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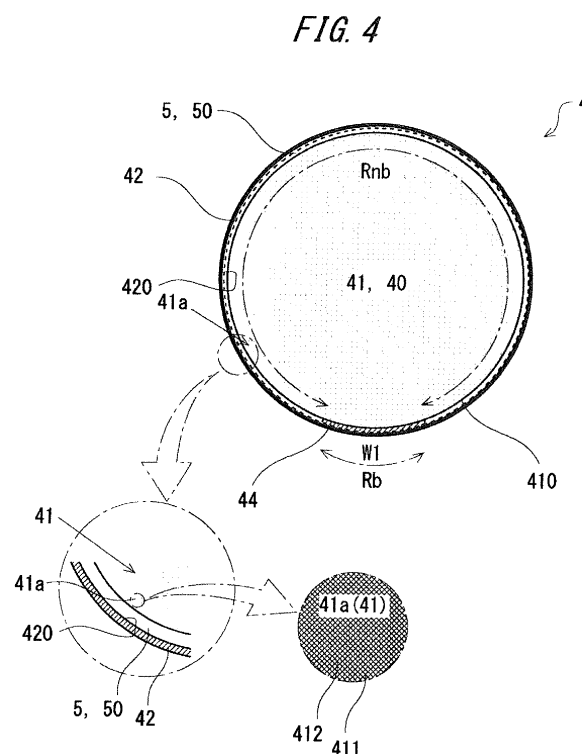
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(54) **CIGARETTE FILTER**

(57) A cigarette filter connected through tipping paper at one end of a tobacco rod in which tobacco shreds are wrapped in cigarette paper, the cigarette filter including: a filter material arranged at an inhalation end of the filter; and wrapping paper wrapping the filter material so as to cover the outer circumferential surface of the filter material, wherein the wrapping paper is colored on its covering surface that covers the filter material, and the cigarette filter further includes a light-permeable portion that is formed at the inhalation end of the filter, on the inside of the filter lateral cross-section from the covering surface of the wrapping paper.



Description

Technical Field

[0001] The present invention relates to a cigarette filter.

Background Art

[0002] A filter cigarette provided with a filter on the inhalation side of the cigarette is widely known. In the filter cigarette, the filter is connected through tipping paper at one end of a tobacco rod (wrap portion) in which tobacco shreds are wrapped in cigarette paper. Such a cigarette filter is formed, for example, by enveloping a filter material, such as a bundle of acetate fibers, in cigarette paper.

[0003] In recent years, there has been demand for a technique to provide a cigarette filter with excellent design. In this connection, a technique has also been proposed that provides a distinctive appearance at the end face of a filter by adding a naturally-colored flavoring agent to an adhesive used for bonding a filter material of the filter and wrapping paper (plug wrap) with each other (e.g., see Patent document 1).

[0004] [Patent document 1] International Publication No. WO 2009/080604

Summary of Invention

Technical Problem

[0005] However, the conventional technique for enhancing the design of a filter seems to still have room for improvement. Having been devised in view of such a situation, the present invention aims to provide a cigarette filter superior in design to conventional ones.

Solution to Problem

[0006] To solve the above problem, the present invention has adopted the following solutions. According to the present invention, there is provided a cigarette filter that is connected through tipping paper at one end of a tobacco rod in which tobacco shreds are wrapped in cigarette paper, the cigarette filter including: a filter material arranged at an inhalation end of the filter; and wrapping paper wrapping the filter material so as to cover the outer circumferential surface of the filter material, wherein the wrapping paper is colored on its covering surface that covers the filter material, and the cigarette filter further includes a light-permeable portion that is formed at the inhalation end of the filter, on the inside of the filter lateral cross-section from the covering surface of the wrapping paper.

[0007] Here is the principle of how the color of an object can be seen: when visible light reflected from an object enters the human eye, the eye senses differences in intensity and wavelength of the light as stimuli, which cause the brain to work to recognize a "color". In the present

invention, it is possible to cause visible light, which has reflected off the covering surface of the colored wrapping paper, to penetrate the light-permeable portion and emit the light from the inhalation end of the filter to the outside.

Thus, as the light reflected from the covering surface of the colored wrapping paper is delivered through the light-permeable portion to the eyes of a smoker, the smoker can recognize the color of the colored covering surface. As a result, the design of the cigarette filter can be enhanced compared with conventional ones. That is, according to the present invention, it is possible to provide a cigarette filter superior in design to conventional ones.

[0008] Here, the light-permeable portion may be configured to include a clearance among fibers forming an outer circumferential region of the filter material at the inhalation end of the filter. If the clearance formed among the fibers constituting the filter material functions as the light-permeable portion, the light reflected from the covering surface of the colored wrapping paper can be favorably delivered to the eyes of a smoker, so that the smoker can recognize the color of the covering surface.

[0009] In the case where the clearance formed among the fibers constituting the filter material functions as the light-permeable portion as described above, the fiber layer density in the outer circumferential region of the filter material may be lower than the fiber layer density in an inner circumferential region located further on the central axis side of the filter material than the outer circumferential region. Thus, if the fiber layer density in the outer circumferential region of the filter material is reduced, the penetration efficiency with which the visible light having reflected off the covering surface of the wrapping paper penetrates the clearance formed among the fibers constituting the filter material can be favorably increased, so that the color of the colored covering surface can be visually well recognized.

[0010] The light-permeable portion may be configured to include a clearance portion that is formed between the covering surface of the wrapping paper and the outer circumferential surface of the filter material at the inhalation end of the filter. Thus, if the clearance portion formed between the covering surface of the wrapping paper and the outer circumferential surface of the filter material functions as the light-permeable portion, the light reflected from the covering surface of the colored wrapping paper can be favorably delivered to the eyes of a smoker, so that the smoker can recognize the color of the covering surface.

[0011] Here, the covering surface of the wrapping paper may be bonded with the outer circumferential surface of the filter material in a part in the circumferential direction of the filter material, and the clearance portion may be formed in a non-bonded region in which the covering surface of the wrapping paper and the outer circumferential surface of the filter material are not bonded with each other at the inhalation end of the filter. Thus, the clearance portion can be favorably formed between the covering surface of the wrapping paper and the outer

circumferential surface of the filter material.

[0012] An adhesive used for bonding the covering surface of the wrapping paper and the outer circumferential surface of the filter material with each other may be applied along the longitudinal axis direction of the filter, and the clearance portion may be formed along the entire circumference of the inhalation end of the filter as an unapplied region to which the adhesive is not applied is formed at the inhalation end. Accordingly, the light-permeable portion can be formed annularly along the entire circumference of the inhalation end of the filter. As a result, the visual recognizability of the color of the covering surface of the colored wrapping paper can be further increased, so that the design of the filter can be further enhanced.

[0013] The light-permeable portion may be configured to include a transparent coating layer that is laminated on the covering surface of the wrapping paper at the inhalation end of the filter. Accordingly, the same effect as when the above-described clearance portion is provided is achieved, since the transparent coating layer can be interposed between the covering surface of the wrapping paper and the outer circumferential surface of the filter material. That is, the transparent coating layer allows penetration of the reflected light of visible light having reflected off the covering surface of the wrapping paper. Thus, when a smoker looks at the inhalation end of the filter, the visible light having reflected off the covering surface of the wrapping paper can be sufficiently delivered to the eyes of the smoker, so that the smoker can favorably recognize the color of the covering surface of the colored wrapping paper.

[0014] The wrapping paper may be colored with a printing ink printed on the covering surface. Accordingly, it is possible to prevent dropping of the ink during handling in the manufacturing process of the cigarette, or to prevent bleeding of ink due to saliva of a smoker etc. during smoking.

[0015] The solutions of the present invention for solving the problem can be adopted in combination as far as possible.

Advantageous Effects of Invention

[0016] According to the present invention, it is possible to provide a cigarette filter superior in design to conventional ones.

Brief Description of Drawings

[0017]

[Fig. 1] Fig. 1 is a side view of a cigarette according to Embodiment 1.

[Fig. 2] Fig. 2 is a view representing the schematic structure of the cigarette according to Embodiment 1.

[Fig. 3] Fig. 3 is a view illustrating an aspect of bonding between a plug wrap and a filter segment according to Embodiment 1.

ing to Embodiment 1.

[Fig. 4] Fig. 4 is a view representing a filter in a state in which the filter segment is wrapped in the plug wrap according to Embodiment 1.

[Fig. 5] Fig. 5 is a view illustrating a filter according to a first modified example.

[Fig. 6] Fig. 6 is a view representing the schematic configuration of the filter according to the first modified example.

[Fig. 7] Fig. 7 is a view representing the schematic configuration of a filter according to a second modified example.

[Fig. 8] Fig. 8 is a view representing the schematic configuration of a filter according to Embodiment 2.

Description of Embodiments

[0018] Here, embodiments of a cigarette filter according to the present invention will be described on the basis of the drawings. Unless specifically described otherwise, the dimensions, materials, shapes, relative arrangement, etc. of the components described in the embodiments are not intended to limit the technical scope of the present invention only thereto.

<Embodiment 1>

[0019] Fig. 1 is a side view of a cigarette 1 according to Embodiment 1. Fig. 2 is a view representing the schematic structure of the cigarette 1 according to Embodiment 1. Fig. 2 is a cross-sectional view representing a part of the cigarette 1. The cigarette 1 has a tobacco rod 2 and a filter 4 that is connected through tipping paper 3 at one end of the tobacco rod 2. The tobacco rod 2 is tobacco shreds 21 wrapped in cigarette paper 22, and is shaped in a circular columnar shape (rod shape). The tobacco rod 2 is sometimes called a "single-wrap portion". The filter 4 is also shaped in a circular columnar shape (rod shape) as represented in Fig. 1. The arrow A in Fig. 1 indicates the longitudinal axis direction of the cigarette 1 (the tobacco rod 2, the filter 4). In this specification, the cross-section orthogonal to the longitudinal axis of the cigarette 1 (the tobacco rod 2, the filter 4) will be hereafter referred to as the "lateral cross-section".

[0020] The filter 4 is a member that filters smoke components contained in mainstream smoke generated during smoking of the cigarette 1. Hereinafter, the end of the filter 4 connected with the tobacco rod 2 will be referred to as a "connection end", and the end opposite from this connection end will be referred to as an "inhalation end 40". The inhalation end 40 of the filter 4 is the end that is held in a smoker's mouth during smoking.

[0021] The filter 4 includes a filter segment 41 that is a filter material (filtration material), and a plug wrap 42 as wrapping paper that wraps the filter segment 41. For example, the filter segment 41 is a fiber bundle of cellulose acetate shaped into a circular columnar shape. The plug wrap 42 has air permeability. As represented in Fig.

2, the end face of the plug wrap 42 and the end face of the filter segment 41 are aligned at the inhalation end 40 of the filter 4.

[0022] The tobacco rod 2 and the filter 4 are integrally connected with each other by being wrapped in the tipping paper 3. The tipping paper 3 is bonded on the plug wrap 42 and the cigarette paper 22 so as to cover the entire outer circumference of the plug wrap 42 of the filter 4 as well as to cover the end side of the cigarette paper 22 of the tobacco rod 2. In a region of the tipping paper 3 that covers the filter 4, ventilation holes 31 are drilled through which external air (air) for diluting mainstream smoke is introduced into the filter 4. These ventilation holes 31 are introduction holes of so-called ventilating external air, and the plurality of ventilation holes 31 are provided in the tipping paper 3. Whether or not to provide the ventilation holes 31 in the tipping paper 3 is optional, and the aspect of installation of the ventilation holes 31 can also be changed appropriately. Since the plug wrap 42 has air permeability as mentioned above, external air passing through the ventilation holes 31 of the tipping paper 3 is introduced into the filter 4 by penetrating the plug wrap 42.

[0023] Fig. 3 is a view illustrating an aspect of bonding between the plug wrap 42 and the filter segment 41 according to Embodiment 1. Reference sign 420 indicated in Fig. 3 denotes a covering surface that covers the filter segment 41 so as to face the outer circumferential surface 410 thereof when the filter segment 41 is wrapped. The surface of the plug wrap 42 opposite from the covering surface 420 will be referred to as an outer circumferential surface 421. The outer circumferential surface 421 of the plug wrap 42 is a surface to be bonded with the tipping paper 3.

[0024] In this embodiment, the covering surface 420 of the plug wrap 42 is colored by printing. Reference sign 45 indicated in Fig. 3 represents a printing ink applied to all over the covering surface 420 of the plug wrap 42. For example, the type of the printing ink 45 may be a gravure ink, a flexo ink, etc. In this embodiment, the covering surface 420 of the plug wrap 42 is colored with one color, but the covering surface 420 may be colored with a plurality of colors. When printing a coloring ink by gravure printing on the covering surface 420 of the plug wrap 42, it is preferable that the plug wrap 42 has the following properties excellently suitable for gravure printing. For example, the covering surface 420 of the plug wrap 42 has a smoothness of preferably 80 [sec] or higher, and more preferably 150 [sec] or higher. The plug wrap 42 has a basis weight of preferably 25 [gms] or larger, and more preferably 30 [gms] or larger. The plug wrap 42 has a Stoeckigt sizing degree of preferably 2.8 [sec] or lower. It is preferable that a coating agent of starch etc. is applied before printing to the surface to be printed with a coloring ink. Thus, the coloring effect of the coloring ink can be enhanced by printing the coloring ink on the surface to be printed to which a coating agent has been applied. In addition, applying a coating agent to the surface to be

printed of the plug wrap 42 as described above can impart a sizing property and a water-resisting property to the surface to be printed.

[0025] In this embodiment, since the covering surface 420 of the plug wrap 42 is colored with the printing ink 45 by printing, there is favorably no concern about dropping of the ink during handling in the manufacturing process of the cigarette 1 or about bleeding of the ink due to saliva of a smoker etc. during smoking of the cigarette 1. However, the method for coloring the covering surface 420 of the plug wrap 42 is not limited to a printing technique, and a dyeing technique using a dye, for example, may be used. For example, the fibers of base paper of the plug wrap 42 can be colored with a pigment (dye) by immersing the base paper in aqueous solution of the pigment dissolved in water. Alternatively, it is also possible, when producing the wrapping paper, to mix a paint and fibers in advance and color the paper by a papermaking process.

[0026] As represented in Fig. 3, the plug wrap 42 has a rectangular shape. At the pair of long sides of the plug wrap 42, wrap regions 42a, 42b are formed which are bonded on top of each other when the filter segment 41 is wrapped. The length of the long side of the plug wrap 42 is substantially equal to the axial length of the filter segment 41. The long side of the plug wrap 42 is arranged along the longitudinal axis direction A of the cigarette 1 when the cigarette 1 has been manufactured. In the wrap region 42a of the plug wrap 42, an adhesive (hereinafter referred to as a "first adhesive") 43 is applied on the side of the covering surface 420. In the manufacturing process of the cigarette 1, the covering surface 420 of the plug wrap 42 is wrapped around the outer circumferential surface 410 of the filter segment 41 when the filter segment 41 is wrapped in the plug wrap 42. In this process, the wrap region 42a on the side of the covering surface 420 of the plug wrap 42 is laid over the wrap region 42b on the side of the outer circumferential surface 421, so that the wrap regions 42a, 42b are bonded with each other by the first adhesive 43. As a result, the plug wrap 42 is shaped into a tubular shape.

[0027] As represented in Fig. 3, an adhesive (hereinafter referred to as a "second adhesive") 44 is applied in a middle part of the covering surface 420 of the plug wrap 42 along the long side direction of the plug wrap 42. This second adhesive 44 is an adhesive used for bonding the covering surface 420 of the plug wrap 42 to the outer circumferential surface 410 of the filter segment 41. As represented in Fig. 3, the lateral width (indicated by reference sign W1 in Fig. 3) of the second adhesive 44 is set to a dimension of a part of the short side of the plug wrap 42, for example, a severalth part to a tenth part thereof. In the manufacturing process of the cigarette 1, the covering surface 420 of the plug wrap 42 is wrapped around the outer circumferential surface 410 of the filter segment 41, so that the covering surface 420 of the plug wrap 42 and the outer circumferential surface 410 of the filter segment 41 are bonded with each other by the sec-

ond adhesive 44.

[0028] Fig. 4 is a view representing the filter 4 in a state in which the filter segment 41 is wrapped in the plug wrap 42 according to Embodiment 1. Fig. 4 represents a state of the inhalation end 40 of the filter 4 (filter segment 41). The dashed line indicated on the inside of the plug wrap 42 indicated in Fig. 4 represents the colored covering surface 420, and corresponds to the inner surface of the plug wrap 42. As represented in Fig. 4, the covering surface 420 of the plug wrap 42 is partially bonded by the second adhesive 44 with the outer circumferential surface 410 of the filter segment 41.

[0029] Reference sign Rb in Fig. 4 denotes a bonded region, in which the second adhesive 44 is interposed, in the boundary portion (boundary surface) formed between the filter segment 41 and the plug wrap 42 along the circumferential direction at the inhalation end 40 of the filter 4. Reference sign Rnb denotes a non-bonded region, in which the second adhesive 44 is not interposed, in the boundary portion between the filter segment 41 and the plug wrap 42. As represented in Fig. 4, the plug wrap 42 is bonded with the outer circumferential surface 410 of the filter segment 41 in the bonded region Rb that is formed in a part in the circumferential direction of the filter segment 41.

[0030] Here, in the non-bonded region Rnb formed at the inhalation end 40 of the filter 4, the covering surface 420 of the plug wrap 42 is not bonded to the outer circumferential surface 410 of the filter segment 41. Therefore, as represented in Fig. 4, a clearance portion 50, which is a clearance region (hollow region), is formed between the outer circumferential surface 410 and the covering surface 420 in the part of the inhalation end 40 that corresponds to the non-bonded region Rnb.

[0031] Thus, the filter 4 according to this embodiment has the clearance portion 50 formed in the non-bonded region Rnb at the inhalation end 40, on the inside of the filter lateral cross-section from the covering surface 420 of the plug wrap 42, i.e., between the plug wrap 42 and the filter segment 41. This clearance portion 50 functions as a light-permeable portion 5 through which reflected light of visible light reflecting off the covering surface 420 of the plug wrap 42 penetrates. Here, the light-permeable portion 5 formed by the clearance portion 50 of the filter 4 is located at the end on the inhalation side in the longitudinal axis direction of the filter 4, i.e., at the inhalation end 40. Therefore, visible light on the outside of the cigarette 1 is radiated through the light-permeable portion 5 to the covering surface 420 of the plug wrap 42, and the visible light reflecting off the covering surface 420 penetrates the light-permeable portion 5 and is emitted to the outside again. Then, the visible light reflecting off the covering surface 420 of the plug wrap 42 reaches the eye, so that the color of the covering surface 420 is recognized.

[0032] Moreover, since the filter segment 41 is a fiber bundle into which fibers constituting the filter material are shaped, the visible light reflecting off the covering surface

420 of the plug wrap 42 can penetrate through a clearance 412 among fibers 411, which form an outer circumferential region 41a of the filter segment 41, to the outside on the side of the inhalation end face. Therefore, as with the above-described light reflected from the covering surface 420 of the plug wrap 42 that is emitted through the clearance portion 50 to the outside, the light reflected from the covering surface 420 that penetrates the clearance 412 among the fibers 411 forming the outer circumferential region 41a of the filter segment 41 and is emitted to the outside is delivered to the eyes of a smoker, so that the smoker can recognize the color of the covering surface 420.

[0033] Thus, the filter 4 in this embodiment includes the light-permeable portion 5, through which reflected light of visible light reflecting off the covering surface 420 of the plug wrap 42 penetrates, at the inhalation end 40 on the inside of the filter lateral cross-section from the covering surface 420 of the plug wrap 42. In the filter 4 according to this embodiment, the light-permeable portion 5 is formed to include the clearance portion 50 formed between the covering surface 420 of the plug wrap 42 and the outer circumferential surface 410 of the filter segment 41, and the clearance 412 among the fibers 411 forming the outer circumferential region 41a of the filter segment 41. Accordingly, when a smoker looks at the filter 4 from the side of the inhalation end 40, reflected light of visible light reflecting off the covering surface 420 of the plug wrap 42 can be delivered through the light-permeable portion 5 to the eyes of the smoker, so that the smoker can recognize the color of the colored covering surface 420. As a result, the design of the filter 4 and the cigarette 1 with the filter 4 incorporated therein can be enhanced compared with conventional ones. That is, it is possible to provide the filter 4 and the cigarette 1 superior in design to conventional ones.

[0034] Moreover, according to the filter 4 of the above configuration, it is possible to cause the light reflected from the covering surface 420 of the plug wrap 42 to reflect irregularly by the fibers 411 forming the outer circumferential region 41a of the filter segment 41. Thus, as the visible light reflecting off the covering surface 420 is diffused, the color of the colored covering surface 420 is easier for a smoker to visually recognize.

[0035] As has been described, the filter 4 according to this embodiment has the light-permeable portion 5 formed therein which includes the clearance portion 50 and the clearance 412, but the light-permeable portion 5 may be formed by only one of these clearances. That is, as the means for forming the light-permeable portion 5, both the clearance portion 50 and the clearance 412 can be adopted independently. For example, even in the case where the covering surface 420 of the plug wrap 42 and the outer circumferential surface 410 of the filter segment 41 are entirely bonded with each other at the inhalation end 40 of the filter 4 and the clearance portion 50 is not particularly provided, the light-permeable portion 5 may be formed by the clearance 412 among the fibers 411

forming the outer circumferential region 41a of the filter segment 41 and light reflected from the colored covering surface 420 may be delivered through this light-permeable portion 5 (clearance 412) to the eyes of a smoker. Thus, the smoker can recognize the color of the colored covering surface 420, and the design of the filter 4 can be enhanced.

<First modified example>

[0036] Next, a filter 4A according to a first modified example will be described. As represented in Fig. 5, in the first modified example, an unapplied region 46, to which the second adhesive 44 is not applied, is provided in one of end regions in the long side direction of the covering surface 420 of the plug wrap 42 that constitutes the edge of the inhalation end 40 when the filter has been shaped. The second adhesive 44 is applied along the long side direction of the covering surface 420 of the plug wrap 42. In that process, the second adhesive 44 may be applied to the covering surface 420 in a strip shape, or applied in a spiral shape or a wave shape.

[0037] As in this modified example, by forming the unapplied region 46 in one of the end regions that corresponds to the inhalation end 40 when applying the second adhesive 44 along the long side direction (longitudinal axis direction when the filter has been shaped) of the covering surface 420, it is possible to form the non-bonded region Rnb along the entire region in the circumferential direction (entire circumference) of the inhalation end 40 of the filter 4A when the filter 4A has been shaped. That is, it is possible to form the clearance portion 50 annularly along the entire region in the circumferential direction (entire circumference) of the inhalation end 40 of the filter 4A. As a result, as represented in Fig. 6, it is possible to form the light-permeable portion 5, through which light reflected from the colored covering surface 420 penetrates and is emitted to the outside, annularly along the entire region in the circumferential direction of the filter 4A. Accordingly, the area in which the light-permeable portion 5 is formed can be increased compared with the example represented in Fig. 4. Thus, it is possible to further increase the visual recognizability of the color of the colored covering surface 420 and further enhance the design of the filter 4A.

<Second modified example>

[0038] Next, a filter 4B according to a second modified example will be described. Fig. 7 is a view representing the schematic configuration of the filter 4B according to the second modified example. Fig. 7 represents the structure of the filter 4B at the position of the inhalation end 40. In Fig. 7, reference sign 141 denotes a filter segment according to the second modified example. The filter 4B in the second modified example is different from that of the above-described embodiment in the structure of the filter segment 141. In the following, differences from the

above embodiment will be mainly described.

[0039] The filter segment 141 includes the outer circumferential region 41a including the outer circumferential surface 410, and an inner circumferential region 41b located further on the inside (center side of the filter material) than the outer circumferential region 41a. Here, the technical significance of the inner circumferential region 41b and the outer circumferential region 41a will be described. The outer circumferential region 41a of the filter segment 141 is formed as a low-density layer having a lower fiber layer density than the inner circumferential region 41b. The inner circumferential region 41b has a fiber layer density equivalent to that of a filter material used in a common cigarette filter.

[0040] The fiber layer density of the inner circumferential region 41b of the filter segment 141 is adjusted, for example, within a range that satisfies the filtration performance required for filtering smoke components contained in mainstream smoke. On the other hand, the outer circumferential region 41a of the filter segment 141 functions as the light-permeable portion 5 that allows the visible light reflected off the covering surface 420 of the plug wrap 42 to penetrate the clearance 412 among the fibers 411 forming the outer circumferential region 41a and be delivered to the eyes of a smoker, as well as functions to filter the smoke components contained in mainstream smoke. From the viewpoint of increasing the penetration efficiency of visible light when the outer circumferential region 41a of the filter segment 141 functions as the light-permeable portion 5, it is advantageous that the fiber layer density of the outer circumferential region 41a is as low as possible.

[0041] Therefore, in the second modified example, the fiber layer density of the outer circumferential region 41a of the filter segment 141 is set to a range of 0.05 to 0.12 [g/cm³]. However, this range of the fiber layer density in the outer circumferential region 41a is given as a mere example, and the fiber layer density is not limited to this range. In this modified example, since the outer circumferential region 41a of the filter segment 141 is formed as a low-density layer having a lower fiber layer density than the inner circumferential region 41b, it is possible to favorably increase the penetration efficiency with which the visible light having reflected off the covering surface 420 of the plug wrap 42 penetrates the clearance 412 formed among the fibers 411 constituting the outer circumferential region 41a of the filter segment 141, and thereby to make the color of the colored covering surface 420 visually well recognizable. In this modified example, even if the fiber layer density of the outer circumferential region 41a of the filter segment 141 is reduced from the viewpoint of securing the penetration efficiency of visible light, it is possible to guarantee the filtration performance required of the filter as a whole by making the fiber layer density of the inner circumferential region 41b higher than that of the outer circumferential region 41a.

<Embodiment 2>

[0042] Next, a filter 4C according to Embodiment 2 will be described. Fig. 8 is a view representing the schematic configuration of the filter 4C according to Embodiment 2. Fig. 8 represents the structure of the filter 4C at the position of the inhalation end 40. In the filter 4C, the filter segment 41 and the plug wrap 42 are the same as those of the filter 4 according to Embodiment 1. In this embodiment, a transparent coating layer 6 is formed which is a transparent coating layer laminated on the colored covering surface 410 of the plug wrap 42. The transparent coating layer 6 laminated on the covering surface 420 of the plug wrap 42 faces the outer circumferential surface 410 of the filter segment 41, and is interposed between the covering surface 420 of the plug wrap 42 and the outer circumferential surface 410 of the filter segment 41.

[0043] The transparent coating layer 6 interposed between the covering surface 420 of the plug wrap 42 and the outer circumferential surface 410 of the filter segment 41 exerts an effect equivalent to that of the clearance portion 50 of Embodiment 1, and functions as the light-permeable portion 5. That is, the transparent coating layer 6 allows penetration of the reflected light of visible light reflecting off the covering surface 420 of the plug wrap 42. Thus, when a smoker looks at the inhalation end 40 of the filter 4, the visible light reflecting off the covering surface 420 of the plug wrap 42 can be delivered to the eyes, so that the smoker can recognize the color of the colored covering surface 420.

[0044] The transparent coating layer 6 may be formed, for example, by building up a transparent varnish on the covering surface 420 of the plug wrap 42. In this case, it is preferable that a varnish thickness of approximately 50 μm is secured from the viewpoint of securing the penetration efficiency of the visible light reflecting off the covering surface 420. Alternatively, the transparent coating layer 6 may be formed, for example, by attaching a transparent film, such as a cellulose film, to the covering surface 420 of the plug wrap 42. In this case, it is preferable that a film thickness of approximately 40 μm is secured from the viewpoint of securing the penetration efficiency of the visible light reflecting off the covering surface 420. However, these varnish thickness and film thickness are mere examples, and the applicable range is not limited to these values.

[0045] In this embodiment, as the transparent coating layer 6 is laminated on the covering surface 420 of the plug wrap 42, it is possible to form the light-permeable portion 5 according to the thickness of the transparent coating layer 6 between the covering surface 420 and the outer circumferential surface 410 regardless of the aspect of bonding between the covering surface 420 of the plug wrap 42 and the outer circumferential surface 410 of the filter segment 41. Accordingly, it is not necessary to form the non-bonded region Rnb on the bonding surface between the covering surface 420 and the outer circumferential surface 410 at the inhalation end 40 as

illustrated in Embodiment 1. That is, even if the covering surface 420 and the outer circumferential surface 410 are bonded with each other along the entire circumference of the filter 4 at the inhalation end 40, it is possible to favorably form the light-permeable portion 5 by the transparent coating layer 6.

[0046] While the preferred embodiments of the present invention have been described, it is obvious to those skilled in the art that various modifications, improvements, combinations, etc. can be implemented with the cigarette filter according to the present invention.

Reference Signs List

15 **[0047]**

1	Cigarette
2	Tobacco rod
3	Tipping paper
4	Filter
5	Light-permeable portion
6	Transparent coating layer
21	Tobacco shred
22	Wrapping paper
31	Ventilation hole
40	Inhalation end
41	Filter segment
41a	Outer circumferential region
41b	Inner circumferential region
42	Plug wrap
43	First adhesive
44	Second adhesive
45	Printing ink
50	Clearance portion
410	Outer circumferential surface
411	Fiber
412	Clearance
420	Covering surface
420A	Through-passage

Claims

1. A cigarette filter connected through tipping paper at one end of a tobacco rod in which tobacco shreds are wrapped in cigarette paper, the cigarette filter comprising:

a filter material arranged at an inhalation end of the filter; and
wrapping paper wrapping the filter material so as to cover the outer circumferential surface of the filter material, wherein
the wrapping paper is colored on its covering surface that covers the filter material, and
the cigarette filter further comprises a light-permeable portion that is formed at the inhalation end of the filter, on the inside of the filter lateral

cross-section from the covering surface of the wrapping paper.

2. The cigarette filter according to claim 1, wherein the light-permeable portion is configured to include a clearance among fibers forming an outer circumferential region of the filter material at the inhalation end of the filter. 5

3. The cigarette filter according to claim 2, wherein the fiber layer density in the outer circumferential region of the filter material is lower than the fiber layer density in an inner circumferential region located further on the central axis side of the filter material than the outer circumferential region. 10
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4. The cigarette filter according to any one of claims 1 to 3, wherein the light-permeable portion is configured to include a clearance portion that is formed between the covering surface of the wrapping paper and the outer circumferential surface of the filter material at the inhalation end of the filter. 20

5. The cigarette filter according to claim 4, wherein the covering surface of the wrapping paper is bonded with the outer circumferential surface of the filter material in a part in the circumferential direction of the filter material, and the clearance portion is formed in a non-bonded region in which the covering surface of the wrapping paper and the outer circumferential surface of the filter material are not bonded with each other at the inhalation end of the filter. 25
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6. The cigarette filter according to claim 5, wherein an adhesive used for bonding the covering surface of the wrapping paper and the outer circumferential surface of the filter material with each other is applied along the longitudinal axis direction of the filter, and the clearance portion is formed along the entire circumference of the inhalation end of the filter as an unapplied region to which the adhesive is not applied is formed at the inhalation end. 35
40

7. The cigarette filter according to any one of claims 1 to 6, wherein the light-permeable portion is configured to include a transparent coating layer that is laminated on the covering surface of the wrapping paper at the inhalation end of the filter. 45
50

8. The cigarette filter according to any one of claims 1 to 7, wherein the wrapping paper is colored with a printing ink printed on the covering surface. 55

FIG. 1

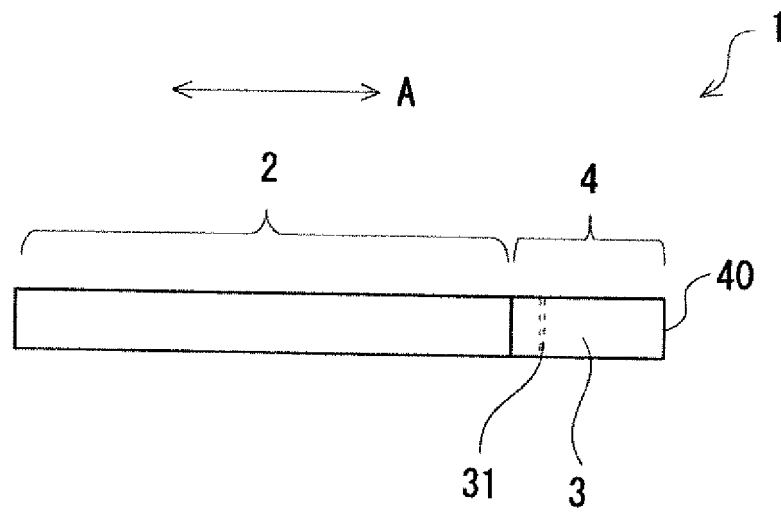


FIG. 2

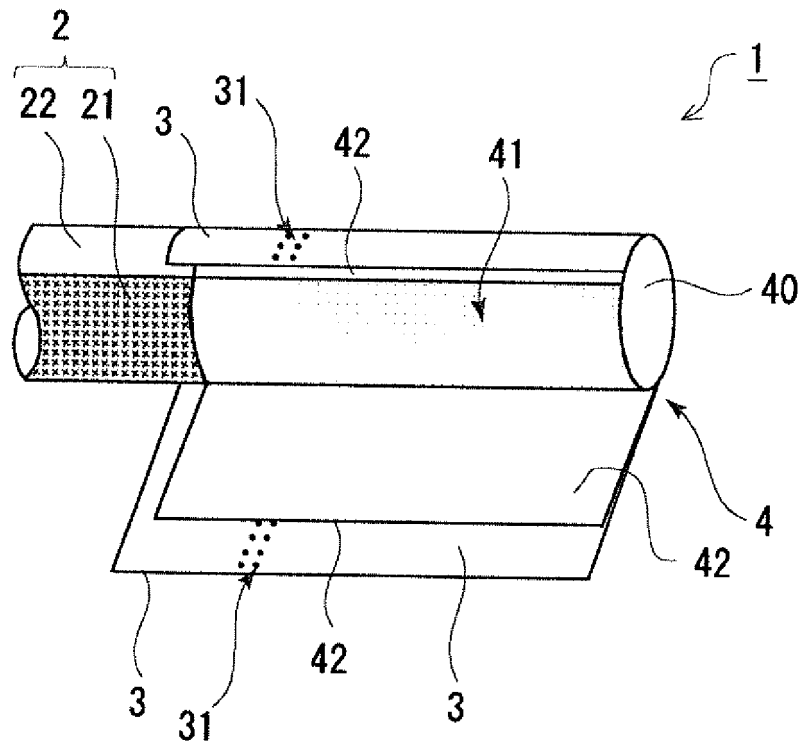


FIG. 3

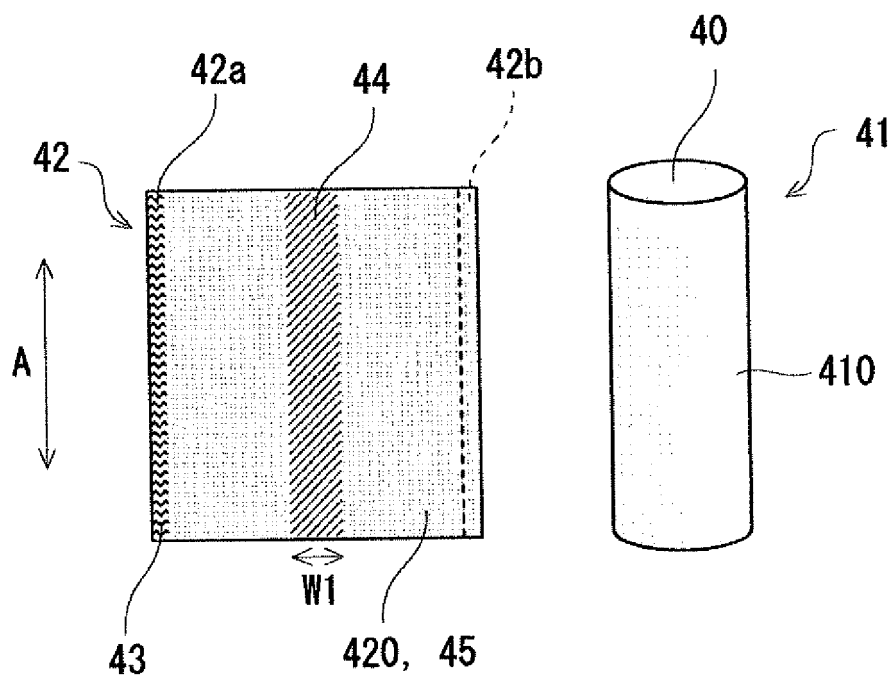


FIG. 4

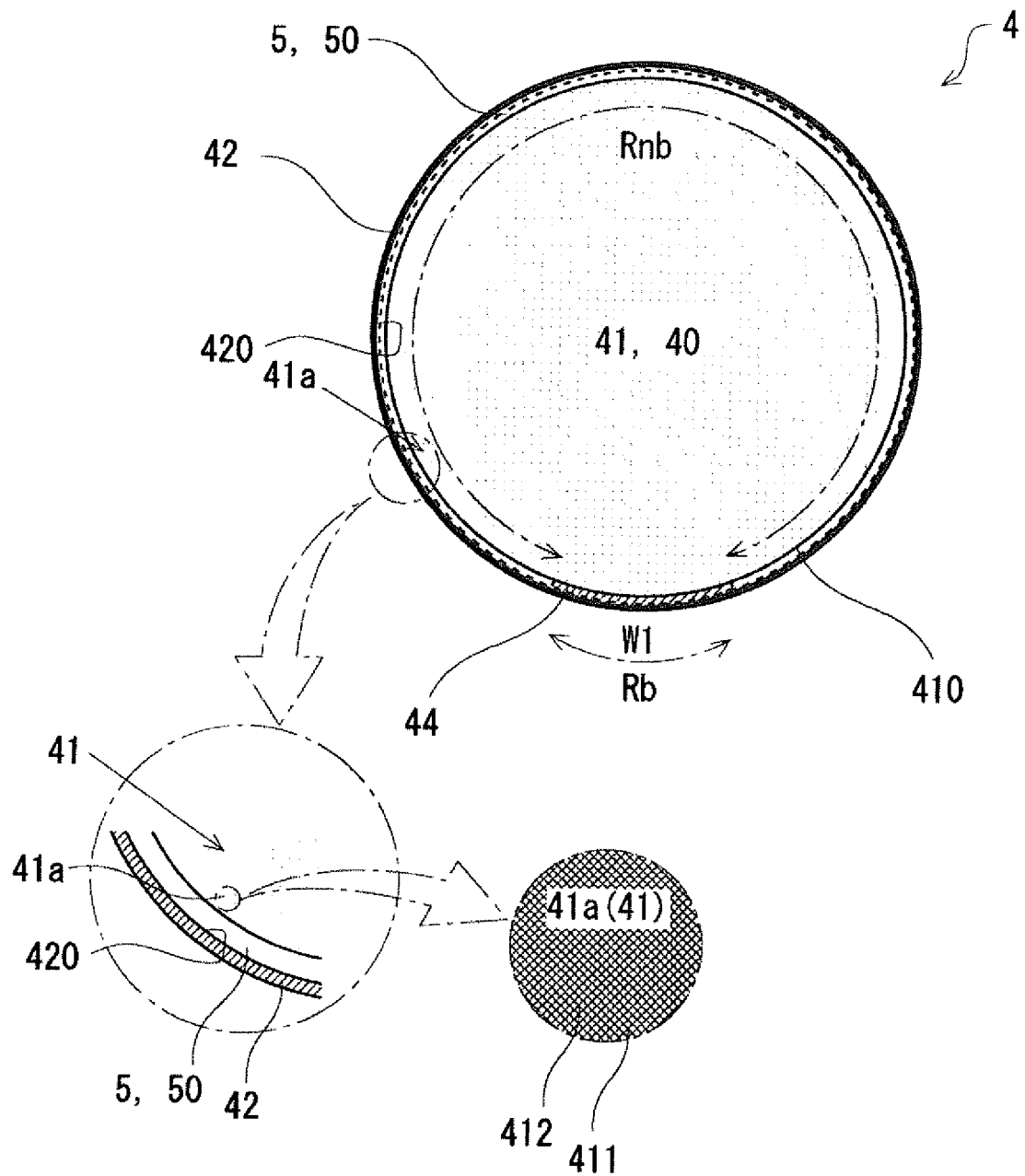


FIG. 5

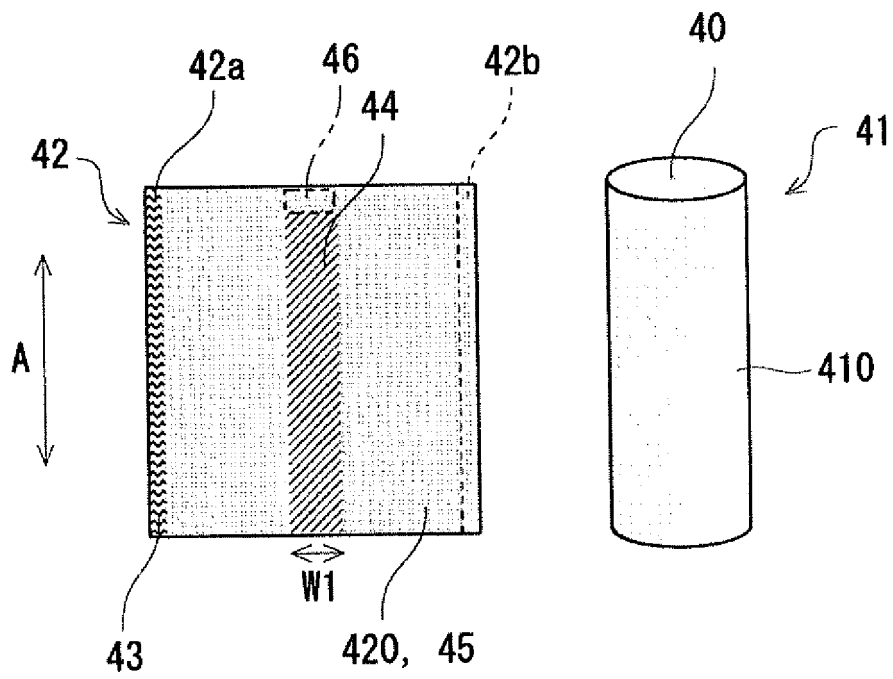


FIG. 6

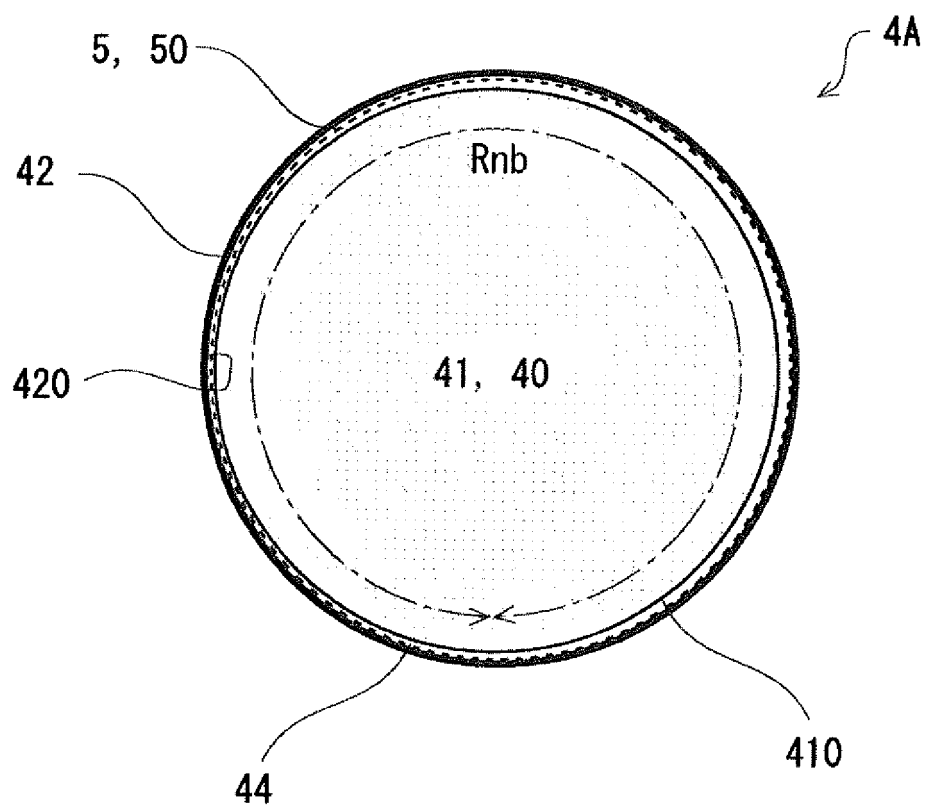


FIG. 7

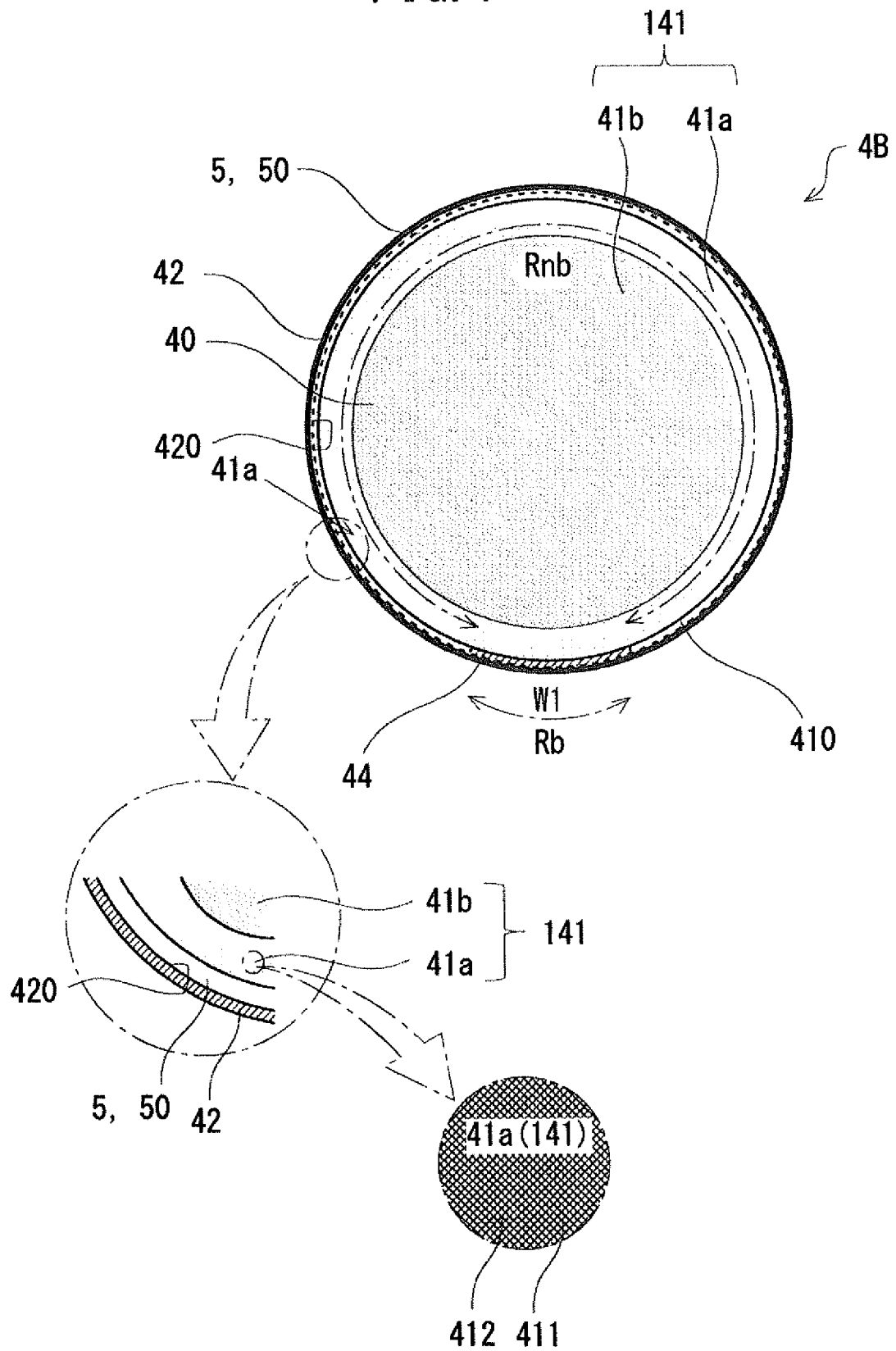
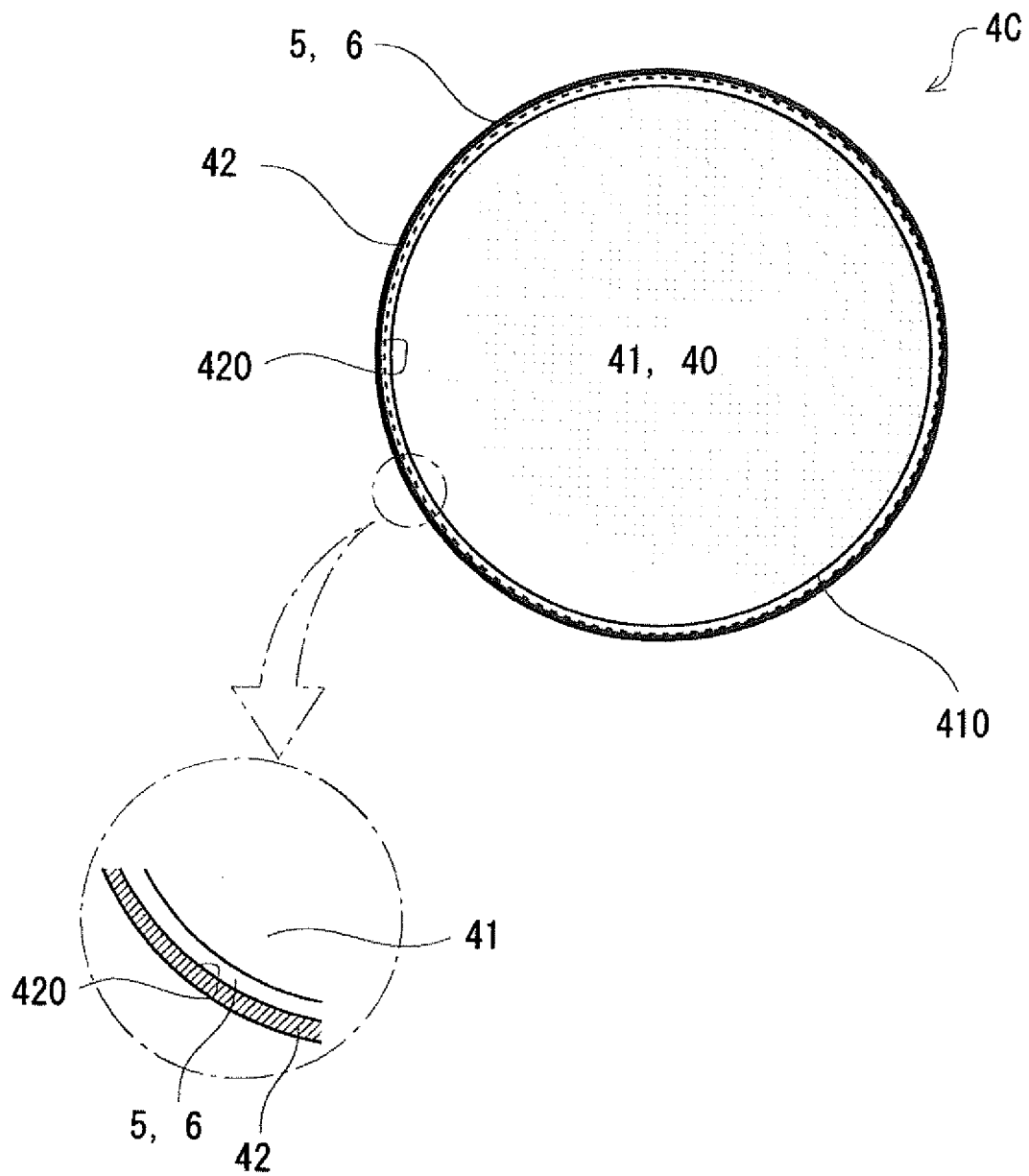


FIG. 8



INTERNATIONAL SEARCH REPORT

International application No.

PCT/JP2013/072264

A. CLASSIFICATION OF SUBJECT MATTER

A24D1/02(2006.01) i, A24D3/04(2006.01) i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24D1/02, A24D3/04

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2013

Kokai Jitsuyo Shinan Koho 1971-2013 Toroku Jitsuyo Shinan Koho 1994-2013

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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Y A	JP 2011-525368 A (British American Tobacco (Investments) Ltd.), 22 September 2011 (22.09.2011), paragraph [0036]; fig. 2 to 4 & US 2011/0168195 A1 & GB 811552 D & EP 2326189 A & WO 2009/156269 A1 & AU 2009262418 A & CA 2726933 A & AR 74157 A & KR 10-2011-0031478 A & CN 102076231 A & MX 2010014158 A & RU 2011101773 A	1-5, 8 6-7



Further documents are listed in the continuation of Box C.



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"&"

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Date of the actual completion of the international search

23 October, 2013 (23.10.13)

Date of mailing of the international search report

05 November, 2013 (05.11.13)

Name and mailing address of the ISA/
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INTERNATIONAL SEARCH REPORT

International application No.

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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