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(54) **FILTERED CIGARETTE WITH DIFFUSE TIPPING MATERIAL**

(52) **U.S. Cl. .... 131/338**

(57) **ABSTRACT**

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A filtered cigarette includes a smokable rod and a filter element. The smokable rod is secured to the filter element using tipping material. The tipping material includes at least one flavorant providing a sensory characteristic. The cigarette may include more than one layer of tipping material. An outer layer of tipping material can overlie at least a portion of an underlying inner layer of tipping material, and during use by the smoker, the outer layer can be removed from the cigarette. Thus, it is possible for a cigarette manufacturer to provide a cigarette that can be used as such by the smoker, or that can be adapted by the smoker to provide a different sensory experience (e.g., the visual, organoleptic, trigeminal, aromatic, and tactile characteristics of the cigarette can be altered by removal of the outer tipping material, and or by provision of a tipping material layer that is treated with a flavorant and/or provides a desirable diffusivity). The use of the outer layer of tipping material can be used to improve the physical integrity of the cigarette.

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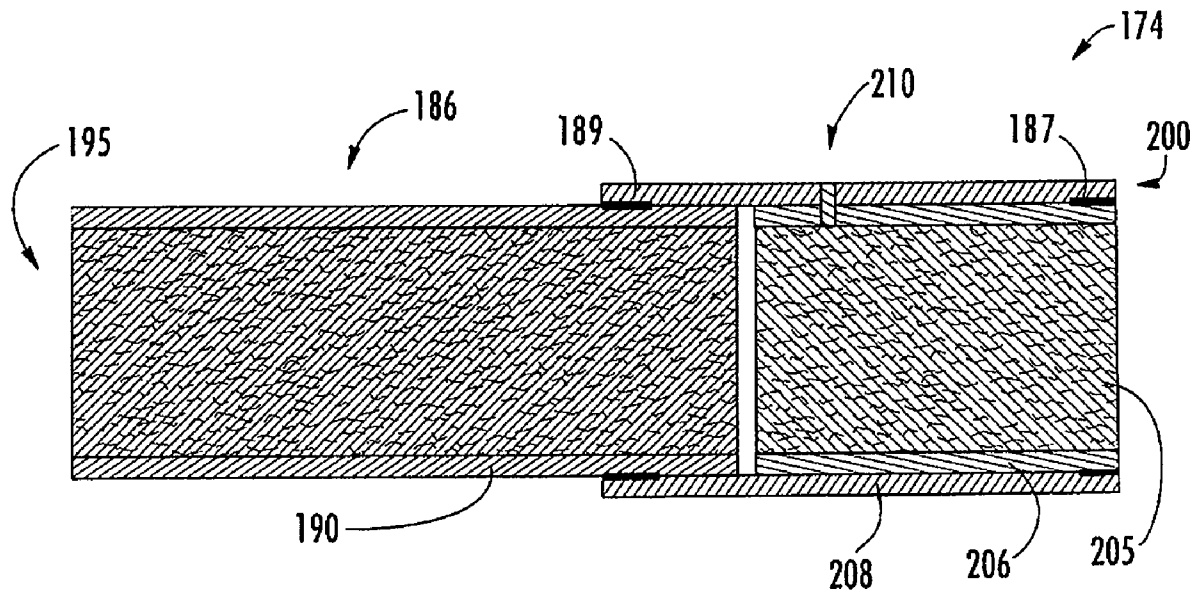
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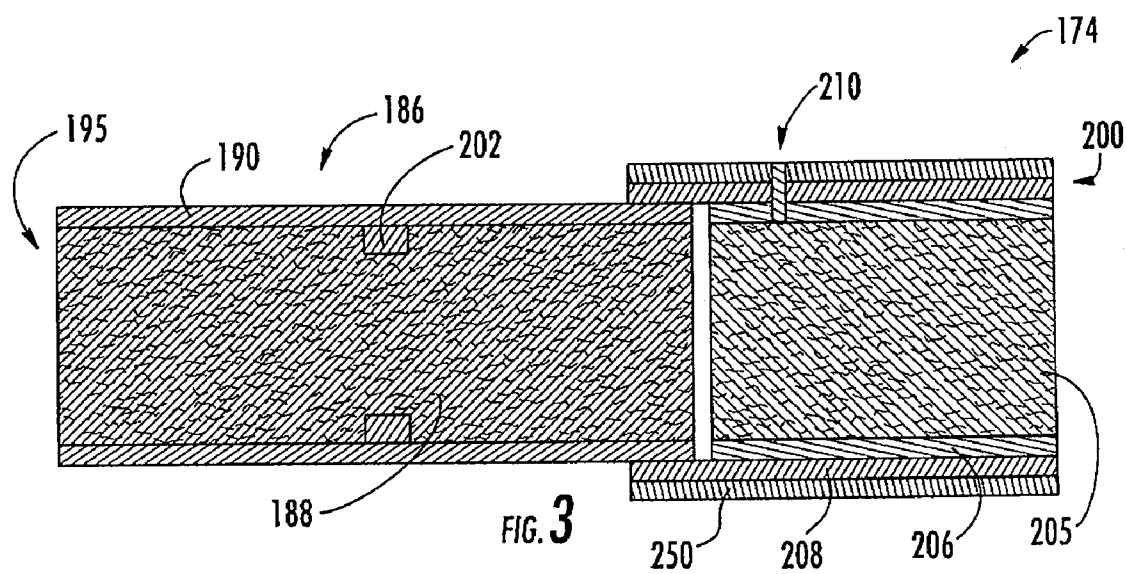
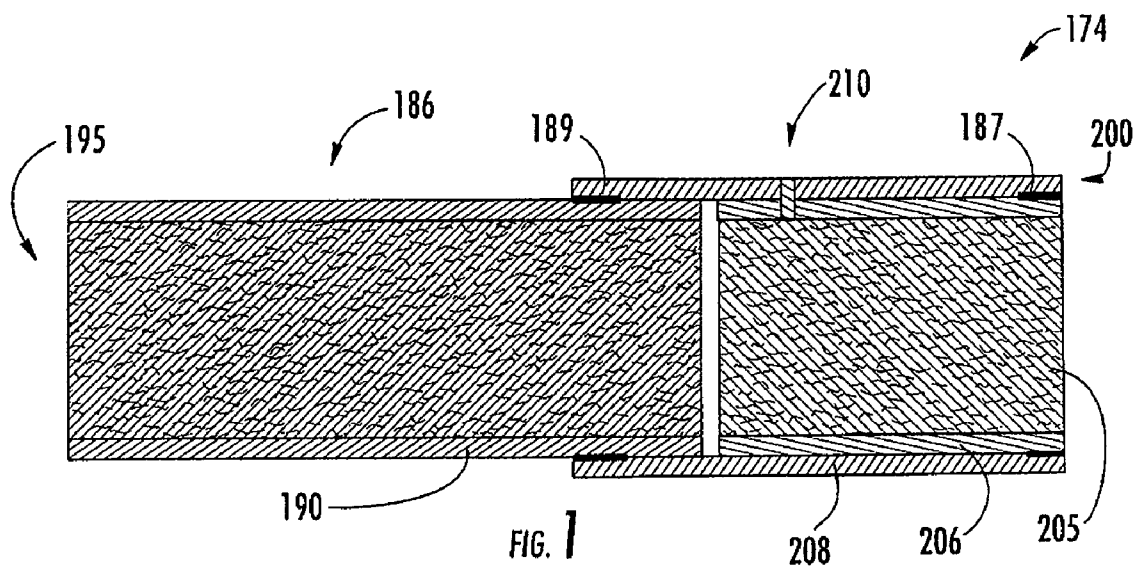
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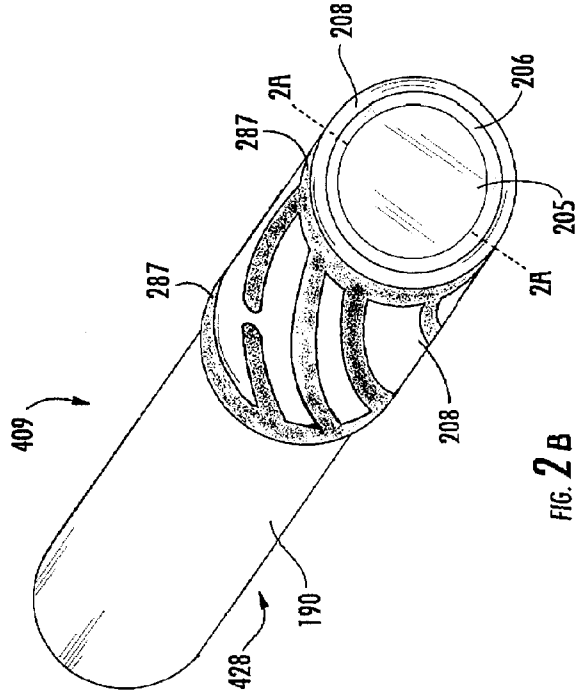
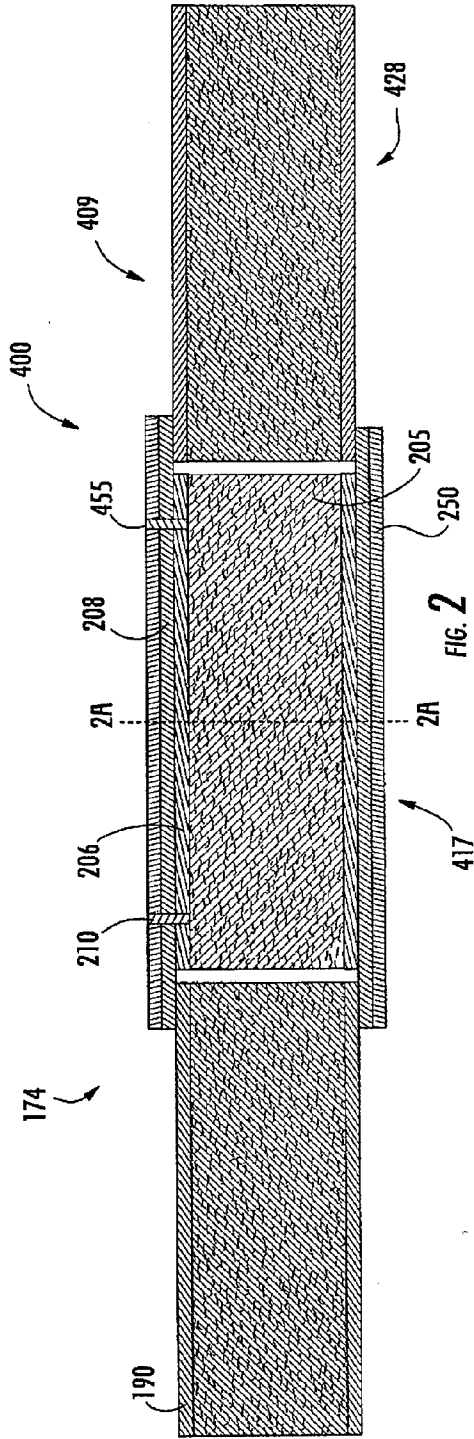


FIG. 2A

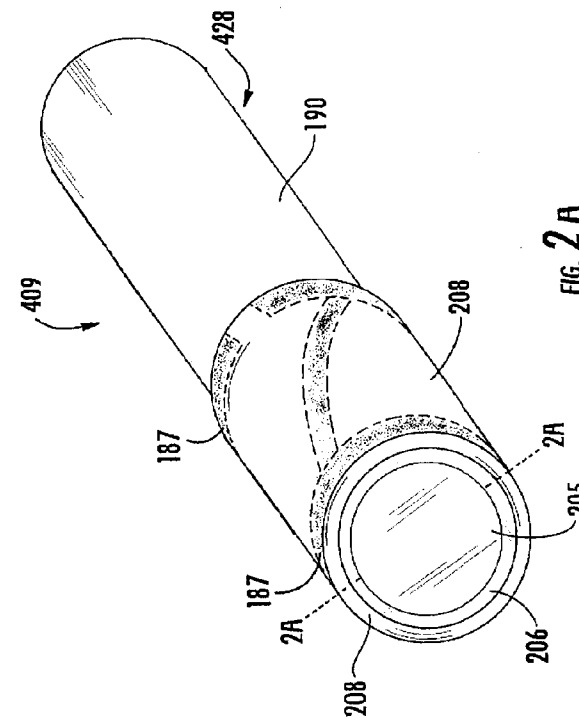
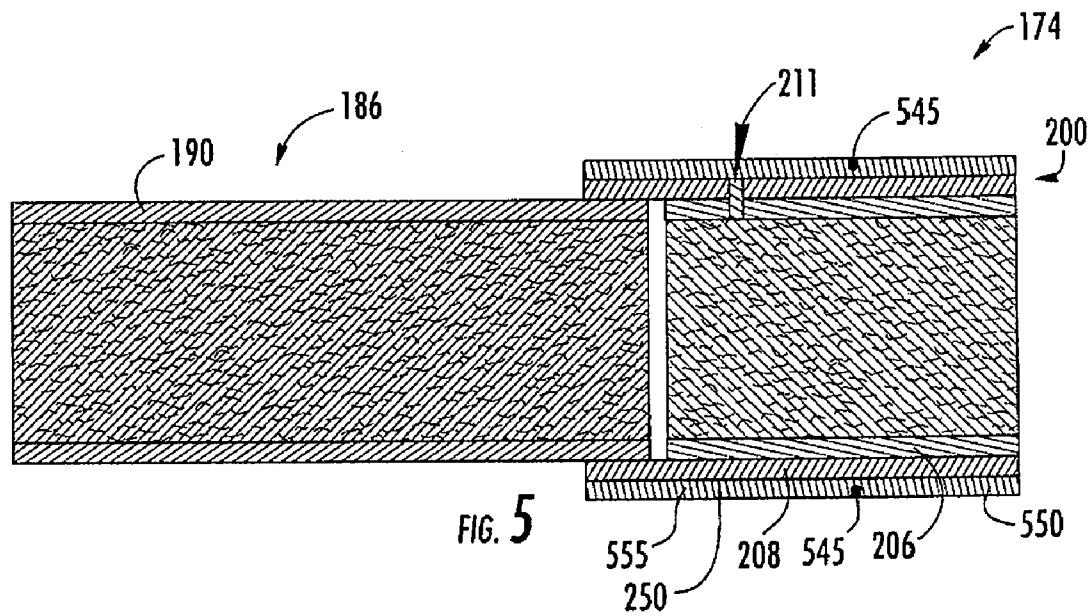
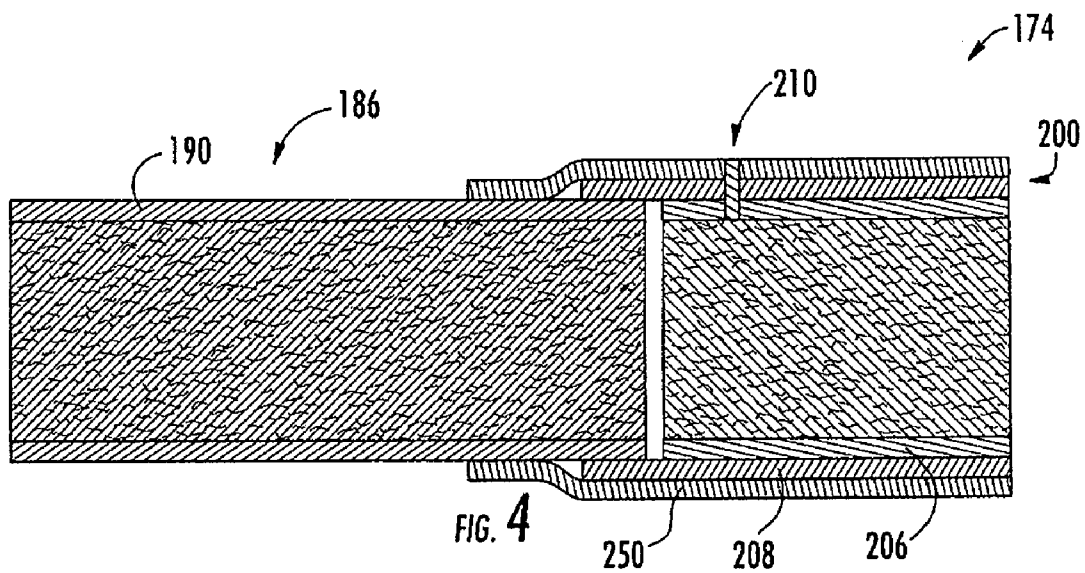


FIG. 2B



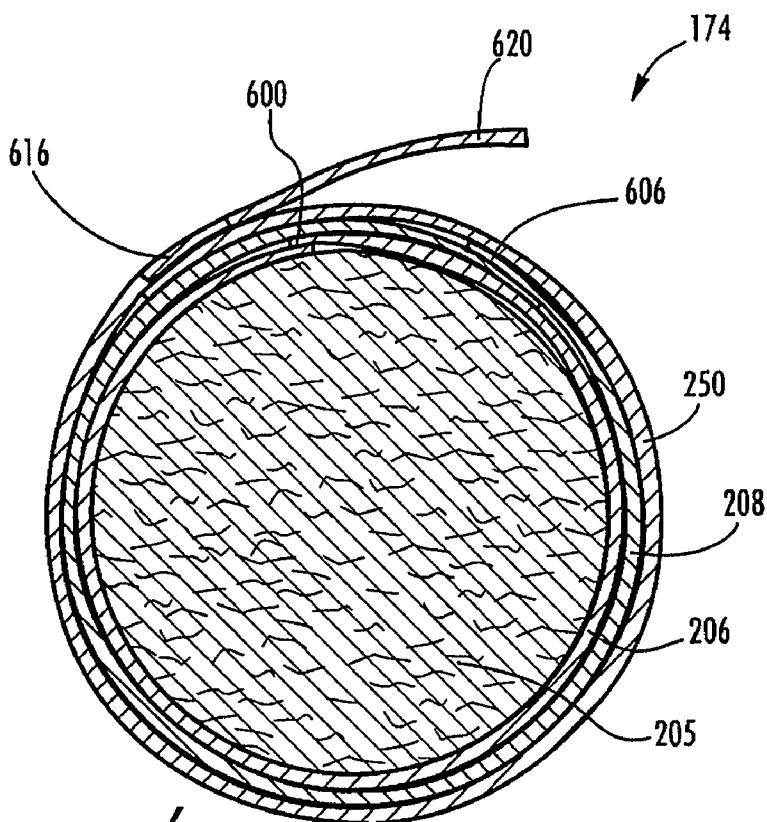


FIG. 6

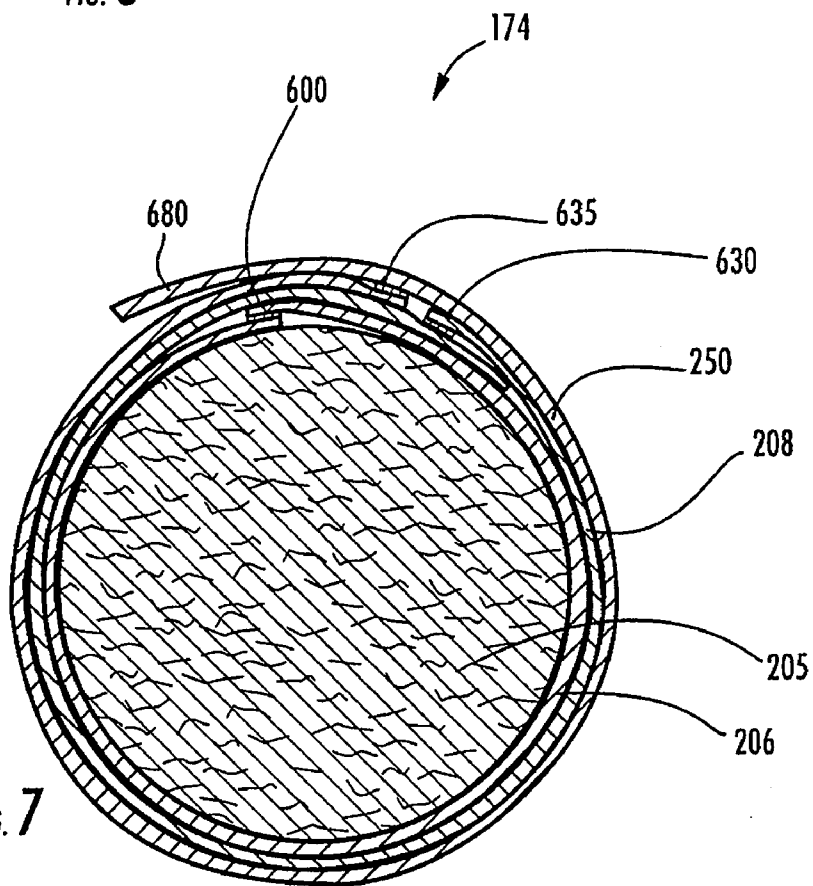


FIG. 7

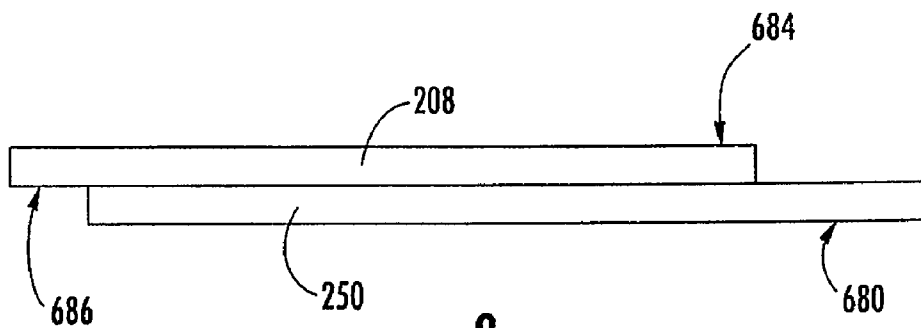


FIG. 8

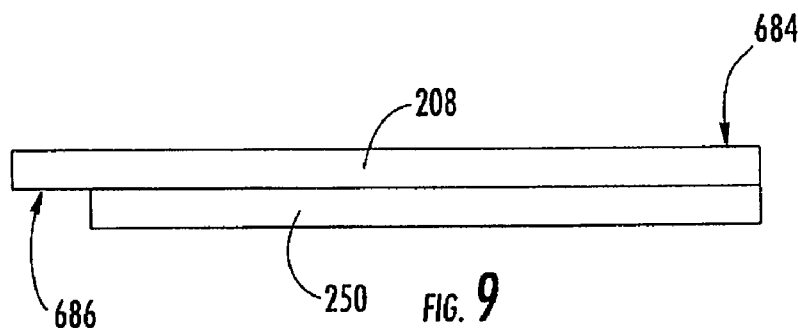


FIG. 9

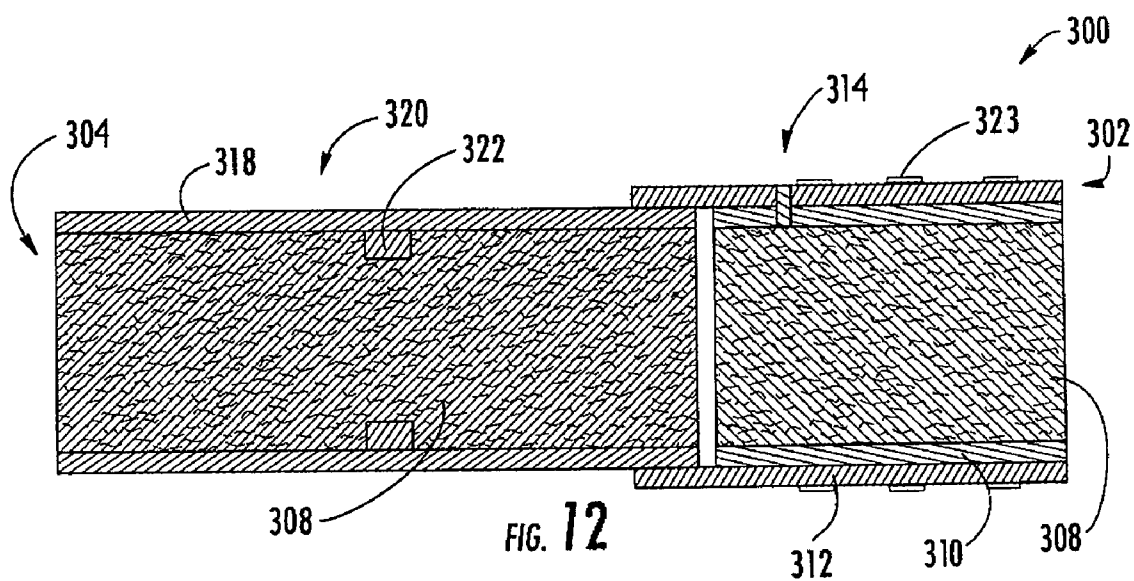


FIG. 12

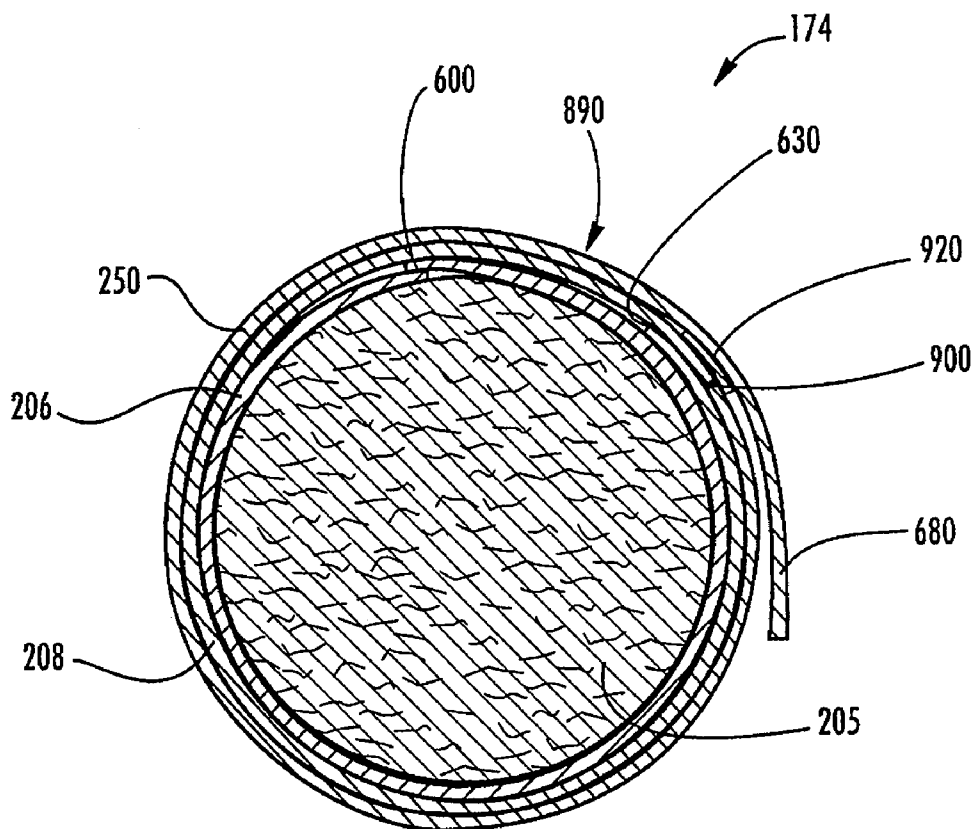


FIG. 10

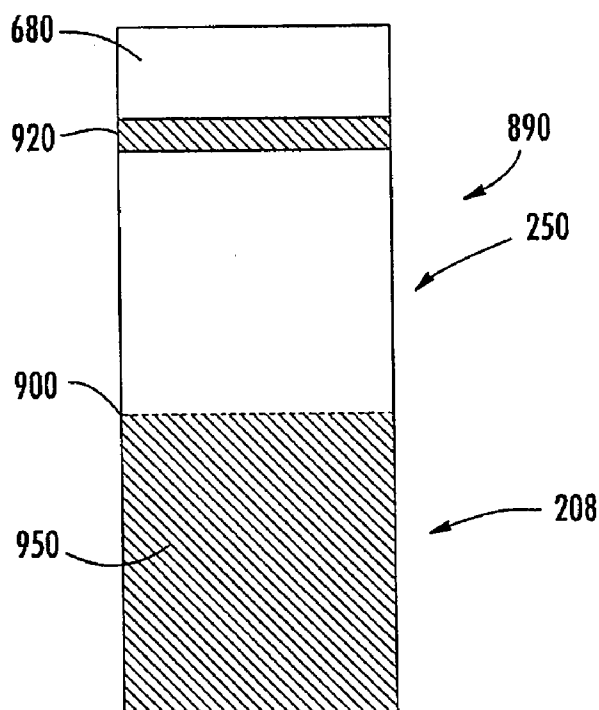


FIG. 11

## FILTERED CIGARETTE WITH DIFFUSE TIPPING MATERIAL

### FIELD OF THE INVENTION

[0001] The present invention relates generally to smoking articles, such as filtered cigarettes, and particularly to tipping paper material used thereon.

### BACKGROUND OF THE INVENTION

[0002] Popular smoking articles, such as cigarettes, have a substantially cylindrical rod shaped structure and include a charge, roll, or column of smokable material such as shredded tobacco (e.g., in cut filler form) surrounded by a paper wrapper thereby forming a so-called "smokable rod" or "tobacco rod." Normally, a cigarette has a cylindrical filter element aligned in an end-to-end relationship with the tobacco rod. Typically, a filter element comprises cellulose acetate tow plasticized using triacetin, and the tow is circumscribed by a paper material known as "plug wrap." A cigarette can incorporate a filter element having multiple segments, and one of those segments can comprise activated charcoal particles. See, for example, U.S. Pat. No. 6,537,186 to Veluz; PCT Pub. No. WO 2006/064371 to Banerjea; and U.S. Pat. App. Pub. No. 2007/0056600, to Coleman III, et al.; each of which is incorporated herein by reference. Typically, the filter element is attached to one end of the tobacco rod using a circumscribing wrapping material known as "tipping paper," in order to provide a so-called "filtered cigarette." It also has become desirable to perforate the tipping material and plug wrap, in order to provide dilution of drawn mainstream smoke with ambient air. Descriptions of cigarettes and the various components thereof are set forth Tobacco Production, *Chemistry and Technology*, Davis et al. (Eds.) (1999). A cigarette is employed by a smoker by lighting one end thereof and burning the tobacco rod. The smoker then receives mainstream smoke into his/her mouth by drawing on the opposite end (e.g., the filter or mouth end) of the cigarette.

[0003] Various attempts to alter the visual attributes of cigarettes have been proposed. For example, there have been attempts to alter the color of the wrapping materials that provide the wrapping material of the tobacco rod (e.g., cigarettes marketed under the tradename "More" by R. J. Reynolds Tobacco Company include cigarette rod wrapping papers exhibiting a brown color) and tipping materials used to attach the tobacco rod to the filter element (e.g., tipping materials have been printed so as to include a "cork" appearance and/or to include at least one circumscribing ring). In addition, there have been attempts to alter the general appearance of the filter elements of cigarettes. See, for example, the types of cigarette filter element formats, configurations and designs set forth in U.S. Pat. No. 3,596,663 to Schultz; U.S. Pat. No. 4,508,525 to Berger; U.S. Pat. No. 4,646,763 to Nichols; U.S. Pat. No. 4,655,736 to Keith; U.S. Pat. No. 4,726,385 to Chumney, Jr.; U.S. Pat. No. 4,807,809 to Pryor et al.; and U.S. Pat. No. 5,025,814 to Raker; and U.S. Pat. App. Pub. No. 2007/0215167, to Crooks et al.; each of which is incorporated herein by reference.

[0004] The sensory attributes of cigarette smoke can be enhanced by applying additives to tobacco and/or by otherwise incorporating flavoring materials into various components of a cigarette. See, Leffingwell et al., Tobacco Flavoring for Smoking Products, R. J. Reynolds Tobacco Company (1972). For example, one type of tobacco flavoring additive is

menthol. See, Borschke, *Rec. Adv. Tob. Sci.*, 19, p. 47-70, 1993. Various proposed methods for modifying the sensory attributes of cigarettes have involved suggestion that filter elements may be used as vehicles for adding flavor to the mainstream smoke of those cigarettes. U.S. Pat. No. 6,761,174 to Jupe et al. proposes the placement of adsorbent and flavor-releasing materials in a cigarette filter. U.S. Pat. No. 6,584,979 to Xue et al. proposes the placement of fibers containing small particle size adsorbents/absorbents in the filter. U.S. Pat. No. 4,941,486 to Dube et al. and U.S. Pat. No. 4,862,905 to Green, Jr. et al. propose manners and methods for the placement of a flavor-containing pellet in each cigarette filter. Other representative types of cigarettes incorporating flavorants at or near the mouth end are set forth in U.S. Pat. No. 3,972,335 to Tiggelbeck et al.; U.S. Pat. No. 4,082,098 to Owens, Jr.; U.S. Pat. No. 4,281,671 to Byrne; U.S. Pat. No. 4,643,205 to Redding et al.; U.S. Pat. No. 4,677,995 to Kallianos et al.; U.S. Pat. No. 4,715,390 to Nichols et al.; U.S. Pat. No. 4,729,391 to Woods et al.; U.S. Pat. No. 4,768,526 to Pryor; U.S. Pat. No. 5,012,829 to Thesing et al.; U.S. Pat. No. 5,387,285 to Rivers; and U.S. Pat. No. 7,074,170 to Lanier, Jr. et al.; each of which is incorporated herein by reference. See, also, the types of cigarette filter technologies that are discussed in the background art section set forth in U.S. Pat. Application Publication No. 2004/0261807 to Dube et al.; which is incorporated herein by reference. In addition, tipping paper products are available that include a humidity-activated flavor- or aroma-releasing material from, for example, Tannpapier (Austria).

[0005] It would be highly desirable to provide a smoker with the ability to enhance his/her smoking experience, such as can be accomplished by providing a filtered cigarette including a filter element end having particular design features. That is, it would be desirable to provide a cigarette including filter end components that are employed in a manner such that the visual appearance of the cigarette is aesthetically pleasing. It also would be desirable to provide a cigarette including selected design features that can be modified or otherwise controlled. In addition, it would be desirable to provide a filter element for a cigarette that is capable of enhancing the sensory attributes of the cigarette during use.

### SUMMARY OF THE INVENTION

[0006] The present invention relates to filtered cigarettes. A representative cigarette includes a smokable rod and a filter element. The smokable rod, which contains filler material (e.g., tobacco cut filler) intended to be burned to yield drawn mainstream tobacco smoke, is connected or otherwise secured to the filter element using tipping material. The cigarette may include one or more than one layer of tipping material. For example, the cigarette can include an outer layer of tipping material that overlies at least a portion of an underlying inner layer of tipping material, and during use by the person desiring to smoke the cigarette, the outer layer can be removed therefrom. Thus, it is possible for a cigarette manufacturer to provide a single cigarette that can be used by the smoker as provided, or that can easily be adapted by the smoker to provide a different sensory experience (e.g., wherein the visual, organoleptic, trigeminal, aromatic and tactile characteristics of the cigarette can be altered by removal of the outer tipping material). Alternatively, an outer layer of tipping material (e.g., a second layer of tipping material) may be used to further improve the physical integrity of the cigarette. In yet another regard, outer tipping material

including printed indicia (e.g., information printed on the inner surface of a removable outer layer of tipping material) can be used for marketing purposes (e.g., to identify each individual cigarette for purposes of promotional or advertising campaigns, or to identify cigarettes for purposes of discouraging counterfeiting).

**[0007]** In one aspect, a filtered cigarette of the present invention may include a distal end portion comprising a tobacco rod and a proximal end portion comprising a filter element having a distal filter end and a proximal mouth end. The smokable rod is secured to the distal filter end by a tipping material that substantially covers the outer surface of the filter element along its longitudinal circumference and that covers the smokable rod along a proximal portion of its circumference adjacent to the filter element. The tipping material includes at least one nonperforated diffuse region, the diffuse region comprising a diffusivity of at least about 1.5 cm/sec; and wherein the tipping material also includes at least one flavorant applied thereto in a pattern that covers less than an entire surface of the tipping material, where the flavorant provides a sensory characteristic selected from organoleptic sensation, taste sensation, aroma sensation, trigeminal nerve stimulation sensation, and any combination thereof.

**[0008]** In another aspect, a filtered cigarette of the present invention may include a smokable rod and a filter element having a distal filter end and a proximal mouth end, where the smokable rod is secured to the distal filter end by a first tipping material that substantially circumscribes the filter element along its longitudinal periphery and that substantially circumscribes the smokable rod along a proximal portion of its longitudinal periphery adjacent to the filter element. The tipping material includes at least one flavorant applied thereto in a pattern that covers less than an entire surface of the tipping material and providing a sensory characteristic selected from organoleptic sensation, taste sensation, aroma sensation, trigeminal nerve stimulation sensation, and any combination thereof.

**[0009]** In yet another aspect, the a filtered cigarette of the invention may include a smokable rod and a filter element having a mouth end terminus, the smokable rod and filter element being secured to one another by a first tipping material that circumscribes the filter element along its longitudinal periphery and the smokable rod along a portion of its longitudinal periphery in a region thereof adjacent to the filter element, the cigarette further comprising a second tipping material overlying at least a portion of first tipping material.

**[0010]** The two tipping materials can be substantially identical in overall dimension, or the second tipping material can extend further along the longitudinal periphery of the smokable rod than the first tipping material, or the first tipping material can extend further along the longitudinal periphery of the smokable rod than the second tipping material. Each of the first and second tipping materials can include a series of air dilution perforations, or only the inner tipping material can include such perforations.

**[0011]** In certain embodiments, all or at least a portion of the second tipping material is removable from the cigarette. In certain applications, the visual appearance, tactile characteristics, or other properties of the two tipping materials can differ such that removal of the second tipping material exposes the smoker to a different property, such as a different flavor or aroma, a different visual appearance, or a different tactile characteristic.

**[0012]** The second tipping material can include, in certain embodiments, features such as printed indicia on its inner face, a perforated region adapted to facilitate removal of at least a portion of the second tipping material, a tab region adapted for grasping for removal of at least a portion of the second tipping material, or combinations thereof.

**[0013]** There are several ways in which the two tipping materials can be applied to the cigarette rod. For example, the first tipping material and the second tipping material can be formed from a single piece of tipping material wrapped around the filter element. Alternatively, the two tipping materials can be preformed as a tipping material laminate prior to application to the cigarette rod. For example, the tipping material laminate can comprise a first layer of tipping material having a first edge and a second edge and a second layer of tipping material, wherein the first layer and the second layer are offset such that, when wrapped around a rod-shaped object, the first edge of the first layer of tipping material can overlie the second edge of the first layer of tipping material. The first edge of the first layer of tipping material can be coextensive with a first edge of the second layer of tipping material. Alternatively, a first edge of the second layer of tipping material can extend beyond the first edge of the first layer of tipping material, thereby forming a tab region of the second layer of tipping material.

**[0014]** In a further embodiment, the second tipping material comprises a first region proximal to the smokable rod, a second region remote from the smokable rod, and a perforated region therebetween, wherein one of the first and second regions is securely affixed to the first tipping material and the other of the first and second regions is configured to slidably engage the filter element upon perforation of the perforated region. The first region can be configured to slidably engage the filter element and the smokable rod and, for example, can include a flavorant adapted to alter the sensory characteristics of the cigarette before, during, or after smoking. In other embodiments, the first region is formed of a non-combustible material and is configured to extinguish the cigarette when slidably engaged with the smokable rod. Alternatively, the second region is configured to slidably engage the filter element and extend beyond the mouth end terminus of the filter element.

**[0015]** In yet another aspect, a filtered cigarette of the invention may include a smokable rod and a filter element having a distal filter end and a proximal mouth end, where the smokable rod is secured to the distal filter end by a first tipping material that substantially circumscribes the filter element along its longitudinal periphery and circumscribes the smokable rod along a proximal portion of its longitudinal periphery adjacent to the filter element. The tipping material includes at least one nonperforated diffuse region, the diffuse region comprising a diffusivity of at least about 1 cm/sec. And, in still another aspect, a filtered cigarette of the invention includes a distal end and a proximal end with a smokable rod and a filter element, which has a distal filter end and a proximal mouth end. The smokable rod is secured to the distal filter end by a first tipping material that substantially circumscribes the filter element along its longitudinal periphery and circumscribes the smokable rod along a proximal portion of its longitudinal periphery adjacent to the filter element, wherein substantially the entire tipping material includes a nonperforated diffuse region, the diffuse region including a diffusivity of at least about 1 cm/sec.

## BRIEF DESCRIPTION OF THE DRAWINGS

[0016] In order to assist the understanding of embodiments of the invention, reference will now be made to the appended drawings, which are not necessarily drawn to scale and in which like reference numerals refer to like elements. The drawings are exemplary only, and should not be construed as limiting the invention. For the various figures, in order to clearly shown the configurations of the various wrapping materials, the thicknesses of those wrapping materials of the various filtered cigarettes are exaggerated. Most preferably, the wrapping materials are tightly wrapped around the filtered cigarettes to provide a tight or snug fit, to provide a cigarette having acceptable physical integrity, and to provide an aesthetically pleasing appearance.

[0017] FIG. 1 is a cross-sectional view of one embodiment of a filtered cigarette of the invention;

[0018] FIG. 2 is a cross-sectional view of one embodiment of a “two-up” filtered cigarette of the invention;

[0019] FIGS. 2A and 2B each show a perspective view of a cigarette embodiment from a “two-up” cigarette like that of FIG. 2;

[0020] FIGS. 3 through 5 are cross-sectional views of further selected embodiments of filtered cigarettes of the invention;

[0021] FIGS. 6 and 7 are end views, viewed from the mouth end, of selected embodiments of filtered cigarettes of the invention;

[0022] FIGS. 8 and 9 are side views of selected embodiments of laminated tipping materials that are useful for the manufacture of cigarettes of the invention;

[0023] FIG. 10 is an end view, viewed from the mouth end, of one embodiment of a filtered cigarette of the invention;

[0024] FIG. 11 is a view of tipping material useful for the manufacture of a cigarette of the generally type set forth in FIG. 10; and

[0025] FIG. 12 is a cigarette embodiment with a single layer of tipping material.

## DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0026] The present inventions now will be described more fully hereinafter with reference to the accompanying drawing. The invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout. As used in this specification and the claims, the singular forms “a,” “an,” and “the” include plural referents unless the context clearly dictates otherwise. Although preferred embodiments of the invention include two layers of tipping material, the invention also encompasses embodiments wherein three or more layers of tipping material are applied to the cigarette.

[0027] Referring to FIG. 1, there are shown components of a smoking article 174 in the form of a filtered cigarette. The cigarette 174 includes a generally cylindrical rod 186 of a charge or roll of smokable filler material 188 contained in a circumscribing wrapping material 190 of the present invention. The rod 186 is conventionally referred to as a “smokable rod” or “tobacco rod”. The ends of the tobacco rod are open to expose the smokable filler material. At one end of the tobacco rod 186 is the lighting end 195, and at the other end is shown a filter element 200. The cigarette 174 normally includes a

filter element 200 or other suitable mouthpiece positioned adjacent one end of the tobacco rod 186 such that the filter element and tobacco rod are axially aligned in an end-to-end relationship, preferably abutting one another. Filter element 200 has a generally cylindrical shape, and the diameter thereof is essentially equal to the diameter of the tobacco rod. The ends of the filter element are open to permit the passage of air and smoke therethrough. The filter element 200 includes filter material 205 (e.g., plasticized cellulose acetate tow) that is overwrapped along the longitudinally extending surface thereof with circumscribing plug wrap material 206. The filter element 200 can comprise two or more filter segments (not shown), and/or flavor additives incorporated therein.

[0028] The filter element 200 is attached to the tobacco rod 186 by a first tipping material 208 which circumscribes both the entire length of the filter element and an adjacent region of the tobacco rod. The inner surface of the first tipping material 208 is fixedly secured to the outer surface of the plug wrap 206 and the outer surface of the wrapping material 190 of the tobacco rod, using a suitable adhesive (e.g., a water-based adhesive of the type traditionally employed by cigarette manufacturers for application of tipping paper during filtered cigarette manufacture). That is, the first tipping material extends around the longitudinally extending periphery of substantially the entire length of the plug wrap, and a portion of the longitudinally extending periphery of the wrapping material of the tobacco rod in a region of the tobacco rod immediately adjacent to the filter element. A ventilated or air-diluted smoking article may be provided with an air dilution means, such as a plurality or series of perforations 210, each of which extend through the tipping material 208 and plug wrap 206. Most preferably, adhesive is applied to a longitudinally extending seam line or lap zone (not shown) of the first tipping material, such as is conventionally employed during cigarette manufacture.

[0029] Typical wrapping material base sheets suitable for use as the circumscribing wrappers of tobacco rods for cigarettes have inherent porosities that can vary. Typical base sheets have inherent porosities that are at least about 5 CORESTA units, usually are at least about 10 CORESTA units, often are at least about 15 CORESTA units, and frequently are at least about 20 CORESTA units. Typical base sheets have inherent porosities that are less than about 200 CORESTA units, usually are less than about 150 CORESTA units, often are less than about 85 CORESTA units, and frequently are less than about 70 CORESTA units. A CORESTA unit is a measure of the linear air velocity that passes through a 1 cm<sup>2</sup> area of wrapping material at a constant pressure of 1 cent bar. See, CORESTA Publication ISO/TC0126/SC 1 N159E (1986). The term “inherent porosity” refers to the porosity of that wrapping material itself to the flow of air. A particularly preferred paper wrapping material base sheet is composed of wood pulp and calcium carbonate, and exhibits an inherent porosity of about 20 to about 50 CORESTA units.

[0030] Typical paper wrapping material base sheets suitable for use as the circumscribing wrappers of tobacco rods for cigarettes incorporate at least one type of fibrous material, and can incorporate at least one filler material, in amounts that can vary. Typical base sheets include about 55 to about 100, often about 65 to about 95, and frequently about 70 to about 90 percent fibrous material (which most preferably is a cellulosic material); and about 0 to about 45, often about 5 to

about 35, and frequently about 10 to about 30 percent filler material (which most preferably is an inorganic material); based on the dry weight of that base sheet.

**[0031]** The wrapping material typically incorporates a fibrous material. The fibrous material can vary. Most preferably, the fibrous material is a cellulosic material, and the cellulosic material can be a lignocellulosic material. Exemplary cellulosic materials include flax fibers, hardwood pulp, softwood pulp, hemp fibers, esparto fibers, kenaf fibers, jute fibers and sisal fibers. Mixtures of two or more types of cellulosic materials can be employed. For example, wrapping materials can incorporate mixtures of flax fibers and wood pulp. The fibers can be bleached or unbleached. Other fibrous materials that can be incorporated within wrapping materials include microfibers materials and fibrous synthetic cellulosic materials. See, for example, U.S. Pat. No. 4,779,631 to Durocher and U.S. Pat. No. 5,849,153 to Ishino. Representative fibrous materials, and methods for making wrapping materials therefrom, are set forth in U.S. Pat. No. 2,754,207 to Schur et al.; and U.S. Pat. No. 5,474,095 to Allen et al.; and PCT WO 01/48318.

**[0032]** The wrapping material normally incorporates a filler material. Preferably, the filler material has the form of essentially water insoluble particles. Additionally, the filler material normally incorporates inorganic components. Filler materials incorporating calcium salts are particularly preferred. One exemplary filler material has the form of calcium carbonate, and the calcium carbonate most preferably is used in particulate form. See, for example, U.S. Pat. No. 4,805,644 to Hampf; U.S. Pat. No. 5,161,551 to Sanders; and U.S. Pat. No. 5,263,500 to Baldwin et al.; and PCT WO 01/48,316. Other filler materials include agglomerated calcium carbonate particles, calcium tartrate particles, magnesium oxide particles, magnesium hydroxide gels; magnesium carbonate-type materials, clays, diatomaceous earth materials, titanium dioxide particles, gamma alumina materials and calcium sulfate particles. See, for example, U.S. Pat. No. 3,049,449 to Allegrini; U.S. Pat. No. 4,108,151 to Martin; U.S. Pat. No. 4,231,377 to Cline; U.S. Pat. No. 4,450,847 to Owens; U.S. Pat. No. 4,779,631 to Durocher; U.S. Pat. No. 4,915,118 to Kaufman; U.S. Pat. No. 5,092,306 to Bokelman; U.S. Pat. No. 5,109,876 to Hayden; U.S. Pat. No. 5,699,811 to Paine; U.S. Pat. No. 5,927,288 to Bensalem; U.S. Pat. No. 5,979,461 to Bensalem; and U.S. Pat. No. 6,138,684 to Yamazaki; and European Pat. App No 357,359. Certain filler-type materials that can be incorporated into the wrapping materials can have fibrous forms. For example, components of the filler material can include materials such as glass fibers, ceramic fibers, carbon fibers and calcium sulfate fibers. See, for example, U.S. Pat. No. 2,998,012 to Lamm; U.S. Pat. No. 4,433,679 to Cline; and U.S. Pat. No. 5,103,844 to Hayden et al.; PCT WO 01/41590; and European Pat. Application 1,084,629. Mixtures of filler materials can be used. For example, filler material compositions can incorporate mixtures of calcium carbonate particles and precipitated magnesium hydroxide gel, mixtures of calcium carbonate particles and calcium sulfate fibers, or mixtures of calcium carbonate particles and magnesium carbonate particles.

**[0033]** There are various ways by which the various additive components can be added to, or otherwise incorporated into, the base sheet. Certain additives can be incorporated into the wrapping material as part of the paper manufacturing process associated with the production of that wrapping material. Alternatively, additives can be incorporated into the

wrapping material using size press techniques, spraying techniques, printing techniques, or the like. Such techniques, known as "off-line" techniques, are used to apply additives to wrapping materials after those wrapping materials have been manufactured. Various additives can be added to, or otherwise incorporated into, the wrapping material simultaneously or at different stages during or after the paper manufacturing process. Each of these and other embodiments of cigarettes of the present invention most preferably include an aesthetically-pleasing experience and present desirable visual, olfactory, taste, and tactile sensations for a smoker.

**[0034]** The base sheets can be treated further, and those base sheets can be treated so as to impart a change to the overall physical characteristics thereof and/or so as to introduce a change in the overall chemical compositions thereof. For example, the base sheet can be electrostatically perforated. See, for example, U.S. Pat. No. 4,924,888 to Perfetti et al. The base sheet also can be embossed, for example, in order to provide texture to major surface thereof. Additives can be incorporated into the wrapping material for a variety of reasons. Representative additives and methods for incorporating those additives to wrapping materials are set forth in U.S. Pat. No. 5,220,930 to Gentry, which is incorporated herein by reference. See, also, U.S. Pat. No. 5,168,884 to Baldwin et al.

**[0035]** Certain components, such as alkali metal salts, can act a burn control additives. Representative salts include alkali metal succinates, citrates, acetates, malates, carbonates, chlorides, tartrates, propionates, nitrates and glycolates; including sodium succinate, potassium succinate, sodium citrate, potassium citrate, sodium acetate, potassium acetate, sodium malate, potassium malate, sodium carbonate, potassium carbonate, sodium chloride, potassium chloride, sodium tartrate, potassium tartrate, sodium propionate, potassium propionate, sodium nitrate, potassium nitrate, sodium glycolate and potassium glycolate; and other salts such as monoammonium phosphate. See, for example, U.S. Pat. No. 2,580,568 to Matthews; U.S. Pat. No. 4,461,311 to Matthews; U.S. Pat. No. 4,622,983 to Matthews; U.S. Pat. No. 4,941,485 to Perfetti et al.; U.S. Pat. No. 4,998,541 to Perfetti et al.; and PCT WO 01/08514. Certain components, such as metal citrates, can act as ash conditioners or ash sealers. See, for example, European Pat. App. No. 1,084,630. Other representative components include organic and inorganic acids, such as malic, levulinic, boric and lactic acids. See, for example, U.S. Pat. No. 4,230,131 to Simon. Other representative components include catalytic materials. See, for example, U.S. Pat. No. 2,755,207 to Frankenburg.

**[0036]** Typically, the amount of chemical additive does not exceed about 3 percent, often does not exceed about 2 percent, and usually does not exceed about 1 percent, based on the dry weight of the wrapping material to which the chemical additive is applied. For certain wrapping materials, the amount of certain additive salts, such as burn chemicals such as potassium citrate and monoammonium phosphate, preferably are in the range of about 0.5 to about 0.8 percent, based on the dry weight of the wrapping material to which those additive salts are applied. Relatively high levels of additive salts can be used on certain types of wrapping materials printed with printed regions that are very effective at causing extinction of cigarettes manufactured from those wrapping materials. Exemplary flax-containing cigarette paper wrapping materials having relatively high levels of chemical additives have been available as Grade Names 512, 525, 527, 540, 605 and 664 from Schweitzer-Mauduit International. Exem-

ply wood pulp-containing cigarette paper wrapping materials having relatively high levels of chemical additives have been available as Grade Names 406 and 419 from Schweitzer-Mauduit International. Porosity and diffusivity are among the properties that may be controlled by these means, as well as by printing or other application of films, film-forming materials, inks, pigments, other materials, or any combination thereof. Tipping materials can similarly be constructed and treated. For example, specific porosity of a tipping material and plug wrap combination may be modified by constructing and treating the materials forming them. See, e.g., U.S. Pat. No. 5,394,895 to Muramatsu, et al. and U.S. Pat. No. 5,830,318 to Snow, et al.

**[0037]** Flavoring agents and/or flavor and aroma precursors (e.g., vanillin glucoside and/or ethyl vanillin glucoside) also can be incorporated into the paper wrapping material. See, for example, U.S. Pat. No. 4,804,002 to Herron; and U.S. Pat. No. 4,941,486 to Dube et al. Flavoring agents also can be printed onto cigarette papers. See, for example, the types of flavoring agents used in cigarette manufacture that are set forth in Gutcho, Tobacco Flavoring Substances and Methods, Noyes Data Corp. (1972) and Leffingwell et al., Tobacco Flavoring for Smoking Products (1972). Films can be applied to the paper. See, for example, U.S. Pat. No. 4,889,145 to Adams; U.S. Pat. No. 5,060,675 to Milford et al., and PCT WO 02/43513 and PCT WO 02/055294. Catalytic materials can be incorporated into the paper. See, for example, PCT WO 02/435134.

**[0038]** In conventional cigarettes, adhesive is provided between substantially the entire underside surface of the inner tipping material **208** and the plug wrap **206** (or directly to the exterior of a filter in cigarettes that do not include a plug wrap) on a proximal mouth-end portion and the wrapping material **190** on a distal portion (each relative to the tipping material). However, in the embodiment of FIG. 1, the adhesive preferably is applied only to specified regions. For example, the adhesive may be applied as a proximal band **187** and a distal band **189**. In the embodiment of FIG. 1, the tipping material preferably is a diffuse tipping material. In diffuse tipping material embodiments, the diffusivity of tipping material will most preferably be similar to that of standard cigarette wrapping material such as, for example, the material **190** (e.g., diffusivity of about 2 cm/sec, or a base porosity of about 15 to about 80 CORESTA) or similar materials of the type commonly used around a tobacco charge in a cigarette. Preferred embodiments will have a single layer of diffuse tipping material and porous or no plug wrap. Diffuse tipping material will be greater than 0 CORESTA and less than 100 CORESTA, with a preferred range between about 5 to about 80 CORESTA, and a diffusivity of at least about 1 cm/sec, preferably at least about 1.5 cm/sec. These diffusivity measures preferably apply to tipping material including any printed formulations (e.g., lip release, adhesive, etc.). Diffusivity may be measured using techniques such as, for example, those disclosed in U.S. Pat. App. Pub. 2005/0087202 to Norman et al., which is incorporated herein by reference. This differs significantly from typical tipping materials, which may provide little or no diffusivity (e.g., about 0 cm/sec, commonly less than about 1 cm/sec, or a base porosity of less than about 10 CORESTA). However, other highly porous, highly porous tipping materials are also known (e.g., 300-1200 CORESTA, see U.S. Pat. No. 5,394,895 to Muramatsu, et al.), including some that are highly-perforated by, for example, a laser.

**[0039]** The diffuse tipping material **208** may include one or more perforations (e.g., a laser perforation **210**). In preferred embodiments, air flow through the longitudinal circumferential surface area of the diffuse tipping material **208** between (and/or through) adhesive bands **187**, **189** provides desirable characteristics to mainstream aerosol for a smoker. For example, the mainstream aerosol at the mouth end may, under FTC smoking conditions, provide for lower "tar" and CO content and a lower CO/tar ratio as compared with a cigarette otherwise identical, but made with a conventional low/no-diffusivity tipping material. This effect, along with flavor intensity of mainstream aerosol may be varied by changing the dilution percentage of the cigarette filter **200** by, for example, laser perforations thereof.

**[0040]** For cigarette embodiments including diffuse tipping material, the tipping material may be selected from a number of paper or paper-like materials. In one example, a typical wrapping material of the type commonly used to contain a tobacco charge may be used. Such a wrapping material will most preferably include a desirable diffusivity (e.g., sometimes greater than 1 cm/sec, preferably greater than about 1.5 cm/sec, often about 1 to about 3 cm/sec, and frequently about 2 cm/sec). Preferably, to be used as a tipping material, a paper or paper-like product will be configured to include some features not typically present in a tobacco wrapping material. For example, cellulose or polymer fibers (e.g., plastics) may be incorporated during manufacture and/or applied to one or both surfaces to enhance its structural integrity by providing, for example, columnar strength, resistance to moisture (e.g., from the mouth of a smoker), and desirable lip-release traits. (In the cigarette art, the term "lip-release" refers to materials configured to promote easy release of contact between human lips and the tipping-material-covered filter section of a cigarette without substantial sticking, and the lip-release material referred to herein may include any standard lip-release formulations currently known and/or practiced in the art, or developed in the future).

**[0041]** The diffuse tipping material may be formed as a weave, mesh, paper, membrane, and/or other appropriate structure providing the desired diffusivity. Its thickness and density may be determined during manufacture or altered thereafter to provide desired diffusivity, and a lower mass is generally preferred. Treatment of the diffuse tipping material with, or inclusion therein of, fibers, films, coatings, or other means for providing desired traits may be localized to particular regions of the tipping material. For example, lip-release and/or moisture-resistance may be provided only on a proximal-most mouth end portion. As another example, fibers or other means providing or promoting columnar strength may be provided primarily or only in a region of the tipping paper that will span the junction of a filter portion with a tobacco rod. As one means for providing desirable lip-release, one or more film-forming materials such as, for example, nitrocellulose, may be applied to the tipping material or incorporated therein. Moisture resistant papers and paper materials, including those that may provide desirable columnar strength are known in the art, and may readily be used within or adapted for use within the scope of the present invention.

**[0042]** A mesh, a porous paper material other than a typical wrapping material, or another paper-like material (e.g., a polymer sheet) may be used to provide a diffuse tipping material. In addition to diffusivity, desirable traits will include that the diffuse tipping material should provide

acceptable “mouth feel” to a smoker (for at least that portion that will contact a smoker’s mouth) including lip-release. It should provide structural strength sufficient for holding the filter and smokable rod together during typical use (manufacturing, packaging, transport, lighting, and smoking). It should not degrade or develop an unpleasant taste or texture when in contact with a smoker’s mouth. And it should provide a neutral or positive flavor and contact sensation, if any, to the smoker. A mixture of organic and/or inorganic fibers and/or particles, formulated in any of many ways known in the paper-making and membrane-making arts may be used to form the diffuse tipping material.

[0043] Some or all of the tipping material may provide a desirable diffusivity that is greater than traditional tipping materials. In certain embodiments, the thickness and/or density of the tipping material may be varied to provide a desired diffusivity and/or flavor profile. For example, a very diffuse paper or mesh may be as thick as, or thicker than, a typical tipping material to provide desirable structural strength while also providing a desirable diffusivity.

[0044] The cigarette 174 may also include a second tipping material 250. The second tipping material 250 provides an outer layer that overlies and circumscribes the first tipping material 208. All or selected portions of the inner surface of the second tipping material 250 may fixedly be secured to the outer surface of the inner or first tipping material 208. As such, in preferred embodiments, the second tipping material 250 also overlies the entire length of the filter element and the adjacent region of the tobacco rod. For the embodiment shown in FIG. 3, both tipping materials extend essentially equal distances along the region of the tobacco rod that is adjacent the filter element. For certain preferred cigarettes, the first and second tipping materials each are substantially identical in overall dimension (e.g., those tipping materials have comparable thicknesses, widths, and lengths). In other embodiments, a ventilated or air-diluted smoking article may be provided with an air dilution means, such as a series of perforations 210, each of which extends through the outer tipping material 250, the inner tipping material 208, and the plug wrap 206.

[0045] Adhesive may be applied in to each of the tipping materials using techniques generally similar to those employed conventionally for tipping material application during cigarette manufacture. In such a manner, one or two layers of tipping material can be applied and secured using conventional adhesives, and the cigarette so provided may be used with one (of a single-layer or double-layer tipping) or both layers of tipping material attached thereto. However, adhesive can be applied to a longitudinally extending seam line or lap zone (not shown, see regions 600, 616 of FIG. 6) of a second tipping material 250 rather than its entire underside surface. In such a manner, a second tipping material 250 may be adapted and applied to the cigarette such that the second tipping material is purposefully removable from that cigarette. Thus, the resulting filtered cigarette of acceptable quality can be employed by leaving the second tipping material 250 intact. In another embodiment, a second tipping material 250 can be removed from the cigarette, while the first tipping material 208 provides an altered filtered cigarette that also is of acceptable quality and that preferably will provide a different, but desirable, flavor profile or other characteristic for a smoker.

[0046] In one embodiment, an outer (e.g., second) tipping material 250, which is not configured or treated so as to

provide for air dilution to the cigarette, or which is treated in such a manner such that the cigarette does not experience a high degree or level of air dilution, can be removed from the cigarette. For example, as shown in FIG. 5, a perforation 211 may extend only through the plug wrap 206 and the inner tipping material 208. As such, the underlying or first tipping material 208, which can be treated so as to provide for a relatively high level of dilution to the cigarette, can be exposed by removal of the overlying second tipping to allow for a higher level of air dilution. As such, the cigarette can be smoked with the second tipping material 250 intact, in order to provide for more flavorful mainstream smoke; or that second tipping material can be removed, in order to provide air diluted mainstream smoke that is less flavorful in character, but may also reduce the presence and/or relative amounts of tar and CO.

[0047] A representative manner or method for providing such a cigarette involves suitable modification of the equipment and methodologies employed by cigarette manufacturers to provide so-called “banded” cigarettes for consumer research purposes. That is, rather than applying a circumscribing band (e.g., a band of about 1 cm width) around the cigarette in the general region where the tobacco rod and filter element abut one another, a second tipping material is applied as a circumscribing band over the entire length of the filter element and a portion of the length of the tobacco rod in a region of the tobacco rod adjacent to the filter element. As such, there are provided filtered cigarettes including one or two layers of tipping material that are positioned, applied and aligned in a predetermined, desired fashion, meaning that the position and alignment of each layer of tipping material is predetermined by the manufacturer. Such equipment is particularly suitable for applying two appropriately aligned layers of tipping material to a cigarette, neither of which layer of tipping material is designed for the purpose of removal from the cigarette (e.g., because adhesive can be applied over substantially the whole inner surface of the outer tipping material for non-diffuse tipping materials, or for diffuse tipping materials where the adhesive is also configured to allow a desirable diffusivity). As such, the double-tipped cigarette of the invention can exhibit improved physical integrity. Alternatively, such equipment can be suitable for applying two appropriately aligned layers of tipping material to a cigarette, the outer layer of which is designed for the purpose of removal from the cigarette (e.g., by using a release coating type of adhesive that can be applied to a part of or substantially the entire inner surface of the outer tipping material, or to the outer surface of the inner tipping material).

[0048] Referring to FIG. 2, there is shown a representative “two-up” cigarette 400 that can be subdivided along hashed line 2A-2A in order to provide two filtered cigarettes 174, 409. In addition, representative manners or methods for providing preferred types of cigarettes are described with reference to FIG. 2. A “two-up” filter segment 417 is provided. That representative filter segment 417 includes filter material 205 circumscribed by plug wrap 206. Two tobacco rods 190, 428 are aligned at each end of the “two-up” filter segment. A first layer of tipping material 208 (e.g., a so-called “patch” of tipping material) is wrapped around the aligned components, such that the tipping material circumscribes the entire length of the “two-up” filter segment 417, and a portion of the length of each tobacco rod 190, 428 in the respective regions thereof adjacent the filter segment. Typically, that first layer of tipping material 208 circumscribes about 3 mm to about 4 mm of the

length of each tobacco rod. As such, a so called “two-up” cigarette **400** is provided. For certain preferred embodiments, the first layer of tipping material is selected from a type of tipping material, and is applied in a type of manner, each of which is comparable to that traditionally used for commercial filtered cigarette manufacture. Or, the tipping material **208** may be applied with one or more glue seams **187**. The seam(s) may be circumferentially (either partially or wholly, including being oriented transverse/perpendicular to the longitudinal axis and/or at an angle thereto), and/or may be longitudinally disposed.

[**0049**] FIG. 2A shows a cigarette **409** in a partial perspective view as having been cut along the line **2A-2A** from a two-up cigarette of the type shown in FIG. 2. However, the cigarette **409**, as shown, is provided with only a single layer of tipping material, or has had a second layer (e.g. tipping layer **250**) removed therefrom. As shown by broken lines and stippling, adhesive seams **187** are disposed longitudinally and circumferentially (both continuously and discontinuously) between the tipping material **208** and the plug wrap **206**. Specifically, the regions **187** delineated by broken lines and stippling show an adhesive that contacts the tipping material in a generally linear manner along a circumferential inner surface near each end and along a generally longitudinal inner surface. The tipping material may be a diffuse tipping material. Various methods for specific placement of continuous and discontinuous adhesive seams during manufacturing processes are commonly used, and new methods are forthcoming as well (see, e.g., U.S. patent application Ser. No. 12/101,529 to Pipes et al.). Although placement of adhesive in this manner may use adhesives that limit or diminish diffusivity in a region where applied, it will be appreciated that one or more “diffuse as applied” adhesives may be used on part or all of the inner surface of tipping material that do not significantly limit or diminish diffusivity of the tipping material in a region where applied. Such adhesives preferably provide a porous or otherwise diffuse surface allowing passage of air therethrough while simultaneously providing desirable adhesive traits. In some embodiments, the combined diffusivity of the tipping material and adhesive may be greater than 1 cm/sec, preferably greater than about 1.5 cm/sec, often about 1 to about 3 cm/sec, and frequently about 2 cm/sec.

[**0050**] That cigarette can be air diluted (e.g., using laser perforation techniques) by applying at least one circumscribing ring of perforations **210**, **455** though the first layer of tipping material **208** and underlying plug wrap **206**. Then, the “two-up” cigarette so provided can be transferred to a second tipping assembly. There, a second layer of tipping material **250** (e.g., a second “patch” of tipping material) is wrapped around the “two-up” cigarette **400**, such that the second layer of tipping material overlies the first layer of tipping material **208**. That cigarette may be air diluted (e.g., using laser perforation techniques) by applying at least one circumscribing ring of perforations **210**, **455** though the second layer of tipping material **250**, first layer tipping material **208** and underlying plug wrap **206**. Thus, for the embodiment shown, air dilution perforations can be absent, provided through both layers of tipping materials, or provided through only the first layer of tipping material. Then, the “two-up” combined segment including two layers of tipping material is cut in half, perpendicular to its longitudinal axis, to provide two finished cigarettes **174**, **409**. As such, the two finished cigarettes **174**, **409** are both characterized by a smooth mouth end, wherein the mouth end terminus of the filter material **205**, plug wrap

**206**, and tipping materials **208**, **250** are all in the same plane. If desired, the two types of “patches” used for tipping materials **208**, **250** can be substantially identical to one another (e.g., in terms of overall visual appearance, width, length, thickness, physical properties and/or composition). As such, there are provided filtered cigarettes including two layers of tipping material that are positioned, applied and aligned in a pre-determined, desired fashion.

[**0051**] Preparation of a double tipped “two-up” cigarette in the foregoing fashion is particularly suitable for applying two appropriately aligned layers of tipping material to a cigarette, neither of which layer of tipping material is designed for the purpose of being, or intended to be, removed from the cigarette (e.g., because adhesive can be applied over substantially the whole inner surface of the outer tipping material). Alternatively, such a methodology can be suitable for applying two appropriately aligned layers tipping material to a cigarette, an outer layer of which (if present) is configured to be easily removable from the cigarette (e.g., by using a release coating type of adhesive that can be applied over substantially the whole inner surface of the outer tipping material, or the outer surface of the inner tipping material).

[**0052**] If desired, the inner and/or outer tipping material can be applied so as to include adhesive on only selected regions thereof, such as can be carried out using so-called “skip gap” types of tipping adhesive application techniques. As such, adhesive can be registered at one or more desired locations on each tipping patch. For an outer patch of a multi-layer tipping, sufficient adhesive can be applied so as to provide for a longitudinally extending strip to tack to the underlying region of the cigarette (e.g., to the first layer of tipping material) as well as a longitudinally extending strip to tack onto itself (e.g., to allow the folded over outer layer of tipping material to form a type of seam). When “skip gap” types of adhesive application are employed, adhesive application may be absent at either or both ends of the adhesive strip on the region of the tipping patch that provides the outer seam of the outer tipping material; and as such, either or both longitudinal end of the outer tipping material can be provided with a type of tab that can be used to grasp the outer tipping material for the purpose of tearing that tipping material away from the remainder of the cigarette. Such tabs may commonly have widths that are at least comparable to that of the seam line, and lengths of about 2 mm to about 5 mm.

[**0053**] Preparation of a double tipped “two-up” cigarette also can be carried out using a single “patch” of tipping material. In such a manner, a tipping “patch” having an extended length (e.g., at least sufficient in length to allow for that “patch” to be wrapped twice around the relevant region of the “two-up” cigarette) can be employed. For example, the “patch” of tipping material can be wrapped around the “two-up” cigarette to form an inner tipping portion or layer that extends around that “two-up” cigarette. This may be used to produce cigarettes with single-layer tipping material. Or, the “two-up” cigarette can be turned a second time in order that it can be wrapped with the remaining length of the “patch” and thereby provide an outer tipping portion or layer. In one embodiment, adhesive can be applied to the entire inner surface of the elongated “patch.” In another embodiment, adhesive can be applied to the entire inner surface of the “patch” that forms the inner (or only) tipping layer, and “skip gap” techniques can be employed such that only a strip of adhesive (e.g., so as to provide a seam) is applied to the portion of that “patch” that forms the outer tipping layer. Or, “skip gap” or

other techniques as described herein, as known in the art, and/or as may yet be developed, may be used during application of the inner (or only) tipping material layer.

**[0054]** Alternative representative manners or methods for providing certain preferred types of cigarettes also are described with reference to FIG. 2. A “two-up” filter segment **417** including filter material **205** circumscribed by plug wrap **206** is provided. Two tobacco rods **190**, **428** are aligned at each end of the “two-up” filter segment. A first layer of tipping material **208** and an outer second layer of tipping material **250** are provided as a double layer of tipping material (e.g., as a laminate). That laminated layer of first and second layers of tipping material **208**, **250** is wrapped around the aligned components, such that the laminated layer of those two tipping materials circumscribes the entire length of the “two-up” filter segment **417**, and a portion of the length of each tobacco rod **190**, **428** in the respective regions thereof adjacent the filter segment. As such, the so called “two-up” cigarette **400** is provided. That cigarette may be air diluted (e.g., using laser perforation techniques) by applying at least one circumscribing ring of perforations **210**, **455** though the second or outer layer of tipping material **250**, the first layer or inner layer of tipping material **208**, and underlying plug wrap **206**. Then, the “two-up” combined segment including two layers of tipping material is cut in half perpendicular to its longitudinal axis to provide two finished cigarettes **174**, **409**. As such, there are provided filtered cigarettes including two layers of tipping material that are positioned, applied and aligned in a pre-determined, desired fashion.

**[0055]** Cigarette rods typically are manufactured using a cigarette making machine, such as a conventional automated cigarette rod making machine. Exemplary cigarette rod making machines are of the type commercially available from Molins PLC or Hauni-Werke Korber & Co. KG. For example, cigarette rod making machines of the type known as MkX (commercially available from Molins PLC) or PROTOS (commercially available from Hauni-Werke Korber & Co. KG) can be employed. A description of a PROTOS cigarette making machine is provided in U.S. Pat. No. 4,474,190 to Brand, at col. 5, line 48 through col. 8, line 3, which is incorporated herein by reference. Types of equipment suitable for the manufacture of cigarettes also are set forth in U.S. Pat. No. 4,781,203 to La Hue; U.S. Pat. No. 4,844,100 to Holznagel; U.S. Pat. No. 5,131,416 to Gentry; U.S. Pat. No. 5,156,169 to Holmes et al.; U.S. Pat. No. 5,191,906 to Myracle, Jr. et al.; U.S. Pat. No. 6,647,870 to Blau et al.; U.S. Pat. No. 6,848,449 to Kitao et al.; and U.S. Pat. No. 6,904,917 to Kitao et al.; U.S. Pat. No. 7,210,486 to Hartman; U.S. Pat. No. 7,275,548 to Hancock et al.; U.S. Pat. No. 7,281,540 to Barnes et al.; and U.S. Pat. No. 7,234,471 to Fitzgerald et al.; each of which is incorporated herein by reference.

**[0056]** A variety of components and operation of conventional automated cigarette making machines are commonly used. For example, descriptions of the components and operation of several types of chimneys, tobacco filler supply equipment, suction conveyor systems and garniture systems are set forth in U.S. Pat. No. 3,288,147 to Molins et al.; U.S. Pat. No. 3,915,176 to Heitmann et al.; U.S. Pat. No. 4,291,713 to Frank; U.S. Pat. No. 4,574,816 to Rudszinat; U.S. Pat. No. 4,736,754 to Heitmann et al. U.S. Pat. No. 4,878,506 to Pinck et al.; U.S. Pat. No. 5,060,665 to Heitmann; U.S. Pat. No. 5,012,823 to Keritsis et al. and U.S. Pat. No. 6,360,751 to Fagg et al.; and U.S. Pat. App. Pub. No. 2003/0136419 to Muller; each of which is incorporated herein by reference.

The automated cigarette making machines of the type set forth herein provide a formed continuous cigarette rod or smokable rod that can be subdivided into formed smokable rods of desired lengths.

**[0057]** Various types of cigarette components, including tobacco types, tobacco blends, top dressing and casing materials, blend packing densities and types of paper wrapping materials for tobacco rods, can be employed. See, for example, the various representative types of cigarette components, as well as the various cigarette designs, formats, configurations and characteristics, that are set forth in Johnson, Development of Cigarette Components to Meet Industry Needs, 52<sup>nd</sup> T.S.R.C. (September, 1998); U.S. Pat. No. 5,101,839 to Jakob et al.; U.S. Pat. No. 5,159,944 to Arzonico et al.; U.S. Pat. No. 5,220,930 to Gentry; U.S. Pat. No. 6,779,530 to Kraker; U.S. Pat. No. 7,237,559 to Ashcraft et al.; U.S. Pat. App. Nos. 2005/0066986 to Nestor et al.; 2006/0272655 to Thomas et al. and 2007/0246055 to Oglesby; each of which is incorporated herein by reference. Most preferably, the entire smokable rod is composed of smokable material (e.g., tobacco cut filler) and a layer of circumscribing outer wrapping material.

**[0058]** Components for filter elements for filtered cigarettes typically are provided from filter rods that are produced using traditional types of rod-forming units, such as those available as KDF-2 and KDF-3E from Hauni-Werke Korber & Co. KG. Typically, filter material, such as filter tow, is provided using a tow processing unit. An exemplary tow processing unit has been commercially available as E-60 supplied by Arjay Equipment Corp., Winston-Salem, N.C. Other exemplary tow processing units have been commercially available as AF-2, AF-3, and AF-4 from Hauni-Werke Korber & Co. KG. In addition, representative manners and methods for operating a filter material supply units and filter-making units are set forth in U.S. Pat. No. 4,281,671 to Byrne; U.S. Pat. No. 4,862,905 to Green, Jr. et al.; U.S. Pat. No. 5,060,664 to Siems et al.; U.S. Pat. No. 5,387,285 to Rivers; and U.S. Pat. No. 7,074,170 to Lanier, Jr. et al. Other types of technologies for supplying filter materials to a filter rod-forming unit are set forth in U.S. Pat. No. 4,807,809 to Pryor et al. and U.S. Pat. No. 5,025,814 to Raker; which are incorporated herein by reference.

**[0059]** The filter material can vary, and can be any material of the type that can be employed for providing a tobacco smoke filter for cigarettes. Preferably a traditional cigarette filter material is used, such as cellulose acetate tow, gathered cellulose acetate web, polypropylene tow, gathered cellulose acetate web, gathered paper, strands of reconstituted tobacco, or the like. Especially preferred is filamentary tow such as cellulose acetate, polyolefins such as polypropylene, or the like. One filter material that can provide a suitable filter rod is cellulose acetate tow having 3 denier per filament and 40,000 total denier. As another example, cellulose acetate tow having 3 denier per filament and 35,000 total denier can provide a suitable filter rod. As another example, cellulose acetate tow having 8 denier per filament and 40,000 total denier can provide a suitable filter rod. For further examples, see the types of filter materials set forth in U.S. Pat. No. 3,424,172 to Neurath; U.S. Pat. No. 4,811,745 to Cohen et al.; U.S. Pat. No. 4,925,602 to Hill et al.; U.S. Pat. No. 5,225,277 to Takegawa et al. and U.S. Pat. No. 5,271,419 to Arzonico et al.; each of which is incorporated herein by reference.

**[0060]** Normally a plasticizer such as triacetin is applied to the filamentary tow in traditional amounts using known tech-

niques. Other suitable materials or additives commonly used in connection with the construction of the filter element may also be used within the scope of the present invention. See, for example, U.S. Pat. No. 5,387,285 to Rivers.

**[0061]** The plug wrap can vary. See, for example, U.S. Pat. No. 4,174,719 to Martin. The plug wrap may be a porous or non-porous paper material. In embodiments of cigarettes of the present invention that include a diffuse tipping material, it is highly preferable to use a porous plug wrap rather than a non-porous plug wrap. Suitable plug wrap materials are commercially available. Exemplary plug wrap papers ranging in porosity from about 1,100 CORESTA units to about 26,000 CORESTA units are available from Schweitzer-Mauduit International as Porowrap 17-M1, 33-M1, 45-M1, 70-M9, 95-M9, 150-M4, 150-M9, 240M9S, 260-M4 and 260-M4T; and from Miquel-y-Costas as 22HP90 and 22HP150. Non-porous plug wrap materials typically exhibit porosities of less than about 40 CORESTA units, and often less than about 20 CORESTA units. Exemplary non-porous plug wrap papers are available from Olsany Facility (OP Paprina) of the Czech Republic as PW646; Wattenspapier of Austria as FY/33060; Miquel-y-Costas of Spain as 646; and Schweitzer-Mauduit International as MR650 and 180. Plug wrap paper can be coated, particularly on the surface that faces the filter material, with a layer of a film-forming material. Such a coating can be provided using a suitable polymeric film-forming agent (e.g., ethylcellulose, ethylcellulose mixed with calcium carbonate, nitrocellulose, nitrocellulose mixed with calcium carbonate, or a so-called lip release coating composition of the type commonly employed for cigarette manufacture). Alternatively, a plastic film (e.g., a polypropylene film) can be used as a plug wrap material. For example, non-porous polypropylene materials that are available as ZNA-20 and ZNA-25 from Treofan Germany GmbH & Co. KG can be employed as plug wrap materials.

**[0062]** Cigarette filter rods can be used to provide multi-segment filter rods. Such multi-segment filter rods then can be employed for the production of filtered cigarettes including multi-segment filter elements. An example of a two-segment filter element is a filter element including a first cylindrical segment incorporating activated charcoal particles dispersed within cellulose acetate tow (e.g., a "dalmation" type of filter segment) at one end, and a second cylindrical segment that is produced from a filter rod produced essentially of flavored, plasticized cellulose acetate tow filter material at the other end. The production of multi-segment filter rods can be carried out using the types of rod-forming units that traditionally have been employed to provide multi-segment cigarette filter components. Multi-segment cigarette filter rods can be manufactured using a cigarette filter rod making device available under the brand name Mulfi from Hauni-Werke Korber & Co. KG of Hamburg, Germany. Representative types of filter designs and components, including representative types of segmented cigarette filters, are set forth in U.S. Pat. No. 4,920,990 to Lawrence et al.; U.S. Pat. No. 5,012,829 to Thesing et al.; U.S. Pat. No. 5,025,814 to Raker; U.S. Pat. No. 5,074,320 to Jones et al.; U.S. Pat. No. 5,105,838 to White et al.; U.S. Pat. No. 5,271,419 to Arzonico et al.; U.S. Pat. No. 5,360,023 to Blakley et al.; U.S. Pat. No. 5,396,909 to Gentry et al.; U.S. Pat. No. 5,718,250 to Banerjee et al.; and U.S. Pat. No. 6,761,174 to Jupe et al.; U.S. Pat. App. Pub. Nos. 2004/0261807 to Dube et al.; 2005/0066981 to Crooks et al.; and 2007/0056600 to Coleman III, et al.; PCT Pub. Nos. WO

03/009711 to Kim, and WO 03/047836 to Xue et al.; which are incorporated herein by reference.

**[0063]** The length of the filter element of each cigarette can vary. Typically, the overall length of a filter element is about 20 mm to about 40 mm, and often about 25 mm to about 35 mm. For a typical dual-segment filter element, the downstream or mouth end filter segment often has a length of about 10 mm to about 20 mm; and the upstream or tobacco rod end filter segment often has a length of about 10 mm to about 20 mm.

**[0064]** Filter elements, or filter segment components of combination filters, typically are provided from filter rods that are manufactured using traditional types of cigarette filter rod making techniques. For example, so-called "six-up" filter rods, "four-up" filter rods and "two-up" filter rods that are of the general format and configuration conventionally used for the manufacture of filtered cigarettes can be handled using conventional-type or suitably modified cigarette rod handling devices, such as tipping devices available as Lab MAX, MAX, MAX S or MAX 80 from Hauni-Werke Korber & Co. KG. See, for example, the types of devices set forth in U.S. Pat. No. 3,308,600 to Erdmann et al.; U.S. Pat. No. 4,281,670 to Heitmann et al.; U.S. Pat. No. 4,280,187 to Reuland et al.; U.S. Pat. No. 4,850,301 to Greene, Jr. et al.; U.S. Pat. No. 6,229,115 to Vos et al.; and U.S. Pat. No. 7,296,578 to Read, Jr., and U.S. Pat. App. Pub. Nos. 2005/0103355 to Holmes and 2006/0169295 to Draghetti, each of which is incorporated herein by reference. Various manners and methods for applying adhesives to tipping materials during automated cigarette manufacture are commonly known and used in the art of cigarette design and manufacture. For example, a filtered cigarette can be tipped with a first layer of tipping material in an essentially traditional manner using a Lab MAX tipping device that is available from Hauni-Werke Korber & Co. KG, and that tipped cigarette can be collected and tipped again using that device (e.g., using the device in an essentially traditional manner, or in a suitably modified manner to provide a desired pattern of adhesive application) in order to provide a filtered cigarette including two layers of tipping material.

**[0065]** The first layer of tipping material most preferably extends over the entire length of the filter element, and about 2 mm to about 6 mm, often about 3 mm to about 5 mm, and frequently about 4 mm over the length of the adjacent region of the tobacco rod. The second layer of tipping material most preferably extends over the entire length of the filter element, and about 2 mm to about 6 mm, often about 3 mm to about 5 mm, and frequently about 4 mm over the length of the adjacent region of the tobacco rod.

**[0066]** The tipping material that is used for any of the tipping material layers can vary. In certain preferred embodiments, the material used to construct both tipping material layers has the characteristics and qualities commonly associated with cigarette tipping materials known in the art. As such, both layers can be constructed of the types of material conventionally used as tipping material in the manufacture of cigarettes. Typical tipping materials are papers exhibiting relatively high opacities. Representative tipping materials have TAPPI opacities of greater than about 81 percent, often in the range of about 84 percent to about 90 percent, and sometimes greater than about 90 percent. Typical tipping materials are printed with inks, typically nitrocellulose based, which can provide for a wide variety of appearances and "lip release" properties. Representative tipping papers materials

have basis weights ranging from about 25 g/m<sup>2</sup> to about 60 g/m<sup>2</sup>, often about 30 g/m<sup>2</sup> to about 40 g/m<sup>2</sup>. Representative tipping papers are available as Tervakoski Reference Nos. 3121, 3124, TK 652, TK674, TK675, A360, A362, TK696 (36-gsm white), and TK604 (cork); and Schweitzer-Mauduit International Reference Nos. GSR270 and GSR265M2. See also, for example, the types of tipping materials, the methods for combining cigarette components using tipping materials, and techniques for wrapping various portions of cigarettes using tipping materials, that are set forth in U.S. Pat. App. Pub. No. 2007/0215167 to Crooks et al.

**[0067]** Adhesives used to secure tipping materials to each other or to other filtered cigarette components can vary. Typical exemplary adhesive formulations that are used for application of tipping material to other cigarette components in commercial filtered cigarette manufacturing operations are water-based emulsions incorporating mixtures of ethylene vinyl acetate copolymers and polyvinylacetate. Representative adhesives that are useful for applying tipping materials to cigarette components are available as Reference Nos. 32-2049 and 32-2124 from National Starch & Adhesives Corp. See also, for example, Skeist, Handbook of Adhesives, 2<sup>nd</sup> Edition (1977); Schneberger, Adhesive in Manufacturing (1983); Gutcho, Adhesives Technology Developments Since 1979 (1983); Landrock, Adhesives Technology Handbook (1985); and Flick, Handbook of Adhesives Raw Materials, 2<sup>nd</sup> Edition (1989).

**[0068]** Pressure-sensitive adhesives can be used to provide for adhesion of the outer tipping material to the remaining components of the cigarette (e.g., particularly for manufacture, handling, packaging, shipping, storage and initial use of the cigarette), as well as for providing the ability to readily release (e.g., particularly so that the outer tipping can be readily removed from the cigarette when desired). That is, suitable preferred pressure-sensitive adhesives provide a satisfactory but temporary bond between the outer tipping material and the remaining components of the cigarette, and that adhesive is such that the outer tipping material or a portion thereof can be peeled away, and hence removed from the cigarette, most preferably without leaving to any significant or readily noticeable degree, any adhesive residue on the underlying cigarette components. In addition, suitable preferred pressure-sensitive adhesives, though providing sufficient adhesion so that a double tipped cigarette can be used as desired without adhesive failure (i.e., so as to avoid undesirable premature release of portions of the outer tipping from the cigarette), is most preferably such that purposeful removal of the outer tipping material does not cause any significant or noticeable structural failure to the underlying cigarette components. That is, most preferably, after purposeful removal of the outer tipping material, the resulting cigarette does not include any significant visual or structural damage resulting from the presence and removal of that outer tipping material. If desired, the outer surface of the underlying first tipping material may be coated with a lacquer, or other suitable coating material, in order to provide a propensity for substantially all the pressure-sensitive adhesive to be removed along with the outer tipping material. Representative pressure-sensitive adhesives are commercially available from a wide variety of sources, such as 3M, Rohm & Haas Company, and Ashland Specialty Chemical Company. See, also, for example, Satas, Handbook of Pressure-Sensitive Adhesive Technology (1982), and Satas, Advances in Pressure Sensitive Adhesive Technology 2 (1995).

**[0069]** Cigarettes can be air diluted. Tipping materials can be pre-perforated, or air diluted on-line using laser perforation techniques. For cigarettes that are air diluted or ventilated, the amount or degree of air dilution or ventilation can vary. Frequently, the amount of air dilution for an air diluted cigarette is greater than about 10 percent, generally is greater than about 20 percent, often is greater than about 30 percent, and sometimes is greater than about 40 percent. Typically, the upper level for air dilution for an air diluted cigarette is less than about 80 percent, and often is less than about 70 percent. As used herein, the term "air dilution" is the ratio (expressed as a percentage) of the volume of air drawn through the air dilution means to the total volume and air and smoke drawn through the cigarette and exiting the extreme mouth end portion of the cigarette. For certain preferred air diluted cigarettes, the cigarettes are air diluted in such a manner that the cigarette exhibits substantially identical levels of air dilution when the second layer is present on the cigarette and when the second layer is removed from the cigarette (e.g., by laser perforating relevant regions of a "two-up" cigarette after that cigarette has the second layer of tipping material applied thereto).

**[0070]** Referring to FIG. 3, there is shown a further embodiment of a filtered cigarette 174. A first tipping material 208 circumscribes both the entire length of the filter element and an adjacent region of the tobacco rod. The inner surface of the first tipping material 208 is fixedly secured to the outer surface of the plug wrap 206 and the outer surface of the wrapping material 190 of the tobacco rod, using a suitable adhesive. The cigarette 174 also includes a second tipping material 250. The second tipping material 250 provides an outer layer that overlies and circumscribes the first tipping material 208. The inner surface, or some portion thereof, of the second tipping material 250 can be fixedly secured to the outer surface of the inner or first tipping material 208. As such, the second tipping material 250 also can overlie the entire length of the filter element and the adjacent region of the tobacco rod. A ventilated or air-diluted smoking article may include an air dilution means, such as a series of perforations 210, each of which extends through the outer tipping material 250, the inner tipping material 208, and the plug wrap 206. The cigarette 174 is shown as having one optional printed band 202 printed on wrapping material 190, and that band entirely circumscribes the cigarette rod in a direction transverse to the longitudinal axis of the cigarette. That is, the band provides a cross-directional region relative to the longitudinal axis of the cigarette. The band most preferably is applied to the inner surface of the wrapping material (i.e., facing the smokable filler material), but can be applied to the outer surface of the wrapping material. Although the cigarette shown includes wrapping material having one band, the cigarette also can include wrapping material having spaced bands numbering two, three, or more. The band 202 may comprise additive materials of a coating formulation, which may confer, for example, flavor, burn-retardation, altered diffusivity, and/or other traits.

**[0071]** A diffuse area of a tipping material may comprise less than the entire surface area. For example, about 30 percent or more of the surface area of tipping material as applied to a cigarette may be generally non-diffuse, while preferably up to about 70 percent of the area is diffuse. For example, in one example of a cigarette, the tipping material may have about 40 percent of its surface area being generally non-diffuse (i.e., low-porosity) and about 60 percent of its surface

area generally more diffuse (i.e., higher-porosity). The non-diffuse area may have that property due to inherent construction of the tipping material (e.g., as formed based on thickness and/or density, as treated with—for example—fillers or films of the types described above with reference to wrapping materials) and/or due to the positioning of adjacent material in the cigarette (e.g., a non-porous adhesive applied to attach the tipping material to another cigarette portion).

#### EXAMPLE 1

##### Comparison of Standard Tipping Material with a Porous Tipping Material

[0072] Cigarettes were tested to assess impact of a more diffuse, porous tipping material compared to a typical less diffuse, low-porosity tipping material. Both the experimental and the standard/control cigarettes were constructed with a standard 31 mm filter covered by a standard high-porosity plug wrap. For the experimental cigarettes, a special glue roller was used to apply adhesive only to a proximal/mouth end and the distal/tobacco-rod end of the tipping material to secure it to the filter and a tobacco rod covered with a standard wrapping material (where the tipping paper was the means for attaching the filter to the tobacco rod). The standard/control cigarettes were made with a conventional tipping paper (about 0 CORESTA, 0 cm/sec diffusion capacity) and glue roller. The experimental cigarettes were made using a standard cigarette paper (80 CORESTA, 2 cm/sec diffusion capacity). Both groups of cigarettes were perforated with an on-line laser to provide a range of ventilation levels. Finished cigarettes were tested to determine yields of tar and CO at FTC smoking conditions. Table 1, below, shows a summary of the data:

TABLE 1

Tipping Paper	Filter Dilution (%)	Tar (mg/cig)	CO (mg/cig)	CO/tar ratio	Percent Change
Standard/Control	0.0	14.2	16.0	1.13	—
Cigarettes	33.8	10.4	11.3	1.09	—
Experimental	50.5	8.0	5.8	1.06	—
Cigarettes	19.2	11.7	11.6	0.99	-12.0
	53.0	6.6	6.1	0.92	-14.9
	62.7	4.7	4.2	0.89	-15.9

[0073] As shown in Table 1, cigarettes with the more-porous, more diffuse tipping material reduced both the tar and CO yields relative to the standard/control cigarette, as well as the CO/tar ratio.

[0074] Referring to FIG. 4, there is shown another embodiment of a filtered cigarette 174. A first tipping material 208 circumscribes both the entire length of the filter element and an adjacent region of the tobacco rod. The inner surface of the first tipping material 208 is fixedly secured to the outer surface of the plug wrap 206 and the outer surface of the wrapping material 190 of the tobacco rod, using a suitable adhesive. The cigarette 174 also includes a second tipping material 250. The second tipping material 250 provides an outer layer that overlies and circumscribes the first tipping material 208. The second tipping material 250 extends further upstream along the cigarette as does the first tipping material 208, and as such, a portion of the length of the wrapping material 190 of the tobacco rod that is not covered or overwrapped by the first tipping material is circumscribed by the second tipping

material 250. The second tipping material 250 does not extend as far upstream along the cigarette as does the first tipping material 208, and as such, a portion of the length of the first tipping material is not covered or overwrapped by the second tipping material 250. The inner surface, or some portion thereof, of the second tipping material 250 can be fixedly secured to the outer surface of the inner or first tipping material 208, and preferably, the wrapping material 190 in that upstream region thereof that is not circumscribed by the first tipping material. As such, the second tipping material 250 also can overlie the entire length of the filter element and the adjacent region of the tobacco rod. A ventilated or air-diluted smoking article may include an air dilution means, such as a series of perforations 210, each of which extends through the outer tipping material 250, the inner tipping material 208, and the plug wrap 206.

[0075] Referring to FIG. 5, there is shown yet another embodiment of a filtered cigarette 174. A first tipping material 208 circumscribes both the entire length of the filter element 200 and an adjacent region of the tobacco rod 186. The inner surface of the first tipping material 208 is fixedly secured to the outer surface of the plug wrap 206 and the outer surface of the wrapping material 190 of the tobacco rod, using a suitable adhesive. The cigarette 174 also includes a second tipping material 250. The second tipping material 250 provides an outer layer that overlies and circumscribes the first tipping material 208. A ventilated or air-diluted smoking article may include an air dilution means, such as a series of perforations 210, each of which extends through the outer tipping material 250, the inner tipping material 208, and the plug wrap 206. The second tipping material 250 includes a line or ring of a plurality of perforations 545 that extends around the cigarette essentially perpendicular to the longitudinal axis of that cigarette. As such, the second tipping material 250 can be subdivided about the line of perforations in order to provide two pieces of outer tipping material, one outer piece or segment 550 located at the extreme mouth end of the cigarette, and the other outer piece 555 located upstream from that mouth end segment.

[0076] Referring to FIG. 6, there is shown the mouth end region of a filtered cigarette 174, such as a filter cigarette of the type described previously with reference to FIGS. 1 and 3 through 5. The filter material 205 is circumscribed by plug wrap 206, which includes a lap or seam region 600 where a portion of the plug wrap overlies itself. The lap zone for the plug wrap typically is about 2 mm to about 4 mm in width. Overlying the plug wrap 206 is a layer of first tipping material 208, which includes a lap or seam region 606 where a portion of that tipping material overlies itself. The lap zone for the first tipping material typically is less than about 4 mm, often less than about 3 mm, and is frequently about 1.5 mm to about 2.5 mm in width. Overlying the first tipping material 208 is a layer of second tipping material 250, which includes a lap or seam region 616 where a portion of that tipping material overlies itself. The lap zone for the second tipping material typically is less than about 4 mm, often less than about 3 mm, and is frequently about 1.5 mm to about 2.5 mm in width. In addition, beyond the seam region 616 of the second tipping material 250, that tipping material may include an extended region 620, which preferably is not adhered back onto itself, but rather, lies over its underlying outer surface and is sufficiently free to act as a tab that can be grasped by the fingers of the smoker. The extended region, which preferably extends along a portion of the length of the cigarette, and for the entire

length of the second tipping material, has a width that can vary. For example, the extended region often can have a width of about 1 mm to about 5 mm, and often about 2 mm to about 4 mm. If desired, printed indicia on the outer surface of the second tipping material can provide indication of the location of the extended region.

[0077] Referring to FIG. 7, there is shown the mouth end region of a filtered cigarette 174, such as a filter cigarette of the type described previously with reference to FIGS. 1 and 3 through 5. The filter material 205 is circumscribed by plug wrap 206, which includes a lap or seam region 600 where a portion of the plug wrap overlies itself. Overlying the plug wrap 206 is a double layer, and most preferably, a laminated layer, of first and second tipping materials 208, 250. The double layer of tipping materials includes a lap or seam region 630 where a portion of the bottom or inner face of the first tipping material 208 overlies a portion of its upper or outer face. That lap zone for the first tipping material typically is less than about 4 mm, often less than about 3 mm, and is frequently about 1.5 mm to about 2.5 mm in width. The double layer of tipping materials may include (though not preferable) lap or seam region 635 where a portion of the bottom or inner face of the second tipping material 250 overlies a portion of its upper or outer face, and wherein the lap or seam region may include an adhesive for securing the second tipping material to itself. That lap zone for the second tipping material, if present, typically is less than about 4 mm, often less than about 3 mm, and is frequently about 1.5 mm to about 2.5 mm in width. In addition, beyond the seam region 635, the second or outer tipping material 250 includes an extended region 680, which preferably does not have adhesive applied to its inner face, but rather, lies over its underlying outer surface and is sufficiently free to act as a tab that can be grasped by the fingers of the smoker. The extended region, which preferably extends along a portion of the length of the cigarette, and for the entire length of the second tipping material, has a width that can vary. For example, the extended region often can have a width of about 1 mm to about 5 mm, and often about 2 mm to about 4 mm. If desired, printed indicia on the outer surface of the second tipping material can provide indication of the location of the extended region.

[0078] Referring to FIG. 8, there is shown a side view of a representative laminated tipping material including layers provided by a first tipping material 208 and a second tipping material 250. The configuration of those tipping materials 208, 250 is such that the laminated layer of tipping material can be used to provide a filtered cigarette of the type described previously with reference to FIG. 7. The layers of tipping material 208, 250 are offset relative to one another, such that a portion of the second layer 250 does not overlie the first layer 208 at one side, and a portion of the first layer 208 does not overlie the second layer 250 at the opposite side. As such, the laminate can be folded over itself so as to provide a generally circular arrangement with the first layer of tipping material forming the inner region and the second layer of tipping material forming the outer tipping region. For the embodiment shown, the inside right face 684 of the inner tipping material 208 can overlap and be adhered to outside left face 686 of the left side of the inner tipping material in that region that is not overlapped by the outer tipping material 250. As such, right side 680 of the outer tipping material 250 can act as the so-called extended region or tab that can be used to pull the removable tipping material away from the rest of the filtered cigarette within which it is incorporated.

[0079] Referring to FIG. 9, there is shown a side view of a further embodiment of a laminated tipping material including layers provided by a first tipping material 208 and a second tipping material 250. The configuration of those tipping materials 208, 250 is such that the laminated layer of tipping material can be used to provide a filtered cigarette generally of the type described previously with reference to FIG. 7. The layers of tipping material 208, 250 are offset relative to one another, such that a portion of the second layer 250 does not overlie the first layer 208 at one side 686. For the embodiment shown, the inside right face 684 of the inner tipping material 208 can overlap and be adhered to outside left face 686 of the left side of the inner tipping material in that region that is not overlapped by the outer tipping material 250. As such, the laminate can be folded over itself so as to provide a generally circular arrangement with the inner tipping material forming the inner region and the outer tipping material forming the outer tipping region.

[0080] Referring to FIG. 10, there is shown the mouth end region of a filtered cigarette 174, such as a filter cigarette of the type described previously with reference to FIGS. 1 and 3 through 5. The filter material 205 is circumscribed by plug wrap 206, which includes a lap or seam region 600 where a portion of the plug wrap overlies itself. Overlying the plug wrap 206 is a double layer of first and second tipping materials 208, 250 that are provided encircling the cigarette twice with a single piece of tipping material 890. The first layer of tipping material 208 preferably is adhered to the underlying plug wrap 206, and also includes a lap or seam region 630 where a portion of the bottom or inner face of that inner tipping material 208 overlies a portion of its upper or outer face. A line of perforations 900, extending along the longitudinal length of the filter element, extends across that tipping material, and as such, defines a type of demarcation between the inner and outer tipping materials 208, 250. The tipping material extends around the cigarette to provide the second layer of tipping material 250. The second layer of tipping material 250 preferably includes a lap or seam region 920 where a portion of the bottom or inner face of that outer tipping material 250 overlies a portion of its upper or outer face and can be adhered thereto. That lap zone or region 920 for the second tipping material 250 is typically less than about 4 mm, often less than about 3 mm, and is frequently about 1.5 mm to about 2.5 mm in width. In addition, beyond the seam region 920, the second or outer tipping material 250 includes an extended region 680, which preferably does not have adhesive applied to its inner face, but rather, lies over its underlying outer surface and is sufficiently free to act as a tab that can be grasped by the fingers of the smoker. The extended region, which preferably extends along a portion of the length of the cigarette, and for the entire length of the second tipping material, has a width that can vary. For example, the extended region often can have a width of about 1 mm to about 5 mm, and often about 2 mm to about 4 mm.

[0081] Referring to FIG. 11, there is shown a single piece of "patch" of tipping material 890 that can be used to form the double wrapped tipping material shown in FIG. 10. The representative single piece is at least roughly twice the length of a conventional piece or "patch" of tipping material. Thus, the tipping material piece 890 can form an inner layer 208 and an outer layer 250 when that tipping material is wrapped twice around the relevant regions of cigarette components. The inner face of the inner region 208 can have adhesive 950 applied thereto, in order to adhere that portion of the tipping

material **890** to relevant regions of cigarette components. The line of perforations **900** allows the tipping material **890** to be separated into two pieces. A line of adhesive can be placed in the lap or seam region **920** (e.g., which can be applied by “skip gap” techniques) provides for fastening, securing, or connecting the outer layer of tipping material **250** in place. The tab region **680** will, if present, extend beyond the adhesive line of the lap region **920**.

**[0082]** For various embodiments of the present invention, depending upon the selection of the tipping materials, the first (i.e., inner) tipping material and the second (i.e., outer) tipping material can be different from one another (e.g., in terms of visual appearance, composition, physical properties or characteristics such as basis weight, sizing level, inherent porosity, opacity, sensory characteristics, and/or general dimensions). Alternatively, those inner and outer tipping materials can be substantially identical to one another.

**[0083]** In some embodiments, a flavorant may be printed onto or otherwise applied to the tipping material (e.g., a single layer of tipping material, or one or more layers of a multi-layer tipping material where one or more of those layers may be removable). The flavorant may impart flavor directly to a smoker’s lips and/or tongue via contact with the tipping material. Instead, or in addition, flavor may be provided by releasing an odor—whether passively, upon contact with a smoker, or upon being heated by passage of, for example, mainstream aerosol. Release of flavor-affecting material (whether by or to the mouth and/or nose of the smoker) can be activated or intensified by heating the flavorant when a smoker draws mainstream aerosol through the filter such that the mainstream aerosol is proximate the flavorant. Moisture may also serve as a releasing means for flavor (e.g., from contact with a smoker’s lips and/or tongue).

**[0084]** As used here, “flavorant” includes any material that may be applied to or incorporated into the tipping material—preferably by printing—and that provides one or more of a selected organoleptic sensation, a sensation of one or more tastes/flavors and/or scents/aromas that may be transmitted orally and/or olfactorily, trigeminal nerve stimulation sensation, and may include a cool, warm, spicy, tangy, salty, tingly, or tart sensation for a smoker, or any combination of any of these sensations. Flavorants may be encapsulated or added directly. They may be printed together with, under, or on top of the inks that are commonly applied to tipping materials to provide a particular appearance (e.g., appearance of cork, lettering and/or logos, visible patterns, etc.). Flavorants may also be applied with lip-release (in the cigarette art, the term “lip-release” refers to materials configured to promote easy release of contact between human lips and the tipping-material-covered filter section of a cigarette without substantial sticking, and the lip-release material referred to herein may include any standard lip-release formulations currently known and/or practiced in the art, or developed in the future). A flavorant will provide a smoker with at least one oral and/or olfactory sense beyond a tactile contact with and other normal sensation associated with a tipping material lacking a flavorant.

**[0085]** Flavorants applied to other parts of a cigarette such as, for example, use of flavorants applied to wrapping material surrounding the tobacco, which are released upon burning (see, e.g., U.S. Pat. No. 6,997,190 to Stokes et al.). Flavorants have also been applied to the filter tow and/or plug wrap (see, e.g., U.S. Pat. No. 4,082,098 to Owens, Jr. and U.S. Pat. No. 7,381,277 to Gonterman, et al.). However, the present appli-

cation of flavorants to tipping paper provides a new approach. The flavorants used on, and released upon burning of, wrapping materials are expected to have different flavor profiles than the unburned flavorants of the present application. In addition, rather than exhibiting a primary impact upon the flavor or other sensations of mainstream aerosol, the present application of flavorants to tipping paper will primarily have a direct impact upon the smoker through the lips, tongue, and/or nose, even though the smoker may also enjoy an effect upon the mainstream aerosol from certain flavorants entering the aerosol stream from air passage through the tipping paper. It is expected that a smoker’s main sensory input from the flavorant may not come in the mainstream aerosol being drawn through the filter of a cigarette, although the tastes and/or other sensations will complement the smoker’s appreciation of the mainstream aerosol.

**[0086]** The flavorant(s) may include or be included in a variety of substrates for application to the tipping material such as, for example, inks, films, or other compositions that may include one or more pigments, fillers, and/or optical brightening agents. In a preferred embodiment, the flavorant composition is formulated to be printed on one or both sides of tipping material before, during, or after assembly of a smoking article such as a cigarette. However, the formulation may also be applied by other means including, for example, misting, spraying, or soaking the tipping material. One or more flavorant compositions may be incorporated into tipping material during its manufacture.

**[0087]** At least one layer of flavorant, and possibly several layers of one or more flavorants (in each layer-applied together, or separately), is applied to a wrapping material, preferably using a printing process. Most preferably, the coating formulation is applied using intaglio processes. As such, gravure coating techniques, such as rotogravure printing techniques, are particularly preferred. Other techniques for the coating formulation to the wrapping material include blade coating, air-knife coating, roll-coating and shaft coating techniques. Alternatively and/or additionally, the layers of coating formulation can be applied by spraying, ink jet coating, or other similar printing techniques. A printed wrapping material will thereby be provided with a pattern by application of at least one flavorant material to a tipping material. The pattern preferably may be applied to the tipping material in a so-called offline fashion (i.e., offline relative to the manufacture of that wrapping material).

**[0088]** Gravure printing techniques involve printing from the continuous surface of a metal cylinder engraved mechanically or etched chemically so as to possess minute grooves or cells below the surface of that cylinder. A typical printing cylinder surface is provided by etching a smooth, polished copper surface and plating that etched surface with chrome. Those recessed cells or grooves hold liquid (or liquid dispersion) formulations form impressions, layers or “bumps” to be deposited onto the desired location of a substrate, such as a continuous web of paper wrapping material. Rotogravure printing presses have been commercially available from Bobst Champlain, Inc.; from Cerutti S.p.A.; from Rotomek, S.p.A.; from Intra-Roto, Inc.; as Merkur Heliostar from Wirmoller & Holscher, and KBA TR 7B from Albert-Frankenthal AG. Gravure printing techniques are described in Pocket Pal, published by International Paper Company (1970); Scarlett et al., *What the Printer Should Know About Ink* (1984); and *Gravure, Process and Technology*, Grav. Educ. Fdn. and Grav. Assoc. Amer. (1991). Thus, the selection and operation of

gravure printing equipment as commonly used in the art may be practiced within the scope of the present invention. See, for example, U.S. Pat. No. 6,725,867 to Peterson et al. and 6,997,190 to Stokes et al., both of which are incorporated herein by reference in their entirety. Equipment and techniques for applying coatings and inks to paper wrapping materials suitable for the manufacture of tobacco rods for cigarettes are set forth in U.S. Pat. No. 5,060,675 to Milford et al.; U.S. Pat. No. 5,878,753 to Peterson et al.; U.S. Pat. No. 5,878,754 to Peterson et al.; and PCT Pub. No. WO 02/37991. See, also, U.S. Pat. No. 4,474,110 to Rosner.

**[0089]** Other printing techniques may be used as well, including flexographic, ink-jet, thermal-transfer (including laser), screen printing, or any other method for transferring a composition to a paper or paper-like material such as tipping material. Different solvents may be selected to carry the flavorant during application. Most solvents preferably will evaporate and/or will not have a negative impact upon the flavorant (including a smoker's experience thereof). Preferably, the solvent will not disrupt or damage the structure of the wrapping material (e.g., by weakening it) or negatively affecting its appearance, nor will it confer any undesirable flavor. Solvents used with gravure printing or flexographic printing may include water, methylated spirits, ethyl acetate, isopropanol, and/or n-propyl acetate. Solvents used with screen printing may include cyclohexanone, butoxyethanol, aromatic distillates, butyrolactone, and/or methoxypropanol acetate. Solvents used with ink jet printing may include methanol, ethanol, methylethylketone, ethylacetate, acetone, and/or ethyl lactate. Solvents used with printable ink resins may include acrylics, alkyds, cellulose derivatives, rubber resins, ketone, maleics, formaldehydes, phenolics, epoxides, fumarics, polyurethanes, polyvinylbutyrals, polyamines, and/or shellac. Solvents used with pigment dispersants in inks (with or without flavorant) may include monomeric cationic, anionic, or amphoteric surfactants as well as various homopolymers or copolymers that may be random block copolymers or graft copolymers such as comb copolymers. Printing may form one or more patterns or may cover substantially an entire surface of the tipping material.

**[0090]** In addition to the printing-type and other applications described herein, smoking articles also can incorporate at least one flavor component within an adhesive used to apply the tipping material. Some examples of flavorants that may be printed or otherwise applied to the tipping material or in the adhesive include methyl cyclopentenolone, vanillin, ethyl vanillin, inulin, 4-parahydroxyphenyl-2-butanone, gamma-undecalactone, 2-methoxy-4-vinylphenol, 2-methoxy-4-methylphenol, 5-ethyl-3-hydroxy-4-methyl-2(5H)-furanone, methyl salicylate, clary sage oil and sandalwood oil. These flavor components may be employed in amounts of about 0.2 percent to about 6.0 percent, based on the total weight of the adhesive and flavor components. Other flavorants (including flavor and aroma precursors) include, for example, vanillin glucoside and/or ethyl vanillin glucoside. See, for example, U.S. Pat. No. 4,804,002 to Herron; and U.S. Pat. No. 4,941,486 to Dube et al., each of which is incorporated herein by reference. Other types of flavorants used in cigarette manufacture are set forth in Gutcho, Tobacco Flavoring Substances and Methods, Noyes Data Corp. (1972) and Leffingwell et al., Tobacco Flavoring for Smoking Products (1972), each of which is incorporated herein by reference. Other flavorants may include, for example, ethyl vanillin, caryophyllene oxide, sugars (e.g., rhamnose), and

different flavor precursors that will produce a flavor and/or aroma when contacted by the lips or tongue of a smoker and/or heat and/or moisture from mainstream aerosol. Inks useful as flavorants providing a scent, aroma, or other olfactory sensation include those disclosed in U.S. Pat. No. 5,577,947 to Malloy et al and U.S. Pat. No. 6,454,842 to Vernardakis et al.

**[0091]** Flavorants may be incorporated by means other than printing one or both surfaces of tipping material. For example, tipping material may be dipped into a flavorant material such that it will be absorbed thereby and/or will adsorb to surfaces of material making up the tipping material. As another example, microcapsules may be incorporated into the tipping material and configured to release flavorant(s), for example, upon contact with moisture and/or warmth of a smoker's lips, or, for example, in an embodiment with a multi-layer tipping material, upon removal of an outer layer of tipping material. For examples of synthetic capsules and biologically-derived "capsules" (e.g., yeast organisms as a delivery means) and methods that may be used within the scope of the present invention, see Kondo, Microcapsule Processing and Technology, ISBN 0824768574 (1979); Iwamoto et al., AAPS Pharm. Sci. Tech. 2002 3(3): article 25; U.S. Pat. No. 3,550,598 to McGlumphy and U.S. Pat. No. 6,117,455 to Takada et al.; U.S. Pat. App. Pub. Nos. 2006/0096605 to Karles, et al.; 2006/0135335 to Dawson, et al.; 2006/0144412 to Mishra et al.; 2006/0174901 to Karles, et al.; 2007/0012327 to Karles, et al.; and 2007/0095357 to Besso, et al., each of which is incorporated by reference herein. Representative types of capsules and components thereof also are set forth in U.S. Pat. No. 3,339,558 to Waterbury; U.S. Pat. No. 3,390,686 to Irby, Jr. et al.; U.S. Pat. No. 3,685,521 to Dock; U.S. Pat. No. 3,916,914 to Brooks et al.; U.S. Pat. No. 4,889,144 to Tateno et al. and U.S. Pat. No. 6,631,722 to MacAdam et al.; U.S. Pat. Pub. Nos. 2004/0261807 to Dube et al.; and PCT App. No. WO 03/009711 to Kim; which are incorporated herein by reference. See also, the types of capsules and components thereof set forth in U.S. Pat. No. 5,223,185 to Takei et al.; U.S. Pat. No. 5,387,093 to Takei; U.S. Pat. No. 5,882,680 to Suzuki et al.; U.S. Pat. No. 6,719,933 to Nakamura et al.; and U.S. Pat. No. 6,949,256 to Fonkwe et al.; and U.S. Pat. App. Pub. Nos. 2004/0224020 to Schoenhard; 2005/0123601 to Mane et al.; 2005/0196437 to Bednarz et al. and 2005/0249676 to Scott et al.; which are incorporated herein by reference.

**[0092]** Printing and other formulations incorporating flavorants can be applied over an entire surface of the tipping material, over portions of one or both surfaces of the tipping material. It may be applied, for example, in single- or multi-layer bands, in other printed patterns (decorative patterns, letters, etc), some or all of which may include flavorant(s). For examples of methods and materials useful in providing multilayered bands, see U.S. Pat. No. 6,976,493 to Chapman, et al. Some preferred flavorants will exhibit sensory characteristics that can be described as having notes that are sweet, woody, fruity, or some combination thereof. The flavorants preferably are employed in amounts that depend upon their individual detection thresholds. In one aspect, the flavorants may be employed in sufficient amounts to mask or ameliorate any off-tastes or malodors associated with burning paper. Combinations of flavorants may be used to provide one or more desired sensory characteristics to the experience of a smoker from the smoking articles incorporating those flavorants. In some applications, those flavorants may be

employed in amounts and manners so that their sensory characteristics are barely detectable so they do not adversely affect the overall sensory characteristics of smoking article into which they are incorporated. In other aspects, a strong or at least distinctive flavor may be desirable to satisfy a particular taste of a smoker.

**[0093]** For example, some flavorings will provide a unique sensation to a smoker that may include, but go beyond one or more of taste, smell, and tactile sensation. For example, such flavorants may include menthol, menthanes, menthones, sweet proteins (e.g., thaumatin, monellin), essential oils containing menthol or menthol-like compounds (e.g., peppermint), other essential oils (wintergreen, spearmint), succinate esters, capsaicin, cinnamon, or any commercially-available (or future-developed) “cooling compounds” or “spicy compounds” (e.g., Evercool® (Givaudan Flavors Corp.); WS-3, WS-5, & WS-23 (Wilkinson Sword Ltd.); Frescolat® MGA (Haarmann & Reimer)), and other sources of flavorant compounds. See also the flavorants and methods described in U.S. Pat. No. 4,059,118 to Watson et al.; U.S. Pat. No. 4,060,091 to Watson et al.; U.S. Pat. No. 4,082,098 to Owens, Jr.; U.S. Pat. No. 4,123,592 to Rainer et al.; U.S. Pat. No. 4,300,576 van der Loo et al.; U.S. Pat. No. 4,715,390 to Nichols et al.; and U.S. Pat. No. 7,381,277 to Gonterman, et al.

**[0094]** Preferred flavorants may be incorporated into printing formulations, will have low vapor pressures, will not have a tendency to migrate or evaporate under normal ambient conditions, and will be stable under the processing conditions experienced by tipping materials of the present invention. Exemplary flavorants that provide sweet notes include ethyl vanillin, vanillin, inulin (a fructose oligomer), heliotropin, methylcyclopentenolone; and those flavorants typically are employed in amounts of 0.001 to about 0.01 percent, based on the total weight of the printing formulation into which they are incorporated. An exemplary flavorant that provides woody notes includes caryophyllene oxide; and that flavorant typically is employed in amounts of 0.2 to about 0.6 percent, based on the total weight of the printing formulation into which it is incorporated. Exemplary flavorants that provide fruity notes include ketones such as 4-hydroxyphenyl-2-butanone and lactones such as gamma-dodecalactone; and those flavorants typically are employed in amounts of 0.001 to about 0.1 percent, based on the total weight of the printing formulation into which they are incorporated. Other flavorants are well known within the tobacco, food-preparation, and confectionary arts, and it will be appreciated that such flavorants may be used within the scope of the present invention.

**[0095]** For example, confectionary inks are known in the art including those, for example, those available from Sherwood Brands (in Candicraft Pens). Edible inks that may include flavor are not new and have been used with foodstuffs (see, e.g., U.S. Pat. No. 3,961,082 to Winkler, et al.; U.S. Pat. No. 5,453,122 to Lyon; U.S. Pat. No. 6,030,134 to Stewart; U.S. Pat. No. 7,128,938 to Stewart; PCT Pub. No. WO/2004/057985 to Pearce et al.; and U.S. Pat. App. Pub. Nos. 2005/0003048 to Pearce et al. and 2007/0222830 to Moynihan et al.).

**[0096]** For embodiments of the present invention including more than one layer of tipping material, one or more flavorants will be included in at least one layer of tipping material and may be included in a plurality of layers. In a cigarette embodiment having a plurality of tipping material layers, a first layer may include a first flavorant, and a second layer

may include a second flavorant, wherein the flavorants may impart the same, similar, or different sensations, and wherein—if different—the sensations may be complementary or contrasting. In a multi-layer tipping material embodiment where one or more outer layers are removable, a smoker may have a selection option of flavors (e.g., an inner tipping material layer having a first flavorant, and an outer tipping material layer having a second flavorant, such that the smoker may select to use the product with both layers in place providing a combined sensation from the inner layer flavorant(s) and outer layer flavorant(s), or to remove the outer layer with its flavorant(s) and experience only the flavorant(s) of the inner tipping material layer).

**[0097]** FIG. 2B shows a cigarette 409 in a partial perspective view as having been cut along the line 2A-2A from a two-up cigarette of the type shown in FIG. 2. However, the cigarette 409, as shown, is provided with only a single layer of tipping material, or has had a second layer (e.g. tipping layer 250) removed therefrom. This embodiment includes a pattern of flavorant 287 applied to an exterior surface as a plurality of bands that are disposed generally longitudinally and circumferentially (both continuously and discontinuously). The tipping material 208 substantially circumscribes the filter element 205 along its longitudinal periphery and a smokable rod covered by wrapping material 190 along a proximal portion of its longitudinal periphery adjacent to the filter element 205. Specifically, the flavorant bands 287 are designated by stippled regions, which may be easily visible to a user, or which may be clear or color-matched to the tipping material such that they are not readily visible. The stippled flavorant band region may be disposed in or on the tipping material, and may include capsules (e.g., each stipple or set of a plurality of stipples may represent a capsule such as a microcapsule) or other flavorant means. The pattern may take any number of other forms as will readily be apparent (e.g., other banded patterns, checked patterns, zigzags, geometric or non-geometric patterns, images, lettering, etc.), and may be applied to the underside of the tipping material alone, or in combination with a pattern on the upper side of the tipping material.

**[0098]** In one embodiment, the first tipping material can be one color or of one type of appearance (e.g., white in appearance), and the second tipping material, which preferably can be removable from the cigarette, can be another color or of another type of appearance (e.g., printed so as to have a brown cork-type of appearance or printed with other indicia). Other cosmetic differences can be provided by using one type of tipping material that is smooth, high opacity, shiny, or of high luster in appearance, and one type of tipping material that is rough, low opacity, dull or satiny in appearance. Other visual effects can be provided by using different graphics on each of the two tipping materials. Thus, there is provided a manner or method by which the smoker can, by removing the second tipping material from the cigarette during use, select the desired general appearance or of a cigarette.

**[0099]** In one embodiment, the first tipping material can be selected so as to include one type of tactile character, and the second tipping material, which preferably can be removable from the cigarette, can include a difference type of tactile character. For example, the inner tipping material can include an outer surface that can be characterized as wavy, rough, variegated, including folds or creases, having an accordion-type or bellows-type configuration, or the like; while the outer tipping material can include an outer surface that can be characterized as smooth, slick, or the like. In that regard,

suitable coating agents (e.g., a lacquer) that provide a slick, smooth feel to the outer surface of the outer tipping material can be employed. Alternatively, the inner tipping material can be highly perforated (e.g., from the bottom face outwards), embossed, subjected to fillgraining processing, printed with coatings (e.g., ink formulations or starch-based materials that provide raised or textured surface properties), or treated with particulate material within an adhesive film). For example, sugar crystals, salt crystals, rupturable flavor-containing microcapsules, cellulosic fibers, particles of calcium carbonate, or the like, can be secured to the outer surface of the inner tipping material using an over-layer or patterned over-layer of a suitable adhesive.

**[0100]** Tipping materials that each can provide a mouth end region that can exhibit a different feeling when placed in the lips of the smoker also can be accomplished through the use of two types of laminated tipping materials. For example, the inner face of the outer tipping material can be coated with a suitable release coating; and the outer face of the inner tipping material can be treated so as to have regions that provide for desired adhesion to the release coating as well as regions that provide the desired surface texture. Thus, there is provided a manner or method by which the smoker can, by removing the second tipping material from the cigarette during use, select the tactile sensation provided by the outer mouth end region of that cigarette.

**[0101]** In one embodiment, the first tipping material can be selected so as to include certain other physical properties, and the second tipping, which preferably can be removable from the cigarette, can include different physical properties. For example, the tipping materials can differ in terms of basis weight, thickness, tensile strength, wet strength, moisture porosity, air permeability, flexibility, general or overall hardness, general or overall softness, or the like.

**[0102]** In one embodiment, the first tipping material can be selected so as to include the ability to secure the filter element to the tobacco rod. Such can be provided by selection of a material having desired surface properties, ability to seal, ability to accept adhesive, and the like. The second tipping material can be selected so as to provide desirable visual, tactile and sensory properties. As such, cigarettes of both highly desirable sensory quality and good physical integrity can be provided.

**[0103]** In one embodiment, the first tipping material can be selected so as to exhibit one type of aroma or flavor sensation, and the second tipping material, which can be removable from the cigarette, can be selected so as to exhibit another type of aroma or flavor sensation. In one aspect, the amount of aromatic or flavorant carried by one of the tipping materials can differ from that amount carried by the other. Thus, for example, an outer tipping material carrying a relatively low level of aromatic or flavorant can provide one type of sensation; while an inner tipping material carrying a relatively high level of aromatic or flavorant can, when the outer tipping material is removed from the cigarette, provide impact in terms of the delivery of that aromatic or flavorant to the lips and mouth of the smoker. In certain embodiments, the outer tipping material can be adapted to prevent flavorants incorporated in between the tipping materials or within the inner tipping material from escaping prior to use of the cigarette, or can be adapted to mask the flavorant prior to cigarette use. At the time of use, the smoker can remove the outer wrapping material to expose the flavorant.

**[0104]** Exemplary manners and methods for providing encapsulated materials, such as microencapsulated flavorants, are set forth in Gutcho, *Microcapsules and Microencapsulation Techniques* (1976) and Gutcho, *Microcapsules and Other Capsules Advances Since 1975* (1979). Exemplary types of microcapsules can have diameters of less than 100 microns, an often can have outer shells that are gelatin based, cyclodextrin based, or the like. Microcapsules have been commercially available, and exemplary types of microcapsule technologies are of that type set forth in Kondo, *Microcapsule Processing and Technology* (1979); Iwamoto et al., *AAPS Pharm. Sci. Tech.* 2002 3(3): article 25; and U.S. Pat. No. 3,550,598 to McGlumphy and U.S. Pat. No. 6,117,455 to Takada et al.

**[0105]** In one embodiment, releasable flavoring or aromatic agents, such as are provided by encapsulated flavor materials, can be incorporated into either or both of the first and second tipping materials. For example, microcapsules can be positioned in the region between the layers of tipping materials; and such flavors can be released by application of pressure or peeling of the outer tipping material from the inner tipping material. Alternatively, or in addition, capsules (including microcapsules) could be placed on the underside of the tipping material, the top surface thereof, or embedded therein (as well as any combination, or being placed between the tipping material and the plug wrap and/or filter). As used herein, capsules or microcapsules refer to crushable or otherwise disruptable or disintegrable components that may be formed from, for example, a gel with a skin, a rigid or semi-rigid shell with a liquid, aromatic, or semi-liquid core (that may be contained in one or more inner capsules), or another capsule construction. They may be crushed or otherwise disrupted to release a flavorant. The capsules may be applied with an adhesive, in a suspension, or incorporated into a tipping material. The capsules may be configured to be crushed or otherwise disrupted by a smoker's fingers (e.g., by pinching or rolling the cigarette), by mouth contact (e.g., heat, pressure, moisture of the mouth), and/or smoking process.

**[0106]** Exemplary flavorants suitable for use in the invention may be natural or synthetic, and the character of these flavors can be described, without limitation, as fresh, sweet, herbal, confectionary, floral, fruity or spice. Specific types of flavors include, but are not limited to, vanilla, coffee, chocolate, cream, mint, spearmint, menthol, peppermint, wintergreen, lavender, cardamom, nutmeg, cinnamon, clove, cascarilla, sandalwood, honey, jasmine, ginger, anise, sage, licorice, lemon, orange, apple, peach, lime, cherry, and strawberry. See also, Leffingwill et al., *Tobacco Flavoring for Smoking Products*, R. J. Reynolds Tobacco Company (1972). Flavorings also can include components that are considered moistening, cooling or soothing agents, such as eucalyptus. These flavors may be provided neat (i.e., alone) or in a composite (e.g., spearmint and menthol, or orange and cinnamon). Composite flavors may be combined in a single capsule as a mixture, or as components of multiple capsules. The flavoring material may cover an entire surface of the tipping material.

**[0107]** In one embodiment, the tipping materials can include printed indicia for marketing or other purposes. For example, markings or indicia on either or both of the tipping materials can aid in identification of properly manufactured cigarettes so as to assist in identifying or recognizing counterfeit cigarettes. As another example, markings on the inner

or outer face of a removable outer tipping material can be used to identify product, act as a coupon or ticket, act a game piece, or the like.

[0108] In one embodiment, the tipping materials can be used to enhance the degradability of spent cigarette portions, such as cigarette butts. For example, outer tipping materials, which might be desirable for providing certain sensory characteristics, can be removed after the cigarette is smoked. That portion of the outer tipping material removed from the cigarette butt can be disposed of separately from the remainder of the cigarette butt. As such, absence of that tipping material within the cigarette butt can provide for enhanced degradability of the remaining butt components.

[0109] In certain embodiments, the outer tipping material can be constructed of a paper having characteristics and qualities, such as combustibility, commonly associated with cigarette paper used as smokable rod wrapping material 190. In such embodiments, the outer tipping material is designed to be removed from the inner tipping material through use of, for example, a pressure sensitive adhesive or skip gap adhesive application between the inner and outer tipping material that provides sufficient adhesive strength to maintain the outer tipping material in place prior to use by the smoker, but which can be removed from the inner tipping material when desired. As such, the outer tipping material can be removed to expose the inner tipping material prior to smoking. Alternatively, the smoker may, in certain embodiments, slide the outer tipping material down to the smokable rod portion of the cigarette such that a portion of the smokable rod has a double layer of wrapping material. The presence of the double wrapping on a portion of the smokable rod can reduce visible sidestream smoke or alter the sensory characteristics (e.g., the flavor or aroma characteristics of the smoke) or chemistry of the smoke generated by the cigarette. For example, the outer tipping material may include any of the flavoring or aroma agents discussed herein, including, for example, the flavor and aroma precursors discussed in U.S. Pat. No. 4,941,486 to Dube et al., which is incorporated by reference herein. In this manner, the smoker can selectively alter the sensory characteristics of the smoke as desired or simply remove the outer tipping material.

[0110] Referring to FIG. 12, there are shown components of a smoking article 300 in the form of a filtered cigarette. The cigarette 300 includes a generally cylindrical rod 320 of a charge or roll of smokable filler material 308 contained in a circumscribing wrapping material 318 of the present invention. The rod 320 is conventionally referred to as a "smokable rod" or "tobacco rod". The ends of the tobacco rod are open to expose the smokable filler material. At one end of the tobacco rod 320 is the lighting end 304, and at the other end is shown a filter element 302. The cigarette 300 is shown as having one optional printed band 322 printed on wrapping material 318, and that band entirely circumscribes the cigarette rod in a direction transverse to the longitudinal axis of the cigarette. That is, the band provides a cross-directional region relative to the longitudinal axis of the cigarette. The band most preferably is applied to the inner surface of the wrapping material (i.e., facing the smokable filler material), but can be applied to the outer surface of the wrapping material. Although the cigarette shown includes wrapping material having one band, the cigarette also can include wrapping material having spaced bands numbering two, three, or more. The band 322 may comprise additive materials of a coating formulation,

which may confer, for example, flavor, burn-retardation, altered diffusivity, and/or other traits.

[0111] The cigarette 300 normally includes a filter element 302 or other suitable mouthpiece positioned adjacent one end of the tobacco rod 320 such that the filter element and tobacco rod are axially aligned in an end-to-end relationship, preferably abutting one another. Filter element 302 has a generally cylindrical shape, and the diameter thereof is essentially equal to the diameter of the tobacco rod. The ends of the filter element are open to permit the passage of air and smoke therethrough. The filter element 302 includes filter material 308 (e.g., plasticized cellulose acetate tow) that is over-wrapped along the longitudinally extending surface thereof with circumscribing plug wrap material 310. The filter element 302 can comprise two or more filter segments (not shown), and/or flavor additives incorporated therein.

[0112] The filter element 302 is attached to the tobacco rod 320 by a tipping material 312 which circumscribes both the entire length of the filter element and an adjacent region of the tobacco rod. The inner surface of the tipping material 312 is fixedly secured to the outer surface of the plug wrap 310 and the outer surface of the wrapping material 318 of the tobacco rod, using a suitable adhesive (e.g., a water-based adhesive of the type traditionally employed by cigarette manufacturers for application of tipping paper during filtered cigarette manufacture). That is, the first tipping material extends around the longitudinally extending periphery of substantially the entire length of the plug wrap, and a portion of the longitudinally extending periphery of the wrapping material of the tobacco rod in a region of the tobacco rod immediately adjacent to the filter element. A ventilated or air-diluted smoking article may be provided with an air dilution means, such as a plurality or series of perforations 314, each of which extend through the tipping material 312 and plug wrap 310. Most preferably, adhesive is applied to a longitudinally extending seam line or lap zone (not shown) of the first tipping material, such as is conventionally employed during cigarette manufacture. As with the embodiments described above that include more than one layer of tipping material, the tipping material 312 may be printed or otherwise treated with a flavorant using one or more of the methods and/or materials described above. As one example, the tipping material 312 may be printed with bands 323 of a flavorant formulation as described above. As another example, one or both surfaces of the tipping material 312 may be printed with a pattern that may cover some or substantially all of said surface with a flavorant, and/or one of the other means described above may be used to incorporate or apply flavorant into/onto the tipping material.

[0113] Many modifications and other embodiments of the invention will come to mind to one skilled in the art to which this invention pertains having the benefit of the teachings presented in the foregoing description; and it will be apparent to those skilled in the art that variations and modifications of the present invention can be made without departing from the scope or spirit of the invention. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed and that modifications and other embodiments are intended to be included within the scope of the claims, which define the invention. Although specific terms are employed herein, they are used in a generic and descriptive sense only and not for purposes of limitation.

We claim:

- 1. A filtered cigarette having a distal end and a proximal end, and comprising:  
a smokable rod and a filter element having a distal filter end and a proximal mouth end;  
the smokable rod being secured to the distal filter end by a first tipping material that substantially circumscribes the filter element along its longitudinal periphery and circumscribes the smokable rod along a proximal portion of its longitudinal periphery adjacent to the filter element;  
wherein the tipping material comprises at least one non-perforated diffuse region, the diffuse region comprising a diffusivity of at least about 1 cm/sec.
- 2. The cigarette of claim 1, further comprising a second tipping material.
- 3. The cigarette of claim 2, wherein the second tipping material is disposed overlying at least a portion of first tipping material.
- 4. The cigarette of claim 3, wherein the second tipping material comprises a diffusivity of less than about 1 cm/sec.
- 5. The cigarette of claim 2, wherein at least a portion of the second tipping material is removable from the cigarette.
- 6. The cigarette of claim 1, wherein the first tipping material comprises a diffusivity of at least about 1.5 cm/sec.
- 7. The cigarette of claim 1, wherein the first tipping material comprises a diffusivity of about 1 cm/sec to about 3 cm/sec.
- 8. The cigarette of claim 1, wherein the first tipping material comprises a paper material.
- 9. The cigarette of claim 1, wherein the first tipping material comprises a polymer sheet material.
- 10. The cigarette of claim 1, wherein the first tipping material comprises a moisture resistant material disposed at least on a mouth-end region configured to contact the mouth of a smoker.
- 11. The cigarette of claim 1, wherein the first tipping material comprises a lip-release material disposed at least on a mouth-end region configured to contact the mouth of a smoker.
- 12. The cigarette of claim 1, further comprising an adhesive contacting at least one side of the first tipping material, the adhesive substantially disposed in a generally linear manner around at least a portion of a circumferential inner surface of the tipping material.
- 13. The cigarette of claim 1, further comprising an adhesive contacting at least one side of the first tipping material, the adhesive substantially disposed in a generally linear manner

- along a generally longitudinal portion of a circumferential inner surface of the tipping material.
- 14. The cigarette of claim 1, further comprising an adhesive contacting at least one side of the first tipping material, the adhesive being generally diffuse.
- 15. The cigarette of claim 14, wherein the diffusivity of the first tipping material with adhesive is about 1 cm/sec to about 3 cm/sec.
- 16. The cigarette of claim 14, wherein the diffusivity of the first tipping material with adhesive is about 2 cm/sec.
- 17. The cigarette of claim 1, further comprising at least one perforated region of the first tipping material.
- 18. A filtered cigarette having a distal end and a proximal end, and comprising:  
a smokable rod and a filter element having a distal filter end and a proximal mouth end;  
the smokable rod being secured to the distal filter end by a first tipping material that substantially circumscribes the filter element along its longitudinal periphery and circumscribes the smokable rod along a proximal portion of its longitudinal periphery adjacent to the filter element;  
wherein substantially the entire tipping material comprises a nonperforated diffuse region, the diffuse region comprising a diffusivity of at least about 1 cm/sec.
- 19. The cigarette of claim 18, wherein the first tipping material comprises at least one fiber material configured to enhance its structural integrity.
- 20. A filtered cigarette comprising:  
a distal end portion comprising a tobacco rod and a proximal end portion comprising a filter element having a distal filter end and a proximal mouth end;  
the smokable rod being secured to the distal filter end by a tipping material that substantially covers the outer surface of the filter element along its longitudinal circumference and the smokable rod along a proximal portion of its circumference adjacent to the filter element;  
wherein the tipping material comprises at least one non-perforated diffuse region, the diffuse region comprising a diffusivity of at least about 1.5 cm/sec; and  
wherein the tipping material comprises at least one flavorant applied thereto in a pattern that covers less than an entire surface of the tipping material and providing a sensory characteristic selected from organoleptic sensation, taste sensation, aroma sensation, trigeminal nerve stimulation sensation, and any combination thereof.

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