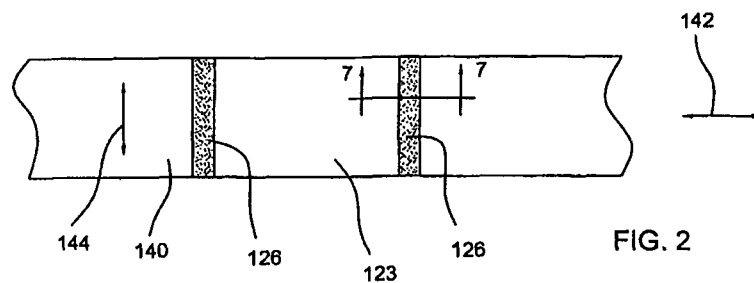


BANDED PAPER, SMOKING ARTICLE AND METHOD

Abstract of the Invention

A cigarette wrapper 123 includes transversely extending banded regions 126 applied by a printing technique, such as gravure printing. The banded regions are applied in a single application of an aqueous starch solution also containing an anti-wrinkling agent such as propylene glycol, and calcium carbonate. The pattern of banded regions may be bands or stripes and the like which lie along and/or around a tobacco rod in a cigarette including the wrapper. The banded regions may be solid or contain any number of cross-web and/or longitudinal discontinuities. The pattern may be configured so that when a smoking article including the wrapper is placed on a substrate, at least two longitudinal locations along the length of the tobacco rod have film-forming compound located only on sides of the smoking article not in contact with the substrate. The invention includes a tobacco rod including the wrapper, a smoking article including the tobacco rod and processes for making the wrapper, as well as a method of abating the tendency of wrapper with an aqueous starch-based printed pattern to wrinkle during its manufacture.

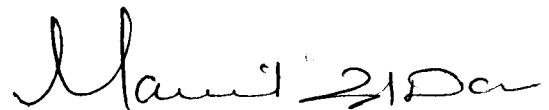


WE CLAIM

1. A process of making wrapper paper for a smoking article comprising the steps of:
supplying a base web;
preparing an aqueous starch solution containing:
 from about 25% to about 35% starch by weight;
 from about 20% to about 30% anti-wrinkling agent by weight of starch; and
 between about 30% and about 80% chalk by weight of starch; and
applying the aqueous starch solution to the base web in a pattern by a single printing step.
2. A process according to claim 1 wherein the aqueous starch solution is heated to a temperature in the range of about 35°C to about 60°C (about 100°F to about 140°F).
3. A tobacco rod comprising:
a quantity of tobacco;
a wrapper paper surrounding the quantity of tobacco; and
an add-on material applied to the wrapper paper in a pattern, the add-on material containing starch, chalk, and an anti-wrinkling agent,
wherein the add-on material has been applied as an aqueous starch solution containing:
 from about 25% to about 35% starch by weight;
 from about 20% to about 30% anti-wrinkling agent by weight of starch; and
 between about 30% and about 80% chalk by weight of starch
4. A tobacco rod according to claim 3 wherein the anti-wrinkling agent is propylene glycol.
5. A tobacco rod according to claim 3 or 4 wherein the pattern contains at least one banded region extending circumferentially around the tobacco rod.
6. A tobacco rod according to claim 3 or 4 wherein the banded region contains a discontinuity measuring about 1mm to about 2mm.
7. A tobacco rod according to claim 3 or 4 wherein the wrapper paper has a permeability of about 60 CORESTA.
8. A tobacco rod according to claim 3 or 4 wherein the add-on material is printed.
9. A tobacco rod according to claim 3 or 4 wherein the add-on material has been applied by a gravure printing step.
10. A tobacco rod according to claim 3 or 4 wherein the pattern contains at least one banded region extending circumferentially around the tobacco rod.

11. A tobacco rod according to claim 10 wherein the banded region contains at least two discontinuities measuring about 1 mm to about 2 mm.
12. A tobacco rod according to claim 11 wherein the discontinuities are spaced less than about 25 mm apart.
13. A smoking article comprising a tobacco rod according to any of claims 3 to 12.
14. A smoking article according to claim 13 comprising a filter attached to an end of the tobacco rod.
15. A method of abating the tendency of wrapper with an aqueous starch-based printed pattern to wrinkle during its manufacture comprising the steps of:
 - reducing the availability of unbounded water in a printing operation; and
 - counteracting a tendency of the unbounded water to cause wrinkling with an anti-wrinkling agent.

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FIELD OF THE DISCLOSURE

This disclosure relates generally to a smoking article and, more particularly, a banded wrapper for use in cigarette manufacturing, related materials, processes, and methods for making them. Anti-wrinkling agents, specially formulated oxidized starch material, smoking articles and wrappers which exhibit a low ignition propensity and/or low self-extinguishment characteristics, and patterns for banded regions are disclosed.

WORKING ENVIRONMENT

As part of efforts to reduce the incidence of accidental fires resulting from untended smoking articles, various jurisdictions have imposed, are imposing, and may impose in the future limitations on the burning characteristics of smoking articles. One measure of the tendency of a smoking article to cause ignition of an underlying substrate is the Ignition Propensity value. To satisfy those increasingly common governmental requirements, the Ignition Propensity value, or IP value, for a smoking article should preferably be no greater than about 25%. Accordingly, efforts to meet such limits are undertaken by various manufacturers of smoking articles.

Reduced IP values typically are associated with a tendency for the smoking article to self-extinguish during smoldering between puffs. Generally speaking, consumers do not like to re-light a cigarette during their smoking experience. A measure of the tendency for a smoking article to self-extinguish during free burn has been developed and is known as the Self-Extinction value. The Self-Extinction or SE value has been found to be a useful indicia to evaluate the likelihood of consumer satisfaction for a smoking article where various techniques for IP reduction have been employed. The average Self-Extinction Average value for a smoking article should preferably be no greater than about 80% and/or the Self-Extinction at 0° value should be no greater than about 50%, and more preferably no greater than about 25%.

IGNITION PROPENSITY ("IP")

Ignition Propensity or IP is a standard test conducted as set forth in ASTM E 2187--04, "Standard Test Method for Measuring the Ignition Strength of Smoking articles", which is incorporated herein in its entirety by this reference thereto. Ignition propensity measures the probability that a smoking article, when smoldering and placed on a substrate, will generate sufficient heat to maintain smoldering of the tobacco rod. Low values for IP are desirable as such values correlate with a reduced likelihood that a smoldering smoking article, when inadvertently left unattended upon a substrate, will cause combustion in the substrate.

SELF-EXTINGUISHMENT ("SE")

Self-Extinguishment or SE herein is a reference to smoldering characteristics of a smoking article under free burn conditions. To evaluate SE, a laboratory test is conducted at a temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and relative humidity of $55\% \pm 5\%$, both of which should be monitored by a recording hygrothermograph. Exhaust hood(s) remove combustion products formed during testing. Prior to testing, smoking articles to be tested are conditioned at $55\% \pm 5\%$ relative humidity and $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ for 24 hours. Just prior to testing, the smoking articles are placed in glass beakers to assure free air access.

SE testing takes place within an enclosure or test box. A single port smoking machine or an electric lighter is used to ignite the smoking articles for the test. During testing, an apparatus or "angle holder" holds the smoking articles to be tested by holding an end at angles of 0° (horizontal), 45° , and/or 90° (vertical). Preferably, twenty (20) smoking articles are tested at each of the 0° , 45° , and 90° positions. If more than one apparatus is used, the apparatuses are preferably positioned such that the smoking articles face away from each other to avoid cross interference. If a smoking article goes out before the front line of the smoldering coal reaches the tipping paper, the outcome is scored as "self-extinguishment"; on the other hand, if the smoking article continues smoldering until the front line of the smoldering coal reaches the tipping paper, then the outcome is scored as "non-extinguishment". Thus, for example, an SE value of 95% indicates that 95% of the smoking articles tested exhibited self-extinguishment under free burn conditions; while an SE value of 20% indicates that only 20% of the smoking articles tested exhibited self-extinguishment under such free burn conditions.

The SE value may be referred to in terms of "Self-Extinction at 0° value", "Self-Extinction at 45° value", or "Self-Extinction at 90° value", each of which refers to the value of SE at the specified tested angle. In addition, the SE value may be referred to in terms of "Self-Extinction Average value", which refers to an average of the three angular positions: namely, an average of (i) the "Self-Extinction at 0° value", (ii) the "Self-Extinction at 45° value", and (iii) the "Self-Extinction at 90° value". A reference to "Self-Extinction value" or "SE value" does not distinguish between SE at 0° , SE at 45° , SE at 90° , or SE average values and may refer to any one of them.

SUMMARY

Embodiments herein disclosed include banded papers and smoking articles constructed from such papers, wherein the add-on material comprises an aqueous starch solution (or system) that includes an anti-wrinkling agent as disclosed herein, as well as chalk as disclosed herein, such that the following are achievable:

