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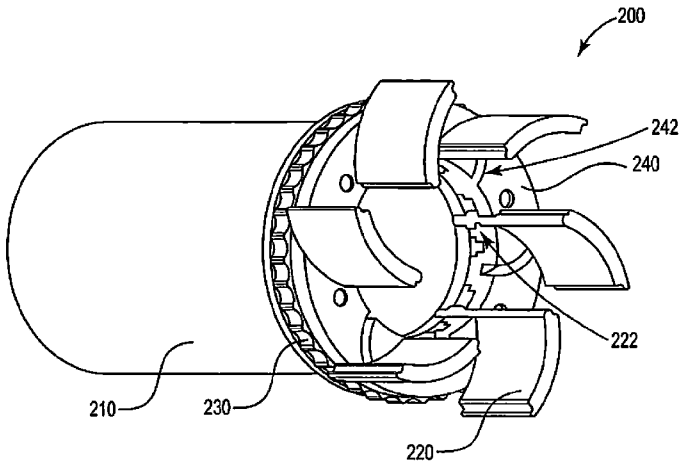

Fig. 2

(57) Abstract: An apparatus (200) for positioning over a heat source (102) of an aerosol generating article (100) includes a body (210) defining a passage configured to receive the smoking article. The apparatus further includes a plurality of blades (220) configured to surround the heat source. The blades are actuatable from an open position to a closed position. The blades in the open position allow airflow to the heat source. The blades in the closed position restrict air from accessing the heat source. The apparatus also comprises a rotatable actuator (230) operably coupled to the body and to the blades. Rotation of the actuator causes the blades to move from the open position to the closed position.

APPARATUS FOR AEROSOL GENERATING ARTICLE

This invention relates to an aerosol generating article having a combustible heat source for heating an aerosol generating substrate.

A number of smoking articles in which tobacco is heated rather than combusted have been proposed in the art. An aim of such 'heated' smoking articles is to reduce certain smoke constituents of the type produced by the combustion and pyrolytic degradation of tobacco in conventional cigarettes.

In one known type of heated smoking article, an aerosol is generated by the transfer of heat from a combustible heat source to a physically separate aerosol generating substrate, for example containing tobacco. The aerosol generating substrate may be located within, around or downstream of the combustible heat source. During use, volatile compounds are released from the aerosol generating substrate by heat transfer from the combustible heat source and entrained in air drawn through the smoking article. As the released compounds cool, they condense to form an aerosol that is inhaled by the user.

Heated smoking articles, and aerosol generating articles in general, may be configured so that the combustible heat source is blind, which may limit the amount or number volatile compounds released from combustion of the heat source that enter air drawn through the smoking article. Heated smoking articles having blind combustible heat sources may transfer heat to the aerosol-generating substrate primarily via conduction. Heated smoking articles may also be configured so that the heat source is non-blind. Heated smoking articles having non-blind combustible heat sources transfer heat to the aerosol-generating substrate primarily via convection through one or more air flow channels through the heat source, which allow volatile compounds from the heat source to enter air drawn through the smoking article. Because one aim of heated smoking articles is to reduce certain smoke constituents produced via combustion, heated smoking articles employing blind heat sources may be preferred.

Published PCT patent application, WO-A2-2009/022232, discloses an example of a heated smoking article having a non-blind heat source. The heated smoking article disclosed in WO-A2-2009/022232 comprises a combustible heat source, an aerosol generating substrate downstream of the combustible heat source, and a heat conducting element around and in contact with a rear portion of the combustible heat source and an adjacent front portion of the

aerosol generating substrate. An air flow channel extends through the heat source such that air may be drawn through the channel downstream towards a mouthpiece.

Regardless of whether heated smoking articles include a blind or non-blind combustible heat source, the heat source may require direct contact with air to burn properly. Thus, heated smoking articles may be manufactured such that the heat source is exposed to a smoker and their surroundings during smoking. However, temperatures of the combustible heat sources may be quite high when burning. For example, temperatures of the heat sources during combustion may be more than 600°C, which may consequently require more effort to extinguish or to remove heat to facilitate disposal.

One advantage of at least some examples of the invention is to reduce the temperature of an exposed element to which a user of an aerosol generating article having a combustible heat source or their environment may be exposed. Another advantage of at least some examples of the invention is to facilitate extinguishment of a combustible heat source of an aerosol generating article. Another advantage of at least some examples of the invention is to maintain a blind heat source while reducing the temperature of an exposed element to which a user or their environment may be exposed.

In various aspects, the invention provides an apparatus for positioning over a heat source of an aerosol generating article. The apparatus comprises a body defining a passage configured to receive, for example slidably receive, the smoking article. The apparatus further comprises a plurality of blades configured to surround the heat source. The blades are actuatable from an open position to a closed position. The blades in the open position allow airflow to the heat source. The blades in the closed position restrict air from accessing the heat source. The apparatus also comprises a rotatable actuator operably coupled to the body and to the blades. Rotation of the actuator causes the blades to move from the open position to the closed position.

The term "aerosol generating article" refers to an article comprising an aerosol generating substrate that releases volatile compounds to form an aerosol that may be inhaled by a user. The term "aerosol-generating substrate" refers to a substrate capable of releasing, upon heating, volatile compounds, which may form an aerosol. The aerosols generated from aerosol-generating substrates of articles according to the invention may be visible or invisible and may include vapours (for example, fine particles of substances, which are in a gaseous

state, that are ordinarily liquid or solid at room temperature) as well as gases and liquid droplets of condensed vapours.

The terms "distal," "upstream," "proximal," and "downstream" are used to describe the relative positions of components, or portions of components, of an aerosol generating article. Aerosol generating articles according to the invention have a proximal end through which, in use, an aerosol exits the article for delivery to a user, and have an opposing distal end. The proximal end of the aerosol generating article may also be referred to as the mouth end. In use, a user draws on the proximal end of the aerosol generating article in order to inhale an aerosol generated by the aerosol generating article. The terms upstream and downstream are relative to the direction of aerosol movement through the aerosol generating article when a user draws on the proximal end.

Various aspects of the aerosol generating articles and apparatuses according to the present invention may have one or more advantages relative to currently available aerosol generating articles that include a combustible heat source. For example, apparatuses according to the invention provide a simple to use barrier to protect a smoker or their surrounding environment from contact with a combusted heat source having a high temperature. The blades of the apparatus that surrounds the heat source may be separated from the heat source so that the temperature of the blades is lower than the temperature of the combusted heat source. The blades may also be configured to efficiently dissipate heat to reduce temperature of the blades relative to the combusted heat source. In the open position, the blades allow air to flow to the heat source to allow the heat source to be lit with, for example a flame, to allow continued combustion of the heat source, and to allow evacuation of combustion gasses. In the closed position, the blades restrict air flow to the heat source to aid in extinguishing the heat source. In some preferred embodiments, apparatuses according to the invention are configured to prevent or reduce the number or amount volatile compounds released from the heat source during combustion from entering air drawn through the aerosol generating article and inhaled by a user. For example, apparatus may include a seal extending from an inner surface of the body of the apparatus and arranged to surround and seal the aerosol generating article between the heat source and, for example, the aerosol-generating substrate to limit volatile compounds released from the heat source during combustion from entering drawn through the aerosol generating article. Additional advantages of one or more

aspects of aerosol generating articles described herein will be evident to those of skill in the art upon reading and understanding the present disclosure.

The present invention relates to an aerosol generating article having a combustible heat source for heating an aerosol generating substrate and an apparatus for positioning over the heat source. The apparatus includes a blades configured to surround at least a portion of the heat source and to allow air to access the heat source when the blades are in an open position. In use, the temperature of the blades is substantially lower than the heat source during combustion. Accordingly, the temperature of an element to which a user of the aerosol generating article may be exposed is reduced. When the blades are closed, air flow to the heat source is restricted and the heat source may be more readily extinguished.

The apparatus includes a main body. The body defines a passage for slidably receiving an aerosol generating article having a combustible heat source. The passage defines an inner surface of the body. Preferably, at least a portion of the inner surface of the body engages the aerosol generating article when the article is received in the passage. For example, the inner surface of the body may define one or more detents that are configured to engage the aerosol generating article by interference fit. In addition or alternatively, the passage may be sized to engage the aerosol generating article along its length. Alternatively, one or more additional elements disposed in the passage may engage the aerosol generating article. Regardless of whether the inner surface of the body is configured to engage the aerosol generating article or whether an additional element in the passage is configured to engage the aerosol generating article, the aerosol generating article is preferably retained in a longitudinal position relative to the body in use. The aerosol generating article is preferably insertable or removable from the bore with minimal force. For example, the aerosol generating article may be readily inserted or withdrawn from the passage by a user.

The body may be formed of any suitable material or combination of materials. For example, the body may be formed from a material comprising a polymer, such as a thermoplastic polymer, or a material comprising a metal, such as aluminium. Preferably, the body comprises a semi-crystalline polymer. Examples of suitable polymers from which the body or a portion of the body may be made include polyethter ether ketone (PEEK), polyoxymethylene (POM), high density polyethylene (HDPE) and the like. In addition or alternatively, the body may comprise wood, a carbon fibre, or glass fibre-containing material.

The body may define one or more through holes configured to be positioned downstream of the heat source when the aerosol generating article is received in the passage of the body. The holes may be arranged to allow air flow into the aerosol generating article. Where air inlets are present in the aerosol generating article, the through holes of the body may be arranged to allow air external to the body to be drawn through the holes, through the air inlets of the aerosol generating article and into a mouth of a user. The through holes may enhance air flow over the aerosol generating substrate to increase release of volatile compounds from the substrate, to increase delivery of volatile compounds to a user, or increase release of volatile compounds from the substrate and increase delivery of volatile compounds to a user.

The apparatus may further comprise a seal or baffle extending from an inner surface of the body. The seal or baffle may be configured and arranged to contact the aerosol generating article downstream of the heat source. The holes through the body, if present, may be downstream of the seal or baffle. The seal or baffle can limit the amount or number of combustion products from the heat source from entering air drawn through the aerosol generating article and delivered to a user. Preferably, the apparatus further comprises a seal.

The seal may have any suitable inner diameter. Preferably, the inner diameter of the seal, in a relaxed state, is less than the outer diameter of the aerosol generating article. As an aerosol generating article is introduced into the passage of the body, the seal may deflect to allow insertion the article through the seal. The seal may serve to hold the body in a longitudinal position relative to the aerosol generating article when the article is fully inserted into the body.

The seal may be integrally formed with the body or attached to the body in any suitable manner. The seal may be formed of any suitable material or combination of materials. Because the seal is configured to be placed in proximity to the heat source, the seal preferably comprises heat resistant materials. The seal preferably comprises a resilient material. Examples of materials that may be used to form a seal or a portion thereof include plastic materials and elastomers, for example nitrile or fluorocarbons (viton) materials.

An apparatus of the invention comprises a plurality of blades. The blades are configured to surround a heat source of an aerosol generating article. The blades are actuatable from an open position to a closed position. Preferably, the blades are actuatable between an open

position and a closed position. That is, the blades may preferably be repeatedly opened and closed so that the apparatus can be re-used on multiple aerosol generating articles or for multiple uses of an individual aerosol generating article. The blades in the open position allow airflow to the heat source to allow the heat source to be ignited by, for example, a flame, permit continued combustion of the heat source, and to allow venting of combustion gasses.

The blades in the closed position restrict air from accessing the heat source. In the closed position, the blades may form a cylinder that surrounds the heat source. The inner diameter of the cylinder formed by the blades is greater than the outer diameter of the heat source of the aerosol generating article. As used herein, the term 'diameter' denotes the maximum dimension in the transverse direction of the combustible heat source, aerosol generating article, cylinder formed by closed blades or other apparatus or component. As used herein, the terms 'radial' and 'transverse' are used to describe the direction perpendicular to the longitudinal direction.

Preferably, in the open position a part of a blade that is closest to the heat source is no closer to the heat source when the blade is in the closed position. The blades may be pivotable about a post to move from the open position to the open position. Preferably, the post is at or in proximity to an end of the blade so that a part of a blade that is closest to the heat source in the open position is no closer to the heat source when the blade is in the closed position.

In use, the blades at least partially surround the heat source. Preferably, the blades surround the heat source along the length of the heat source. The distance between the blades and the heat source, the material of the blades, the thickness of the blades, and the permeability of the open blades, among other factors, may be selected to control the maximum temperature, relative to the heat source when in use. Preferably, the open blades reach a maximum temperature substantially lower than the heat source when the heat source is combusted. For example, a temperature at an exposed surface of the open blades may be at least 200°C less than the temperature of a surface of the heat source. Preferably, a temperature at an exposed surface of the open blades may be at least 300°C less than the temperature of a surface of the heat source. For example, when the heat source is at a temperature of about 400 °C, preferably the blade temperature is less than about 200 °C, and preferab0ly at a temperature of less than about 150 °C at its external edge.

The blades may be separated from the heat source by any suitable distance. Preferably, the radial clearance between the blades and the heat source when the blades are closed is sufficiently small to restrict air flow such that the heat source extinguishes. For example, the radial clearance between the heat source and the blades may be between about 0.2 mm and about 3 mm. Preferably, the radial clearance between the heat source and the blades is between about 0.5 mm and about 1 mm.

The blades may be made of any suitable material or combination of materials. Preferably, the material or materials forming the blades are heat resistant. For example, the blades may be formed from materials that can withstand temperatures of about 350 °C or greater. Examples of suitable materials for forming the blade include metallic materials, glass materials and ceramic materials. In preferred embodiments, the blades comprise a semi-crystalline polymer. Examples of suitable polymers from which the blades or a portion of the blades may be made include polyethter ether ketone (PEEK), and the like. Aluminium and stainless steel and brass are examples of suitable metallic material that may be used to form the blades or a portion thereof.

Preferably the material or materials from which the blades are made are sufficiently thermally conductive, sufficiently thin, or are of a sufficiently low density to rapidly dissipate heat.

An apparatus according to the present invention includes an actuator operably coupled to the blades and the body. The actuator may be rotatable about a longitudinal axis of the body. Rotation of the actuator causes the blades to move from the open position to the closed position. Preferably, reverse rotation of the actuator causes the blades to move from the closed position to the open position. Thus, the apparatus may preferably be reused.

The rotatable actuator can be formed from any suitable material or materials. For example, the rotatable actuator may be formed from a material or materials described above regarding the body or the blades. Preferably, the rotatable actuator comprises a metallic material. For example, the actuator may be formed from aluminium or stainless steel.

An apparatus according to the present invention may include a stationary plate. The stationary plate can be a part of the body or a separate piece attached to the body. The plate may define a plurality of slots, each defining an arcuate path. Each of the blades may comprise a second post. The second posts may be inserted in the slots of the plate. The second posts

may also be coupled to an actuator such that rotation of the actuator causes the second post to move along the arcuate path within the slots to open and close the blades.

In preferred embodiments, the actuator defines radial slots configured to slidably receive the second posts of the blades. Rotation of the actuator may cause radial movement of the posts in the radial slots along the arcuate path defined by the slots of the stationary plate.

The plate may be formed of any suitable material or materials. For example, the plate may be formed of a material or materials described above regarding the body, the blades or the actuator.

An apparatus according to the present invention may include a distal stop. The stop may be arranged to engage a distal end of the heat source as the aerosol generating article is introduced into the apparatus. The distal stop, if present, may be configured to prevent the distal end of the heat source from being advanced beyond the blades. The distal stop may be extend from the body a longitudinal distance equal to or less than a longitudinal distance that a blade extends from the body. A distal portion of the stop may extend in a direction towards the longitudinal axis of the passage of the body. In some preferred embodiments, one or more of the blades comprise the distal stop. In some preferred embodiments, the distal stop is separate from the blades and is attached to, and extends from, the body. Preferably, the distal stop is formed from one or more materials that are heat resistant. For example, the stop may be formed from one or more heat resistant materials described above regarding the blades.

An apparatus according to the present invention may include a mouthpiece. The mouthpiece has a mouth end and a distal end. The mouthpiece defines a passage between the mouth end and the distal end. The passage may be configured to receive the aerosol generating article inserted in a direction from the distal end towards the mouth end. The passage defines an inner surface of the mouthpiece. In some preferred embodiments, the body of the apparatus defines the mouthpiece. In other preferred embodiment, the body is attached couplable to the mouth

Preferably, the inner surface of the mouthpiece defines a stepped or tapered inner diameter such that the inner diameter in proximity to the mouth end is smaller than the outer diameter of the aerosol generating article to prevent advancement of the aerosol generating

article in the passage beyond the mouth end. A portion of such a tapered inner surface may be configured to engage and retain the aerosol generating article.

The mouthpiece may be telescoping and may adapt a collapsed, ejection position and an expanded, use position. Preferably, the mouth end is movable distally relative to the distal end to the collapsed position to eject the aerosol generating article from the holder. The mouth end may be biased towards the expanded position so the mouth end moves distally relative to the distal end after a pushing force, for example to collapse the mouthpiece, is removed.

An apparatus according to the present invention is configured to allow an aerosol generating article to be inserted into a passage of a body of the apparatus. In some embodiments where the apparatus comprises a mouthpiece, the aerosol generating article may be inserted mouth end first into the passage. The aerosol generating article may be inserted until the mouth end engages a shoulder or tapered portion in proximity to the mouth end of the mouthpiece. In some embodiments, the aerosol generating article is inserted heat source first, into the passage defined by the body. If the apparatus comprises a distal stop, the heat source may be inserted until the heat source engages the distal stop.

The blades may be set to an open position and the heat source may be ignited with, for example, a flame. A user can draw on the mouth end of the aerosol generating article or the mouthpiece of the apparatus, if present, to inhale aerosol from the aerosol generating article. When the user has completed a use of the article, the blades may be closed to extinguish the heat source.

Preferably, an apparatus of the invention is reusable. If the aersol generating article is not spent, the blades may be reopened, the heat source may be reignited, and the user may draw on the mouthpiece of the aerosol generating article or an apparatus of the invention to inhale aerosol from the article. If the aerosol generating article is spent, the apparatus may be placed about another aerosol generating article. The blades may be set to an open position, the heat source may be ignited, and the user may draw on the mouthpiece of the aerosol generating article or an apparatus of the invention to inhale aerosol from the article.

If the apparatus comprises a telescoping mouthpiece, the mouth end of the mouth piece can be pressed and moved distally relative to the distal end of the mouthpiece to eject the extinguished smoking article.

Apparatuses according to the present invention may be used with any suitable aerosol generating article having a combustible heat source. The aerosol generating article includes an aerosol generating substrate that may be heated by the combustible heat source to release one or more volatile compounds from the aerosol generating substrate.

An aerosol generating article for use with an apparatus according to the present invention may include any suitable combustible heat source.

The combustible heat source is preferably a blind combustible heat source. As used herein, the term 'blind' describes a heat source that does not comprise any air flow channels that provide inhalation air to the aerosol generating substrate. In a blind combustible heat source, heat transfer from the blind combustible heat source to the aerosol-generating substrate occurs primarily by conduction and heating of the aerosol generating substrate by forced convection is minimized or reduced. The lack of any airflow channels through the blind combustible heat source advantageously substantially prevents or inhibits activation of combustion of the blind combustible heat source during puffing by a user. This substantially prevents or inhibits spikes in the temperature of the aerosol generating substrate during puffing by a user. By preventing or inhibiting activation of combustion of the blind combustible heat source, and so preventing or inhibiting excess temperature increases in the aerosol generating substrate, combustion or pyrolysis of the aerosol generating substrate under intense puffing regimes may be advantageously avoided. In addition, the impact of a user's puffing regime on the composition of the mainstream aerosol may be advantageously minimized or reduced. The inclusion of a blind combustible heat source may also advantageously substantially prevent or inhibit combustion and decomposition products and other materials formed during ignition and combustion of the blind combustible heat source from entering air drawn through the aerosol generating article during use thereof.

Alternatively, the combustible heat source comprises at least one longitudinal airflow channel, which provides one or more inhalation airflow pathways through the heat source to the aerosol generating substrate. This inhalation airflow channel may extend along the length of the heat source through which air may be drawn through the aerosol generating article for inhalation by a user. Such heat sources including one or more longitudinal inhalation airflow channels are referred to herein as "non-blind" heat sources.

The combustible heat source is preferably a carbonaceous heat source having a carbon content of at least about 35 percent, more preferably of at least about 40 percent, most preferably of at least about 45 percent by dry weight of the combustible heat source. Where the combustible heat source is a carbonaceous heat source, the combustible heat source may be formed from one or more suitable carbon-containing materials. The term "carbonaceous" refers to a material that comprises carbon.

The combustible heat source may be a combustible carbon-based heat source having a carbon content of at least about 50 percent. For example, the combustible heat source may be a combustible carbon-based heat source having a carbon content of at least about 60 percent, or at least about 70 percent, or at least about 80 percent by dry weight of the combustible heat source. The term "carbon-based" refers to a material comprises primarily of carbon or at least about 50% carbon, by dry weight of material.

One or more binders may be combined with the one or more carbon-containing materials to form the carbonaceous heat source. The combustible heat source may comprise one or more organic binders, one or more inorganic binders or a combination of one or more organic binders and one or more inorganic binders.

Instead of, or in addition to one or more binders, the combustible heat source may comprise one or more additives in order to improve the properties of the combustible heat source. Suitable additives include, but are not limited to, additives to promote consolidation of the combustible heat source (for example, sintering aids), additives to promote ignition of the combustible heat source (for example, oxidizers such as perchlorates, chlorates, nitrates, peroxides, permanganates, zirconium and combinations thereof), additives to promote combustion of the combustible heat source (for example, potassium and potassium salts, such as potassium citrate) and additives to promote decomposition of one or more gases produced by combustion of the combustible heat source (for example catalysts, such as CuO, Fe_2O_3 and Al_2O_3). Combustible heat sources for aerosol generating articles and methods for producing such heat sources are known in the art and described in, for example, US-A-5,040,552 and US-A-5,595,577.

Preferably, the combustible heat source has an apparent density of between about 0.8 g/cm^3 and about 1.1 g/cm^3. Preferably, the combustible heat source has a mass of between about 300 mg and about 500 mg, more preferably of between about 400 mg and about 450 mg.

Preferably, the combustible heat source has a length of between about 7 mm and about 17 mm, more preferably of between about 7 mm and about 15 mm, most preferably of between about 7 mm and about 13 mm. Preferably, combustible heat sources according to the invention have a diameter of between about 5 mm and about 9 mm, more preferably of between about 7 mm and about 8 mm.

Preferably, the combustible heat source is of substantially uniform diameter. However, the combustible heat source may alternatively be tapered such that the diameter of one of the front end face and the rear end face of the combustible heat source is greater than the diameter of the other of the front end face and the rear end face thereof. For example, combustible heat sources may be tapered such that the diameter of the rear end face of the combustible heat source is greater that the diameter of the front end face of the combustible heat source. Preferably, the combustible heat source is substantially cylindrical. The combustible heat source may be a cylindrical combustible heat source of substantially circular cross-section or of substantially elliptical cross-section. In particularly preferred embodiments, the combustible heat source is a substantially cylindrical combustible heat source of substantially circular cross-section.

An aerosol generating article for use with an apparatus according to the invention may include any aerosol generating substrate.

Preferably, the aerosol generating substrate comprises at least one aerosol-former and a material capable of releasing volatile compounds in response to heating. The aerosol generating substrate may comprise other additives and ingredients including, but not limited to, humectants, flavorants, binders and mixtures thereof. Preferably, the aerosol generating substrate comprises nicotine. More preferably, the aerosol generating substrate comprises tobacco.

The at least one aerosol-former may be any suitable known compound or mixture of compounds that, in use, facilitates formation of a dense and stable aerosol and that is substantially resistant to thermal degradation at the operating temperature of the aerosol generating article. Suitable aerosol-formers are well known in the art and include, for example, polyhydric alcohols, esters of polyhydric alcohols, such as glycerol mono-, di- or triacetate, and aliphatic esters of mono-, di- or polycarboxylic acids, such as dimethyl dodecanedioate and dimethyl tetradecanedioate. Preferred aerosol formers for use in aerosol generating articles

herein are polyhydric alcohols or mixtures thereof, such as triethylene glycol, 1,3-butanediol and, most preferred, glycerin.

The material capable of emitting volatile compounds in response to heating may be a charge of plant-based material. The material capable of emitting volatile compounds in response to heating may be a charge of homogenized plant-based material. For example, the aerosol generating substrate may comprise one or more materials derived from plants including, but not limited to: tobacco; tea, for example green tea; peppermint; laurel; eucalyptus; basil; sage; verbena; and tarragon. Preferably, the material capable of emitting volatile compounds in response to heating is a charge of tobacco-based material, most preferably a charge of homogenised tobacco-based material.

The aerosol generating substrate may be in the form of a plug or segment comprising a material capable of emitting volatile compounds in response to heating circumscribed by a paper or other wrapper. As stated above, where an aerosol generating substrate is in the form of such a plug or segment, the entire plug or segment including any wrapper is considered to be the aerosol generating substrate. The aerosol generating substrate preferably has a length of between about 5 mm and about 20 mm. Preferably, the aerosol generating substrate has a length of between about 6 mm and about 15 mm or a length of between about 7 mm and about 12 mm. In preferred embodiments, the aerosol generating substrate comprises a plug of tobacco-based material wrapped in a plug wrap. In particularly preferred embodiments, the aerosol generating substrate comprises a plug of homogenised tobacco-based material wrapped in a plug wrap.

Apparatuses according to the present invention may be used with any suitable aerosol generating article.

Aerosol generating articles for use with holders according to the present invention may comprise one or more air inlets around the periphery of the aerosol generating substrate. In such embodiments, in use, cool air is drawn into the aerosol generating substrate of the aerosol generating article through the air inlets. The air drawn into the aerosol generating substrate through the air inlets passes downstream through the aerosol generating article from the aerosol generating substrate and exits the aerosol generating article through the mouthpiece or proximal end thereof.

In such embodiments, during puffing by a user the cool air drawn through the one or more air inlets around the periphery of the aerosol generating substrate advantageously reduces the temperature of the aerosol generating substrate. This advantageously substantially prevents or inhibits spikes in the temperature of the aerosol generating substrate during puffing by a user. As used herein, the term 'cool air' is used to describe ambient air that is not significantly heated by the combustible heat source upon puffing by a user.

Aerosol generating articles described herein may comprise a heat conducting element around and in direct contact with both at least a rear portion of the heat source and at least a front portion of the aerosol generating substrate. The heat conducting element provides a thermal link between the combustible heat source and the aerosol generating substrate and advantageously helps to facilitate adequate heat transfer from the combustible heat source to the aerosol generating substrate to provide an acceptable aerosol.

Suitable heat conducting elements for use herein include, but are not limited to: metal foil wrappers such as, for example, aluminum foil wrappers, steel wrappers, iron foil wrappers and copper foil wrappers; and metal alloy foil wrappers.

Aerosol generating articles described herein may comprise a mouthpiece located at the proximal end thereof. Preferably, the mouthpiece is of low filtration efficiency, more preferably of very low filtration efficiency. The mouthpiece may be a single segment or component mouthpiece. Alternatively, the mouthpiece may be a multi-segment or multi-component mouthpiece.

The mouthpiece may comprise a filter comprising one or more segments comprising suitable known filtration materials. Suitable filtration materials are known in the art and include, but are not limited to, cellulose acetate and paper. Alternatively or in addition, the mouthpiece may comprise one or more segments comprising absorbents, adsorbents, flavorants, and other aerosol modifiers and additives or combinations thereof.

Aerosol generating articles described herein preferably further comprise a transfer element or spacer element between the aerosol generating substrate and the mouthpiece. The transfer element may abut one or both of the aerosol generating substrate and the mouthpiece. Alternatively, the transfer element may be spaced apart from one or both of the aerosol generating substrate and the mouthpiece.

The inclusion of a transfer element advantageously allows cooling of the aerosol generated by heat transfer from the combustible heat source to the aerosol generating substrate. The inclusion of a transfer element also advantageously allows the overall length of the aerosol generating article to be adjusted to a desired value, for example to a length similar to that of a conventional cigarette, through an appropriate choice of the length of the transfer element.

The transfer element may have a length of between about 7 mm and about 50 mm, for example a length of between about 10 mm and about 45 mm or of between about 15 mm and about 30 mm. The transfer element may have other lengths depending upon the desired overall length of the aerosol generating article, and the presence and length of other components within the aerosol generating article.

Preferably, the transfer element comprises at least one open-ended tubular hollow body. In such embodiments, in use, air drawn into the aerosol generating article passes through the at least one open-ended tubular hollow body as it passes downstream through the aerosol generating article from the aerosol generating substrate to the mouthpiece. The transfer element may comprise at least one open-ended tubular hollow body formed from one or more suitable materials that are substantially thermally stable at the temperature of the aerosol generated by the transfer of heat from the combustible heat source to the aerosol generating substrate. Suitable materials are known in the art and include, but are not limited to, paper, cardboard, plastics, such a cellulose acetate, ceramics and combinations thereof.

Alternatively or in addition, aerosol generating articles described herein may comprise an aerosol cooling element or heat exchanger between the aerosol generating substrate and the mouthpiece. The aerosol cooling element may comprise a plurality of longitudinally extending channels. The aerosol cooling element may comprise a gathered sheet of material selected from the group consisting of metallic foil, polymeric material, and substantially non-porous paper or cardboard. In certain embodiments, the aerosol cooling element may comprise a gathered sheet of material selected from the group consisting of polyethylene (PE), polypropylene (PP), polyvinylchloride (PVC), polyethylene terephthalate (PET), polylactic acid (PLA), cellulose acetate (CA), and aluminum foil. Preferably the aerosol-cooling element may comprise a gathered sheet of biodegradable polymeric material, such as polylactic acid (PLA) or a grade of Mater-Bi® (a commercially available family of starch based copolyesters).

The aerosol generating articles described herein may comprise an outer wrapper that circumscribes the aerosol generating substrate and at least a rear portion of the heat source or heat source holder. The outer wrapper should grip the heat source and heat source holder and the aerosol generating substrate of the aerosol generating article when the aerosol generating article is assembled. Preferably the outer wrapper circumscribes the aerosol generating substrate, at least a rear portion of the heat source and heat source holder and any other components of the aerosol generating article downstream of the aerosol generating substrate. Outer wrappers may be formed from any suitable material or combination of materials. Suitable materials are well known in the art and include, but are not limited to, cigarette paper. Alternatively or in addition, the mouthpiece may be circumscribed by tipping paper. Aerosol generating articles described herein may be assembled using known methods and machinery.

The aerosol generating article may be substantially cylindrical in shape. The aerosol generating or may be substantially elongate. The aerosol generating or has a length and a circumference substantially perpendicular to the length. The aerosol generating substrate may be substantially cylindrical in shape. The aerosol generating substrate may be substantially elongate. The aerosol generating substrate also has a length and a circumference substantially perpendicular to the length. The aerosol generating substrate may be located in the aerosol generating or such that the length of the aerosol generating substrate is substantially parallel to the airflow direction in the aerosol generating article. The transfer section or element may be substantially elongate.

The aerosol generating article may have any desired length. For example, the aerosol generating article may have a total length of between approximately 65 mm and approximately 100 mm. The aerosol generating article may have any desired external diameter. For example, the aerosol generating article may have an external diameter of between approximately 5 mm and approximately 12 mm.

One or more of the filter, transfer element, aerosol cooling element, and heat exchanger may be incorporated into an apparatus of the present invention rather than being included in the aerosol generating article. In some preferred embodiments, the apparatus includes a mouthpiece and one or more of the filter, transfer element, aerosol cooling element, and heat exchanger may be incorporated into the mouthpiece. The length of the aerosol generating

article may be reduced if one or more of the filter, transfer element, aerosol cooling element, and heat exchanger are incorporated into the apparatus.

All scientific and technical terms used herein have meanings commonly used in the art unless otherwise specified. The definitions provided herein are to facilitate understanding of certain terms used frequently herein.

As used herein, the singular forms "a", "an", and "the" encompass embodiments having plural referents, unless the content clearly dictates otherwise.

As used herein, "or" is generally employed in its sense including "and/or" unless the content clearly dictates otherwise. The term "and/or" means one or all of the listed elements or a combination of any two or more of the listed elements.

As used herein, "have", "having", "include", "including", "comprise", "comprising" or the like are used in their open ended sense, and generally mean "including, but not limited to". It will be understood that "consisting essentially of", "consisting of", and the like are subsumed in "comprising," and the like.

The words "preferred" and "preferably" refer to embodiments of the invention that may afford certain benefits, under certain circumstances. However, other embodiments may also be preferred, under the same or other circumstances. Furthermore, the recitation of one or more preferred embodiments does not imply that other embodiments are not useful, and is not intended to exclude other embodiments from the scope of the disclosure, including the claims.

Reference will now be made to the drawings, which depict one or more aspects described in this disclosure. However, it will be understood that other aspects not depicted in the drawing fall within the scope and spirit of this disclosure. Like numbers used in the figures refer to like components, steps and the like. However, it will be understood that the use of a number to refer to a component in a given figure is not intended to limit the component in another figure labeled with the same number. In addition, the use of different numbers to refer to components in different figures is not intended to indicate that the different numbered components cannot be the same or similar to other numbered components.

FIG. 1 is schematic perspective view of an illustrative aerosol generating article **100** with the wrapper **110** partially opened to view the internal contents.

FIG. 2 is a schematic perspective view of an illustrative apparatus **200** having blades **220** in an open position.

FIG. 3 is a schematic perspective view of an illustrative apparatus **200** having blades in a closed position.

FIG. 4 is a schematic perspective view of an illustrative aerosol generating article **100** received by an illustrative apparatus **200**.

FIG. 5 is a schematic exploded view showing some components of an illustrative apparatus **200**.

FIG. 6 is a schematic sectional view of an illustrative body **210** of an apparatus.

FIG. 7is a schematic sectional view of an illustrative aerosol generating article **100** received by an illustrative body **210** of an apparatus.

The schematic drawings are not necessarily to scale and are presented for purposes of illustration and not limitation.

Referring now to **FIG. 1**, an aerosol generating article **100** extends between a proximal end **103** and a distal end **105**.The aerosol generating article **100** includes a combustible heat source **102** positioned at the distal end **105** of the aerosol generating article **100**, an aerosol generating substrate **104** downstream of the combustible heat source **102** and a mouthpiece **106** downstream of the aerosol generating substrate **104** and positioned at the proximal end **103** of the aerosol generating article **100**.

The aerosol generating article **100** comprises a combustible heat source **102**, an aerosol generating substrate **104**, an aerosol cooling element **107**, an elongate expansion chamber or transfer element **108** and a mouthpiece **106**, are in sequential, abutting coaxial alignment, which are overwrapped in an outer wrapper **110** of, for example, cigarette paper. The combustible heat source **102** is cylindrical.

The aerosol generating substrate **104** is located immediately downstream of the combustible heat source **102** and comprises a cylindrical plug of homogenized tobacco material comprising, for example, glycerin as aerosol former and circumscribed by filter plug wrap. A heat conducting element **112**, consisting of a tube of aluminum foil, surrounds and is in contact with a rear portion of the combustible heat source **102** and an abutting front portion of the aerosol generating substrate **104**. The elongate expansion chamber **108** is located downstream of the aerosol generating substrate **104** and comprises a cylindrical open-ended tube of cardboard. The mouthpiece **106** is located downstream of the expansion chamber **108** and comprises a cylindrical plug of cellulose acetate tow **109** circumscribed by filter plug wrap.

In use, the user ignites the combustible heat source which heats the aerosol generating substrate to produce an aerosol. When the user inhales on the mouthpiece **106** air is drawn through the aerosol generating substrate **104** through air inlet holes **113** in the cigarette paper **110** and adjacent to the aerosol generating substrate **104**, through the expansion chamber **108**, through the mouthpiece **106** and into the user's mouth.

Referring now to **FIGS. 2-3**, an apparatus **200** includes a body **210**, a plurality of blades **220**, each pivotable about a post **222**, a rotatable actuator **230** and a stationary plate **240**. The body **210** defines a passage for slidably receiving an aerosol generating article having a heat source. The blades **220** are configured to surround the heat source of the aerosol generating article when the article is received by the apparatus **200**. The blades **220** are actuatable from an open position (**FIG. 2**) to a closed position (**FIG. 3**). Rotation of actuator **230** causes the blades **220** to pivot about posts **222** from the open position to the closed position or from the closed position to the open position. In the open position, the blades **220** allow airflow to the heat source so that the heat source may be ignited and may continue being combusted to allow combustion gasses to be vented. In the closed position, the blades **220** restrict air from accessing the heat source and aid in extinguishing the heat source.

Referring now to **FIG. 4**, an aerosol generating article **100** having a heat source **102** is received in a body **210** of an apparatus **200** of the invention. The apparatus **200** is positioned relative to the article **100** so that the heat source **102** is surrounded by the blades **220**.

Referring now to **FIG. 5**, an apparatus of the invention includes a body **210**, first plate **250**, actuator **230**, second plate **240**, blades **220** and pins **260**. The first plate **250** defines a cylinder **252** about which actuator **230** may rotate. The cylinder **252** may optional be a part of

the body **210**. Actuator includes radial slots **232** configured to receive second posts **224** of blades **220** and includes indents **234** configured to engage pins **260** and to define a maximum rotational aspect of actuator **230**. Plate **240** includes arcuate slots **242** configured to receive second posts **224** of blades **220** and includes indents **244** configured to engage first posts **222** of blades **220**. Pins **260** attach plates **240**, **250** to body **210**. Rotation of actuator **230** about cylinder **252** causes the blades **220** to pivot about first posts **222** and causes second posts **224** of blades **220** to move within radial slots **232** of actuator **230** and in arcuate slots **242** of plate **240**. Over rotation of actuator **230** is prevented by interaction of pins **260** with indents **234**.

Referring now to **FIG. 6**, a body **210** of an apparatus of the invention may form a mouthpiece having a mouth end **272** and a distal end **274** and a passage **270** extending from the mouth end to the distal end. The passage **270** is configured to slidably receive an aerosol generating article. The mouthpiece may include a tapered or stepped inner diameter such that the inner diameter is smaller at the mouth end **272** than at the distal end **274**. In **FIG. 6**, the mouthpiece has a stepped inner diameter to form a shoulder **276** configured to engage the aerosol generating article to prevent further proximal insertion of the article in the passage **270**. It will be understood that only the body **210**, which serves as a mouthpiece, is depicted in **FIG. 6** for purposes of illustration, and an apparatus of the invention that includes such a body may also comprise other components as described herein.

Referring now to **FIG. 7**, an aerosol generating article **100** having a heat source **102** is received in body **210**. A seal **260** extends from an inner surface of the body **210** and is arranged and configured to engage the aerosol generating article **100** downstream of the heat source **102**. The body defines through holes **212** downstream of the seal **230**. When a user draws on the mouth end of the aerosol generating article **100**, air is drawn through holes **212** from outside the body **210** and into air inlets **113** of the of the aerosol generating article **100**. The air may pass over the aerosol generating substrate in the article **100** to increase release of volatile compounds from the substrate, to increase delivery of volatile compounds to a user, or increase release of volatile compounds from the substrate and increase delivery of volatile compounds to a user. It will be understood that only the body **210** and seal **230** of an apparatus are depicted in **FIG. 6** for purposes of illustration, and an apparatus of the invention that includes such a body may also comprise other components as described herein.

Thus, methods, systems, apparatuses, assemblies and articles for an apparatus for aerosol generating articles are described. Various modifications and variations of the invention will be apparent to those skilled in the art without departing from the scope and spirit of the invention. Although the invention has been described in connection with specific preferred embodiments, it should be understood that the invention as claimed should not be unduly limited to such specific embodiments. Indeed, various modifications of the described modes for carrying out the invention which are apparent to those skilled in the mechanical arts and aerosol generating article manufacturing or related fields are intended to be within the scope of the following claims.

CLAIMS:

1. An apparatus for an aerosol generating article having a heat source, the apparatus comprising:
   a body defining an passage configured to receive the aerosol generating article;
   a plurality of blades configured to surround the heat source, wherein the blades are actuatable from an open position to a closed position, wherein the blades in the open position allow airflow to the heat source and wherein the blades in the closed position restrict air from accessing the heat source;
   a rotatable actuator operably coupled to the body and to the blades, wherein rotation of the actuator causes the blades to move from the open position to the closed position.

2. An apparatus according to claim 1, wherein the each of the plurality of blades pivots about a respective first post to move from the open position to the closed position.

3. An apparatus according to claim 2, wherein each of the plurality of blades is operably coupled to a respective second post, the second posts being operably coupled to the rotatable actuator such that rotation of the actuator causes the second posts to move along an arcuate path to open and close the blades.

4. An apparatus according to claim 3, further comprising a stationary plate comprising a plurality of arcuate slots, each defining the arcuate path along with the second post of each of the blades move.

5. An apparatus according to claim 4, wherein the rotatable actuator comprises a plurality of radial slots operably coupled to the second posts, wherein rotation of the actuator causes radial movement of the second posts within the radial slots.

6. An apparatus according to claim 4 or claim 5, wherein the stationary plate is attached to the body.

7. An apparatus according to any preceding claim, wherein one or more of the blades, the body and the rotatable actuator are formed from a polymeric material.

8. An apparatus according to claim 7, wherein the blades and the body are formed from a polymeric material.

9. An apparatus according to any preceding claim, wherein the rotatable actuator is formed from a metallic material.

10. An apparatus according to any preceding claim, wherein the blades in the closed position form a cylinder, wherein the radial clearance between the inner surface of the cylinder and an outer surface of the heat source is between about 0.2 mm and about 3_ mm.

11. An apparatus according to any preceding claim, wherein the body is configured to engage the aerosol generating article in the passage via an interference fit.

12. An assembly comprising an apparatus according to any preceding claim and the aerosol generating article having the heat source, wherein the aerosol generating article is received in the passage of the body of the apparatus.

13. A kit comprising an apparatus according to any of claims 1 to 11 and one or more aerosol generating articles having a heat source, wherein the aerosol generating articles are configured to be received by passage of the body of the apparatus.

14. An assembly according to claim 12 or a kit according to claim 13, wherein the aerosol generating article comprises a aerosol generating material and wherein the aerosol generating article is configured to transfer heat from the heat source to the aerosol generating material without combusting the aerosol generating material.

15. An assembly or kit according to claim 14, wherein the aerosol generating material comprises tobacco.

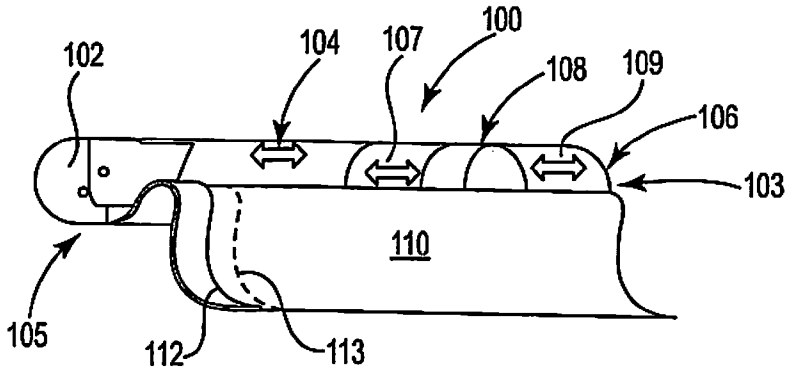

Fig. 1

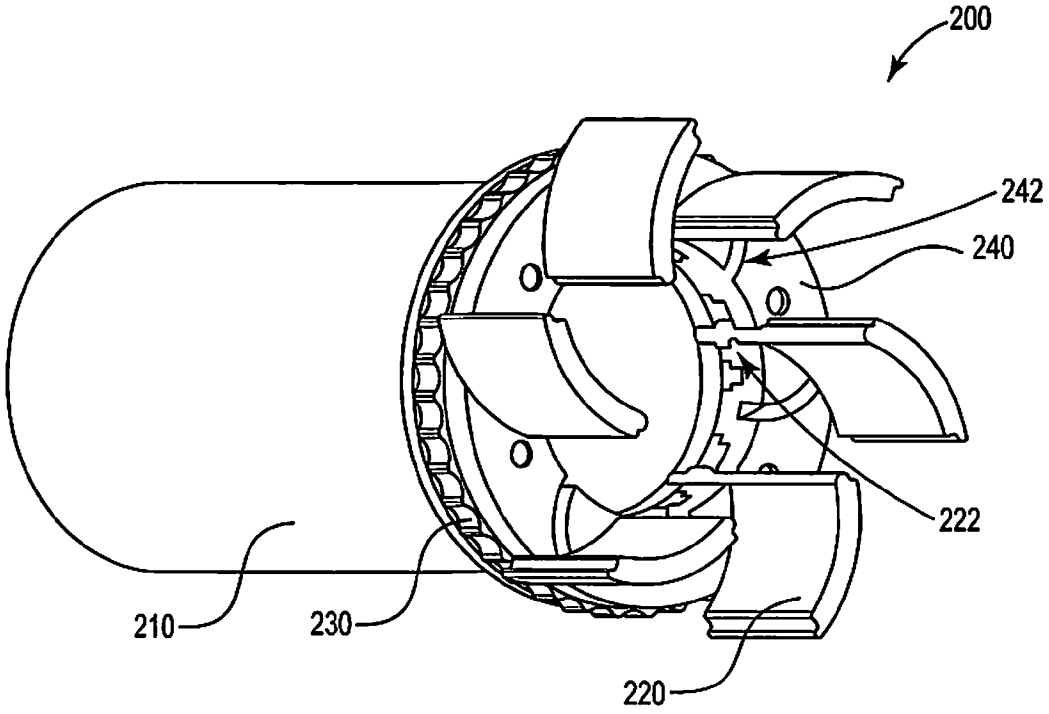

Fig. 2

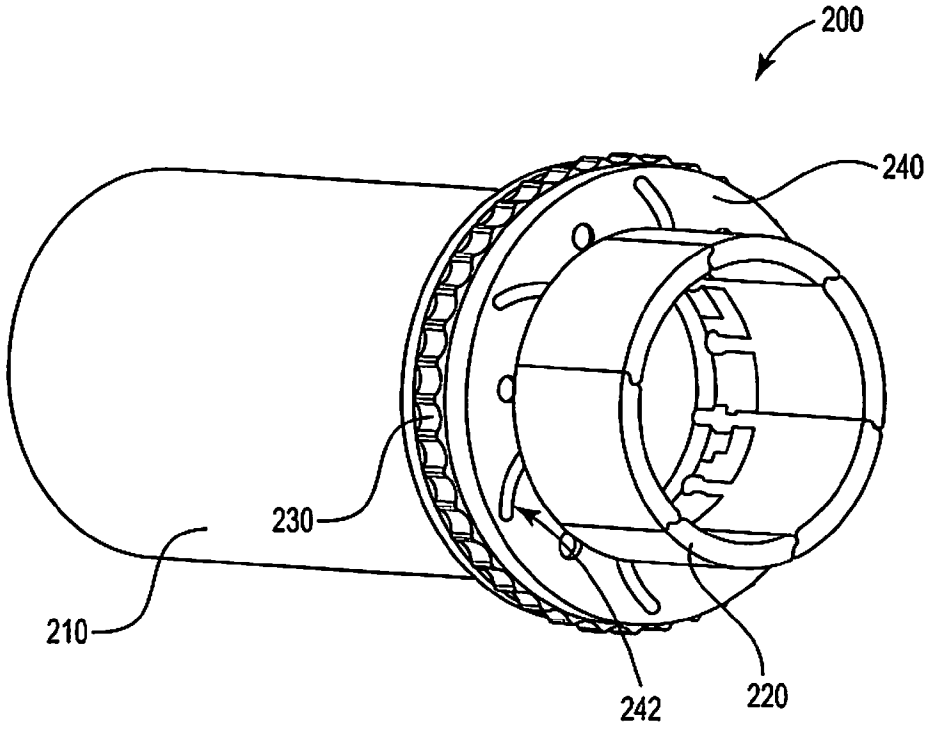

Fig. 3

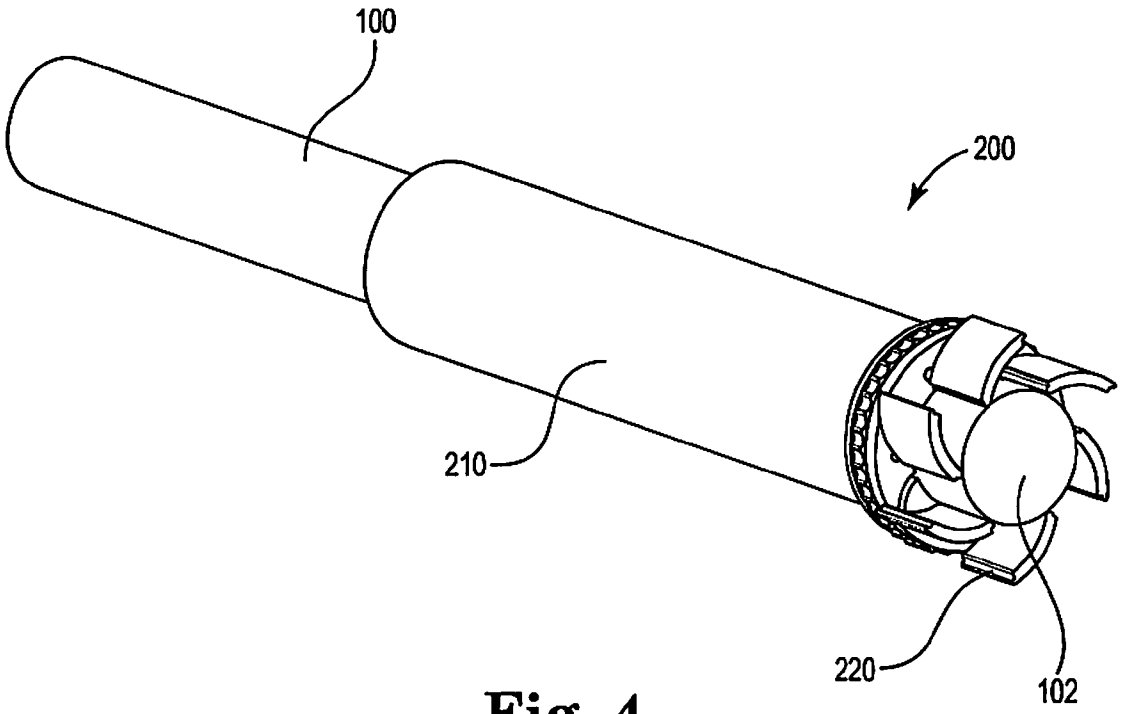

Fig. 4

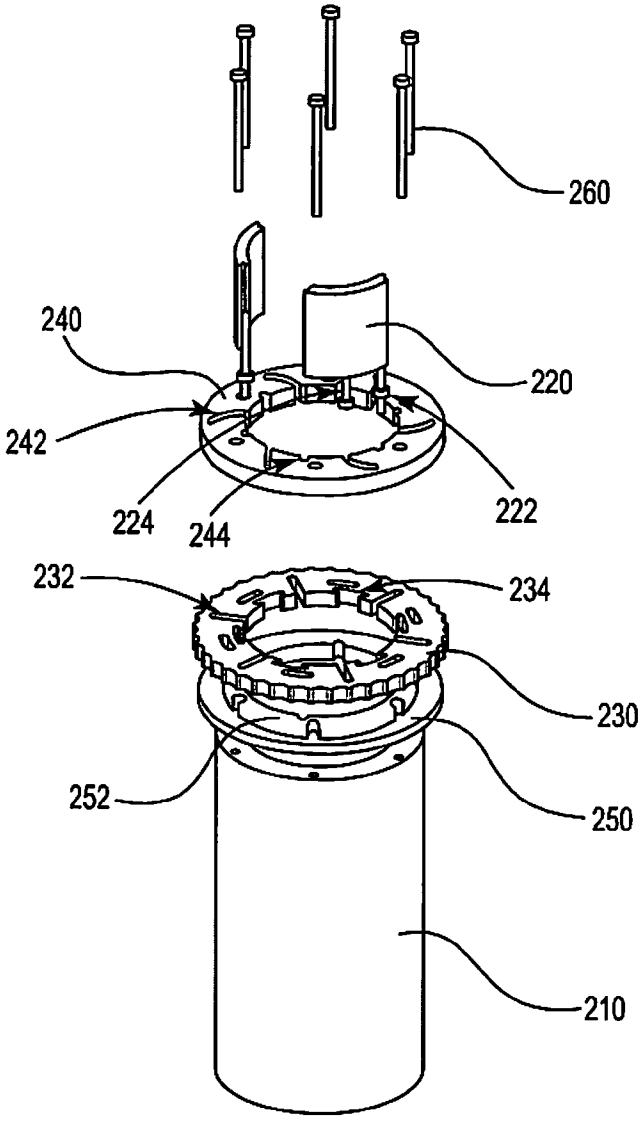

Fig. 5

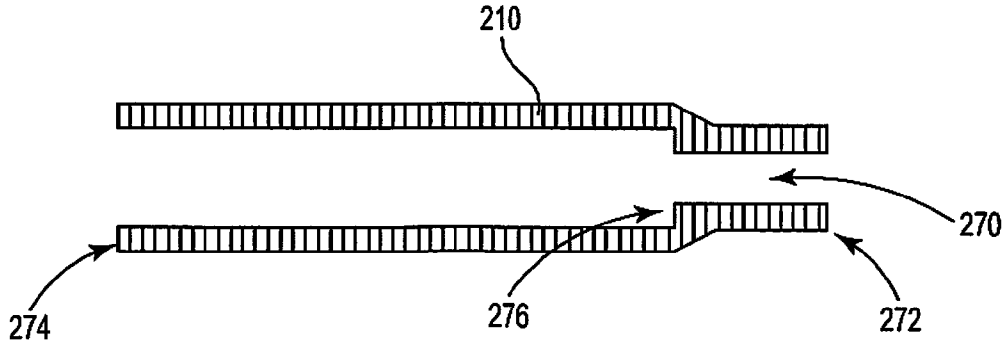

Fig. 6

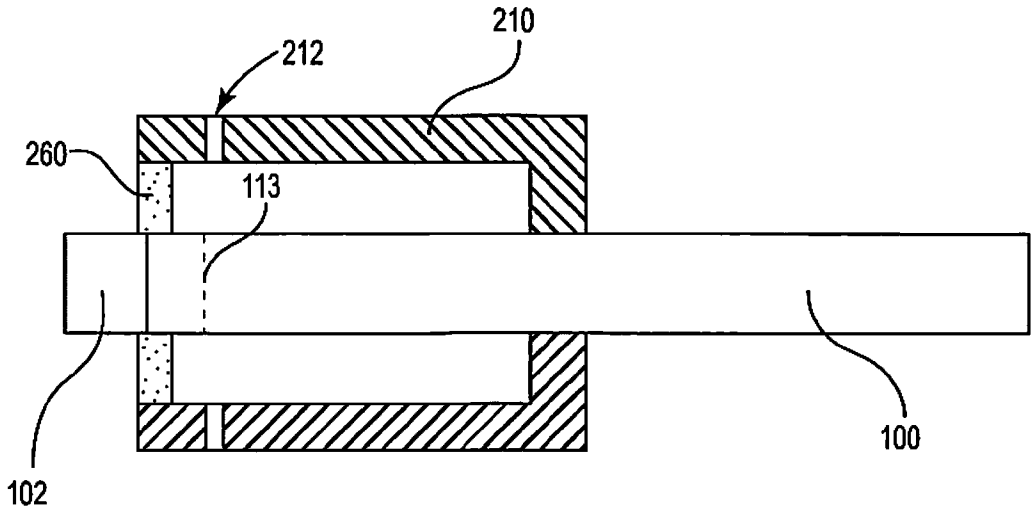

Fig. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2016/057392

A. CLASSIFICATION OF SUBJECT MATTER
INV. A24F13/16
ADD. A24D1/10 A24F47/00

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)
A24F A24D

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	GB 928 089 A (JAMES NOEL DAVIES) 6 June 1963 (1963-06-06) page 2, line 126 - page 3, line 38; figures 5,6,7	1-15
A	US 1 915 405 A (COLLINS JULIUS A) 27 June 1933 (1933-06-27) page 1, line 16 - line 26; figures 1,2	1-15
A	GB 665 045 A (DAVID BENNETT) 16 January 1952 (1952-01-16) page 1, line 90 - page 2, line 9; figures 1,2,3	1-15

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
28 February 2017	15/03/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Caballero Martínez

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/IB2016/057392

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
GB 928089 A	06-06-1963	NONE	
US 1915405 A	27-06-1933	NONE	
GB 665045 A	16-01-1952	NONE	