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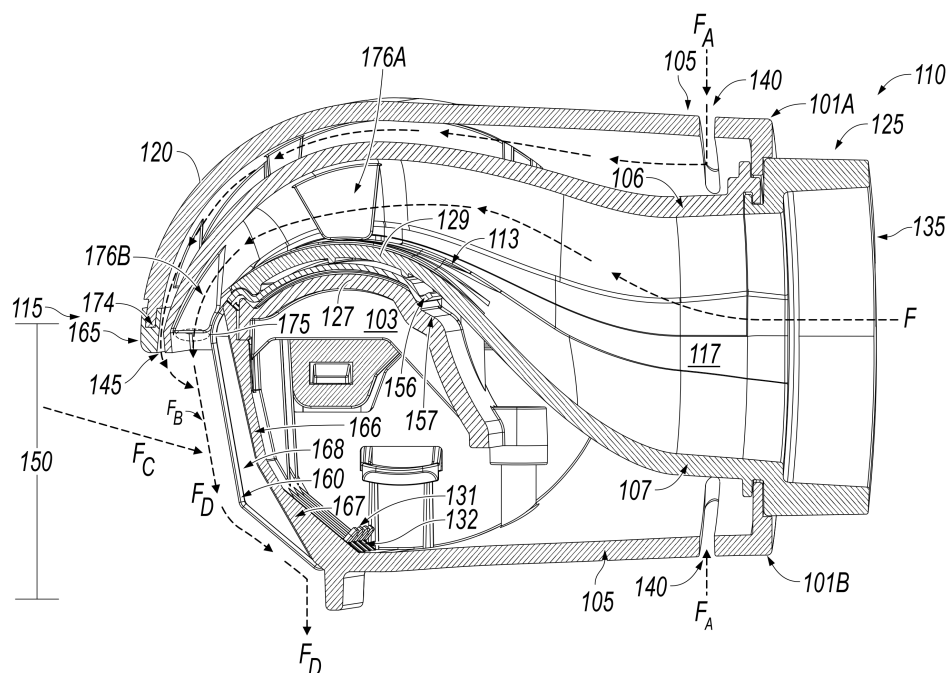
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(54) HAIR CARE APPLIANCE AND ATTACHMENT

(57) An attachment for a hair care appliance includes an inlet, an outlet, an airflow path extending therebetween, and planar hair contacting surface having channels formed in the planar hair contacting surface and configured to reduce a size of a boundary layer of airflow flowing over the planar hair contacting surface such that the airflow adheres thereto. A hair care appliance is also provided and includes an air inlet, an air outlet, a hair

styling region including angled planar surfaces, and a fan assembly configured to generate an airflow over the angled planar surfaces such that a velocity of the airflow flowing over the angled planar surfaces is greater than a velocity of an airflow received at the inlet from the fan assembly. The velocity of the airflow flowing over the angled planar surfaces is configured to draw hair toward the hair styling region.

**FIG. 7****EP 4 817 461 A1**

Description

FIELD

[0001] This invention relates to hair care appliances and attachments therefor.

BACKGROUND

[0002] Hair care appliances are devices used for drying and styling of hair. Hair care appliances can include a variety of components operable to provide a fluid flow via a fluid flow path extending through the device. The fluid flow path receives ambient air at an inlet of the hair care appliance and directs the ambient air through the hair care appliance via a motor and fan assembly. The fluid flow path is directed across a heating assembly to generate heated air at an outlet of the hair care appliance. Air is expelled from the hair care appliance via an outlet arranged to enable a user to dry or style hair.

[0003] One or more attachments are often used with the hair care appliance depending on the user's hair styling or treatment needs. Attachments can be coupled to the outlet of the hair care appliance and can be designed to perform specific functions on the hair.

SUMMARY

[0004] In accordance with the invention there is provided, in a first aspect, an attachment for a hair care appliance, and in a second aspect, a hair care appliance, as defined in the independent claims. The dependent claims define optional features.

[0005] The attachment is configured for use with a hair care device, such as a hair dryer for use in drying and/or styling hair, and includes an inlet, an outlet, and an airflow path extending therebetween. The attachment also includes a planar hair contacting surface having a plurality of channels formed in the planar hair contacting surface and configured to reduce a size (e.g. thickness) of a boundary layer of airflow flowing over the planar hair contacting surface such that the airflow adheres thereto.

[0006] The airflow path may be convergent in the airflow direction, and the planar hair contacting surface may be downstream of the outlet in the airflow direction.

[0007] Optionally, the planar hair contacting surface can include a first surface portion adjacent to the outlet and a second surface portion adjacent to the first surface portion. The first surface can be oriented at a first angle relative to the longitudinal axis of the airflow path exiting the outlet and the second surface can be oriented at a second angle relative to the longitudinal axis of the airflow path exiting the outlet. The first angle can be less than the second angle. The hair contacting surface can include a plurality of grooves positioned across the first and second surface portions. Each groove can be defined by adjacent ridges extending from the first and second surface portions. The plurality of grooves can be angled and

configured to generate turbulent eddies in the airflow flowing over the hair contacting surface so as to cause the airflow flowing over the hair contacting surface to adhere thereto.

[0008] A static pressure of the air flowing over the hair contacting surface can be lower than a static pressure of air received via the inlet. The static pressure of air flowing over the hair contacting surface can be configured to draw individual hairs into contact with a plurality of hairs drawn into contact with the hair contacting surface. Optionally, the hair contacting surface can include a slotted cover extending from the outlet over the first and second surface portions. The slotted cover can have a plurality of projections extending across the first and second surface portions and covering the adjacent ridges. Optionally, the slotted cover can include a thermally conductive material. Optionally, the attachment can include a hair grip feature extending across at least one wall defining the outlet. Optionally, the attachment can include a protrusion positioned at a distal end of the second surface portion and extending thereacross. The protrusion can be configured to direct the airflow flowing over the hair contacting surface away from the inlet or a user's hand.

[0009] The hair care appliance includes an air inlet, an air outlet, a hair styling region including a plurality of angled planar surfaces, and a fan assembly configured to generate an airflow over the plurality of angled planar surfaces such that a velocity of the airflow flowing over the plurality of angled planar surfaces is greater than a velocity of an airflow received at the inlet from the fan assembly. The velocity of the airflow flowing over the plurality of angled planar surfaces is configured to draw hair toward the hair styling region.

[0010] An airflow path from the inlet to the outlet may be convergent in the airflow direction, and the hair styling region may be downstream of the outlet in the airflow direction.

[0011] Optionally, the plurality of angled planar surfaces can include a plurality of channels extending downstream from the outlet and positioned between adjacent ridges extending downstream from the outlet and across the hair styling region. The plurality of channels can be configured to reduce a size (e.g. thickness) of a boundary layer of the airflow flowing over the plurality of angled planar surfaces so as to cause the airflow flowing over the angled planar surfaces to adhere to the hair styling region. Optionally, the hair styling region can include a thermally-conductive surface positioned atop the plurality of angled planar surfaces. The thermally conductive surface can have a plurality of slots separating linear projections extending downstream of the outlet. The linear projections can be positioned atop a plurality of ridge pairs extending across the plurality of angled planar surfaces. Optionally, the plurality of slots can be positioned atop and open into the plurality of channels, and the thermally-conductive surface can be heated by the airflow received at the inlet from the fan assembly.

[0012] A static pressure of the airflow flowing over the

plurality of angled planar surfaces can be lower than a static pressure of the airflow generated by the fan assembly so as to further cause the hair to be drawn toward the hair styling region. Optionally, the air inlet, the air outlet, and the hair styling region can be configured in a hair care attachment releasably coupled to an outlet end of the hair care appliance. Optionally, the hair care attachment can further include a hair grip feature positioned on at least one wall defining the air outlet. The hair grip feature can include a silicone material configured to enhance frictional engagement of the hair. Optionally, the hair care attachment can further include a ridge protruding across a distal end of the hair styling region. The ridge can be configured to direct the airflow flowing over the plurality of angled planar surfaces away from the hair care appliance. Optionally, the ridge can be further configured to prevent recirculation of the airflow flowing over the plurality of angled planar surfaces into a second inlet of the hair care attachment.

DESCRIPTION OF DRAWINGS

[0013] These and other features will be more readily understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a front-side perspective view of one exemplary embodiment of a polishing attachment configured for use with a hair care appliance;

FIG. 2 is a rear-side perspective view of the polishing attachment of FIG. 1;

FIG. 3 is a bottom perspective view of the polishing attachment of FIG. 1;

FIG. 4 is an exploded view of the polishing attachment of FIG. 1;

FIG. 5 is a front-side perspective view of the polishing attachment of FIG. 1 with the second body and the first nozzle portion removed;

FIG. 6 is a bottom-side perspective of the polishing attachment of FIG. 1 with the slotted cover removed;

FIG. 7 is a cross-sectional view of the polishing attachment of FIG. 1 illustrating an airflow path there-through;

FIG. 8A is a front view of the polishing attachment of FIG. 1 illustrating a groove dimension of a groove configured in a hair contacting surface of the polishing attachment of FIG. 1;

FIG. 8B is a cross-sectional view of the polishing attachment of FIG. 1 illustrating angle dimensions of a plurality of angled surfaces of the hair contacting

surface;

FIG. 9A is an image illustrating a cross-sectional view of the polishing attachment of FIG. 1 taken along lines A-A shown in FIG. 8A and computational fluid dynamic (CFD) data illustrating a velocity of a fluid flow through the polishing attachment and exiting the outlet of the attachment;

FIG. 9B is an image illustrating a cross-sectional view of the polishing attachment of FIG. 1 taken along lines B-B shown in FIG. 8A and CFD data illustrating a velocity of a fluid flow through the polishing attachment and exiting the outlet of the attachment;

FIG. 10 is an image illustrating a cross-sectional view of the polishing attachment of FIG. 1 taken along lines A-A shown in FIG. 8A and CFD data illustrating particle traces of a velocity of a fluid flow through the polishing attachment and exiting the outlet of the attachment;

FIG. 11 is an image illustrating a front-side perspective view of the polishing attachment of FIG. 1 and CFD data illustrating particle traces of a velocity of a fluid flow exiting the outlet of the polishing attachment of FIG. 1;

FIG. 12A is an image illustrating a cross-sectional view of the polishing attachment of FIG. 1 taken along lines A-A shown in FIG. 8 and CFD data associated with a static pressure of a fluid flow through the polishing attachment and exiting the outlet of the attachment;

FIG. 12B is an image illustrating a cross-sectional view of the polishing attachment of FIG. 1 taken along lines B-B shown in FIG. 8 and CFD data associated with a static pressure of a fluid flow through the polishing attachment and exiting the outlet of the attachment;

FIG. 13 is a top-side perspective view of an attachment mating assembly of a hair care appliance configured to couple with an appliance mating mechanism of the polishing attachment of FIG. 1;

FIG. 14A is a side view of the attachment mating assembly of FIG. 13 coupled with the appliance mating mechanism of the polishing attachment of FIG. 1 with a cover of the hair care appliance removed; and

FIG. 14B is a cross-sectional view of a portion of the attachment mating assembly of FIG. 13 coupled with the appliance mating mechanism of the polishing attachment of FIG. 1 with a portion of the cover of

the hair care appliance removed.

[0014] It is noted that the drawings are not necessarily to scale. The drawings are intended to depict only typical aspects of the subject matter disclosed herein, and therefore should not be considered as limiting the scope of the disclosure.

DETAILED DESCRIPTION

[0015] Certain exemplary embodiments will now be described to provide an overall understanding of the principles of the structure, function, manufacture, and use of the devices and methods disclosed herein. One or more examples of these embodiments are illustrated in the accompanying drawings. Those skilled in the art will understand that the devices and methods specifically described herein and illustrated in the accompanying drawings are non-limiting exemplary embodiments and that the scope of the present invention is defined solely by the claims. The features illustrated or described in connection with one exemplary embodiment may be combined with the features of other embodiments. Such modifications and variations are intended to be included within the scope of the present invention.

[0016] Various exemplary attachments or accessories for use with a hair care appliance, such as a hair dryer, are provided herein. In one embodiment, an attachment in the form of a hair polishing accessory is provided. The polishing attachment can be configured to efficiently engage with hair to smooth an uneven texture of hair, reduce hair frizz, and/or improve hair shine. The polishing attachment can include one or more features to aid in polishing. For example, the polishing attachment can be configured to increase a velocity of an airflow exiting an outlet of the attachment and to reduce a pressure of the airflow exiting the outlet such that a pressure differential is created adjacent to the outlet. The pressure differential can cause a suction force to be generated adjacent to a hair contacting surface of the attachment that can draw individual, flyaway hairs toward and into contact with the hair contacting surface for more efficient styling of a user's hair. In contrast, the fluid flow entering the air inlet of the attachment (e.g., the fluid flow received from an outlet end of a hair care appliance to which the attachment can be coupled) can flow into the attachment with high-pressure, low-velocity characteristics.

[0017] The airflow path from the inlet to the outlet may be convergent in the airflow direction, and the hair contacting surface may be downstream of the outlet in the airflow direction.

[0018] The suction force can be generated by a Bernoulli effect that is created by grooves formed in the hair contacting surface. The grooves can create turbulent eddies at the hair contacting surface, which can reduce frictional drag of the airflow passing over the hair contacting surface and reduce a size (e.g. thickness) of a boundary layer at the hair contacting surface. The reduce

size (e.g. thickness) of the boundary layer can allow the airflow to adhere more closely to the hair contacting surface and to wrap therearound to prevent airflow separation from the hair contacting surface so that a greater amount of the user's hair is maintained in contact with the hair contacting surface for an improved styling experience. Advantageously, these features can provide an enhanced styling experience, particularly for smoothing, straightening, reducing frizz, and/or improving the shine of a user's hair compared to other attachments for a hair care appliance.

[0019] FIGS. 1-8B illustrate one exemplary embodiment of an attachment 100. In this embodiment, the attachment 100 is in the form of a polishing attachment, however a person skilled in the art will appreciate that the features shown in the figures can be utilized in various other types of attachments, such as straighteners, or curlers. Further, the features can be directly incorporated into a hair styling device and do not need to be a separate attachment. As shown in FIG. 1, the attachment 100 is substantially "T"-shape and includes a cylindrical first body portion 105 and a hemi-cylindrical second body portion 120 oriented substantially transverse to the first body portion 105.

[0020] The first and second body portions 105, 120 together define an airflow path for receiving a primary airflow F at proximal end 110 from a hair care appliance and delivering the airflow to an outlet 145 at a distal end 115. As discussed further below, the second body portion 120 includes one or more planar surfaces across which airflow exiting the outlet 145 passes and is maintained adjacent to the planar surface(s) for drying and/or styling of hair. The airflow exiting the outlet 145 can be configured to create a suction force to draw individual, flyaway hairs toward the planar surfaces for smoothing and polishing the hair. As further discussed below, the first and second body portions 105, 120 can include a second airflow F_A therethrough for receiving secondary air, which combines with the primary airflow F and is delivered to the outlet 145.

[0021] The first body portion 105 of the attachment 100 can have a variety of configurations, but in general it is configured to mate to a hair care appliance, and can define an airflow pathway therein for receiving airflow F from the hair care appliance and for delivering it to the hemi-cylindrically-shaped second body portion 120. As shown, the proximal end 110 includes an appliance mating mechanism 125 configured to mate the attachment 100 with a hair care appliance, such as a hair dryer. The appliance mating mechanism 125 can utilize various mating techniques, such as a twist-lock, magnets, a pressure-fit, or any other mating technique to facilitate attachment to a hair care appliance. The appliance mating mechanism 125 can include an opening 130 at the proximal end 110 defining a first air inlet 135, as shown in FIG. 4. The first air inlet 135 can receive air from the hair care appliance when the attachment 100 is coupled to the hair care appliance via the appliance mating mechanism

125. The air inlet 135 can be fluidically coupled to a nozzle 104 as shown in FIG. 4 positioned within a cavity between the first body portion 105 and the second body portion 120. The nozzle 104 can extend from the proximal end 110 and into the second body portion 120 toward the distal end 115, and it can guide an airflow received from the hair care appliance toward an air outlet 145 at the distal end 115 of the attachment 100. As shown in FIG. 4, the nozzle 104 can be positioned between a first cover 101A and a second cover 101B. The first and second covers 101 together can define part of each of the first body portion 105 and the second body portion 120. In some embodiments, the nozzle 104 can include a first nozzle portion 106 and a second nozzle portion 107 defining a lumen 117 therein. In some embodiments, the nozzle 104 can have a unibody construction. In some embodiments, the second body portion 120 can include vanes 113, 176 downstream of the nozzle 104 to aid in guiding the airflow. Further, in some embodiments, the vanes 113, 176 can be positioned in between or extend from portions of a heat-retention element, such as a thermally conductive metal plate positioned in the first body portion 105 or the second body portion 120. In some embodiments, the vanes 113, 176 can additionally or alternatively be configured on or protrude from an inner surface of the first nozzle portion 106 or the second nozzle portion 107 that is adjacent to the second body portion 120.

[0022] As further shown in FIG. 7, the nozzle can 104 can be spaced from an outer-most wall of the attachment 100 to define a primary airflow F within the attachment. The first body portion 105, and in particular the first and second covers 101A, 101B, can include one or more second air inlets 140 provided thereon and positioned at various locations there around. The air inlets 140 can extend into a secondary airflow F_A and can be fluidically coupled with the primary airflow path such that a combined airflow F_B exits the air outlet 145 at the distal end 115. In some embodiments, the air inlets 140 can be slot shaped, as shown. In some embodiments, the air inlets 140 can have other shapes besides slots, such as circles, ovals, or the like. In some embodiments, the configuration of the air inlets 140 in the first body portion 105 can be configured such that the airflow F_A can cool the outer surfaces of the first body portion 105 and the second body portion 120.

[0023] Further details on the cylindrically-shaped configuration of the first body portion 105 and the hemi-cylindrically-shaped configuration of the second body portion 120 can be found in U.S. Patent Appl. No. 18/174,769 filed on Feb. 27, 2023, which is hereby incorporated by reference in its entirety.

[0024] As indicated above, the second body portion 120 can be substantially hemi-cylindrically-shaped and can be configured to receive air from the first body portion 105. In general, the second body portion 120 can include a planar hair contacting region 150, adjacent to the air outlet 145. The hair contacting region 150 can include planar surface portions 155, such as surface portion

155A and 155B, as shown in FIGS. 1-3. The hair contacting region 150 can also be a hair styling region where a user engages their hair with the attachment for drying or styling of their hair. The hair contacting region 150 can be located downstream of the air outlet 145. In the illustrated embodiment, the hair contacting region 150 includes a first surface portion 155A adjacent to the air outlet 145 and a second surface portion 155B adjacent to the first surface portion 155A. The first and second planar surface portions 155 can be angled relative to one another and angled relative to a longitudinal axis of a fluid flow exiting the air outlet 145. As, will be described later, the first and second planar surfaces 155 can be angled to cause the airflow exiting the air outlet 145 to flow more closely to second body portion 120 within the hair contacting region 150 such that the airflow adheres to the first and second surfaces 155.

[0025] The second body portion 120 can also include a slotted cover 160 positioned atop the first and second planar surfaces 155 within the hair contacting region 150. The slotted cover 160 can be a heat transfer element that is configured to absorb and retain heat provided via the airflow received from a hair care appliance when the attachment 100 is coupled thereto. Heat retained in the slotted cover 160 can be transferred to a user's hair engaged with the hair contacting region 150 for drying or styling of their hair. The slotted cover 160 can include a thermally conductive material, such as a metal material. The slotted cover 160 can include projections 161 extending across the first and second planar surfaces 155 and downstream of the air outlet 145. In the embodiment shown in FIGS. 1-3, the slotted cover 160 includes 10 projections, however, more or fewer projections 161 can be envisioned.

[0026] The second body portion 120 can include a hair grip feature 165 as shown in FIGS. 1-3. The hair grip feature 165 can extend at least partially around the air outlet 145. The hair grip feature 165 can include an elastic material configured to create friction with the user's hair to provide feedback to the user that their hair is engaged with the attachment 100 and the hair contacting region 150. The hair grip feature 165 can include a silicone material. The hair grip feature 165 can be an over molded component that is positioned on at least one wall of the second body portion 120 defining the air outlet 145.

[0027] The second body portion 120 can include a protrusion 170 extending across the distal end 115 of the attachment 100. The protrusion 170 can be positioned adjacent to the second surface portion 155B of the hair contacting region 150 and can define a distal end of the hair contacting region 150. The protrusion 170 can be configured to block or redirect the airflow exiting the outlet 145 and over the hair contacting region 150 away from the user's hand and away from the air inlets 135 and 140.

[0028] As shown in FIG. 4, the first cover 101A and the second cover 101B can be coupled together with the nozzle 104 positioned therein. The first cover 101A can

include one or more attachment mechanisms 102 configured to couple with a corresponding attachment mechanisms positioned on the second cover 101B. In some embodiments, the second cover 101B can include the attachment mechanisms 102. The distal end of the second body 120 can include a wall 116, which can define an outlet wall of the air outlet 145. The hair grip feature 165 can be positioned on the wall 116.

[0029] The nozzle 104 can also include a nozzle frame 103 as shown in FIG. 4 coupled to the second portion 107 of the nozzle 104. At the distal end 123 of the nozzle 104, the nozzle frame 103 can include one or more attachment mechanisms 114 which can be received in or by a corresponding attachment mechanism at a distal end 124 of the second body portion 120, such as within holes 172 positioned between adjacent ridges 169 and extending through the first angled portion 166 of the second body portion 120 as shown in FIG. 6. The distal end 123 of the nozzle 104 and the nozzle frame 103 can be received within hemi-cylindrical portions 108 and 112 of the second body portion 120. Cylindrical disks 111 can be coupled to the hemi-cylindrical portions 108 and 112 of the second body portion 120 on an exterior surface thereof.

[0030] The slotted cover 160 can include a hemi-cylindrical portion 127 from which the projections 161 extend. The hemi-cylindrical portion 127 of the slotted cover 160 can be received atop the distal end 126 of the second body portion 120. For example, as shown in FIG. 5, the slotted cover 160 is received atop the nozzle frame 103 and positioned under a distal end 128 of the second portion 107 of the nozzle 104, which is shown in FIG. 5 with the first portion 106 of the nozzle 104 removed. The surface 129 at the distal end 128 of the second portion 107 of the nozzle 104 can include one or more vanes 113 extending therefrom and configured to guide the airflow from the lumen 117 of the nozzle 104 toward the air outlet 145.

[0031] In FIG. 6, the slotted cover 160 is shown uncoupled from the second body portion 120. The slotted cover 160 can include projections 161 and slots 162 extending downstream from the hemi-cylindrical portion 127 and separating the projections 161. The projections 161 can include a first angled portion 163 and a second angled portion 164. The second body portion 120 can include a first angled portion 166 and a second angled portion 167 that extend across the second body portion 120 between end walls 173.

[0032] The slotted cover 160 can include a first detent 156 extending across the hemi-cylindrical portion 127 and tabs 131 configured at the distal ends of the projections 161 as shown in FIG. 6. The detent 156 can couple the hemi-cylindrical portion 127 to a groove 157 formed on the nozzle frame 103 and the tabs 131 can be received within the openings 132 of the first body as shown in FIG. 7 to couple the slotted cover 160 the first body portion 105.

[0033] When the slotted cover 160 is coupled to the

second body portion 120, the first and second angled portions 163, 164 of the slotted cover 161 can be positioned atop the first and second angled portions 166, 167 of the second body portion 120 to form the first and second surface portions 155 of the hair contacting region 150. The first body portion 105 can also include a plurality of adjacent ridges 169 (e.g., ridge pairs) that extend from the distal end 124 of the second body portion 120 toward the protrusion 170 and over the first and second angled portions 166, 167. The ridges 169 can extend across the distal end 124 of the second body portion 120. The adjacent ridges 169 can include a first ridge 168A and a second ridge 168B. A groove 171 can separate the ridges 168A and 168B. When the slotted cover 160 is coupled to the second body portion 120, the slots 162 are positioned over the grooves 171, such that the slots 162 are open into the grooves 171. As such, the projections 161 are configured to be positioned atop opposing ridges 168 of adjacent ridges 169. In this way, the slotted cover 161 and the second body portion 120 can provide a channel within the groove 171 through which the airflow exiting the air outlet 145 can pass so that the airflow increases in velocity over the hair contacting region 150 with a reduced frictional drag and reduced size of a boundary layer of the airflow in the hair contacting region 150 to allow the airflow flowing over the hair contacting region 150 to more tightly adhere to the first and second angled surface portions 155. The grooves 171 can have a width W between about 1.8 and 2.2 mm. For example, in the embodiment shown in FIG. 8A, the grooves 171 can have a width of 2.0 mm

[0034] FIG. 7 is an exemplary illustration of how the air may flow through the attachment 100. For example, an airflow F can be received via the air inlet 135 positioned within the appliance mating portion 125 and configured to receive the airflow F from a hair care appliance to which it is coupled via the appliance mating portion 125. The primary airflow F can be received via the first air inlet 135 into the lumen 117 and can be directed toward vanes 113 configured on the surface 129 of the second portion 107 of the nozzle 104. The first portion 106 of the nozzle 104 can include vanes 176A and 176B as shown in FIG. 7. The vanes 176A and/or 176B can be configured to define the air outlet portions 145A-145C shown in FIG. 3. The vanes 176 can protrude from an inner surface of the first portion 106 into the primary airflow F to help guide the airflow F through the nozzle 104 at the distal end 115 toward the outlet 145. The primary airflow F can be emitted at the outlet 145 via an opening 175 positioned between the slotted cover 160 and the first portion 106 of the nozzle 104.

[0035] A secondary airflow F_A can be received via an ambient environment in which the attachment 100 is being used. The airflow F_A can be received via air inlet 140 configured in the first body portion 105. The airflow F_A can flow from the air inlets 140 and toward the opening 174 at the distal end 115 of the attachment 100. The openings 174 and 175 can be positioned adjacent to one

another so as to define the outlet 145. Upon exiting the openings 174 and 175, the primary airflow F and the secondary airflow F_A can merge together into a combined airflow F_B passing over the hair contacting region 150. As shown in FIG. 7, the openings 174 and 175 are substantially co-planar. In some embodiments, the openings 174 and 175 can be longitudinally offset or staggered relative to one another.

[0036] As the combined airflow F_B exits the outlet 145 and passes over the hair contacting region 150, a suction force is created due to the high-velocity, low-pressure characteristics of the combined airflow F_B . The suction force is configured to draw a third airflow F_C toward the hair contacting region 150. The third airflow F_C can draw individual, flyaway hairs toward the hair contacting region 150 to be styled along with the bulk of the user's hair being engaged in the hair styling region 150. The third airflow F_C can merge with the combined airflow F_B exiting the outlet 145 to produce a resultant airflow F_D within the hair contacting region 150. The resultant airflow F_D can adhere to the hair contacting region 150 as it flows over the distal end 115 of the attachment 100.

[0037] The attachment 100 provides a number of advantageous effects on the various airflows. For example, the tapered, distal end of the nozzle 104 (e.g., adjacent to the vanes 113, 176) can cause the airflow F to increase in velocity and decrease in pressure. The airflow F received via the air inlet 135 can have substantially high static pressure and lower velocity compared to the combined airflow F_B and the resultant airflow F_D . The tapered interface between the distal end 123 of the nozzle 104 and the hemi-cylindrical surface 129 of the second body portion 120 can create the Venturi effect and can act to reduce the volume through which the airflow F passes such that the combined airflow F_B exiting the openings 175 has a lower static pressure and higher velocity than the airflow F received via the air inlet 135. In this way, the combined airflow F_B has a substantially higher velocity and lower static pressure to create a suction force adjacent to the wall 150 to draw the third airflow F_C toward the hair contacting region 150 and into the combined airflow F_B . The third airflow F_C advantageously draws the user's hair toward the hair contacting region 150 for more complete styling of a given amount of hair. For example, the third airflow F_C can pull or draw individual, flyaway hairs, to be drawn toward the hair contacting region 150 for drying and styling with the bulk of the user's hair already being dried or styled via the resultant airflow F_D . In this way, the attachment 100 enhances the user's styling experience and ensures that individual flyaway hairs are styled at the same time and under the same conditions as the bulk of the hair being dried or styled via the resultant airflow F_D . The resultant airflow F_D produced as a result of drawing the third airflow F_C into the combined airflow F_B maintains the high velocity, low static pressure characteristics as it flows over the hair contacting region 150.

[0038] The configuration of the first and second planar

surfaces 155 and the angled grooves 171 arranged between the projections 161 of the slotted cover 160 within the hair contacting region 150 are advantageously configured to reduce the size (e.g. thickness) of a boundary layer of airflow adjacent to the hair contacting region 150 in accordance with the Bernoulli effect so that the resultant airflow F_D adheres more closely to the first and second planar surfaces 155 of the hair contacting region and along a greater portion of a user's hair. In this way, the attachment 100 provides a more consistent airflow within the hair contacting region 150 to make it easier for a user to engage their hair with the attachment 100 for styling and thus improves the user's styling experience.

[0039] In FIG. 8B, a cross-sectional view of the attachment 100 taken along lines A-A of FIG. 8A is shown to illustrate exemplary, non-limiting dimensions of features of the attachment 100. For example, the protrusion 170 can have a height H_1 between about 2.0 and 4.5 mm. In the embodiment shown in FIG. 8B, the protrusion has a height H_1 of 4.0 mm. The air outlet 145 can have a width O_W that is between about 2.5 and 5.0 mm. In the embodiment shown in FIG. 8B, the air outlet 145 has a width O_W of 4.0 mm. A proximal portion 180 of ridge 168 adjacent to the outlet 145 can be angled at an angle A_1 between about 3 degrees and 5 degrees relative to the first angled portion 163 of the projection 161 of slotted cover 160. In the embodiment shown in FIG. 8B, the angle A_1 is 5 degrees. The proximal portion 180 of the ridge 168 can be angled at an angle A_2 relative to the first angled portion 166 of the first body portion 105 between about 0 degrees and 5 degrees. In the embodiment shown in FIG. 8B, the angle A_2 is 2.5 degrees. The proximal portion 180 of the ridge 168 can be angled at an angle A_3 relative to a plane P transecting the appliance mating mechanism 125 between about 7 degrees and 13 degrees. In the embodiment shown in FIG. 8B, the angle A_3 is 10 degrees. A distal portion 181 of the ridge 168 positioned between the proximal portion 180 and the protrusion 170 can be angled at an angle A_4 relative to the proximal portion 180 between about 15 degrees and 30 degrees. In the embodiment shown in FIG. 8B, the angle A_4 is 20 degrees. The ridge 168 can have a height H_2 at a location between the proximal portion 180 and the distal portion 181 between about 3.0 mm and 5.0 mm. In the embodiment shown in FIG. 8B, the ridge 168 has a height H_2 of 3.6 mm.

[0040] Computational fluid dynamic (CFD) data of the fluid flow provided by the attachment 100 is shown in FIGS. 9A-12B and illustrate the advantageous benefits described herein for drying and styling hair. For example, as shown in FIGS. 9A and 9B, velocity data (in m/s) is shown for the airflow F through the attachment 100, the combined airflow F_B , and the resultant airflow F_D exiting the air outlet 145, as well as the third airflow F_C that is drawn toward the hair contacting region 150. As shown in the view illustrated in FIG. 9A and taken along lines A-A of FIG. 8A corresponding to a cross-section of the groove 171, the airflow F , the combined airflow F_B and the

resultant airflow F_D pass through the attachment 100 and exit of the outlet 145 between about 15 and 30 m/s. The resultant airflow F_D exits the outlet 145 in a substantially downward direction that adheres to the grooves 171 and the hair contacting region 150. The linear downward direction of the resultant airflow F_D illustrates the benefit of orienting the airflow along a greater length of the user's hair compared to attachments that provide a more diffuse airflow direction and/or pattern. As shown in the view illustrated in FIG. 9B and taken along lines B-B of FIG. 8A corresponding to a cross-section of the projection 161 positioned atop ridges 168, the airflow F , the combined airflow F_B and the resultant airflow F_D exhibit similar velocity characteristics and illustrate the uniform characteristics of the velocity of the airflows across the entire hair contacting region 150.

[0041] FIG. 10 illustrates a particle trace of velocity data through the attachment 100 for the airflow F , the combined airflow F_B , and the resultant airflow F_D exiting the air outlet 145, as well as the third airflow F_C that is drawn toward the hair contacting region 150. As shown in the view of FIG. 10 taken along lines A-A of FIG. 8A and corresponding to a cross-section of the groove 171, the airflow F , the combined airflow F_B and the resultant airflow F_D pass through the attachment 100 and exit of the outlet 145 between about 12 and 30 m/s. As further shown, the combined airflow F_B and the resultant airflow F_D adhere closely to the hair contacting region 150 as it passed through the grooves 171.

[0042] FIG. 11 illustrates particle trace data corresponding to the velocity of airflow through the attachment 100 across the hair contacting region 150 for the combined airflow F_B , and the resultant airflow F_D exiting the air outlet 145, as well as the third airflow F_C that is drawn toward the hair contacting region 150. As shown in the view of FIG. 11, the combined airflow F_B and the resultant airflow F_D exiting the outlet 145 is uniformly distributed across the hair contacting region 150. The velocity of the combined airflow F_B and the resultant airflow F_D exiting the air outlet 145 is between about 12 and 30 m/s. The velocity of the third airflow F_C is between 0 and 5 m/s.

[0043] As shown in FIGS. 12A and 12B, pressure data is shown for the airflow F through the attachment 100, the combined airflow F_B , and the resultant airflow F_D exiting the air outlet 145, as well as the third airflow F_B that is drawn toward the hair contacting region 150. As shown in the view illustrated in FIG. 12A and taken along lines A-A of FIG. 8A corresponding to a cross-section of the groove 171, the airflow F , the combined airflow F_B and the resultant airflow F_D - pass through the attachment 100 and exit of the outlet 145 at a low static pressure between about 0 and 3000 Pa.

[0044] As shown in the view illustrated in FIG. 12B and taken along lines B-B of FIG. 8A corresponding to a cross-section of the projection 161 positioned atop ridge 168, the airflow F , the combined airflow F_B and the resultant airflow F_D exhibit similar static pressure characteristics as shown in FIG. 12A and illustrate the uniform

characteristics of the static pressure of the airflows across the entire hair contacting region 150.

[0045] As shown in FIG. 12 (and analogously described above in relation to FIG. 12B), there is a static pressure difference created by the grooves 171, resulting in a low-pressure region adjacent to the planar hair contacting region 150 (e.g., adjacent to the projections 161). The low-pressure region pulls the high velocity airflow close to the surface of the hair contacting region 150, reducing the boundary layer and resulting in a wrapping or suction effect. The low-pressure regions can cause small turbulent air eddies, which can reduce friction drag and result in an overall reduction of boundary layer thickness, allowing the airflow to stay close to the hair contacting region 150. This method of passive boundary layer control prevents early airflow separation from the hair contacting region 150 and leverages Bernoulli's principle to create a pressure differential and draw fly-away hairs toward the bulk mass of hair being styled at the hair contacting region 150.

[0046] As indicated above, the attachment 100 is configured to mate with a hair care appliance, and thus includes an appliance mating mechanism 125 configured to couple to an attachment mating portion on the hair care appliance. In some embodiments, the appliance mating mechanism 125 can be formed on exterior surfaces of the first body portion 105. In some embodiments, the appliance mating mechanism 125 can be formed within the nozzle 104, such as in the portions 106, 107 thereof as shown in FIGS. 1-7. While the mating connection between the two components can vary, FIG. 13 illustrates one embodiment of an attachment mating portion 200 on a hair care appliance that is configured to receive and couple with the appliance mating mechanism 125 of the attachment 100 described herein. The illustrated attachment mating portion 200 includes one or more protrusions 205 on an inner surface of the attachment mating portion 200. The protrusions 205 can be received within the openings 210 of the slots 215 (shown on the appliance mating mechanism 125 in FIG. 1) and can travel to the receiving end 220 as the user couples the attachment 100 onto the outlet end of the hair care appliance.

[0047] The attachment mating portion 200 can also include at least one recess 225 configured to receive a tab or protruding portion of an attachment actuator assembly 300 of the hair care appliance shown in FIGS. 14A and 14B. The attachment actuator assembly can be configured with a latch that is coupled to a spring force mechanism. The spring force mechanism can maintain the latch and the tab portion in a first position in which the tab or protruding portion is positioned within the recess 225 or a second position in which the latch is retracted away from the attachment mating portion 200 causing the tab or protruding portion to move out of the recess 225. Coupling the appliance mating mechanism 125 with the attachment mating portion 200 can cause the spring force mechanism to move the tab portion into the first position without user manipulation of the latch. Uncou-

pling the appliance mating mechanism 125 from the attachment mating portion 200 can require manual manipulation of the latch by a user to retract the latch and cause the tab portion to move out of the recess 225 allowing removal of the attachment 100 from the hair care appliance. For example, the user may retract the latch to the second position, affix the appliance mating mechanism 125 to the attachment mating portion 200, and release the latch causing the spring force mechanism to move the latch and tab into the first position.

[0048] The recess 225 can have a width 230 corresponding to a width of the tab or protruding portion of the attachment actuator assembly 300. As the appliance mating mechanism 125 of the attachment 100 is mated with attachment mating portion 200, the protrusions 205 can travel into the slots 215 on the appliance mating mechanism 125. As explained in detail below, once travel of the protrusions 205 into the slots 215 is complete the spring force of the attachment actuator assembly can cause the latch of the attachment actuator assembly to travel toward the attachment mating portion 200 so that the tab portion of the attachment actuator assembly travels into the recess 225 locking the attachment in place to prevent rotation of the attachment 100 on the hair care appliance. The attachment mating portion 200 can also include an opening 235 along the circumference of the bottom portion of the attachment mating portion 200. The opening 235 can receive the attachment actuator assembly therein.

[0049] The attachment actuator assembly 300 of the hair care appliance is shown in more detail in FIGS. 14A and 14B, with the attachment actuator assembly 300 engaged with the appliance mating mechanism 125 of the attachment 100 according to embodiments described herein. Engagement between the appliance mating mechanism 125 and the attachment mating portion 200 can result from aligning the attachment mating portion 200 with the appliance mating mechanism 125 (or vice versa) and urging the attachment mating portion 200 and the appliance mating mechanism 125 together until the attachment actuator assembly 300 engages with the appliance mating mechanism 125.

[0050] As shown in FIG. 14A, the attachment mating portion 200 and the body 305 of the hair care appliance 310 have been removed for illustration and engagement of the appliance mating mechanism 125 with the attachment actuator assembly 300 can be viewed. The illustrated attachment actuator assembly 300 includes a latch 320 and a tab 315 coupled to or integrated within the latch 320. The attachment actuator assembly 300 can be a spring drive mechanism, or the like, configured to urge the latch 320 (and thus the tab 315) into engagement with the mating mechanism 125.

[0051] As discussed above, the slots 215 of the appliance mating mechanism 125 include an opening 210 at which the protrusions 205 and/or a tab 315 of the attachment mating portion 200 can be received when the attachment 100 is coupled with the hair care appliance

310. When the protrusions 205 reach the receiving end 220, the tab 315 can travel toward the outlet end 321 of the hair care appliance 310 and to be positioned within the opening 210 and the slot 215. In this way, the tab 315 can fill a portion of the slot 215 such that the protrusion 205 is blocked from rotating away from or out of the receiving end 220. As a result, the attachment 100 can be secured to the body 305 and rotation of the attachment 100 relative to the body 305 is significantly reduced or eliminated.

[0052] Retracting the latch 320 can cause the tab 315 to travel out of the slot 215 and as the user removes the attachment 100 from the body 305, the protrusions 205 can travel from the receiving end 220 to the opening 210 of the slots 215 to allow uncoupling the attachment 100 from the body 305 of the hair care appliance 310.

[0053] FIG. 14B illustrates a cut-away view of the attachment actuator assembly 300 engaged with the appliance mating mechanism 125. The cut-away view shows an internal perspective of the attachment actuator assembly 300 engaged with the appliance mating mechanism 125, as well as one of the protrusions 205 engaged with the appliance mating mechanism 125. The user has coupled the appliance mating mechanism 125 with the attachment mating portion 200 such that the protrusion 205 has traveled into a receiving end 210 located at a terminal end of the slot 215. In the cut-away view illustrated in FIG. 14B, the additional protrusions 205 on the opposite side of the attachment mating portion 200 are not shown but it will be understood that the additional protrusions 205 on the opposite side of the attachment mating portion 200 are also engaged with the slots 215 present on the opposite side of the appliance mating mechanism 125. Once the protrusions 205 are fully inserted into the slot 215, the spring force of the attachment actuator assembly 300 can cause the latch 320 to travel toward the outlet end 321 of the hair care appliance 310 causing the tab 315 to travel into the slot 215 to secure the attachment mating portion 200 of the hair care appliance 310 to the appliance mating mechanism 125 of the attachment 100. For example, the tab 315 can be received within the recess 225 of the attachment mating portion 200 and the protrusions 205 can be received within the openings 215 of the appliance mating mechanism 125. The attachment 100 is thus secured to the hair care appliance 310 by the engagement of the protrusions 205 of the attachment mating portion 200 within the receiving end 220 of the slots 215 of the appliance mating mechanism 125. Additionally the protrusions 205 are secured within the slots 215 by the tab 315 of the attachment actuator assembly 300. The tab 315 can be positioned within the opening 210 of the slots 215 to prevent the protrusions 205 from coming out of the opening 210. As a result, the attachment 100 can be attached to the hair care appliance 310 securely and rotation of the attachment 100 relative to the body 305 of the hair care appliance 310 can be reduced or eliminated.

[0054] In use, the attachment 100 can be used to polish, straighten, de-frizz, and improve shine, or otherwise style hair by coupling the attachment 100 to a hair care appliance and engaging the user's hair with the resultant airflow F_D within the hair contacting region 150. The hair care appliance 310 can generate air flow that is received at the air inlet 135 of the attachment 100 and directed through the outlet 145. A user can hold the hair care appliance coupled with the attachment 100 attached thereto in one hand and position the distal end 115 of the attachment 100 adjacent to their scalp at a location at which they wish to style their hair. With the hair care appliance 310 powered on such that heated air exits the outlet 145 along the path of the resultant airflow F_D , the user can draw the distal end 115 of the attachment 100 down or otherwise along the length of their hair. The high-velocity airflow F_D exiting the outlet 145 can also draw hair toward the hair contacting region 150 via the third airflow F_C . In this way, a larger amount of the user's hair can be brought into contact with the hair contacting region 150 and the outlet 145 to polish, straighten, de-frizz and increase shine of their hair. The user can repeat this process at other desired locations where frizzy, dull, or fly-away hairs may be present.

[0055] The improved hair polishing attachment 100 described herein and configured for use with a hair care appliance produces a number of advantages. For example, the convergent airflow path, e.g. the configuration of the air flow paths F , F_B , and F_D and the outlet 145 can generate a high-velocity, low-pressure airflow configured to generate a suction force at the hair contacting region 150 so that the third airflow F_C can draw individual or flyaway hairs toward the attachment 100. The configurations of the grooves 171 formed between ridges 168 and the slots 161 of the slotted cover 160 create small turbulent eddies at the first and second planar surfaces 155 within the hair contacting region 150 to allow the combined airflow F_B and the resultant airflow F_D to flow over the hair contacting region with reduced frictional drag, increased velocity, and to reduce the size (e.g. thickness) of a boundary layer of air present in the hair contacting region 150. The reduction of the boundary layer in the hair contacting region 150 can allow the combined airflow F_B and the resultant airflow F_D to more tightly adhere to the first and second planar surfaces 155 of the hair contacting region 150 and to generate the aforementioned suction force, which can advantageously draw in individual or flyaway hairs for an efficient styling experience. As a result of these features, the attachment 100 described herein can allow users to more efficiently engage larger amounts of hair and can reduce the time to polish, straighten, de-frizz and/or shine hair compared to existing hair care appliance attachments.

[0056] As used herein, the term "proximal" can define a location of an element that is upstream of an air flow path and thus closer in proximity to the outlet of a hair care appliance to which the attachment can be coupled or closer to an air inlet of the attachment. The term "prox-

imal" can also refer to a location that is closer to a handle of the hair care appliance at which the user may grasp the hair care appliance. The term "distal" can define a location of an element that is downstream of the air flow path and thus further away from the outlet of the hair care appliance. The term "distal" can also refer to a location that is farther away from the handle of the hair care appliance. The term "distal" can refer to a location that is closer to an outlet of the attachment at which the air flow path exits the attachment. A distal location will be opposite a proximal location and vice versa.

[0057] Certain exemplary embodiments have been described to provide an overall understanding of the principles of the structure, function, manufacture, and use of the systems, devices, and methods disclosed herein. One or more examples of these embodiments have been illustrated in the accompanying drawings. Those skilled in the art will understand that the systems, devices, and methods specifically described herein and illustrated in the accompanying drawings are non-limiting exemplary embodiments and that the scope of the present invention is defined solely by the claims. The features illustrated or described in connection with one exemplary embodiment may be combined with the features of other embodiments. Such modifications and variations are intended to be included within the scope of the present invention. Further, in the present disclosure, like-named components of the embodiments generally have similar features, and thus within a particular embodiment each feature of each like-named component is not necessarily fully elaborated upon.

[0058] Approximating language, as used herein throughout the specification and claims, may be applied to modify any quantitative representation that could permissibly vary without resulting in a change in the basic function to which it is related. Accordingly, a value modified by a term or terms, such as "about," "approximately," and "substantially," are not to be limited to the precise value specified. In at least some instances, the approximating language may correspond to the precision of an instrument for measuring the value. Here and throughout the specification and claims, range limitations may be combined and/or interchanged, such ranges are identified and include all the sub-ranges contained therein unless context or language indicates otherwise.

[0059] One skilled in the art will appreciate further features and advantages of the invention based on the above-described embodiments. Accordingly, the present application is not to be limited by what has been particularly shown and described, except as indicated by the appended claims.

List of Examples

[0060]

Example 1. An attachment for a hair care appliance, comprising:

an inlet, an outlet, an airflow path extending there-between, and a planar hair contacting surface having a plurality of channels formed in the planar hair contacting surface and configured to reduce a size of a boundary layer of airflow flowing over the planar hair contacting surface such that the airflow adheres thereto. 5

Example 2. The attachment of Example 1, wherein the planar hair contacting surface includes a first surface portion adjacent to the outlet and a second surface portion adjacent to the first surface portion, the first surface oriented at a first angle relative to the longitudinal axis of the airflow path exiting the outlet and the second surface oriented at a second angle relative to the longitudinal axis of the airflow path exiting the outlet, the first angle less than the second angle. 10 15

Example 3. The attachment of Example 2, wherein the hair contacting surface include a plurality of grooves positioned across the first and second surface portions, each groove defined by adjacent ridges extending from the first and second surface portions. 20 25

Example 4. The attachment of Example 3, wherein the plurality of grooves are angled and are configured to generate turbulent eddies in the airflow flowing over the hair contacting surface so as cause the airflow flowing over the hair contacting surface to adhere thereto. 30

Example 5. The attachment of Example 1, wherein a static pressure of the air flowing over the hair contacting surface is lower than a static pressure of air received via the inlet. 35

Example 6. The attachment of Example 5, wherein the static pressure of air flowing over the hair contacting surface is configured to draw individual hairs into contact with a plurality of hairs drawn into contact with the hair contacting surface. 40

Example 7. The attachment of Example 2, wherein the hair contacting surface includes a slotted cover extending from the outlet over the first and second surface portions, the slotted cover having a plurality of projections extending across the first and second surface portions and covering the adjacent ridges. 45 50

Example 8. The attachment of Example 7, wherein the slotted cover includes a thermally conductive material. 55

Example 9. The attachment of Example 1, further comprising a hair grip feature extending across at least one wall defining the outlet.

Example 10. The attachment of Example 1, further comprising a protrusion positioned at a distal end of the second surface portion and extending thereacross, the protrusion configured to direct the airflow flowing over the hair contacting surface away from the inlet or a user's hand.

Example 11. The attachment of any one of Examples 1 - 10, wherein the airflow path is convergent in a direction of the airflow, and the planar hair contacting surface is downstream of the outlet in the airflow direction.

Example 12. A hair care appliance, comprising: an air inlet, an air outlet, a hair styling region including a plurality of angled planar surfaces, and a fan assembly configured to generate an airflow over the plurality of angled planar surfaces such that a velocity of the airflow flowing over the plurality of angled planar surfaces is greater than a velocity of an airflow received at the inlet from the fan assembly, wherein the velocity of the airflow flowing over the plurality of angled planar surfaces is configured to draw hair toward the hair styling region.

Example 13. The hair care appliance of Example 12, wherein the plurality of angled planar surfaces include a plurality of channels extending downstream from the outlet and positioned between adjacent ridges extending downstream from the outlet and across the hair styling region.

Example 14. The hair care appliance of Example 13, wherein the plurality of channels are configured to reduce a size of a boundary layer of the airflow flowing over the plurality of angled planar surfaces so as to cause the airflow flowing over the angled planar surfaces to adhere to the hair styling region.

Example 15. The hair care appliance of Example 13, wherein the hair styling region includes a thermally-conductive surface positioned atop the plurality of angled planar surfaces, the thermally conductive surface having a plurality of slots separating linear projections extending downstream of the outlet, the linear projections positioned atop a plurality of ridge pairs extending across the plurality of angled planar surfaces.

Example 16. The hair care appliance of Example 15, wherein the plurality of slots are positioned atop and open into the plurality of channels, and the thermally-conductive surface is heated by the airflow received at the inlet from the fan assembly.

Example 17. The hair care appliance of Example 12, wherein a static pressure of the airflow flowing over the plurality of angled planar surfaces is lower than a

static pressure of the airflow generated by the fan assembly so as to further cause the hair to be drawn toward the hair styling region.

Example 18. The hair care appliance of Example 12, wherein the air inlet, the air outlet, and the hair styling region are configured in a hair care attachment releasably coupled to an outlet end of the hair care appliance.

Example 19. The hair care appliance of Example 18, wherein the hair care attachment further comprises a hair grip feature positioned on at least one wall defining the air outlet, the hair grip feature including a silicone material configured to enhance frictional engagement of the hair.

Example 20. The hair care appliance of Example 18, wherein the hair care attachment further comprises a ridge protruding across a distal end of the hair styling region, the ridge configured to direct the airflow flowing over the plurality of angled planar surfaces away from the hair care appliance.

Example 21. The hair care appliance of Example 20, wherein the ridge is further configured to prevent recirculation of the airflow flowing over the plurality of angled planar surfaces into a second inlet of the hair care attachment.

Example 22. The hair care appliance of any one of Examples 12 - 21, wherein an airflow path extending between the inlet and the outlet is convergent in a direction of the airflow, and the hair styling region is downstream of the outlet in the airflow direction.

Claims

1. An attachment for a hair care appliance, comprising: an inlet, an outlet, an airflow path extending therebetween, and a planar hair contacting surface having a plurality of channels formed in the planar hair contacting surface and configured to reduce a size of a boundary layer of airflow flowing over the planar hair contacting surface such that the airflow adheres thereto.
2. The attachment of claim 1, wherein the planar hair contacting surface includes a first surface portion adjacent to the outlet and a second surface portion adjacent to the first surface portion, the first surface oriented at a first angle relative to the longitudinal axis of the airflow path exiting the outlet and the second surface oriented at a second angle relative to the longitudinal axis of the airflow path exiting the outlet, the first angle less than the second angle.

3. The attachment of claim 2, wherein the hair contacting surface include a plurality of grooves positioned across the first and second surface portions, each groove defined by adjacent ridges extending from the first and second surface portions.
4. The attachment of claim 3, wherein the plurality of grooves are angled and are configured to generate turbulent eddies in the airflow flowing over the hair contacting surface so as cause the airflow flowing over the hair contacting surface to adhere thereto.
5. The attachment of claim 1, wherein a static pressure of the air flowing over the hair contacting surface is lower than a static pressure of air received via the inlet.
6. The attachment of claim 5, wherein the static pressure of air flowing over the hair contacting surface is configured to draw individual hairs into contact with a plurality of hairs drawn into contact with the hair contacting surface.
7. The attachment of claim 2, wherein the hair contacting surface includes a slotted cover extending from the outlet over the first and second surface portions, the slotted cover having a plurality of projections extending across the first and second surface portions and covering the adjacent ridges;
AND OPTIONALLY,
wherein the slotted cover includes a thermally conductive material.
8. A hair care appliance, comprising:
an air inlet, an air outlet, a hair styling region including a plurality of angled planar surfaces, and a fan assembly configured to generate an airflow over the plurality of angled planar surfaces such that a velocity of the airflow flowing over the plurality of angled planar surfaces is greater than a velocity of an airflow received at the inlet from the fan assembly, wherein the velocity of the airflow flowing over the plurality of angled planar surfaces is configured to draw hair toward the hair styling region.
9. The hair care appliance of claim 8, wherein the plurality of angled planar surfaces include a plurality of channels extending downstream from the outlet and positioned between adjacent ridges extending downstream from the outlet and across the hair styling region.
10. The hair care appliance of claim 9, wherein the plurality of channels are configured to reduce a size of a boundary layer of the airflow flowing over the plurality of angled planar surfaces so as to cause the airflow flowing over the angled planar surfaces to adhere to the hair styling region.

11. The hair care appliance of claim 9, wherein the hair styling region includes a thermally-conductive surface positioned atop the plurality of angled planar surfaces, the thermally conductive surface having a plurality of slots separating linear projections extending downstream of the outlet, the linear projections positioned atop a plurality of ridge pairs extending across the plurality of angled planar surfaces. 5
12. The hair care appliance of claim 11, wherein the plurality of slots are positioned atop and open into the plurality of channels, and the thermally-conductive surface is heated by the airflow received at the inlet from the fan assembly. 10
13. The hair care appliance of claim 8, wherein a static pressure of the airflow flowing over the plurality of angled planar surfaces is lower than a static pressure of the airflow generated by the fan assembly so as to further cause the hair to be drawn toward the hair styling region. 15 20
14. The hair care appliance of claim 8, wherein the air inlet, the air outlet, and the hair styling region are configured in a hair care attachment releasably coupled to an outlet end of the hair care appliance. 25
15. The hair care appliance of claim 14, wherein the hair care attachment further comprises a hair grip feature positioned on at least one wall defining the air outlet, the hair grip feature including a silicone material configured to enhance frictional engagement of the hair. 30

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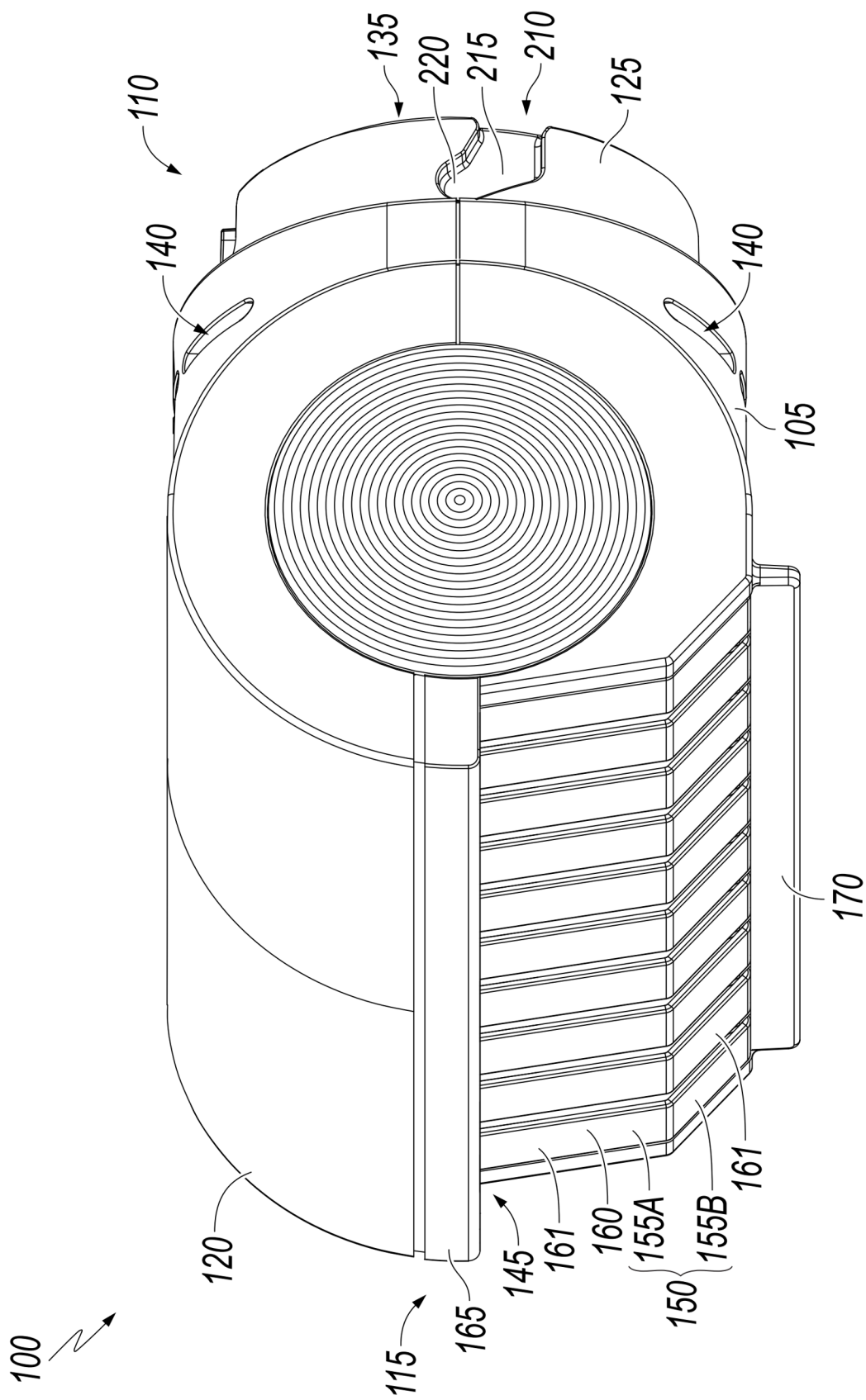


FIG. 1

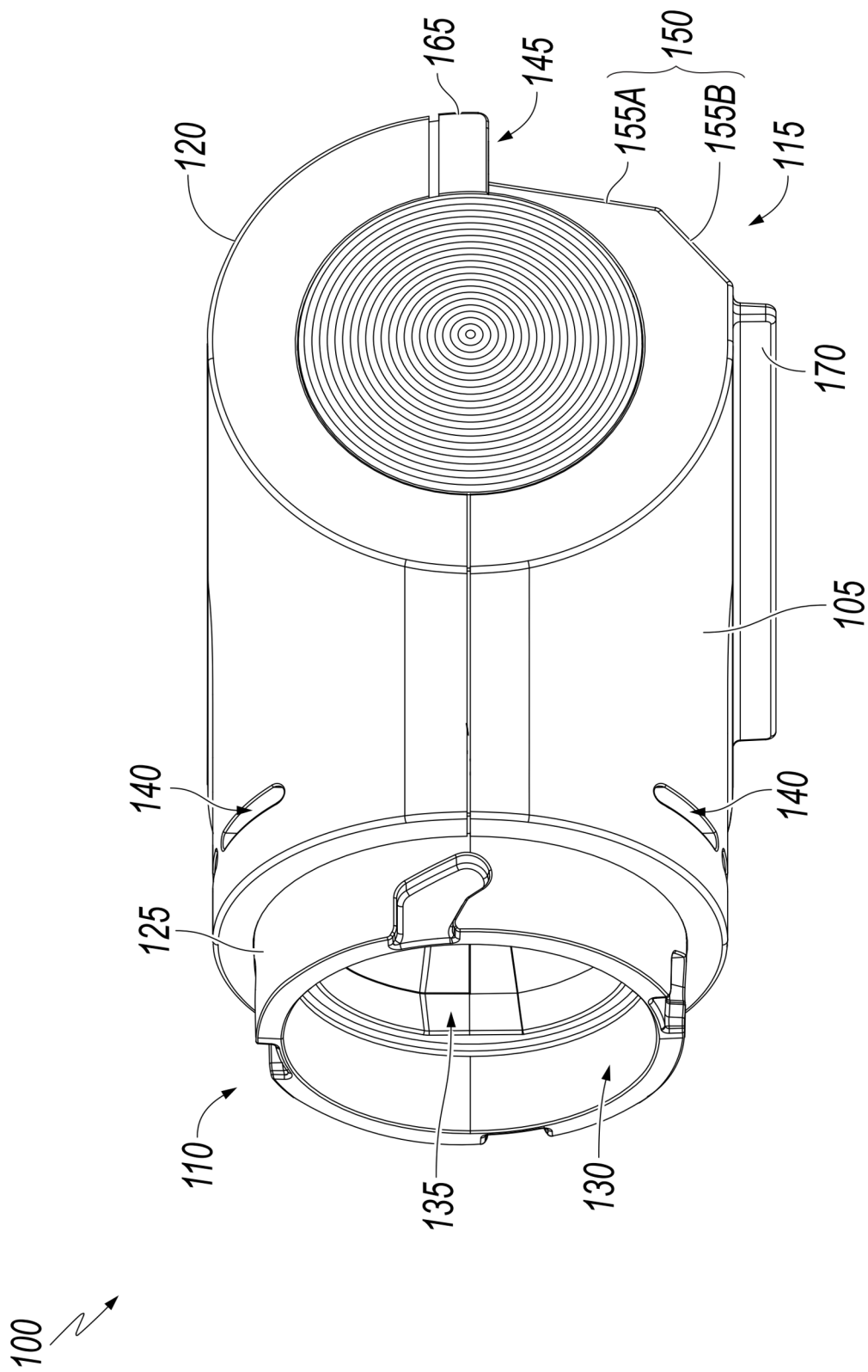


FIG. 2

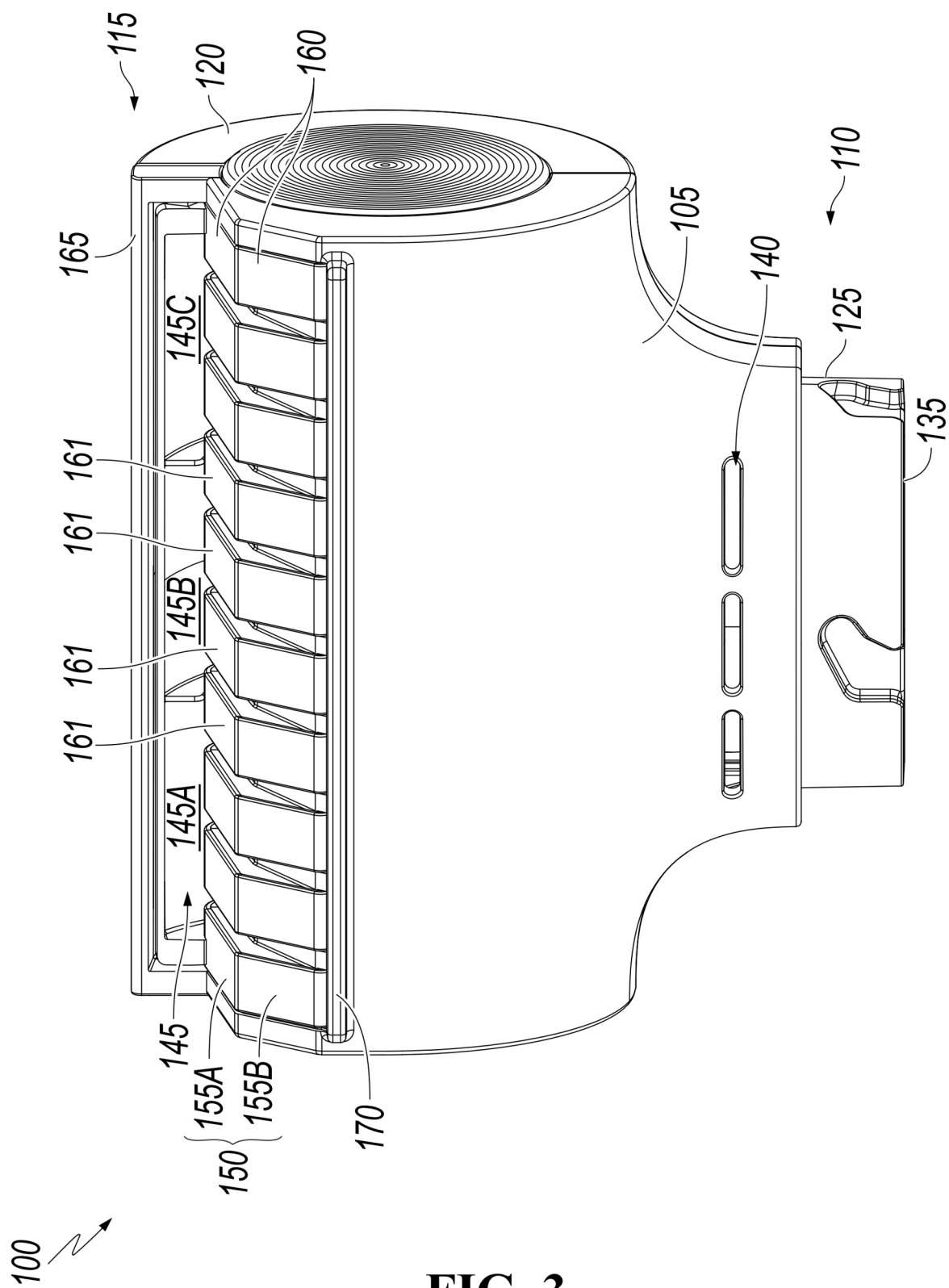


FIG. 3

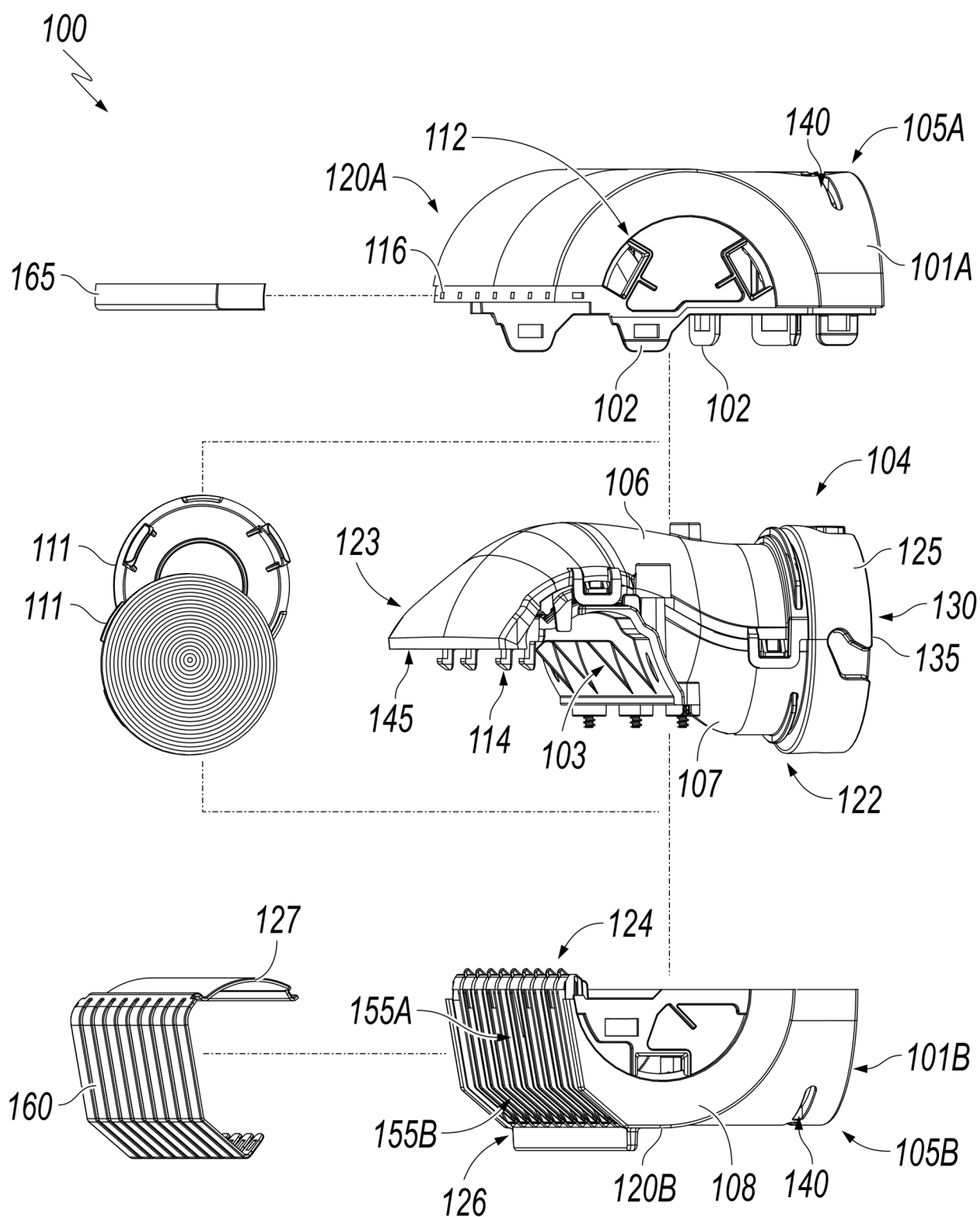


FIG. 4

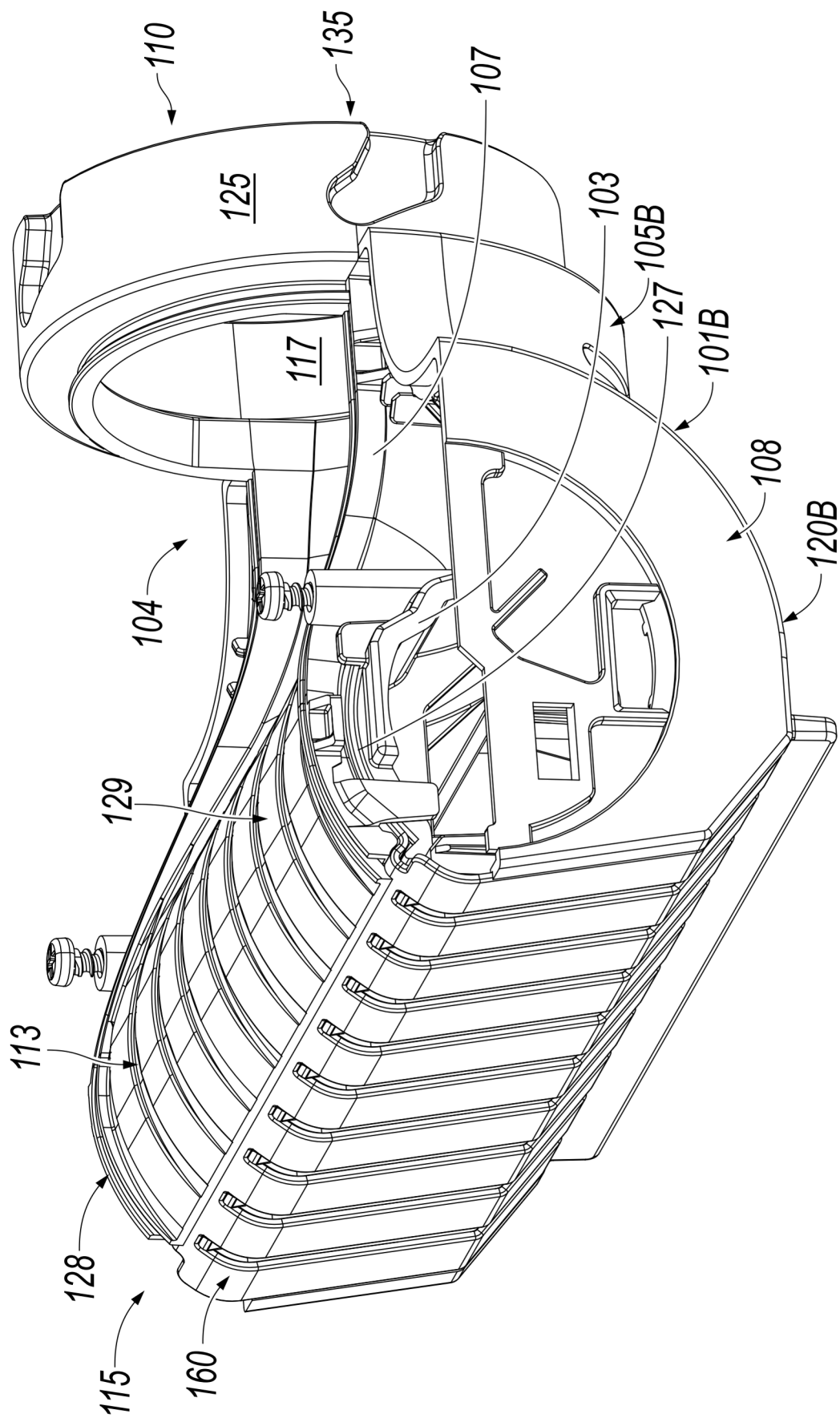


FIG. 5

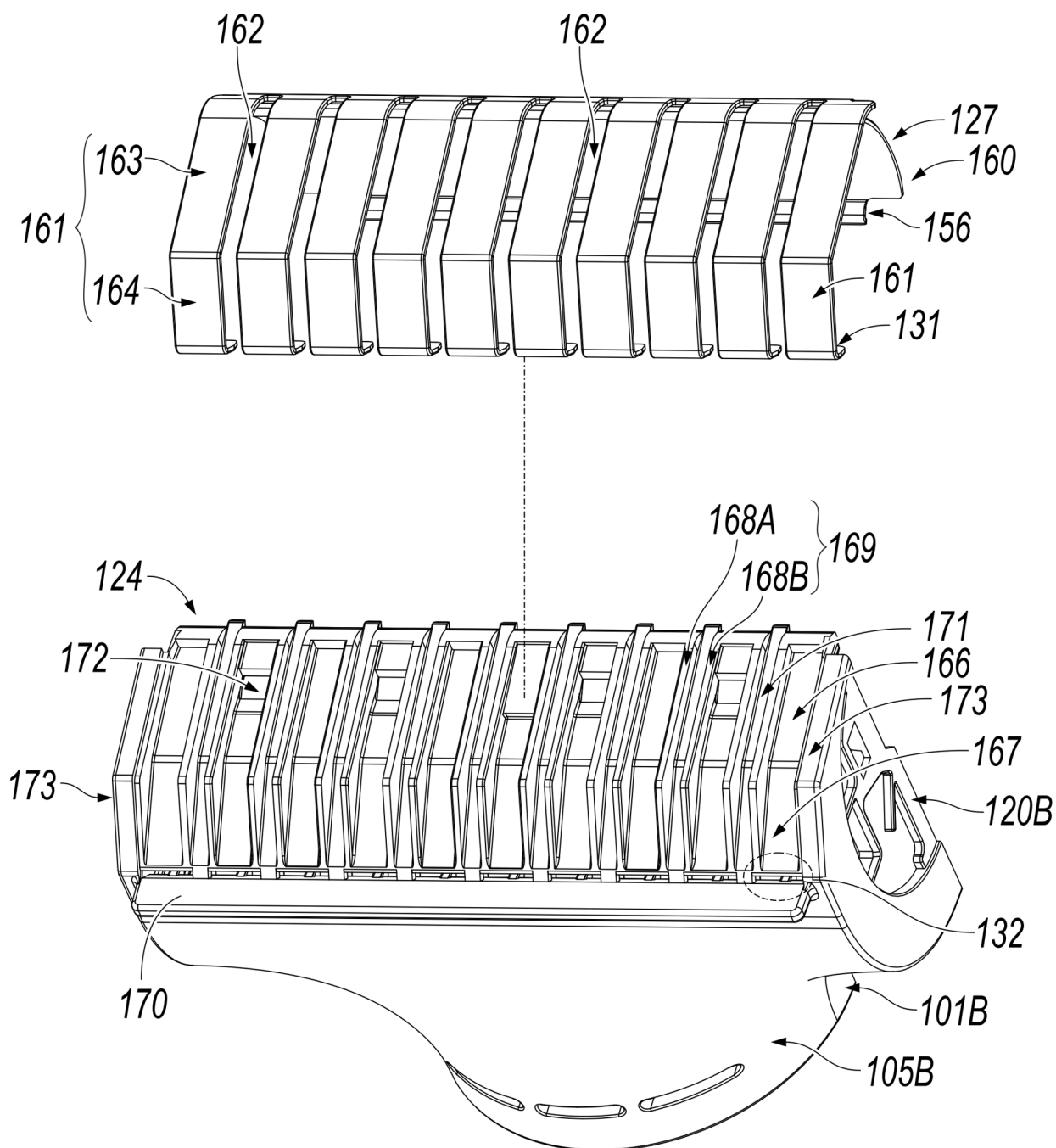


FIG. 6

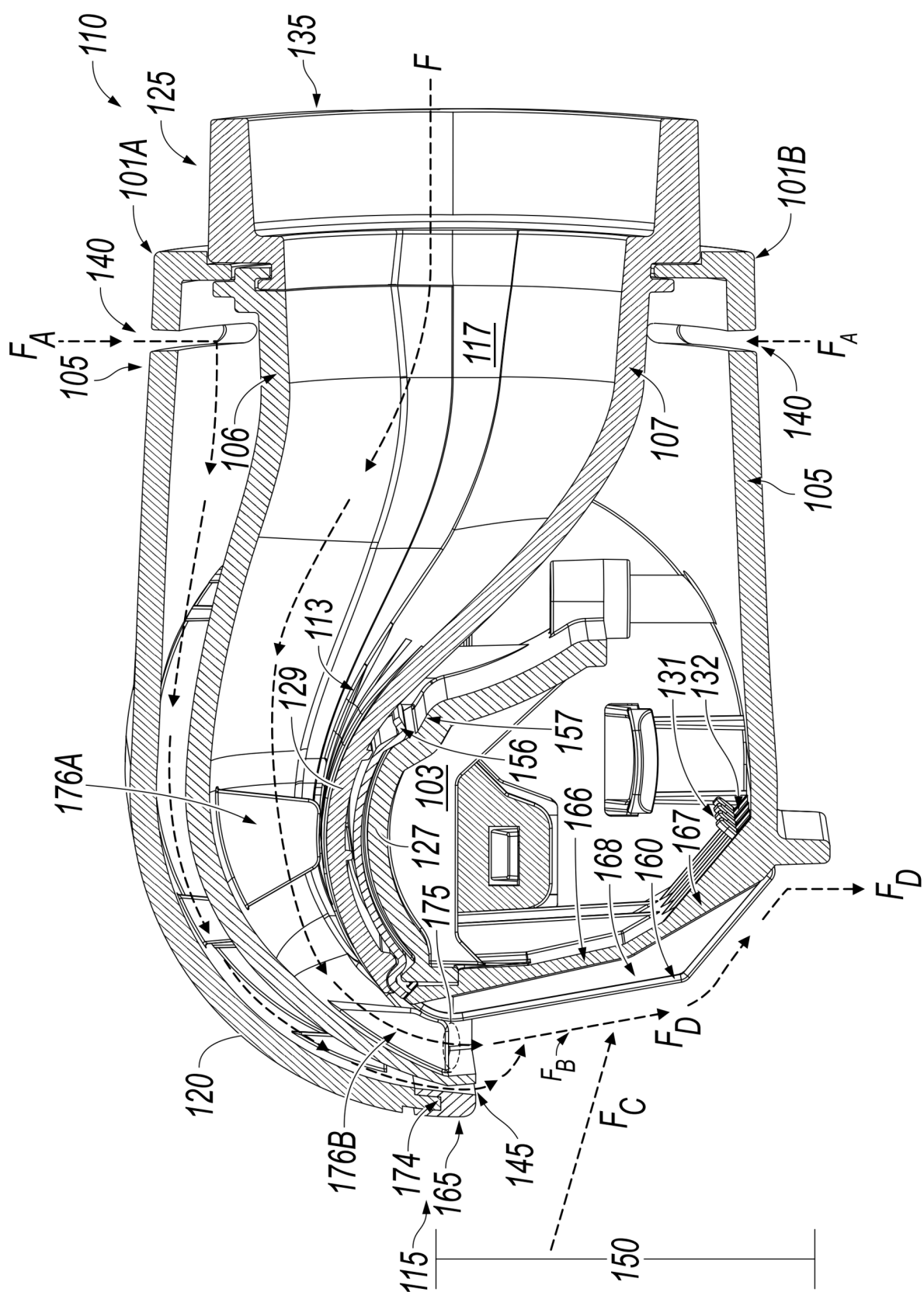


FIG. 7

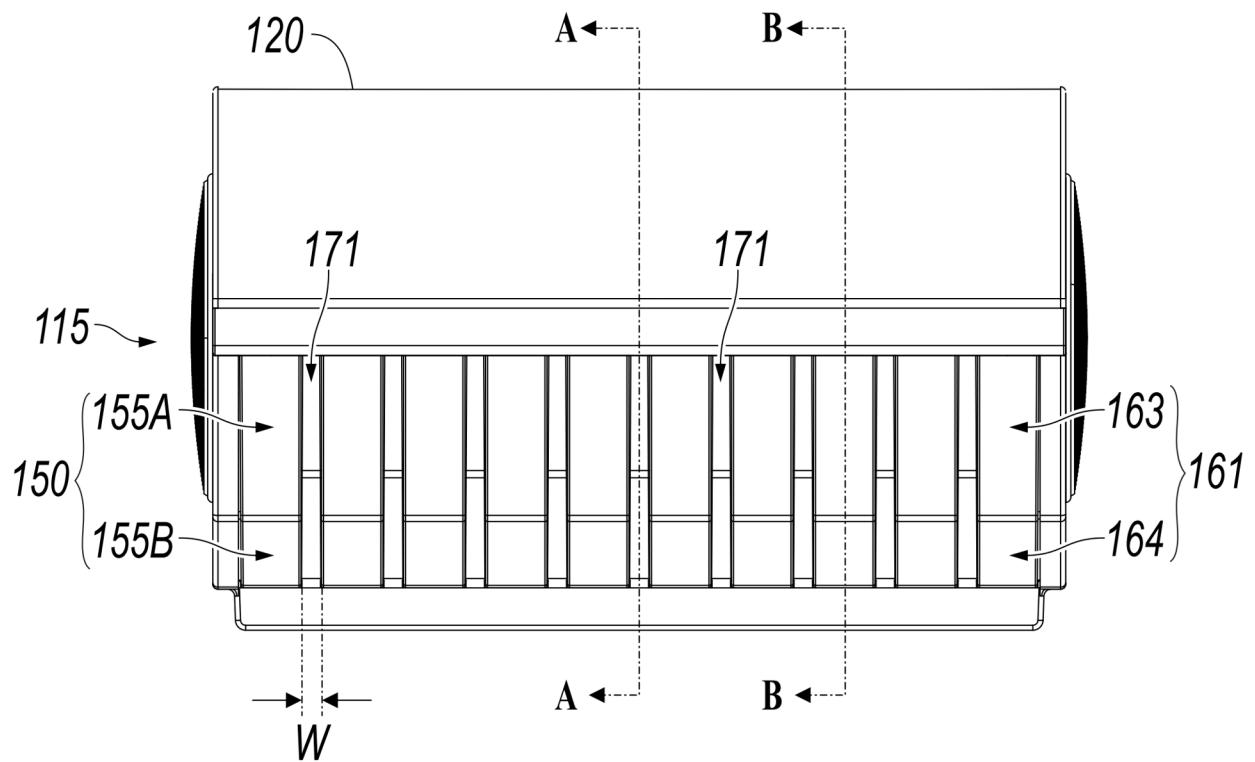


FIG. 8A

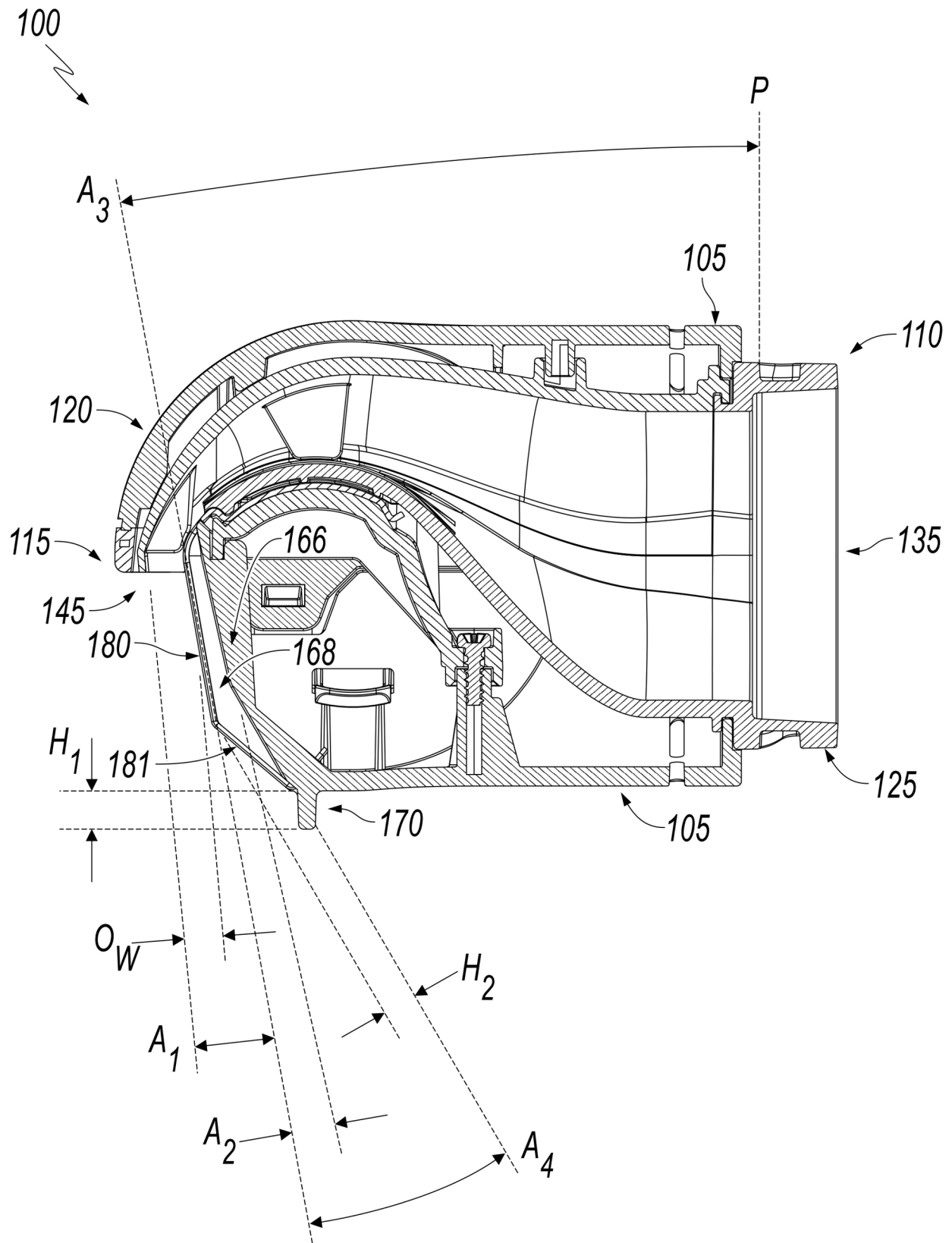


FIG. 8B

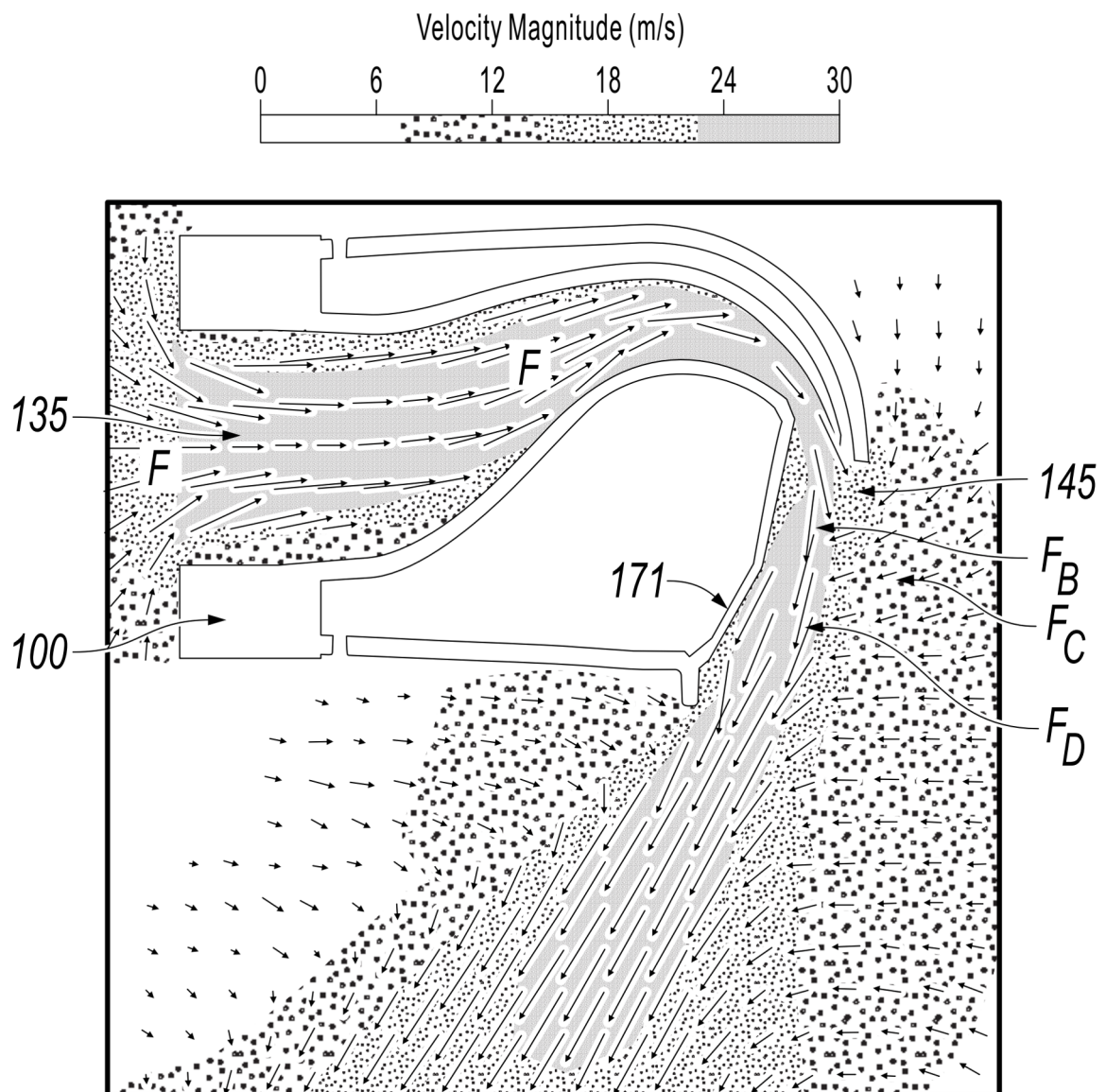


FIG. 9A

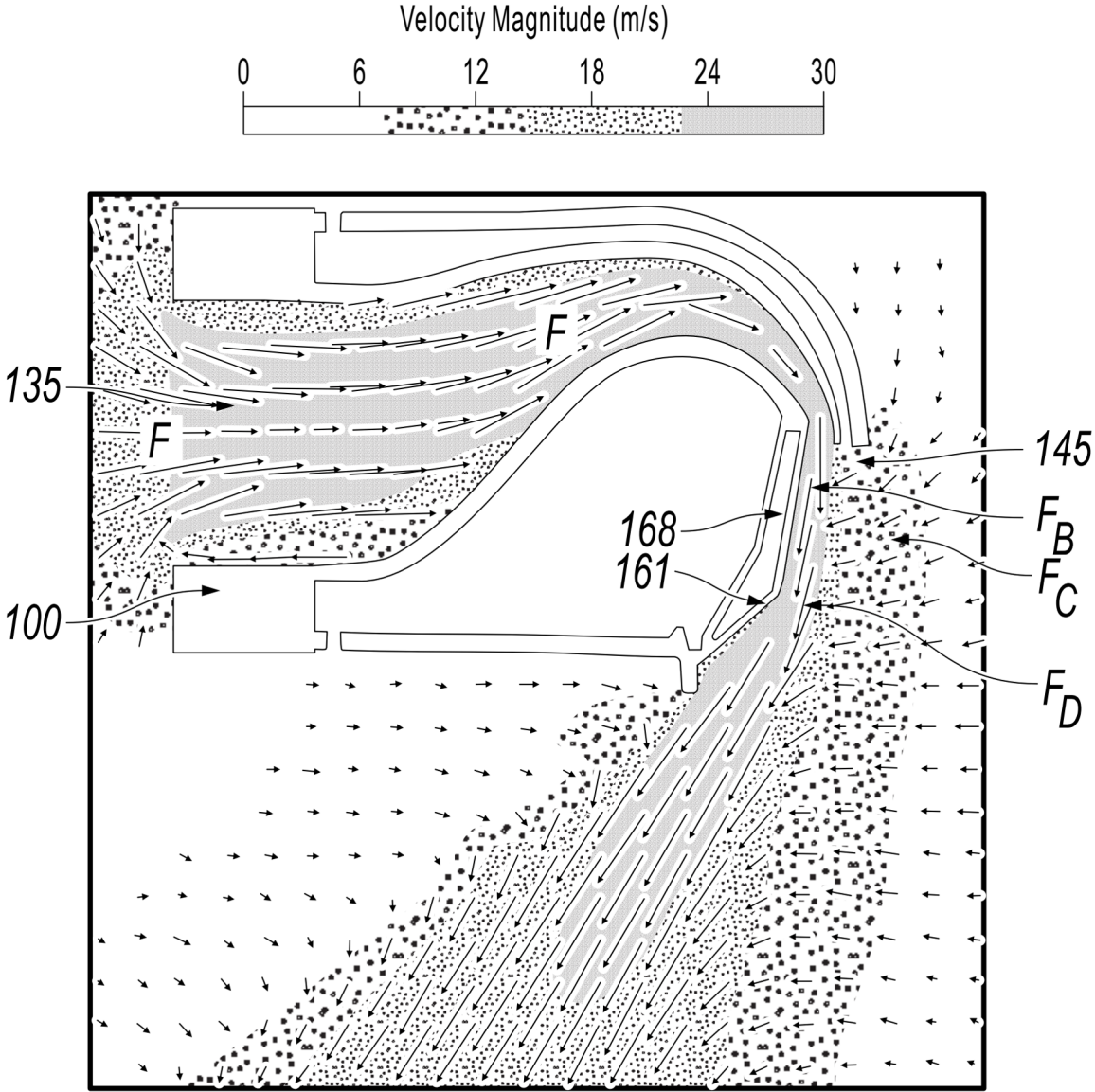


FIG. 9B

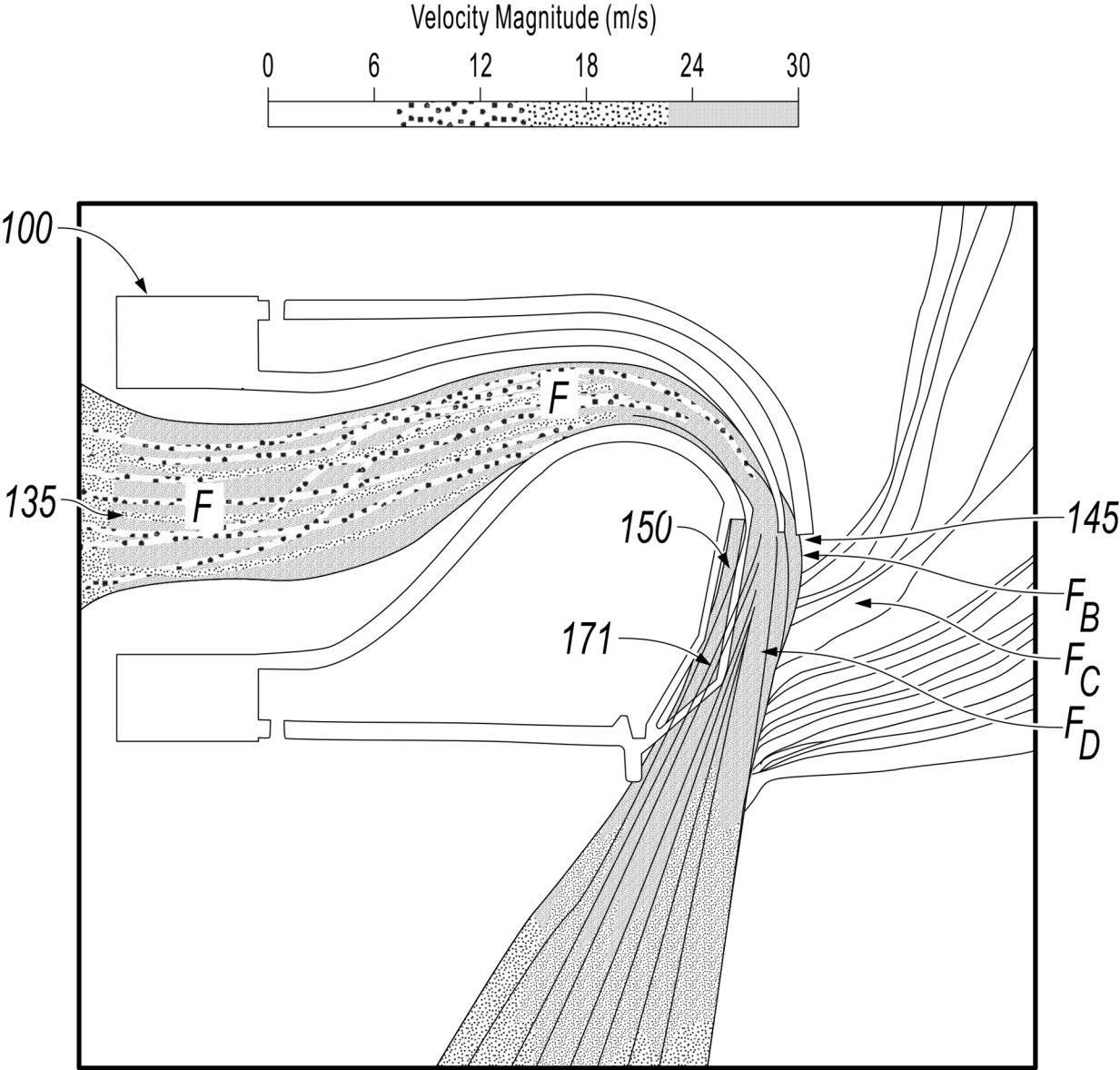


FIG. 10

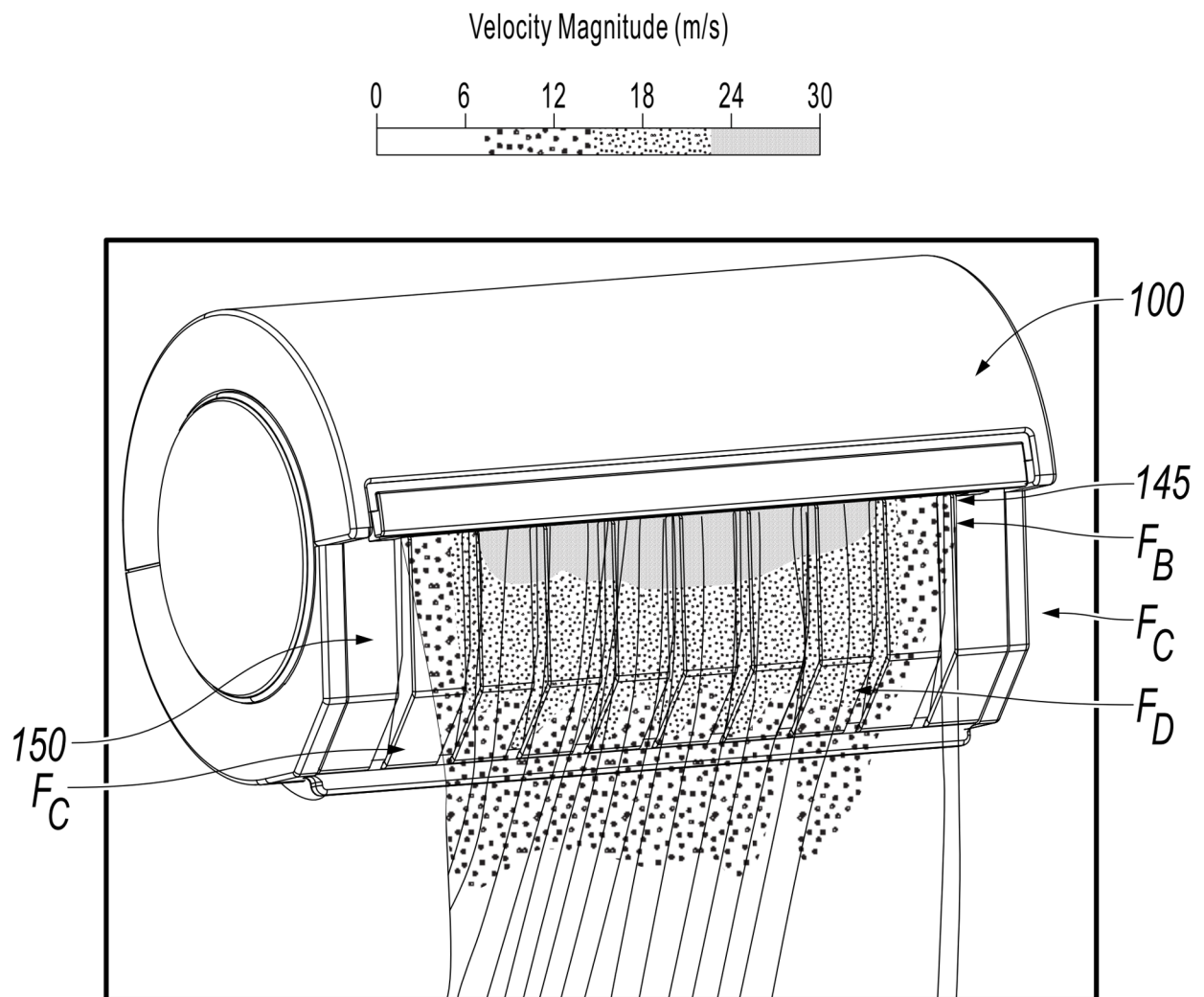


FIG. 11

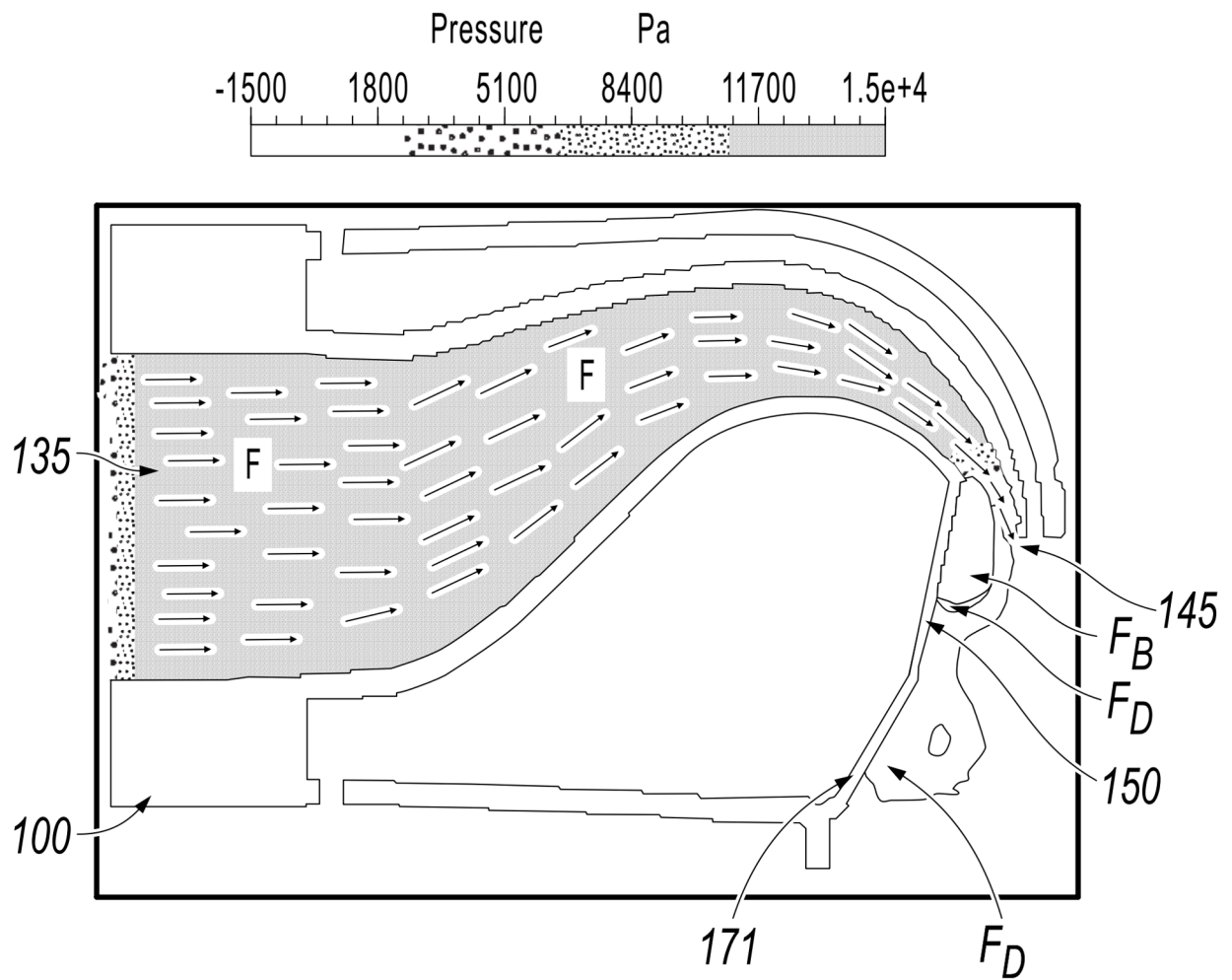


FIG. 12A

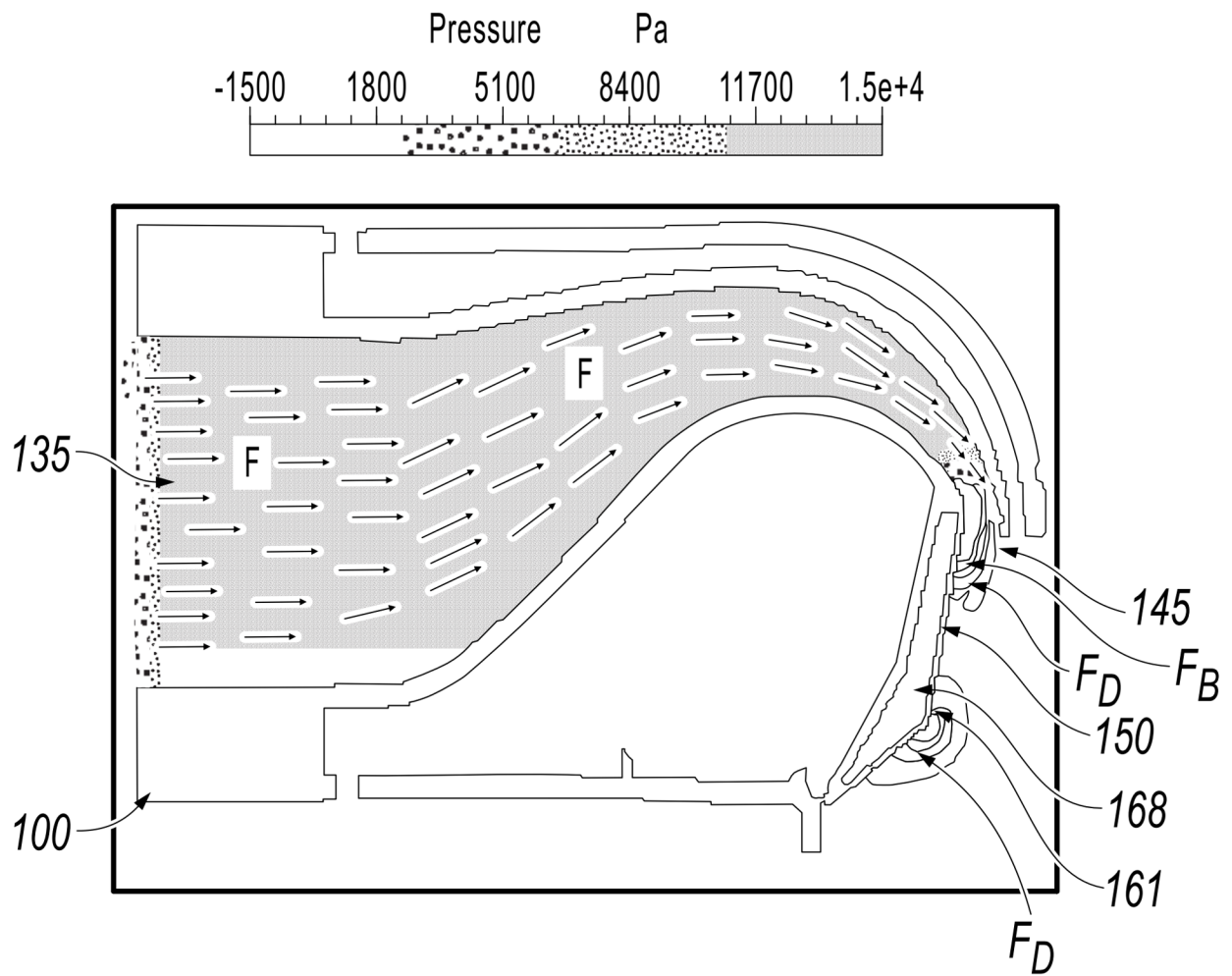


FIG. 12B

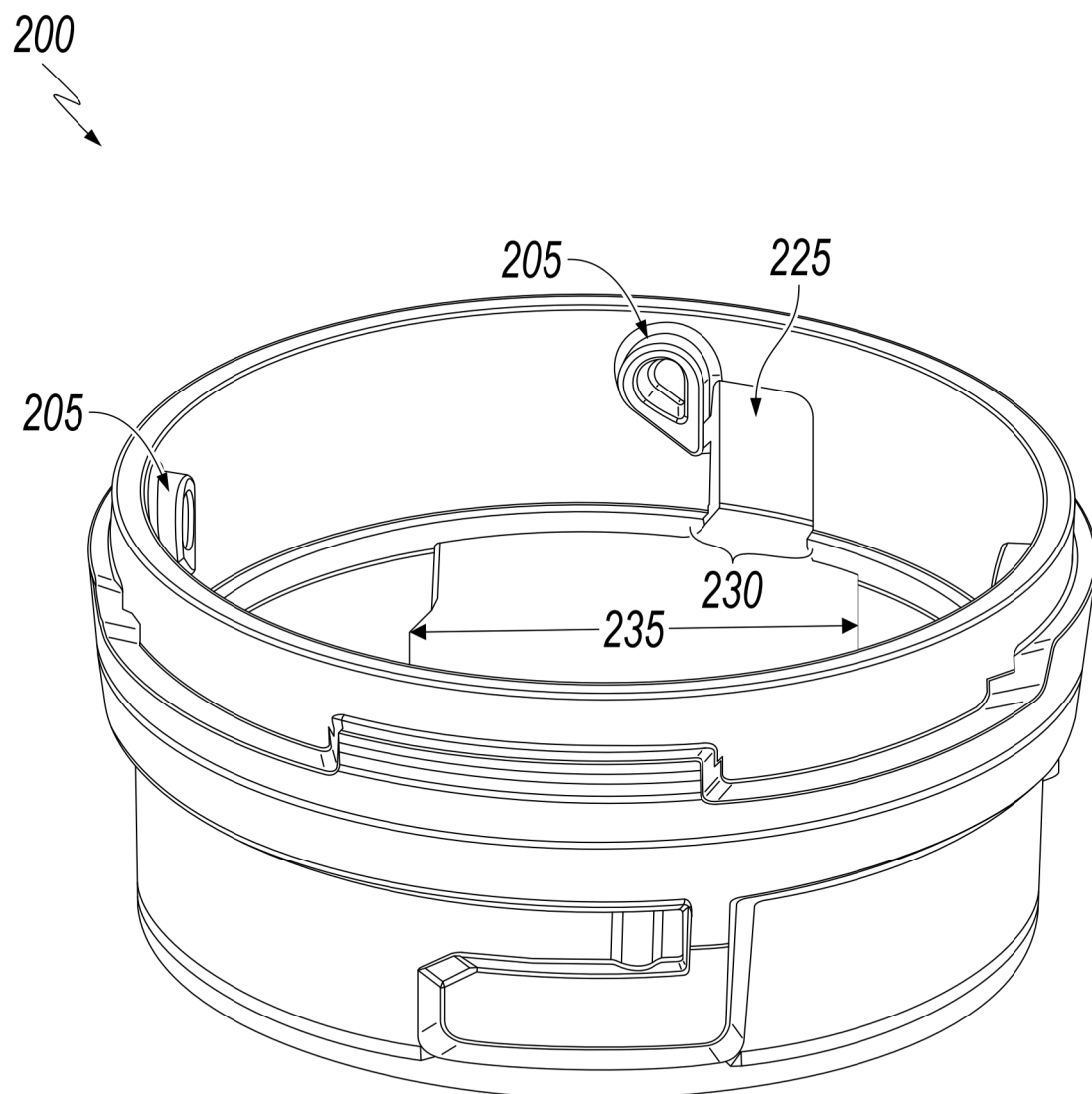


FIG. 13

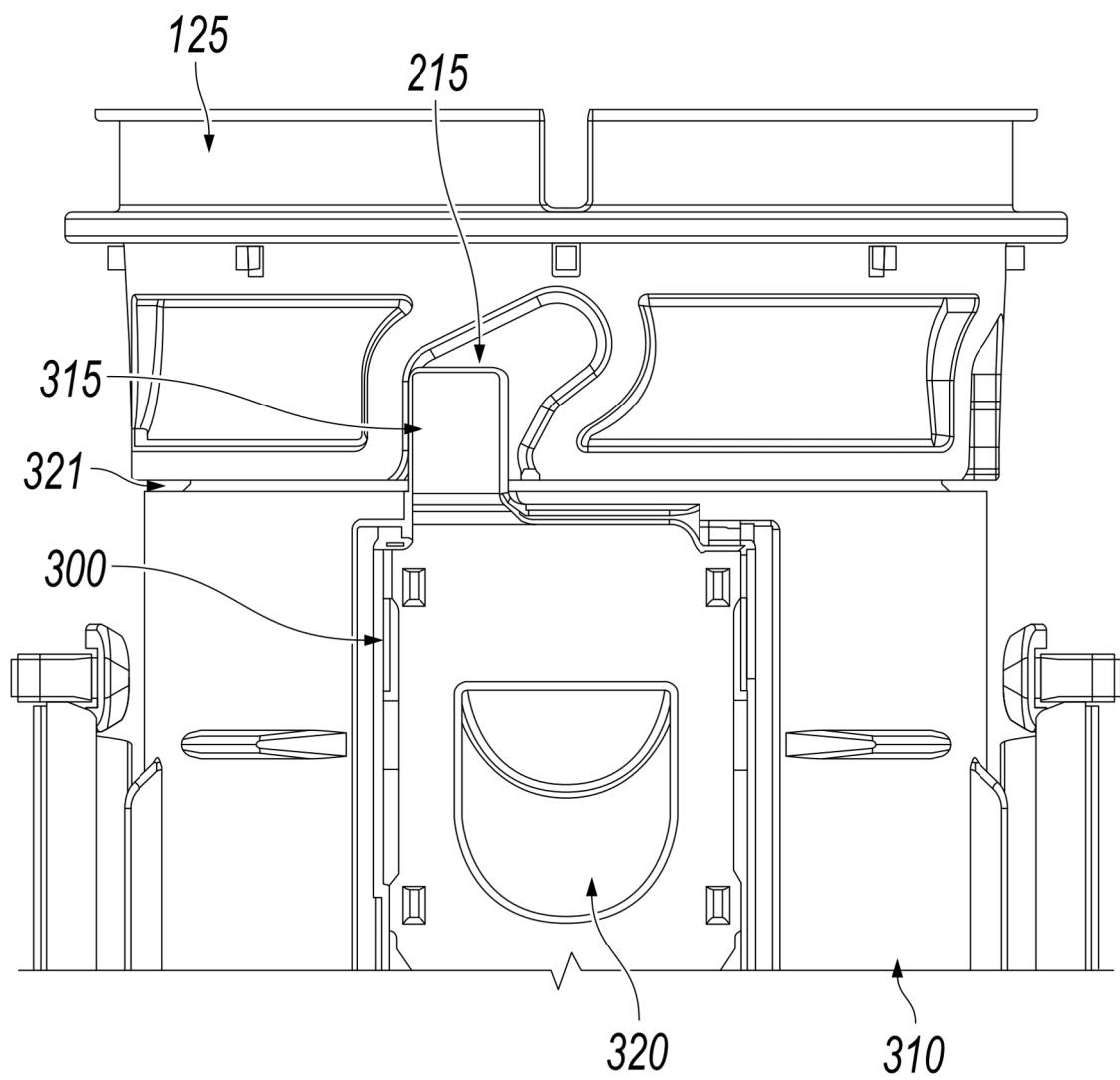


FIG. 14A

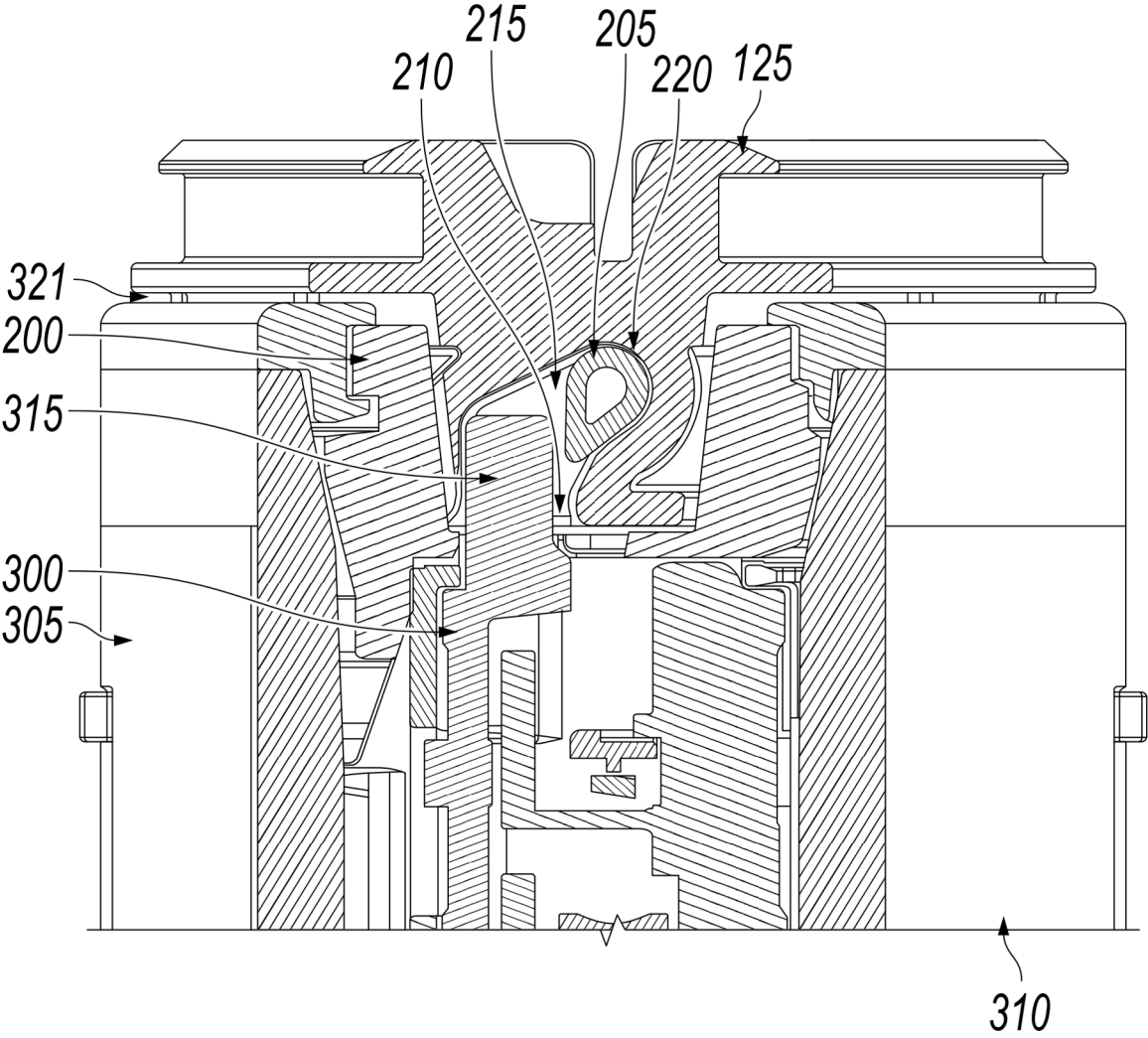


FIG. 14B



EUROPEAN SEARCH REPORT

Application Number

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