



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:  
**07.08.2024 Bulletin 2024/32**

(51) International Patent Classification (IPC):  
**A24F 40/42** <sup>(2020.01)</sup> **A24B 15/167** <sup>(2020.01)</sup>  
**A24D 1/20** <sup>(2020.01)</sup>

(21) Application number: **23154692.0**

(52) Cooperative Patent Classification (CPC):  
**A24F 40/42; A24B 15/167; A24D 1/20**

(22) Date of filing: **02.02.2023**

(84) Designated Contracting States:  
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR**  
Designated Extension States:  
**BA**  
Designated Validation States:  
**KH MA MD TN**

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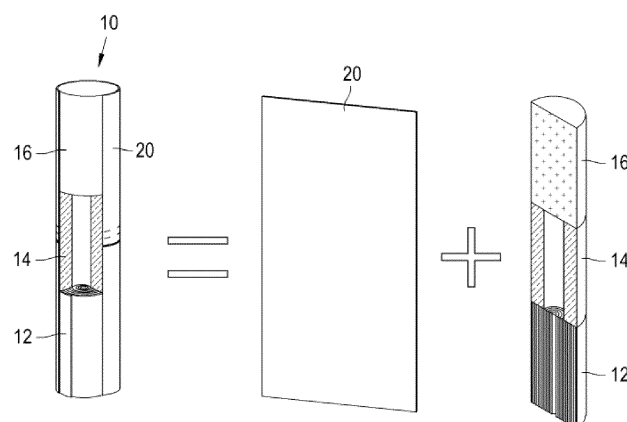
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(54) **GEL RECEPTOR ROD INSERTABLE INTO ELECTRICALLY HEATED SMOKING ARTICLE, ELECTRICALLY HEATED SMOKING ARTICLE COMPRISING SAME, AND AEROSOL GENERATING DEVICE THEREFOR**

(57) Provided are a gel receptor rod (12) including a gel-like aerosol generating substrate including glycerin and carrageenan, which exists in the form of a gel in a first temperature range including room temperature, changes into a sol phase in a second temperature range including 80°C, and vaporizes into an aerosol in a temperature range of 100°C to 350°C, a gel receptor (12a) in which the gel-like aerosol generating substrate is accommodated, and a wrapping paper (21) wrapping the

side of the gel receptor (12a) in a cylindrical shape, an electrically heated smoking article (10) including a filter (16), a tube (14) provided upstream of the filter (16), and a gel receptor rod (12) provided upstream of the tube (14), wherein the filter (16), the tube (14), and the gel receptor rod (12) are wrapped with wrapping paper (20) to form a cigarette, and an aerosol generating device (100) therefor.



**FIG. 2**

**Description**

[Related art document]

**TECHNICAL FIELD**

[Patent document]

**[0001]** The present disclosure relates to a gel receptor rod that insertable into an electrically heated smoking article, and more particularly, to a gel receptor rod which is embedded in a cigarette-type electrically heated smoking article for generating an aerosol by heating rather than combustion, and generates an aerosol by heating, an electrically heated smoking article including the same, and an aerosol generating device therefor.

5 **[0006]** (Patent document 1) Korean Patent Registration No. 10-1081481

**DISCLOSURE OF THE INVENTION****BACKGROUND ART**

**[0002]** In recent years, there has been a growing demand for alternative methods that overcome the disadvantages of general cigarettes. For example, demand for a method of generating an aerosol by heating an aerosol generating material in a cigarette, rather than a method of generating an aerosol by burning the cigarette has increased.

10 **[0007]** An aspect of the present disclosure is to provide a gel receptor rod insertable into a disposable cigarette-type electrically heated smoking article, an electrically heated smoking article including the same, and an aerosol generating device capable of generating an aerosol from such an electrically heated smoking article so that a user may inhale the aerosol.

**[0003]** In general, a slurry reconstructed tobacco sheet, which is a main raw material of a tobacco medium, is difficult to manufacture due to weak tensile force and has poor physical properties because it contains a large amount of humectant in the tobacco medium. In addition, a tobacco medium containing a liquid, such as glycerin, is sensitive to humidity of the surrounding environment due to hydrophilicity thereof, making it difficult to control a manufacturing process environment. There is a limit to the amount of liquid that may be contained in the tobacco medium.

15 **[0008]** In an aspect, a gel receptor rod includes: a gel-like aerosol generating substrate including glycerin and carrageenan, which exists in the form of a gel in a first temperature range including room temperature, changes into a sol phase in a second temperature range including 80°C, and vaporizes into an aerosol in a temperature range of 100°C to 350°C, a gel receptor in which the gel-like aerosol generating substrate is accommodated, and a wrapping paper wrapping the side of the gel receptor in a cylindrical shape.

**[0004]** In addition, in the related art, there is a case in which an aerosol is generated by a cartomizer including a cartridge storing a liquid phase and an atomizer operated by electricity so that a user inhales an aerosol derived from the liquid phase. As a related art document regarding a cartomizer with reference to FIG. 1, Korean Patent Registration No. 10-1081481 discloses a configuration including a liquid tank 1, a heating element 6 provided in an atomizer unit 3 to heat and vaporize an essence delivered through a wick 4, a power terminal unit 5 electrically connected to the heating element 6, a wadding 7 serving to absorb an excessive influx of essence, and a smoke flow tube 2 through which smoke vaporized by the heating element 6 flows. However, in the related art described above, there is difficulty (an expiration date, deterioration, etc.) in managing the liquid phase contained in the cartomizer, and condensate may occur in an air flow path along which the aerosol generated in the cartomizer moves, resulting in contamination.

20 **[0009]** The gel-like aerosol generating substrate may include 0.1% to 5% of a gelling agent, 5% to 100% of an aerosol generating agent including glycerin, 0.1% to 20% of an acidity regulator, and optionally, 0.1% to 15% of flavoring agents, additives or active substances.

**[0005]** Accordingly, there is a need for a technology capable of including a liquid in a smoking article, which is disposed of after use to facilitate storage and use, and generating an aerosol from the smoking article to be inhaled.

25 **[0010]** The aerosol generating agent may include a liquid composition including 70 wt% to 100 wt% of glycerin VG and 0 wt% to 30 wt% of glycerin PG, and the gel-like aerosol generating substrate includes 0.8 wt% to 5 wt% of the gelling agent.

30 **[0011]** The gel-like aerosol generating substrate may additionally include one or more of kappa carrageenan, iota carrageenan, agar, pectin, guar gum, calcium lactate, potassium chloride, glucose, starch powder, natural food additives, or fruit extracts or compounds.

35 **[0012]** The gel-like aerosol generating substrate may include at least one of 0% to 10% nicotine, caffeine, vitamins, and respiratory drugs.

40 **[0013]** In another aspect, an electrically heated smoking article includes: a filter, a tube provided upstream of the filter; and the gel receptor rod provided upstream of the tube according to an embodiment, wherein the filter, the tube, and the gel receptor rod are wrapped with wrapping paper to form a cigarette.

45 **[0014]** The gel receptor rod may include a first gel receptor and a second gel receptor surrounding the first gel receptor.

50 **[0015]** The electrically heated smoking article may further include: a gel receptor rod additionally provided upstream of the gel receptor rod, wherein the filter, the tube, the gel receptor rod, and the additionally provided gel receptor rod are wrapped to form a cigarette.

**[0016]** The electrically heated smoking article may further include: a tobacco body including cut tobacco leaves additionally provided upstream of the tube and upstream or downstream of the gel receptor rod, wherein the filter, the tube, the gel receptor rod, and the additionally provided tobacco body are wrapped to form a cigarette.

**[0017]** The filter may be formed of cellulose acetate or PLA material, have a diameter of 7 mm to 10 mm, and a length of 8 mm to 12 mm, and the tube have an inner diameter of 1 mm to 5 mm and an outer diameter of 7 mm to 10 mm.

**[0018]** In another aspect, an aerosol generating device, which is grippable and portable, for the electrically heated smoking article, includes: a cavity into which a smoking article is insertable, provided in the device; at least one of a resistive heating type heater and an induction heating type heater capable of heating an inside or outside of the gel receptor rod of the smoking article, provided in the device; a rechargeable battery provided in the device and functioning as a power source; and a microcontroller provided in the device to control the heater upon receiving power from the battery.

**[0019]** In another aspect, an aerosol generating device, which is grippable and portable, for the electrically heated smoking article, includes: a cavity into which a smoking article is insertable, provided in the device; at least one (a first heater) of a resistive heating type heater and an induction heating type heater capable of heating an inside or outside of the gel receptor rod of the smoking article, provided in the device; at least one (a second heater) of the resistive heating type heater and the induction heating type heater capable of heating an inside or outside of the additionally provided gel receptor rod or tobacco body in the smoking article, provided in the device; a rechargeable battery provided in the device and functioning as a power source; and a microcontroller provided in the device and controlling the first heater and the second heater separately upon receiving power from the battery, wherein the first heater heats the inside or outside of the gel receptor rod to a first heating temperature range, and the second heater heats the inside or outside of the additionally provided gel receptor rod or tobacco body to a second heating temperature range different from the first heating temperature range.

**[0020]** According to the present disclosure, the gel receptor insertable into a disposable electrically heated smoking article may be provided.

**[0021]** In addition, according to the present disclosure, the electrically heated smoking article including such a gel receptor rod may be provided, and an aerosol generating device capable of generating an aerosol from such an electrically heated smoking article so that a user may inhale the aerosol may be provided, thereby solving the problems of the related art and increasing user convenience.

## BRIEF DESCRIPTION OF THE DRAWINGS

### [0022]

FIG. 1 is a view illustrating the related art.

FIG. 2 conceptually shows an exploded perspective view and a cross-sectional view of a portion of an electrically heated smoking article according to embodiments of the present disclosure.

FIG. 3 conceptually illustrates components of a smoking article of FIG. 2.

FIG. 4 conceptually shows a partial exploded perspective view and a cross-sectional view of a portion of an electrically heated smoking article according to another embodiment of the present disclosure.

FIG. 5 conceptually shows a partially exploded perspective view and a cross-sectional view of an electrically heated smoking article according to another embodiment of the present disclosure.

FIG. 6 conceptually shows a partially exploded perspective view and cross-sectional view of an electrically heated smoking article according to another embodiment of the present disclosure.

FIG. 7 is a view illustrating an embodiment of an aerosol generating device for generating an aerosol from an electrically heated smoking article according to the present disclosure.

FIG. 8 is a view illustrating another embodiment of an aerosol generating device for generating an aerosol from an electrically heated smoking article according to the present disclosure.

FIG. 9 is a view illustrating another embodiment of an aerosol generating device for generating an aerosol from an electrically heated smoking article according to the present disclosure.

## BEST MODE FOR CARRYING OUT THE INVENTION

**[0023]** In the following examples, the terms "upstream" and "downstream" are used to denote relative positions of segments constituting a smoking article based on a direction in which a user inhales air using a smoking article. The smoking article includes an upstream end portion (i.e., a portion through which air flows in) and a downstream end portion (i.e., a portion through which the air exits) opposing the upstream end portion. When using a smoking article, the user may have the downstream end portion of the smoking article in his/her mouth and inhale air that is sucked through the upstream end portion of the smoking article, passes through the inside of the smoking article, and then exits the downstream end portion. The downstream end portion is located downstream of the upstream end portion, and the term "end portion" may also be described as "tip".

**[0024]** In the drawings, the size of components may be exaggerated or reduced for convenience of description. For example, since the size and thickness of each component shown in the drawings are arbitrarily shown

for convenience of description, the present disclosure is not necessarily limited thereto.

**[0025]** Hereinafter, embodiments of the present disclosure will be described in detail with reference to the accompanying drawings so that those skilled in the art may easily carry out the present disclosure. However, the present disclosure may be embodied in many different forms and is not limited to the embodiments described herein.

**[0026]** Hereinafter, a gel receptor insertable into an electrically heated smoking article capable of generating an aerosol by heating and an electrically heated smoking article including the gel receptor rod according to embodiments of the present disclosure are described with reference to the accompanying drawings, but for convenience of description, the gel receptor rod included in the electrically heated smoking article are described, while describing each component of the electrically heated smoking article. Here, the electrically heated smoking article is a type in which an aerosol is generated from a smoking article by heating the smoking article by an electric resistance heating method or an induction heating method, rather than by combustion and a user inhales the aerosol to use. Such a smoking article includes an amount of aerosol generating substrate inside the smoking article suitable for a similar number of inhalations to that of a general cigarette, and after a predetermined amount of aerosol is generated, the smoking article does not generate the aerosol any more and may be disposed of by the user.

**[0027]** FIG. 2 conceptually shows an exploded perspective view and a cross-sectional view of a portion of an electrically heated smoking article according to embodiments of the present disclosure, FIG. 3 conceptually illustrates components of a smoking article of FIG. 2, FIG. 4 conceptually shows a partial exploded perspective view and a cross-sectional view of a portion of an electrically heated smoking article according to another embodiment of the present disclosure, and FIG. 5 conceptually shows a partially exploded perspective view and a cross-sectional view of an electrically heated smoking article according to another embodiment of the present disclosure.

**[0028]** An electrically heated smoking article according to the present disclosure includes, as an aerosol generating substrate, a gel-like aerosol generating substrate including a liquid composition, such as glycerin or the like, as described below. Referring to FIGS. 2 and 3, an electrically heated smoking article 10 according to embodiments of the present disclosure has a structure in which a gel receptor rod 12 containing a liquid composition as a gel-like aerosol generating substrate at an upstream end portion, a tube 14 providing an aerosol movement passage directly downstream, and a filter 16 functioning as a mouthpiece are stacked, and these components are wrapped by a wrapping paper 20.

**[0029]** The gel receptor rod 12 according to embodiments of the present disclosure includes a gel-like aerosol generating substrate including glycerin and carra-

geenan, which exists in the form of a gel in a first temperature range including room temperature, changes into a sol phase in a second temperature range including 80°C, and vaporizes into an aerosol in a temperature range of 100 to 350°C, a gel receptor 12a in which the gel-like aerosol generating substrate is accommodated, and a wrapping paper 21 wrapping the side of the gel receptor 12a in a cylindrical shape. For example, the wrapping paper 21 wraps the side of the gel receptor 12a in a cylindrical shape with a length of 7 to 20 mm and a diameter of 5 to 8 mm. The electrically heated smoking article 10 as shown in FIG. 2 may be obtained by wrapping the filter 16, tube 14 and gel receptor rod 12 described above with the wrapping paper 20. Also, referring to FIG. 4, in the electrically heated smoking article 10 as shown in FIG. 2, the gel receptor rod 12 may include a first gel receptor 12a and a second gel receptor 12b surrounding the first gel receptor 12a, and as shown in FIG. 3, the gel receptor rod 12 may be obtained by wrapping a side surface of the second gel receptor 12b surrounding the first gel receptor 12a with the wrapping paper 21 in a cylindrical shape. According to embodiments, the first gel receptor 12a and the second gel receptor 12b may have different compositions within the scope of the present disclosure. Similar to the electrically heated smoking article 10 as shown in FIG. 2, the electrically heated smoking article 10 as shown in FIG. 4 may be obtained by wrapping the filter 16, the tube 14, and the gel receptor rod 12 with the wrapping paper 20.

**[0030]** In the present disclosure, since the gel-like aerosol generating substrate contains carrageenan, which is widely known to act as a thickening agent, a phase change according to the above temperature range may be expected. For reference, as is already known, the sol phase described in the specification is a form in which colloidal particles are dispersed in a liquid, and may be essentially in a liquid state. The aerosol generating substrate in the gel state may change to a sol state as the colloidal particles dissociate from each other. In the temperature range described above, and may be further heated to be vaporized into an aerosol.

**[0031]** The gel-like aerosol generating substrate is a mixture of glycerin and a thickening agent. For example, glycerin propylene glycol (PG), vegetable glycerine (BG), or a mixture of PG and VG may be heated and stirred for 30 minutes to lower viscosity and 10 to 50 w% of a thickening agent (such as carrageenan) as an additive capable of gelling may be added and stirred until the additive is dissolved in glycerin to obtain a mixture of glycerin and the thickening agent. The mixture maintains a gel, semi-solid or solid state in the first temperature range (a temperature range less than about 50°C) including room temperature and is heated in the second temperature range including 80°C (a temperature range of 50 to 100°C) to change to a sol phase to exist in a liquid phase, and then additionally heated to generate an aerosol at about 150°C or higher.

**[0032]** As described above, the gel-like aerosol gen-

erating substrate may additionally contain at least one of agar, a thickening agent, starch powder, celluloses, carboxymethyl ethers, natural food flavors, or fruit extracts. In addition, the content of glycerin in the gel-like aerosol generating substrate is preferably 50 wt% or more. In addition, the mixture may further contain agar, which functions advantageously to form a gel-like aerosol generating substrate mixture. In addition to this, the gel-like aerosol generating substrate mixture may include a thickening agent, starch powder, celluloses, and carboxymethyl ethers as additives. In addition, the gel-like aerosol generating substrate mixture may further include natural food flavors or fruit extracts. In this case, it is possible to add various tastes to the user through the generated aerosol. In either case, the content of glycerin in the gel-like aerosol generating substrate mixture is preferably 50 wt% or more, thereby minimizing a burnt taste in the generated aerosol. Additionally, the gel-like aerosol generating substrate mixture may or may not include nicotine.

**[0033]** In addition, referring to FIG. 5, according to embodiments, the electrically heated smoking article 10 may have a gel receptor rod 18 additionally provided upstream of the gel receptor rod 12, and the additionally provided gel receptor rod 18 may also be obtained in the same manner as that of the gel receptor rod 12, as shown in FIG. 3. According to embodiments, the gel receptor rod 12 and the additionally provided gel receptor rod 18 may have different compositions within the scope of the present disclosure. The electrically heated smoking article 10 as shown in FIG. 5 may be obtained by wrapping the filter 16, the tube 14, the gel receptor rod 12, and the additionally provided gel receptor rod 18 with a wrapping paper 20. In the present embodiment, the gel receptor rod 18 is additionally provided so that more and richer aerosols may be generated.

**[0034]** According to embodiments, the gel-like aerosol generating substrate may include 0.1 to 5% of a gelling agent, 5 to 100% of an aerosol generating agent including glycerin, 0.1 to 20% of an acidity regulator, and optionally, 0.1 to 15% of flavoring agents, additives or active substances. In addition, according to embodiments, the gel-like aerosol generating substrate may additionally include at least one of kappa carrageenan, iota carrageenan, agar, pectin, guar gum, calcium lactate, potassium chloride, glucose, starch powder, natural food additives, or fruit extracts or compounds.

**[0035]** For example, flavoring agents may include licorice, sucrose, fructose syrup, iso-sweeteners, cocoa, lavender, cinnamon, cardamom, celery, fenugreek, cascarilla, sandalwood, bergamot, geranium, honey essence, rose oil, vanilla, lemon oil, orange oil, mint oil, cinnamon, caraway, cognac, jasmine, chamomile, menthol, ylang-ylang, salvia, spearmint, ginger, coriander, coffee, and the like.

**[0036]** The "gel receptor rod" according to the present disclosure refers to a rod including a gel-like aerosol generating substrate which exists in the form of a gel at room temperature, changes to a sol phase in a temperature

range of 50 to 100°C including 80°C, and then vaporizes into an aerosol within a temperature range of about 150 to 350°C. For example, the aerosol generating substrate includes an aerosol generating agent that exists in a gel phase at the first temperature range including room temperature and changes to a sol phase in the second temperature range including 80°C, and the aerosol generating agent may be heated by a resistance heating or induction heating to generate an aerosol. According to embodiments of the present disclosure, in the gel-like aerosol generating substrate, the aerosol generating agent includes a liquid composition including 70 to 100 wt% of glycerin VG and 0 to 30 wt% of glycerin PG. In addition, the gel-like aerosol generating substrate may include 0.8 to 5 wt% of the gelling agent. Also, according to embodiments, the gel-like aerosol generating substrate may additionally include 0 to 10 wt% of nicotine. Also, according to embodiments, the gel-like aerosol generating substrate may include at least one of caffeine, vitamins, and other breathing drugs.

**[0037]** The gel-like aerosol generating substrate may exist in a liquid or sol state in a manufacturing process, but even if liquefied, the gel receptor 12a in the gel receptor rod having the above specifications need to have sufficient moisture absorption to maintain the liquid composition having the above composition range in the gel receptor rod. That is, the liquid composition remains absorbed in the gel receptor 12a within the gel receptor rod and does not flow out of the gel receptor rod. Here, moisture absorption indicates that the gel receptor is wetted by the liquid composition but does not flow out.

**[0038]** The liquid composition absorbed into the gel receptor 12a is only absorbed and stored in the gel receptor and does not flow out toward the electrically heated smoking article 10 or tube 14 or filter 16. To this end, the liquid composition is preferably absorbed into the gel receptor 12a in an amount of 0.13 to 0.32 mg/mm<sup>3</sup> per unit volume of the gel receptor 12a. The reason for numerical limitation thereof is because, if the amount of the liquid composition is less than a lower limit value (0.13 mg/mm<sup>3</sup>), the amount of the liquid composition absorbed in the gel receptor 12a may not be sufficient so that the aerosol derived from the gel-like aerosol generating substrate may be insufficient during the process of intaking the aerosol derived from the electrically heated smoking article 10 by the user, and therefore, the liquid composition absorbed by the gel receptor rod should be more than the lower limit (0.13 mg/mm<sup>3</sup>). If the liquid composition exceeding the upper limit (0.32 mg/mm<sup>3</sup>) is absorbed into the gel receptor, it may be difficult for the gel receptor in the gel receptor rod having the above specifications to maintain the liquid composition absorbing moisture, so that the liquid composition may flow out of the gel receptor rod 12.

**[0039]** The gel-like aerosol generating substrate maintains a gel phase in the first temperature range (less than about 50°C) including room temperature, changes to a liquid phase (a sol phase) to exist in a liquid phase (the

sol phase), and generates an aerosol at about 100°C or higher when additionally heated.

**[0040]** In order to inject the gel-like aerosol generating substrate into the gel receptor 12a, the gel-like aerosol generating substrate is heated in the second temperature range to liquefy during the manufacturing process, and the liquid is sprayed into the gel receptor 12a or injected by a needle or the like to allow the liquid to be absorbed into the gel receptor 12a. Thereafter, the liquid is maintained at a low temperature, for example, about 4°C for 5 to 10 minutes or maintained at room temperature for 1 hour or more, so that the liquid absorbed by the gel receptor 12a changes into a gel phase and fine grains are distributed in the surface, pores, or networks of the gel receptor 12a.

**[0041]** According to the present disclosure, the gel receptor 12a of various materials may be applied. The gel receptor rod 12 may be obtained by bending, rolling and pushing the gel receptor 12a into one side of a pipe structure (not shown) and wrapped with the wrapping paper 21, while extruding it in a shape with a slightly narrower cross-section from the other side to obtain the gel receptor rod 12. Before being introduced into the pipe structure, the liquefied gel-like aerosol generating substrate is absorbed into the gel receptor 12a through a liquid injection portion, such as a needle, and the gel receptor 12a may be wet or soaked with the liquefied gel-like aerosol generating substrate, while passing through the pipe structure, and then immediately wrapped by the wrapping paper 12 on the other side of the pipe structure, thereby being cut to an appropriate length, for example, about 80 mm or 140 mm to form the gel receptor rod 12. That is, the gel-like aerosol generating substrate mixture is heated in the second temperature range including 80°C to form a liquid or sol state, and is injected into the gel receptor 12a through an injector, such as a needle, to be absorbed into the gel receptor 12a. Before cutting to the gel receptor rod 12, an appropriate cooling process may be performed, and since the gel receptor 12a has sufficient hygroscopicity for the gel-like aerosol generating substrate in a liquid state, and after cutting, the liquid gel-like aerosol generating substrate introduced into the gel receptor 12a may be maintained at an appropriate period of time, for example, for 1 hour at room temperature or may be maintained at a low temperature, for example, at 4°C, for five minutes to 10 minutes to be gelled so that the liquid composition may be prevented or minimized from flowing out of the gel receptor 12a. That is, the gel receptor rod 12 may be provided in a state in which the gel receptor 12a in which the gel-like aerosol generating substrate is immersed in a liquid state is wrapped with the wrapping paper 21, or by providing an appropriate cooling structure to the pipe structure, the gel receptor rod 12 may be wrapped with the wrapping paper 21 in a state in which the gel-like aerosol generating substrate remains in the gel receptor 12a in the form of a gel. Alternatively, the gel receptor rod 12 may retain by gelling the mixture including the aerosol generating substrate

introduced into the gel receptor only when maintained at the first temperature range including room temperature for a predetermined period of time as described above, and is cut to a size that may fit into individual smoking article 10 as described below.

**[0042]** This configuration is a generalized process in an existing cigarette manufacturing line, and has an advantage in that existing cigarette manufacturing processes and equipment may be used as they are. That is, the above process is applied as it is in the manufacture of existing filters, paper tubes, and tobacco cut leaves, and the gel receptor rod 12 may be obtained by using such current equipment and processes as they are.

**[0043]** Since the gel-like aerosol generating substrate is introduced into the gel receptor in a liquid state in the second temperature range of 50 to 100°C, for example, including 80°C, it may be easily absorbed into the gel receptor to be described below, and exists in a gel phase in a space between the surfaces, pores, and networks present in the gel receptor within the gel receptor in the first temperature range less than 50°C. Therefore, when the gel receptor rod is maintained in the first temperature range including room temperature, there is no possibility or minimal possibility that the liquid composition included in the gel aerosol generating substrate flows out or leaks from a gel aerosol cartridge.

**[0044]** According to embodiments, the gel receptor 12a according to the present disclosure has a cylindrical shape by creasing or rolling a strip of 2 to 3 mm thick formed of melamine-based foaming resin and introducing it into the pipe structure described above. According to some other embodiments of the present disclosure, the gel receptor 12a is made by processing a melamine-based foaming resin into a cylindrical shape, introducing it into the pipe structure described above, and extruding it. The gel receptor formed of the melamine-based foaming resin preferably has a weight per unit volume of 0.01 to 0.013 mg/mm<sup>3</sup>.

**[0045]** According to some other embodiments of the present disclosure, the gel receptor 12a is made by creasing, bending, or rolling pulp or fabric containing pulp, introducing it into the pipe structure as described above to have a cylindrical shape or process it to a cylindrical shape, introducing it to the pipe structure as described above, and then extruding it, and the gel receptor formed of pulp or fabric including pulp has a weight per unit volume of 0.25 to 0.4 mg/mm<sup>3</sup>.

**[0046]** According to some other embodiments of the present disclosure, the gel receptor 12a is made by creasing or rolling cotton woven fabric or nonwoven fabric, introducing it into the pipe structure as described above to have a cylindrical shape or process it to a cylindrical shape, introducing it to the pipe structure as described above, and then extruding it, and the gel receptor formed of cotton woven fabric or nonwoven fabric has a weight per unit volume of 0.2 to 0.35 mg/mm<sup>3</sup>.

**[0047]** According to some other embodiments of the present disclosure, the gel receptor 12a is made by

creasing or rolling a woven fabric or non-woven fabric of bamboo fiber, introducing it into the pipe structure as described above to have a cylindrical shape or process it to a cylindrical shape, introducing it to the pipe structure as described above, and then extruding it, and the gel receptor formed of a woven fabric or non-woven fabric of bamboo fiber has a weight per unit volume of 0.15 to 0.25 mg/mm<sup>3</sup>.

**[0048]** In an experiment on the gel receptor 12a of each of the above embodiments, according to results of the experiment conducted on the electrically heated smoking article including the gel receptor rod corresponding to 100 mg of the liquid composition, the liquid composition remained absorbed in the gel receptor 12a without a problem of leakage during the experiment, a much richer aerosol than in the existing heated cigarette was confirmed, and sufficient aerosol derived from a larger amount of liquid composition than the existing hybrid type or a case of absorbing the existing liquid composition as confirmed.

**[0049]** According to embodiments, the wrapping paper 21 forming the gel receptor rod 12 may be provided as a laminate formed by attaching an aluminum foil to paper, and is wrapped to have a cylindrical shape so that the aluminum foil contacts the gel receptor 12a. Accordingly, the aluminum foil may eliminate or minimize the possibility that the liquid gel-like aerosol generating substrate contained in the gel receptor 12a flows out through the side of the gel receptor rod 12. That is, as can be seen from the configuration of the gel receptor rod 12 shown in FIGS. 2 and 3, the gel receptor 12a is wrapped by the separate wrapping paper 21 before being wrapped by the wrapping paper 20 for forming a smoking article. In this case, the wrapping paper 21 may be provided in a form in which aluminum foil is attached the paper, and may be wrapped to have a cylindrical shape so that the aluminum foil contacts the gel receptor 12a.

**[0050]** As shown in FIGS. 2 to 5, the filter 16 serving as a mouthpiece serves to allow aerosol to pass there-through and prevent liquid inflow. Here, the filter 16 is formed of pulp, cellulose acetate, or PLA material, and the filter has a diameter of 7 mm to 10 mm and a length of 8 mm to 12 mm. The filter 16 may be manufactured in a cylindrical or tubular shape. Meanwhile, the filter 16 may improve user satisfaction by including a flavoring component. The flavoring component includes, for example, licorice, sucrose, fructose syrup, iso-sweeteners, cocoa, lavender, cinnamon, cardamom, celery, fenugreek, cascarilla, sandalwood, bergamot, geranium, honey essence, rose oil, vanilla, lemon oil, orange oil, mint oil, caraway, cognac, jasmine, chamomile, menthol, ylang-ylang, salvia, spearmint, ginger, coriander, or coffee, and the like.

**[0051]** Essentially, the gel receptor rod 12 described above may be made using the same process and equipment for introducing the flavoring component into the filter 16 as above. In this case, since the existing process and equipment are used as they are, there is no significant

difficulty in satisfying mass production and quality control.

**[0052]** Since the tube 14 is hollow, it serves as a passage through which the aerosol moves, and has an inner diameter of 1 mm to 5 mm and an outer diameter of 7 mm to 10 mm. The tube 14 may be a paper tube formed of paper, and PLA may be inserted into the tube 14 to lower a temperature of the aerosol, thereby preventing a user from getting burned when inhaling the aerosol. The tube 14 may also be wrapped by a separate wrapping paper (not shown).

**[0053]** FIG. 6 conceptually shows a partially exploded perspective view and cross-sectional view of an electrically heated smoking article according to another embodiment of the present disclosure. The electrically heated smoking article 10 of the present embodiment further includes a tobacco body 19 provided upstream with respect to the tube 14 and additionally provided upstream or downstream with respect to the gel receptor rod 12. The filter 16, the tube 14, the gel receptor rod 12, and the additionally provided tobacco body 19 may be wrapped with the wrapping paper 20 to form a cigarette-type electrically heated smoking article 10. In this figure, the tobacco body 19 is shown as being disposed upstream of the gel receptor rod 12, but the relative positions of the two may be reversed.

**[0054]** The tobacco body 19 may include cut tobacco leaves, but since the cut tobacco leaves alone cannot maintain a shape thereof, it is wrapped by a separate wrapping paper (not shown) to form the tobacco body 19. The tobacco body 19 may be prepared to have the same size (diameter) as that of the gel receptor rod 12, and the filter 16, the tube 14, the gel receptor rod 12, and the tobacco body 19 may be wrapped with the wrapping paper 20 to obtain the electrically heated smoking article 10 as shown in FIG. 6.

**[0055]** FIG. 7 is a view illustrating an embodiment of an aerosol generating device for generating an aerosol from an electrically heated smoking article according to the present disclosure, and FIG. 8 is a view illustrating another embodiment of an aerosol generating device for generating an aerosol from an electrically heated smoking article according to the present disclosure. Although a configuration for generating an aerosol by heating the electrically heated smoking article has been described, and it will be apparent that a person skilled in the art may easily implement the present disclosure by changing the dimensions to suit the electrically heated smoking article to have the same configuration as that described below with reference to FIGS. 7 and 8 for the electrically heated smoking article according to respective embodiments of the present disclosure shown in FIGS. 2 and 4.

**[0056]** Referring to Figures 7 and 8, the present disclosure provides an aerosol generating device 100, which is a grippable and portable sized aerosol generating device for the electrically heated smoking article described above, including a cavity 30 into which a smoking article may be inserted, provided in the device, at least one of a resistive heating type heater and an induction

heating type heater capable of heating the inside or outside of the gel receptor rod of the smoking article, provided in the device, a rechargeable battery 40 provided in the device and functioning as a power source, and a microcontroller 50 provided in the device and controlling the heater upon receiving power from the battery 40. Referring to FIG. 7, the aerosol generating device 100 includes a resistive heating type heater 60, and the resistive heating type heater 60 is provided as a pipe heater. Of course, this is an example, and the resistive heating type heater 60 may be an immersion type heater, such as needle shaped heater. The resistive heating type heater 60 is heated upon receiving power from the battery 40 under the control of the microcontroller 50. As the resistive heating type heater 60 is heated, the gel receptor rod 12 and the gel receptor rod 18 of the electrically heated smoking article 10 may be heated to generate aerosols, which are transported through the tube 14 so that the user may inhale the aerosol through the filter 16.

[0057] In addition, referring to FIG. 8, the aerosol generating device 100 includes an induction heating type heater 70, and the induction heating type heater 70 includes an induction coil. In addition, the aerosol generating device 100 includes a susceptor 80 formed of a material that emits thermal energy by generating an eddy current by a magnetic field to correspond to the induction coil of the induction heating type heater 70. The susceptor 80 is positioned to surround the gel receptor rod 12 and gel receptor rod 18 of the electrically heated smoking article 10 when the electrically heated smoking article 10 is inserted into the cavity 30. Of course, this is an example, and the susceptor 80 may have a shape, such as a needle. Power is supplied from the battery 40 to the induction heating type heater 70, and the microcontroller 50 controls power supply from the battery 40 to the induction heating type heater 70. The microcontroller 50 controls the induction heating type heater 70 to generate an alternating magnetic field in the induction coil, and the alternating magnetic field generated in the induction coil causes hysteresis loss and eddy current in the susceptor 80 to inductively heat the susceptor 80, whereby the gel receptor rod 12 and the gel receptor rod 18 of the electrically heated smoking article 10 are heated to generate aerosols, respectively, and the aerosol may be transported through the tube 14 so that the user may inhale the aerosol through the filter 16.

[0058] FIG. 9 is a view illustrating another embodiment of an aerosol generating device for generating an aerosol from an electrically heated smoking article according to the present disclosure. According to embodiments, the heaters of the aerosol generating device 100 may include a first heater 60a and a second heater 60b disposed up and down to independently heat the gel receptor rod 12 and the gel receptor rod 18 or the gel receptor rod 12 and the tobacco body 19, respectively. In this case, although the gel-like aerosol generating substrates of the gel receptor rod 12 and the gel receptor rod 18 are different materials, the gel receptor rod 12 and the gel re-

ceptor rod 18 may be heated at different optimal temperatures, that is, respective temperatures at which most aerosols may be generated.

[0059] In particular, in the embodiment including the tobacco body 19 as shown in FIG. 6, a temperature range in which aerosol is generated from the tobacco body 19 may be different from a temperature range in which aerosol is generated from the gel receptor rod 12. Therefore, as shown in FIG. 9, when the gel receptor rod 12 is inserted into a corresponding position of the first heater 60a and the tobacco body 19 is inserted into a corresponding position of the second heater 60b, the first heater 60a may heat the inside or outside of the gel receptor rod 12 to the first heating temperature range in which the gel-like aerosol generating substrate contained therein vaporizes into aerosols, and the second heater 60b may heat the inside or outside of the tobacco body 19 to the second heating temperature range in which the components included in the cut tobacco leaf vaporize into aerosols, which is different from the first heating temperature range. This configuration and control method may be equally applied even when the additionally provided gel receptor rod 18 is inserted at a position corresponding to the second heater 60b. In the present embodiment, the microcontroller 50 is connected to the first heater 60a and the second heater 60b through separate paths and individually controls the two heaters.

[0060] The present disclosure is not limited to the specific embodiments described above, and various modifications may be made by anyone skilled in the art without departing from the gist of the present disclosure claimed in the claims. Of course, such changes are within the scope of the claims.

## Claims

### 1. A gel receptor rod (12) comprising:

a gel-like aerosol generating substrate including glycerin and carrageenan, which exists in the form of a gel in a first temperature range including room temperature, changes into a sol phase in a second temperature range including 80°C, and vaporizes into an aerosol in a temperature range of 100°C to 350°C,  
a gel receptor (12a) in which the gel-like aerosol generating substrate is accommodated, and  
a wrapping paper (21) wrapping the side of the gel receptor in a cylindrical shape.

### 2. The gel receptor rod (12) of claim 1, wherein the gel-like aerosol generating substrate includes 0.1% to 5% of a gelling agent, 5% to 100% of an aerosol generating agent including glycerin, 0.1% to 20% of an acidity regulator, and optionally, 0.1% to 15% of flavoring agents, additives or active substances.



3. The gel receptor rod (12) of claim 2, wherein the aerosol generating agent includes a liquid composition including 70 wt% to 100 wt% of glycerin VG and 0 wt% to 30 wt% of glycerin PG, and the gel-like aerosol generating substrate includes 0.8 wt% to 5 wt% of the gelling agent. 5
4. The gel receptor rod (12) of claim 1, wherein the gel-like aerosol generating substrate additionally includes one or more of kappa carrageenan, iota carrageenan, agar, pectin, guar gum, calcium lactate, potassium chloride, glucose, starch powder, natural food additives, or fruit extracts or compounds. 10
5. The gel receptor rod (12) of claim 1, wherein the gel-like aerosol generating substrate includes at least one of 0% to 10% nicotine, caffeine, vitamins, and respiratory drugs. 15
6. An electrically heated smoking article (10) comprising: 20
  - a filter (16),
  - a tube (14) provided upstream of the filter (16);
  - and
  - the gel receptor rod (12) provided upstream of the tube (14) according to any one of claims 1 to 5, 25
    - wherein the filter (16), the tube (14), and the gel receptor rod (12) are wrapped with wrapping paper (20) to form a cigarette. 30
7. The electrically heated smoking article (10) of claim 6, wherein the gel receptor rod (12) includes a first gel receptor (12a) and a second gel receptor (12b) surrounding the first gel receptor (12a). 35
8. The electrically heated smoking article (10) of claim 6, further comprising: 40
  - a gel receptor rod (18) additionally provided upstream of the gel receptor rod (12), wherein the filter (16), the tube (14), the gel receptor rod (12), and the additionally provided gel receptor rod (18) are wrapped to form a cigarette. 45
9. The electrically heated smoking article (10) of claim 6, further comprising: 50
  - a tobacco body (19) including cut tobacco leaves additionally provided upstream of the tube (14) and upstream or downstream of the gel receptor rod (12), 55
    - wherein the filter (16), the tube (14), the gel receptor rod (12), and the additionally provided tobacco body (19) are wrapped to form a cigarette.
10. The electrically heated smoking article (10) of any one of claims 6 to 9, wherein the filter (16) is formed of cellulose acetate or PLA material, has a diameter of 7 mm to 10 mm, and a length of 8 mm to 12 mm, and the tube (14) has an inner diameter of 1 mm to 5 mm and an outer diameter of 7 mm to 10 mm.
11. An aerosol generating device (100), which is grippable and portable, for the electrically heated smoking article (10) according to any one of claim 6 or 7, wherein the aerosol generating device (100) comprising:
  - a cavity (30) into which a smoking article (10) is insertable, provided in the device (100);
  - at least one of a resistive heating type heater (60) and an induction heating type heater (70) capable of heating an inside or outside of the gel receptor rod (12) of the smoking article (10), provided in the device (100);
  - a rechargeable battery (40) provided in the device (100) and functioning as a power source; and
  - a microcontroller (50) provided in the device (100) to control the heater (60, 70) upon receiving power from the battery (40).
12. An aerosol generating device (100), which is grippable and portable, for the electrically heated smoking article (10) according to any one of claim 8 or 9, wherein the aerosol generating device (100) comprising:
  - a cavity (30) into which a smoking article (10) is insertable, provided in the device (100);
  - at least one (a first heater, 60a) of a resistive heating type heater and an induction heating type heater capable of heating an inside or outside of the gel receptor rod (12) of the smoking article (10), provided in the device (100);
  - at least one (a second heater, 60b) of the resistive heating type heater and the induction heating type heater capable of heating an inside or outside of the additionally provided gel receptor rod (18) or tobacco body (19) in the smoking article (10), provided in the device (100);
  - a rechargeable battery (40) provided in the device (100) and functioning as a power source; and
  - a microcontroller (50) provided in the device (100) and controlling the first heater (60a) and the second heater (60b) separately upon receiving power from the battery (40),
  - wherein the first heater (60a) heats the inside or outside of the gel receptor rod (12) to a first heating temperature range, and the second heater (60b) heats the inside or outside of the additionally provided gel receptor rod (18) or tobacco body (19) to a second heating temperature

range different from the first heating temperature range.

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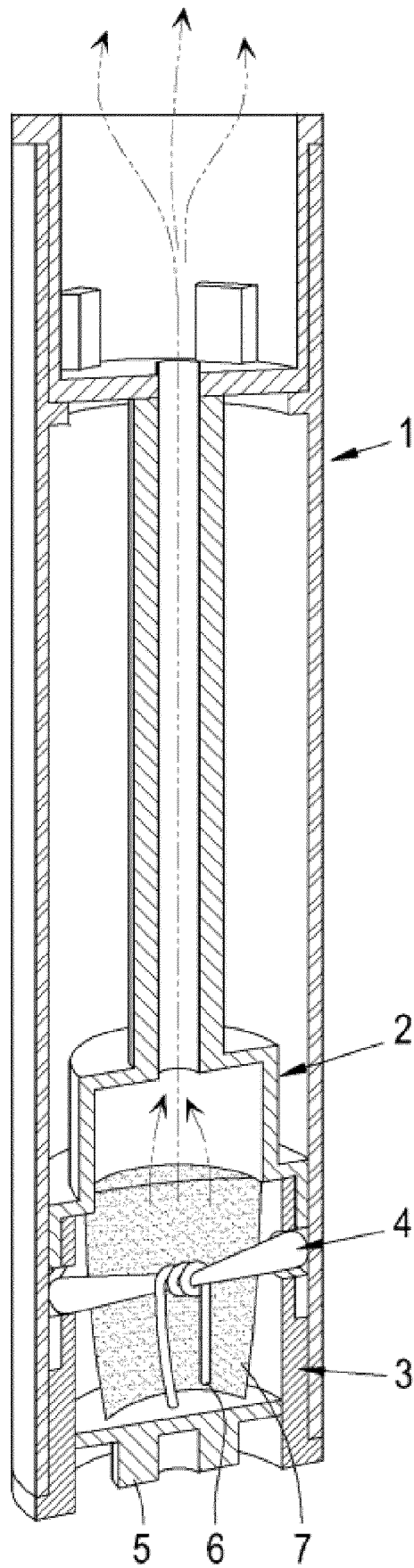


FIG. 1

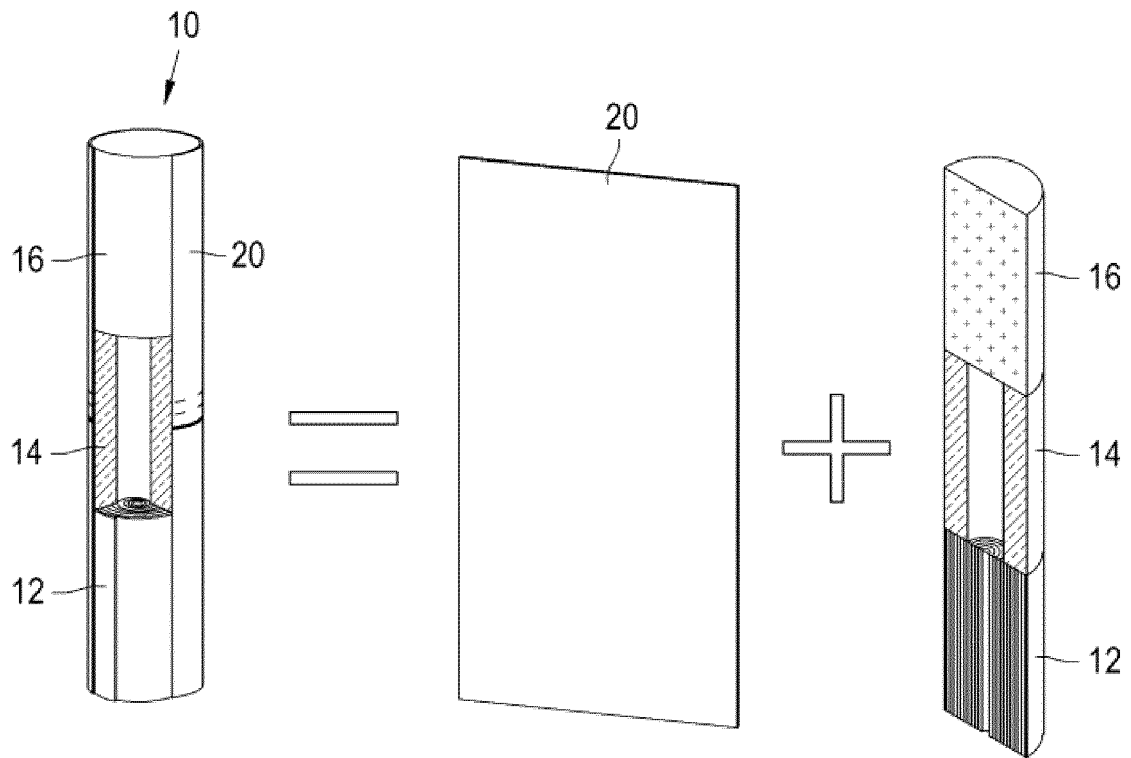


FIG. 2

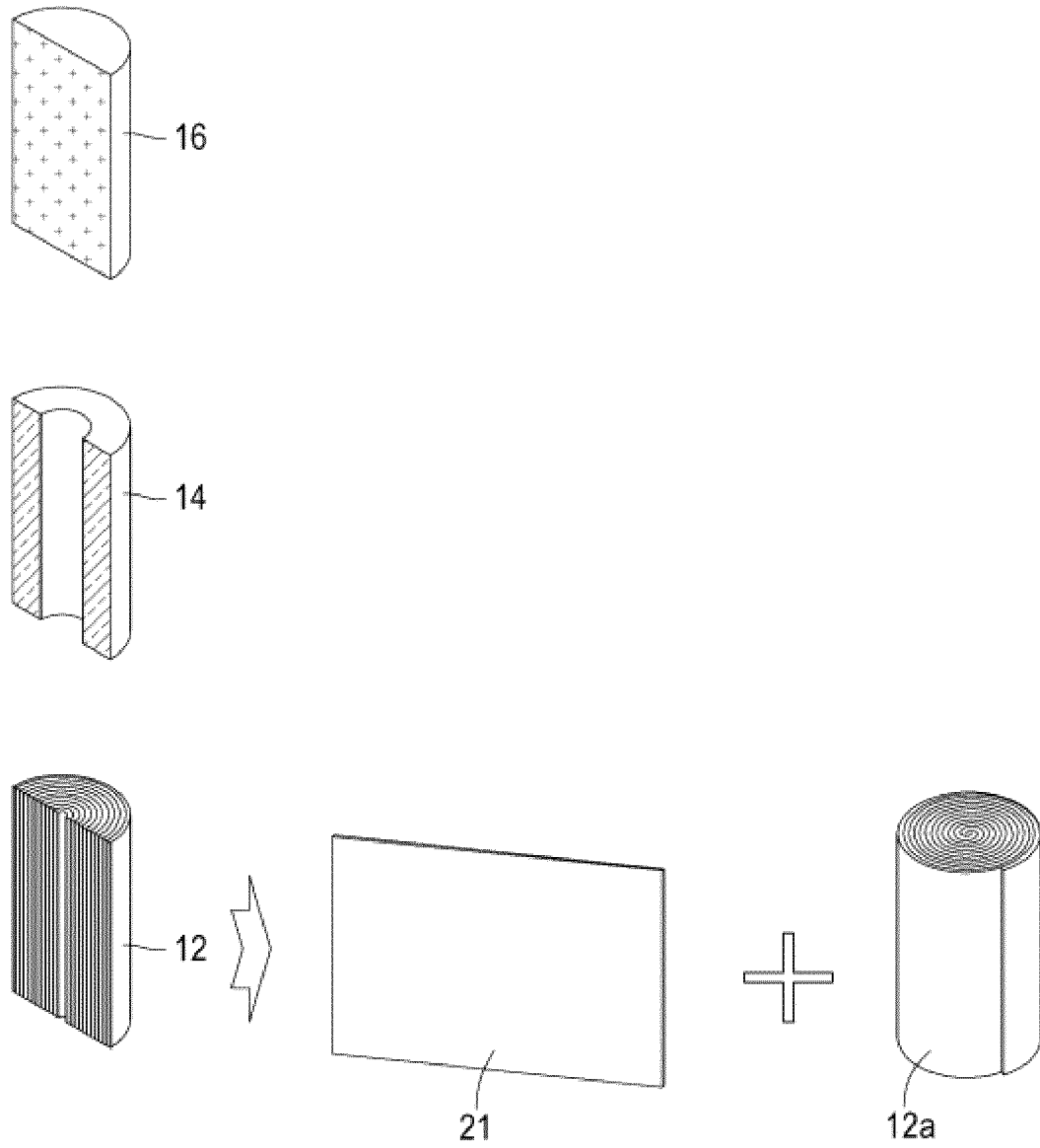


FIG. 3

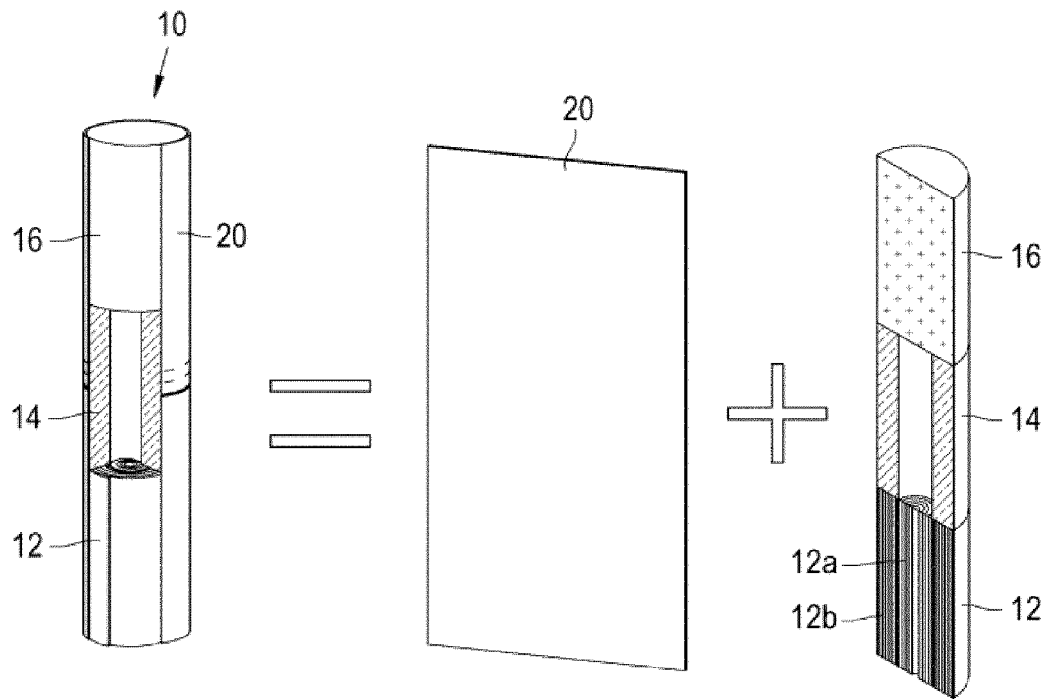


FIG. 4

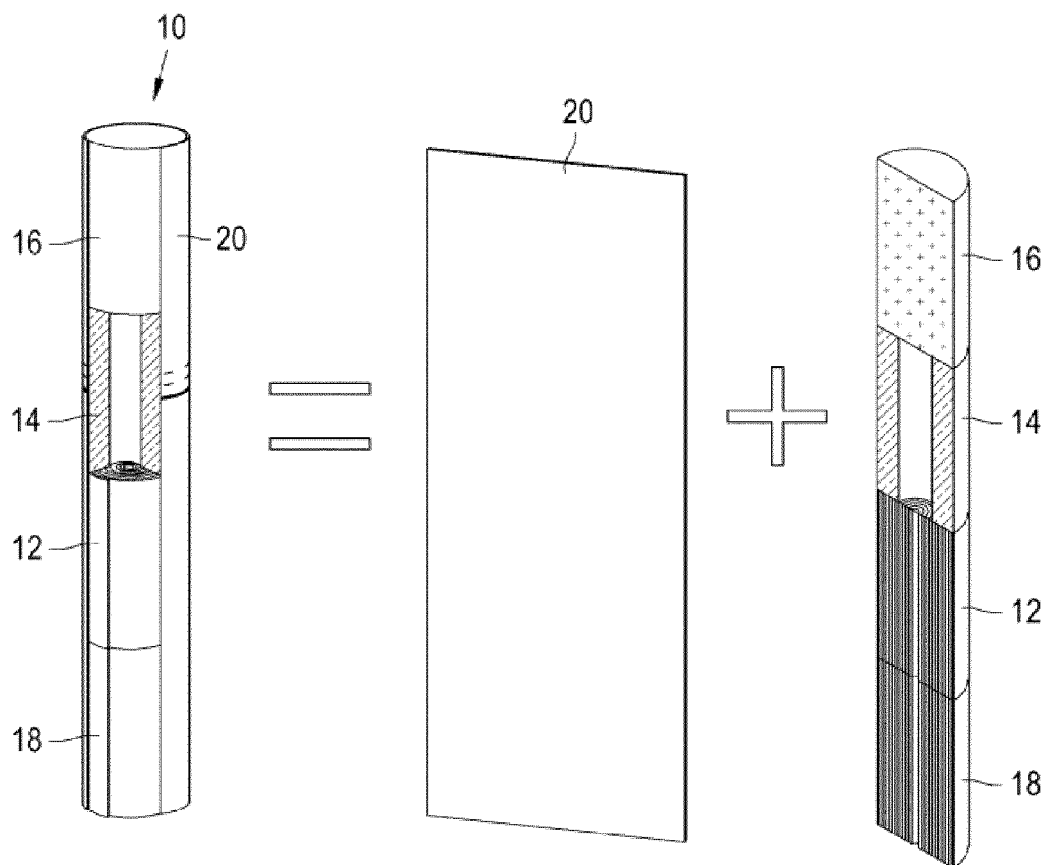


FIG. 5

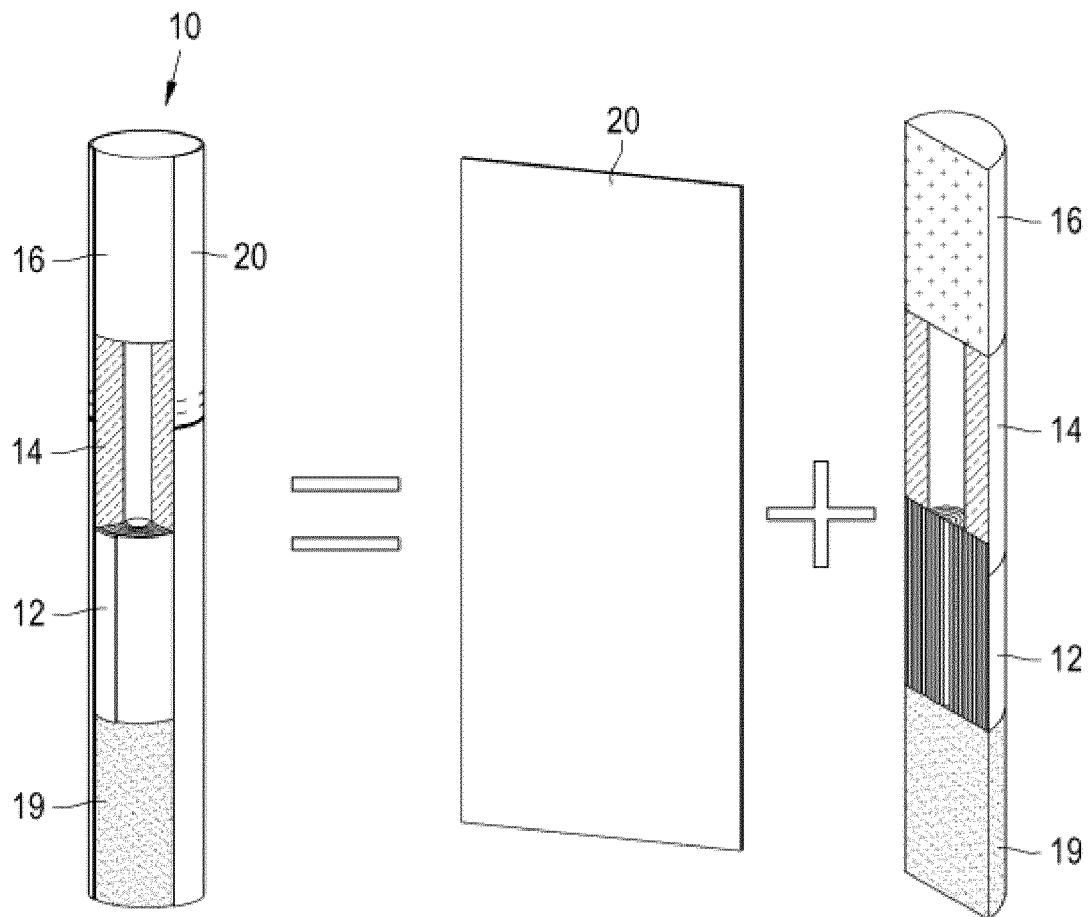


FIG. 6

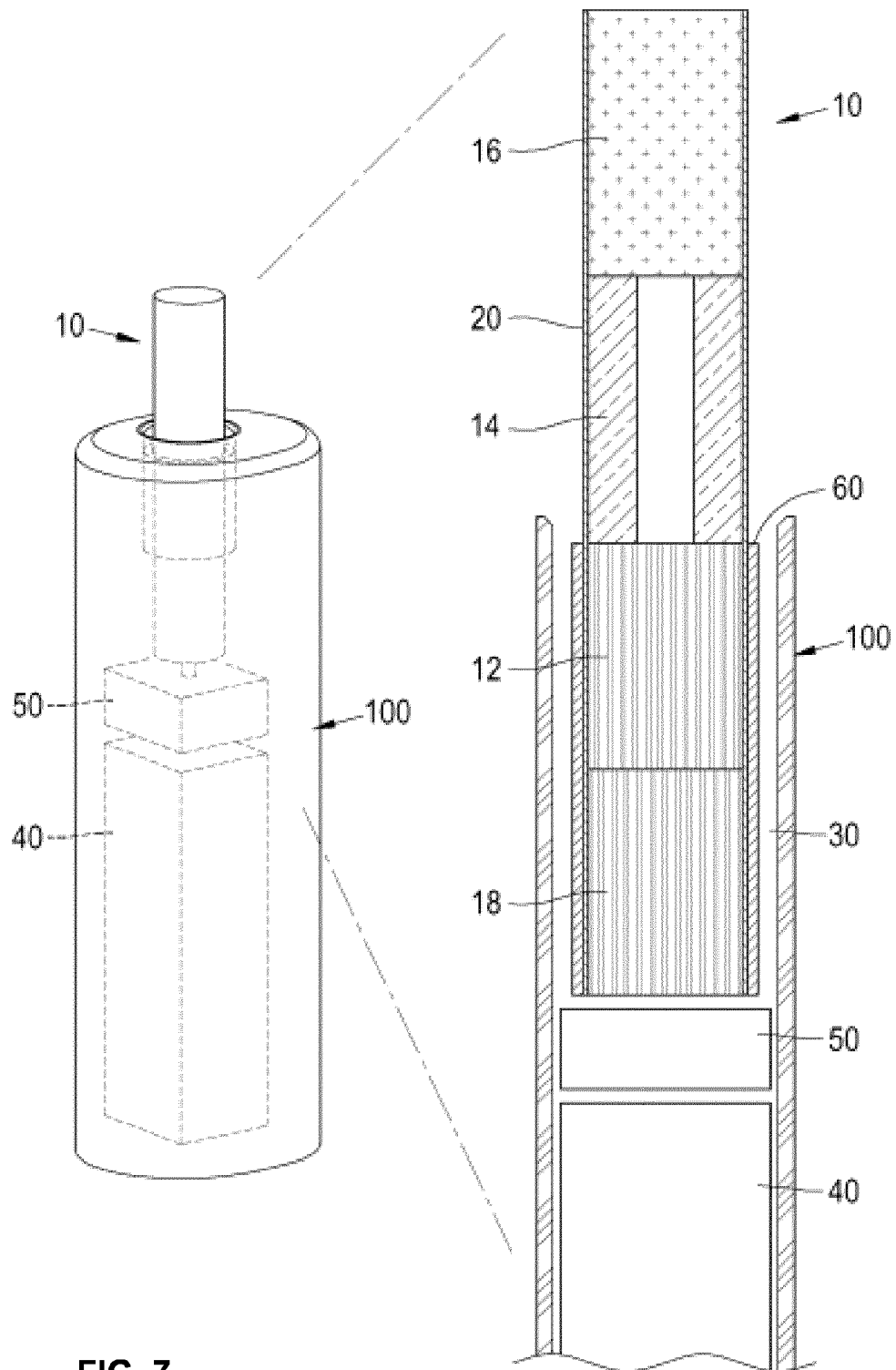


FIG. 7



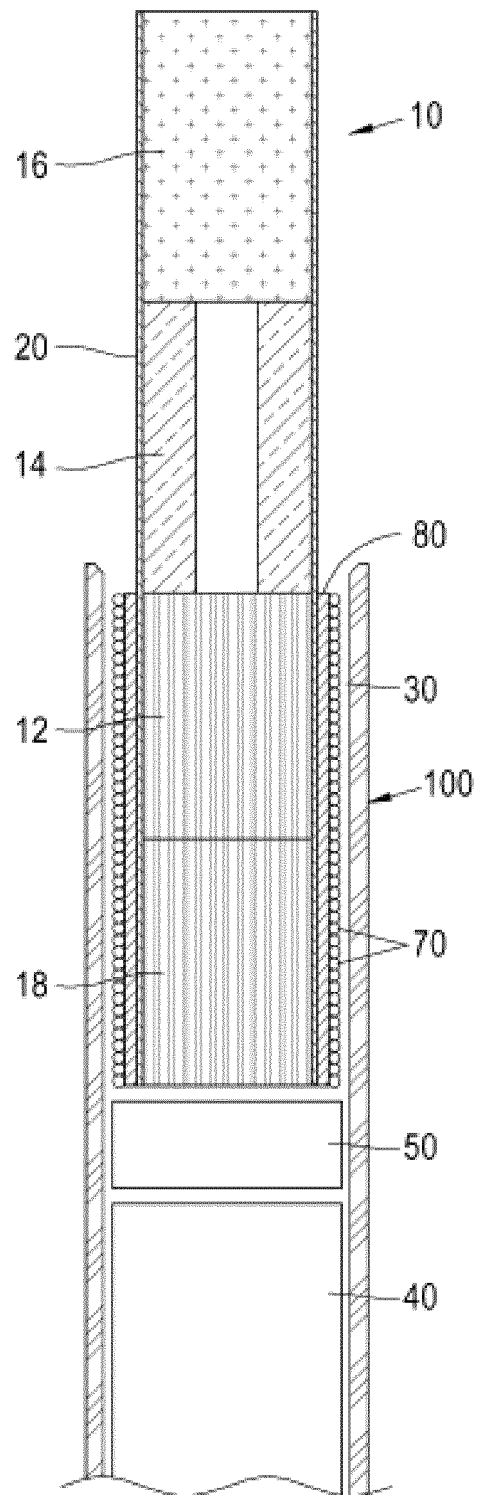


FIG. 8

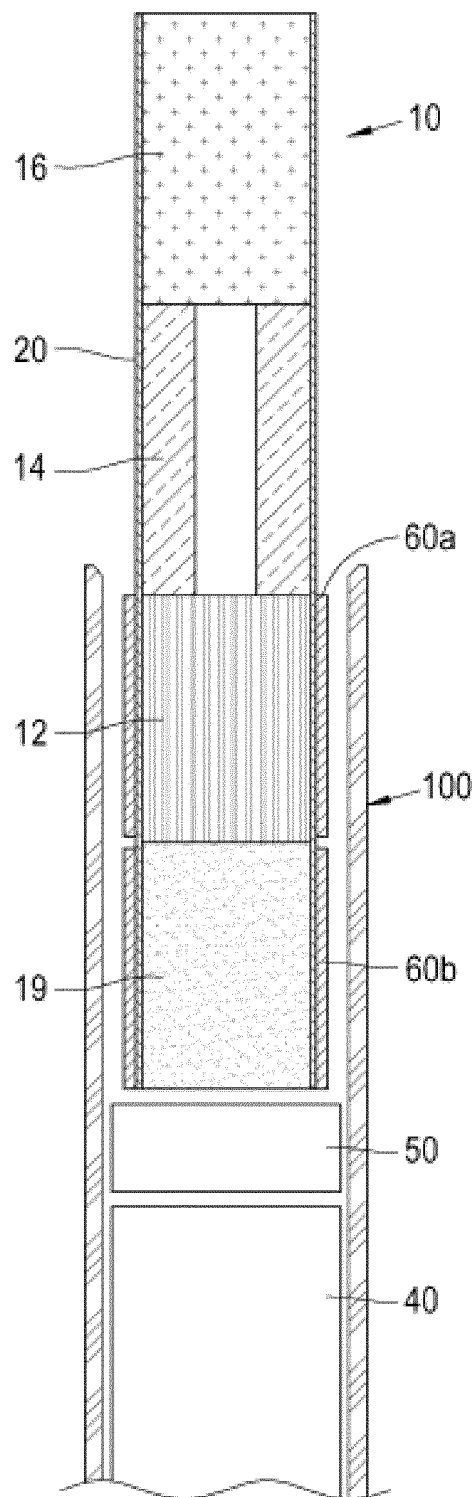


FIG. 9



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| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                       |                                         |
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| Category                                                                                                                                                                                                                                               | Citation of document with indication, where appropriate, of relevant passages                                                                                                                                                                            | Relevant to claim                                                                                                                                                                                                                                                                     | CLASSIFICATION OF THE APPLICATION (IPC) |
| X                                                                                                                                                                                                                                                      | US 2017/340005 A1 (TERAO FUMITAKA [JP])<br>30 November 2017 (2017-11-30)                                                                                                                                                                                 | 1-6, 9-11                                                                                                                                                                                                                                                                             | INV.<br>A24F40/42                       |
| A                                                                                                                                                                                                                                                      | * paragraphs [0002], [0003], [0013],<br>[0014], [0016], [0017], [0050],<br>[0068], [0069], [0075] - [0080],<br>[0085], [0086] *<br>* table 1 *                                                                                                           | 7, 8, 12                                                                                                                                                                                                                                                                              | A24B15/167<br><br>ADD.<br>A24D1/20      |
| X                                                                                                                                                                                                                                                      | WO 2022/167495 A1 (PHILIP MORRIS PRODUCTS<br>SA [CH]) 11 August 2022 (2022-08-11)<br>* page 42, lines 3-6; figure 5 *<br>* page 44, lines 10-19 *<br>* page 45, lines 7-10 *<br>* page 47, lines 6-8 *<br>* page 6, line 30 - page 7, line 13 *<br>----- | 12                                                                                                                                                                                                                                                                                    |                                         |
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|                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                       | A24F<br>A24B                            |
| The present search report has been drawn up for all claims                                                                                                                                                                                             |                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                       |                                         |
| Place of search<br><b>Munich</b>                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                          | Date of completion of the search<br><b>31 July 2023</b>                                                                                                                                                                                                                               | Examiner<br><b>Schwarzer, Bernd</b>     |
| CATEGORY OF CITED DOCUMENTS<br>X : particularly relevant if taken alone<br>Y : particularly relevant if combined with another document of the same category<br>A : technological background<br>O : non-written disclosure<br>P : intermediate document |                                                                                                                                                                                                                                                          | T : theory or principle underlying the invention<br>E : earlier patent document, but published on, or after the filing date<br>D : document cited in the application<br>L : document cited for other reasons<br>.....<br>& : member of the same patent family, corresponding document |                                         |

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

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31-07-2023

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