



(11) **EP 1 468 618 A1**

(12) **EUROPEAN PATENT APPLICATION**
published in accordance with Art. 158(3) EPC

(43) Date of publication:
20.10.2004 Bulletin 2004/43

(51) Int Cl.7: **A24F 47/00**

(21) Application number: **02806062.2**

(86) International application number:
PCT/JP2002/013232

(22) Date of filing: **18.12.2002**

(87) International publication number:
WO 2003/056949 (17.07.2003 Gazette 2003/29)

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
IE IT LI LU MC NL PT SE SI SK TR**
Designated Extension States:
AL LT LV MK RO

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(30) Priority: **28.12.2001 JP 2001401522**

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(54) **SMOKING IMPLEMENT**

(57) A smoking article (10) includes a hollow cylindrical member (11) provided with a heat generating member (13) at its distal end portion and a mouthend portion (17) at its proximal end portion, and a flavor generating member (15) provided adjacent to the heat generating member (13) within the cylindrical member (11).

The flavor generating member (15) includes a plurality of granules (151) each containing 65 to 93% by mass of a substantially non-porous inorganic filler material, 1 to 3% by mass of a binder and 6 to 32% by mass of a flavoring substance, on a dry mass basis.

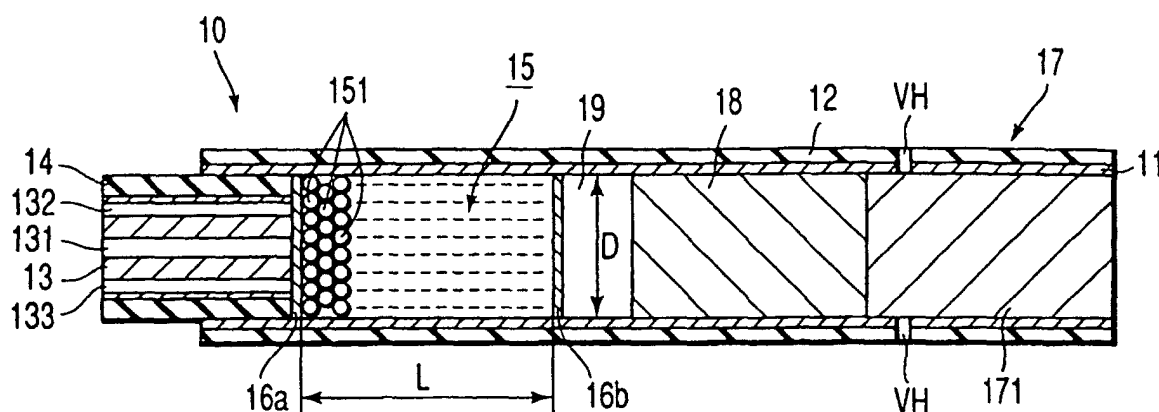


FIG. 1

Description

Technical Field

[0001] The present invention relates to a smoking article, and more specifically, to a smoking article that contains a flavor generating member that generates flavor by heating without burning.

Background Art

[0002] Various types of smoking articles for enjoying tobacco flavors and smoke without burning the leaves of tobacco are already known and proposed. Typical examples of the smoking article of the type in which flavor is generated by the heat generated by a heat generating member mounted at a distal end of the article are disclosed in, for example, Jpn. Pat. Appln. KOKAI Publication No. 63-35468, Jpn. Pat. Appln. KOKAI Publication No. 6-46818, Japanese Patent No. 1681670, Japanese Patent No. 3012253 and Jpn. Pat. Appln. KOKAI Publication No. 2-84168. In these smoking articles, a granular or sheet-like flavor generating member is filled between the heat generating member and its mouthend. As the flavor generating member is heated by the heat of the heat generating member, the flavor components are vaporized and released.

[0003] Various molded materials such as of an incombustible porous material and tobacco raw material have been proposed as the flavor generating member. The porous material, however, requires excessive energy to vaporize or desorb the flavoring substances absorbed inside, and therefore it entails a drawback of the decrease in vaporization efficiency or of thermal denaturation of the flavoring substance. On the other hand, when a flammable material such as a tobacco material is used as the substrate, combustion or thermal decomposition substantially occurs, and therefore the thermal behavior becomes very unstable, which may cause an unfavorable effect on the amount of flavor delivered.

[0004] Further, a smoking article of the above-described type entails a basic problem, that is, the amount of flavor generated vary readily, depending on the heat generating status of the heat generating member. As the heat generating member, a fuel element formed using carbon as the main raw material is most generally employed. However, such a fuel element exhibits a non-uniform behavior in which the heat generating amount reaches its maximum value during the period from the ignition to the first half of the smoking and thereafter the heat generating amount gradually decreases to become eventually extinguished. As a result, the amount of flavor released by the heat exhibits a similar behavior and thus there is a significant difference created between the maximum amount and specially the amount of the last half of the smoking. Therefore, it is pointed out that users feel a stress due to the non-uniform change in amount of smoke and in flavor during smoking, which degrades

the feeling of satisfaction.

[0005] On the other hand, Jpn. Pat. Appln. KOKAI Publication No. 5-277191 discloses an example of the smoking article obtained by laminating a fuel member and a plate-like formed member made of a flavor generating member in amount corresponding to the predetermined number of puffs, together, in order to deliver a constant quality of flavor. However, due to the structure in which the fuel member and the flavor generating member or an intervening insulator are laminated to each other, the temperature of the fuel member easily decreases, which makes it difficult to maintain the combustion, thereby making it highly possible that the article is extinguished. Further, since the flavor generating member is heated at all times, the quality of the member is, in many cases, deteriorated by the unnecessary heat. Furthermore, since the article requires matching between the burning rate of the fuel member with the timing of puffing, it is difficult for the users to take their own desired puffing intervals, thereby increasing the stress on the users. In addition, the structure of the article is complicated, which makes the manufacturing process difficult accordingly.

[0006] The present invention has been achieved in view of the above-described drawbacks, and aims to provide a smoking article having a simple structure, that can deliver flavor in a stable amount at each puff, by which users can enjoy smoking without feeling the stress caused by an uneven change in amount of smoke and in flavor during smoking.

Disclosure of Invention

[0007] In order to achieve the object, the present invention provides a smoking article comprising a hollow cylindrical member provided with a heat generating member at its distal end portion and a mouthend section at its proximal end portion, and a flavor generating member provided adjacent to the heat generating member within the cylindrical member, the flavor generating member comprising a plurality of granules each containing 65 to 93% by mass of a substantially non-porous inorganic filler material, 1 to 3% by mass of a binder and 6 to 32% by mass of a flavoring substance, on a dry mass basis (that is, an amount taken when the materials do not contain moisture).

[0008] In the present invention, it is preferable that the inorganic filler material have a BET specific surface area of 3 m²/g or less, and be made of calcium carbonate.

[0009] It is preferable that the granules be filled in the closest packing state, the ratio of the filled length in the axial direction of the cylindrical member of the granules to the inner diameter of the cylindrical member be in a range of 2 to 4, and the ratio of the inner diameter of the cylindrical member to the major diameter of the granules be 4 to 15. The granules can be in the form of pellets, tablets or spheres.

[0010] Further, in the present invention, it is preferable

ble that the binder comprise methylhydroxyethylcellulose.

[0011] In a preferred embodiment of the present invention, the heat generating member exhibits a thermal conductivity of 1.0 W/m·K or less at room temperature. It is preferable that the heat generating member be made of a carbonaceous material containing the substantially nonporous inorganic filler material in an amount of 15 to 65% by mass, and the inorganic filler material contained in the heat generating member be made of calcium carbonate having a BET specific surface area of 3 m²/g or less.

[0012] In the smoking article of the present invention, the mouthend portion can be constituted by a filter having a filtration efficiency of 20% or less, or a hollow filter.

Brief Description of Drawings

[0013]

FIG. 1 is a schematic sectional view showing a smoking article according to an embodiment of the present invention;

FIGS. 2A and 2B are graphs showing the results of the DSC analysis obtained when the flavoring substance is mixed with a substantially non-porous inorganic filler material and when it is mixed with a porous inorganic filler material;

FIG. 3 is a graph showing the amount of flavoring substance collected per puff from a smoking article of Example 1 which will be described later;

FIG. 4 is a graph showing the amount of flavoring substance collected per puff from a smoking article of Example 2 which will be described later;

FIG. 5 is a graph showing the quantity of heat flowing from the molded carbon heat generating member into the flavor generating member, plotted per puff in the smoking article of Example 1; and

FIG. 6 is a graph showing the amount of flavoring substance collected per puff in a smoking article of Comparative Example 1.

Best Mode for Carrying Out the Invention

[0014] The present invention will now be described in detail.

[0015] A smoking article according to the present invention is a so-called non-combustion type smoking article that does not burn a flavor generating member, and provided with a flavor generating member that releases a flavor component when the member is heated by the heat generated from the heat generating member ignited. The flavor generating member has a specified composition and is provided in a hollow cylindrical member. The cylindrical member has a heat generating member at its distal end portion, and its proximal end portion constitutes a mouthend portion.

[0016] FIG. 1 is a schematic sectional view showing

a structure of a smoking article according to an embodiment of the present invention. A smoking article 10 shown in FIG. 1 has a hollow cylindrical member 11 that constitutes the main body of the smoking article. A heat generating member 13 is provided at a distal end portion of the cylindrical member 11, and a proximal end portion of the cylindrical member 11 constitutes a mouthend portion 17. A flavor generating member 15 of the present invention is provided adjacent to the heat generating member 13 within the cylindrical member 11.

[0017] The cylindrical member 11 is usually of a circular cylindrical shape, and is preferably made of a thermally stable material such as aluminum or stainless steel. Further, in order to reduce its heat capacity, the thickness of the cylindrical member 11 is preferably made small, for example, 0.03 mm to 0.1 mm. The cylindrical member 11 may have an inner diameter of about 7 mm to 8 mm and a length of about 80 mm to 120 mm as in the case of usual cigarettes. The entire outer surface of the cylindrical member 11 is usually wrapped around with a heat insulating member 12 so that the cylindrical member can be held by fingers without any trouble.

[0018] The flavor generating member 15 employed for the smoking article of the present invention is made of a plurality of granules each containing 65 to 93% by mass of a substantially non-porous inorganic filler material, 1 to 3% by mass of a binder and 6 to 32% by mass of a flavoring substance on a dry mass basis.

[0019] The flavoring substance includes, for example, a substance that generates aerosol (an alcohol, a saccharide, water), a substance that generates a flavor only (menthol, caffeine, a natural extract), when heated by the heat from the heat generating member burned, as well as tobacco, a tobacco extract, and a mixture of these. As an alcohol, for example, glycerin, propylene glycol or a mixture of these can be used.

[0020] The substantially nonporous inorganic filler material, which is one of the components of the flavor generating member 15, preferably has a BET specific surface area of 3 m²/g or less.

[0021] A so-called porous material that has innumerable extremely fine pores, for example, activated carbon, ceramics such as alumina beads and silica, or a molecular sieve has a property of taking other substances inside by adsorption or absorption. When an attempt is made to have a flavor released from a smoking article such as of the present invention at a high efficiency by heat, not only the thermal energy is required to evaporate the flavoring substance but also further thermal energy for desorbing the flavoring substance out of the pores is required, if the flavoring substance is trapped in the pores of the substrate. Thus, the vaporization efficiency is reduced and further the thermal denaturalization is easily induced since the material is continuously heated inside the pores. In the present invention, the flavoring substance is merely held in gaps each created between the substrate grains made of a substantially

non-porous inorganic filler material. With this structure, it is possible to easily release the flavor from the flavor generating member 15 by heat without causing the above-described problem with the porous material.

[0022] It is particularly preferable to use calcium carbonate grains having a BET specific surface area of 3 m²/g or less as the substantially nonporous inorganic filler material. It is fully possible that the granular molded materials are made of a tobacco raw material, or a substituting plant raw material and its extract, etc.; however, such a material, in many cases, causes combustion or thermal decomposition by heat and therefore the thermal behavior becomes unstable. As a result, the amount of flavor delivered is easily made unstable, and it is possible to cause the problem of the thermal denaturalization of the flavor due to the porousness.

[0023] As the binder contained in the flavor generating member of the present invention, cellulose, various types of cellulose derivatives, alginates, guar gum, xanthan gum, locust bean gum and the like can be used. In particular, the use of methylhydroxyethylcellulose can improve the sustainability of the flavoring substance and provide excellent flavor and taste. As the amount of the binder added is increased, the physical strength of the molded material is increased, thereby making it possible to facilitate the handling of it. However, most of the binders, in many cases, create an unfavorable effect on the flavor when they are heated at a high temperature. Therefore, as long as the material can be handled without any particular troubles, the amount of the binder added should preferably be as small as in a range of 1 to 3% by mass.

[0024] The (molded or formed) granules that constitute the flavor generating member of the present invention can be prepared by mixing the substantially nonporous inorganic filler material, the binder and the flavoring substance in amounts mentioned above, and adding an appropriate amount of water required to generate the binding force of the binder. Then, the mixture is molded by an extruder, granulating machine, pelleting machine or the like into a predetermined size and shape. Thus, the granules can be formed into pellets, tablets, spheres or the like.

[0025] As shown in FIG. 1, an air permeable heat resisting member 16a made of, for example, a metal mesh is provided between the heat generating member 13 and the flavor generating member 15 so that the flavor generating member 15 is not directly brought into contact with the heat generator 13.

[0026] The heat generating member 13 provided at the distal end portion of the cylindrical member 11 of the smoking article of the present invention can be made of a carbonaceous material such as carbon. The carbonaceous material can be formed into a desired shape by an extruder, pelleting machine or the like. It is preferable that the shape of the carbonaceous material be circular cylinder. Such a heat generating member includes an air flow path, through which air is introduced into the cy-

lindrical member 11 from outside via the heat generating member 13 by a suction from the mouthend, and the introduced air heated by the heat generating member 13 is allowed to pass through the air flow path created between the granules 151 of the flavor generating member 15, thereby making it possible for the smoker to enjoy the flavoring component thus generated. Such an air flow path can be made of at least one groove provided in an outer circumferential surface of the carbonaceous cylinder formed material along the longitudinal axis of the cylindrical member 11 or at least one through hole made through the carbonaceous cylinder formed material along the longitudinal axis of the cylindrical member 11. FIG. 1 illustrates such flow paths, that is, a central through hole 131 made through the heat generating member 13 in its axial direction and a plurality of through holes (through holes 132 and 133 are shown in FIG. 1) arranged around the through hole 131.

[0027] Not only the type and composition of the carbonaceous material, but also the shape (the depth of each groove and the diameter of each through hole) and the number of air flow paths in the heat generating member 13 have an effect on the combustion characteristics such as the ignition time of the heat generating member, combustion speed, combustion temperature and the amount of product created by the combustion. In particular, with regard to the ignition time characteristic, it is required to be such an ignition time that can be expected without a feeling of any significant difference by the user from the ignition of an ordinary cigarette (within about 1 second.) According to the present invention, it has been found that an ignition time for the carbonaceous material of within about 1.5 seconds can be achieved by selecting such a composition of the carbonaceous material that the heat conductivity at room temperature (about 22°C) is 1.0 W/m·K or less. Further, according to the present invention, it has been found that when the heat generating member is made of a carbon material composition that contains the substantially nonporous inorganic filler material in an amount of 15 to 65% by mass (the balance is carbon), the amount of carbon is substantially reduced. Thus, the amount of combustion product, especially, carbon monoxide, can be further reduced. At the same time, the amount of combustion, that is, the number of puffs can be decreased, and therefore, the total amount of combustion product can be reduced. As the substantially nonporous inorganic filler material, calcium carbonate having a BET specific surface area of 3 m²/g or less is particularly suitable. The heat generated by the combustion of the heat generating member 13 heats the flavor generating member 15 disposed adjacent to the heat generating member and makes it vaporize the flavor to be released.

[0028] Usually, the heat generating member 13 is surrounded by a heat-resisting enclosing member 14 and it is inserted and fixed in the cylindrical member 11.

[0029] In the cylindrical member 11, a flavor supplying member 18 can be provided on a downstream side of

the flavor generating member 15. The flavor supplying member 18 can carry various types of flavors or the like when the flavor needs further characterization by adding other flavors to the flavor component generated from the flavor generating member 15, or when it is preferable that the various types of flavors should not be exposed to a high temperature. The flavor supplying member 18 can be made of tobacco or reconstituted tobacco, or paper that carries a flavor, or a carrier such as a non-woven fabric, depending upon the purpose. Further, it is possible that the flavor supplying member 18 is provided in the form of a molded material containing a flavor.

[0030] At the mouthend portion 17, a filter 171 for tobacco, which is generally employed in the art, can be provided. In order to efficiently deliver a flavor in an amount that can be ultimately smoked by the smoker with respect to the amount of the flavor released, a low filtration efficiency filter having a filtration efficiency of 20% or less or a hollow filter can be used. Further, a plurality of ventilation holes VH can be made in the mouthend portion 17 to pierce through the heat insulating member 12 and cylindrical member 11 at desired positions (usually in a circumferential direction of the mouthend portion 17) in accordance with necessity in order to adjust the suction amount and suction pressure.

[0031] In the present invention, it is possible that the flavor generating member 15 and the flavor supplying member 18 are disposed to be in direct contact with each other; however it is preferable that a gap portion 19 be provided between these members as shown in FIG. 1. In some cases, the gap portion 19 serves to promote the cooling of the aerosol or flavor generated from the flavor generating member 15, thereby making it possible to reduce the loss caused by the condensation of the aerosol or flavor in the flavor supplying member 18 and the mouthend portion 19. The volume of the gap portion 19 can be arbitrarily set in accordance with the purpose. When the gap portion 19 is provided as described above, an air permeable member 16b similar to the air permeable member 16a is provided on a downstream side of the flavor generating member 15 so that the granules 151 do not move.

[0032] In the present invention, it is preferable that the granules 151 are filled in the cylindrical member 11 in its closest packing state. If the granules 151 are loosely put in the cylinder member, they are unevenly distributed in the member while being used, and thus the fluid paths formed between granules 151 become uneven, thereby deteriorating the uniformity of the amount of flavor delivered. For this reason, it is preferable that the granules be filled in the cylindrical member at the closest packing density so that the initial filled state can be maintained. The closest packing is meant to be a state in which the granules are densely filled in the member by vibration or tapping, etc.

[0033] Here, it has been found that it is preferable that the filled length (L) of the granules 151 filled at the closes

packing state and the inner diameter (D) of the cylindrical member 11 be set so that the ratio between them (L/D) is 2 to 4. When the ratio is smaller than 2, there is such a tendency that the behavior of the generation of the flavor component from the flavor generating member 15 is easily affected by the heat generating pattern of the heat generating member 13. On the other hand, when the ratio is larger than 4, there is such a tendency that the amount of flavor delivered is easily decreased due to the condensation and deposition of the component in the flavor generating member 15. Thus, there is a tendency that the uniformity of the deliver of the flavor is deteriorated. Therefore, when the inner diameter of the cylindrical member 11 is about 7 to 8 mm as in the case of ordinary cigarettes, the filled length (L) is preferably set in a range of about 14 to 32 mm. Further, it has been also found that the size of the granules 151 is preferably set such that the ratio between the major diameter (d) and the inner diameter (D) of the cylindrical member 11 (D/d) is 3.5 to 16, or more preferably 4 to 15. When the ratio is smaller than 4, the heat capacity per granule 151 increases, and therefore there is a tendency that the amount of flavor delivered at the initial stage of the smoking is decreased. On the other hand, when the ratio is larger than 15, the suction resistance is increased, and therefore the suction tends to become difficult. Therefore, when the inner diameter (D) of the cylindrical member 11 is about 7 to 8 mm as in the case of ordinary cigarettes, the major diameter of the granules 151 should preferably be set in a range of about 2.0 to 0.5 mm. The major diameter of the granules is defined as the largest diameter in the axial direction or radial direction.

[0034] The present invention will now be described by presenting actual examples; however, the invention should not limited to the following examples.

Experimental Example 1

[0035] FIG. 2A and FIG. 2B show the results of the DSC analysis for the case where calcium carbonate having a BET specific surface area of 1 m²/g was employed as the nonporous inorganic filler material and mixed with a flavoring substance (FIG. 2A) and for the case where alumina having a specific surface area of 120 m²/g was employed as the porous inorganic filler material and mixed with the same flavoring substance at the same ratio (FIG. 2B). When the nonporous inorganic filler material is used, the endothermic peak caused by the vaporization of the flavoring substance appears only once as shown in FIG. 2A. On the other hand, when the porous inorganic filler material is used, an endothermic peak (endothermic peak (1)) and another endothermic peak (endothermic peak (2)) appears in a higher temperature region as shown in FIG. 2B. The results indicate that more energy is required to vaporize the flavoring substance adsorbed in the porous material. Therefore, from the results, it can be understood that

the use of a nonporous material is significantly advantageous.

Example 1

[0036] A smoking article having the structure shown in FIG. 1 was manufactured with the following specifications.

<Hollow cylindrical member>

[0037]

Material: Aluminum foil laminated paper
Length: 85 mm
Inner Diameter (D) 7.5 mm

<Flavor generating member>

[0038]

Composition: 80% by mass of calcium carbonate having a BET specific surface area of 1 m²/g

1% by mass of methylhydroxyethylcellulose
19% by mass of glycerin (flavoring substance)

Shape: Spherical
Major diameter (d): 1.5 mm
Closest packing filled length (L): 15 mm
L/D = 2
D/d = 5

<Flavor supplying member>

[0039]

Composition: Flue-cured cut tobacco
Length: 20 mm

<Mouthend portion>

[0040]

Filter
Length: 20 mm

<Heat generating member>

[0041]

Composition: 85% by mass of carbon
15% by mass of calcium carbonate having a BET specific surface area of 1 m²/g

<Gap portion>

[0042]

5 Length: 15 mm

[0043] The thus prepared smoking article was smoked by an automatic smoking machine in such a manner of taking a puff by a volume of 50 mL/2 seconds at intervals of 30 seconds. FIG. 3 shows the results of the measurement of the amount of the flavoring substance collected in each puff. Further, the uniformity index (explained latter) regarding the release of the flavor component of the smoking article of this embodiment was 0.79. The total amount of the flavoring substance collected was about 11 mg.

Example 2

20 **[0044]** A smoking article similar to that of Example 1 except that the closest packing filled length of the granules that constitute the flavor generating member was set to 30 mm (L/D = 4; no gap portion), and the major diameter of the granules was set to 1.0 mm (D/d = 7.5).
25 The thus prepared smoking article was smoked by the automatic smoking machine in such a manner of taking a puff by a volume of 50 mL/2 seconds at intervals of 30 seconds. FIG. 4 shows the results of the measurement of the amount of the flavoring substance collected in each puff. Further, the uniformity index of the smoking article of this Example was as high as 0.81. However, with the L/D value set at a large value, the total amount of the flavoring substance collected was lower than the previous Example, and was about 7 mg.

35 **[0045]** The uniformity index in each Example described above was calculated based on the following equations from the measured values of 2nd to 11th puffs.

40 Uniformity index = 1 - (variation coefficient)

Variation coefficient = (standard deviation) /

45 (average value)

[0046] The uniformity index indicates a better condition as its value is closer to 1.

50 **[0047]** FIG. 5 shows the results in which the quantity of heat flowing from the carbon formed heat generating member to the flavor generating member in the smoking article of Example 1 was plotted for each puff. The grounds for setting the range of the evaluation of the uniformity index to 2nd to 11th puffs were that they satisfy the conditions that the amount of heat flowing to the flavor generating member is 50% or more of its maximum (which can be obtained at, usually, 5th puff).
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Example 3

[0048] A smoking article similar to that of Example 1 except that the content of calcium carbonate in the heat generating member was set to 40% by mass, and the thus prepared smoking article was subjected to a similar smoking process. The results indicated that the amount of carbon monoxide generated was reduced to 55% of that of Example 1.

Comparative Example 1

[0049] In the case where the flavor generating member is weak to heat and has such a property or form that it is easily burned, the filled state varies due to the combustion and the amount of flavor generated increases abruptly by the heat of combustion. Therefore, its behavior becomes even more non-uniform than the heat generating behavior of the heat generating member itself. Here, a flavor generating material was prepared from a cut sheet medium made of pulp and tobacco-based material, as disclosed in Jpn. Pat. Appln. KOKAI Publication No. 6-46818, and a flavoring substance (for example, glycerin) contained in the medium at 40% by mass, and filled to have a length of about 30 mm. Thus, a smoking article similar to that of Example 2 was manufactured. FIG. 6 shows the results of the measurement of the amount of the flavoring substance collected in each puff. The total amount of the flavor material collected was about 13 mg, which was not very much different from that of Example 1, whereas the uniformity index was as low as 0.31. Further, the smoking article was disassembled after smoked and examined. It was found that some cut sheet was incinerated and lost by combustion.

Example 4

[0050] The smoking articles of Examples 1 and 2 and that of Comparative Example 1 were actually smoked by a specially trained smoking tasting expert and compared with each other. The results of the evaluation indicated that the smoking articles of Examples 1 and 2 of the present invention had a stable amount of flavored smoke in each puff, and the amount of flavor did not decrease in the later half of the smoking, thus making it possible to maintain a good amount of smoke even in a later stage of the smoking. By contrast, with regard to the smoking article of Comparative Example 1, the results indicated that a specific change in taste, which was caused by combustion of the flavor generating member, was noticed in a later stage of the smoking.

[0051] As described above, according to the present invention, there is provided a smoking article that can, with a simple structure, deliver a stable amount of flavor per puff while it is smoked by a user, thereby making it possible for the user to enjoy smoking without feeling a stress caused by an uneven change in amount of smoke

or flavor.

Claims

1. A smoking article comprising a hollow cylindrical member provided with a heat generating member at its distal end portion and a mouthend portion at its proximal end portion, and a flavor generating member provided adjacent to the heat generating member within the cylindrical member, the flavor generating member comprising a plurality of granules each containing 65 to 93% by mass of a substantially non-porous inorganic filler material, 1 to 3% by mass of a binder and 6 to 32% by mass of a flavoring substance, on a dry mass basis.
2. The smoking article according to claim 1, wherein the inorganic filler material has a BET specific surface area of 3 m²/g or less.
3. The smoking article according to claim 2, wherein the inorganic filler material is calcium carbonate.
4. The smoking article according to claim 1, wherein the granules are filled in a closest packing state, a ratio of a filled length of the granules in the cylindrical member in its axial direction to an inner diameter of the cylindrical member is in a range of 2 to 4, and a ratio of the inner diameter of the cylindrical member to a major diameter of the granules is 4 to 15.
5. The smoking article according to claim 1, wherein the granules are in a form of pellets, tablets or spheres.
6. The smoking article according to claim 1, wherein the heat generating member comprises methylhydroxyethylcellulose.
7. The smoking article according to claim 1, wherein the binder exhibits a thermal conductivity of 1.0 W/m·K or less at room temperature.
8. The smoking article according to claim 1, wherein the heat generating member is made of a carbonaceous material containing the substantially nonporous inorganic filler material in an amount of 15 to 65% by mass.
9. The smoking article according to claim 1, wherein the inorganic filler material contained in the heat generating member is made of calcium carbonate having a BET specific surface area of 3 m²/g or less.
10. The smoking article according to claim 1, wherein the mouthend portion is constituted by a filter having a filtration efficiency of 20% or less.

11. The smoking article according to claim 1, wherein the mouthend portion is constituted by a hollow filter.

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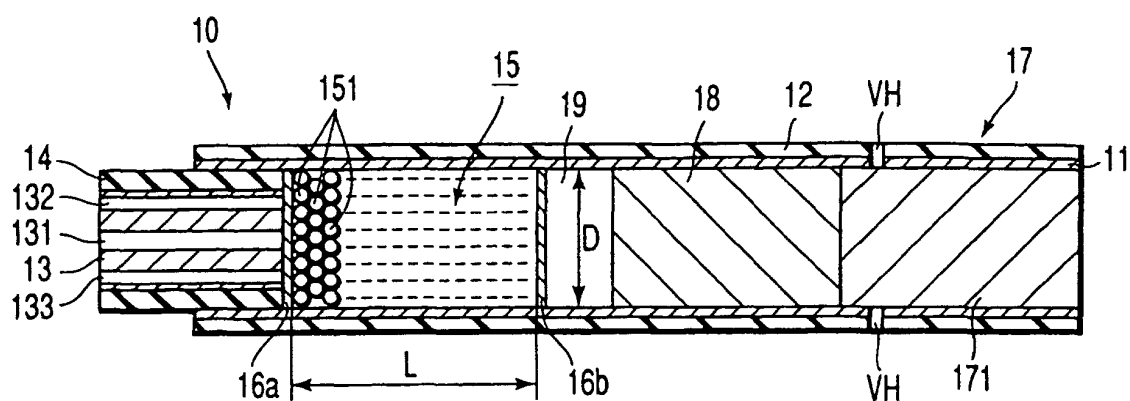


FIG. 1

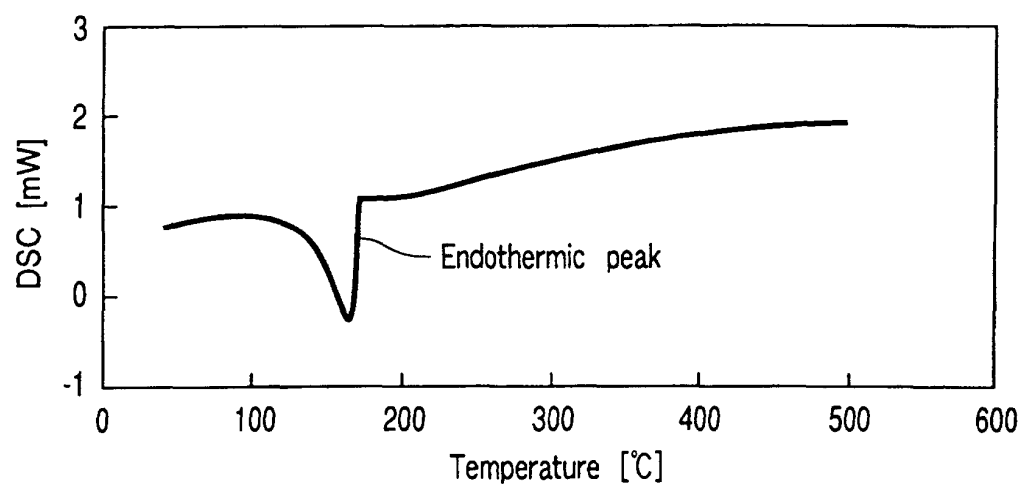


FIG. 2A

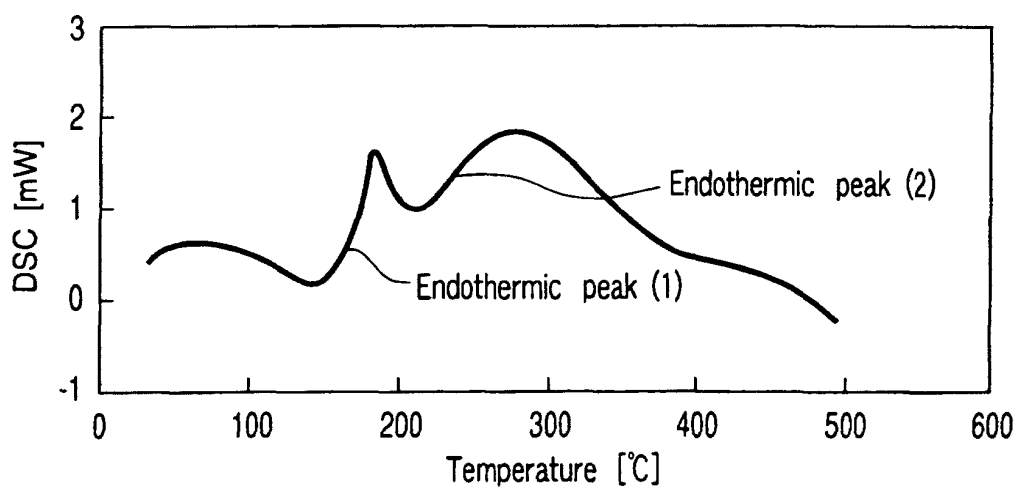


FIG. 2B

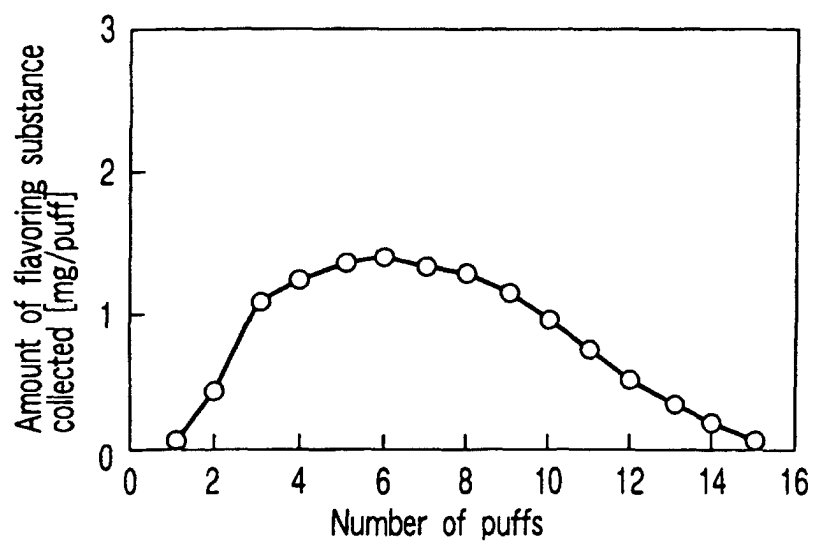


FIG. 3

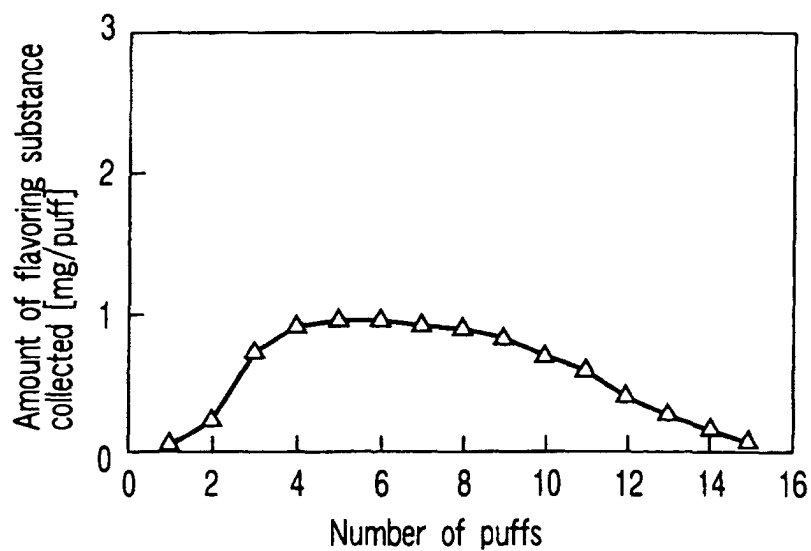


FIG. 4

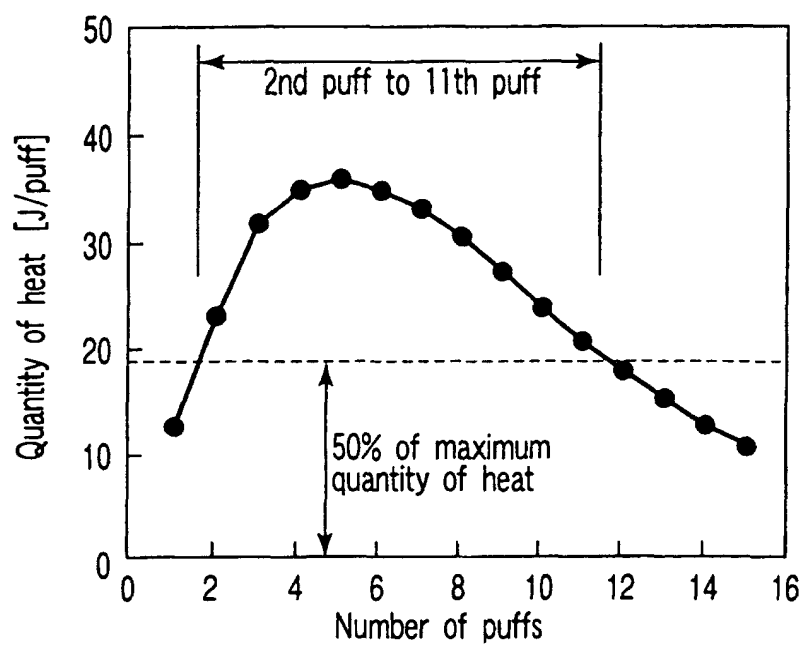


FIG. 5

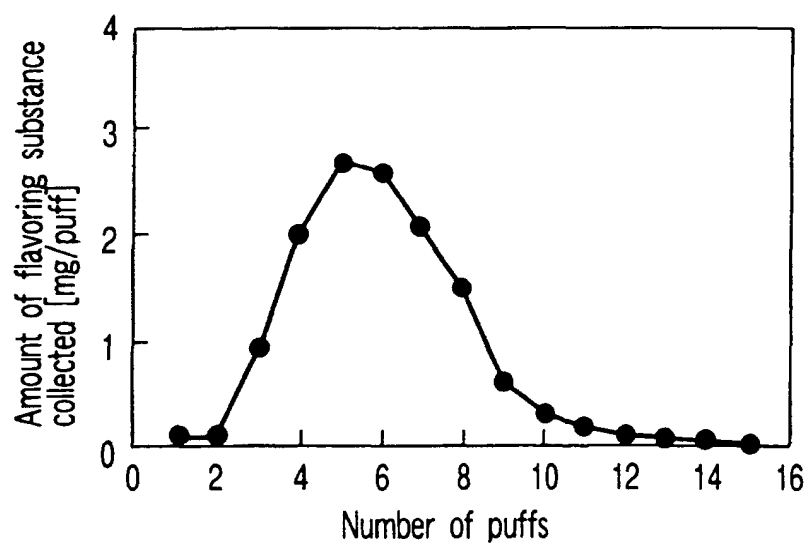


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP02/13232

A. CLASSIFICATION OF SUBJECT MATTER Int.Cl ⁷ A24F47/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) Int.Cl ⁷ A24F47/00		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched Jitsuyo Shinan Koho 1926-1996 Toroku Jitsuyo Shinan Koho 1994-2003 Kokai Jitsuyo Shinan Koho 1971-2003 Jitsuyo Shinan Toroku Koho 1996-2003		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 2000-41654 A (Japan Tobacco Inc.), 15 February, 2000 (15.02.00), (Family: none)	1-11
Y	JP 11-164679 A (Japan Tobacco Inc.), 22 June, 1999 (22.06.99), (Family: none)	1-11
Y	JP 6-315366 A (Philip Morris Products Inc.), 15 November, 1994 (15.11.94), & US 5095921 A1 & CA 2035761 A & EP 488488 A1 & AU 642460 B	1-11
Y	JP 3-49674 A (R.J. Reynolds Tobacco Co.), 04 March, 1991 (04.03.91), & US 4991596 A1 & EP 407792 A3	11
☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 27 January, 2003 (27.01.03)		Date of mailing of the international search report 12 February, 2003 (12.02.03)
Name and mailing address of the ISA/ Japanese Patent Office		Authorized officer
Facsimile No.		Telephone No.