous support (2) is in the form of a tube.
10. A cigarette filter rod element as claimed in claim 8 characterised in that said porous support is in the form of a porous core rod (28).
11. A cigarette filter rod element as claimed in claim 10 characterised in that said core rod (28) is made of porous material with minimum flow resistance to gas flow.
12. A cigarette filter rod element as claimed in claim 11 characterised in that said core rod (28) is made from cellulose acetate or polypropylene tow.
13. A cigarette filter rod element as claimed in claim 12 characterised in that said tow consists of coarse fibres of 5 denier or larger.
14. A cigarette filter rod element as claimed in claim claims 11 to 13 characterised in that the material is packed with a low packing density.
15. A cigarette filter rod element as claimed in any one of the preceding claims characterised by being provided with tip ventilation holes.
16. A cigarette filter rod element as claimed in any one of the preceding claims comprising a first rod segment (21) formed as the element set forth in any one of the preceding claims and characterised by a second filter rod segment (22) in abutment therewith.



17. A cigarette filter rod element as claimed in claim 16 characterised in that said second filter rod segment (22) comprises an impervious material or a densely packed filter material (23) with a high resistance to gas flow and a centrally and axially situated core (25).
18. A cigarette filter rod element as claimed in claim 17 characterised in that said core (25) is an empty channel or filled with loosely packed material.
19. A cigarette filter rod element as claimed in claim 18 when dependent on claim 9 characterised in that the diameter of said core (25) is the same or smaller than the diameter of the porous support tube (2).
20. A cigarette incorporating a filter rod element as set forth in any one of the preceding claims.

Patentansprüche

1. Zigarettenfilterstäbchenelement mit einer Außenwand (3), die ein sich axial erstreckendes poröses Sperröhrchen (1) umgibt, sodaß ein Zwischenraum dazwischen geschaffen wird, dadurch gekennzeichnet, daß der genannte Zwischenraum mit einem porösen Filtermaterial (4) gefüllt ist, wobei das genannte Sperröhrchen (1) aus mikrofeinen Fasern mit einem Durchmesser von zwischen 0,5 und 10 µm besteht und ein Ende (6) (12) davon geschlossen und so angeordnet ist, daß zumindest ein Teil des Gasstroms kontinuierlich durch die Wand des Sperröhrchens (1) hindurchgelangt.
2. Zigarettenfilterstäbchenelement nach Anspruch 1, dadurch gekennzeichnet, daß die Wand des Sperröhrchens (1) aus mikrofeinen Fasern mit einer Packdichte von 0,05 bis 0,3 besteht und die Wanddicke zwischen 0,05 und 2 mm liegt.
3. Zigarettenfilterstäbchenelement nach Anspruch 1 oder Anspruch 2, dadurch gekennzeichnet, daß das genannte Sperröhrchen (1) mit einer oder mehreren Strömungsöffnungen (5) versehen ist, von denen jede einen Durchmesser im Bereich von 0,1 mm bis 3,0 mm bei einer kombinierten Gesamtfläche von zwischen 0,1 mm² und 10 mm² aufweist.
4. Zigarettenfilterstäbchenelement nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß das genannte Sperröhrchen (1) axial innerhalb der genannten Außenwand (3) angeordnet ist, wobei der genannte Zwischenraum einen Strömungsweg vom einen zum anderen Ende da-

- von darstellt und die genannte Außenwand durch eine Stößelumhüllung oder ein eigenes Element geschaffen wird.
5. Zigarettenfilterstäbchenelement nach Anspruch 1, 2 oder 3, dadurch gekennzeichnet, daß das genannte Sperröhrchen (1) axial innerhalb der genannten Außenwand (3) angeordnet ist und ein Ende (7) des genannten Zwischenraums, das im Abstand vom geschlossenen Ende (6) des Sperröhrchens (1) angeordnet ist, geschlossen ist.
 6. Zigarettenfilterstäbchenelement nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das poröse Filtermaterial (4) Zelluloseacetat- oder Polypropylenfadenmaterial ist.
 7. Zigarettenfilterstäbchenelement nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das genannte Sperröhrchen (1) aus einer Materialbahn gebildet ist, die eine Schicht aus mikrofeinen Fasern enthält, die in Sandwichanordnung zwischen Schichten aus porösem Material angeordnet ist, um ein Laminat zu bilden.
 8. Zigarettenfilterstäbchenelement nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß das genannte Sperröhrchen (1) auf einem porösen Träger (2) getragen wird.
 9. Zigarettenfilterstäbchenelement nach Anspruch 8, dadurch gekennzeichnet, daß der genannte poröse Träger (2) die Form eines Röhrchens hat.
 10. Zigarettenfilterstäbchenelement nach Anspruch 8, dadurch gekennzeichnet, daß der genannte poröse Träger in der Form eines porösen Kernstäbchens (28) vorliegt.
 11. Zigarettenfilterstäbchenelement nach Anspruch 10, dadurch gekennzeichnet, daß das genannte Kernstäbchen (28) aus porösem Material mit minimalem Strömungswiderstand gegen den Gasfluß besteht.
 12. Zigarettenfilterelement nach Anspruch 11, dadurch gekennzeichnet, daß das genannte Kernstäbchen (28) aus Zelluloseacetat- oder Polypropylenfaden besteht.
 13. Zigarettenfilterstäbchenelement nach Anspruch 12, dadurch gekennzeichnet, daß der genannte Faden aus rauen Fasern mit 5 Denier oder



darüber besteht.

14. Zigarettfilterstäbchenelement nach einem der Ansprüche 11 bis 13, dadurch gekennzeichnet, daß das Material mit einer geringen Packdichte gepackt ist. 5
15. Zigarettfilterstäbchenelement nach einem der vorhergehenden Ansprüche, dadurch gekennzeichnet, daß es mit Belüftungslöchern an der Spitze versehen ist. 10
16. Zigarettfilterstäbchenelement nach einem der vorhergehenden Ansprüche, das ein erstes Stäbchensegment (21) umfaßt, das als das in einem der vorangehenden Ansprüche dargelegte Element ausgebildet ist, und durch ein zweites Filterstäbchensegment (22) gekennzeichnet ist, das daran anliegt. 15
17. Zigarettfilterstäbchenelement nach Anspruch 16, dadurch gekennzeichnet, daß das genannte zweite Filterstäbchensegment (22) ein undurchlässiges Material oder ein dicht gepacktes Filtermaterial (23) mit hohem Widerstand gegen Gasfluß und einen zentral und axial angeordneten Kern (25) umfaßt. 20 25
18. Zigarettfilterstäbchenelement nach Anspruch 17, dadurch gekennzeichnet, daß der genannte Kern (25) ein leerer Kanal oder mit lose gepacktem Material gefüllt ist. 30
19. Zigarettfilterstäbchenelement nach Anspruch 18 in Abhängigkeit von Anspruch 9, dadurch gekennzeichnet, daß der Durchmesser des genannten Kerns (25) gleich groß wie oder kleiner als der Durchmesser des porösen Trageröhrchens (2) ist. 35
20. Zigarette, die ein Filterstäbchenelement nach einem der vorhergehenden Ansprüche enthält. 40

Revendications

1. Element de tige de filtre à cigarette présentant une paroi extérieure (3) qui entoure un tube formant barrière poreuse s'étendant axialement (1) pour réaliser un espace entre ceux-ci, caractérisé en ce que ledit espace est rempli d'un matériau filtrant poreux (4), ledit tube formant barrière (1) étant réalisé à partir de fibres micro-fines avec un diamètre compris entre 0,5 et 10 microns, et une extrémité (6) (12) de celui-ci étant fermée et positionnée de façon qu'au moins une partie du flux de gaz passe continuellement à travers la paroi du tube formant barrière (1). 50
2. Elément de tige de filtre à cigarette selon la revendication 1, caractérisé en ce que la paroi du tube formant barrière (1) est réalisée à partir de fibres micro-fines possédant une densité de tassement de 0,05 à 0,3 et l'épaisseur de paroi est comprise entre 0,05 et 2 mm. 5
3. Elément de tige de filtre à cigarette selon la revendication 1, la revendication 2, caractérisé en ce que ledit tube formant barrière (1) est pourvu d'une ou de plusieurs ouvertures d'écoulement (5), dont chacune a un diamètre dans la plage de 0,1 mm à 3,0 mm avec une zone totale combinée comprise entre 0,1 mm² et 10 mm². 10 15
4. Elément de tige de filtre à cigarette selon la revendication 1, la revendication 2 ou la revendication 3, caractérisé en ce que ledit tube formant barrière (1) est situé axialement à l'intérieur de ladite paroi extérieure (3), ledit espace réalisant un trajet d'écoulement d'un bout à l'autre de celui-ci, et ladite paroi extérieure étant constituée par un enroulement ou enveloppe de bouchon ou un élément séparé. 20 25
5. Elément de tige de filtre à cigarette selon la revendication 1, la revendication 2 ou 3, caractérisé en ce que ledit tube formant barrière (1) situé axialement à l'intérieur de ladite paroi extérieure (3), et une extrémité (7) dudit espace, éloignée de l'extrémité fermée (6) du tube formant barrière (1) est fermée. 30
6. Elément de tige de filtre à cigarette selon l'une des revendications précédentes, caractérisé en ce que le matériau filtrant poreux (4) est l'acétate de cellulose ou un matériau de filament de polypropylène. 35 40
7. Elément de tige de filtre à cigarette selon l'une des revendications précédentes, caractérisé en ce que ledit tube formant barrière (1) est réalisé à partir d'une feuille de matériau comprenant une couche de fibres micro-fines prise en sandwich entre les couches du matériau poreux pour former un laminé. 45
8. Elément de tige de filtre à cigarette selon l'une des revendications précédentes, caractérisé en ce que ledit tube formant barrière (1) est supporté sur un support poreux (2). 50
9. Elément de tige de filtre à cigarette selon la revendication 8, caractérisé en ce que ledit support poreux (2) a la forme d'un tube. 55



10. Élément de tige de filtre à cigarette selon la revendication 8, caractérisé en ce que ledit support poreux se présente sous la forme d'une tige (28) à noyau poreux.
11. Élément de tige de filtre à cigarette selon la revendication 10, caractérisé en ce que ladite tige de noyau (28) est réalisée en matériau poreux présentant une résistance d'écoulement minimale à l'écoulement gazeux.
12. Élément de tige de filtre à cigarette selon la revendication 11, caractérisé en ce que ladite tige de noyau (28) est réalisée à partir d'acétate de cellulose ou de filaments de polypropylène.
13. Élément de tige de filtre à cigarette selon la revendication 12, caractérisé en ce que ledit filament est constitué de fibres grossières de 5 deniers ou plus.
14. Élément de tige de filtre à cigarette selon les revendications 11 à 13, caractérisé en ce que le matériau est tassé suivant une densité de tassement réduite.
15. Élément de tige de filtre à cigarette selon l'une des revendications précédentes, caractérisé en ce qu'il est pourvu de trous de ventilation au bout.
16. Élément de tige de filtre à cigarette selon l'une des revendications précédentes comprenant un premier segment de tige (21) formé comme l'élément exposé dans l'une des revendications précédentes, et caractérisé par un deuxième segment de tige de filtre (22) en butée avec celui-ci.
17. Élément de tige de filtre à cigarette selon la revendication 16, caractérisé en ce que ledit deuxième segment de tige de filtre (22) comprend un matériau étanche ou un matériau de filtre (23) tassé de manière dense avec une résistance élevée au passage gazeux et un noyau situé centralement et axialement (25).
18. Élément de tige de filtre à cigarette selon la revendication 17, caractérisé en ce que ledit noyau (25) est un canal vide ou rempli de matériau tassé lâchement.
19. Élément de tige de filtre à cigarette selon la revendication 18, lorsqu'elle dépend de la revendication 9, caractérisé en ce que le diamètre dudit noyau (25) est le même ou plus petit que le diamètre du tube de support poreux (2).
20. Cigarette incorporant un élément de tige de filtre tel qu'exposé dans l'une des revendications précédentes.

5

10

15

20

25

30

35

40

45

50

55