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(54) **CIGARETTE**

(57) A cigarette includes a tobacco portion having cut tobacco wrapped with a cigarette paper sheet into a rod shape. The cut tobacco has a cut width of 1.2 mm or more. Projections having a height which corresponds

to 1/3 or more of the thickness of the cigarette paper sheet are formed from the inner surface of the sheet in array partially or entirely on the surface of the cigarette paper sheet, and the sheet is arranged with the projections directed towards the cut tobacco side.

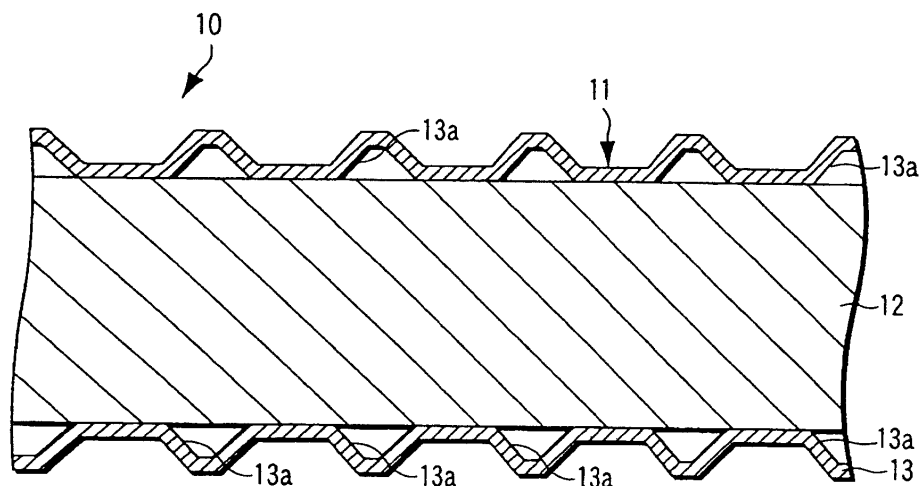


FIG. 1

Description

Technical Field

5 [0001] The present invention relates to a cigarette, and more specifically to a cigarette whose tobacco mainstream smoke is reduced in carbon monoxide amount.

Background Art

10 [0002] Nowadays, various requirements are posed on cigarettes. One of such requirements is to reduce the amount of carbon monoxide in the mainstream smoke.

[0003] Jpn. Pat. Appln. KOKAI Publication No. 10-99067 (Japanese Patent No. 3206885), which was filed by the applicant of the present invention, discloses that when cut tobacco is wrapped with an embossed cigarette paper sheet, not only the falling off of cut tobacco from the tip end of the cigarette can be prevented, but also the mass ratio of carbon monoxide to tar (CO/T ratio) in the mainstream smoke can be reduced.

15 [0004] An object of the present invention is to provide a cigarette which can further reduce the amount of carbon monoxide in the tobacco mainstream smoke, thereby achieving a further low CO/T ratio.

Disclosure of Invention

20 [0005] In an attempt to achieve the above-described object, the inventors of the present invention have conducted studies in detail on embossing made on cigarette paper sheet. As a result, they have found that the above-described object can be achieved by embossing cigarette paper so as to have a certain depth or more and by setting a cut width of cutting tobacco used at a certain width or more. The present invention is based on this finding.

25 [0006] Thus, according to the present invention, there is provided a cigarette comprising a tobacco portion having cut tobacco wrapped with a cigarette paper sheet into a rod shape, the cut tobacco having a cut width of 1.2 mm or more, projections having a height which corresponds to 1/3 or more of the thickness of the cigarette paper sheet being formed from the inner surface of the sheet in array partially or entirely on the surface of the cigarette paper sheet, the sheet being arranged with the projections directed towards the cut tobacco side.

30 [0007] In the present invention, it is preferable that the cut tobacco has a cut width of 2.0 mm or more.

[0008] In the present invention, the cigarette paper usually has a thickness of 10 to 50 μ m.

[0009] Further, in the present invention, the projections may each have a truncated conical shape.

Brief Description of Drawings

35 [0010]

FIG. 1 is a sectional view schematically showing a cigarette according to an embodiment of the present invention;

FIG. 2A is a plan view showing an example of a embossed cigarette paper sheet used in the present invention; and

40 FIG. 2B is a sectional view taken along the line IIB-IIB of the cigarette paper sheet shown in FIG. 2A.

Best Mode for Carrying Out the Invention

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

45 [0012] The cigarette of the present invention includes a tobacco portion having cut tobacco wrapped with a cigarette paper sheet into a rod shape. In the present invention, the cut tobacco has a predetermined width, whereas the cigarette paper sheet has projections formed in array from its inner surface side to have a predetermined height. The cigarette paper sheet is disposed such that the projections are directed towards the cut tobacco side.

[0013] FIG. 1 is an enlarged sectional view schematically showing a portion of a cigarette according to an embodiment of the present invention. As shown in FIG. 1, a cigarette 10 includes a cut tobacco rod 12 in which cut tobacco is filled into a columnar shape, and the circumference of the rod is wrapped with a cigarette paper sheet 13, thus constituting a tobacco portion 11.

50 [0014] In the present invention, the cut tobacco pieces constituting the cut tobacco rod 12 have a cut width of 1.2 mm or more. When the cut width is less than 1.2 mm, the effect of reducing carbon monoxide in the mainstream smoke cannot be sufficiently obtained even if such cut tobacco is combined with the cigarette paper of the present invention, which will be later described. It is more preferable that the width of the cut tobacco pieces is 2.0 mm or more. In the present invention, the width of the cut tobacco pieces is usually up to 3.0 mm. It should be noted that the cut tobacco having such a width can be obtained by a conventionally known method (See, for example, Jpn. Pat. Appln. KOKAI

Publication No. 2000-224978).

[0015] The cigarette paper sheet 13 wrapping the cut tobacco rod 12 has projections 13a formed in array in its inner surface, the projection having a height corresponding to 1/3 or more of the thickness of the cigarette paper sheet 13. The projections 13a are directed towards the cut tobacco rod 12 side. If the height of the projections taken from the inner surface of the cigarette paper sheet is less than 1/3 of the thickness of the sheet, the effect of reducing carbon monoxide in the mainstream smoke cannot be sufficiently obtained even if such cigarette paper is combined with the cut tobacco pieces having a width of 1.2 mm or more. In the present invention the height of the projections 13a is usually not more than 10 times the thickness of the cigarette paper sheet.

The projections 13a in the cigarette paper sheet 13 are formed usually by an embossing process in which the sheet is embossed with use of means such as a knurl member. It is preferable that the embossing provides a pattern of lattice of recesses (grooves).

[0016] The cigarette paper to be embossed by the present invention is the one that is generally used for cigarettes. Such cigarette paper can have a basis weight of 15 to 60 g/m², and it can contain a filler such as calcium carbonate in an amount of 0 to 60% by mass and a burn aid such as sodium citrate in an amount of 0 to 10% by mass. The thickness of the cigarette paper is usually 30 to 50 µm. The cigarette paper can have an air permeability of 0 to 100 CORESTA Unit (C.U.) before embossing, while it can have an air permeability of 0 to 200 C.U. after the embossing.

[0017] Needless to say, a cigarette according to the present invention may have a filter, usually used for ordinary cigarettes, attached to the proximal end of the tobacco portion using tipping paper.

[0018] FIG. 2 is a plan view showing a part of an inner surface of the embossed cigarette paper sheet 13, and FIG. 2B is a cross sectional view taken along the line IIB-IIB in FIG. 2A. Both FIGURES show enlarged views.

[0019] The emboss applied on the cigarette paper sheet 13 shown in FIG. 2 is a rectangular lattice (a square lattice or rectangular lattice) pattern of grooves having substantially the same shape, and the pattern is formed entirely on the paper sheet 13 except for the lapping portions used for gluing.

[0020] In FIGS. 2A and 2B there are shown grooves 131-a1 to 131-a4 having an inverted trapezoidal shape in cross-section, which extend in parallel with each other in right and left directions of the FIGURE (to be referred to as "lateral" direction hereinafter, which may correspond to the longitudinal axis direction of the cigarette), and grooves 131-b1 to 131-b6 having an inverted trapezoidal shape in cross-section, which extend in parallel with each other in a direction orthogonal to the above grooves (to be also referred to as "orthogonal" direction hereinafter). Each of the rectangular regions in plan defined by the grooves 131-a1 to 131-a4 and the grooves 131-b1 to 131-b6 constitutes, three-dimensionally, a projection 132 (which corresponds to a projection 13a in FIG. 1) projecting in the form of tetragonal prismoid. The top surface of the tetragonal prismoid has a flat rectangular shape. The cigarette paper sheet 13 is wrapped around the cut tobacco rod 12 shown in FIG. 1 such that the rectangular top surfaces of the prismoid are abutted against the tobacco rod.

[0021] Next, preferable sizes of the embossing pattern will now be described together with the thickness of the cigarette paper sheet 13. The preferable sizes fall within the following ranges where, as shown in FIGS. 2A and 2B, A and A' represent the length of the substantially rectangular top surface of the projection 132 in the orthogonal direction and in the lateral direction, respectively; B and B' represent the length taken from the base of the projection 132 to the edge of the rectangular top surface in the orthogonal direction and in the lateral direction, respectively; C and C' represent the width of the bottom portion of the groove extending in the lateral direction and in the orthogonal direction, respectively; D is defined as an emboss pitch in the orthogonal direction ($A + 2B + C$); D' is defined as an emboss pitch in the lateral direction ($A' + 2B' + C'$); E represents the depth of each groove (which is also the height of the projection 132 or the emboss depth ED); and F represents the thickness of the cigarette paper sheet 13 (before being embossed):

A and A': each 5 to 1000 µm (preferably, each 5 to 400 µm)

B and B': each 10 to 500 µm (preferably, each 10 to 200 µm)

C and C': each 0 to 400 µm (preferably, each 200 to 300 µm)

E: 10 to 300 µm (preferably, each 40 to 150 µm)

F: 10 to 50 µm (preferably, each 25 to 40 µm).

[0022] It should be noted that the emboss depth can be measured using a probe type three-dimensional surface roughness measurement instrument (for example, SE-3AK of Kosaka Laboratory Ltd.).

[0023] Each embossed dot shown in FIG. 2 has a shape of tetragonal prismoid; however, the present invention is not limited thereto. For example, emboss dots having conical shapes (including pyramids and circular cones) and truncated conical shapes other than a tetragonal prismoid (for examples, a prismoid other than a tetragonal prismoid, such as a trigonal or pentagonal prismoid, and a circular truncated cone) can be used. Of these, emboss dots having a shape of a truncated cone (prismoid and circular truncated cone) are preferable, and emboss dots having a tetragonal prismoidal shape is particularly preferable.

[0024] The cigarette of the present invention employs cut tobacco having the predetermined width and, at the same

time, a cigarette paper sheet that has been specifically embossed. Thus, the amount of carbon monoxide in the mainstream smoke is synergistically reduced, and accordingly, the CO/T ratio is synergistically reduced.

[0025] The present invention will now be described in detail by way of Examples; however, the present invention should not be limited thereto.

Examples

[0026] Cigarettes having a structure similar to that of an ordinary filter-tipped cigarette (diameter: 8 mm, length of tobacco rod: 59 mm, length of filter: 25 mm) were prepared using the cut tobacco and cigarette paper sheets that had the specifications described below. Tipping paper was attached to the proximal end portion of each of the cigarettes prepared, and thus cigarette samples listed in TABLE 1 below were prepared. Five cigarette samples were prepared for each cigarette specification.

<Cut tobacco>

[0027]

Tar value: 5 mg per cigarette
Width of cut piece: 0.8 mm or 2 mm

<Cigarette paper A (not embossed)>

[0028]

Basis weight: 22 g/m²
Filler: calcium carbonate
Amount of filler used: 28% by mass
Burn aid: sodium citrate
Amount of burn aid added: 1% by mass
Thickness: 32 μm
Air permeability: 24 C.U.

<Cigarette paper B (embossed)>

[0029]

Basis weight: 22 g/m²
Filler: calcium carbonate
Amount of filler used: 28% by mass
Burn aid: sodium citrate
Amount of burn aid added: 1% by mass
Thickness: 32 μm
Emboss pitch: 0.64 mm
Emboss depth: 85 μm
Emboss shape: tetragonal prismoid
Emboss dot width (corresponding to A + 2B in FIG. 2): 0.4 mm
Air permeability: 80 C.U.
Wrapping state: wrapping with the projections on cut tobacco side

[0030] Each of the cigarette samples was placed vertically on a smoking device (RGC system R26 of Borgwaldt Co.) and ignited at its distal end. Each sample was statically burned until its char line reaches a point 5 mm away from the distal end of the tipping paper and at that point each sample was puffed one time (puffing time: 2 seconds; puffed volume 35 mL), in order to eliminate the effects of dilution and diffusion from the cigarette paper sheet. The mainstream smoke was collected in a gas bag (Tedler bag of Supelco Co.). The collected mainstream smoke was subjected to a gas chromatography (Micro GC M200H of Agilent Co.) to measure the amount of carbon monoxide (CO). The results are shown also in TABLE 1 below.

TABLE 1:

| CO amount in the mainstream smoke of each cigarette sample | | | | |
|--|-----------------------------|-------------------------------|------------------------------------|---------------------|
| Cigarette paper | Width of cut tobacco pieces | CO amount (average) (mg/puff) | CO amount reduction rate (average) | Remarks |
| Cigarette paper A | 0.8 mm | 2.010 | Reference | Control |
| Cigarette paper A | 2 mm | 1.735 | 14% | Comparative Example |
| Cigarette paper B | 0.8 mm | 1.700 | 15% | Comparative Example |
| Cigarette paper B | 2 mm | 1.182 | 41% | Invention |

[0031] As can be seen from FIG. 1, even merely when the width of the cut tobacco pieces employed was set to 1.2 mm or more, or merely when the cigarette paper sheet was subjected to the embossing process, the amount of CO generated was reduced by about 15%. However, when these conditions are combined together, the amount of CO could be cut down even by 41%. From these results, it is clear that when the cut tobacco having the predetermined cut width and the cigarette paper sheet that has been subjected to the specified embossing, which are defined by the present invention, are used in combination, the above-described synergistic effect can be achieved.

[0032] As described above, according to the present invention, there is provided a cigarette that produces a further less amount of carbon monoxide in its tobacco mainstream smoke.

Claims

1. A cigarette comprising a tobacco portion having cut tobacco wrapped with a cigarette paper sheet into a rod shape, the cut tobacco having a cut width of 1.2 mm or more, projections having a height which corresponds to 1/3 or more of the thickness of the cigarette paper sheet being formed from the inner surface of the sheet in array partially or entirely on the surface of the cigarette paper sheet, the sheet being arranged with the projections directed towards the cut tobacco side.
2. The cigarette according to claim 1, wherein the cut tobacco has a cut width of 2.0 mm or more.
3. The cigarette according to claim 1, wherein the cut tobacco has a cut width of up to 3.0 mm.
4. The cigarette according to claim 1, wherein the projections have a height of up to 10 times the thickness of the cigarette paper sheet.
5. The cigarette according to claim 1, wherein the cigarette paper sheet has a thickness of 10 to 50 μm .
6. The cigarette according to claim 1, wherein the projections each have a truncated conical shape.

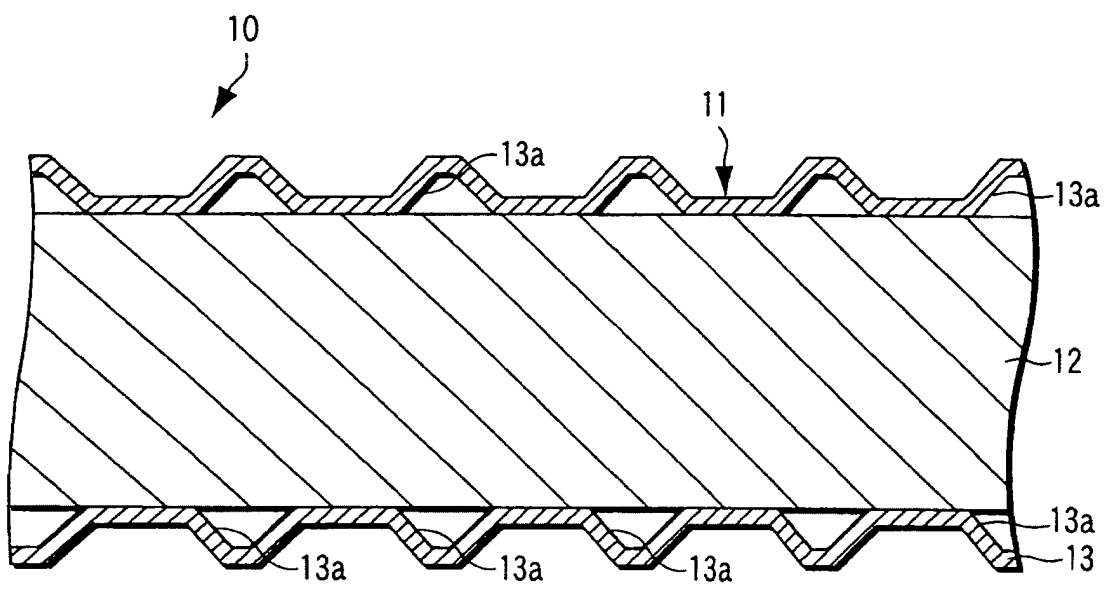
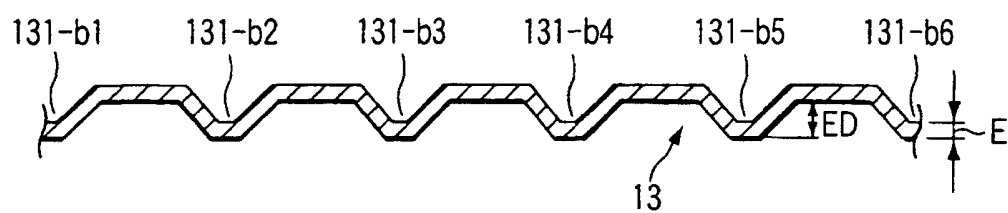
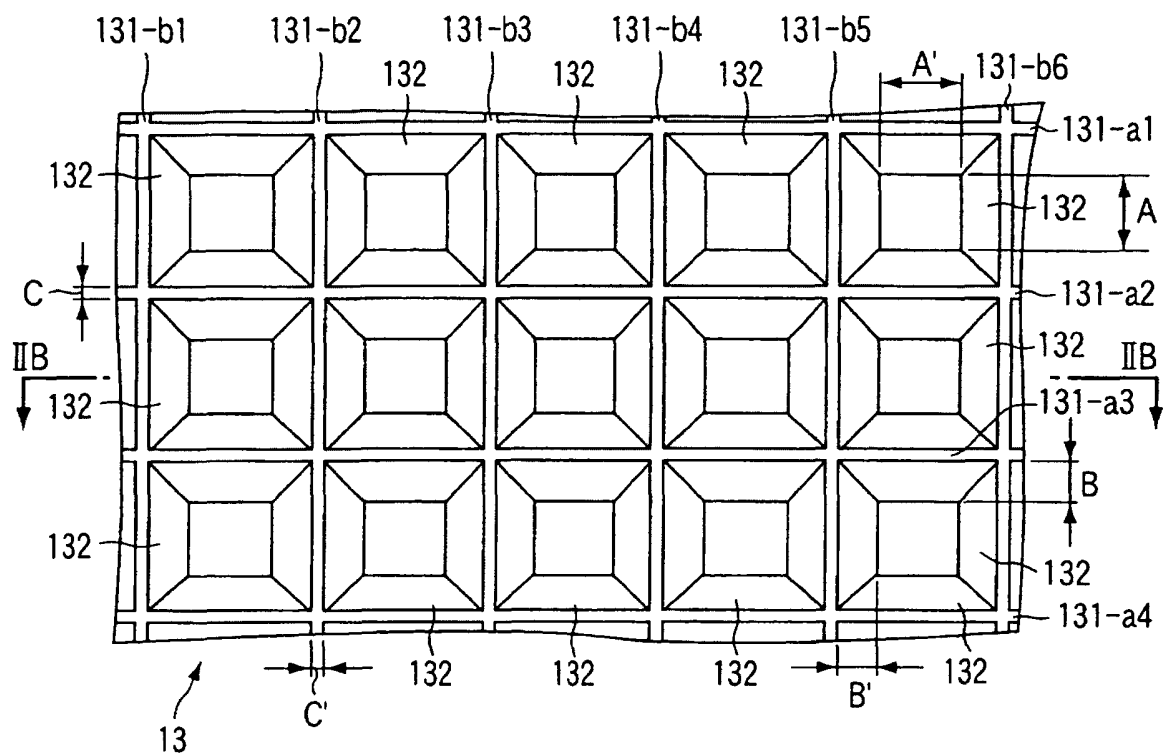


FIG. 1



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP03/01016

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl.⁷ A24D1/02

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 A24D1/02

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. |
|-----------|--|-----------------------|
| A | JP 10-99067 A (Japan Tobacco Inc.), 21 April, 1998 (21.04.98), Par. No. [0009]; Fig. 3 & WO 98/12939 A1 & EP 880905 A1 & US 6019106 A1 & KR 275040 B | 1-6 |
| A | JP 11-169153 A (Japan Tobacco Inc.), 29 June, 1999 (29.06.99), Fig. 3 (Family: none) | 1-6 |
| A | JP 2000-224978 A (Brown & Williamson Tobacco Corp.), 15 August, 2000 (15.08.00), Par. No. [0012] & EP 1004247 A1 & DE 19854662 A | 1-6 |

☐ 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
08 April, 2003 (08.04.03)

Date of mailing of the international search report
22 April, 2003 (22.04.03)

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