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(54) **CIGARETTE OF ENHANCED LOW FIRE SPREAD**

ZIGARETTE MIT VERBESSERTER NIEDRIGFEUERAUSBREITUNG

CIGARETTE PRESENTANT UNE FAIBLE PROPAGATION DE FEU AMELIOREE

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Description

Technical Field

[0001] The present invention relates to a low flame-spreading cigarette that is unlikely to cause flame spread from the kindling to the surroundings so as not to allow the ignited cigarette to cause fire by, for example, the carelessness of the smoker.

Background Art

[0002] Cigarettes have been proposed, including, for example, a cigarette having a cellulose paper band, which is 2 to 20 mm wide, formed on the cigarette paper to impart self-extinguishing property(see Japanese Patent Disclosure (Kokai) No. 63-85200), and a cigarette in which a band coated with a flame retardant substance is formed on the cigarette paper (see Japanese Patent Disclosure (Kokai) No. 7-300795), in order to prevent the spread of flame from the kindling to, for example, the floor, where the cigarette is dropped onto, for example, the floor by the carelessness of the smoker. Further, a cigarette paper having a nonflammable substance pasted thereto is also known. These technologies are based on the idea that a region having high flammability and another region having low flammability are formed in the cigarette paper such that ordinary smoking can be performed in the region having high flammability and that the cigarette is extinguished in the region having low flammability.

[0003] It is also known well in the art that, if the burn rate of the cigarette is lowered in an attempt to decrease the amount of the sidestream smoke per hour, it is possible to provide a cigarette that can be self-extinguished. As such a cigarette, a cigarette has been proposed, in which shredded tobacco are wrapped with a cigarette paper having a small amount of loading material used an inner paper and with an ordinary cigarette paper used as an outer paper (see Japanese Patent No. 2,572,488). Also, as a cigarette with a low sidestream smoke, a cigarette has been proposed, in which a smoking material rod having a loading density of 100 to 260 mg/cm^3 is wrapped by a wrapping paper having an air permeability not higher than 7 CORESTA units (see Japanese Patent No. 3,001,582). Further, a cigarette has been proposed, in which the burn rate is lowered by using a wrapping paper having a low air permeability (7 CORESTA units), having a small amount of loading material, and having a small basis weight (see International Publication WO 01/48316).

[0004] Further examples of cigarettes are disclosed in EP 1 084 630 and WO 01/08 514.

[0005] However, in the case of using a cigarette paper including a nonflammable region, the tobacco burn is made nonuniform because the cigarette paper includes a flame retardant region and a flammable region. Also, the smoking taste is made nonuniform. Also, in the method of lowering flame spread by lowering the burn rate, the flame spread is lowered by lowering the air permeability of the cigarette paper for this purpose. As a result, the ventilation effect produced by the cigarette paper is lowered so as to increase the amount of the carbon monoxide (CO) contained in the mainstream smoke, increasing the carbon monoxide/tar ratio (C/T ratio). Further, if the air permeability of the cigarette paper is lowered, the taste of the tobacco is changed so as to give rise to the problem that an ordinary smoker is caused to feel an incompatibility.

[0006] On the other hand, it is known that a cigarette using a cigarette paper having a low mixing ratio of loading material is lowered in the burn rate. However, it is experimentally known that the cigarette goes out during static burn, and thus the amount of loading material cannot be decreased excessively.

[0007] Therefore, an object of the present invention is to provide a cigarette, which is substantially equal to an ordinary cigarette in smoking behavior and in the burn rate, and which permits improving the C/T ratio in the mainstream smoke and exhibits low flame spread.

Disclosure of Invention

[0008] As a result of research conducted in an effort to develop a low flame-spreading cigarette, the present inventors have found that a cigarette achieving the above object can be obtained merely by setting the inherent air permeability of the cigarette paper wrapping the tobacco filler material rod and the amount of the loading material mixed in the cigarette paper at prescribed values. The amount of loading material can be decreased as much as possible within the range of maintaining the static burn by setting the inherent air permeability of the cigarette paper to fall within a prescribed range. The present invention is based on these findings.

[0009] According to the present invention, there is provided a cigarette comprising the features of claim 1.

[0010] The cigarette of the present invention maintains static burn, and can exhibit a low flame spread property such that, when left to stand on a substrate after static burn over a prescribed distance, a median value of a moving distance of a char line of the cigarette paper in an axial direction of the cigarette until the burn of the cigarette is stopped is not larger than 8 mm.

Best Mode for Carrying Out the Invention

[0011] The present invention will be described in more detail below.

[0012] A cigarette according to the present invention comprises a tobacco filler material rod and a cigarette paper wrapping the tobacco filler material rod. The cigarette of the present invention has an outer appearance and shape similar to those of an ordinary cigarette.

[0013] The tobacco filler material rod used in the cigarette of the present invention is formed of, e.g., ordinary shredded tobacco. The shredded tobacco may contain expanded tobacco and regenerated tobacco, and the central vein of tobacco leaf. It is preferable that the loading density of the shredded tobacco is 130 to 260 mg/cm^3. If the loading density fails to fall within the range given above, it may sometime become difficult to suppress sufficiently the flame spread even if the tobacco rod is wrapped in the cigarette paper of the present invention. It is more preferable that the loading density of the tobacco filler material is 130 to 230 mg/cm^3, further preferably 140 to 230 mg/cm^3. It suffices for the shredding width of the shredded tobacco to be equal to that of ordinary shredded tobacco. However, in view of low flame spread, it is desirable for the shredding width to be relatively large, i.e., 0.5 to 1.5 mm, more preferably 0.8 to 1.2 mm.

[0014] The cigarette paper used in the present invention is based on ordinary pulp such as flax pulp used for forming ordinary cigarette paper and, thus, contains pulp. The cigarette paper used in the present invention has an inherent air permeability (the air permeability of the cigarette paper without any perforations made therein) of more than 20 CORESTA units (C.U.) but 80 CORESTA units or less. If the inherent air permeability of the cigarette paper sheet is not higher than 20 CORESTA units, the C/T ratio is increased in the cigarette mainstream smoke that is generated during the smoking stage. On the other hand, if the inherent air permeability of the cigarette paper exceeds 80 CORESTA units, the nonuniformity of the air permeability is increased. The inherent air permeability of the cigarette paper is desirably more than 20 CORESTA units but 60 CORESTA units or less, and is more desirably 25 to 55 CORESTA units.

[0015] Incidentally, the cigarette paper may be perforated mechanically or electrically by the ordinary method. The air permeability of the wrapping paper having such holes is not particularly limited.

[0016] The cigarette paper of the present invention contains loading materials. The loading materials that are used are selected from calcium carbonate, potassium carbonate, calcium hydroxide and magnesium hydroxide. The loading material is contained in the cigarette paper in an amount of 1.6 to 3.3 g/m^2. If the amount of the loading material is smaller than 1.0 g/m^2, the cigarette goes out during static burn. Also, if the loading material is contained in an amount exceeding 5.0 g/m^2, low flame spread cannot be achieved. It is desirable for the amount of the loading material to be 1.4 to 3.7 g/m^2, more desirably, according to the invention 1.6 to 3.3 g/m^2. Also, the amount of loading material in the cigarette paper is preferably 6 to 25% by weight, more preferably 7 to 21% by weight, and furthermore preferably 8 to 17% by weight.

[0017] The basis weight of the cigarette paper is preferably 17 to 28 g/m^2. If the basis weight is smaller than 17 g/m^2, it tends to be difficult to stably manufacture the cigarette paper sheet. Also, if the basis weight exceeds 28 g/m^2, flame spread tends to be promoted. The basis weight of the cigarette paper is more preferably 18 to 25 g/m^2, furthermore preferably 18 to 22 g/m^2.

[0018] A burn adjusting agent such as citric acid or its salt (such as sodium salt or potassium salt) is added to the cigarette paper. The content of the burn adjusting agent is 0.1 to 1.0% by weight. If the amount of burn adjusting agent exceeds 1.0% by weight, the C/T ratio tends to become high. The amount of burn adjusting agent is preferably 0.1 to 0.6% by weight.

[0019] Incidentally, the cigarette paper of the present invention, by having a tensile strength of 10 to 20 N/15 mm or more, can make cigarettes, without difficulty, even if applied to a high-speed cigarette making machine that permits manufacturing cigarettes at a rate of 8,000 to 12,000 cigarettes/min. The tensile strength of the cigarette paper can be controlled by controlling the beating degree of the pulp or by controlling the amount of pulp used for manufacturing the cigarette paper sheet. The tensile strength of the cigarette paper increases with increase in the amount of pulp per unit area of the cigarette paper or in the beating degree of the pulp.

[0020] According to the present invention, a cigarette low in flame spread, and generating mainstream smoke having a small C/T ratio is obtained in spite of the relatively high inherent air permeability of the cigarette paper by setting the inherent air permeability of the cigarette paper and the amount of the loading material contained in the cigarette paper to fall within the ranges given above. Also, the cigarette of the present invention permits exhibiting a burn rate substantially equal to that of an ordinary cigarette. The low flame-spreading property of the cigarette of the present invention may be such that, when left to stand on a substrate (10 superposed filter paper sheets) after static burn over a prescribed distance, a median value of a moving distance of a char line of the cigarette paper in an axial direction of the cigarette until the burn of the cigarette is stopped is not larger than 8 mm, preferably 4 mm or lees (measured according to ASTM E 2187-02b method). In a plurality of cigarettes of the present invention, the most frequently obtained value of the moving distance of the char line noted above may be 8 mm or less, preferably 4 mm or less.

[0021] The present invention will now be described with reference to Examples, but the present invention is not limited thereto.

Examples and Comparative Examples

[0022] Shredded tobacco was wrapped in a flax pulp cigarette paper having the specification shown in Table 1 such that the shredded tobacco had the loading density shown in Table 1 so as to fabricate 40 cigarettes for each case. Calcium carbonate was used as the loading material, and sodium citrate was used as the burn adjusting agent. Flue-cured shredded tobacco or blended shredded tobacco were used as the shredded tobacco. Table 1 also shows the inherent air permeability and the tensile strength of the cigarette paper. Incidentally, the tensile strength shown in Table 1 was measured by using a tensile strength tester STROGPAPHE-S manufactured by Toyo Seiki K.K. in accordance with the method specified in Japanese Industrial Standards (JIS) P 8113-1998 (the size of test piece: 15.0 mm X about 250 mm, the gripping distance: 180 ± 2 mm, and the pulling rate: 50 mm/min).

[0023] The static burn rates of the cigarettes thus fabricated were measured by the ordinary method in respect of the fabricated cigarette. Also, the percent full length burn on 10 superposed filter paper sheets was measured by the method specified in ASTM E2187-02b. Further, measurement was made of the median value of the moving distance of the char line of the cigarette paper in the axial direction of the cigarette after the ignited cigarette was placed on the filer papers until the cigarette burning is stopped (or went out). Table 2 shows the results.

[0024] Further, measurement by the ordinary method was made of the amount of total particulate matter (TPM), the amount of carbon monoxide and the amount of tar contained in the tobacco mainstream smoke that was generated during burning of each cigarette, and the C/T ratio was calculated. Also measured was the number of puffs. Table 3 shows the results.

Table 1

Ex. No.	Cigarette paper					Shredded Tobacco	
	Basis weight (g/m^2)	Amount of loading material cigarette paper (g/m^2)	Burn in adjusting agent (% by weight)	Inherent air permeability (C.U.)	Tensile strength (N/15mm)	Shredding width (mm)	Loading density (mg/cm^3)
Comp. Ex. 1-1 (Ordinary Cig. 1)	26	7.7	1.0	35	14	0.8	230
Comp. Ex. 1-2-1	30	8.7	0	10	>14	0.8	220
Comp. Ex. 1-2-2						1.2	
Comp. Ex. 1-3-1	21	1.9	0	9	24	0.8	220
Comp. Ex. 1-3-2						1.2	
Ex. 1-1-1	21	2.4	0.2	34	17	0.8	220
Ex. 1-1-2						1.2	
Ex. 1-2-1	21	3.3	0.2	52	14	0.8	220
Ex. 1-2-2						1.2	
	Basis weight (g/m^2)	Amount of loading material cigarette paper (g/m^2)	Bum in adjusting agent (% by weight)	Inherent air permeability (C.U.)	Tensile strength (N/15mm)	Shredding width (mm)	Loading density (mg/cm^3)
Camp. Ex. 1-2 (ordinary Cig. 2)	26	7.7	1.0	35	14	0.8	185
Ex. 1-1-3	21	2,4	0,2	34	17	1.2	185

(continued)

	Basis weight (g/m^2)	Amount of loading material cigarette paper (g/m^2)	Bum in adjusting agent (% by weight)	Inherent air permeability (C.U.)	Tensile strength (N/15mm)	Shredding width (mm)	Loading density (mg/cm^3)
Comp. Ex. 1-2-3	30	8.7	0	10	>14	1.0	140
Comp. Ex. 1-3-3	21	1.9	0	9	24	1.0	140
Ex. 1-1-4	21	2.4	0.2	34	17	1.0	140
Ex. 1-2-3	21	3.3	0.2	52	14	1.0	140

Table 2

Ex. No.	Cigarette Properties			
	Static burn rate (mm/min)	Static weight burn rate (mg/min)	Percent full length burn (%)	Median value(mm) of moving distance of char line until cigarette went out
Comp. Ex, 1-1 (Ordinary Cig. 1)	4.5	45	100	-
Comp. Ex. 1-2-1	3.2	32	30	4
Comp. Ex, 1-2-2	33	33	18	12
Comp. Ex, 1-3-1	Went out		0 -	-
Comp. Ex. 1-3-2	Went out		0	-
Ex. 1-1-1	3.2	36	8	4
Ex. 1-1-2	2.9	34	0	5
Ex. 1-2-1	3.2	37	18	6
Ex. 1-2-2	3.2	37	18	5
Comp. Ex. 1-2 (Ordinary Cig. 2)	5.5	51	100	-
Ex. 1-1-3	4.1	38	10	6
Comp. Ex, 1-2-3	4.6	31	0	3
Comp. Ex. 1-3-3	Went out		0	-
Ex. 1-1-4	4.0	27	0	3
Ex. 1-2-3	4.2	29	0	4

Table 3

Ex. No.	Components in Mainstream Smoke				Number of puffs (times/cig.)
	TPM (mg/cig.)	Tar (mg/cig.)	CO (mg/cig.)	C/T ratio	
Comp, Ex. 1-1 (Ordinary Cig. 1)	30	23	15	0.64	7.6
Comp. Ex. 1-2-1	38	28	18	0.64	8.6
Comp. Ex. 1-2-2	37	28	18	0.64	8.8

(continued)

Ex. No.	Components in Mainstream Smoke				Number of puffs (times/cig.)
	TPM (mg/cig.)	Tar (mg/cig.)	CO (mg/cig.)	C/T ratio	
Comp, Ex. 1-3-1	45	33	21	0.59	9.9
Comp, Ex. 1-3-2	45	33	20	0.64	10.2
Ex. 1-1-1	42	31	17	0.56	9.1
Ex. 1-1-2	42	30	17	0.55	9.6
Ex, 1-2-1	40	28	15	0.54	8.9
Ex, 2-2	41	29	15	0.53	9.0
Comp. Ex. 1-2 (Ordinary Cig. 2)	20	19	11	0.57	5.3
Ex. 1-1-3	36	25	13	0.51	6.9
Comp. Ex. 1-2-3	36	25	13	0.51	6.2
Comp, Ex. 1-3-3	37	26	13	0.51	6.8
Ex. 1-1-4	33	19	10	0.45	6.0
Ex. 1-2-3	26-	23	9	0.47	5.4

[0025] As is apparent from the results given in Tables 2 and 3, the cigarette fabricated by using the cigarette paper specified in the present invention and tobacco filler materials exhibits excellent low flame spread and a small C/T ratio.

[0026] As described above, the present invention provides a cigarette, which permits a smoking behavior similar to that of an ordinary cigarette, also permits a burn rate substantially equal to that of an ordinary cigarette, further permits exhibiting a low flame spread, and is small in C/T ratio in the generated mainstream smoke. Also, since a special band and a special flame retardant substance are not used in the present invention, the cigarette of the present invention continues to produce a prescribed taste under ordinary smoking behavior.

Claims

1. A cigarette comprising a tobacco filler material rod and a cigarette paper wrapping the rod, wherein the cigarette paper has an inherent air permeability of more than 20 CORESTA units but 80 CORESTA units or less and contains a loading material in an amount of 1.6 to 3.3 g/m^2, the loading material is selected from the group consisting of calcium carbonate, potassium carbonate, calcium hydroxide and magnesium hydroxide, the tobacco filler material comprises shredded tobacco having a width of 0.5 to 1.5 mm, and the cigarette paper contains a burn adjusting agent in an amount of 0.1 to 1.0% by weight.

2. The cigarette according to claim 1, wherein the cigarette paper has an inherent air permeability of more than 20 CORESTA units but 60 CORESTA units or less.

3. The cigarette according to claim 1, wherein the cigarette paper has an inherent air permeability of 25 to 55 CORESTA units.

4. The cigarette according to claim 1, wherein the cigarette paper has a basis weight of 17 to 28 g/m^2.

5. The cigarette according to claim 1, wherein the cigarette paper has a basis weight of 18 to 25 g/m^2.

6. The cigarette according to claim 1, wherein the cigarette paper has a basis weight of 18 to 22 g/m^2.

7. The cigarette according to claim 1, wherein the cigarette paper contains a burn adjusting agent in an amount of 0.1 to 0.6% by weight.

8. The cigarette according to claim 1, wherein the tobacco filler material is loaded at a loading density of 130 to 260

mg/cm^3.

9. The cigarette according to claim 1, wherein the tobacco filler material is loaded at a loading density of 140 to 230 mg/cm^3.

10. The cigarette according to claim 1, which exhibits a low flame spread property such that, when left to stand on 10 superposed filter papers after static burn over a prescribed distance and measured according to ASTM E2187-02b method, a median value of a moving distance of a char line of the cigarette paper in an axial direction of the cigarette until the burn of the cigarette is stopped is not larger than 8 mm.

Patentansprüche

1. Eine Zigarette, umfassend einen Tabakfüllmaterialstrang und ein Zigarettenpapier, das den Strang umhüllt, wobei das Zigarettenpapier eine inhärente Luftdurchlässigkeit von mehr als 20 CORESTA-Einheiten, aber 80 CORESTA-Einheiten oder weniger hat und ein Lademateriał in einer Menge von 1,6 bis 3,3 g/m^2 beinhaltet, das Lademateriał ausgewählt ist aus der Gruppe, bestehend aus Calciumcarbonat, Kaliumcarbonat, Calciumhydroxid und Magnesiumhydroxid, das Tabakfüllmateual geschnittenen Tabak mit einer Breite von 0,5 bis 1,5 mm umfasst, und das Zigarettenpapier ein Verbrennungsreguliermittel in einer Menge von 0,1 bis 1,0 Gew.-% beinhaltet.

2. Die Zigarette gemäß Anspruch 1, wobei das Zigarettenpapier eine inhärente Luftdurchlässigkeit von mehr als 20 CORESTA-Einheiten, aber 60 CORESTA-Einheiten oder weniger hat.

3. Die Zigarette gemäß Anspruch 1, wobei das Zigarettenpapier eine inhärente Luftdurchlässigkeit von 25 bis 55 CORESTA-Einheiten hat.

4. Die Zigarette gemäß Anspruch 1, wobei das Zigarettenpapier ein Grundgewicht von 17 bis 28g/m^2 hat.

5. Die Zigarette gemäß Anspruch 1, wobei das Zigarettenpapier ein Grundgewicht von 18 bis 25 g/m^2 hat.

6. Die Zigarette gemäß Anspruch 1, wobei das Zigarettenpapier ein Grundgewicht von 18 bis 22 g/m^2 hat.

7. Die Zigarette gemäß Anspruch 1, wobei das Zigarettenpapier ein Verbrennungsreguliermittel in einer Menge von 0 bis 0,6 Gew.-% beinhaltet.

8. Die Zigarette gemäß Anspruch 1, wobei das Tabakfüllmaterial bei einer Ladedichte von 130 bis 260 mg/cm^3 beladen wird.

9. Die Zigarette gemäß Anspruch 1, wobei das Tabakfüllmaterial bei einer Ladedichte von 140 bis 230 mg/cm^3 beladen wird.

10. Die Zigarette gemäß Anspruch 1, die eine geringe Brandausweitungseigenschaft aufweist, sodass bei Stehenlassen auf 10 überlagerten Filterpapieren nach statischem Brennen über eine vorgeschriebene Entfernung und bestimmt nach dem ASTM E2187-02b-Verfahren ein Medianwert eines Bewegungsabstands einer Verkohlungslinie des Zigarettenpapiers in axialer Richtung der Zigarette, bis das Brennen der Zigarette gestoppt ist, nicht größer als 8 mm ist.

Revendications

1. Cigarette comprenant un bâtonnet de matériau de charge de tabac et un papier de cigarette enveloppant le bâtonnet, dans laquelle le papier de cigarette présente une perméabilité inhérente de l'air supérieure à 20 unités CORESTA mais inférieure à 80 unités CORESTA et contient un matériau de charge dans une quantité de 1,6 à 3,3 g/m^2, le matériau de charge est choisi dans le groupe constitué de carbonate de calcium, de carbonate de potassium, d'hydroxyde de calcium et d'hydroxyde de magnésium, et le matériau de charge de tabac comprend du tabac déchiqueté ayant une largeur de 0,5 à 1,5 mm, et le papier de cigarette contient un agent d'ajustement de la combustion dans une quantité de 0,1 à 1,0 % en masse.

2. Cigarette selon la revendication 1, dans laquelle le papier de cigarette présente une perméabilité inhérente de l'air

supérieure à 20 unités CORESTA mais inférieure à 60 unités CORESTA.

3. Cigarette selon la revendication 1, dans laquelle le papier de cigarette présente une perméabilité inhérente de l'air de 25 à 55 unités CORESTA.

4. Cigarette selon la revendication 1, dans laquelle le papier de cigarette présente une masse de base de 17 à 28 g/m^2.

5. Cigarette selon la revendication 1, dans laquelle le papier de cigarette présente une masse de base de 18 à 25 g/m^2.

6. Cigarette selon la revendication 1, dans laquelle le papier de cigarette présente une masse de base de 18 à 22 g/m^2.

7. Cigarette selon la revendication 1, dans laquelle le papier de cigarette contient un agent d'ajustement de la combustion dans une quantité de 0,1 à 0,6 % en masse.

8. Cigarette selon la revendication 1, dans laquelle le matériau de charge de tabac est chargé à une densité de charge de 130 à 260 mg/cm^3.

9. Cigarette selon la revendication 1, dans laquelle le matériau de charge de tabac est chargé à une densité de charge de 140 à 230 mg/cm^3.

10. Cigarette selon la revendication 1, laquelle exhibe une propriété de faible propagation de flamme de sorte que, lorsqu'elle est laissée sur 10 papiers de filtre superposés après une combustion statique sur une distance prédéterminée et mesurée selon la méthode ASTM E2187-02b, une valeur moyenne d'une distance de déplacement d'une ligne de résidu charbonneux du papier de cigarette dans une direction axiale de la cigarette jusqu'à ce que la combustion de la cigarette s'arrête est d'au plus 8 mm.

REFERENCES CITED IN THE DESCRIPTION

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