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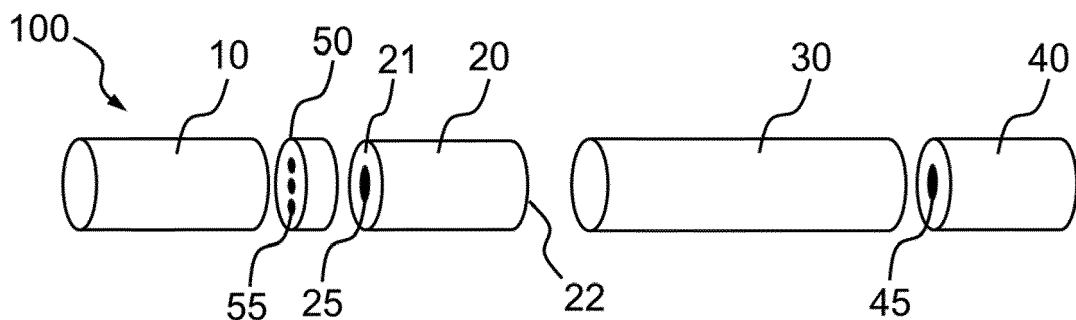
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(54) **ELONGATED SMOKING ARTICLE**

(57) The present invention relates to an elongated smoking article (100) that comprises a cylindrical smoking body (10) with a combustible material and a hollow bore filter element (20) adjacent to the cylindrical smoking body (10). The hollow bore filter element (20) comprises a first base area (21) facing the smoking body (10) and a second base area (22) opposite the first base area (21) and a hollow bore (25) extending from the first base area (21) to the second base area (22). The elongated

smoking article (100) further comprises a filter membrane (50) that is arranged between the smoking body (10) and the hollow bore filter (20), that comprises at least one filter aperture (55) aligned with the hollow bore (25), that is configured for filtering particles emitted by the heated smoking body (10) and that is permeable for vapor emitted by the heated smoking body (10). The invention further relates to a method for manufacturing a hollow bore filter for such an elongated smoking article (100).



**FIG. 2**

**Description**

## FIELD OF THE INVENTION

**[0001]** The present invention relates to an elongated smoking article comprising a smoking body filled with a combustible material and a hollow element adjacent to the cylindrical smoking body and comprising a first base area facing the smoking body. A filter membrane is disposed between the smoking body and the hollow element and comprises at least one filter aperture that is aligned with the hollow bore of the hollow element.

## BACKGROUND

**[0002]** Elongated smoking articles, such as e.g. (filter) cigarettes and cigarillos, are usually of cylindrical shape and comprise a smoking body that is filled with a combustible material. Therein, the combustible material comprises tobacco or a tobacco related product, such as e.g. shredded tobacco or reconstituted tobacco. For forming the smoking body, the combustible material is surrounded by a wrapping paper. Usually cigarettes have a cylindrical filter element that is aligned with the smoking body. The filter element is configured to filter substances, e.g. tar, from the combustion gases emitted by the burning combustible material and might comprises cellulose acetate, paper, and/or charcoal. Usually, the filter element is packed using a so-called plug wrap, e.g., a paper plug wrap. The filter element is usually attached to one end of the tobacco rod using a circumscribing wrapping material known as tipping paper. Therein, the tipping paper can be overlaid with and attached to both, the filter element and the smoking body.

**[0003]** Further known are so-called heated tobacco products that might also be formed as an elongated smoking article and that are used without burning the combustible material of the smoking body. The combustible material of the smoking body is rather heated to a temperature below the combustion temperature of the combustible material. The heated combustible material, usually tobacco or a tobacco related product, emits vapor that can be drawn and inhaled by a user. In heated tobacco products the amount of vapor might be less than the amount of vapor and/or smoke emitted by a burning combustible material. Hence, a user experience might be different from a classical tobacco product. Further, while heating the combustible material, particles might be emitted by the heated combustible material and hence the emitted vapor is usually filtered before it can reach the mouth of a user. However, the filtering might also diminish the amount of vapor that can reach the mouth of the user thus further distinguishing the smoking experience from a classical tobacco product.

**[0004]** It is thus an object of the present invention to overcome or reduce the disadvantages of the prior art and to provide an elongated smoking article that is configured to be used as a heated tobacco product without

combustion and that provides an improved user experience.

## SUMMARY OF INVENTION

**[0005]** One or more of the drawbacks of the prior art could be avoided or at least reduced by means of the present invention, particularly by an elongated smoking article that is extending in a longitudinal direction. The elongated smoking article comprises a cylindrical smoking body that is configured to be heated during smoking of the smoking article. Therefore, the smoking body comprises combustible material that is preferably surrounded by a plug wrap.

**[0006]** The elongated smoking article further comprises a hollow element that is disposed/positioned adjacent to the cylindrical smoking body and comprises a first base area that is facing the smoking body. The hollow bore filter element further comprises a second base area that is opposite the first base area as well as a hollow bore that is extending through the whole hollow element from the first base area to the second base area.

**[0007]** The elongated smoking article according to the present invention further comprises a filter membrane that is arranged between the smoking body and the hollow element, particularly between a base area of the cylindrical smoking body and the first base area of the hollow element. The filter membrane comprises at least one filter aperture that is aligned with the hollow bore, i.e., that is arranged in a section of the filter membrane that is overlaying the hollow bore. In other words, the filter aperture is overlaid with the hollow bore in the first base area of the hollow element. The filter aperture has a smaller (effective) size than a diameter of the hollow bore in the first base area of the hollow element. The at least one filter aperture is configured for filtering particles emitted by the heated smoking body and is at the same time permeable for vapor emitted by the heated smoking body.

**[0008]** In an elongated smoking article configured to be used as a heated tobacco product, i.e., in a device configured for heating the smoking body without burning the combustible material, hollow elements as specified below have been shown to provide a pleasant user experience, particularly by allowing a user to draw amounts of vapor comparable to conventional tobacco products with a resistance to draw also comparable to conventional tobacco products. However, due to the hollow bore extending through the whole filter element the filtering capacity is limited. The present invention advantageously allow to reduce the risk of particles and/or heat of the heated smoking body to reach the mouth of a user without significantly increasing the resistance to draw. Further, the present invention thus allows utilizing the advantages of hollow elements in a smoking article with improved user experience. Preferably, the hollow element is attached to one of the base areas of the smoking body in an end-to-end relationship and elongates the smoking

body. Particularly, a first base area of the hollow element faces a base area of the smoking body in an end-to-end relationship. A second base area of the hollow element is opposite the first base area. Therefore, the hollow element preferably is also of cylindrical shape with the same cross section as the smoking body. The hollow element is further configured to draw vapor, from the heated smoking body.

**[0009]** The elongated smoking article preferably comprises a tipping paper that is circumscribing the smoking body and the hollow element. In other words, the tipping paper circumferentially encloses the cross sections of the smoking body and the hollow element and extends in the longitudinal direction across the smoking body and the hollow element. The tipping paper is further preferred attached to the external surfaces of both, the smoking body and the hollow element and thus connects the smoking body and the hollow element. Preferably, the tipping paper is adhered to the external surfaces of the smoking body and the hollow element.

**[0010]** Preferably, the hollow element of the elongated smoking article according to the present invention is one of a hollow bore filter element and a hollow tube portion. Therein, the hollow bore filter element is configured to reduce specific substances from combustion gases that are emitted from the heated smoking body, particularly the heated combustible material. The filter element may comprise a filter plug, e.g., from cellulose acetate, that comprises a central hollow bore extending along the whole length of the filter. At the same time and in comparison to completely hollow tube portions, such hollow bore filters further provide a support base surface for the combustible material of the smoking body and sufficient mechanical support for a wrapping paper surrounding the elongated smoking article.

**[0011]** However, in another preferred embodiment the hollow element is a hollow tube portion, such as e.g. a hollow cardboard tube. In such an embodiment, the hollow bore extends substantially over the whole first base area as well as the whole second base area. Such hollow tube is configured to allow for cooling and/or mixing of the vapor emitted by the heated smoking body. Hence, the hollow tube portion advantageously improves the uniformity of the vapor drawn by a user. The hollow tube portion may further comprise embedded flavoring materials for improving the gustatory qualities of the vapor. According to this embodiment, the support base surface for the combustible material of the smoking body is preferably formed by the filtering membrane that is covering to the first base area. In a particularly preferred embodiment, the hollow element is the hollow bore filter element as described above and a hollow tube portion as described above is disposed adjacent to and downstream of the hollow bore filter element. Further preferred, the elongated smoking article of the invention also comprises a second filter element that is adjacent to and downstream of the hollow tube portion and that is configured as a mouthpiece for a user. The hollow tube portion and

the second filter element preferably are of cylindrical shape and of the same diameter as the smoking body and/or the hollow bore filter element. The second filter element preferably is a second hollow bore filter element that does not significantly increase a resistance to draw experienced by a user. The smoking body, the hollow bore filter element, the hollow tube portion and/or the second filter element are preferably circumferentially wrapped by a wrapping paper and preferably connected therewith.

**[0012]** In a further preferred embodiment, the filter membrane is disc-shaped, particularly preferred with the same diameter as the cylindrical smoking body and hollow element. In other words, the base areas of the filter membrane is of essentially circular shape. Depending on a thickness of the filter membrane, the filter membrane might be either considered of flat shape or of cylindrical shape. Such filter membrane is preferably attached to one or both of the smoking body and the hollow element, e.g., by a suitable adhesive applied to the first base area of the hollow element. Also preferred, the filter membrane is wedged between the smoking body and the hollow element. In such an embodiment, the filter membrane can be secured in position without being attached to the smoking body and/or the hollow element, e.g., by force closure and/or by the wrapping paper circumferentially surrounding the elements of the elongated smoking article.

**[0013]** Particularly preferred, the filter membrane comprises a plurality of filter apertures. Therein, the filter apertures are preferably configured as a plurality of through holes in the membrane, as a plurality of openings in a mesh-shaped material and/or as a plurality of openings or pores in a cloth shaped material. In other words, the filter apertures are preferably inserted into the material of the filter membrane, e.g., by perforation, or are formed by the material of the filter membrane itself, e.g., as voids between the web bars of a mesh-material. Each of the aperture openings preferably has an effective size between 0.5  $\mu\text{m}$  and 0.5 mm, further preferred between 1  $\mu\text{m}$  and 0.1 mm and particularly preferred between 10  $\mu\text{m}$  and 50  $\mu\text{m}$ . In the context of this application, the effective size refers to a linear extension characteristic for the cross-sectional area of the openings available for vapors to pass through the openings. For a circular aperture, the effective size refers to a diameter of the filter aperture and to a square aperture the effective size refers to a side length of the filter aperture.

**[0014]** The aperture openings are thus suitable for filtering particles emitted by the heated smoking body while being permeable for vapors emitted by the heated smoking body. Further, the aperture openings are significantly smaller than the hollow bore of the hollow element, usually having a size of several millimeters, e.g., 3.5 mm. Further, the aperture openings are significantly larger than the pores or channels of a full cellulose acetate filter, particularly with respect to a hollow bore filter element being the hollow element. Hence, the aperture openings

advantageously allow for filtering particles from the vapor emitted by the heated smoking body without increasing the resistance to draw significantly. Further, the aperture openings advantageously contribute to mixing of the emitted vapor. The size of the filter apertures advantageously ensures that no ash or tobacco particles can pass. It is thus possible to build up a secure stick design while having a hollow bore through all filter and tube segments which generates an intensive tobacco taste and smoke experience.

**[0015]** In another preferred embodiment of the elongated smoking article of the invention, the filter membrane is configured for deflecting, absorbing and/or distributing heat emitted by the heated smoking body. In other words, the filter membrane is also configured to block, dissipate and/or distribute heat which is generated by the device for heating the smoking body. Hence, a user's mouth is advantageously protected from too much heat. Further, by distributing the heat the uniformity of heating of the smoking body might be improved. At the same times any other elements of the elongated smoking article downstream of the filter membrane, such as e.g., the hollow element, are protected from too much heat. In the case of cellulose acetate filter elements downstream the filter membrane, blocking and/or absorbing the heat advantageously protects these downstream elements from melting.

**[0016]** The filter membrane is preferably configured to reflect heat radiation and/or to block heat transport by heat conduction by comprising at least one layer of material with low heat conductivity. Alternatively or additionally, the filter membrane is configured to absorb heat by comprising at least one additional layer with high heat conductivity, whereas such layer is preferably combined with a downstream layer of low heat conductivity. In other words, a layer of the filter membrane facing the smoking body is preferably configured with heat reflecting property and a high heat conductivity for absorbing and/or distributing heat, whereas a downstream layer of the filter membrane is preferably configured with a low heat conductivity in order to block heat transport. Hence, a first layer of the filter membrane facing the smoking body has a higher heat conductivity of a second layer adjacently downstream the first layer.

**[0017]** In another preferred embodiment, at least a portion of the filter membrane that is facing the smoking body comprises a heat-deflecting material, i.e., a material configured for reflecting heat radiation. Preferably, the heat deflecting material is aluminum commonly used in the tobacco industry. Advantageously, aluminum distributes the heat that is not reflected. Further preferred, at least one layer of the filter membrane is of low heat conductivity, such as e.g., of a paper material. Particularly preferred, the filter membrane is formed of a laminate sheet comprising an aluminum layer and a paper layer, wherein the aluminum layer is either adhered to or coated onto the paper layer. Such paper-aluminum-laminates are commonly used in the packaging of tobacco-related

products. In this embodiment, the aluminum layer is facing the smoking body for reflecting the heat emitted therefrom. Further preferred, the filter membrane comprises a metal mesh, wherein such metal mesh can also be combined with a paper layer for forming a metal-paper-laminate sheet. Therein, the metal mesh is preferably circumferentially surrounded by the paper sheet that is used for fixation.

**[0018]** In a preferred embodiment of the elongated smoking article of the invention, the at least one aperture opening is, preferably the plurality of aperture openings are, formed in the filter membrane by laser perforation. However, other forms of perforation such as e.g., needle punching or the like, are also preferred for generating the at least one aperture opening. However, as already mentioned above the aperture openings may also be formed by the material of the filter membrane itself, such as a mesh material, and perforation is obsolete. Particularly preferred, the filter membrane is fully or partially formed of aluminum foil, paper, mesh material and/or cloth material. Particularly preferred, the mesh material is a metal mesh, e.g., from copper or aluminum.

**[0019]** In a particularly preferred embodiment, the filter membrane of the invention further comprises at least one first portion and a second portion. The at least one first portion extends along a lateral surface of the hollow bore filter element, e.g., along the whole length or part thereof and is bent from a second portion of the filter membrane. The second portion of the filter membrane is bent from the at least one first portion, particularly over the first base area of the hollow element such that it extends over the first base area of the hollow element at least partially. In other words, the second portion is covering at least part of the first base area of the hollow element and the at least one first portion is bent to cover a part of the lateral surface of the hollow element. Further, the second portion of the filter membrane comprises the at least one filter aperture as described above, i.e., being aligned with the hollow bore in the first base area. This embodiment advantageously provides an improved fixation of the filter membrane to the hollow element, particularly via the at least first portion being fixed to the lateral surface of the hollow bore filter element. Preferably, the filter membrane is formed of aluminum foil, paper, mesh material and/or cloth material or a mixture of those materials, such as e.g., an aluminum-paper-laminate.

**[0020]** In a particularly preferred embodiment, the at least one first portion and the second portion of the filter membrane are formed of a metal mesh. Further preferred, such filter membrane comprises a plurality of first portions, e.g., two or more, first portions that are bent from the second portion covering the first base area onto the lateral surface for providing a form and/or form closure between the first portions and the lateral surface of the filter element. Further preferred, the second portion is formed of a metal mesh and configured for being placed on the first base area, e.g., by comprising a disc-shape. Then, the at least one first portion is extending outward

from the second area in the plane of the second area before being bent onto the lateral surface of the hollow bore filter element. Further preferred, in this embodiment the at least one first portion can also be formed of a paper material or a cloth material and is configured to be glued to the lateral surface of the hollow bore filter element.

**[0021]** Further preferred, the second portion has a rectangular or circular shape that is suitable for covering the hollow bore in the first base area of the hollow element. According to a preferred embodiment, at least two first portions extend laterally from respective parts of the circumference of the second portion. In other words, the first portions protrude as flaps from the second portion, wherein the flaps are separate from each other and can be separately bent to extent over the lateral surface of the hollow element. In such embodiment, each of the flaps can be glued to the lateral surface of the hollow element or the plurality of flaps commonly provides a form closure with the hollow element. In an alternatively preferred embodiment, one first portion surrounds the entire second portion circumferentially. Exemplarily, in case of a circular second portion, the first portion is formed by a circular ring connected to the second portion in a radially outward direction. Such one first portion can also be glued to or provide a form closure with the lateral surface of the hollow element.

**[0022]** The first portion of the filter membrane is preferably glued to the lateral surface of the hollow element. Hence, the filter membrane is properly fixed to the hollow element. However, the first portion can also be attached to the hollow element by other means, such as e.g., stitching or the like. Also preferred, the first portion is attached to the hollow element solely by the wrapping paper wrapped around the hollow element and the first portion and/or by the second portion being wedged between the smoking body and the hollow element.

**[0023]** Further preferred, the filter membrane comprises a third portion that is bent from the first portion and that extends over the second base area. In other words, the third portion is preferably bent over the second base area, particularly above the hollow bore in the second base area. According to this embodiment, the third portion also has at least one filter aperture that is aligned with the hollow bore in the second base area. The filter apertures in the third portion are preferably configured as described above. By providing such third portion a second filter membrane is provided in the flow path of the vapor emitted by the smoking body hence increasing the filter efficiency with respect to particles emitted by the heated smoking body and/or increasing the heat deflecting efficiency of the membranes.

**[0024]** Another aspect of the present invention relates to a method for producing or manufacturing a hollow element, preferably a hollow bore filter element or a hollow tube portion for an elongated smoking article according to the present invention. The so produced hollow element can thus be used for manufacturing an elongated smoking article according to the invention. The method for

manufacturing the hollow element comprises at least the following steps.

**[0025]** In a first step of the method, a hollow element is provided that has a first base area, a second base area opposite to the first base area and a hollow bore that extends from the first base area to the second base area. Such hollow elements are known from the prior art and the provided hollow element does not differ from those elements. In another step of the method of the invention, a membrane sheet is provided that has a width that exceeds a distance between the first base area and the second base area. In other words, the width of the membrane sheet exceeds the length of the hollow element.

**[0026]** In the method of the invention, then an adhesive is applied to a first portion of the membrane sheet, wherein the first portion has a width that corresponds to the distance between the first base area and the second base area. In other words, the first portion of the membrane sheet is only a part of the membrane sheet and thus a portion of the membrane sheet is not covered by the adhesive. Depending on the position of the first portion, either one second portion of the membrane sheet on one side of the first portion remains free of adhesive or second portion and a third portion on both sides of the first portion remain free of adhesive.

**[0027]** In a next step of the method of the invention, a segment is separated from the membrane sheet, wherein the segment has a length corresponding to the width of the membrane sheet. In other words, the segment is separated, e.g., cut, from the membrane sheet in the width direction of the membrane sheet. Hence, a plurality of segments connected to each other in a length direction of the membrane sheet perpendicular to the width direction of the membrane sheet form the membrane sheet. The separation of the segment is preferably performed by blade-cutting or the like. The segment has thus a first portion covered by the adhesive and a second portion without adhesive on one side of the first portion and eventually also a third portion.

**[0028]** In the method of the invention, the first portion of the segment is then attached to a lateral surface of the hollow element via the adhesive. In other words, the segment is adhered to the hollow element. This can be done by placing the segment onto the hollow element or by rolling the hollow element over the segment or the like. After the segment is attached to the hollow element and, eventually, after the adhesive is dried, the second portion of the segment is bent over the first base area of the hollow element. In a preferred embodiment, wherein the first portion is a central portion of the membrane sheet in a width direction thereof as described above, further a third portion of the segment is bent over the second base area of the hollow element.

**[0029]** Preferably, the membrane sheet used in the method of the invention comprises at least one aperture opening as described above that is located in the second portion and, eventually, in the third portion of the membrane sheet. Then, the first portion is bent over the first

base area such that the aperture openings in the first portion are aligned with the hollow bore in the first base area and, eventually, the second portion is bent over the second base area such that the aperture openings in the second portion are aligned with the hollow bore in the second base area. Alternatively, the method further comprises the step of perforating, preferably laser perforating, the second portion and/or the third portion of the membrane sheet, i.e., before the segmentation of the segment, or the step of perforating, preferably laser perforating, the second portion and/or the third portion of the segment, i.e., after the segmentation of the segment.

**[0030]** Further aspects and preferred embodiments of the invention result from the dependent claims, the drawings and the following description of the drawings. Different disclosed embodiments are advantageously combined with each other if not stated otherwise.

#### BRIEF DESCRIPTION OF DRAWINGS

**[0031]** Further features of the invention will become apparent to those of ordinary skill in the art by describing in detail exemplary embodiments with reference to the attached drawings in which:

Fig. 1 illustrates a schematic perspective view of an elongated smoking article according to the prior art;

Fig. 2 illustrates a schematic perspective view of an elongated smoking article according to a first embodiment;

Fig. 3 illustrates a schematic perspective view of an elongated smoking article according to a second embodiment;

Fig. 4 illustrates a schematic perspective view of an hollow bore filter element according to an embodiment and schematic front views of the base areas of such hollow bore filter element;

Fig. 5 illustrates a schematic perspective partial view of an elongated smoking article according to the second embodiment;

Fig. 6 illustrates a schematic perspective view of an elongated smoking article according to a third embodiment;

Fig. 7 schematically illustrates schematic front views of filter membranes according to embodiments; and

Fig. 8 schematically illustrates schematic front views of filter membranes according to further embodiments.

#### DETAILED DESCRIPTION OF AN EXAMPLE EMBODIMENT

**[0032]** With reference to Figure 1, a schematic perspective view of an elongated smoking article according to the prior art is illustrated. The elongated smoking article includes a cylindrical smoking body 10 filled with combustible material. The cylindrical surface of the smoking body 10 is surrounded by a wrapping paper. The wrapping paper 12 typically incorporates a fibrous material, such as a cellulosic material, e.g. a lignocellulosic material. Exemplary cellulosic materials include flax fibers, hardwood pulp, softwood pulp, hemp fibers, esparto fibers, and sisal fibers, wherein mixtures of cellulosic materials can be employed.

**[0033]** One base area of the smoking body 10 is open to expose the combustible material. At this open base area of the smoking body 10 a heating element to heat the combustible material could be inserted into the smoking body. At the other base area a hollow bore filter element 20 is positioned. The filter element 20 may be at least partially formed of 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. The hollow bore filter element comprises a hollow bore 25. Preferably, smoking body 10 and the hollow bore filter element 20 has a diameter of 7.2 mm and the hollow bore 25 has a diameter of 3.5 mm.

**[0034]** Adjacent to the hollow bore filter element 20 a hollow tube portion 30 is positioned that is formed by a cardboard tube having the same diameter as the smoking body 10 and the hollow bore filter element 20. Adjacent to the hollow tube portion 30 a second hollow bore filter element 40 with a hollow bore 45 having a diameter of 2 mm is positioned. The hollow tube portion 30 and the second hollow bore filter element 40 have also a diameter of 7.2 mm.

**[0035]** The smoking body 10, the hollow bore filter element 20, the hollow tube portion 30 and the second hollow bore filter element 40 are axially aligned in an end-to-end relationship along a longitudinal relationship of the elongated smoking article. The base areas 21, 22 of the hollow bore filter element 20 are open to permit the passage of air and smoke there through. One of these base areas, i.e., the first base area 21, contacts the smoking body 10 and the other base area opposite the first base area, i.e., the second base area 22, contacts the hollow tube portion 30. The hollow bore filter element 20 includes a filter material, such as e.g. plasticized cellulose acetate or a biodegradable material, which is configured to reduce substances in combustion gases that are drawn by a smoker from the heated smoking body 10 through the second base area 22 of the hollow bore filter element 20.

**[0036]** Preferably, the smoking body 10, the hollow bore filter element 20, the hollow tube portion 30 and the

second hollow bore filter element 40 are fixed to each other via a wrapping paper (not shown) that is circumscribing all of the aforementioned components. The wrapping paper is wrapped around these components along the longitudinal direction and is attached by an adhesive to external surfaces of these components and/or to itself. Thus, the wrapping paper provides a force closure between the aforementioned components via an indirect adhesive bond using a suitable adhesive, such as e.g., a water-based adhesive of the type traditionally employed by cigarette manufacturers for application of wrapping paper during filtered cigarette manufacture. The wrapping paper hence extends around the longitudinally extending periphery of substantially the entire length of the elongated smoking article.

**[0037]** Figure 2 illustrates a schematic perspective view of an elongated smoking article 100 according to a first embodiment of the present invention. The elongated smoking article 100 of Figure 2 differs of that from Figure 1 in that a disc-shaped filter membrane 50 is positioned in between the smoking body 10 and the hollow bore filter element. The filter membrane is adhered to the first base area 21 of the hollow bore filter element 20 and/or wedged between the smoking body 10 and the hollow bore filter element 20 by indirect force closure due to the wrapping paper (not shown). The filter membrane 50 comprises a plurality of aperture openings 55 that are aligned with the hollow bore 25 of the hollow bore filter element 20 as schematically shown in Figure 2. The function of the filter membrane 50 is described in detail with respect to Figure 5 and a redundant description is thus omitted with respect to Figure 2.

**[0038]** Figure 3 illustrates a schematic perspective view of an elongated smoking article 100 according to a second embodiment of the present invention. The elongated smoking article 100 of Figure 2 differs of that from Figures 1 and 2 in that a first portion 51 of the filter membrane 50 is attached to a lateral surface of the hollow bore filter element 20. A second portion 52 of the filter membrane 50 is bent from the first portion 51 and over the first base area 21 of the hollow bore filter element 20. A plurality of aperture openings (not shown) are arranged in the second portion 52 and aligned, i.e., overlaid, with hollow bore 25. The filter membrane 50 is advantageously well attachable to the hollow bore filter element 20.

**[0039]** Figure 4 illustrates a schematic perspective view of a hollow bore filter element 20 according to an embodiment and schematic front views of the base areas 21, 22, of such hollow bore filter element 20. The hollow bore filter element 20 has a first portion 51 of a filter membrane 50 attached thereto as already described with respect to Figure 3. A second portion 52 of the filter membrane 50 is bent over the first base area 21 of the hollow bore filter element 20 and comprises a plurality of aperture openings 55 that are overlaid with the hollow bore 25 in the first base area 21 as shown in the plan view on the first base area 21. Further, a third portion 53 is bent over the second base area 22 of the hollow bore filter

element 20 and comprises a mesh 56 with a plurality of openings that are overlaid with the hollow bore 25 in second base area 22 as shown in the plan view thereon.

**[0040]** Figure 5 illustrates a schematic perspective partial view of an elongated smoking article 100 according to the first embodiment as well as a working principle thereof. As can be seen in Figure 5, particles 70, such as e.g., ash, as well as vapor 80 are emitted from the smoking body 10 that is heated to a temperature below its combustion temperature. These particles 70 and vapor 80 are drawn from a user in a downstream direction of the elongated smoking article 100 towards the hollow bore filter element 20 thereof. A distance between smoking body 10 and hollow bore filter element 20 is solely shown for illustrative purposes, the smoking body 10 and hollow bore filter element 20 are actually located directly adjacent.

**[0041]** The hollow bore filter element 20 is configured as already described with respect to Figures 3 and 4 and comprises a second portion 52 of a strip-shaped segment 50 bent over the hollow bore 25 with a plurality of aperture openings 55 aligned with hollow bore 25. The strip-shaped segment 50 is formed from a paper-aluminum laminate, wherein the aluminum layer is facing upward in the first portion 51 and in direction of the smoking body 10 in the second portion 52. Due to the second portion 52 heat emitted by the smoking body 10 and/or a heating element (not shown) inserted therein, is deflected back towards the smoking body 10 and thus kept away from a user's mouth. Further, the aperture openings 55 with a size of 10  $\mu\text{m}$  filter the particles 70 out of the stream and let only vapor 80 pass to the user's mouth. The vapor 80 then passes predominantly through the hollow bore 25 of the hollow bore filter element 20 as illustrate in Figure 5 by the central set of arrows marked with reference 80. Hence, a user experience is characterized by less/low heat, particles and resistance to draw.

**[0042]** Figure 6 illustrates a schematic perspective view of an elongated smoking article 100 according to a third embodiment. The elongated smoking article 100 differs from the smoking articles 100 according to the first and second embodiment in two respects. First, in the third embodiment the hollow element is a hollow tube portion 30 that is positioned adjacent to the smoking body 10. In other words, the first hollow bore filter element 20 is omitted, whereas the second hollow bore filter element 40 downstream the hollow tube portion 30 is kept as a mouthpiece for the user. Second the filter membrane 50 is formed differently then in the first and second embodiment, particularly as shown in Figure 7A as described below.

**[0043]** Figure 7 schematically illustrates schematic front views of filter membranes 50 according to embodiments. The filter membranes 50 of Figure 7 are fully formed of a metal mesh, e.g. a copper or aluminum mesh, wherein the mesh openings form the aperture openings as described above. Each of the filter membranes shown in Figure 7 comprises a central circular second portion

52 that is configured to be overlaid with, i.e., to cover, the hollow bore 25, 35 of the hollow element 20, 30. Further, each of the filter membranes 50 of Figure 7 comprises at least one first portion 51. Particularly, the filter membrane 50 of Figure 7A comprises four first portions 51 that extend laterally from the second portion 52.

**[0044]** Each of the first portions 51 has a rectangular shape and is configured to be bend to cover the lateral surface of the hollow element 20, 30. Due to the plasticity of the metal mesh, the first portions 51 stay fixed in the bent position and provide a form and/or force closure with the lateral surface of the hollow element 20, 30. The filter membrane 50 of Figure 7B comprises two first portions 51 that are configured identically to the first portions 51 of Figure 7A. The filter membrane 50 of Figure 7C comprises a single first portion 51 that is formed as a circular ring circumferentially surrounding the central second portion 52. The single first portion 51 is also configured to be bend over the lateral surface of the hollow element 20, 30, to be plastically deformed and to provide a form and/or force closure with the lateral surface.

**[0045]** Figure 8 schematically illustrates schematic front views of filter membranes 50 according to further embodiments. In the filter membranes 50 of Figure 8, only the central second portion 52 is formed from a metal mesh material that is circumferentially embedded by a paper carrier 54. The paper carrier 54 might be double layered and an edge region of the metal mesh second portion 52 might be glued between the layers of the paper carrier 54. First portions 51 extend from the paper carrier of the filter membrane and are configured to be bend over the lateral surface of the hollow element 20, 30 and to be glued to the lateral surface. Particularly, the filter membrane 50 of Figure 8A comprises four first portions 51 that extend laterally from the second portion 52. Each of the first portions 51 has a rectangular shape and is configured to be bend to be glued to the lateral surface of the hollow element 20, 30. The filter membrane 50 of Figure 8B comprises two first portions 51 that are configured identically to the first portions 51 of Figure 7A. The filter membrane 50 of Figure 8C comprises a single first portion 51 that is formed as a circular ring circumferentially surrounding the central second portion 52. The single first portion 51 is also configured to be bend over the lateral surface of the hollow element 20, 30, to be glued to the lateral surface.

#### REFERENCE SIGNS

##### **[0046]**

10 cylindrical smoking body  
20 hollow bore filter element  
21 first base area  
22 second base area  
25 first hollow bore

30 hollow tube portion  
40 second hollow bore filter element  
45 second hollow bore  
50 filter membrane  
55 filter aperture  
51 first portion  
52 second portion  
53 third portion  
100 elongated smoking article

#### Claims

1. Elongated smoking article (100), comprising:

20 a cylindrical smoking body (10) with a combustible material;  
a hollow element (20, 30) adjacent to the cylindrical smoking body (10) and comprising a first base area (21, 31) facing the smoking body (10) and a second base area (22, 32) opposite the first base area (21, 32) and a hollow bore (25, 35) extending from the first base area (21, 31) to the second base area (22, 32); and  
a filter membrane (50) arranged between the smoking body (10) and the hollow element (20, 30), comprising at least one filter aperture (55) aligned with the hollow bore (25, 35), configured for filtering particles emitted by the heated smoking body (10) and permeable for vapor emitted by the heated smoking body (10).

2. Elongated smoking article (100) according to claim 1, wherein the hollow element (20, 30) is one of a hollow bore filter element (20) configured for filtering substances from vapor emitted by the heated smoking body (10) and a hollow tube portion (30) configured for mixing the vapor emitted by the heated smoking body (10).

3. Elongated smoking article according to claim 1 and 2, wherein the hollow element is the hollow bore filter element (20) and wherein the hollow tube portion (30) is adjacent to and downstream of the hollow bore filter element (20), the elongated smoking article (100) further comprising a second filter element (40) adjacent to and downstream of the hollow tube portion (30) and configured as a mouthpiece for a user, wherein the second filter element (40) preferably is a second hollow bore filter element.

4. Elongated smoking article (100) according to any one of the preceding claims, wherein the filter membrane (50) is disc-shaped and/or wedged between

- the smoking body (10) and the hollow element (20, 30).
5. Elongated smoking article (100) according to any one of the preceding claims, wherein the filter membrane (50) comprises a plurality of filter apertures (55), each filter aperture (55) having an effective size between 0.5  $\mu\text{m}$  and 0.5 mm.
  6. Elongated smoking article (100) according to any one of the preceding claims, wherein the filter membrane (50) is configured for deflecting, absorbing and/or distributing heat emitted by the heated smoking body (10).
  7. Elongated smoking article (100) according to claim 6, wherein at least a portion of the filter membrane (50) facing the smoking body (10) comprises a heat-deflecting and/or heat-distributing material, preferably aluminum.
  8. Elongated smoking article (100) according to any of the preceding claims, wherein the at least one aperture opening (55) is formed in the filter membrane (50) by laser perforation.
  9. Elongated smoking article (100) according to any of the preceding claims, wherein the membrane (50) is formed of aluminum foil, paper, mesh material and/or cloth material.
  10. Elongated smoking article (100) according to any one of the preceding claims, wherein the filter membrane (50) comprises at least one first portion (51) extending along a lateral surface of the hollow element (20, 30) and bent from a second portion (52) extending over the first base area (21, 31) and comprising the at least one filter aperture (55).
  11. Elongated smoking article (100) according claim 10, wherein the at least one first portion (51) is glued to the lateral surface of the hollow element (20, 30) and/or formed of paper and/or wherein the second portion (52) is formed of metal mesh.
  12. Elongated smoking article (100) according to claim 10, wherein the filter membrane (50) is formed of a metal mesh and is attached to the hollow element (20, 30) by a form closure and/or force closure between the at least one first portion (51) and the hollow element (20, 30).
  13. Elongated smoking article (100) according to claim 10 or 11, wherein the first portion (51) extends along the whole length of the lateral surface of the hollow element (20, 30) and the filter membrane (50) comprises a third portion (53) bent from the first portion (51) and extending over the second base area (22, 32), the third portion (53) comprising at least one further filter aperture (55) aligned with the hollow bore (25, 35) in the second base area (22, 32).
  14. Method for producing a hollow element for an elongated smoking article (100) according to any one of the preceding claims, comprising the steps of:
    - providing a hollow element (20, 30) with a first base area (21, 31), a second base area (22, 32) opposite the first base area (21, 31) and a hollow bore (25, 35) extending from the first base area (21, 31) to the second base area (22, 32);
    - providing a membrane sheet with a width exceeding a distance between the first base area (21, 31) and the second base area (22, 32);
    - applying an adhesive to a first portion (51) of the membrane sheet, the first portion having a width corresponding to the distance between the first base area (21, 31) and the second base area (22, 32);
    - separating a segment from the membrane sheet, the segment having a length corresponding to the width of the membrane sheet;
    - attaching the first portion (51) of the segment to a lateral surface of the hollow element (20, 30) via the adhesive; and
    - bending a second portion (52) of the segment over the first base area (21, 31) of the hollow element (20, 30).
  15. Method according to claim 14, wherein the first portion (51) is a central portion of the membrane sheet in a width direction of the membrane sheet, the method further comprising the step of:
    - bending a third portion (53) of the segment over the second base area (22, 32) of the hollow element (20, 30).

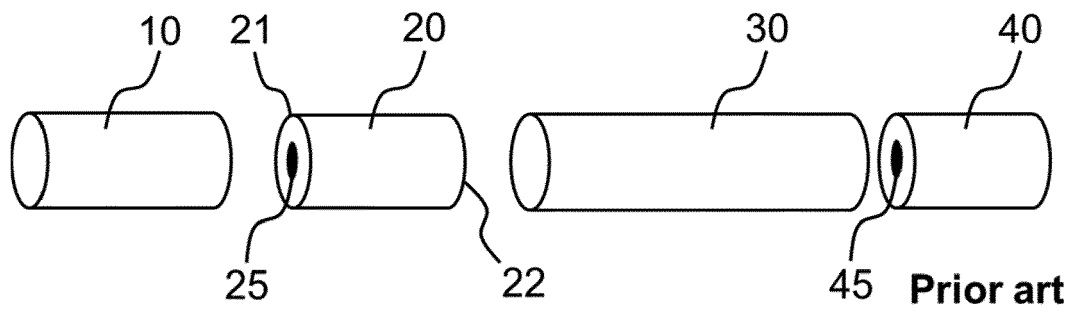


FIG. 1

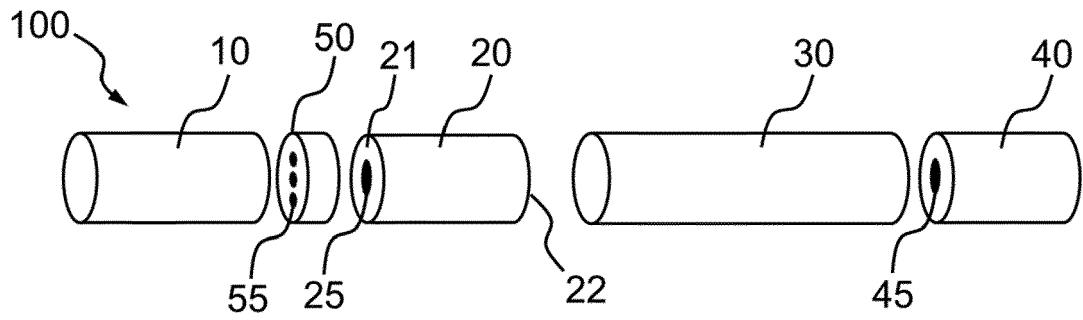


FIG. 2

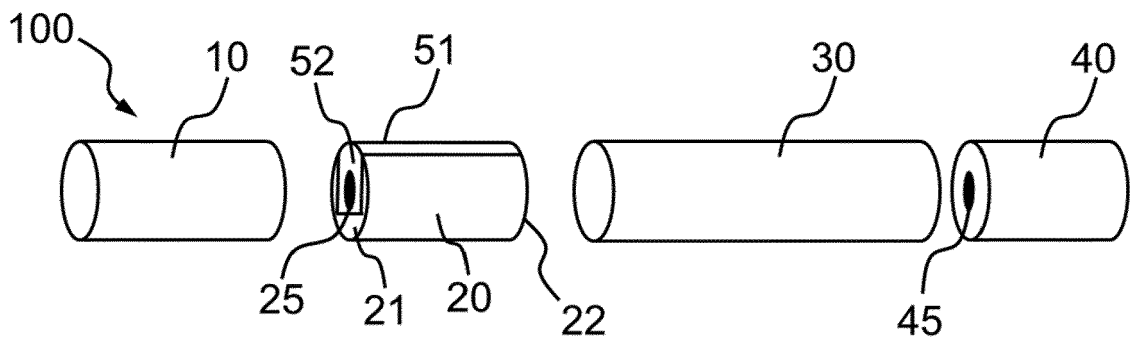


FIG. 3

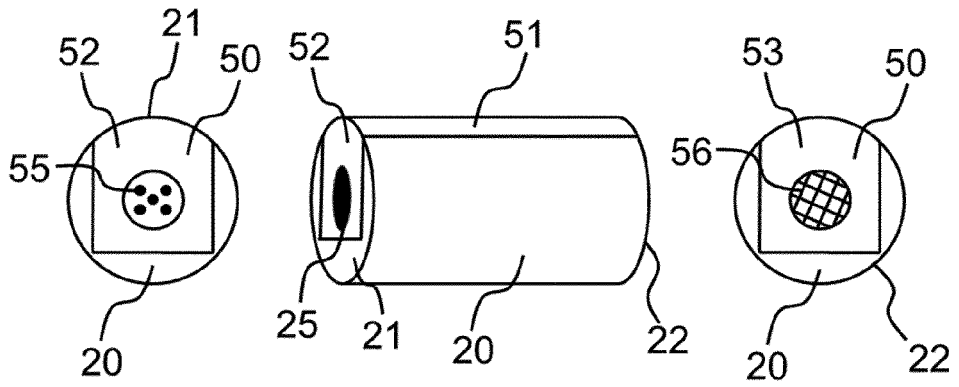


FIG. 4

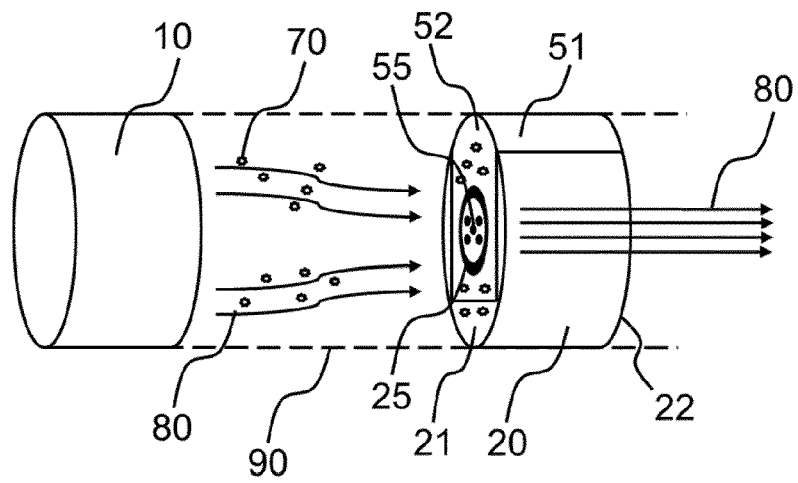


FIG. 5

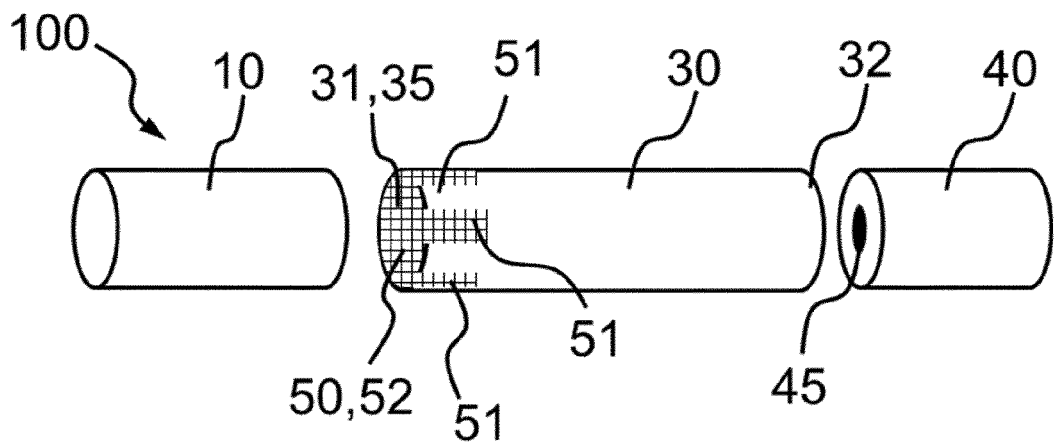


FIG. 6

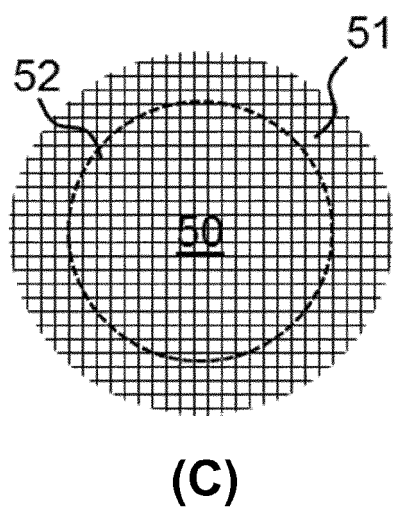
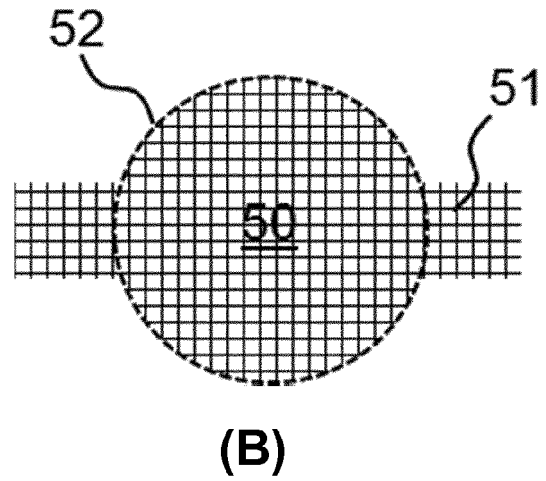
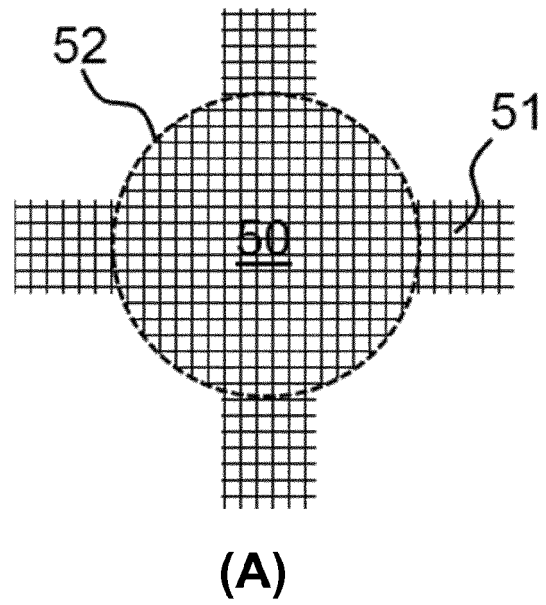
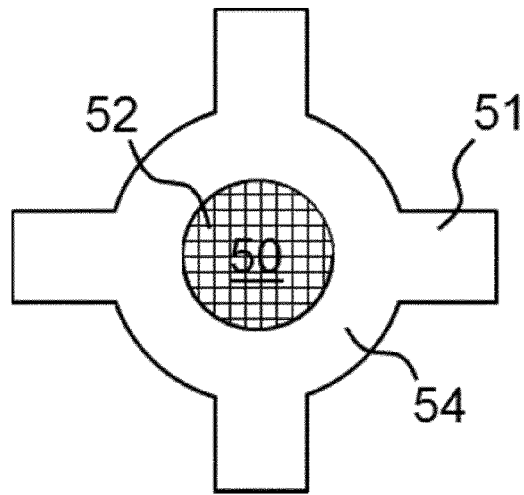
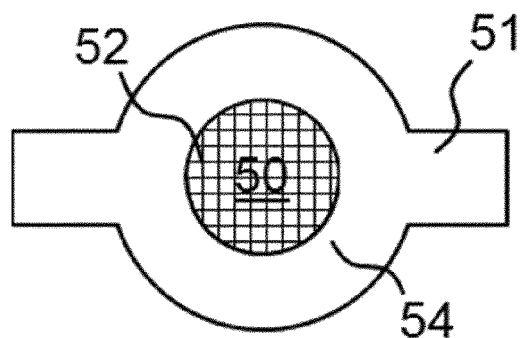


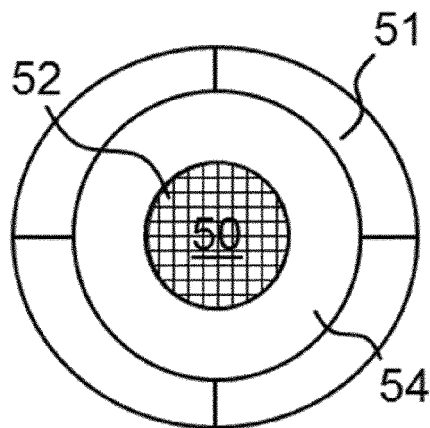
FIG. 7



(A)



(B)



(C)

FIG. 8



EUROPEAN SEARCH REPORT

Application Number  
EP 19 18 7689

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			A24D
The present search report has been drawn up for all claims			
Place of search <b>Munich</b>		Date of completion of the search <b>17 January 2020</b>	Examiner <b>Schwertfeger, C</b>
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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