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(54)

CIGARETTE PACK

- (57)

A cigarette package accommodates a plurality of cigarettes containing a volatile flavor. In the package,
- a porous polysaccharide gel containing the same flavor as the flavor is accommodated.

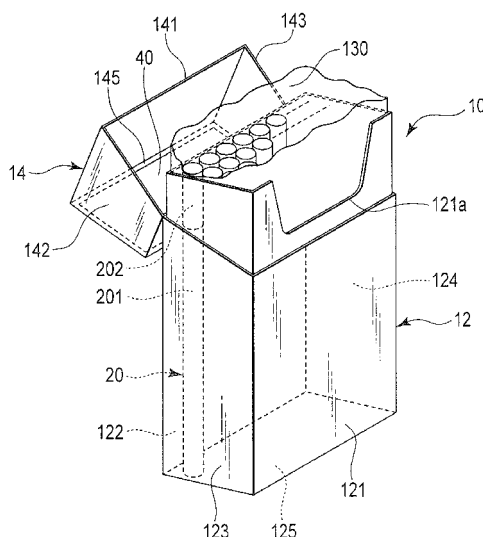


FIG. 1

Description

Technical Field

[0001] The present invention relates to a cigarette package. More particularly, it relates to a cigarette package which does not significantly reduce the amount of a volatile flavor delivered into the mainstream smoke of the cigarette when it is smoked.

Background Art

[0002] Cigarettes are accommodated in a package to be stored and sold. The package is formed of an outer pack and an inner pack which is accommodated in the outer pack and directly wraps a cluster of cigarettes. The outer pack is covered with a thin resin film.

[0003] Incidentally, many currently sold cigarettes comprise a filter. Cellulose acetate is used as a material for the filter. Cellulose acetate is very excellent in filtrating and sorbing components of the mainstream smoke of the cigarette, however it also sorbs a volatile flavor component such as menthol contained in the cigarette. Thus, even if the cigarettes are accommodated in the package and stored, the amount of the volatile flavor delivered into the mainstream smoke of the cigarette when it is smoked is reduced by the sorption by the cellulose acetate as the storage period becomes longer. The reduction rate tends to be higher as the temperature during storage is higher.

[0004] Patent Literature 1 discloses that cigarettes are wrapped with a packaging material containing glycerol ester and/or propylene glycol to suppress the volatilization of the flavor in the cigarettes after opening the package. However, volatilization of the flavor when the cigarettes accommodated in an unopened package are exposed to high temperatures is not examined.

Citation List

Patent Literature

[0005]

Patent Literature 1: Japanese Patent No. 2960008

Summary of Invention

Technical Problem

[0006] An object of the present invention is to provide a cigarette package which does not significantly reduce the amount of a volatile flavor delivered into the mainstream smoke of cigarettes that contain the volatile flavor, when they are smoked, even if the cigarettes accommodated in the package which has not been opened are exposed to high temperatures.

Solution to Problem

[0007] According to one aspect of the present invention, there is provided a cigarette package accommodating a plurality of cigarettes containing a volatile flavor, wherein a porous polysaccharide gel containing the same flavor as the flavor is accommodated in the package.

10 Advantageous Effects of Invention

[0008] The cigarette package of the present invention does not significantly reduce the amount of a volatile flavor delivered into the mainstream smoke of the cigarette even if the package is exposed to high temperatures.

Brief Description of Drawings

[0009]

FIG. 1 is a perspective view of a cigarette package according to one embodiment of the present invention;

FIG. 2 is a perspective view of a cigarette package according to another embodiment of the present invention;

FIG. 3 is an SEM photograph of a volatile-flavor-containing dry polysaccharide gel sheet before microwave heating which has been prepared in Example 1 to be described later;

FIG. 4 is an SEM photograph of a volatile-flavor-containing porous polysaccharide gel sheet after microwave heating which has been prepared in Example 1 to be described later; and

FIG. 5 is a graph showing the change with time of the amount of menthol delivered into the mainstream smoke of the cigarette.

Mode for Carrying out the Invention

[0010] A cigarette package according to one aspect of the present invention accommodates a plurality of cigarettes containing a volatile flavor. A porous polysaccharide gel containing the same flavor as the volatile flavor contained in the cigarettes is accommodated in the package.

[0011] The package may be a so-called hard package like a hinge lid box or a soft package. In any package, a plurality of cigarettes (usually 15 or 20 cigarettes) are directly packed with an inner pack formed of a paper sheet lined with aluminium foil, which is accommodated in an outer pack.

[0012] The cigarettes accommodated in the package are ordinary cigarettes and each comprise a cigarette rod formed of a rod of a tobacco filler such as shredded tobacco and a cigarette paper which wraps the periphery of the rod. A filter may be attached to one end of the cigarette rod using a tipping paper. The filter may be, for

example, a so-called cellulose acetate filter which contains cellulose acetate fiber tow as a filter material. The cigarettes contain a volatile flavor. Examples of the volatile flavor include acetanisole, acetophenone, acetylpyrazine, 2-acetylthiazole, alfalfa extract, amyl alcohol, amyl butyrate, trans-anethole, Star-anise oil, apple juice, Peru balsam oil, yellow-beeswax absolute, benzaldehyde, benzoin resinoid, benzyl alcohol, benzyl benzoate, benzyl phenylacetate, benzyl propionate, 2,3-butanedione, 2-butanol, butyl butyrate, butyric acid, caramel, cardamom oil, carob absolute, beta-carotene, carrot juice, L-carvone, β -caryophyllene, cassia bark oil, cedarwood oil, celery seed oil, chamomile oil, cinnamaldehyde, cinnamic acid, cinnamyl alcohol, cinnamyl cinnamate, citronella oil, DL-citronellol, clary sage extract, cocoa, coffee, cognac oil, coriander oil, cuminaldehyde, Davana oil, δ -decalactone, γ -decalactone, decanoic acid, dill herb oil, 3,4-dimethyl-1,2-cyclopentanedione, 4,5-dimethyl-3-hydroxy-2,5-dihydrofuran-2-one, 3,7-dimethyl-6-octenoic acid, 2,3-dimethylpyrazine, 2,5-dimethylpyrazine, 2,6-dimethylpyrazine, ethyl 2-methylbutyrate, ethyl acetate, ethyl butyrate, ethyl hexanoate, ethyl isovalerate, ethyl lactate, ethyl laurate, ethyl levulinate, ethyl maltol, ethyl octanoate, ethyl oleate, ethyl palmitate, ethyl phenylacetate, ethyl propionate, ethyl stearate, ethyl valerianate, ethyl vanillin, ethyl vanillin glucoside, 2-ethyl-3-(5 or 6)-dimethylpyrazine, 5-ethyl-3-hydroxy-4-methyl-2(5H)-furanone, 2-ethyl-3-methylpyrazine, eucalyptol, Fenu-greek absolute, Genet absolute, Gentian root infusion, geraniol, geranyl acetate, grape juice, guaiacol, guava extract, γ -hepta-lactone, γ -hexalactone, hexanoic acid, cis-3-hexen-1-ol, hexyl acetate, hexyl alcohol, hexyl phenylacetate, honey, 4-hydroxy-3-pentenoic acid lactone, 4-hydroxy-4-(3-hydroxy-1-butenyl)-3,5,5-trimethyl-2-cyclohexene-1-one, 4-(para-hydroxyphenyl)-2-butanone, 4-hydroxyundecanoic acid sodium salt, Immortelle absolute, β -ionone, isoamyl acetate, isoamyl butyrate, isoamyl phenylacetate, isobutyl acetate, isobutyl phenylacetate, jasmine absolute, Kola nut tincture, labdanum oil, terpenless oil of lemon, liquorice extract, linalool, linalyl acetate, Lovage root oil, maltol, maple syrup, L-menthol, menthone, L-menthyl acetate, para-methoxybenzaldehyde, methyl-2-pyrrolyl ketone, methyl anthranilate, methyl phenyl acetate, methyl salicylate, 4'-methylacetophenone, methyl cyclopentenolone, 3-methylvaleric acid, mimosa absolute, molasses, myristic acid, nerol, nerolidol, γ -nonalactone, nutmeg oil, δ -octalactone, octanal, octanoic acid, orange flower oil, orange oil, Orris root oil, palmitic acid, ω -pentadecalactone, peppermint oil, petit-grain Paraguay oil, phenethyl alcohol, phenethyl phenylacetate, phenylacetic acid, piperonal, plum extract, propenyl guaethol, propyl acetate, 3-propyldenedephthalide, prune juice, pyruvic acid, raisin extract, Rose oil, rum, sage oil, sandalwood oil, spearmint oil, Styrax absolute, marigold oil, tea distillate, α -terpineol, terpinyl acetate, 5,6,7,8-tetrahydroquinoxaline, 1,5,5,9-tetramethyl-13-oxacyclo-(8.3.0.0 (4.9))-tridecane, 2,3,5,6-tetramethylpyrazine, thyme oil, tomato extract, 2-tride-

canone, triethyl citrate, 4-(2,6,6-trimethyl-1-cyclohexenyl)-2-butene-4-one, 2,6,6-trimethyl-2-cyclohexene-1,4-dione, 4-(2,6,6-trimethyl-1,3-cyclohexadienyl)-2-butene-4-one, 2,3,5-trimethylpyrazine, γ -undecalactone, γ -valerolactone, vanilla extract, vanillin, veratrum aldehyde, and violet leaf absolute. Usually, the volatile flavor is 1-menthol. The volatile flavor may be added to, for example, a tobacco filler, a filter or both of them. Needless to say, a plurality of packages to be accommodated in one package is produced in the same specification.

[0013] The porous polysaccharide gel which is accommodated together with cigarettes in the cigarette package contains the same flavor as the volatile flavor contained in the cigarette.

[0014] Polysaccharides such as carrageenan, agar, gellan gum, tamarind gum, psyllium seed gum, and konnyaku glucomannan may be used singly. Alternatively, two or more polysaccharides selected from the group consisting of carrageenan, locust bean gum, guar gum, agar, xanthan gum, gellan gum, tamarind gum, tara gum, konnyaku glucomannan, starch, cassia gum, and psyllium seed gum may be used in combination. A mixture of gellan gum and tamarind gum is preferred. Since these polysaccharides can gel by only heating, it is not necessary to use gelling agent for allowing the polysaccharide to gel.

[0015] The porous polysaccharide gel can be produced by subjecting a flavor-containing porous gel disclosed in WO2009/142159 A1 to microwave heating.

[0016] More specifically, a polysaccharide is first dissolved in water while heating, for example, at a temperature of 60 to 90°C. A volatile flavor and an emulsifier are added to the obtained solution, which is kneaded and emulsified at the above temperature to obtain an emulsified slurry. Usable examples of the emulsifier include lecithin, sucrose fatty acid ester, glycerine fatty acid ester, and sorbitan fatty acid ester.

[0017] Subsequently, the emulsified slurry is casted on an appropriate support and dried to evaporate water. The drying is performed at relatively low temperatures, such as 30 to 40°C. The obtained dry polysaccharide gel (sheet) may contain the volatile flavor preferably in an amount of 18% by weight or more, more preferably in an amount of 60% by weight or more, particularly in an amount of 70% by weight or more. The content of the volatile flavor is usually 85% by weight or less. As described in WO2009/142159 A1, even if the dried polysaccharide gel containing the volatile flavor thus obtained is exposed to a high temperature of, for example, 50°C, it hardly releases the volatile flavor. Then, the obtained volatile-flavor-containing dry polysaccharide gel is subjected to microwave heating. The dry gel becomes porous by the microwave heating. The microwave heating is a heating method that causes heat from a substance by the interaction of the microwave and the substance. Conveniently, the microwave heating is performed using a microwave oven. The volatile-flavor-containing dry polysaccharide gel can be heated, for example, in a mi-

crowave oven at a frequency of 2.45 GHz and an output power of 500 W (5A) for 20 to 40 seconds. That is, the microwave energy corresponding to a microwave oven at a frequency of 2.45 GHz and an output power of 500 W (5A) can be applied to the volatile-flavor-containing dry polysaccharide gel for 20 to 40 seconds. As described above, the volatile-flavor-containing dry polysaccharide gel becomes porous by the microwave heating. The obtained porous polysaccharide gel exhibits temperature-dependent specific properties of releasing only a small amount of the volatile flavor such as menthol at an ordinary temperature (30°C or less), but releasing a large amount of the volatile flavor such as menthol at high temperatures (50°C or more). The volatile-flavor-containing porous polysaccharide gel has a plurality of or many pores with a size of 100 μm or less. The volatile-flavor-containing porous polysaccharide gel exhibits porosity that does not significantly reduce the amount of the volatile flavor delivered into the mainstream smoke of the cigarette even if the cigarettes accommodated in the package are exposed to high temperatures. It is preferable that the porous polysaccharide gel contains the volatile flavor in an amount of 1% or more, usually 10 to 50%, of the total amount of the volatile flavor contained in the cigarettes accommodated in the cigarette package.

[0018] As described above, the volatile-flavor-containing porous polysaccharide gel of the present invention is accommodated in the cigarette package. The porous polysaccharide gel in the form of, e.g., sheet or lump can be accommodated in the cigarette package. For example, the sheet of the porous polysaccharide gel can be adhered to cover at least a part of the inner surface of the outer pack. Alternatively, the sheet of the porous polysaccharide gel can be simply inserted into a space formed between the outer and inner packs.

[0019] FIG. 1 is a schematic perspective view showing a hinge lid cigarette box 10. The cigarette box 10 comprises an outer box body 12 and a lid (hinge lid) 14 which is pivotally connected to the box body to be opened and closed and which opens and closes the open end of the box body 12. The box body 12 has a front wall 121, a rear wall 122, side walls 123 and 124, and a bottom wall 125. The front wall 121 of the box body 12 is partially cut away (121a) from the upper end.

The lid 14 is connected to the rear wall 122 of the lid via a hinge 27 (not shown). The lid 14 has a front wall 141, a rear wall 142, side walls 143 and 144, and a top wall 145. In FIG. 1, a lid 12 is opened so that cigarettes 20 in the box can be seen. An inner pack 130 to be described later is opened similarly. The inner pack 130 is partially broken away so that the cigarettes 20 can be seen.

[0020] A cluster of the cigarettes 20 is directly wrapped with the inner pack 130 formed of a paper sheet lined with aluminium and accommodated in the box body 12. Each of the cigarettes 20 has a cigarette rod 201 comprising a tobacco filler rod wrapped with a cigarette paper (not shown). A filter 202 is attached to one end of the cigarette rod. The cigarettes 20 are, for example, menthol

cigarettes, in which menthol is added to the tobacco filler or the filter.

[0021] The volatile-flavor-containing polysaccharide gel porous sheet of the present invention is accommodated in the cigarette box 12. For example, the porous sheet can be attached to the front wall 121 of the box body, the rear wall 122, the side walls 123 and 124 and/or the inner surface of the bottom wall 125 using an appropriate adhesive. The porous sheet can be attached to the front wall 141 of the lid 12, the rear wall 142, the side walls 143 and 144 and/or the inner surface of the top wall 145, in place of or in addition to the inner surface of the box body. In FIG. 1, a volatile-flavor-containing porous polysaccharide gel sheet 40 of the present invention is attached to the inner surface of the top wall 145 of the lid 14. The cigarette box 10 is usually wrapped with a thin resin film (not shown).

[0022] FIG. 2 shows the same cigarette package shown in FIG. 1 except that a volatile-flavor-containing porous polysaccharide gel sheet 41 of the present invention is simply inserted into a space between the inner surface of the front wall 121 of the box body 12 and the front wall of the inner pack 130 (not adhered to any portion of the cigarette package).

[0023] Since the cigarette package of the present invention accommodates the volatile-flavor-containing porous polysaccharide gel, even if it is kept under high temperatures (for example, even if it is placed in a vending machine in summer), the amount of the volatile flavor delivered into the mainstream smoke of the cigarette is not substantially reduced. Examples

Example 1

[0024] In this example, as polysaccharides, gellan gum (trade name: Kelcogel, manufactured by CP Kelco) and tamarind gum (trade name: Bistop D-2032, manufactured by San-Ei Gen F.F.I., Inc.) were used. As the flavor, l-menthol (reagent menthol, Wako Pure Chemical Industries, Ltd.) was used. As the emulsifier, lecithin (trade name: Sunlecithin A-1, Taiyo Kagaku Co., Ltd.) was used.

[0025] 1 g of gellan gum and 1 g of tamarind gum were added to 100 mL of water and dissolved by heating in a constant temperature water bath at 80°C. 10 g of 1-menthol and 1.6 mL of 5% lecithin aqueous solution were added and the mixture was emulsified with a homogenizer (high-performance mixer DMM, A-Tech Japan). The obtained emulsified slurry was extended into a sheet on a stainless plate and the resulting sheet was dried in a forced-air-circulation drier (EPSF116, manufactured by Isuzu) at 40°C for one week. It was analyzed that the thus obtained dry sheet contained about 85% by weight of menthol. An SEM (JSM5310, manufactured by JEOL Ltd.) photograph of the dry sheet is shown in FIG. 3. The dry sheet was placed in a beaker and heated in a microwave oven (ER-V11 (W), manufactured by Toshiba Corporation) at 500 W for 30 seconds to obtain a porous

menthol sheet. An SEM (JSM5310, manufactured by JEOL Ltd.) photograph of the obtained porous menthol sheet is shown in FIG. 4.

[0026] The following experiments were performed using or not using the obtained porous menthol sheet.

[0027] Experiment 1: Only commercially available menthol cigarettes with a cellulose acetate filter (about 6 mg of menthol has been added to the shredded tobacco; in this regard, when the distribution state of the menthol was measured immediately before the start of the present experiment, about 4.5 mg of menthol was present in the shredded tobacco and about 1.5 mg of menthol was present in the filter) were placed in sealed glass containers, which were stored at 22°C for 13 days and for 28 days. Thereafter, the cigarettes were automatically smoked and the amount of menthol in the cigarette smoke was measured.

[0028] Experiment 2: Commercially available menthol cigarettes with a cellulose acetate filter (about 6 mg of menthol has been added to the shredded tobacco) and the porous menthol sheet were placed in sealed glass containers, which were stored at 22°C for 13 days and for 28 days. Thereafter, the cigarettes were automatically smoked and the amount of menthol in the cigarette smoke was measured.

[0029] Experiment 3: Only commercially available menthol cigarettes with a cellulose acetate filter (about 6 mg of menthol has been added to the shredded tobacco) were placed in sealed glass containers, which were stored at 55°C for 13 days and for 28 days. Thereafter, the cigarettes were automatically smoked and the amount of menthol in the cigarette smoke was measured.

[0030] Experiment 4: Commercially available menthol cigarettes with a cellulose acetate filter (about 6 mg of menthol has been added to the shredded tobacco) and the porous menthol sheet were placed in sealed glass containers, which were stored at 55°C for 14 days and for 28 days. Thereafter, the cigarettes were automatically smoked and the amount of menthol in the cigarette smoke was measured.

[0031] In automatically smoking the cigarettes, a 20-port linear smoking machine (SM400; ISO authentic machine, manufactured by Filtrona) was used. The puff time was 2 seconds per puff, the puff volume was 35 mL, and the puff interval was 60 seconds. The cigarette was burnt by a length of 53 mm from the distal end thereof. The smoke was collected in a gas bag and the amount of menthol in the smoke was measured by a gas chromatograph (6890N, manufactured by Agilent Technologies Inc.). The results (the amount of menthol in the cigarette smoke per cigarette) are shown in FIG. 5. In FIG. 5, the results of Experiment 1 are indicated by a white rhombus, the results of Experiment 2 are indicated by a black rhombus, the results of Experiment 3 are indicated by a white triangle, and the results of Experiment 4 are indicated by a black triangle.

[0032] As shown in FIG. 5, in the case where the menthol cigarette was stored at 22°C, there was no great

difference in the amount of menthol in the cigarette smoke between when the porous menthol sheet was co-existent and when it was not coexistent. However, in the case where the menthol cigarette was stored at 55°C, when the porous menthol sheet was not coexistent, the amount of menthol in the cigarette smoke was significantly reduced as compared to the initial amount. However, when the porous menthol sheet was coexistent, the amount of menthol in the cigarette smoke was hardly reduced. These results strongly suggest that the porous menthol sheet releases a small amount of menthol at an ordinary temperature (30°C or less), however it releases a large amount of menthol at high temperatures (50°C or more).

Claims

1. A cigarette package accommodating a plurality of cigarettes containing a volatile flavor, wherein a porous polysaccharide gel containing the same flavor as the flavor is accommodated in the package.
2. The cigarette package according to claim 1, wherein the flavor comprises l-menthol.
3. The cigarette package according to claim 2, wherein the polysaccharide comprises a mixture of gellan gum and tamarind gum.
4. The cigarette package according to claim 1, wherein the polysaccharide gel is in the form of sheet and the sheet covers at least a part of the inner surface of the package.

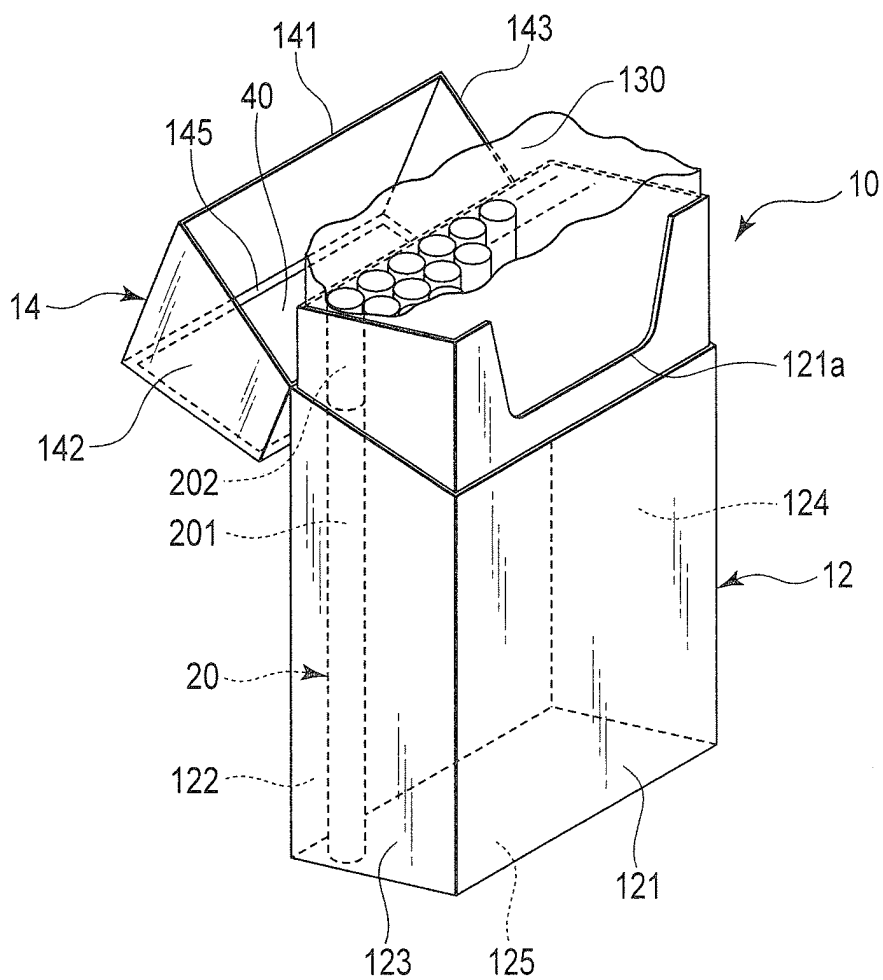


FIG. 1

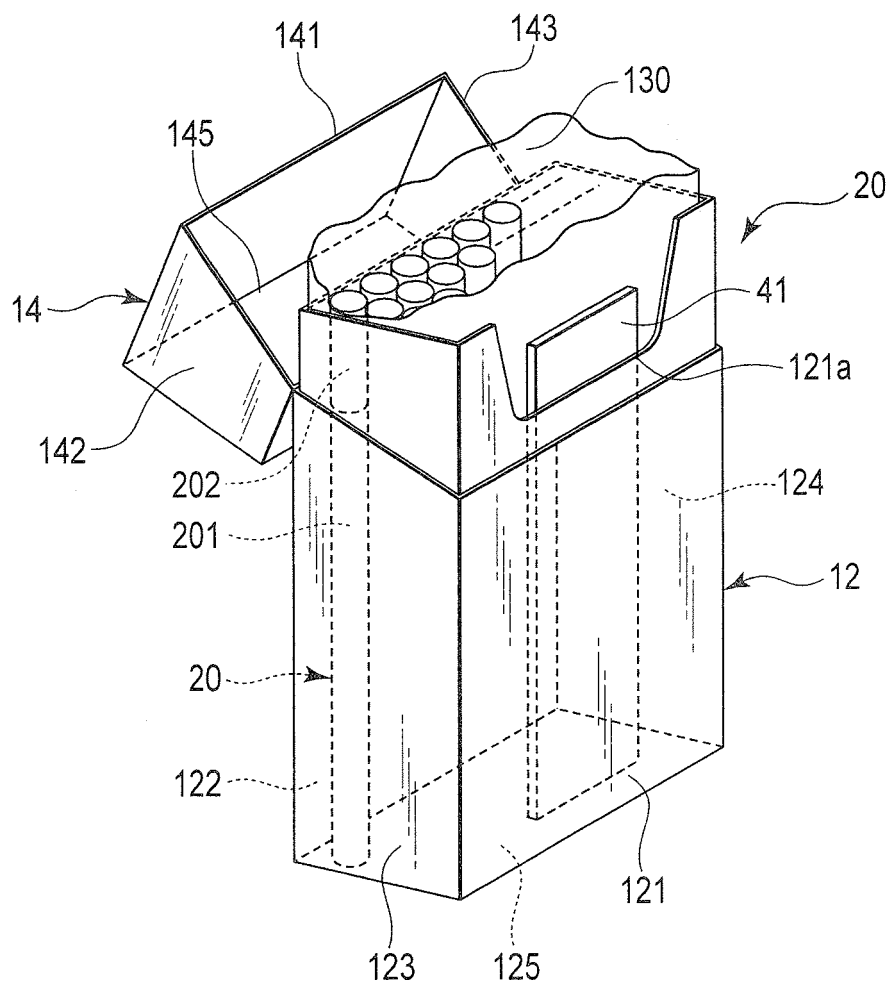


FIG. 2

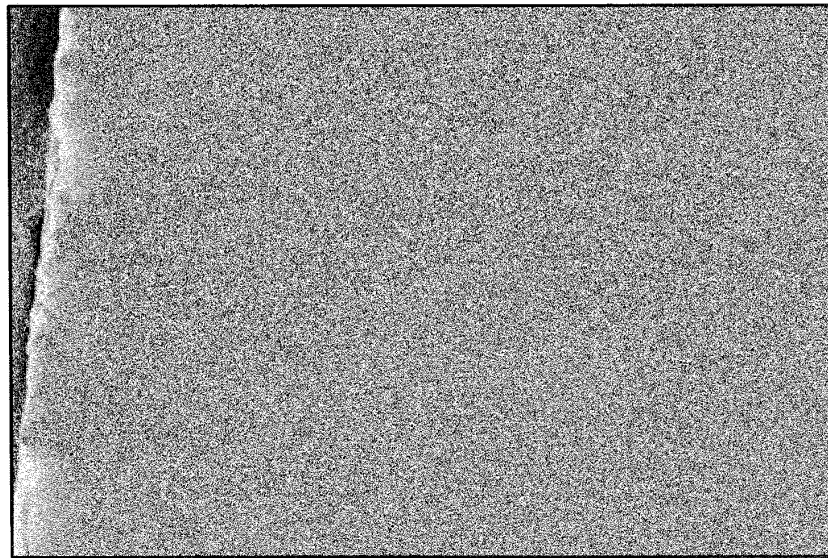


FIG. 3

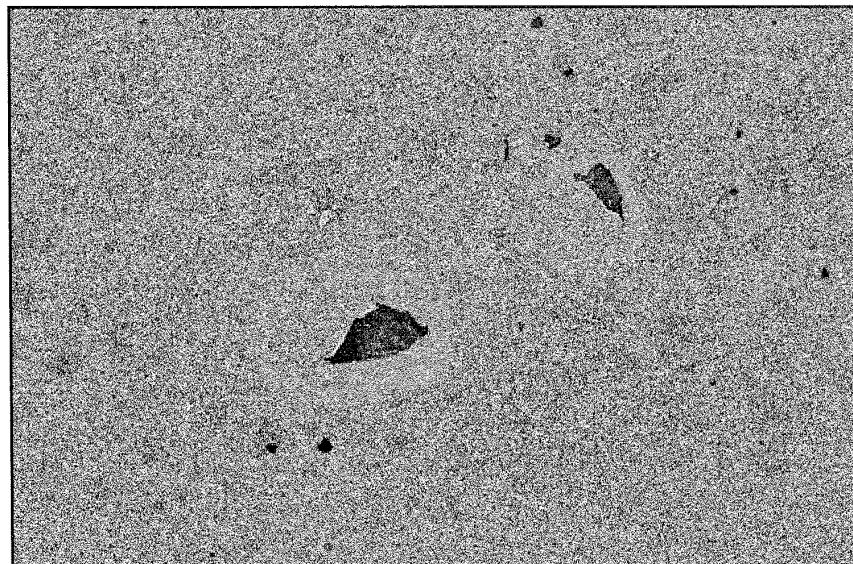


FIG. 4

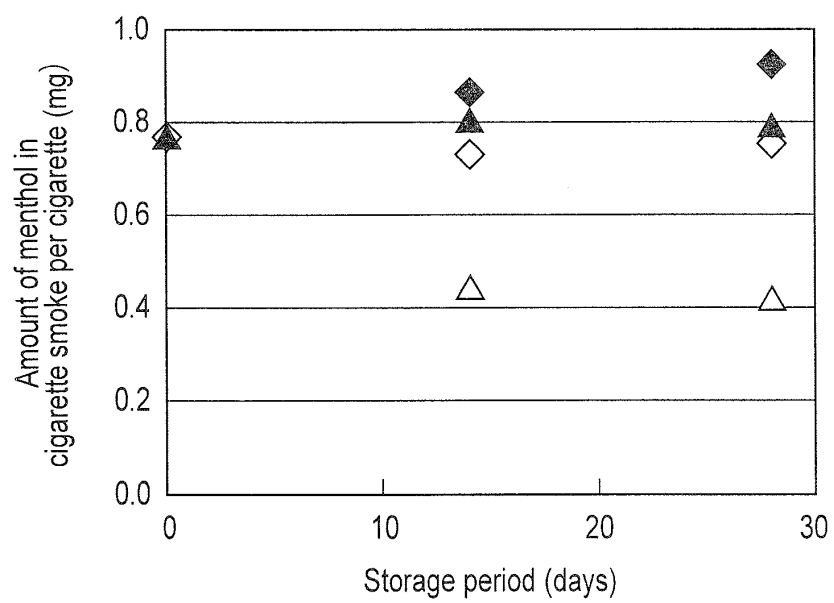


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2010/054879

A. CLASSIFICATION OF SUBJECT MATTER

B65D81/20 (2006.01) i, A24F15/12 (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)

B65D81/20, A24F15/12

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.
A	JP 04-272298 A (Kimberly-Clark Corp.), 29 September 1992 (29.09.1992), entire text; all drawings & US 5144967 A & EP 482587 A1 & DE 69110613 C & ES 2073643 T & CA 2044078 A & CN 1060773 A & CA 2044078 A1	1, 2
A	JP 56-158085 A (Kabushiki Kaisha Kiyoushin), 05 December 1981 (05.12.1981), entire text; all drawings (Family: none)	1-4

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

* Special categories of cited documents:

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Date of the actual completion of the international search
09 June, 2010 (09.06.10)Date of mailing of the international search report
22 June, 2010 (22.06.10)Name and mailing address of the ISA/
Japanese Patent Office

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Facsimile No.

Telephone No.

Form PCT/ISA/210 (second sheet) (July 2009)

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- JP 2960008 B [0005]
- WO 2009142159 A1 [0015] [0017]