United States Patent Application Publication	20250250741
Kind Code	A1
Publication Date	August 07, 2025
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TIPPING PAPER TO WHICH TECHNOLOGY FOR REDUCING TOBACCO SMELL ON FINGERS IS APPLIED AND SMOKING ARTICLE INCLUDING THE SAME, AND METHOD OF PRODUCING THE TIPPING PAPER

Abstract

An embodiment of the present invention provides a tipping paper for smoking articles. The tipping paper includes a fragrance carrier including a fragrance material and a carrier material, the carrier material includes the fragrance material, and the fragrance material included in the carrier material is disseminated from the tipping paper in response to moisture, saliva, or friction, and the carrier material is a material soluble in ethanol.

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Appl. No.: **19/186757**

Filed: **April 23, 2025**

Foreign Application Priority Data

KR	10-2019-0136080	Oct. 30, 2019

Related U.S. Application Data

parent US division 17280290 20210326 PENDING WO division PCT/KR2020/011439 20200827 child US 19186757

Publication Classification

Int. Cl.: **D21H27/00** (20060101); **A24C5/56** (20060101); **A24D1/02** (20060101); **D21H17/06** (20060101); **D21H17/24** (20060101)

U.S. Cl.:

CPC **D21H5/16** (20130101); **A24C5/565** (20130101); **A24D1/02** (20130101); **D21H17/06** (20130101); **D21H17/24** (20130101);

Background/Summary

CROSS REFERENCE TO RELATED APPLICATIONS [0001] This application is a divisional of U.S. application Ser. No. 17/280,290 filed Mar. 26, 2021, which is a National Stage of International Application No. PCT/K R 2020/011439 filed Aug. 27, 2020, claiming priority based on Korean Patent Application No. 10-2019-0136080 filed Oct. 30, 2019.

TECHNICAL FIELD
[0002] The present invention relates to a tipping paper for smoking articles, and more particularly, to a tipping paper capable of reducing a tobacco smell that may cling to fingers of a smoker and a smoking article including the same and a method of producing the tipping paper.
BACKGROUND ART
[0003] Various attempts have been made using a fragrance material to mask a tobacco smell caused by smoking. However, since a tipping paper for smoking articles requires printing and drying processes during the production, there is a need to develop a tipping paper and a smoking article thereof that solve a discoloration issue, a drying process issue, and a curl occurrence issue of the tipping paper while masking a tobacco smell on fingers of a smoker.
DISCLOSURE
Technical Problem
[0004] The present invention is directed to providing a tipping paper capable of reducing a tobacco smell on fingers and a smoking article including the same.
[0005] Objectives of the present invention are not limited to above-mentioned objective, and other objectives not mentioned above may become more apparent to those of ordinary skill in art to which the present invention pertains from the following description.
Technical Solution
[0006] According to an embodiment, there is provided a tipping paper for smoking articles that surrounds at least a partial region of a smoking material portion and a smoking article filter portion so that the smoking material portion and the smoking article filter portion are combined. The tipping paper includes: a fragrance carrier including a fragrance material and a carrier material, the carrier material including the fragrance material, wherein the fragrance material included in the carrier material is disseminated from the tipping paper in response to moisture, saliva, or friction, and the carrier material is a material soluble in ethanol.
[0007] The carrier material includes 2-hydroxypropyl-β-cyclodextrin.
[0008] The fragrance material includes one or more materials of vanillin and ethyl vanillin.
[0009] A weight ratio of the vanillin with respect to a total weight of the fragrance material is in a range of about 15% to 25%, and a weight ratio of the ethyl vanillin with respect to the total weight of the fragrance material is in a range of about 5% to 15%.
[0010] The fragrance carrier is disposed in the tipping paper through a fragrance carrier printing process that uses a fragrance carrier ink including the ethanol, the fragrance material, and the

carrier material.
[0011] A weight ratio of the fragrance material with respect to a total weight of the fragrance carrier ink is greater than 0% and lower than or equal to 1.5%, and a weight ratio of the carrier material with respect to the total weight of the fragrance carrier ink is greater than 0% and lower than or equal to 15%.
[0012] The fragrance carrier ink further includes a binder, and a weight ratio of the binder with respect to a total weight of the fragrance carrier ink is greater than 0% and lower than or equal to 15%.
[0013] The binder is a polymer material that is soluble in ethanol and has a molecular weight in a range of about 3,000 to 20,000 and a glass transition temperature in a range of about 60° C. to 90° C.
[0014] The fragrance carrier ink further includes microcapsules, and a weight ratio of the microcapsules with respect to the total weight of the fragrance carrier ink is greater than 0% and lower than or equal to 25%.
[0015] The weight ratio of the binder with respect to the total weight of the fragrance carrier ink is in a range of about 5% to 10%, and a weight ratio of the microcapsules with respect to the total weight of the fragrance carrier ink is in a range of about 5% to 20%.
[0016] Each of the microcapsules has a diameter in a range of about 1.5 μm to 5.0 μm and includes polyvinyl alcohol (PVA), a fragrance, and a cross-linking agent; and a content ratio of the PVA and the fragrance included in each microcapsule is in a range of 1:3 to 1:7.
[0017] The fragrance carrier printing process is performed after an overprint varnish (OPV) process is applied to the tipping paper.
[0018] According to an embodiment, there is provided a smoking article including: a smoking material portion that is wrapped by a smoking material wrapper; a filter portion in which an upstream end of the filter portion is combined with the smoking material portion and is wrapped by a filter wrapper; and a tipping paper surrounding at least a partial region of the smoking material portion and a partial region of the filter portion so that the smoking material portion and the filter portion are combined, wherein the tipping paper comprises a fragrance carrier including a fragrance material and a carrier material, the carrier material including the fragrance material, the fragrance material included in the carrier material is disseminated from the tipping paper in response to moisture, saliva, or friction, and the carrier material is a material soluble in ethanol.
[0019] According to an embodiment, there is provided a method of producing a tipping paper for smoking articles that surrounds at least a partial region of a smoking material portion and a partial region of a smoking article filter portion so that the smoking material portion and the smoking article filter portion are combined and includes a fragrance material and a carrier material that includes the fragrance material. The method includes: adding the carrier material to ethanol to obtain a first solution and stirring the first solution; adding the fragrance material to the first solution in which the carrier material is added to the ethanol to obtain a second solution and stirring the second solution; adding a binder to the second solution, in which the carrier material and the fragrance material are added to the ethanol, to obtain a third solution and stirring the third solution; and printing the third solution, in which the carrier material, the fragrance material, and the binder are added to the ethanol to be used as a fragrance carrier ink, on the tipping paper.
[0020] The printing the third solution further includes adding microcapsules to the fragrance carrier ink to obtain a fourth solution and stirring the fourth solution, wherein a core of each microcapsule is an ethanol-based fragrance and a shell of each microcapsule is PVA, and the microcapsules are produced by stirring the ethanol-based fragrance and the PVA at room temperature, adding a cross-linking agent to a fifth solution in which the ethanol-based fragrance and the PVA are stirred and stirring the fifth solution at a temperature higher than or equal to 60° C. and lower than or equal to 100° C., and cooling the fifth solution in which the ethanol-based fragrance, the PVA, and the cross-linking agent are stirred.

Advantageous Effects

[0021] According to the embodiments of the present invention, since a fragrance material is included in a fragrance carrier material and then a process of printing a fragrance carrier on a tipping paper is applied, it is possible to effectively reduce a smell on fingers caused by smoking and solve a tipping paper curl issue and a tipping paper surface contamination problem which occur due to application of the printing process.

[0022] In addition, since the fragrance material is included in a carrier and printed, it is possible to reduce amount of fragrance that disseminates during simple storage of smoking articles and increase amount of fragrance that disseminates during smoking.

[0023] Further, since ethanol is used as a solvent for ink in a fragrance carrier printing process, and the extent to which an ink is dried and the extent to which a curl occurs in the tipping paper are secured at an equivalent level compared to a case in which the fragrance carrier printing process is not applied, it is possible to also secure the workability of printing the fragrance carrier.

Description

DESCRIPTION OF DRAWINGS

[0024] FIG. **1** is a view illustrating a smoking article to which a tipping paper is applied according to an embodiment of the present invention.

[0025] FIG. **2** shows results of smoking sensory evaluation relating to smoking articles two weeks after production thereof according to Example 1, Comparative Example 1, and Comparative Example 4.

[0026] FIG. **3** shows results of smoking sensory evaluation relating to smoking articles two months after production thereof according to Example 1, Comparative Example 1, and Comparative Example 4.

[0027] FIG. **4** shows results of smoking sensory evaluation relating to smoking articles two weeks after production thereof according to Examples 10 to 12 and Comparative Example 1.

MODES OF THE INVENTION

[0028] Hereinafter, exemplary embodiments of the present invention will be described in detail with reference to accompanying drawings. Advantages and features of the present invention and a method of achieving the same should become clear with embodiments described in detail below with reference to accompanying drawings. However, the present invention is not limited to embodiments disclosed below and may be implemented in various other forms. The embodiments make the disclosure of the present invention complete and are provided to completely inform one of ordinary skill in art to which the present invention pertains of the scope of the invention. The present invention is defined by the scope of the claims. Like reference numerals refer to like elements throughout.

[0029] Unless otherwise defined, all terms including technical or scientific terms used herein have the same meaning as commonly understood by those of ordinary skill in art to which the present invention pertains. Terms defined in commonly used dictionaries should not be construed in an idealized or overly formal sense unless expressly so defined herein.

[0030] Also, in the disclosure, a singular expression includes a plural expression unless the context clearly indicates otherwise. The terms “comprises” and/or “comprising” used herein do not preclude the presence of or the possibility of adding one or more elements, steps, operations, and/or devices other than those mentioned.

[0031] Terms including ordinals such as “first” or “second” used herein may be used to describe various elements, but the elements are not limited by the terms. The terms may be used for the purpose of distinguishing one element from another element.

[0032] Throughout the disclosure, “smoking article” may refer to any article capable of generating

an aerosol, such as tobacco (cigarette) and cigar. The smoking article may include an aerosol-generating material or an aerosol-forming substrate. A Iso, the smoking article may include a solid material that is based on tobacco raw materials, such as reconstituted tobacco leaves, shredded tobacco, and reconstituted tobacco. A smoking material may include a volatile compound.

[0033] Also, throughout the disclosure, “upstream” or “upstream direction” refers to a direction moving away from an oral region of a user smoking a smoking article **100**, and “downstream” or “downstream direction” refers to a direction approaching the oral region of the user smoking the smoking article **100**. For example, in the smoking article **100** illustrated in FIG. **1**, a smoking material portion **120** is disposed upstream or in an upstream direction from a filter portion **110**.

[0034] Further, in the specification, a case in which the smoking article **100** is a combustion-type cigarette is described as an example. However, the present invention is not limited thereto, and the smoking article **100** may also be a heating-type cigarette or the like that is used together with an aerosol generation device (not illustrated) such as an electronic cigarette device.

[0035] FIG. **1** is a view illustrating a smoking article to which a tipping paper is applied according to an embodiment of the present invention.

[0036] Referring to FIG. **1**, the smoking article **100** may include the filter portion **110** wrapped by a filter wrapper **110***a*, the smoking material portion **120** wrapped by a smoking material wrapper **120***a*, and a tipping paper **130** configured to combine the filter portion **110** and the smoking material portion **120**.

[0037] The filter portion **110** may be disposed downstream from the smoking material portion **120**, and an aerosol material generated in the smoking material portion **120** may pass through the filter portion **110** before being inhaled by the user.

[0038] The filter portion **110** may be formed of various materials. For example, the filter portion **110** may be a cellulose acetate filter.

[0039] In some embodiments, the filter portion **110** may be a cellulose acetate filter without being scented with a fragrance material, but the present invention is not limited thereto.

[0040] The filter portion **110** may also be a transfer jet nozzle system (TJNS) filter scented with a fragrance material.

[0041] In some embodiments, the filter portion **110** may be a tubular structure including a hollow formed therein. The filter portion **110** may also be manufactured by inserting structures such as films or tubes formed of the same or different materials (for example, into the hollow).

[0042] Moreover, a hardness of the filter portion **110** may be adjusted by controlling the content of plasticizer during manufacture of the filter portion **110**. Triacetin may be applied as a plasticizer and included at a weight ratio in a range of about 5 to 15% with respect to the total weight of the filter portion **110**, but the type and content of the plasticizer are not limited thereto and may be properly controlled as necessary.

[0043] The filter portion **110** of the present embodiment is illustrated as a mono filter formed of a single filter, but the embodiment is not limited thereto. For example, the filter portion **110** may, of course, be provided as a dual filter, which includes two acetate filters, a triple filter, or the like in order to increase filter efficiency.

[0044] Further, a capsule (not illustrated) may be included inside the filter portion **110**. The capsule may have a structure in which a liquid including a fragrance and filled therein is wrapped by a film. For example, the capsule may have a spherical or cylindrical shape. A diameter of the capsule may be in a range of about 2.6 mm to 3.5 mm, but is not limited thereto. The diameter of the capsule may vary according to the standard of the smoking article **100**.

[0045] Materials forming the film of the capsule may be a natural material, starch, and/or a gellant. For example, a film made of a natural material may be composed of agar, pectin, sodium alginate, glycerin, and the like. Gellan gum or gelatin may be used as the gellant. Also, a gelation auxiliary agent may be further used as a material forming the film of the capsule. Here, as the gelation auxiliary agent, for example, calcium chloride may be used. Also, a plasticizer may be further used

as a material forming the film of the capsule. Here, as the plasticizer, glycerin and/or sorbitol may be used. Also, a coloring agent may be used as a material forming the film of the capsule.
[0046] In some embodiments, as a solvent for the fragrance included in the liquid filled in the capsule, for example, a medium chain fatty acid triglyceride (M CTG) may be used. The liquid may also include other additives such as coloring, an emulsifier, and a thickener.
[0047] A fragrance such as menthol and an essential oil of plants may be included in the liquid filled in the capsule, but the present invention is not limited thereto.
[0048] The filter portion **110** may be wrapped by the filter wrapper **110***a*. In some embodiments, the filter wrapper **110***a* may be produced using grease-resistant wrapping paper in order to prevent a liquid filled in the capsule in the filter portion **110** passing through the filter wrapper **110***a* and being released to the outside of the capsule due to the smoker crushing the capsule. In some embodiments, an aluminum foil may be further included at an inner surface of the filter wrapper **110***a*.
[0049] The filter portion **110** is disposed downstream of the smoking material portion **120** and serves as a filter through which an aerosol material generated in the smoking material portion **120** passes before being inhaled by the user.
[0050] The smoking material portion **120** may contain an aerosol-generating material. For example, the smoking material portion **120** may include tobacco strands. The smoking material portion **120** may have the form of a longitudinally extending rod which may have various lengths, circumferences, and diameters.
[0051] In some embodiments, aerosol-generating material may include at least one of glycerin, propylene glycol, ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, and oleyl alcohol.
[0052] In some embodiments, the smoking material portion **120** may also include other additives such as a flavoring agent, a wetting agent, and/or an acetate compound. For example, the flavoring agent may include licorice, saccharose, fructose syrup, isosweet, cocoa, lavender, cinnamon, cardamom, celery, fenugreek, cascarilla, white sandalwood, bergamot, geranium, honey essence, rose oil, vanilla, lemon oil, orange oil, mint oil, cinnamon, caraway, cognac, jasmine, chamomile, menthol, cinnamon, ylang-ylang, sage, spearmint, ginger, cilantro, coffee, or the like. Also, the wetting agent may include glycerin, propylene glycol, or the like.
[0053] In some embodiments, the smoking material portion **120** may include a reconstituted tobacco material which is formed in the shape of pieces of rods or the like, by grinding tobacco raw materials, mixing a solvent and various additives with the ground tobacco raw materials to make a tobacco slurry, drying the tobacco slurry to form a tobacco sheet, and processing the tobacco sheet. For example, the smoking material portion **120** may include a plurality of tobacco material strands, and each strand may have a length in a range of about 10 mm to 14 mm (for example, 12 mm), a width in a range of about 0.8 mm to 1.2 mm (for example, 1 mm), and a thickness in a range of about 0.08 mm to 0.12 mm (for example, 0.1 mm), but the present invention is not limited thereto.
[0054] Since the smoking material portion **120** includes a plurality of strand materials formed by processing a wide tobacco sheet, a density of tobacco materials filled in the smoking material portion **120** may increase. Accordingly, amount of aerosol generated may be increased, and smoking taste or feature of the smoking material portion **120** may be improved.
[0055] The smoking material portion **120** may be wrapped by the smoking material wrapper **120***a*.
[0056] In some embodiments, the smoking material wrapper **120***a* may include a filler. Accordingly, an opacity of the smoking material wrapper **120***a* may be increased, porosity may be imparted to the smoking material wrapper **120***a*, smoothness and ash integrity of the cigarette paper may be improved, and whiteness of the cigarette paper may be increased. Materials such as calcium carbonate, titanium dioxide, and magnesium oxide may be used as the filler, but the present invention is not limited thereto.
[0057] Also, although not illustrated, the smoking material wrapper **120***a* may have a double

wrapping paper structure. Specifically, the smoking material wrapper **120***a* may include an inner wrapper (not illustrated) that comes in contact with the smoking material portion **120** and surrounds the smoking material portion **120** and an outer wrapper that comes in contact with the inner wrapper and surrounds an outer portion of the inner wrapper.

[0058] The filter portion **110** wrapped by the filter wrapper **110***a* and the smoking material portion **120** wrapped by the smoking material wrapper **120***a* may be wrapped together by the tipping paper **130**. That is, the tipping paper **130** may wrap around at least a portion (for example, a partial downstream region) of the smoking material wrapper **120***a* and an outer boundary of the filter wrapper **110***a*. In other words, at least a portion of the smoking material portion **120** and the filter portion **110** may be further wrapped by the tipping paper **130** and physically combined.

[0059] In some embodiments, the tipping paper **130** may be produced using nonporous wrapping paper that is not treated to be grease-resistant, but the present invention is not limited thereto.

[0060] The tipping paper **130** may be coated with a sweetener such as sucralose and citric acid. Also, a predetermined material may be added into the tipping paper **130**. Silicone may be an example of the predetermined material, but the predetermined material is not limited thereto. For example, silicone has characteristics such as being heat-resistant (i.e., not changing much of its characteristics due to temperature), being oxidation-resistant (i.e., not being oxidized), being resistant to various chemicals, being water-repellent, and being electrically insulated. However, any material other than silicone may be applied or coated on the tipping paper **130** as long as the material has above-described or similar characteristics.

[0061] The tipping paper **130** may prevent a phenomenon in which the filter portion **110** is combusted. For example, in a case in which the smoking material portion **120** is combusted up to a portion thereof adjacent to the filter portion **110**, there is a possibility that the filter portion **110** may also be combusted. Even such a case, since the tipping paper **130** includes an incombustible material, the phenomenon in which the filter portion **110** is combusted may be prevented.

[0062] During the manufacture of the smoking material wrapper **120***a*, various attempts have been made as described above, such as including a filler in the smoking material wrapper **120***a* using various compositions and methods, forming the double wrapping paper structure in the smoking material wrapper **120***a*, or applying a water-soluble fragrance carrier that includes a fragrance to the smoking material wrapper **120***a*, in order to reduce a tobacco smell caused by smoke generated during smoking. However, apart from the sidestream smoke reduction effect or the like of the various attempts, since the tipping paper **130** is in direct contact with fingers of a smoker when the smoker smokes, instead of the smoking material wrapper **120***a*, one or more embodiments for reducing a tobacco smell on fingers that may be directly applied to the tipping paper **130**, instead of the smoking material wrapper **120***a*, to effectively reduce the tobacco smell on the fingers.

[0063] Thus, the tipping paper **130** of the present invention includes a fragrance carrier that includes a fragrance material for masking a tobacco smell and a carrier material including the fragrance material. The fragrance carrier may be disposed onto the tipping paper through a process of printing the fragrance carrier on the tipping paper by using a fragrance carrier ink including ethanol, the fragrance material, and the carrier material.

[0064] The fragrance carrier ink may be produced by sequentially adding the carrier material, the fragrance material, and a binder to the ethanol and stirring solutions obtained thereof. Specifically, the fragrance carrier ink may be produced by: i) adding the carrier material to ethanol and stirring a solution obtained thereof for about 30 minutes to 60 minutes; ii) adding the fragrance material to the solution in which the carrier material is added to ethanol and stirring a solution obtained thereof for about 15 minutes to 45 minutes; and iii) adding the binder to the solution in which the carrier material and the fragrance material are added to ethanol and stirring a solution obtained thereof for about 15 minutes to 45 minutes.

[0065] When the fragrance carrier ink includes microcapsules, which will be described below, the method of producing the fragrance carrier ink may further include, after the step iii), a step of iv)

adding microcapsules to the solution in which the carrier material, the fragrance material, and the binder are added to ethanol and stirring a solution obtained thereof for about 15 minutes to 45 minutes.

[0066] The fragrance carrier printing process may be performed by mixing the fragrance carrier with an ink used in an overprint varnish (OPV) process that is performed on the tipping paper. However, preferably, in order to maximize amount of carried fragrance that is delivered to the tipping paper, the fragrance carrier printing process may be performed as a printing process separate from the OPV process after the OPV process.

[0067] In some embodiments, the fragrance carrier ink may further include a binder and/or microcapsules. The binder and microcapsules will be described in detail below.

[0068] The carrier material in the present invention is a material that is soluble in ethanol, but not soluble in water, isopropyl alcohol, and the like. For example, the carrier material may be 2-hydroxypropyl-β-cyclodextrin.

[0069] This is because, in reality, a method of applying a water-soluble fragrance carrier material (for example, β-cyclodextrin), which includes a fragrance material, to above-described smoking material wrapper **120***a* cannot be applied as is to the tipping paper **130** that requires printing and drying processes. Specifically, when applying the water-soluble fragrance carrier method to the tipping paper **130**, water should be used as a solvent for ink. In this case, the surface energy of the ink may be increased to about 70 mN/m to 75 mN/m, and thus, a difficulty may occur in the drying process after the ink is printed on the tipping paper **130**, and problems such as contamination of the tipping paper and a phenomenon in which the ink peels off due to weakening of a binding force between the printed ink and the tipping paper may occur. Further, in a case in which a drying temperature or drying time is increased to dry the ink of which the surface energy is increased, a curl of the tipping paper is increased. Unlike above, in a case in which a fragrance material is printed on the tipping paper without applying the carrier method, due to a characteristic of the tipping paper being disposed at an outermost portion of the smoking article, the fragrance material may be lost to the outside of the smoking article during a period in which the smoking article is stored, or the tipping paper may be discolored according to storage conditions such as light exposure and humidity level.

[0070] On the contrary, in a case in which a polymer material, such as 2-hydroxypropyl-β-cyclodextrin, that is soluble in ethanol and includes a hydrophobic fragrance material, is applied as the carrier material that is applied to the tipping paper as in the present invention, ethanol may be used as a solvent for ink, and thus, an ink having a surface energy of about 20 mN/m to 50 mN/m may be used. Accordingly, it is possible to apply the printing and drying processes of the tipping paper, and not only the workability of producing smoking articles, but also the stability of storing the smoking articles may be secured because there is no discoloration issue.

[0071] In addition, the fragrance material included in the carrier material may be disseminated or diffused outside the tipping paper **130** (that is, outside the smoking article **100**) in response to moisture, saliva, or friction, and the disseminated fragrance material may be spread to the fingers of the smoker gripping the tipping paper portion and serve to mask the tobacco smell on the fingers.

[0072] Further, since the fragrance material remains in the carrier material and is not disseminated before moisture or saliva from the smoker is in contact with the tipping paper or friction is transmitted to the tipping paper (for example, by the smoker gripping or rubbing the tipping paper), a problem in that a scent is lost over the storage period or a problem in that a fragrance is unnecessarily disseminated while the smoker is not using the smoking article may be solved.

[0073] The fragrance material in the carrier material may include one or more materials of vanillin and ethyl vanillin.

[0074] As will be described below with reference to Table 7 and Table 8, a sum of weight ratios of the vanillin and ethyl vanillin in consideration of the tipping paper discoloration issue may be greater than 0% and lower than or equal to 50% with respect to the total weight of the fragrance

material. Preferably, the weight ratio of vanillin with respect to the total weight of the fragrance material is greater than 0% and lower than or equal to 30%, and the weight ratio of ethyl vanillin with respect to the total weight of the fragrance material is greater than 0% and lower than or equal to 20%. M ore preferably, the weight ratio of the vanillin with respect to the total weight of the fragrance material is in a range of about 15% to 25%, and the weight ratio of the ethyl vanillin with respect to the total weight of the fragrance material is in a range of about 5% to 15%.

[0075] The fragrance material may include various components other than the vanillin and ethyl vanillin. Table 1 shows a list of components for the fragrance material which were confirmed to maximize the effect of reducing the tobacco smell on fingers.

TABLE-US-00001 TABLE 1 COMPONENT RATIO Classification (RANKING) ROSEMARY OIL 1 VANILLIN 2 FERMENTED ETHYL ALCOHOL 3 LAVANDIN OIL 4 ETHYL VANILLIN 5 EUCALYPTOL 6 LIME OIL 7 ANISE OIL 8 DAVANA OIL 9 PEPPERMINT OIL 10 ETHY MALTOL 11 SPEARMINT OIL 12 ANGELICA ROOT OIL 13 CLARY SAGE OIL 14 2,3,5-TRIMETHYL PYRAZINE 15 GAMMA-HEPTALACTONE 16 HELIOTROPINE 17 BETA-DAMASCENONE 18 BETA-DAMASCONE 19 BENZALDEHYDE 20 RASPBERRY KETONE 21 GAMMA-OCTALACTONE 22 BETA-DAMASCONE 23 ACETANISOLE 24 P-ANISYL ALDEHYDE 25 P-METHYL ACETOPHENONE 26 ISOVALERALDEHYDE 27

[0076] In some embodiments, the fragrance material may have a component ratio in the order of rosemary oil >vanillin >fermented ethyl alcohol >lavandin oil >ethyl vanillin>eucalyptol. A content ratio of the vanillin and eucalyptol contained in the fragrance material may be in a range of about 2.5:1 to 3.5:1 (preferably, about 3:1), and a content ratio of the ethyl vanillin and lavandin oil in the fragrance material may be in a range of about 0.5:1 to 1.5:1 (preferably, about 1:1), but the present invention is not limited thereto.

[0077] When the fragrance carrier ink contains more fragrance material than necessary, a problem may occur in that a fragrance is spread to other tipping paper, to which the fragrance should not be applied. In addition to being spread to the tipping paper of the present invention during a cigarette mass production process, and a problem may occur in that the tipping paper of the present invention is discolored while being stored after being produced.

[0078] To address such problems, a weight ratio of the fragrance material with respect to the total weight of the fragrance carrier ink may be greater than 0% and lower than or equal to about 3%, and a weight ratio of the carrier material with respect to the total weight of the fragrance carrier ink may be greater than 0% and lower than or equal to about 30%. Preferably, the weight ratio of the fragrance material with respect to the total weight of the fragrance carrier ink may be greater than 0% and lower than or equal to about 1.5%, and the weight ratio of the carrier material with respect to the total weight of the fragrance carrier ink may be greater than 0% and lower than or equal to about 15%. M ore preferably, the weight ratio of the fragrance material with respect to the total weight of the fragrance carrier ink may be in a range of about 0.4% to 1.3%, and the weight ratio of the carrier material with respect to the total weight of the fragrance carrier ink may be in a range of about 5% to 10%.

[0079] The binder that may be included in the fragrance carrier ink may be an acrylic and starch-based polymer that is soluble in ethanol. When the binder is included in the fragrance carrier ink, the residual amount of the fragrance material, which is included in the fragrance carrier, in the tipping paper may be increased. That is, the fragrance material or fragrance carrier that may be lost over the storage period of the smoking article after the smoking article is produced may be better preserved in the tipping paper by the binder.

[0080] Moreover, for the binder to also secure the workability of printing while serving to preserve the fragrance material, an appropriate viscosity is required for the binder. To this end, the binder may be a polymer material that has a molecular weight in a range of about 1,000 to 30,000 and a glass transition temperature in a range of about 50° C. to 100° C. Preferably, the binder may be a polymer material that has a molecular weight in a range of about 3,000 to 20,000 and a glass

transition temperature in a range of about 60° C. to 90° C. This is because, when the viscosity of the binder is too low, the ink may flow down, and when the viscosity of the binder is too high, the ink may become stiff, which may degrade the workability and performance of the binder itself.
[0081] Also, as will be described below with reference to Table 4, a fragrance retaining property tends to increase with an increase in an amount of applied binder, but in a case in which too much binder is applied, the curl of the tipping paper may be increased, and there may be difficulty in producing the smoking article.
[0082] To address such a difficulty, a weight ratio of the binder with respect to the total weight of the fragrance carrier ink may be greater than 0% and lower than or equal to about 15%. Preferably, the weight ratio of the binder with respect to the total weight of the fragrance carrier ink is in a range of about 5% to 10%.
[0083] The microcapsules that may be included in the fragrance carrier ink may each include polyvinyl alcohol (PVA), a fragrance, and a cross-linking agent. Specifically, a core of each microcapsule may be an ethanol-based fragrance, a shell of each microcapsule may be PVA, and sodium sulfate (Na.sub.2SO.sub.4) may be used as the cross-linking agent. The fragrance may be an ethanol-based fragrance. The microcapsules may each have a diameter in a range of about 1.5 μm to 5.0 μm.
[0084] In some embodiments, the fragrance may also have the same composition as the fragrance material included in the fragrance carrier material.
[0085] In some embodiments, a content ratio of the PVA and the fragrance in each microcapsule may be in a range of about 1:3 to 1:7. Preferably, the content ratio of the PVA and the fragrance in each microcapsule is about 1:5. For example, each microcapsule may be produced by stirring about 5% PV A, about 25% fragrance, and about 1.5% cross-linking agent.
[0086] In some embodiments, a weight ratio of the microcapsules with respect to the total weight of the fragrance carrier ink may be greater than 0% and lower than or equal to about 25%, and preferably, may be in a range of about 5% to 20%. As such, it is possible to address a problem where a fragrance is excessively disseminated before smoking due to breakage of the microcapsules and/or a problem where the surface of the tipping paper is contaminated by the shells of the microcapsules and roughens, which may occur when the fragrance carrier ink contains an excessive amount of microcapsules.
[0087] In some embodiments, the weight ratio of the binder with respect to the total weight of the fragrance carrier ink may be in a range of about 5% to 10%, and the weight ratio of the microcapsules with respect to the total weight of the fragrance carrier ink may be in a range of about 5% to 20%. Preferably, the weight ratios of the binder and the microcapsules with respect to the total weight of the fragrance carrier ink is about 5%.
[0088] The microcapsules may be produced by: i) stirring an ethanol-based fragrance and PVA at room temperature for about 15 minutes to 45 minutes; ii) adding a cross-linking agent, at a level of about 30% with respect to the PVA, to a solution in which the ethanol-based fragrance and the PVA are stirred and stirring a solution obtained thereof at a temperature which is higher than or equal to about 60° C. and lower than or equal to about 100° C. for about 5 hours to 10 hours; and iii) cooling the solution in which the ethanol-based fragrance, the PVA, and the cross-linking agent are stirred, at room temperature for about 30 minutes to 2 hours.
[0089] Hereinafter, the embodiments of the present invention and advantageous effects thereto will be described in more detail using examples and comparative examples. However, the examples are merely for describing the present invention in more detail, and the scope of the present invention is not limited by these examples.
COMPARATIVE EXAMPLE 1
[0090] An OPV printing process was performed on a tipping paper material produced for testing of examples, which had undergone and completed a process of printing a first design and a process of printing a second design different from the first design, and then a drying process was performed at

a drying speed of about 150 m/min.

COMPARATIVE EXAMPLE 2

[0091] A printing process using an ink including a water-soluble fragrance carrier including a fragrance material was performed on the tipping paper material of Comparative Example 1, which had undergone and completed the OPV printing process and the drying process, and then a drying process was performed at a drying speed of about 150 m/min. In the water-soluble fragrance carrier printing process, a fragrance carrier ink, for which water was used as a solvent and which contained about 1.25% fragrance material(s) of Table 1 above, about 9% β-cyclodextrin, and about 5% water-soluble binder, was used.

COMPARATIVE EXAMPLE 3

[0092] A drying process was performed at a drying speed of about 10 m/min on the tipping paper material of Comparative Example 2, which had undergone and completed the printing process using the ink including the water-soluble fragrance carrier.

EXAMPLE 1

[0093] The fragrance carrier printing process of the present invention was performed on the tipping paper material of Comparative Example 1, which had undergone and completed the OPV printing process and the drying process, and then a drying process was performed at a drying speed of about 150 m/min. In the fragrance carrier printing process, a fragrance carrier ink, for which ethanol was used as a solvent and which contained about 1.25% fragrance material(s) of Table 1 above, about 9% 2-hydroxypropyl-β-cyclodextrin, and about 5% binder, was used.

Experimental Example 1: Evaluation of Drying and Curl Characteristics of Tipping Paper after Ink is Printed on Tipping Paper

[0094] In order to confirm drying and curl characteristics of the tipping paper produced according to the examples of the present invention after an ink is printed on the tipping paper, the surface energy of ink applied to printing, the extent to which the fragrance carrier is dissolved, the extent to which the ink is dried, and a curl of the tipping paper were analyzed for each of the example and comparative examples, and results thereof are shown in Table 2 below.

TABLE-US-00002 TABLE 2 Surface Curl of Drying energy Dissolution tipping speed of ink of fragrance Drying paper Classification Details (m/min) (mN/m) carrier of ink (mm) Example 1 OPV + fragrance 150 29.2 Good Good 1.0 carrier(1.25%) + binder(5.0%) Comparative OPV only 150 21.2 Not Good 0.7 Example 1 added Comparative OPV + water- 150 72.4 Good Not — Example 2 soluble fragrance completely carrier(1.25%) + dried water-soluble binder(5.0%) Comparative OPV + water- 10 72.4 Good Good 12.0 Example 3 soluble fragrance carrier(1.25%) + water-soluble binder(5.0%)

[0095] As shown in Table 2, the extent to which the fragrance carrier is dissolved was good in all of Example 1 and Comparative Examples 2 and 3. However, in the tipping paper of Comparative Example 2 on which the water-soluble fragrance carrier was printed, it was confirmed that the ink was not completely dried after the printing and drying processes. This is due to the surface energy of the ink having a high value of 72.4 mN/m, which is due to using water as the solvent for the ink when printing the water-soluble fragrance carrier. In Comparative Example 3 in which the drying speed was lowered to 10 m/min to completely dry the ink for which water was used as the solvent, the extent to which the ink is dried was good, but a curl of the tipping paper occurred at a high numerical value of about 12 mm. Thus, the tipping paper of Comparative Example 3 was found to be not applicable to a cigarette mass production process.

[0096] On the other hand, regarding the tipping paper of Example 1, in which ethanol was used as the solvent for the ink and to which the fragrance carrier and binder were applied, the extent to which the ink is dried was good and a curl of the tipping paper did not show a statistically significant difference from the numerical value thereof according to Comparative Example 1 in which the fragrance carrier printing process was not applied. Thus, it was confirmed that there was no problem at all in applying the tipping paper of Example 1 to a cigarette mass production

process.

EXAMPLE 2

[0097] A tipping paper was removed from a cigarette produced for testing, and a material portion and a filter portion were separated. A smoking article was produced by combining the separated material portion and filter portion using a tipping paper having a porosity of about 100 CU that was produced by applying the OPV process and the fragrance carrier printing process using an ethanol-based fragrance carrier ink containing 0.4% fragrance material.

EXAMPLE 3

[0098] A smoking article was produced in the same way as in Example 2 except that the ethanol-based fragrance carrier ink contained 0.7% fragrance material.

EXAMPLE 4

[0099] A smoking article was produced in the same way as in Example 2 except that the ethanol-based fragrance carrier ink contained 1.25% fragrance material.

EXAMPLE 5

[0100] A smoking article was produced in the same way as in Example 2 except that the ethanol-based fragrance carrier ink contained 1.5% fragrance material.

COMPARATIVE EXAMPLE 4

[0101] A smoking article was produced in the same way as in Example 2 except that, unlike in Examples 2 to 5, the fragrance printing process was performed by stirring the fragrance material in the ink without including the fragrance material in a carrier.

[0102] Experimental Example 2: Evaluation of index materials of tipping paper for reducing tobacco smell on fingers-no binder applied

[0103] In order to measure the effect of reducing a tobacco smell on fingers when smoking cigarettes according to the examples and the comparative example, changes in contents of vanillin and ethyl vanillin in smoke collected from the tipping paper were analyzed, and results thereof are shown in Table 3 below.

[0104] All of the smoking articles according to the examples and the comparative example were smoked two weeks after being produced. Smoking conditions were set as follows: a puff volume of 55 ml, a puff time of 2 seconds, a puff cycle of 20 seconds, and a puff number of 12. The analysis of contents of vanillin and ethyl vanillin was performed by gas chromatography (GC) analysis of smoke collected by wrapping a Cambridge filter pad (CFP) around the tipping paper **130**.

TABLE-US-00003 TABLE 3 Vanillin Ethyl vanillin Classification Details (mg/g) (mg/g) Remarks Example 2 OPV + fragrance 0.012 0.002 — carrier(0.40%) Example 3 OPV + fragrance 0.021 0.005 — carrier(0.70%) Example 4 OPV + fragrance 0.040 0.012 — carrier(1.25%) Example 5 OPV + fragrance 0.065 0.029 — carrier(1.5%) Comparative OPV + fragrance 0.028 0.007 Some of the scent was lost during Example 4 material(1.25%) cigarette production

[0105] As shown in Table 3, vanillin and ethyl vanillin components were detected in all of the examples. Therefore, it was confirmed that the detected vanillin and ethyl vanillin components may serve to mask a tobacco smell on fingers by coming in contact with the fingers. In addition, from the results of analysis of Example 4 and Comparative Example 4, it can be confirmed that, while the contents of the fragrance material in the ink were the same, more vanillin and ethyl vanillin components were detected in the case in which fragrance carrier printing was performed by including the fragrance material in the carrier material (Example 4) as compared to the case in which fragrance printing was performed without including the fragrance material in a carrier (Comparative Example 4).

[0106] Further, from the results of analysis of Examples 2 to 5, it was found that the amounts of vanillin and ethyl vanillin components in the tipping paper increased with an increase in the content of the fragrance material in the fragrance carrier ink. However, in the case of Example 5 in which the content of the fragrance material included in a carrier was 1.5%, a problem occurred in that a fragrance spread to other tipping paper, to which the fragrance should not be applied, in addition to

being spread to the tipping paper of the present invention during a cigarette mass production process. It was found that, in Example 4 in which the content of the fragrance material included in a carrier was 1.25%, the effect of reducing a tobacco smell on fingers caused by smoking was excellent and the tipping paper could be applied to cigarette mass production without any problems.

EXAMPLE 6

[0107] A smoking article was produced in the same way as in Example 4 described above with reference to Table 3, except that the ethanol-based fragrance carrier ink contained 1.0% binder. A polymer material having a molecular weight of about 18,000 and a glass transition temperature of about 80° C. was used as the binder.

EXAMPLE 7

[0108] A smoking article was produced in the same way as in Example 6 except that the ethanol-based fragrance carrier ink contained 3.0% binder.

EXAMPLE 8

[0109] A smoking article was produced in the same way as in Example 6 except that the ethanol-based fragrance carrier ink contained 5.0% binder.

EXAMPLE 9

[0110] A smoking article was produced in the same way as in Example 6 except that the ethanol-based fragrance carrier ink contained 15.0% binder.

[0111] Experimental Example 3: Evaluation of index materials of tipping paper for reducing tobacco smell on fingers-binder applied

[0112] In order to measure the effect of reducing a tobacco smell on fingers when smoking cigarettes according to the examples and the comparative example, changes in contents of vanillin and ethyl vanillin in smoke were collected from the tipping paper and analyzed. The results of the analysis are shown in Table 4 below.

TABLE-US-00004 TABLE 4 Two weeks after Two months after production production Vanillin Ethyl vanillin Vanillin Ethyl vanillin Classification Details (mg/g) (mg/g) (mg/g) (mg/g) Remarks Comparative OPV + fragrance 0.028 0.007 0.019 0.003 — Example 4 material(1.25%) + binder(0.0%) Example 4 OPV + fragrance 0.040 0.012 0.029 0.009 — carrier(1.25%) + binder(0.0%) Example 6 OPV + fragrance 0.062 0.023 0.043 0.014 — carrier(1.25%) + binder(1.0%) Example 7 OPV + fragrance 0.121 0.045 0.090 0.040 — carrier(1.25%) + binder(3.0%) Example 8 OPV + fragrance 0.200 0.070 0.146 0.056 — carrier(1.25%) + binder(5.0%) Example 9 OPV + fragrance 0.260 0.116 0.235 0.098 Excessive curl carrier(1.25%) + occurred in binder(15.0%) tipping paper

[0113] As shown in Table 4, it was found that amounts of vanillin and ethyl vanillin components in the tipping paper increased with an increase in the content of the binder in the fragrance carrier ink. However, in the case of Example 9 in which the content of the binder was 15%, there was a problem in that an excessive curl occurred in the tipping paper. It was found that, when the content of the binder was in a range of 5% to 10%, the effect of reducing a tobacco smell on fingers caused by smoking was excellent and the tipping paper curl issue could also be solved.

EXAMPLE 10

[0114] A smoking article was produced in the same way as in Example 8 described above with reference to Table 4, except that the ethanol-based fragrance carrier ink contained 5.0% microcapsules. As the microcapsules, microcapsules each having a diameter in a range of about 1.5 μm to 5.0 μm were used, wherein a core of each microcapsule was an ethanol-based fragrance, a shell of each microcapsule was made of PVA, and Na.sub.2SO.sub.4 was used as a cross-linking agent.

EXAMPLE 11

[0115] A smoking article was produced in the same way as in Example 10 except that the ethanol-based fragrance carrier ink contained 10.0% binder.

EXAMPLE 12

[0116] A smoking article was produced in the same way as in Example 11 except that the ethanol-based fragrance carrier ink contained 15.0% microcapsules.

EXAMPLE 13

[0117] A smoking article was produced in the same way as in Example 12 except that the ethanol-based fragrance carrier ink contained 25.0% microcapsules.

Experimental Example 4: Evaluation of Index Materials of Tipping Paper for Reducing Tobacco Smell on Fingers-Binder Applied, Microcapsules Applied

[0118] In order to measure the effect of reducing a tobacco smell on fingers when smoking cigarettes according to the examples and the comparative example, changes in contents of vanillin and ethyl vanillin in smoke were collected from the tipping paper and analyzed. The results of the analysis are shown in Table 5 below.

TABLE-US-00005 TABLE 5 Vanillin Ethyl vanillin Classification Details (mg/g) (mg/g) Remarks Example 8 OPV + fragrance carrier 0.200 0.070 (1.25%) + binder(5.0%) Example 10 OPV + fragrance 0.243 0.130 carrier(1.25%) + binder(5.0%) + capsules(5.0%) Example 11 OPV + fragrance 0.357 0.231 carrier(1.25%) + binder(10.0%) + capsules(5.0%) Example 12 OPV + fragrance 0.541 0.385 carrier(1.25%) + binder(10.0%) + capsules(15.0%) Example 13 OPV + fragrance 0.878 0.522 Intensity of external scent carrier(1.25%) + binder(10.0%) + increased excessively/ capsules(25.0%) Surface of tipping paper was contaminated

[0119] As shown in Table 5, it was found that amounts of vanillin and ethyl vanillin components in the tipping paper increased with an increase in the content of the microcapsules in the fragrance carrier ink. However, in the case of Example 13 in which the content of the microcapsules was 25%, the intensity of an external scent generated while a cigarette was stored before being smoked increased excessively, and the surface of the tipping paper was contaminated due to breakage of the microcapsules. It was found that, when the content of the microcapsules is in a range of 10% to 20%, the effect of reducing a tobacco smell on fingers caused by smoking was excellent and the problems relating to the intensity of the external scent and contamination of the surface of the tipping paper could be solved.

Experimental Example 5: Evaluation of Workability of Printing on Tipping Paper/Workability of Subsequent Process

[0120] In order to confirm workability of printing on the tipping paper produced according to the examples of the present invention and workability of a subsequent process for producing cigarettes after the printing, physical characteristics of the tipping paper were analyzed, and results thereof are shown in Table 6 below. In Experimental Example 5, analysis of physical characteristics of tipping paper was carried out on tipping paper before the tipping paper was assembled to each of the smoking articles according to Example 8 and Examples 10 to 12.

TABLE-US-00006 TABLE 6 Adhesion between front and Worka- rear surfaces bility of of tipping Slip Curl of tipping Classification Details printing paper property paper (mm) Comparative OPV only Good None Good 0.7 Example 1 Comparative OPV + fragrance material Good Good Good 1.0 Example 4 (1.25%) Example 8 OPV + fragrance Good None Good 1.0 carrier(1.25%) + binder(5.0%) Example 10 OPV + fragrance Good None Good 3.0 carrier(1.25%) + binder(5.0%) + capsules(5.0%) Example 11 OPV + fragrance Good None Good 5.0 carrier(1.25%) + binder(10.0%) + capsules(5.0%) Example 12 OPV + fragrance Good None Good 4.0 carrier(1.25%) + binder(10.0%) + capsules(15.0%)

[0121] As shown in Table 6, in all of Example 8 and Examples 10 to 12, the workability of printing on the tipping paper was good. However, a problem of adhesion between front and rear surfaces of the tipping paper did not occur, which may occur when the paper is rolled while the ink is not completely dried and the ink on the front surface is spread to the rear surface. The slip property was good without a problem in that the surface of the tipping paper was too slippery or rough, and a curl of the tipping paper was also within an appropriate numerical value range. Accordingly, it was

confirmed that, according to the examples, there was no problem in terms of the workability of fragrance carrier printing using the fragrance carrier ink including the fragrance material, binder, and the microcapsules.

EXAMPLE 14

[0122] A tipping paper was removed from a cigarette produced for testing of examples, and a material portion and a filter portion were separated. A smoking article was produced by combining the separated material portion and filter portion using a tipping paper having a porosity of about 100 CU that was produced by applying the OPV process and the fragrance carrier printing process using an ethanol-based fragrance carrier ink containing 1.25% fragrance material. Here, the fragrance material contained 5% vanillin and 10% ethyl vanillin.

EXAMPLE 15

[0123] A smoking article was produced in the same way as in Example 14 except that the fragrance material contained 10% vanillin.

EXAMPLE 16

[0124] A smoking article was produced in the same way as in Example 14 except that the fragrance material contained 20% vanillin.

EXAMPLE 17

[0125] A smoking article was produced in the same way as in Example 14 except that the fragrance material contained 30% vanillin.

EXAMPLE 18

[0126] A smoking article was produced in the same way as in Example 14 except that the fragrance material contained 40% vanillin.

COMPARATIVE EXAMPLE 5

[0127] A smoking article was produced in the same way as in Example 15 except that, unlike in Examples 13 to 17, the fragrance printing process was performed by stirring the fragrance material in the ink without including the fragrance material in a carrier.

Experimental Example 6: Evaluation of Color Stability According to Changes in Content of Vanillin in Fragrance Material

[0128] For evaluation of color stability of the tipping paper according to changes in content of vanillin in the fragrance material, the degrees of color change in cigarettes immediately after production thereof and cigarettes after two months of production were measured according to color difference (ΔE) in the CIELAB color space, and results thereof are shown in Table 7. The cigarettes were stored for two months under conditions of a temperature of about 40° C. and a relative humidity of about 60%.

TABLE-US-00007 TABLE 7 Color change Classification Details (ΔE) Comparative OPV only 0.43 Example 1 Comparative OPV+ fragrance material(1.25%) [vanillin(20.0%), ethyl vanillin(10.0%)] 1.26 Example 5 Example 14 OPV + fragrance carrier(1.25%) [vanillin(5.0%), ethyl vanillin(10.0%)] 0.57 Example 15 OPV + fragrance carrier(1.25%) [vanillin(10.0%), ethyl vanillin(10.0%)] 0.71 Example 16 OPV + fragrance carrier(1.25%) [vanillin(20.0%), ethyl vanillin(10.0%)] 0.82 Example 17 OPV + fragrance carrier(1.25%) [vanillin(30.0%), ethyl vanillin(10.0%)] 1.70 Example 18 OPV + fragrance carrier(1.25%) [vanillin(40.0%), ethyl vanillin(10.0%)] 2.20

[0129] From the results of analysis of Examples 14 to 18, it was found that the degree of discoloration of the tipping paper increased with an increase in the content of vanillin in the fragrance material (while the content of ethyl vanillin was fixed at 10%). Particularly, it can be seen that, in Examples 17 and 18 where the content of vanillin was higher than or equal to 30%, the degree of discoloration increased sharply at which the discoloration could even be seen with naked-eyes by visual inspection. In contrast, the degree of discoloration of the tipping paper was insignificant in Examples 14 to 16 in which the content of vanillin was in a range of 5% to 20%. Also, from the results of analysis of Example 16 and Comparative Example 5, it was confirmed

that, while the contents of vanillin and ethyl vanillin in the fragrance material were the same, the degree of discoloration was lower in the case in which fragrance carrier printing was performed by including the fragrance material in the carrier material (Example 16) as compared to the case in which fragrance printing was performed without including the fragrance material in a carrier (Comparative Example 5).

EXAMPLE 19

[0130] A smoking article was produced in the same way as in Example 14 described above with reference to Table 7, except that the fragrance material contained 20% vanillin and 5% ethyl vanillin.

EXAMPLE 20

[0131] A smoking article was produced in the same way as in Example 19 except that the fragrance material contained 20% ethyl vanillin.

EXAMPLE 21

[0132] A smoking article was produced in the same way as in Example 19 except that the fragrance material contained 30% ethyl vanillin.

EXAMPLE 22

[0133] A smoking article was produced in the same way as in Example 19 except that the fragrance material contained 40% ethyl vanillin.

Experimental Example 7: Evaluation of Color Stability According to Changes in Content of Ethyl Vanillin in Fragrance Material

[0134] For evaluation of color stability of the tipping paper according to changes in content of ethyl vanillin in the fragrance material, the degrees of color change of cigarettes immediately after production and cigarettes after two months of production were measured according to color difference (ΔE) in the CIELAB color space, and results thereof are shown in Table 8. The cigarettes were stored for two months under conditions of a temperature of about 40° C. and a relative humidity of about 60%.

TABLE-US-00008 TABLE 8 Color change Classification Details (ΔE) Comparative OPV only 0.43 Example 1 Comparative OPV + fragrance material(1.25%) [vanillin(20.0%), ethyl vanillin(10.0%)] 1.26 Example 5 Example 19 OPV + fragrance carrier(1.25%) [vanillin(20.0%), ethyl vanillin(5.0%)] 0.61 Example 16 OPV + fragrance carrier(1.25%) [vanillin(20.0%), ethyl vanillin(10.0%)] 0.82 Example 20 OPV + fragrance carrier(1.25%) [vanillin(20.0%), ethyl vanillin(20.0%)] 1.68 Example 21 OPV + fragrance carrier(1.25%) [vanillin(20.0%), ethyl vanillin(30.0%)] 1.92 Example 22 OPV + fragrance carrier(1.25%) [vanillin(20.0%), ethyl vanillin(40.0%)] 2.17

[0135] Similar to Example 6, the results of analysis in Examples 19 to 22 show that the degree of discoloration of the tipping paper increased with the increase in the content of ethyl vanillin in the fragrance material (while the content of vanillin was fixed at 20%). Particularly, it can be seen that, in Examples 20 to 22 in which the content of ethyl vanillin was higher than or equal to 20%, the degree of discoloration increased sharply at which the discoloration could even be seen by naked-eyes by visual inspection. In contrast, the degree of discoloration of the tipping paper was insignificant in Examples 16 and 19 in which the content of ethyl vanillin was in a range of 5% to 10%.

Experimental Example 8: Smoking Sensory Evaluation Using Tipping Paper to which Fragrance Carrier is Applied

[0136] In order to confirm sensory characteristics of the tipping paper to which the fragrance carrier is applied according to the present invention, sensory evaluation was performed with respect to external scent intensity, tobacco taste intensity, intensity of the tobacco smell on fingers after smoking, intensity of the scent remaining on the fingers after smoking, and satisfaction with the scent remaining on the fingers, for the smoking articles according to Example 1, Comparative Example 1, and Comparative Example 4.

[0137] The sensory evaluation was performed by a panel of twenty evaluators using the smoking articles according to Example 1, Comparative Example 1, and Comparative Example 4, based on a scale of 8 points.

[0138] FIG. **2** shows results of smoking sensory evaluation relating to smoking articles stored at room temperature for two weeks after being produced according to Example 1, Comparative Example 1, and Comparative Example 4. FIG. **3** shows results of smoking sensory evaluation relating to smoking articles stored at room temperature for two months after being produced according to Example 1, Comparative Example 1, and Comparative Example 4.

[0139] Referring to FIGS. **2** and **3**, it can be seen that external scent intensity (that is, the scent intensity before the cigarette is rubbed by fingers of a smoker or saliva is delivered from the smoker's mouth to the cigarette) increased noticeably in the cigarette according to Comparative Example 4 to which fragrance printing was applied as compared to the cigarette according to Comparative Example 1 to which fragrance printing was not applied. On the other hand, it can be seen that, in the cigarette according to Example 1 to which fragrance carrier printing was applied, the external scent intensity somewhat increased as compared to the cigarette according to Comparative Example 1, but the external scent intensity had a significantly lower numerical value as compared to Comparative Example 4.

[0140] It can be seen that the intensity of the scent remaining on the fingers after smoking increased significantly in Comparative Example 4 and Example 1 as compared to Comparative Example 1 and increased slightly in Example 1 as compared to Comparative Example 4. It can be seen that the intensity of the tobacco smell on the fingers after smoking reduced in Comparative Example 4 and Example 1 as compared to Comparative Example 1 and reduced in Example 1 as compared to Comparative Example 4.

[0141] Considering together the fact that the external scent intensity had a lower numerical value in Example 1 as compared to Comparative Example 4 and the fact that the intensity of the scent remaining on the fingers after smoking had a higher numerical value in Example 1 as compared to Comparative Example 4, it can be confirmed that amount of fragrance disseminated before smoking relatively decreased and amount of fragrance disseminated during smoking relatively increased in the case in which the fragrance material was included in a carrier and printed (Example 1) as compared to the case in which the fragrance material was printed without being included in a carrier (Comparative Example 4).

[0142] Example 1, Comparative Example 1, and Comparative Example 4 showed no significant difference in terms of tobacco taste intensity. Thus, the taste of tobacco smoke would not be affected due to applying fragrance printing.

Experimental Example 9: Smoking Sensory Evaluation According to Whether Microcapsules are Additionally Applied

[0143] In order to confirm changes in sensory characteristics according to whether the microcapsules are added, sensory evaluation was performed with respect to external scent intensity, tobacco taste intensity, intensity of the tobacco smell on fingers after smoking, intensity of the scent remaining on the fingers after smoking, and satisfaction with the scent remaining on the fingers, for the smoking articles according to Examples 10 to 12 and Comparative Example 1. The sensory evaluation was performed by a panel of twenty evaluators using the smoking articles according to Example 10 to 12 and Comparative Example 1, based on a scale of 8 points.

[0144] FIG. **4** shows results of smoking sensory evaluation relating to smoking articles two weeks after production thereof according to Examples 10 to 12 and Comparative Example 1.

[0145] Referring to FIG. **4**, the external scent intensity, intensity of the scent remaining on the fingers after smoking, and satisfaction with the scent remaining on the fingers tended to increase and the intensity of the tobacco smell on the fingers after smoking tended to decrease with an increase in the content of the binder and/or microcapsules in the fragrance carrier ink.

[0146] It was confirmed that, in all of Examples 10 to 12, an increase in the intensity of the scent

remaining on the fingers after smoking as compared to Comparative Example 1 was larger than an increase in external scent intensity as compared to Comparative Example 1. Thus, it can be seen that, in all of Examples 10 to 12, the fragrance was not substantially disseminated during storage of the cigarettes and then was substantially disseminated according to the smoking behavior of the smoker.

[0147] Those of ordinary skill in art related to the present examples should understand that the present disclosure may be implemented in modified forms without departing from the scope of the present disclosure. Therefore, the one or more embodiments disclosed herein should be considered as illustrative rather than limiting the scope of the disclosure. The scope of the present disclosure is defined in the claims below, and any modification, improvement, substitution, and any equivalents thereof of the one or more embodiments described herein should be construed as falling within the scope of the present disclosure.

Claims

1. A method of producing a tipping paper, the method comprising: adding a carrier material to ethanol to obtain a first solution and stirring the first solution; adding a fragrance material to the first solution in which the carrier material is added to the ethanol to obtain a second solution and stirring the second solution; adding a binder to the second solution, in which the carrier material and the fragrance material are added to the ethanol, to obtain a third solution and stirring the third solution; and printing the third solution, in which the carrier material, the fragrance material, and the binder are added to the ethanol to be used as a fragrance carrier ink, on the tipping paper.

2. The method of claim 1, wherein the printing the third solution further comprises adding microcapsules to the fragrance carrier ink to obtain a fourth solution and stirring the fourth solution, wherein a core of each microcapsule is an ethanol-based fragrance and a shell of each microcapsule is polyvinyl alcohol (PVA), and the microcapsules are produced by stirring the ethanol-based fragrance and the PVA at room temperature, adding a cross-linking agent to a fifth solution in which the ethanol-based fragrance and the PVA are stirred and stirring the fifth solution at a temperature higher than or equal to 60° C. and lower than or equal to 100° C., and cooling the fifth solution in which the ethanol-based fragrance, the PVA, and the cross-linking agent are stirred.

3. The method of claim 1, wherein the carrier material comprises 2-hydroxypropyl-β-cyclodextrin.

4. The method of claim 1, wherein the fragrance material comprises one or more materials of vanillin and ethyl vanillin.

5. The method of claim 4, wherein: a weight ratio of the vanillin with respect to a total weight of the fragrance material is in a range of 15% to 25%, and a weight ratio of the ethyl vanillin with respect to the total weight of the fragrance material is in a range of 5% to 15%.

6. The method of claim 1, wherein: a weight ratio of the fragrance material with respect to a total weight of the fragrance carrier ink is greater than 0% and lower than or equal to 1.5%, and a weight ratio of the carrier material with respect to the total weight of the fragrance carrier ink is greater than 0% and lower than or equal to 15%.

7. The method of claim 1, wherein: a weight ratio of the binder with respect to a total weight of the fragrance carrier ink is greater than 5% and lower than or equal to 10%.

8. The method of claim 1, wherein: the binder is a polymer material that is soluble in ethanol and has a molecular weight in a range of 3,000 to 20,000 and a glass transition temperature in a range of 60° C. to 90° C.

9. The method of claim 1, wherein: the carrier material is insoluble in water and isopropyl alcohol, and the carrier material is soluble in ethanol.