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(54) **PROCESS FOR PRODUCING NON-COMBUSTION TYPE TOBACCO SHEET**

(57) A method for producing a non-combustion type tobacco sheet **characterized by** comprising steps of contacting a tobacco raw material with water to separate them into an aqueous extract and an insoluble tobacco residue, selectively reducing anions contained in the

aqueous extract to provide a low-anion liquid, adding an acid to the low-anion liquid to provide a neutralized liquid, and blending pulp to the insoluble tobacco residue to prepare a mixture from which a sheet is made, followed by adding the neutralized liquid to the sheet to provide a tobacco sheet.

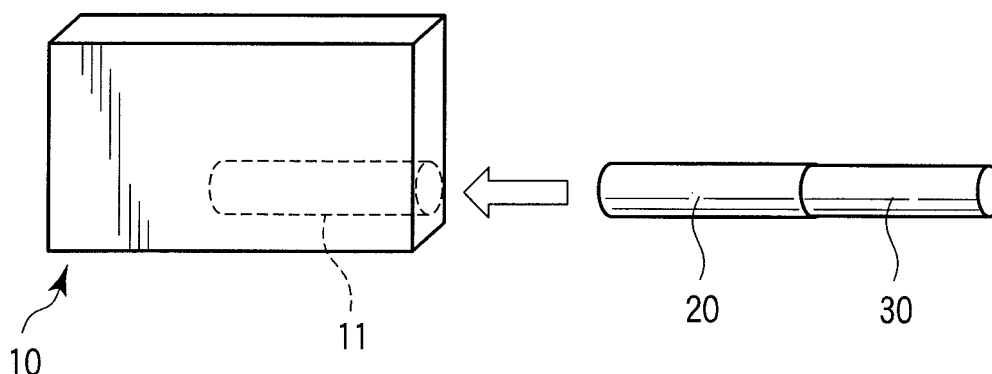


FIG. 2

Description

Technical Field

5 **[0001]** The present invention relates to a method for producing a non-combustion type tobacco sheet, the method particularly improving flavor and taste.

Background Art

10 **[0002]** Usual tobacco requires burning, and thus can generate smoke and undesirable combustion products. In order to solve this problem, non-combustion type flavor suction articles which will not generate smoke or undesirable combustion products have been developed.

[0003] Of the non-combustion type flavor suction articles, such a type that a tobacco sheet is heated and vapor of effective tobacco components generated is sucked has advantages in a simple structure and of being easy to handle. 15 However, the non-combustion type flavor suction articles of this type tend to give insufficient flavor and taste. Therefore, there may be considered that the method for producing the tobacco sheet is improved for strengthening the flavor and taste.

[0004] Patent Document 1 describes a method for treating tobacco, comprising contacting a tobacco material with water to separate them into an aqueous extract and an insoluble tobacco residue, selectively removing the nitrate ions 20 contained in the aqueous extract, and mixing the denitrified aqueous extract with the insoluble tobacco residue.

[0005] However, this method is intended to reduce vapor components (nitrogen oxides, HCN, and CO) during burning by selectively reducing the nitrate ions, and this method is not used for non-combustion type articles. In addition, the amount of nicotine released during smoking of the cigarette produced by using the treated tobacco is not so different 25 from that of a cigarette produced by using untreated tobacco. Therefore, this method cannot improve the flavor and taste.

Prior Art Documents

Patent Documents

30 **[0006]** [Patent Document 1] Jpn. Pat. Appln. KOKAI Publication No. 56-148275

Disclosure of Invention

35 **[0007]** An object of the present invention is to provide a method for producing a non-combustion type tobacco sheet with improved flavor and taste.

[0008] According to an aspect of the present invention, there is provided a method for producing a non-combustion type tobacco sheet, characterized by comprising steps of: contacting a tobacco raw material with water to separate them into an aqueous extract and an insoluble tobacco residue; selectively reducing anions contained in the aqueous extract to provide a low-anion liquid; adding an acid to the low-anion liquid to provide a neutralized liquid; and blending pulp to 40 the insoluble tobacco residue to prepare a mixture from which a sheet is made, followed by adding the neutralized liquid to the sheet to provide a tobacco sheet.

[0009] In the present invention, the step of selectively reducing anions contained in the aqueous extract is achieved by, for example, anion exchange.

45 **[0010]** In the present invention, the acid added to the low-anion liquid is selected from the group consisting of acetic acid, malic acid, maleic acid, citric acid, and succinic acid.

[0011] Use of the method of the present invention enables to produce a non-combustion type tobacco sheet providing improved flavor and taste.

Brief Description of Drawings

50 **[0012]**

FIG. 1 is a perspective view showing an example of a roll including a non-combustion type tobacco sheet according to one embodiment of the present invention.

55 FIG. 2 is an illustration showing the insertion of the roll including the tobacco sheet into a heater of a heating device.

FIG. 3 is a cross-sectional view of the heating device into which the roll including the tobacco sheet is inserted.

FIG. 4 is a perspective view showing the heating device.

[0013] Best Mode for Carrying Out the Invention Hereinafter, the present invention will be described in more detail with reference to embodiments.

[0014] Japanese burley leaves (burley 21) were prepared as a tobacco raw material. The tobacco raw material was finely cut, and 200 g of the lamina was stirred in 20 times volume of water, and then the mixture was separated into an aqueous extract and an insoluble tobacco residue.

[0015] A weakly basic anion exchange resin (Amberite IRA96SB, manufactured by Rohm and Haas) was charged into an open column with a diameter of 18 mm. The above-described aqueous extract was passed through the column at a flow rate of 5 mL/min to provide a low-anion liquid. The low-anion liquid was concentrated using an evaporator. An acid was added to the concentrated low-anion liquid until the pH reached 5.6 to provide a neutralized liquid. The acid used was nitric acid, malic acid, citric acid, or succinic acid.

[0016] On the other hand, 7 wt% of pulp was blended to the insoluble tobacco residue, and then a sheet was made. Each neutralized liquid was poured back to the sheet which was dried at room temperature for two days to provide a tobacco sheet.

[0017] In this manner, the method of the present invention for producing a tobacco sheet is different from conventional method for producing a tobacco sheet in respect of having additional steps of selectively reducing anions contained in the aqueous extract, and adding an acid to the low-anion liquid to provide a neutralized liquid.

[0018] For comparison, another tobacco sheet was produced in the same manner as the above method, except that the low-anion liquid was not neutralized.

[0019] The tobacco sheet was cut into a piece with a length of 10 mm and a width of 27 mm, and formed into a cylinder with a length of 10 mm and a diameter of 8 mm. As shown in FIG. 1, the cylindrical tobacco sheet 21 was brought into contact with a cylindrical mouthpiece 30 with a length of 48 mm and a diameter of 8 mm, and a wrapping material 22 having high heat conductivity was wrapped around the tobacco sheet 21 and the mouthpiece 30 thereby bonding them together. As the heat-conducting wrapping material 22, an aluminum foil or an aluminum-paper laminate is typically used. The composite of the tobacco sheet 21 and the wrapping material 22 is hereinafter referred to as a roll 20.

[0020] As shown in FIG. 2, the roll 20 including the tobacco sheet is inserted into a heater 11 having a hollow cylindrical structure in a heating device 10. The heater 11 is preferably a hollow cylinder made of the same material as the wrapping material 22 (for example, aluminum) of the roll 20 which is covered with an electric resistor. The reason for this is that electrolytic corrosion can undesirably occur if the material of the inner surface of the heater 11 is different from the material of the wrapping material 22.

[0021] At least either one of the roll 20 and the heating device 10 may contain a flavor or flavor carrier. From the viewpoint of storage stability, it is preferable that flavor is carried by a carrier so that the flavor is released by heating.

[0022] FIG. 3 is a cross-sectional view of the heating device into which the roll including the tobacco sheet is inserted. The heater 11 having a hollow cylindrical structure and fitted in the heating device 10 is heated to a temperature of 80 to 140°C. The roll 20 including the tobacco sheet is inserted into the hollow part of the heater 11. The suction end of the mouthpiece 30 has no filter. The size, shape, and material of the mouthpiece 30 are appropriately selected in consideration of holding a cigarette in the mouth.

[0023] FIG. 4 is a perspective view of the heating device 10. As described above, the heating device 10 includes the heater 11 having a hollow cylindrical structure. The heating device 10 contains a control circuit 12, a temperature sensor (not shown), and a battery 13. Examples of the temperature sensor include a thermocouple and a thermistor. The control circuit 12 is powered by the battery 13, and perform a feedback control such that the temperature of the heater 11 detected by the temperature sensor ranges from 80 to 140°C.

[0024] After the roll 20 was inserted into the heater 11, the heater 11 was heated to 115°C in about 10 seconds while controlling the temperature by the control circuit 12. When the user sucks through the mouthpiece 30 in the same manner as for a usual cigarette, effective components originated from tobacco leaf giving flavor and taste are taken in as vapor. At that time, smoke and combustion products will not generate from the tobacco sheet 21, so that the user can enjoy the flavor without fear of causing a nuisance to the surroundings. In addition, ash and burning associated with usual cigarettes will not occur, so that the roll after use can be readily collected and disposed of.

[0025] It was found that the tobacco sheet produced using a neutralized liquid that had been prepared by neutralizing a low-anion liquid with an acid, provided excellent flavor and taste compared with a tobacco sheet produced using a low-anion liquid that had not been neutralized.

[0026] Subsequently, as described below, nicotine content of the tobacco sheet and pH of the tobacco sheet were measured. The nicotine content of the tobacco sheet was measured as follows: after storage for two days, nicotine remaining in the tobacco sheet was extracted, and the nicotine content was measured by GC/MS. The pH of the tobacco sheet was measured as follows: a piece of tobacco sheet with a length of 10 mm and a width of 27 mm was stored for two days, and then shaken and extracted in 10 mL of 0.4 mol/L KCl aqueous solution, and then the pH was measured with a pH meter. These results are shown in Table 1.

[0027] The results in Table 1 indicate that the tobacco sheet produced by using a low-anion liquid without neutralization treatment had extremely low nicotine content and high pH. The reason for this is considered that nicotine volatilized

during the storage. Therefore, it is considered that such high pH and a low nicotine content of the tobacco sheet are causes of not providing good flavor and taste as the non-combustion type flavor suction article.

Table 1

Anion reduction treatment	Acid used for neutralization	Nicotine content of tobacco sheet [mg]	pH of tobacco sheet [-]	Impact
Untreated	-	1.56	5.5	Slightly weak
Treated	-	0.13	8.3	Slightly weak
Treated	Acetic acid	0.25	8.0	Moderate
Treated	Nitric acid	1.24	6.2	Moderate
Treated	Sulfuric acid	1.32	6.4	Moderate
Treated	Hydrochloric acid	1.25	6.1	Slightly strong
Treated	Malic acid	1.18	5.8	Slightly strong
Treated	Maleic acid	1.20	5.9	Strong
Treated	Citric acid	1.15	5.9	Strong
Treated	Succinic acid	0.98	5.8	Strong

Claims

1. A method for producing a non-combustion type tobacco sheet, **characterized by** comprising steps of:

contacting a tobacco raw material with water to separate them into an aqueous extract and an insoluble tobacco residue;

selectively reducing anions contained in the aqueous extract to provide a low-anion liquid;

adding an acid to the low-anion liquid to provide a neutralized liquid; and

blending pulp to the insoluble tobacco residue to prepare a mixture from which a sheet is made, followed by adding the neutralized liquid to the sheet to provide a tobacco sheet.

2. The method for producing a non-combustion type tobacco sheet according to claim 1, **characterized in that** the step of selectively reducing anions contained in the aqueous extract is an anion exchange treatment.

3. The method for producing a non-combustion type tobacco sheet according to claim 1, **characterized in that** the acid added to the low-anion liquid is selected from the group consisting of acetic acid, malic acid, maleic acid, citric acid, and succinic acid.

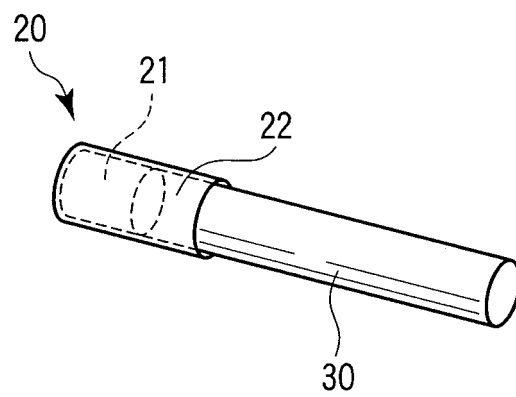


FIG. 1

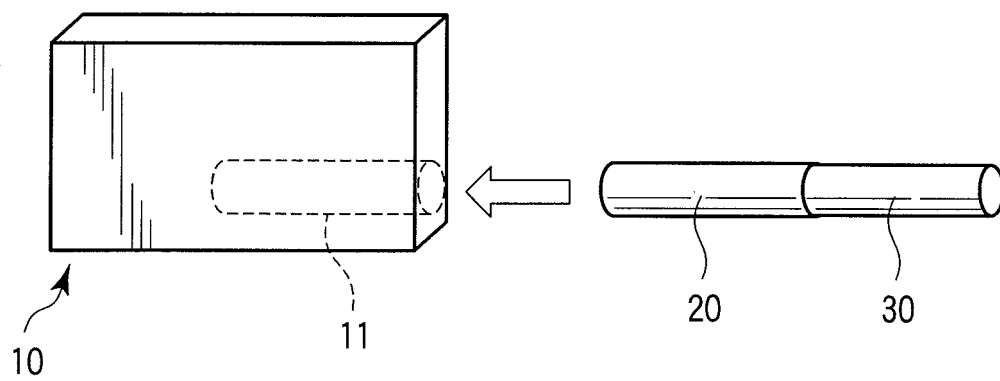


FIG. 2

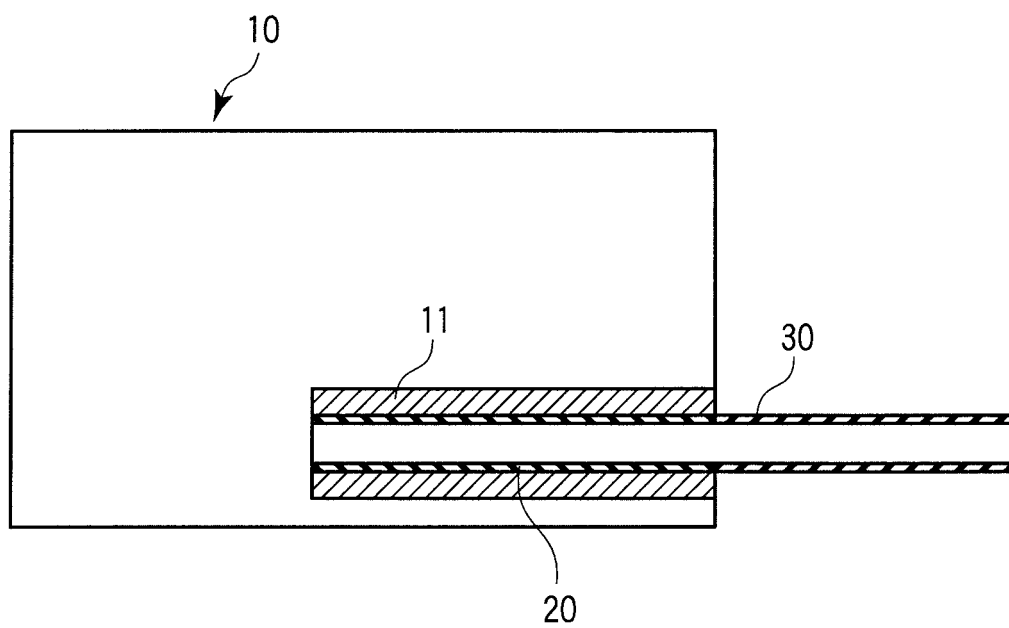


FIG. 3

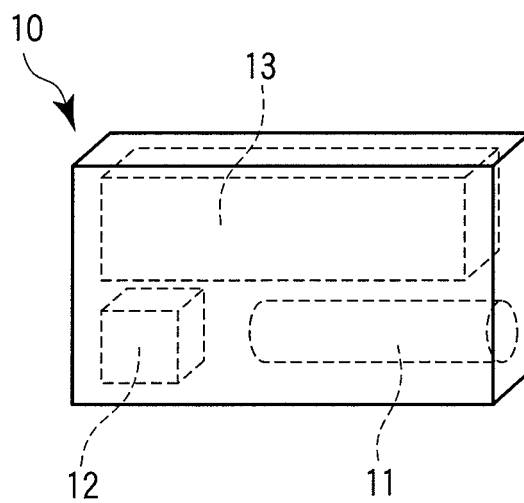


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/054878

A. CLASSIFICATION OF SUBJECT MATTER

A24B13/02 (2006.01) i, A24B15/24 (2006.01) i

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)

A24B13/02, A24B15/24

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2010

Kokai Jitsuyo Shinan Koho 1971-2010 Toroku Jitsuyo Shinan Koho 1994-2010

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 56-148275 A (Philip Morris Inc.), 17 November 1981 (17.11.1981), entire text & US 4301817 A & US 4364401 A & EP 35273 A1 & DE 3171091 D & AU 6807981 A & CA 1150133 A	1-3

☒ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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Date of the actual completion of the international search

01 June, 2010 (01.06.10)

Date of mailing of the international search report

15 June, 2010 (15.06.10)

Name and mailing address of the ISA/

Japanese Patent Office

Authorized officer

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/054878

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 4171054 B2 (Philip Morris Products Inc.), 22 October 2008 (22.10.2008), paragraph [0052] & JP 11-503912 A & JP 2007-259864 A & JP 7-184627 A & JP 5-115272 A & JP 8-511175 A & JP 8-511176 A & US 5692525 A & US 5666978 A & US 5388594 A & US 5505214 A & US 5988176 A & US 6026820 A & US 5499636 A & US 5591368 A & US 5750964 A & US 5708258 A	1-3
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 56148275 A [0006]