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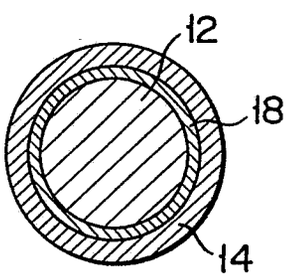
(54) **CIGARETTE.**

(57) A cigarette in which the amount of tar produced during smoking is reduced. A cigarette (10) has a fire retardant existing within a tobacco enclosing material (14) or in the outer surface of the material (14) and a fire promoter existing within cut tobacco (12) or in the inner surface of the tobacco enclosing material (14).



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S P E C I F I C A T I O N

CIGARETTE

Technical Field

The present invention relates to cigarettes. More particularly, the present invention relates to cigarettes which have lower tar contents in the main and sub smoke flows without changing the number of puffs per cigarette and the air permeation amount.

Background Art

Techniques for reducing the sub smoke flow in cigarette smoking are known as per U.S.A. Patent No. 4,231,377 and Japanese Patent Disclosure (Kokai) No. 57-163,479. A technique for reducing the main and sub smoke flows in cigarette smoking is known as per Japanese Patent Disclosure (Kokai) No. 48-61,699.

In U.S.A. Patent No. 4,231,377, a magnesium compound such as magnesia or magnesium hydroxide is added to cigarettes to reduce the sub smoke flow. This patent does not provide any description of the main smoke flow.

In Japanese Patent Disclosure (Kokai) No. 57-163,479, the sub smoke flow is reduced using a rolling material having a small amount of air permeation (about 0.5 to 8 collesters). However, this technique has its disadvantages of increase in the main smoke flow and the number of puffs.

In Japanese Patent Disclosure (Kokai)

No. 48-61,699, activated carbon having a particle size of 0.177 mm or less and containing particles having a size of 0.44 mm or less in an amount of 25 to 50% is added in the amount of up to about 70% to provide an activated carbon added rolling material. This rolling material is used to wrap tobacco, and general paper then covers this rolling material thereby reducing the main and sub smoke flows. However, according to this method, the thickness of the rolling material is increased and interferes with the rolling operation of a conventional rolling machine. This leads to a need for an improved rolling machine or the development of a new type of rolling machine. Even if rolling with a conventional rolling machine can be performed, activated carbon may be separated or peeled off during rolling, thus adversely affecting the rolling conditions. This also renders maintenance of the rolling machine difficult.

Disclosure of Invention

It is an object of the present invention to provide cigarettes which produce a reduced amount of tar when being smoked without substantially changing the number of puffs and the air permeation amount.

It is another object of the present invention to provide cigarettes which produce a reduced amount of tar when being smoked without requiring a significant change in manufacturing procedures or without adversely affecting manufacturing conditions.

In order to achieve these objects, there is provided a cigarette having tobacco and rolling material wrapping it, wherein a fire-retarding agent is contained in the rolling material or on an outer surface of the rolling material, and a combustion promoter is contained in the tobacco or on an inner surface of the rolling material.

The cigarette according to the present invention has substantially the same number of puffs and air permeation as conventional cigarettes and can be manufactured by substantially the same method as that of conventional cigarettes, produces less amount of tar when being smoked than conventional cigarettes.

Brief Description of Drawings

Fig. 1 is a perspective view of a cigarette according to an embodiment of the present invention; and

Figs. 2 to 4 are enlarged sectional views along the line a - a' in Fig. 1 for illustrating various embodiments of the present invention.

Best Mode for Carrying Out the Invention

As shown in Fig. 1, the cigarette 10 according to the present invention has the same outer appearance as that of a conventional cigarette. That is, the cigarette 10 has shredded tobacco 12 and a rolling material 14 wrapping it. The rolling material is a sheetlike material used for encircling shredded tobacco and usually consists of paper. A tobacco

leaf of a cigar is also a rolling material. A filter plug 16 is generally arranged at one end of a cigarette. In the cigarette of the present invention, a fire-retarding agent is present in the rolling material 14 or on its outer surface, and a combustion promoter is present in the tobacco 12 or on the inner surface of the rolling material 14.

Examples of the fire-retarding agent may include carbohydrates; inorganic substances such as antimony-containing compounds, ammonium phosphate and ammonium sulfamate; phosphorus-containing compounds such as lower alkyl phosphate and hydroxymethyl phosphonium; bromine- or chlorine-containing compounds; and mixtures thereof. Among these examples, carbohydrates are particularly preferable. Particularly preferable examples of carbohydrates are cellulose derivatives such as carboxy methyl cellulose; gums such as gum arabic; pectines; or starches.

The fire-retarding agent is contained in the rolling material or is applied on the outer surface of the rolling material. The fire-retarding agent can be added to the rolling material, in the manufacture of rolling paper, by adding it to liquid pulp immediately before forming into paper. The fire-retarding agent can be applied on the surface of the rolling material by dissolving it in a suitable solvent such as water and spraying the surface of the rolling material with the

resultant solution.

The amount of the fire-retarding agent to be used is about 0.1 to 30% and preferably 1 to 20% with respect to the weight of the rolling material.

Examples of the combustion promoter may include alkali metal salts or alkali earth metal salts of nitric acid, tartaric acid, phosphoric acid, fumaric acid and citric acid.

The combustion promoter is added to the shredded tobacco or is coated on the inner surface of the rolling material. Addition of the combustion promoter to the shredded tobacco or coating of the surface of the rolling material therewith can be performed by dissolving it in a suitable solvent such as water and spraying the shredded tobacco or rolling material with the resultant solution.

The amount of the combustion promoter to be used is 0.1 to 50% and preferably 1 to 35% with respect to the weight of the rolling material.

The cigarette according to the present invention can be one as shown in Fig. 2 wherein a combustion promoter 18 is coated on the inner surface of a rolling material 14, and a fire-retarding agent is contained in the rolling material 14. The fire-retarding agent can be added in the rolling material, and the combustion promoter can be added in tobacco. Alternatively, as shown in Fig. 3, a fire-retarding agent 20 can be coated

on the outer surface of a rolling material 14, and a combustion promoter 18 can be coated on the inner surface of the rolling material 14. Still alternatively, as shown in Fig. 4, a fire-retarding agent 20 can be coated on the outer surface of a rolling material 14, and a combustion improver can be added to the shredded tobacco 12.

The relationship between an addition of a fire-retarding agent and the combustibility of the rolling material was examined. The combustibility of the rolling material was tested in accordance with the flame contact method of the combustibility test method D of fiber materials according to the Japanese Industrial Standard JIS-L1091. A rolling material having a length of 200 mm and a width of 27 mm was wrapped around a cylinder with an outer diameter of 8 mm such that the rolling material cylinder had a length of 100 mm. The cylinder was placed in a stainless steel coil which had an inner diameter of 10 mm, a line diameter of 0.5 mm and a line pitch of 2 mm, and which was inclined at an angle of 45 degrees with respect to a horizontal plane. The lower end of this sample was brought into contact with a burner flame and 90% of the cylindrical rolling material was burnt into ash. The number of contacts of the sample with the flame of burner to burn 90% of the rolling material was observed. The above operation was repeated five times to calculate the average number of

contacts of the sample with the flame as an index of the combustibility of the rolling material. The type and amount (% by weight with respect to the weight of the rolling material) of the fire-retarding agent are shown in Table 1 below. The test results are also shown in the table.

Table 1

Fire-retarding agent	Amount	Average No. of contact with flame
carboxymethyl cellulose	2.9	4.7
carboxymethyl cellulose	8.3	9.3
carboxymethyl cellulose	9.8	15.0
gum arabic	2.0	1.5
gum arabic	5.3	3.5
-- (Control)	-	1.0

It is seen from Table 1 above that when the fire-retarding agent is added, the number of contact of the sample with the flame is increased, and the combustibility is impaired.

Example

Five types of filter cigarette samples A to E of standard size according to the present invention were prepared. Each of these cigarettes had a rolling portion (the cigarette from which the filter is removed) of 63 mm length, an acetate filter of 17 mm

length (overall length: 80 mm), and an outer circumferential length of the rolling portion of 25 mm. A control cigarette sample F of general type was also prepared to provide a total of 6 types of cigarettes. The samples were subjected to the smoking test according to the following method. The tar contents in the main and sub smoke flows were examined. The types and amounts (% by weight) of the fire-retarding agent and the combustion promoter in each sample and methods of adding them are shown in Table 2 below. The air permeation amount and combustibility (average number of contact of the sample with the flame and the average combustion speed (mm/sec)) of each rolling material are also shown in Table 2. The air permeation amount of the rolling material is expressed in units of collesters which represent the amount of air (mℓ) which is passed through an area of 1 cm^2 of the rolling material at a differential pressure of 100 mmH_2O.

Each sample was mounted in an automatic smoking machine and was smoked under standard conditions. The automatic smoking machine was of a type which can separately collect tars in the main and sub smoke flows produced during smoking. The standard conditions mean a combustion length of 50 mm, a smoking frequency of once/min, a smoking volume of 35 mℓ/puff, and a smoking time of 2 sec/puff. The tar was collected with a Cambridge filter and the amount of the tar was measured

by subtracting the water content from the weight difference of the Cambridge filter before and after tar collection. Five samples were tested each time with the automatic smoking machine, and this cycle was repeated three times. The average amount of tar in terms of weight per gram of the cigarette was calculated. The tar contents in the main and sub smoke flows and the average number of puffs are shown in Table 3 below.

Table 2

Sample	Fire-retaring agent			Combustion promoter			Air permeation amount	Combustibility of rolling material	
	Type	Adding method	Amount	Type	Adding method	Amount		Average No. of contact with flame	Average combustion speed
A	carboxy-methyl cellulose	Applied on outer surface or rolling material	4.5	potassium nitrate	Applied on inner surface of rolling material	15.6	12	1	2.20
B	carboxy-methyl cellulose	Applied on outer surface of rolling material	2.8	potassium nitrate	Applied on inner surface of rolling material	1.2	11	1	2.27
C	carboxy-methyl cellulose	Applied on outer surface or rolling material	1.0	sodium fumarate	Applied on inner surface of rolling material	3.0	12	1	1.00
D	carboxy-methyl cellulose	Added in rolling material	20.0	potassium nitrate	Applied on inner surface of rolling material	30.5	13	1	1.15
E	gum arabic	Applied on outer surface of rolling material	3.8	sodium citrate	Added in tobacco	5.2	9	2	-
F	- (Control)	-	-	-	-	-	13	1	0.88

Table 3

Sample	Average tar amount in smoke (mg/g)			Average No. of puffs
	Main smoke flow	Sub smoke flow	Total	
A	28.0	18.0	46.0	13.0
B	31.0	26.2	57.2	10.0
C	32.2	27.0	59.2	9.2
D	29.1	12.1	41.2	10.3
E	32.0	28.1	60.0	10.3
F	33.9	31.8	65.7	10.5

As can be seen from Table 3, as compared to sample F, with samples A to E of the present invention, the tar contents in both the main and sub smoke flows, particularly, the tar content in the sub smoke flow which is considered to be more hazardous to health, is significantly decreased. The average numbers of puffs of samples A to E of the present invention are substantially the same as that of the sample F. Particularly, with samples A and D, the tar contents in the main and sub smoke flows are about 15% and 50% lower than those of sample F, respectively.

C L A I M S

1. A cigarette with shredded tobacco and a rolling material wrapping it, comprising a fire-retarding agent contained in the rolling material or applied on the outer surface of the rolling material, and a combustion promoter contained in the shredded tobacco or applied on the inner surface of the rolling material.

2. The cigarette according to claim 1, wherein the fire-retarding agent is one member selected from the group consisting of cellulose derivatives, pectines, gums, and starches, and the combustion promoter is a member selected from the group consisting of alkali metal salts and alkali earth metal salts of nitric acid, tartaric acid, phosphoric acid, fumaric acid, and citric acid.

3. The cigarette according to claim 1, wherein the fire-retarding agent is contained in the rolling material and the combustion promoter is applied on the inner surface of the rolling material.

4. The cigarette according to claim 1, wherein the fire-retarding agent is contained in the rolling material, and the combustion promoter is added in the shredded tobacco.

5. The cigarette according to claim 1, wherein the fire-retarding agent is applied on the outer surface of the rolling material, and the combustion promoter is applied on the inner surface of the rolling material.

6. A cigarette according to claim 1, wherein the fire-retarding agent is applied on the outer surface of the rolling material, and the combustion promoter is added in the shredded tobacco.

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FIG. 1

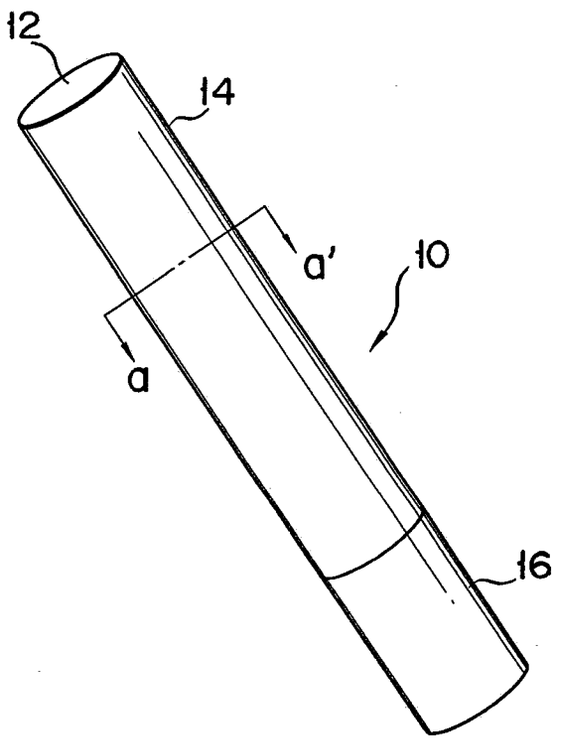


FIG. 2

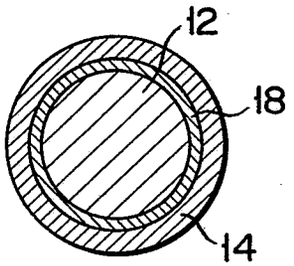


FIG. 3

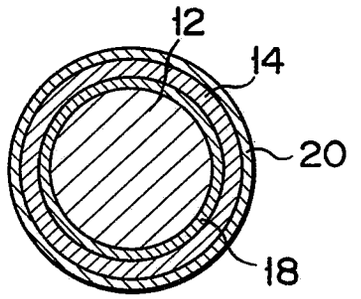
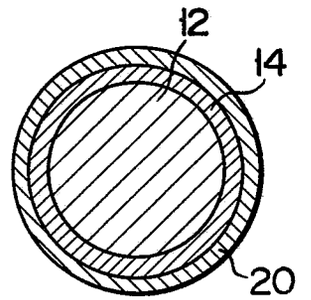


FIG. 4



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INTERNATIONAL SEARCH REPORT

International Application No. PCT/JP84/00420

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [3]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int. Cl[3] A24D 1/02, A24B 15/00

II. FIELDS SEARCHED

Minimum Documentation Searched [4]

Classification System	Classification Symbols
IPC	A24D 1/02, A24B 15/00, A24D 1/10, A24B 3/14, A24B 15/28, A24C 5/46

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [5]

Jitsuyo Shinan Koho 1926-1984
Kokai Jitsuyo Shinan Koho 1971-1984

III. DOCUMENTS CONSIDERED TO BE RELEVANT [14]

Category*	Citation of Document, [15] with indication, where appropriate, of the relevant passages [17]	Relevant to Claim No. [18]
A	JP, A, 48-44500 (Iizuka Toshiyuki and two others) 26 June. 1973 (26.06.73)	1 - 6
A	JP, A, 55-114279 (Tokyo Pipe Kabushiki Kaisha) 3. September. 1980 (03.09.80)	1 - 6
A	JP, A, 50-135298 (Rijet and Meyers Inc.) 27. October 1975 (27.10.75)	1 - 6

* Special categories of cited documents: [16]

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"P" document published prior to the international filing date but later than the priority date claimed

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"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

IV. CERTIFICATION

Date of the Actual Completion of the International Search [2]	Date of Mailing of this International Search Report [2]
October 17, 1984 (17.10.84)	October 22, 1984 (22.10.84)
International Searching Authority [1]	Signature of Authorized Officer [20]
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