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(54) **Smoking article**

(57) A smoking article comprises a wrapped tobacco rod (1) and a filter (2, 3), the wrapped tobacco rod (1) and the filter (2, 3) being connected by a tipping paper (4) which overwraps the filter (2, 3) and a part of the

wrapped tobacco rod (1). The tipping paper (4) is designed as a single-ply tipping paper and contains activated carbon.

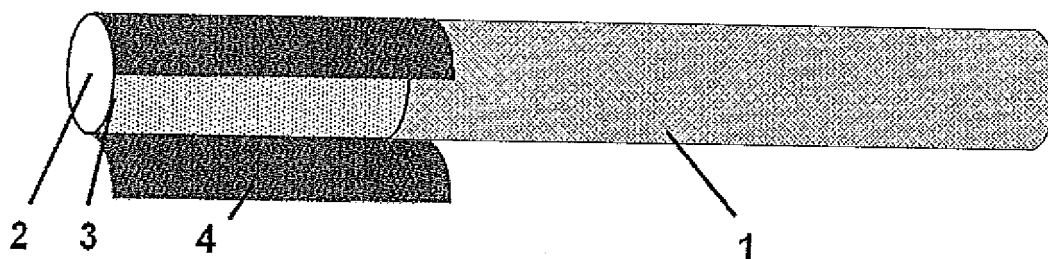


Figure 1

Description

[0001] The invention relates to a smoking article, e.g., a filter cigarette.

[0002] It is commonly known that smoking can cause smelly fingers. During the smouldering phase of a cigarette, sidestream smoke is emitted from the burning end. Depending on the angle in which the cigarette is held, a portion of this sidestream smoke flows alongside the cigarette and gets into contact with a smoker's fingers. Smelly components of the sidestream smoke can deposit on the skin, causing a long-lasting, unpleasant finger smell.

[0003] Use of adsorbent materials (e.g. charcoal materials or activated carbon) in cigarette papers and filters is a widely applied technology to reduce the levels of volatile smoke constituents.

[0004] WO 2008/043988 A1 discloses a carbon-containing paper used as a filter plug wrap. The core of the related filter comprises carbon as well. A filter according to this document would be connected to a cigarette rod using a conventional tipping paper so that the carbon paper is not directly exposed to the outer surface of the cigarette.

[0005] WO 2009/109427 A1 describes the use of a tobacco wrapper consisting of multiple plies, wherein one ply contains activated carbon and a flavourant. The carbon ply is located on the tobacco side of the wrapper to allow better flavour release and interaction with mainstream smoke.

[0006] In WO 2009/109433 A1, a carbon-containing plug wrap or tipping paper consisting of multiple plies is described, with one ply comprising an adsorbent material such as activated carbon.

[0007] This carbon-containing ply is directed towards the inner side of the smoking article to allow for interaction with the mainstream smoke. Another ply which does not contain any adsorbent forms the outer surface of the plug wrap or tipping paper.

[0008] The object of the invention is to provide a smoking article which can reduce finger smell generally caused by smoking.

[0009] This object is achieved by a smoking article having the features of claim 1. Advantageous versions of the invention follow from the dependent claims.

[0010] The smoking article (e.g., a cigarette) according to the invention comprises a wrapped tobacco rod and a filter. The wrapped tobacco rod and the filter are connected by a tipping paper which overwraps the filter and a part of the wrapped tobacco rod. The tipping paper is designed as a single-ply tipping paper and contains activated carbon.

[0011] The tobacco rod of the smoking article can be wrapped with a suitable cigarette paper, as well known in the art. The filter can be designed as a single or multiple filter, which can be wrapped with a plug wrap. The wrapped tobacco rod and the filter are coaxially aligned and linked by wrapping with the tipping paper. As such, the tipping paper is always the outermost layer in the filter region of the smoking article.

[0012] The tipping paper consists of a single ply containing activated carbon (active charcoal). The term "single ply" does not exclude an optional additional coating (see below), but means that there is only one paper ply. Activated carbon can be added, e.g., during the paper manufacturing process so that it is inherently included in the tipping paper. Suitable papers are disclosed in WO 2008/043988 A1 (see above) and are commercially available, e.g., from Saber Swiss Quality Paper. They are commonly referred to as "carbon papers". Activated carbon can also be applied to the outer surface of a conventional tipping paper after paper making by suitable methods such as coating or printing. It is also conceivable to apply activated carbon to the outer surface of a tipping paper which already inherently includes activated carbon.

[0013] In the smoking article according to the invention, the activated carbon is present at the outer surface of the filter end of the smoking article, where the smoking article is usually held, so that the activated carbon is placed in close proximity to the smoker's fingers during use of the smoking article. The activated carbon can interact with the sidestream smoke that passes along the cigarette surface and can adsorb smelly sidestream smoke constituents. A further way of interaction is by direct contact between the activated carbon and the fingers, whereby smelly, volatile substances that already have been deposited on the skin can be adsorbed by the activated carbon.

[0014] In advantageous embodiments of the invention, the tipping paper has an activated-carbon content in the range of from 5% to 50% (by weight) or, preferably, in the range of from 15% to 30% (by weight).

[0015] As already mentioned, activated carbon may be applied to the outwardly directed surface of the tipping paper, i.e. to that surface of the tipping paper which is outwardly directed (exposed) in the finished smoking article. The step of application can be performed, e.g., by coating or printing, preferably after the paper making process and before the tipping paper is wrapped about the filter and the filter-ended area of the wrapped tobacco rod.

[0016] Due to the specific manufacturing process of carbon papers, carbon papers usually have a high natural porosity (inherent porosity, i.e. porosity determined when it is not artificially increased by ventilation holes). The inherent porosity can be measured in Coresta Units (CU); $1 \text{ CU} = 1 \text{ cm}^3/(\text{cm}^2 \cdot \text{min} \cdot \text{kPa})$. Preferably, the tipping paper containing activated carbon has an inherent porosity of at least 50 CU. By using this type of paper as a tipping material, preferentially in combination with a porous plug wrap, the carbon monoxide (CO) included in mainstream smoke can diffuse through the plug wrap and the tipping paper, which lowers CO levels in mainstream smoke. This is especially beneficial if the tobacco rod is wrapped with a low-sidestream paper (see below), because such papers tend to increase the CO levels in mainstream smoke. To achieve the required level of filter ventilation, the tipping paper can be additionally perforated, e.g. by

electro-perforation or laser perforation, either before or after it is wrapped about the smoking article.

[0017] In advantageous embodiments of the invention, the tipping paper containing activated carbon comprises an at least partial coating on its outwardly directed surface. This coating may improve, e.g., the haptical and/or optical properties of the tipping paper. For example, lip release can be facilitated by a coating, or a coloured or white varnish can change the appearance of the tipping paper containing activated carbon. The term "coating" also covers applications like a porous varnish which penetrates into the pores of the tipping paper containing activated carbon. Such coatings can be applied, e.g., by spraying or printing, preferably before the tipping paper is wrapped about the filter and the wrapped tobacco rod.

[0018] Even without such coating or partial coating, the activated carbon in the tipping paper generally adheres well to the paper ply and does not result in coloured fingers when the consumer grasps and smokes the smoking article.

[0019] As already mentioned, the tipping paper containing activated carbon may comprise artificial perforations, which can result in a filter ventilation of the smoking article in the range of from 10% to 90%. The artificial perforations are preferably made as electro-perforations or laser perforations, as is well known in the art. In case any coating of the tipping paper decreases the porosity of the tipping paper, such artificial perforations can be used to adjust the filter ventilation to a desired value.

[0020] Typically, the tipping paper containing activated carbon has an areal weight in the range of from 20 g/m² to 80 g/m².

[0021] Generally, the tobacco rod can be wrapped with a conventional cigarette paper (porosity typically in the range of from 5 CU to 400 CU). In advantageous embodiments of the invention, the tobacco rod is wrapped with a low-sidestream ("LSS") cigarette paper (or with multiple layers of a cigarette paper, which also has a sidestream-reducing effect). LSS cigarette papers are commercially available, e.g. from Delfort Group, and usually contain higher CaCO₃ filler levels or special fillers like MgO. By using an LSS cigarette paper, a lower amount of sidestream smoke is released from the smoking article during smouldering, which adds to the effect of the tipping paper containing activated carbon with respect to a reduction of finger smell.

[0022] Generally, the filter may comprise one filter segment or more than one filter segment. In advantageous embodiments, at least one filter segment may contain an adsorbent, preferably activated carbon. The adsorbent is used to change the composition of mainstream smoke and also has the potential to reduce the smell of discarded cigarette butts. Adsorbent may be added to filter materials and/or contained in a separate filter compartment, as generally known in the art.

[0023] The filter can be wrapped in a porous plug wrap, preferably having a porosity in the range of from 100 CU to 40000 CU. CU: Coresta Unit. 1 CU = 1 cm³/(cm²•min•kPa). However, a non-porous plug wrap may be used as well. The plug wrap can optionally contain activated carbon or another adsorbent. In any case, the plug wrap is covered by the tipping paper.

[0024] In addition to or instead of activated carbon, it is also conceivable that the tipping paper contains at least one adsorbent different from activated carbon. Examples for such adsorbents are zeolites, alumina, silica, silica gel, ion exchange resins, polyester resins, sepiolite, and carbon species like impregnated carbon, activated carbon fibres and highly activated carbon.

[0025] In further embodiments of the invention, the filter of the smoking article has particular design features such as a coloured tow (e.g., coloured cellulose acetate tow), a mouth-sided recess or a shaped hollow bore element at the mouth-sided end of the filter, as known to anyone familiar with the state of the art.

[0026] In the following, the invention is explained in more detail by means of embodiments and examples. The drawings show in

Figure 1 a schematic three-dimensional view of an embodiment of the smoking article according to the invention, in which part of a tipping paper connecting a wrapped tobacco rod to a filter is shown unwrapped, and

Figure 2 a schematic cross-sectional view of the embodiment of Figure 1, taken in a plane cut through the filter.

[0027] Figure 1 illustrates, in a longitudinal view, a cigarette as an example of a smoking article. The cigarette comprises a wrapped tobacco rod 1, which includes an amount of a tobacco blend wrapped in a cigarette paper, and a filter. The filter comprises filter material 2, e.g. cellulose acetate, which is wrapped in a plug wrap 3. The filter is connected to the wrapped tobacco rod 1 by a tipping paper 4, which overwraps the filter 2, 3 and a part of the wrapped tobacco rod 1. For illustration purposes, the tipping paper 4 is shown partially unwrapped. Generally, the filter can be designed as a filter having one segment or more than one segment. Figure 2 is a schematic cross-sectional view of the cigarette of Figure 1, in a plane cut through the filter, which shows the filter material 2, the plug wrap 3, and the tipping paper 4. The plug wrap 3 may form a step in the area of its overlap (not shown in Figure 2). The same holds for the tipping paper 4. Figure 2 is not drawn in scale.

[0028] So far, the set-up of the cigarette is known in the prior art.

[0029] According to the invention, the tipping paper 4 is designed as a single-ply tipping paper and contains activated carbon. In the embodiment, the colour of the tipping paper 4 is a dark gray. Many possible features of the tipping paper

4 and of the other parts of the smoking article have already been explained further above.

[0030] In the following, the properties of three particular cigarettes (Examples 1 to 3) are compared to each other. Example 1 relates to a reference cigarette, in which the tipping paper does not contain activated carbon. In Example 2, the cigarette paper is a low-sidestream paper (LSS), whereas the tipping paper still does not contain activated carbon. In the cigarette of Example 3, the cigarette paper is a low-sidestream paper (LSS), and the tipping paper is a single-ply tipping paper and contains activated carbon. In another example (not shown in detail), the tipping paper is a single-ply tipping paper containing activated carbon as in Example 3, but the cigarette paper is a conventional cigarette paper as in Example 1.

Example 1: Reference cigarette

[0031] American Blend cigarettes with a mono-acetate filter and a cigarette paper having a base weight of 24.5 g/m², a CaCO₃ filler content of 27% (by weight) and a porosity of 24 CU were produced on a standard cigarette maker using a conventional non-porous tipping paper. The cigarettes were perforated by an online-laser to achieve a target filter ventilation of 44%.

Example 2: Reference cigarette with LSS paper

[0032] American Blend cigarettes similar to Example 1 were produced with a low-sidestream cigarette paper having a base weight of 45 g/m², a CaCO₃ filler content of 45% (by weight) and a porosity of 6 CU. The cigarettes were perforated by an online-laser to achieve a target filter ventilation of 41%.

Example 3: Cigarette with LSS paper and carbon tipping paper

[0033] American Blend cigarettes according to Example 2 were produced with a single-ply tipping paper containing activated carbon and having a base weight of 50 g/m² (including the activated carbon), a carbon content of 30% (by weight) and a porosity of 1200 CU. The cigarettes were perforated by an online-laser to achieve a target filter ventilation of 43%.

[0034] Table 1 illustrates physical data and smoke yields of the cigarettes according to Examples 1 to 3. NFDPM (nicotine-free dry particulate matter, "tar"), nicotine and CO were measured according to DIN/ISO 4387 (NFDPM), DIN/ISO 10315 (nicotine) and DIN/ISO 8454 (CO), respectively.

[0035] The comparison of the CO yields and CO/NFDPM ratios in Table 1 demonstrates that the CO increase caused by using an LSS paper can partly be compensated by use of a porous tipping paper containing activated carbon.

Table 1: Physical data and smoke yields for Examples 1 to 3

	Example 1	Example 2	Example 3
Cigarette length [mm]	83.0	83.0	83.0
Filter length [mm]	25.0	25.0	25.0
Tipping paper length [mm]	32.0	32.0	32.0
Cigarette weight [mg]	812	803	811
Filter ventilation	44%	41%	43%
Puff count	6.5	5.1	5.2
NFDPM [mg/cig]	6.6	6.1	5.8
Nicotine [mg/cig]	0.55	0.46	0.44
CO [mg/cig]	7.1	10.0	8.0
CO/NFDPM	1.08	1.64	1.38

[0036] Moreover, cigarettes according to Example 3 were smoked by a test panel over a period of one week. The participants reported that less finger smell was observed, compared to their usual brand.

Claims

1. Smoking article, comprising a wrapped tobacco rod (1) and a filter (2, 3), the wrapped tobacco rod (1) and the filter (2, 3) being connected by a tipping paper (4) which overwraps the filter (2, 3) and a part of the wrapped tobacco rod (1), **characterised in that** the tipping paper (4) is designed as a single-ply tipping paper and contains activated carbon.
2. Smoking article according to claim 1, **characterised in that** the tipping paper (4) has an activated-carbon content in the range of from 5% to 50%, by weight.
3. Smoking article according to claim 2, **characterised in that** the tipping paper (4) has an activated-carbon content in the range of from 15% to 30%, by weight.
4. Smoking article according to anyone of claims 1 to 3, **characterised in that** activated carbon is inherently included in the tipping paper (4).
5. Smoking article according to anyone of claims 1 to 4, **characterised in that** activated carbon is applied to the outwardly directed surface of the tipping paper (4).
6. Smoking article according to anyone of claims 1 to 5, **characterised in that** the tipping paper (4) containing activated carbon has an inherent porosity of at least 50 CU.
7. Smoking article according to anyone of claims 1 to 6, **characterised in that** the tipping paper containing activated carbon comprises an at least partial coating on its outwardly directed surface.
8. Smoking article according to anyone of claims 1 to 7, **characterised in that** the tipping paper (4) containing activated carbon comprises artificial perforations, resulting in a filter ventilation of the smoking article in the range of from 10% to 90%, wherein the artificial perforations are preferably electro-perforations or laser perforations.
9. Smoking article according to anyone of claims 1 to 8, **characterised in that** the tipping paper (4) containing activated carbon has an areal weight in the range of from 20 g/m² to 80 g/m².
10. Smoking article according to anyone of claims 1 to 9, **characterised in that** the tobacco rod is wrapped with a low-sidestream cigarette paper or by multiple layers of a cigarette paper having a sidestream-reducing effect.
11. Smoking article according to anyone of claims 1 to 10, **characterised in that** the filter comprises at least one filter segment containing an adsorbent, preferably activated carbon.
12. Smoking article according to anyone of claims 1 to 11, **characterised in that** the filter (2, 3) is wrapped in a porous plug wrap (3) having a porosity in the range of from 100 CU to 40000 CU, wherein the plug wrap optionally contains activated carbon.

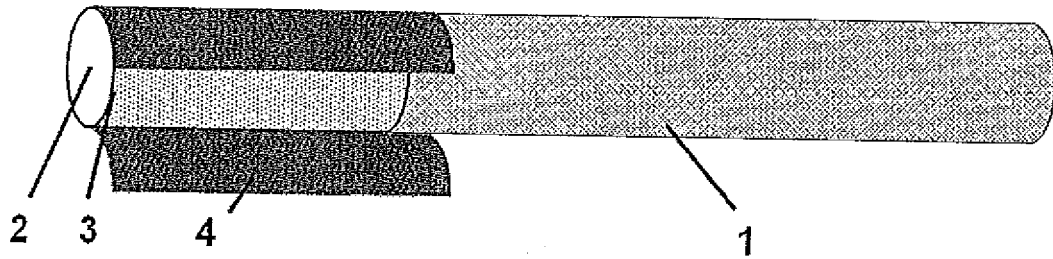


Figure 1

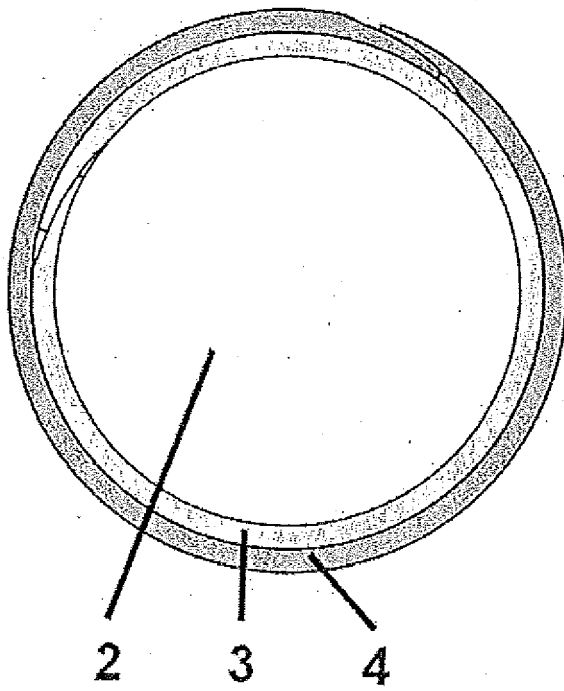


Figure 2



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Application Number
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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