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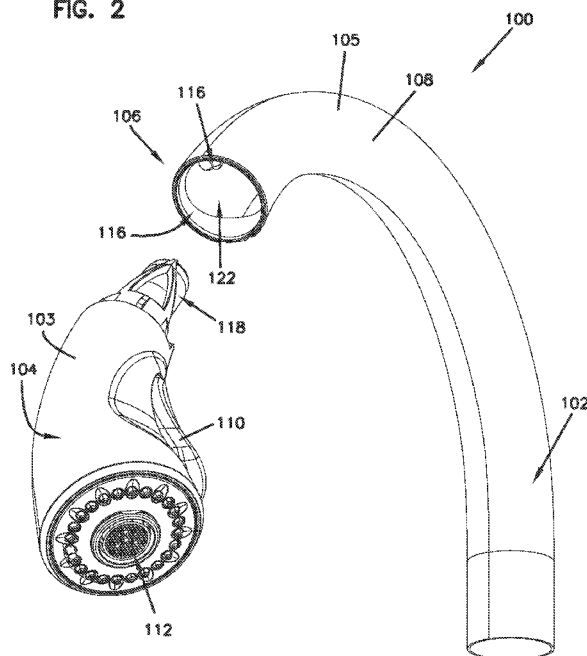
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(54) Title: FAUCET SPRAY HEAD ALIGNMENT SYSTEM

FIG. 2



(57) Abstract: An alignment coupling for a faucet includes a first alignment element positionable within a faucet body. The first alignment element has a first alignment feature. The first alignment feature includes one of a projection and a tapered groove. The alignment coupling includes a second alignment element that is movable with respect to the first alignment element. The second alignment element has a second alignment feature. The second alignment feature includes the other of the projection and tapered groove. The tapered groove includes walls that extend toward each other, and wherein the walls guide the projection to a narrowest portion of the tapered groove.

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FAUCET SPRAY HEAD ALIGNMENT SYSTEM

Cross-Reference to Related Applications

This application is being filed on 23 August 2019, as a PCT International patent application, and claims priority to U.S. Provisional Application Serial Nos. 62/849,570, filed May 17, 2019; and 62/722,092, filed August 23, 2019, which applications are hereby incorporated by reference in their entireties.

Background

Fluid dispensing devices, specifically faucets, can be found in many different rooms of a building, including, but not limited to, bathrooms and kitchens. Many typical kitchen faucets utilize pull-down functionality that allow the spray head to be detached and undocked from the faucet body. This allows the user to manipulate the spray head. When the user is done using the spray head, the spray head often utilizes a pullback system (e.g., weights on water hose) to allow for retraction of the spray head back toward a docked position with the faucet body.

Faucets are often designed to have an aesthetic look to go with a particular user style or the style of a particular room/dwelling. For example, faucets can have a variety of different finishes, shapes, etc. to allow the user to furnish a particular room to their liking. Some faucets are designed with an asymmetrical spray head to achieve a particular stylistic look of the faucet when the spray head is docked with the faucet body. However, this creates a problem when re-docking the faucet head with the faucet body. If a typical pullback system is utilized, the asymmetrical head can dock with the faucet body in a variety of ways, most of which are positions that are misaligned with the faucet body. This results in an undesirable look of the faucet and destroys the aesthetic look that the faucet was designed to achieve in the first place.

Therefore improvements in faucet spray head alignment are needed.

Summary

The present disclosure relates generally to a faucet. In one possible configuration, and by non-limiting example, the pull-down faucet has alignment coupling to align the spray head with the faucet body when the faucet spray head

returns to interface with the faucet body to ensure reliable alignment to a same position.

In one aspect of the present disclosure, a faucet is disclosed. The faucet includes a faucet body that includes a first alignment element located at an outlet
5 within the faucet body. The faucet includes a faucet spray head that is positionable at the outlet of the faucet body. The faucet spray head includes a second alignment element. The faucet spray head has an aligned position and a plurality of misaligned positions with respect to the faucet body. The first and second alignment elements form an alignment coupling. The alignment coupling includes a projection and a
10 tapered groove where at least one is movable with respect to other. When the projection is positioned at a narrowest portion of the tapered groove, the faucet spray head is in the aligned position.

In another aspect of the present disclosure, a faucet is disclosed. The faucet includes a faucet body and a faucet spray head that is movable with respect to the
15 faucet body. The faucet includes a first alignment element mounted within the faucet body. The first alignment element has a first alignment feature. The first alignment feature includes one of a projection and a tapered groove. The faucet includes a second alignment element mounted to the faucet spray head. The second alignment element has a second alignment feature. The second alignment feature includes the
20 other of the projection and tapered groove. The projection is configured to interface with walls of the tapered groove to align the faucet spray head.

In another aspect of the present disclosure, an alignment coupling for a faucet is disclosed. The alignment coupling includes a first alignment element positionable within a faucet body. The first alignment element has a first alignment
25 feature. The first alignment feature includes one of a projection and a tapered groove. The alignment coupling includes a second alignment element that is movable with respect to the first alignment element. The second alignment element has a second alignment feature. The second alignment feature includes the other of the projection and tapered groove. The tapered groove includes walls that extend
30 toward each other, and the walls guide the projection to a narrowest portion of the tapered groove.

In another aspect of the present disclosure, a fluid dispensing device is disclosed. The fluid dispensing device includes a body and a spray head that is movable with respect to the body. The fluid dispensing device includes a water hose

positioned within the body and connected to the spray head at a fitting. The fitting has a spherical portion positioned within the spray head. The fluid dispensing device includes a seal assembly positioned within the spray head and positioned at least partially around the spherical portion of the fitting. The seal assembly includes a
5 holder that defines an interior seal chamber, and the seal chamber has a first end and second end. The seal assembly includes a first seal positioned around the spherical portion of the fitting and a second seal that has an opening positioned around the spherical portion of the fitting. The seal assembly includes a seal holder positioned between the first and second seals. The seal holder and second seal are interlocked to
10 reduce relative rotation between the second seal and the seal holder. The seal assembly includes a spring positioned within the interior seal chamber. The spring is positioned between the first end of the seal chamber and the second seal.

In another aspect of the present disclosure, a fluid dispensing device is disclosed. The fluid dispensing device includes a body and a spray head that is
15 movable with respect to the body. The fluid dispensing device includes a water hose positioned within the body and connected to the spray head at a fitting. The fitting has a spherical portion positioned within the spray head. The fluid dispensing device includes a seal assembly positioned within the spray head and positioned at least partially around the spherical portion of the fitting. The seal assembly automatically
20 increases a sealing force around the fitting when the spray head dispenses water.

In another aspect of the present disclosure, a method of operating a fluid dispensing device is disclosed. The method includes providing a body and a spray head movable with respect to the body. The method includes providing a water hose positioned within the body and connected to the spray head at a fitting. The fitting
25 has a spherical portion positioned within the spray head. The method includes providing a seal assembly positioned within the spray head and positioned at least partially around the spherical portion of the fitting. The method includes automatically increasing a sealing force around the fitting using the sealing assembly when the spray head dispenses water. The method includes automatically decreasing
30 a sealing force around the fitting using the sealing assembly when the spray head does not dispense water.

A variety of additional aspects will be set forth in the description that follows. The aspects can relate to individual features and to combinations of features. It is to be understood that both the foregoing general description and the

following detailed description are exemplary and explanatory only and are not restrictive of the broad inventive concepts upon which the embodiments disclosed herein are based.

Brief Description of the Drawings

5 The following drawings are illustrative of particular embodiments of the present disclosure and therefore do not limit the scope of the present disclosure. The drawings are not to scale and are intended for use in conjunction with the explanations in the following detailed description. Embodiments of the present disclosure will hereinafter be described in conjunction with the appended drawings,
10 wherein like numerals denote like elements.

FIG. 1 illustrates a perspective view of a faucet with a spray head in an aligned position, according to one embodiment of the present disclosure.

FIG. 2 illustrates a perspective view of the faucet of FIG. 1 with the spray head in an extended, misaligned position, excluding a water hose.

15 FIG. 3 illustrates a perspective schematic view of the faucet of FIG. 1 with the spray head in an extended, misaligned position.

FIG. 4 illustrates a perspective schematic view of the faucet of FIG. 1 with the spray head in an extended, misaligned position.

20 FIG. 5 illustrates a perspective schematic view of the faucet of FIG. 1 with the spray head in the aligned position.

FIG. 6 illustrates a side cross-sectional view of the faucet of FIG. 1 with the spray head in the aligned position.

FIG. 7 illustrates a side cross-sectional view of a faucet body and a first alignment element of the faucet of FIG. 1.

25 FIG. 8 illustrates a perspective view of a spray head and a second alignment element of the faucet of FIG. 1.

FIG. 9 illustrates a perspective partially exploded view of the spray head and the second alignment element of the faucet of FIG. 1.

30 FIG. 10 illustrates a perspective partially exploded view of an alignment coupling including the first and second alignment elements, according to one example of the present disclosure.

FIG. 11 illustrates a perspective view of the alignment coupling of FIG. 10 in the fully engaged position.

FIG. 12 illustrates a perspective view of the first alignment element of FIG. 10.

FIG. 13 illustrates another perspective view of the first alignment element of FIG. 10.

5 FIG. 14 illustrates a side cross-sectional view of the first alignment element of FIG. 10.

FIG. 15 illustrates a perspective view of the second alignment element of FIG. 10.

FIG. 16 illustrates a side view of the second alignment element of FIG. 10.

10 FIG. 17 illustrates a side cross-sectional view of the second alignment element of FIG. 10.

FIG. 18 illustrates a perspective view of a second alignment element, according to one example of the present disclosure.

FIG. 19 illustrates a schematic representation of the interfacing of alignment 15 features of the alignment coupling of FIG. 10.

FIG. 20 illustrates another schematic representation of the interfacing of alignment features of the alignment coupling of FIG. 10.

FIG. 21 illustrates another schematic representation of the interfacing of alignment features of the alignment coupling of FIG. 10 in the fully engaged 20 position that corresponds with the aligned position of the spray head.

FIG. 22 illustrates a perspective exploded view of the spray head of the faucet of FIG. 1.

FIG. 23 illustrates a perspective view of the second alignment element of the alignment coupling of FIG. 10 attached to a water hose.

25 FIG. 24 illustrates a side cross-sectional view of the second alignment element of the alignment coupling of FIG. 10 attached to the water hose.

FIG. 25 illustrates a perspective view of a first alignment element, according to one example of the present disclosure.

FIG. 26 illustrates a front view of the first alignment element of FIG. 25.

30 FIG. 27 illustrates a perspective side cross-sectional view of the first alignment element of FIG. 25.

FIG. 28 illustrates a perspective view of a second alignment element, according to one example of the present disclosure.

FIG. 29 illustrates a front view of the second alignment element of FIG. 29.

FIG. 30 illustrates a perspective view of a second alignment element, a water hose fitting, and a valve component, according to one example of the present disclosure.

FIG. 31 illustrates a perspective view of the valve component separated from the second alignment element and the water hose fitting of FIG. 30.

FIG. 32 illustrates another perspective view of the valve component of FIG. 31.

FIG. 33 illustrates an exploded view of the second alignment element, the water hose fitting, and the valve component of FIG. 30.

FIG. 34 illustrates a side view of the second alignment element and the water hose fitting of FIG. 30.

FIG. 35 illustrates a cross-sectional side view of the second alignment element along line 35-35 of FIG. 34.

FIG. 36 illustrates a perspective view of a portion of a seal assembly, according to one example of the present disclosure.

FIG. 37 illustrates another perspective view of the portion of the seal assembly of FIG. 36.

FIG. 38 illustrates an exploded view of the portion of the seal assembly of FIG. 36.

FIG. 39 illustrates a schematic perspective view of a seal assembly, according to one example of the present disclosure.

Detailed Description

Various embodiments will be described in detail with reference to the drawings, wherein like reference numerals represent like parts and assemblies throughout the several views. Reference to various embodiments does not limit the scope of the claims attached hereto. Additionally, any examples set forth in this specification are not intended to be limiting and merely set forth some of the many possible embodiments for the appended claims.

The present disclosure relates to a faucet that includes an alignment coupling. The alignment coupling ensures that a spray head of the faucet reliably returns to the same orientation position when the spray head is retracted to a mated position with the faucet body. The alignment coupling further facilitates reliable complete docking of the spray head within the faucet body. The alignment coupling

includes alignment elements in the faucet body and adjacent the spray head that interface with one another to provide alignment movement. In some examples, at least one of the alignment elements is positioned at least partially around a water hose of the faucet. In another example, the alignment elements include alignment features that include a corresponding projection and a groove (e.g., a v-shaped groove) so that when the groove receives the projection, the projection slides into the narrowest portion of the groove, thereby aligning the spray head with the faucet body. By facilitating reliable alignment and retraction of the spray head, the alignment coupling preserves the aesthetic of the faucet when not in use and further optimizes positioning for particular uses.

FIG. 1 shows a faucet 100 including a faucet body 102 and a faucet spray head 104 that is detachable from a faucet body outlet 106 of the faucet body 102. As shown in FIG. 1, the spray head 104 is docked with the faucet body 102. The spray head 104 is movable away from the faucet body 102 so as to allow the user the ability to manipulate the spray head 104 during use. This is facilitated by a water hose (shown schematically in FIG. 6) having excess length attached to the spray head 104 and positioned within the faucet body 102.

The faucet 100 is configured to dispense water from a water source out of a spray head outlet 112 of the spray head 104. Further, the faucet 100 is configured to be controlled (i.e., on/off, water volume, and water temperature) via traditional methods (e.g., a handle), and/or via gesture or voice. Although the faucet 100 can be a pull-down kitchen faucet, this disclosure encompasses other types of faucets, including but not limited to, pull-out faucets. Although this disclosure will be discussed with regard to a kitchen faucet for purposes of example, the system described herein could be implemented in any type of pull-down faucet and/or a pull-out faucet, including a side auxiliary spray faucet. In some examples, the faucet 100 is a showerhead in a shower. In some examples, the faucet 100 is any fluid dispensing device that is configured to dispense fluid therefrom.

The faucet body 102 can have a variety of different shapes and sizes to provide a variety of different appearances having differing aesthetics. As shown, the faucet body 102 includes an arcuate neck 108 between the outlet 106 and the opposing end of the faucet body 102. The faucet body 102 can be mounted in a variety of different locations, such as, but not limited to, a countertop, a wall, a

ceiling, etc. In some examples, the faucet body 102 is fixed to a location, such as near a kitchen sink.

As noted above, the spray head 104 is detachable so that it can be undocked from the faucet body 102 to allow for maneuverability by the user to aim the spray head 104. The spray head 104 can include a user input 110 positioned thereon to allow the user to toggle characteristics of the water expelled at the spray head outlet 112. In some examples, the operation of the user input 110 can facilitate the toggling of a valve (see FIG. 22) positioned within the spray head 104. The user input 110 can toggle characteristics of the expelled water, such as, but not limited to, volume and/or temperature. In some examples, the user input 110 is one of a button, touch sensitive surface, or the like.

An outer profile 103 of the spray head 104 can have a variety of different shapes and sizes to provide a variety of different aesthetic configurations of the faucet 100. In some examples, the spray head 104 can be configured to have an outer profile 103 that cooperates with an outer profile 105 of the faucet body 102. In some examples, the spray head 104 is generally asymmetrical. In other examples, the spray head 104 is generally symmetrical.

In the depicted example of FIG. 1, the spray head 104 has an aligned position when docked with the faucet body 102. The aligned position is a position that the spray head 104 returns to automatically every time it is docked with the faucet body 102. The aligned position can be a variety of different positions depending on the aesthetics of the faucet 100, as well as the particular use of the faucet 100. In the depicted example, the spray head 104 has an asymmetrical outer profile and has an aligned position that aligns the outer profile of the faucet body 102, specifically the neck 108, with the outer profile of the spray head 104. This allows for a consistent outer profile of the faucet 100, including the faucet body 102 and the spray head 104. Further, as shown, when in the aligned position, the user input 110 is positioned facing the faucet body 102, so as to maintain a clean aesthetic from the front of the faucet 100. In some examples, when in the aligned position, the user input 110 is positioned facing the left, right, or away from the faucet body 102.

In some examples, the spray head 104 can include weights (not shown) to alter the center of the gravity of the spray head 104 in a way to urge the spray head 104 to the aligned position. In some examples, the weight can be positioned at a particular side of the spray head 104 so that the weight, by way of gravity, naturally

rotates the spray head 104 in a way where the weight becomes positioned at an underside of the spray head 104 when in the aligned positioned. This can be accomplished by placing the weight adjacent the spray head outlet 112 and offset of the longitudinal axis of the spray head 104.

5 FIGS. 2-5 show the movement of the spray head 104 to the aligned positioned during docking. Such alignment is facilitated by an alignment coupling 114, which includes a first alignment element 116 and a second alignment element 118. At least one of the first alignment element 116 and the second alignment element 118 is movable with respect to the other. In the depicted example, the
10 second alignment element 118 is movable with respect to the first alignment element 116.

 The first and second alignment elements 116, 118 can be positioned at a variety of different locations on the faucet 100. In the illustrative example shown, the first alignment element 116 is positioned within the faucet body 102 and the
15 second alignment element 118 is positioned adjacent the spray head 104. In some examples, the second alignment element 118 is attached to the spray head 104. In other examples, the second alignment element 118 is positioned around a water hose (not shown) of the faucet 100. In other examples, the second alignment element 118 is attached to a water hose of the faucet 100. In some examples, the first and second
20 alignment elements 116, 118 are integrally formed in the faucet body 102 and spray head 104. In some examples, the first and second alignment elements 116, 118 are separate parts from the faucet body 102 and spray head 104.

 FIG. 2 shows the spray head 104 detached from the faucet body 102. While typically a water hose (not shown) would be connected to the spray head 104 and
25 routed within the outlet 106 of the faucet body 102, the water hose has been omitted for illustration purposes. The outlet 106 allows access to a pathway 122 disposed at least partially within the faucet body 102 so that the water hose can be routed to a water source.

 FIG. 3 shows the spray head 104 partially docked with the outlet 106 of the
30 faucet body 102. For illustration purposes, a cross-sectional isometric view of the faucet body 102 is shown. The spray head 104 is shown rotated along its longitudinal axis in a direction where the user input 110 is facing to a side of the faucet 100. In this particular example, such a position is considered a misaligned position of the spray head 104. The spray head 104 can include a plurality of

misaligned positions. In some examples, every position that the spray head 104 has when in contact with the faucet body 102, where the spray head 104 is not in the aligned position, is considered a misaligned position.

As shown, the first and second alignment elements 116, 118 are shown
5 interfacing with one another to begin an alignment motion caused by the configuration of the alignment coupling 114. As the spray head 104 is drawn closer to the outlet 106, by, for example, a pullback device (e.g., a weight, spring, reel, etc.), the spray head 104 is rotated automatically via the alignment coupling 114 toward the aligned position. As shown in FIG. 4, the spray head 104 is further
10 rotated closer to the aligned position thanks to the interfacing of the first and second alignment elements 116, 118 of the alignment coupling 114. FIG. 5 shows the spray head 104 positioned in the aligned position and fully docked with the faucet body 102.

FIG. 6 shows a cross-sectional view of the faucet 100 with the spray head
15 104 in the aligned position. FIG. 6 also shows a water hose 124 attached to the spray head 104 and positioned within the pathway 122 of the faucet body 102. The water hose 124 can be attached to the spray head in a variety of ways, including being attached to the second alignment element 118. As shown, the first alignment element 116 of the alignment coupling 114 includes a tongue 126 that interfaces with the
20 hose 124 and elevates the hose 124 from a lower interior surface 120 of the pathway 122. In some examples, the tongue 126 is configured to control an angle θ of entry of the water hose 124 into the pathway 122 with respect to horizontal H. Depending on the orientation and configuration of the faucet 100, the angle θ can be altered. In some examples, the angle θ is between about 30 degrees and 60 degrees with respect
25 to horizontal H. In some examples, the angle θ is 45 degrees with respect to horizontal H.

The water hose 124 can be any of a variety of different types including, but not limited to, a nylon-braided hose, a metal braided hose, a flexible hose, a coated hose, etc.

30 FIG. 7 shows a side view of the first alignment element 116 positioned in the outlet 106 of the faucet body 102. In some examples, the first alignment element 116 is positioned within a portion of the neck 108 of the faucet. In some examples, the first alignment element 116 is fixed within the outlet 106 of the faucet body 102. In some examples, the first alignment element 116 is fixed to the faucet body 102 by

way of a fastener, such as, but not limited to, at least one screw, bolt, adhesive, and/or the like. As noted above, the first alignment element 116 can be integral with the faucet body 102. In other examples, the first alignment element 116 is fixed to the faucet body 102 by way of a press fit. In other examples still, the first alignment
5 element 116 is fixed to the faucet body 102 by way of brazing, welding, or the like.

In some examples, the first alignment element 116 includes a faucet body alignment portion 128, a projection 132, and a ring 131. In some examples, the faucet body alignment portion 128 facilitates proper alignment of the first alignment element 116 within the outlet 106 of the faucet body 102. The faucet body alignment
10 portion 128 can assist in the proper assembly of the faucet 100, so that the first alignment element 116 is more easily correctly orientated at the outlet 106 to facilitate the desired alignment of the spray head 104 once the faucet 100 is assembled. In some examples, the faucet body alignment portion 128 is one of a projection and a recess. The faucet body alignment portion 128 is engageable with a
15 corresponding projection or recess 130 of the faucet body 102.

As shown, the first alignment element 116 also includes an alignment feature that includes the projection 132 positioned at a top side 121 of the pathway 122 and extending from the top side of the ring 131 of the first alignment element 116. As will be described in more detail herein, the projection 132 is configured to interface
20 with the second alignment element 118 to move the spray head 104 into the aligned positioned during docking. In some examples, the projection 132 is at a side of the first alignment element 116 opposite the tongue 126.

In the depicted example, the first alignment element 116 also includes the ring 131 positioned at the outlet 106 of the faucet body 102. In some examples, the
25 ring 131 is positioned within the faucet body 102 to encircle the pathway 122. In some examples, the projection 132 extends radially directly inward from the ring 131 and the tongue 126 extends axially therefrom. In some examples, the ring 131 also includes the faucet body alignment portion 128.

FIG. 8 shows the second alignment element 118 mounted to the spray head
30 104. FIG. 9 shows the second alignment element 118 spaced away from an interval cavity 134 of the spray head 104. In some examples, the second alignment element 118 is fixed to the spray head 104 to prevent relative movement therebetween. In some examples, the second alignment element 118 is mounted adjacent to the spray head 104. In some examples, the second alignment element 118 is positioned around

the end of the water hose 124, as shown in FIG. 6. In some examples, the second alignment element 118 is mounted to the hose 124.

The second alignment element 118 includes an alignment feature that includes groove 136 positioned at the periphery of the second alignment element 118. As will be discussed in further detail herein, the groove 136 is configured to interface with the projection 132 of the first alignment element 116 so as to move the spray head 104 toward the aligned position during docking. The second alignment element 118 also includes centering elements 138 positioned circumferentially around the exterior surface thereof. The centering elements 138 are configured to interface with the outlet 106 of the faucet body 102 to aid in centering the spray head 104 during docking. In some examples, the centering elements 138 are configured to interface with a portion of the first alignment element 116. In some examples, the centering elements 138 are fins, with the narrowest side of the fin being configured to interface with the faucet body 102/first alignment element 116 first.

FIG. 10 shows a perspective view of the alignment coupling 114 when the first and second alignment elements 116, 118 are positioned in a fully engaged position. FIG. 11 shows the alignment coupling 114 partially exploded, and the first and second alignment elements 116, 118 are shown spaced apart from one another. As shown, the second alignment element 118 has a generally cylindrical outer profile shape and the first alignment element 116 has a complementary shape, such as a circular recess (e.g., the ring 131) for the outer profile of the second alignment element 118 to be received within. In some examples, the relationship can be reversed and the first alignment element 116 can have a cylindrical shape while the second alignment element 118 has a complementary shape. It is considered within the scope of the present disclosure that the first or second alignment elements 116, 118 can have a variety of different geometric profiles and are not limited to a cylindrical shape and corresponding complementary shape.

In some examples, the fully engaged position of the first and second alignment elements 116, 118 corresponds with the aligned position of the spray head 104. In some examples, when in the fully engaged position, a longitudinal axis S of the second alignment element 118 and a central axis B of the ring 131 of the first alignment element 116 are generally aligned. In the depicted example, the projection 132 of the first alignment element 116 is received and positioned within the groove

136 of the second alignment element 118 when the alignment coupling 114 is in the fully engaged position. As shown, the second alignment element 118 is configured to be positioned within at least a portion of the first alignment element 116. In some examples, when in the fully engaged position, the second alignment element 118 is positioned within the ring 131 of the first alignment element 116.

FIGS. 12 and 13 show perspective views of the first alignment element 116. FIG. 14 shows a side cross-sectional view. As shown, the first alignment element 116 includes the ring 131, where the projection 132 extends radially inward therefrom. The first alignment element 116 also includes the tongue 126 that extends generally in an axial direction away from the ring 131. Further still, the first alignment element 116 includes the faucet body alignment portion 128 at a lower side of the ring 131. In the example shown, the faucet body alignment portion 128 is a projection.

In some examples, the ring 131 is only a partial ring and is configured to only partially surround the pathway 122 of the outlet 106 of the faucet body 102. Further, the projection 132 can extend radially inward from the ring 131 at any point on the ring 131. For example, the projection 132 can extend inward from either side or from the bottom of the ring 131, not just from the top, as shown. Further still, the ring 131 can include a plurality of other alignment features disposed thereon such as, but not limited to, additional projections and/or grooves.

As shown in FIG. 14, the tongue 126 can include a wall 140 that at least partially defines a ramped portion 142. As noted above, the tongue 126, specifically the wall 140, extends in a general axial direction away from the ring 131. While in the example shown, the first alignment element 116 includes the tongue 126, the first alignment element does not have to include a tongue 126. In some examples, the first alignment element 116 only includes an alignment feature, such as the projection 132.

The first alignment element 116 can be constructed of a variety of different materials including, but not limited to, metal (e.g., aluminum) and plastic (e.g., Rulon, Derlin, or other like PTFE plastics).

FIGS. 15-17 show the second alignment element 118. FIG 15 shows a perspective view, FIG. 16 shows a side view, and FIG. 17 shows a side cross-sectional view.

The second alignment element 118 includes a first end 144 and a second end 146. The first end 144 is configured to be inserted into the faucet body 102 before the second end 146. In some examples, the first end 144 is configured to receive the water hose 124 at an opening 147. In some examples, the second end 146 is
5 configured to be attached to a portion of the spray head 104.

In some examples, the second alignment element 118 includes a pair of grooves 136 positioned at opposite sides of the second alignment element 118. In some examples, only a single groove 136 is utilized for alignment. Each groove 136 includes a pair of walls 148 that together define the boundaries of the groove 136. In
10 some examples, the groove 136 has a tapered shape defined by the walls 148 that extend toward one another from the first end 144 in a direction toward the second end 146. In some examples, the tapered shape of the groove 136 is v-shaped. In some examples, the walls 148 extend toward one another in a generally axial direction from the first end 144. In some examples, the walls 148 extend toward one
15 another in a direction that is partially in the axial direction and partially in the circumferential direction. The groove 136 is configured in a way so that immediately adjacent the first end 144, the walls 148 are separated at a distance to define the widest portion of the groove 136. As the walls 148 extend toward the second end 146, the walls 148 progressively narrow the groove 136 until they intersect with one
20 another. Adjacent the point of intersection of the walls 148, the groove 136 has its narrowest width and defines a pocket 150.

FIG. 17 shows a cross sectional view of the second alignment element 118. As shown, the second alignment element 118 defines a passageway 152 that extends longitudinally through the second alignment element 118. The opening 147 at the
25 first end 144 is a first opening of the passageway 152 and an opening 154 at the second end 146 is the second opening of the passageway 152. The passageway is configured to receive the water hose 124 within the opening 147 at the first end 144. The passageway is further configured to be connected at the opening 154 of the second end 146 to the spray head 104. In some examples, the passageway 152 can
30 include threads, a recess, a series of projections, and/or other like attachment structures to aid in attaching the water hose 124 and the spray head 104 thereto. In the depicted examples, the passageway 152 includes internal threads 156 for attaching the water hose 124 and a series of recesses 158 at the opening 154 adjacent the second end 146 to receive corresponding projections of an attachment portion of

the spray head 104. In some examples, the recesses 158 allow for a bayonet connection between the spray head 104 and the second alignment element 118. FIG.18 shows another example of a second alignment element 218 that utilizes internal threads 258 at a second end 246 to attach to the spray head 104.

5 Like the first alignment element 116, the second alignment element 118 can be constructed of a variety of different materials including, but not limited to, metal (e.g., aluminum) and plastic (e.g., Rulon, Derlin, or other like PTFE plastics).

FIGS. 19-21 show a series of schematic illustrations of an example interfacing of the first and second alignment elements 116, 118 of the alignment coupling 114 during the docking of a spray head 104. The projection 132 of the first alignment element 116 is shown. The groove 136 of the second alignment element 118 is shown approaching the projection 132, indicated by the dashed arrow. The example shown is representative of the spray head 104 being re-docked to the fixed faucet body 102 having the projection 132.

15 As shown in FIG. 20, as the walls 148 of the groove 136 interface with the projection 132, due to the tapered nature of the groove 136, the walls 148 slide along the fixed projection 132 in a direction that brings the pocket 150 closer to the projection 132. Because the second alignment element 118, and therefore the groove 136, is fixed to the spray head 104, as the walls 148 slide on the projection 132, the spray head 104 is rotated and moved closer to the aligned position. In some examples, the second alignment element 118 can be fixed to the water hose 124 and the water hose 124 is fixed to the spray head 104. Therefore, upon rotation of the water hose 124 by the second alignment element 118, the water hose 124 rotates the spray head 104.

25 As shown in FIG. 21, once the walls 148 have slid along the projection 132 to where the projection 132 becomes positioned within the pocket 150, the spray head 104 is in the aligned position and docked, and thus the alignment coupling 114 is in the fully engaged position. Such move is done automatically due to the shape of the groove 136 and/or the projection 132.

30 As noted above, the relationship of the groove 136 and the projection 132 can be reversed so that the projection 132 is positioned on the second alignment element 118 and the groove 136 is positioned on the first alignment element 116. In such an example, the projection 132 of the spray head 104 would move within the groove 136 as the spray head 104 is being docked and automatically position itself

in the pocket 150 of the groove thanks to the tapered, V-shape configuration. When in the pocket 150, the spray head 104 would be positioned in the aligned position.

FIG. 22 shows a perspective exploded view of the spray head 104. As shown, the spray head 104 includes an outer housing 160 and a valve 162 positioned within the outer housing 160. In some examples, the valve 162 is configured to alter the characteristic of the water as it is expelled from the spray head outlet 112. The user input 110 is configured to control the operation of the valve 162. As shown, the valve 162 includes an attachment portion 166 that includes a plurality of projections 168. The attachment portion 166 is configured to be connected to the second end 146 of the second alignment element 118. The projections 168 are configured to be received in the recesses 158 of the second alignment element 118 to allow for a bayonet attachment between the spray head 104 and the second alignment element 118.

FIGS. 23 and 24 depict the water hose 124 connected to the first end 144 of the second alignment element 118. As shown, the second alignment element 118 is positioned around a portion the water hose 124. As shown in FIG. 24, the water hose 124 includes a fitting 170 that is connected within the passageway 152 of the second alignment element 118. In some examples, the fitting 170 is mated with the threads 156 of the second alignment element 118.

FIGS. 25-27 show a first alignment element 316 according to another embodiment of the present disclosure. FIGS. 28-29 show a second alignment element 318 configured to interface with the first alignment element 316 to form an alignment coupling. The first and second alignment elements 316, 318 are configured to have functional properties that are substantially similar to the first and second alignment elements 116, 118 outlined above. The first and second alignment elements 316, 318 are also constructed out of similar material as the first and second alignment elements 116, 118, as described above.

The first alignment element 316 is configured to be positioned within the faucet body 102. The first alignment element 316 includes a pair of ramps 348 that surround a passageway 319. The passageway 319 is configured to receive the water hose 124. The ramps 348 are configured to aid in positioning a projection 332 of the second alignment element 318. The ramps 348 are configured to extend away from an opening 317 of the first alignment element 316 and intersect within one another at a pocket 350. Such a configuration allows the projection 332 of the second

alignment element 318 to interface with, and move along, the ramps 348, eventually being automatically positioned at the pocket 350. When the projection 332 is positioned within the pocket 350, the spray head 104 is in the aligned position.

As seen in FIGS. 28 and 29, the second alignment element 318 has a tapered
5 outer surface 321 to ease insertion into the opening 317 of the first alignment element 316. Like the second alignment element 118 described above, the second alignment element 318 is configured to be positioned around the water hose 124. In some examples, the second alignment element 318 is positioned adjacent the spray head 104. In some examples, the second alignment element 318 is connected to the
10 spray head 104.

The second alignment element 318 includes centering elements 338 that function in a similar way to the centering elements 138 described above and aid in positioning the spray head 104 with respect to the faucet body 102. As shown, the projection 332 extends in a radial direction from the outer surface 321. In some
15 examples, the projection 332 is pin-shaped.

FIG. 30 shows a second alignment element 418, according to another example of the present disclosure. The second alignment element 418 is configured to interface with a first alignment element similar to the first alignment element 116, described above. Accordingly, the second alignment element 418 is configured to
20 have functional properties that are substantially similar second alignment elements 118, 218, and 318 described above. The second alignment element 418 is constructed out of similar material as the first and second alignment elements 116, 118, as described above.

Like the second alignment elements 118, 218, 318 described above, the
25 second alignment element 418 is configured to be positioned around the water hose 124, specifically connected to a water hose fitting 419. In some examples, the second alignment element 418 is positioned adjacent the spray head 104. In some examples, the second alignment element 418 is connected to the spray head 104.

With continued reference to FIG. 30, the second alignment element 418
30 connected to both the water hose fitting 419 at a first end 460, and a valve component 470 at a second end 462. FIGS. 31 and 32 show the valve component 470 separated from the second alignment element 418.

In some examples, the valve component 470 is a portion of a valve, similar to valve 162, positioned within the spray head 104. In some examples, the valve

component 470 passes water from the second alignment element 418 and out of the spray head 104. In some examples, the valve of which the valve component 470 is a part of, is configured to alter the characteristic of the water as it is expelled from the spray head outlet 112. In some examples, the valve of which the valve component
5 470 is a part of, is configured to not alter the characteristic of the water as it is expelled from the spray head outlet 112.

The second alignment element 418 is connected to the valve component 470 at the second end 462. In some examples, the second end 462 is connected over the valve component 470. In some examples, the second end 462 is connected within the
10 valve component 470. In some examples, the second alignment element 418 is threaded onto the valve component 470. In other examples, the valve component includes a projection, similar to the projections 168 described above, to allow for a bayonet-type connection between the second alignment element 418 and the valve component 470. In the depicted example, the second end 462 is threaded onto the
15 valve component 470 and includes at least one second alignment stop element 472 that is configured to mate with a spray head stop 474 positioned adjacent an attachment portion 466 of the valve component 470.

In the depicted example, the second end 462 of the second alignment element 418 includes more than one second alignment stop element 472. In some examples,
20 the second alignment stop 472 can be one of a projection and a recess. In some examples, the spray head stop 474 can be the other of the projection and recess from the second alignment stop 472 of the second alignment element 418.

When mated together, the stops 472, 474 prevent incorrect assembly of the second alignment element 418 and the valve component 470. As such, the stops 472,
25 474 ensure consistent assembly of the second alignment element 418 and the valve component 470 because the second alignment element stop 472 bottoms out the rotation in a first direction F1 of the second alignment element 418 with respect to the valve component 470. In some examples, the second alignment stop 472 and the spray head stop 474 rotationally align the second alignment element 418 and the
30 valve component 470. In some examples, the valve component 470 is connected to the spray head 104 in a way to prevent relative rotation between the valve component 470 and the outer housing 160 of the spray head 104. Because of this, if the second alignment element 418 is aligned properly with the valve component 470 when the second alignment element 418 interacts with a first alignment element

(e.g., first alignment element 116), the second alignment element 418 consistently properly aligns the spray head 104 with the faucet body 104.

In some examples, the second alignment stop 472 and the spray head stop 474 prevent over-tightening the second alignment element 418 with the valve component 470.

FIG. 33 shows an exploded view of the water hose fitting 419, the second alignment element 418, and the valve component 470. As shown, the second alignment element 418 includes a seal assembly 475 positioned therein. The seal assembly 475 includes a holder 476, a collar 477, a first seal 478, a second seal 479, a seal holder 480, a spring 481, and a spring cage 482.

The seal assembly 475 is configured to aid in sealing a spherical portion 417 of the water hose fitting 419 within the second alignment element 418. The water hose fitting 419 is allowed to move with respect to the second alignment element 418. Specifically, the spherical portion 417 of the water hose fitting 419 is configured to form a ball joint-like connection with the second alignment element 418.

In one example, when the second alignment element 418 is connected to the spray head 104, the ball joint-like connection with the second alignment element 418 facilitates easy swiveling of the spray head 104 with respect to the water hose 124. In the depicted example, as water pressure increases within the spray head 104, the seal assembly 475 increases the seal force on the water hose fitting 419. As water pressure decreases, the seal assembly 475 decreases the seal force on the water hose fitting 419. It is considered within the scope of the present disclosure that, with the use of devices inside of the spray head 104 (e.g., valves, restrictors, etc.), water pressure within the spray head 104 can be manipulated. In the depicted example, the seal force on the water hose fitting 419 increases when water is dispensed from the spray head 104 and decreases when water is not dispensed from the spray head 104. However, in some examples, the seal force on the water hose fitting 419 decreases when water is dispensed from the spray head 104 and increases when water is not dispensed from the spray head 104.

FIG. 34 shows a side view of the second alignment element 418 and the water hose fitting 419 mated together. FIG. 35 shows a cross-sectional view of the second alignment element 418 and water hose fitting 419 along line 35-35 in FIG. 34.

The spherical portion 417 of the water hose fitting 419 is positioned within the first end of the second alignment element 418 so that a fitting inner passage 415 of water hose fitting 419 communicates with an inner passage 483 of the second alignment element 418.

5 The holder 476 is configured to be positioned within a main inner cavity 486 of the second alignment element 418. In some examples, the holder 476 can be threaded into the main inner cavity 486. The holder 476 is configured to aid in axially positioning the first seal 478, the second seal 479, the seal holder 480, the spring 481, and the spring cage 482 within the main inner cavity 486. In some
10 examples, the holder 476 includes an interior seal chamber 491 that has a first end 492 and a second end 493. The spring 481 is positioned within the interior seal chamber 491 between first and second ends 492, 493 of the interior seal chamber 491. In some examples, the spring 481 is positioned between the first end 492 of the interior seal chamber 491 and the first seal 478. The second seal 479 and the seal
15 holder 480 are positioned adjacent the second end 493 of the interior seal chamber 491 within the main inner cavity 486.

 The collar 477 of the seal assembly 475 surrounds a first end 484 of the spherical portion 417 of the water hose fitting 419. In some examples, the collar 477 has a tapered aperture 485 to facilitate the insertion of the spherical portion 417
20 therethrough. In some examples, the collar 477 can be a rubber seal. In some examples, the collar 477 can act as a bushing between the second alignment element 418 and the water hose fitting 419.

 The first seal 478 is positioned around the spherical portion 417 of the water hose fitting 419, immediately adjacent the seal holder 480 and the collar 477. In
25 some examples, the first seal 478 is positioned within the main inner cavity 486 of the second alignment element 418. In some examples, the main inner cavity 486 houses the holder 476, the first seal 478, the second seal 479, the seal holder 480, the spring 481, and the spring cage 482. In some examples, the main inner cavity 486 has a consistent diameter along its length to facilitate the installation of the seal
30 assembly 475 within the second alignment element 418. In some examples, the first seal 478 is a rubber seal.

 The second seal 479 is positioned around a second end 487 of the spherical portion 417 of the water hose fitting 419. Specifically, the second seal 479 defines an aperture 490 that is sized and shaped to receive the second end 487 of the

spherical portion 417. The second seal 479 is positioned immediately adjacent the seal holder 480 and the spring cage 482. The second seal 479 is rotationally captured by the seal holder 480 and is configured to be compressed by a force received at a first axial side 488, opposite a second axial side 489 that faces the seal holder 480.

5 As the force received at the first axial side 488 fluctuates, the second seal 479 moves axially along a longitudinal axis X of the seal assembly 475. In some examples, the second seal 479 does not contact the main inner cavity 486 when there is no force received at the axial side 488. In some examples, the aperture 490 of the second seal 479 travels toward the first end 484 of the spherical portion 417 when a force is
10 received at the axial side 488, thereby forming a tighter seal around the spherical portion 417, due to the spherical configuration of the spherical portion 417 of the water hose fitting 419. In some examples, the second seal 479 is a rubber seal.

The seal holder 480 is configured to interlock and mate with the second seal 479 to prevent relative rotation between the seal holder 480 and the second seal 479.

15 In some examples, the seal holder 480 is of a different material than the second seal 479. In some examples, the seal holder 480 is a rigid material, such as plastic.

As noted above, the spring 481 is positioned within the interior seal chamber 491 of the holder 476. The spring 481 is positioned between the first end 492 of the seal chamber 491 and the second seal 479. In some examples, the spring 481 is also
20 positioned around a cage portion 494 of the spring cage 482 and in contact with a flange 495 of the spring cage 482. In some examples, the spring 481 is configured to exert a predetermined force at the first axial side 488 of the second seal 479. As depicted, the spring 481 is a compression spring. The spring 481 can be a variety of different types of springs, for example, a helical spring, a wave spring, a conical
25 spring, a disc spring, etc.

The spring cage 482 is configured to be movably positioned within the interior seal chamber 491. The spring cage 482 includes the cage portion 494 and the flange 495. In some examples, the seal assembly 475 does not include a spring cage 482. In some examples, the spring cage 482 is constructed of a rigid material.

30 The cage portion 494 is positioned inside the spring 481 and allows water to flow axially and radially through the cage portion 494 and freely within the seal chamber 491. In the depicted example, the cage portion 494 is cylindrical and includes a plurality of slots 497 to allow for radial water flow therethrough. In some examples, only axial flow through the cage portion is permitted. In some examples,

the cage portion 494 and the flange 495 are separate pieces. In some examples, the cage portion and flange 495 are monolithically formed.

The flange 495 is positioned between the spring 481 and the second seal 479. The flange 495 is generally circular and dispenses a force to the second seal 479 from the seal chamber 491. In some examples, the seal assembly 475 only includes the flange 495 and not the cage portion 494. In some examples, the flange 495 is a washer.

FIGS. 36 and 37 show perspective views of a portion of the seal assembly 475, and FIG. 38 shows an exploded view of a portion of the seal assembly 475. As shown, the second seal 479 and the seal holder 480 interlock with one another to prevent relative rotation therebetween. In the depicted example, the seal holder 480 includes a plurality of projections 498 that are received by a plurality of recesses 499 of the second seal 479. It is considered within the scope of the present disclosure that the seal holder 480 and second seal 479 can interlock with each other in a variety of ways.

FIG. 39 is a schematic depiction of the seal assembly 475. Water is indicated by arrows W. In some examples, the water pressure within the seal chamber 491 exerts a force on the spring cage 482, thus exerting a force on the second seal 479 via the flange 495. Pressurized water W within the seal chamber 491 exerts a force on the second seal 479, thereby axially moving the second seal 479 toward the first seal 478. The force exerted on the second seal 479 by the pressurized water W is in addition to the predetermined amount of force exerted by the spring 481 on the second seal 479. The movement of the second seal 479 toward the first seal 478 tightens the connection of the aperture 490 around the second end 487 of the spherical portion 417 of the water hose fitting 419, thus automatically increasing the seal around the water hose fitting 419. As water pressured within the seal chamber 491 decreases, the force exerted on the second seal 479 is reduced, thereby allowing the second seal 479 to move away from the first seal 478, thus loosening the connection of the aperture 490 around the second end 487 of the spherical portion 417 of the water hose fitting 419 and automatically decreasing the seal around the water hose fitting 419. In some examples, the lowest force exerted on the second seal 479 is the force exerted by the spring 481. This occurs when there is no force exerted by the pressurized water W within the seal chamber 491. In some examples, low flowing water may only exert a low amount of force within the seal chamber

491 due to the low water pressure associated with the low flowing water. The spring
481 ensures that a minimum force is always exerted on the second seal 479 so that a
minimum seal can be formed around the water hose fitting 419 even in low flowing
water conditions. In the depicted example, water W enters the seal chamber 491 via
5 the fitting inner passage 415. If the spray head 104 is dispensing water, the
pressurized water W travels into the seal chamber 491, increasing the seal around
the water hose fitting 491, through the seal assembly 475, and out of the spray head
104. If water is not being dispensed from the spray head 104, water W does not pass
through the seal assembly 475 and minimal water pressure exists within the seal
10 chamber 491.

Examples of the disclosure are reflected in the below-listing of examples, as
well as the claims included herein.

In Example 1, a faucet includes a faucet body including a first alignment
element located at an outlet within the faucet body; and a faucet spray head being
15 positionable at the outlet of the faucet body, the faucet spray head including a
second alignment element, the faucet spray head having an aligned position and a
plurality of misaligned positions with respect to the faucet body. The first and
second alignment elements form an alignment coupling, the alignment coupling
including a projection and a tapered groove, wherein at least one is movable with
20 respect to the other, and wherein, when the projection is positioned at a narrowest
portion of the tapered groove, the faucet spray head is in the aligned position.

In Example 2, the faucet of Example 1 is modified in that the projection is
25 configured to interface with walls of the tapered groove to align the faucet spray
head.

In Example 3, the faucet of Example 1 is modified in that the first alignment
element includes a ring and a tongue, the tongue extending in an axial direction from
the ring, wherein the ring includes the projection extending radially inward
30 therefrom within the outlet of the faucet body.

In Example 4, the faucet of Example 1 is modified in that the first alignment
element includes a tongue surface, wherein the tongue surface extends within the
faucet body from the outlet of the faucet body, and wherein the tongue surface is
raised above a lower surface of the faucet body.

In Example 5, the faucet of Example 1 is modified in that the second alignment element is generally cylindrical, and wherein the tapered groove has walls that extend toward one another in a generally axial direction on an outer surface of the second alignment element to form a v-shaped groove.

5 In Example 6, the faucet of Example 1 is modified in that the alignment coupling includes at least one centering element, wherein the at least one centering element is configured to center the faucet spray head within the outlet of the faucet body.

10 In Example 7, the faucet of Example 1 is modified in that the at least one centering element is a plurality of centering elements positioned at a periphery of the second alignment element.

In Example 8, the faucet of Example 1 is modified in that the faucet body includes an arcuate neck that includes the outlet, wherein an arcuate side profile is created when the faucet spray head is in the aligned position, and wherein the
15 arcuate side profile is interrupted when the faucet spray head is in the plurality of misaligned positions.

In Example 9, the faucet of Example 1 is modified in that the alignment coupling is coupled when the first and second alignment elements are in contact with each other, and wherein the alignment coupling is decoupled when the first and
20 second alignment element are not in contact with each other, wherein when decoupled, the faucet spray head is spaced away from the outlet of the faucet body.

In Example 10, the faucet of Example 1 is modified to further include a water hose connected to the faucet spray head, wherein the second alignment element is secured around the water hose, wherein the water hose includes a
25 pullback feature in communication therewith, and wherein the pullback feature pulls the faucet spray head toward the outlet of the faucet body.

In Example 11, the faucet of Example 10 is modified in that the pullback feature is a weight attached to the water hose.

30 In Example 12, the faucet of Example 1 is modified in that the alignment coupling is integral with the faucet body and faucet spray head.

In Example 13, the faucet of Example 1 is modified in that the alignment coupling is mounted to the faucet body and faucet spray head.

In Example 14, a faucet includes a faucet body; a faucet spray head movable with respect to the faucet body; a first alignment element mounted within the faucet

body, the first alignment element having a first alignment feature, the first alignment feature including one of a projection and a tapered groove; and a second alignment element mounted to the faucet spray head, the second alignment element having a second alignment feature, the second alignment feature including the other of the projection and tapered groove. The projection is configured to interface with walls of the tapered groove to align the faucet spray head.

In Example 15, the faucet of Example 14 is modified in that the first alignment element includes a ring and a tongue, the tongue extending in an axial direction from the ring, wherein the ring includes the projection extending radially inward therefrom.

In Example 16, the faucet of Example 14 is modified in that the first alignment element includes a tongue surface, wherein the tongue surface extends within the faucet body from the outlet of the faucet body, and wherein the tongue surface is raised above a lower surface of the faucet body.

In Example 17, the faucet of Example 14 is modified in that the second alignment element is generally cylindrical, and wherein the tapered groove has walls that extend toward one another in a generally axial direction on an outer surface of the second alignment element to form a v-shaped groove.

In Example 18, the faucet of Example 14 is modified in that the second alignment element includes a plurality of centering elements, wherein the plurality of centering elements is configured to center the faucet spray head within the outlet of the faucet body, and wherein the plurality of centering elements is positioned at a periphery of the second alignment element.

In Example 19, an alignment coupling for a faucet includes a first alignment element positionable within a faucet body, the first alignment element having a first alignment feature, the first alignment feature including one of a projection and a tapered groove; and a second alignment element being movable with respect to the first alignment element, the second alignment element having a second alignment feature, the second alignment feature including the other of the projection and tapered groove. The tapered groove includes walls that extend toward each other, and wherein the walls guide the projection to a narrowest portion of the tapered groove.

In Example 20, the alignment coupling of Example 19 is modified in that the first alignment element includes a ring and a tongue, the tongue extending in an

axial direction from the ring, wherein the ring includes the projection extending radially inward therefrom.

In Example 21, the alignment coupling of Example 20 is modified in that wherein the first alignment element includes a faucet body alignment portion being
5 at least one of a projection and a recess, wherein the faucet body alignment portion is engageable with a corresponding projection and recess of the faucet body to align the first alignment element within the faucet body.

In Example 22, the alignment coupling of Example 19 is modified in that the first alignment element is positionable at an outlet of the faucet body.

10 In Example 23, the alignment coupling of Example 19 is modified in that the second alignment element is generally cylindrical, and wherein the tapered groove has walls that extend toward one another in a generally axial direction on an outer surface of the second alignment element to form a v-shaped groove.

In Example 24, the alignment coupling of Example 19 is modified in that the
15 second alignment element is positionable adjacent the spray head.

In Example 25, the alignment coupling of Example 19 is modified in that the second alignment element is connected to the spray head.

In Example 26, the alignment coupling of Example 25 is modified in that the second alignment element is generally cylindrical and includes a first end and a
20 second end, the first end is configured to interface with the first alignment element and the second end is configured to be mated with a portion of the spray head, the second end has at least one alignment stop configured to mate with a spray head stop of the spray head to prevent rotation in a first direction between the spray head and the second alignment element, and the at least one alignment stop and the spray head
25 alignment stop include at least one projection.

In Example 27, the alignment coupling of Example 26 is modified in that when the at least one alignment stop and the spray head alignment stop are mated with one another, and when the projection of the first alignment feature is positioned within the narrowest portion of the tapered groove, the spray head and faucet body
30 are in an aligned position, wherein the faucet body includes an arcuate neck, and wherein an arcuate side profile is created when the spray head is in the aligned position with the faucet body.

In Example 28, the alignment coupling of Example 26 is modified in that the spray head includes a valve component having an attachment portion that is

configured to be connected to the second end of the second alignment element, wherein the spray head stop is positioned adjacent the attachment portion.

In Example 29, the alignment coupling of Example 28 is modified in that the attachment portion includes threads thereon configured to be received within the second end of the second alignment element to allow for a threaded attachment between the spray head and the second alignment element.

In Example 30, the alignment coupling of Example 26 is modified in that the spray head stop is disposed on a valve component of a valve of the spray head, wherein the valve is controlled via a user input positioned on the spray head.

In Example 31, a fluid dispensing device includes a body; a spray head movable with respect to the body; a water hose being positioned within the body and connected to the spray head at a fitting, the fitting have a spherical portion positioned within the spray head; and a seal assembly positioned within the spray head and positioned at least partially around the spherical portion of the fitting. The seal assembly includes a holder defining an interior seal chamber, the seal chamber having a first end and a second end; a first seal positioned around the spherical portion of the fitting a second seal having an opening positioned around the spherical portion of the fitting; a seal holder positioned between the first and second seals, the seal holder and second seal being interlocked to reduce relative rotation between the second seal and the seal holder; and a spring positioned within the interior seal chamber, wherein the spring is positioned between the first end of the seal chamber and the second seal.

In Example 32, the fluid dispensing device of Example 31 is modified in that the flow portion of the spring cage is cylindrical.

In Example 33, the fluid dispensing device of Example 31 is modified in that the flow portion of the spring cage is cylindrical.

In Example 34, the fluid dispensing device of Example 31 is modified in that the seal holder and the second seal interlock with a plurality of projections and recesses.

In Example 35, the fluid dispensing device of Example 31 is modified in that the holder, first seal, second seal, and seal holder are positioned within a main body recess of the spray head.

In Example 36, the fluid dispensing device of Example 31 is modified in that the first seal, second seal, and seal holder are not positioned within the interior seal chamber.

5 In Example 37, the fluid dispensing device of Example 31 is modified in that the second seal is compressible around the end portion of the spherical portion of the fitting.

In Example 38, the fluid dispensing device of Example 37 is modified in that the second seal is compressible at a side facing the interior seal chamber.

10 In Example 39, the fluid dispensing device of Example 37 is modified in that the second seal is compressible by water pressure.

In Example 40, a fluid dispensing device includes a body; a spray head movable with respect to the body; a water hose being positioned within the body and connected to the spray head at a fitting, the fitting have a spherical portion positioned within the spray head; and a seal assembly positioned within the spray
15 head and positioned at least partially around the spherical portion of the fitting, wherein the seal assembly automatically increases a sealing force around the fitting when the spray head dispenses water.

In Example 41, a fluid dispensing device of Example 40 is further modified in that the seal assembly includes: a holder defining an interior seal chamber, the
20 seal chamber having a first end and second end; a first seal positioned around the spherical portion of the fitting; a second seal having an opening positioned around the spherical portion of the fitting; a seal holder positioned between the first and second seals, the seal holder and second seal being interlocked to reduce relative rotation between the second seal and the seal holder; and a spring positioned within
25 the interior seal chamber, wherein the spring is positioned between the first end of the seal chamber and the second seal.

In Example 42, a method of operating a fluid dispensing device includes providing a body and a spray head movable with respect to the body; providing a water hose being positioned within the body and connected to the spray head at a
30 fitting, the fitting have a spherical portion positioned within the spray head; providing a seal assembly positioned within the spray head and positioned at least partially around the spherical portion of the fitting; automatically increasing a sealing force around the fitting using the seal assembly when the spray head

dispenses water; and automatically decreasing a sealing force around the fitting using the seal assembly when the spray head does not dispense water.

The various embodiments described above are provided by way of illustration only and should not be construed to limit the claims attached hereto.

- 5 Those skilled in the art will readily recognize various modifications and changes that may be made without following the example embodiments and applications illustrated and described herein, and without departing from the true spirit and scope of the following claims.

WHAT IS CLAIMED IS:

1. A faucet comprising:
a faucet body including a first alignment element located at an outlet within
5 the faucet body; and
a faucet spray head being positionable at the outlet of the faucet body, the
faucet spray head including a second alignment element, the faucet spray head
having an aligned position and a plurality of misaligned positions with respect to the
faucet body;
10 wherein the first and second alignment elements form an alignment coupling,
the alignment coupling including a projection and a tapered groove, wherein at least
one is movable with respect to the other, and wherein, when the projection is
positioned at a narrowest portion of the tapered groove, the faucet spray head is in
the aligned position.
15
2. The faucet of claim 1, wherein the projection is configured to interface with
walls of the tapered groove to align the faucet spray head.
3. The faucet of claim 1, wherein the first alignment element includes a ring
20 and a tongue, the tongue extending in an axial direction from the ring, wherein the
ring includes the projection extending radially inward therefrom within the outlet of
the faucet body.
4. The faucet of claim 1, wherein the first alignment element includes a tongue
25 surface, wherein the tongue surface extends within the faucet body from the outlet of
the faucet body, and wherein the tongue surface is raised above a lower surface of
the faucet body.
5. The faucet of claim 1, wherein the second alignment element is generally
30 cylindrical, and wherein the tapered groove has walls that extend toward one another
in a generally axial direction on an outer surface of the second alignment element to
form a v-shaped groove.

6. The faucet of claim 1, wherein the alignment coupling includes at least one centering element, wherein the at least one centering element is configured to center the faucet spray head within the outlet of the faucet body.

5

7. The faucet of claim 6, wherein the at least one centering element is a plurality of centering elements positioned at a periphery of the second alignment element.

10 8. The faucet of claim 1, wherein the faucet body includes an arcuate neck that includes the outlet, wherein an arcuate side profile is created when the faucet spray head is in the aligned position, and wherein the arcuate side profile is interrupted when the faucet spray head is in the plurality of misaligned positions.

15 9. The faucet of claim 1, wherein the alignment coupling is coupled when the first and second alignment elements are in contact with each other, and wherein the alignment coupling is decoupled when the first and second alignment elements are not in contact with each other, wherein when decoupled, the faucet spray head is spaced away from the outlet of the faucet body.

20

10. The faucet of claim 1, further comprising a water hose connected to the faucet spray head, wherein the second alignment element is secured around the water hose, wherein the water hose includes a pullback feature in communication therewith, and wherein the pullback feature pulls the faucet spray head toward the
25 outlet of the faucet body.

11. The faucet of claim 10, wherein the pullback feature is a weight attached to the water hose.

30 12. The faucet of claim 1, wherein the alignment coupling is integral with the faucet body and faucet spray head.

13. The faucet of claim 1, wherein the alignment coupling is mounted to the faucet body and faucet spray head.

14. A faucet comprising:
a faucet body;
a faucet spray head movable with respect to the faucet body;
5 a first alignment element mounted within the faucet body, the first alignment element having a first alignment feature, the first alignment feature including one of a projection and a tapered groove; and
a second alignment element mounted to the faucet spray head, the second alignment element having a second alignment feature, the second alignment feature
10 including the other of the projection and tapered groove; and
wherein the projection is configured to interface with walls of the tapered groove to align the faucet spray head.
15. The faucet of claim 14, wherein the first alignment element includes a ring
15 and a tongue, the tongue extending in an axial direction from the ring, wherein the ring includes the projection extending radially inward therefrom.
16. The faucet of claim 14, wherein the first alignment element includes a tongue
20 surface, wherein the tongue surface extends within the faucet body from the outlet of the faucet body, and wherein the tongue surface is raised above a lower surface of the faucet body.
17. The faucet of claim 14, wherein the second alignment element is generally
25 cylindrical, and wherein the tapered groove has walls that extend toward one another in a generally axial direction on an outer surface of the second alignment element to form a v-shaped groove.
18. The faucet of claim 14, wherein the second alignment element includes a
30 plurality of centering elements, wherein the plurality of centering elements is configured to center the faucet spray head within the outlet of the faucet body, and wherein the plurality of centering elements is positioned at a periphery of the second alignment element.
19. An alignment coupling for a faucet, the alignment coupling comprising:

a first alignment element positionable within a faucet body, the first alignment element having a first alignment feature, the first alignment feature including one of a projection and a tapered groove; and

- 5 a second alignment element being movable with respect to the first alignment element, the second alignment element having a second alignment feature, the second alignment feature including the other of the projection and tapered groove, wherein the tapered groove includes walls that extend toward each other, and wherein the walls guide the projection to a narrowest portion of the tapered groove.

- 10 20. The alignment coupling of claim 19, wherein the first alignment element includes a ring and a tongue, the tongue extending in an axial direction from the ring, wherein the ring includes the projection extending radially inward therefrom, and wherein the first alignment element includes a faucet body alignment portion
15 being at least one of a projection and a recess, wherein the faucet body alignment portion is engageable with a corresponding projection and recess of the faucet body to align the first alignment element within the faucet body.

- 20 21. The alignment coupling of claim 19, wherein the first alignment element is positionable at an outlet of the faucet body.

22. The alignment coupling of claim 19, wherein the second alignment element is generally cylindrical, and wherein the tapered groove has walls that extend toward one another in a generally axial direction on an outer surface of the second
25 alignment element to form a v-shaped groove.

23. The alignment coupling of claim 19, wherein the second alignment element is positionable adjacent the spray head.

- 30 24. The alignment coupling of claim 19, wherein the second alignment element is connected to the spray head.

25. The alignment coupling of claim 24, wherein the second alignment element is generally cylindrical and includes a first end and a second end, wherein the first

end is configured to interface with the first alignment element and the second end is configured to be mated with a portion of the spray head, the second end having at least one alignment stop configured to mate with a spray head stop of the spray head to prevent rotation in a first direction between the spray head and the second
5 alignment element, and wherein the at least one alignment stop and the spray head alignment stop include at least one projection.

26. The alignment coupling of claim 25, wherein, when the at least one alignment stop and the spray head alignment stop are mated with one another, and
10 when the projection of the first alignment feature is positioned within the narrowest portion of the tapered groove, the spray head and faucet body are in an aligned position, wherein the faucet body includes an arcuate neck, and wherein an arcuate side profile is created when the spray head is in the aligned position with the faucet body.

15

27. The alignment coupling of claim 25,
wherein the spray head includes a valve component having an attachment portion that is configured to be connected to the second end of the second alignment element, wherein the spray head stop is positioned adjacent the attachment portion,
20 and

wherein the attachment portion includes threads thereon configured to be received within the second end of the second alignment element to allow for a threaded attachment between the spray head and the second alignment element.

25 28. The alignment coupling of claim 25, wherein the spray head stop is disposed on a valve component of a valve of the spray head, wherein the valve is controlled via a user input positioned on the spray head.

30

FIG. 1

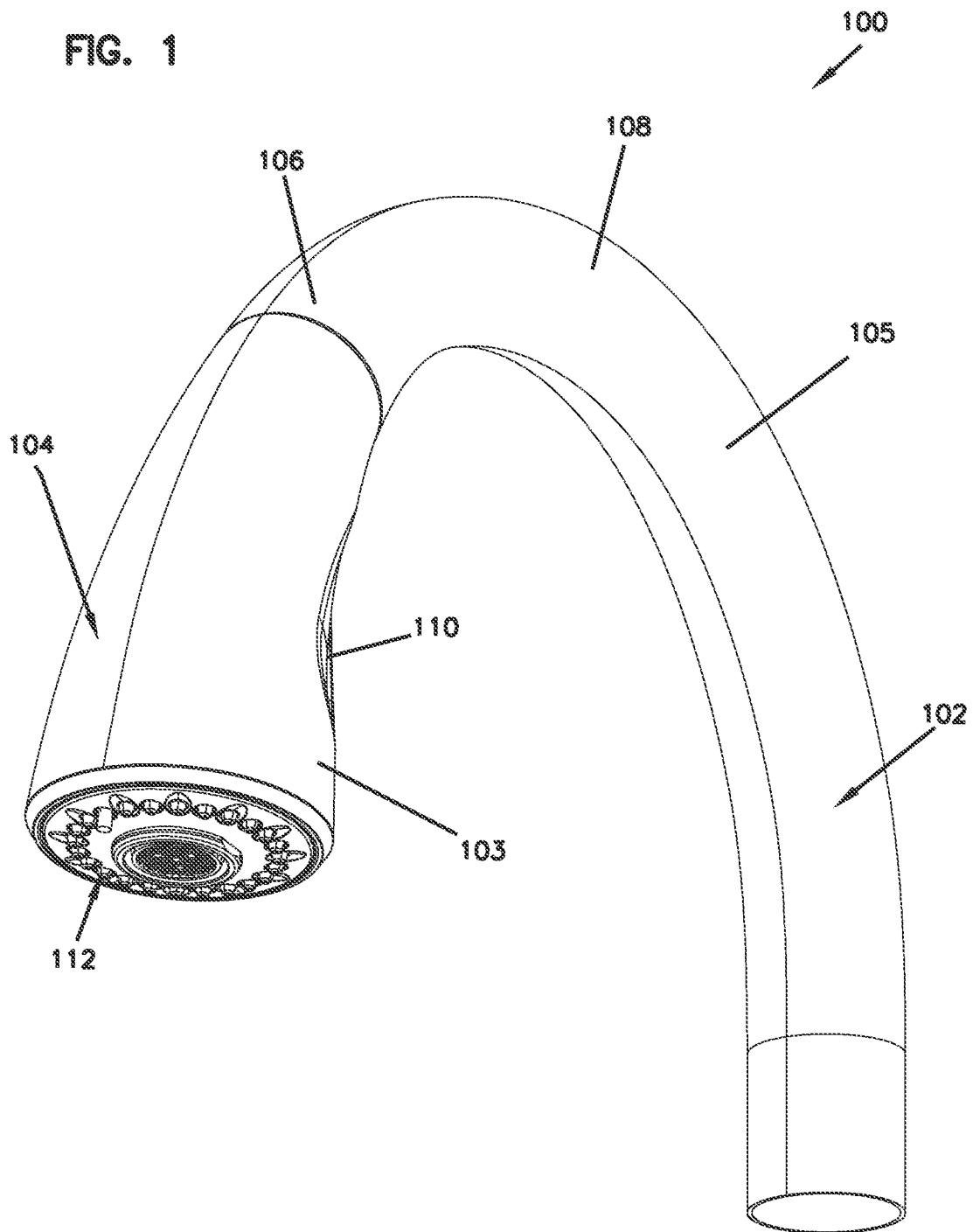
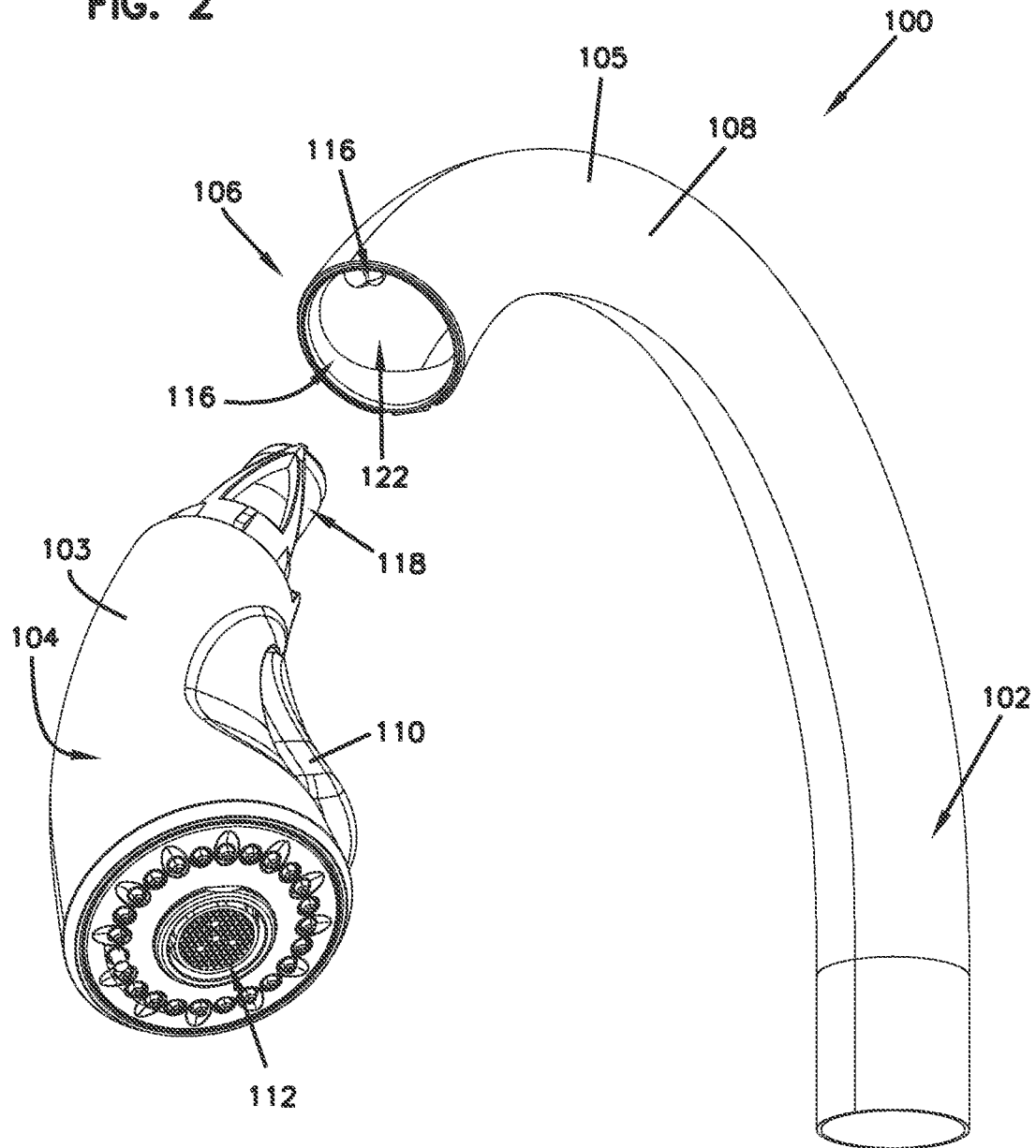


FIG. 2



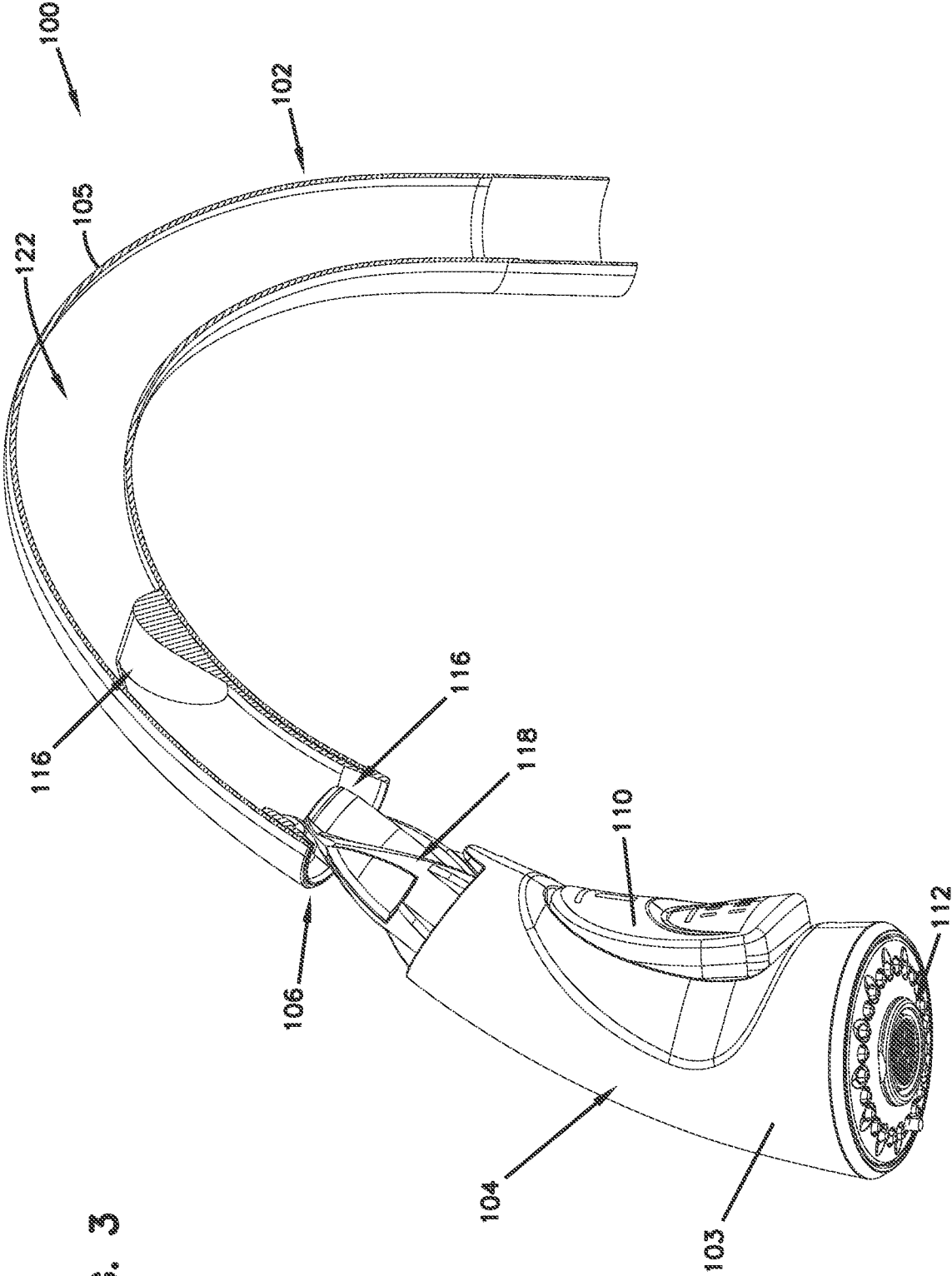


FIG. 3

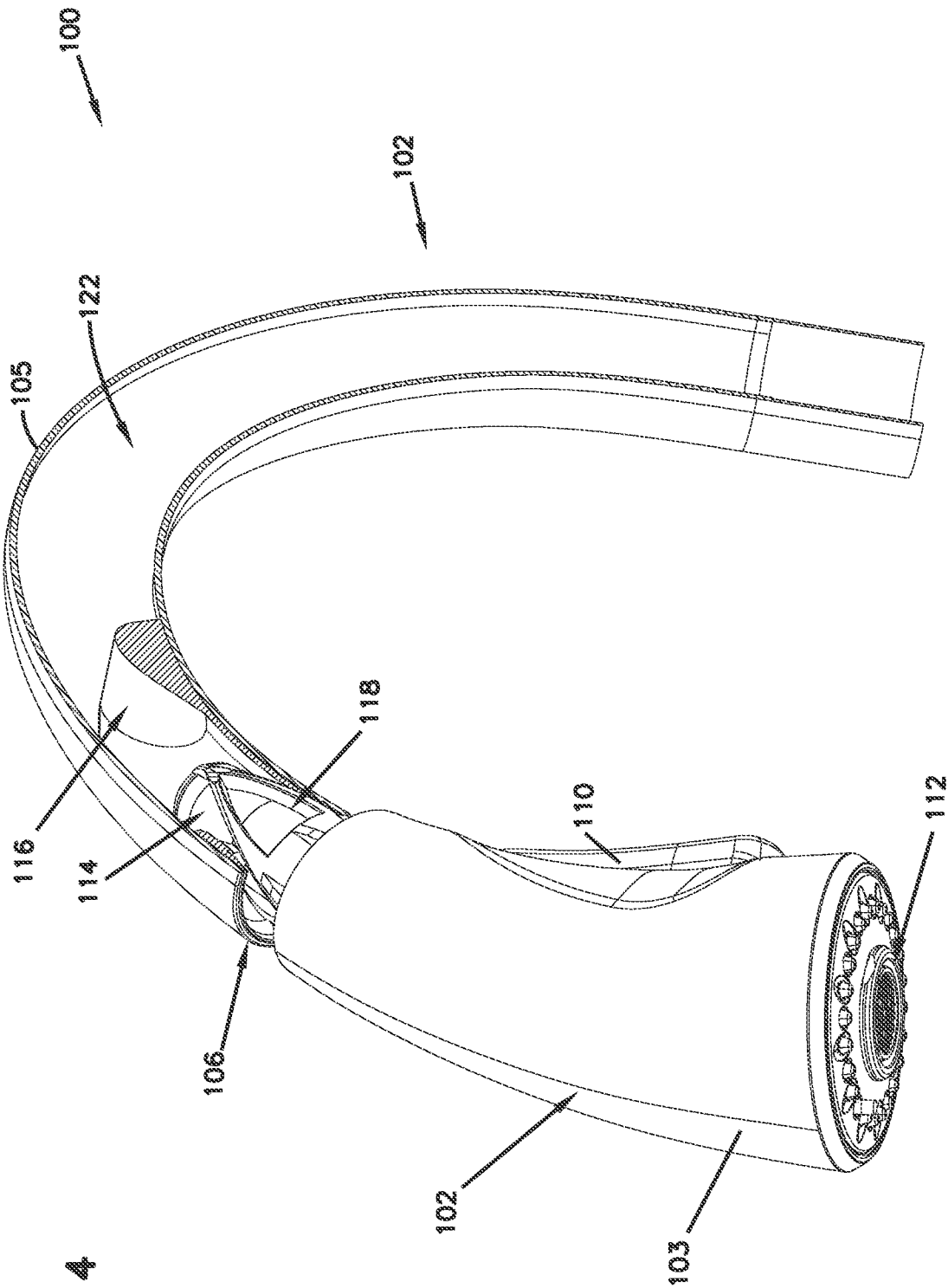
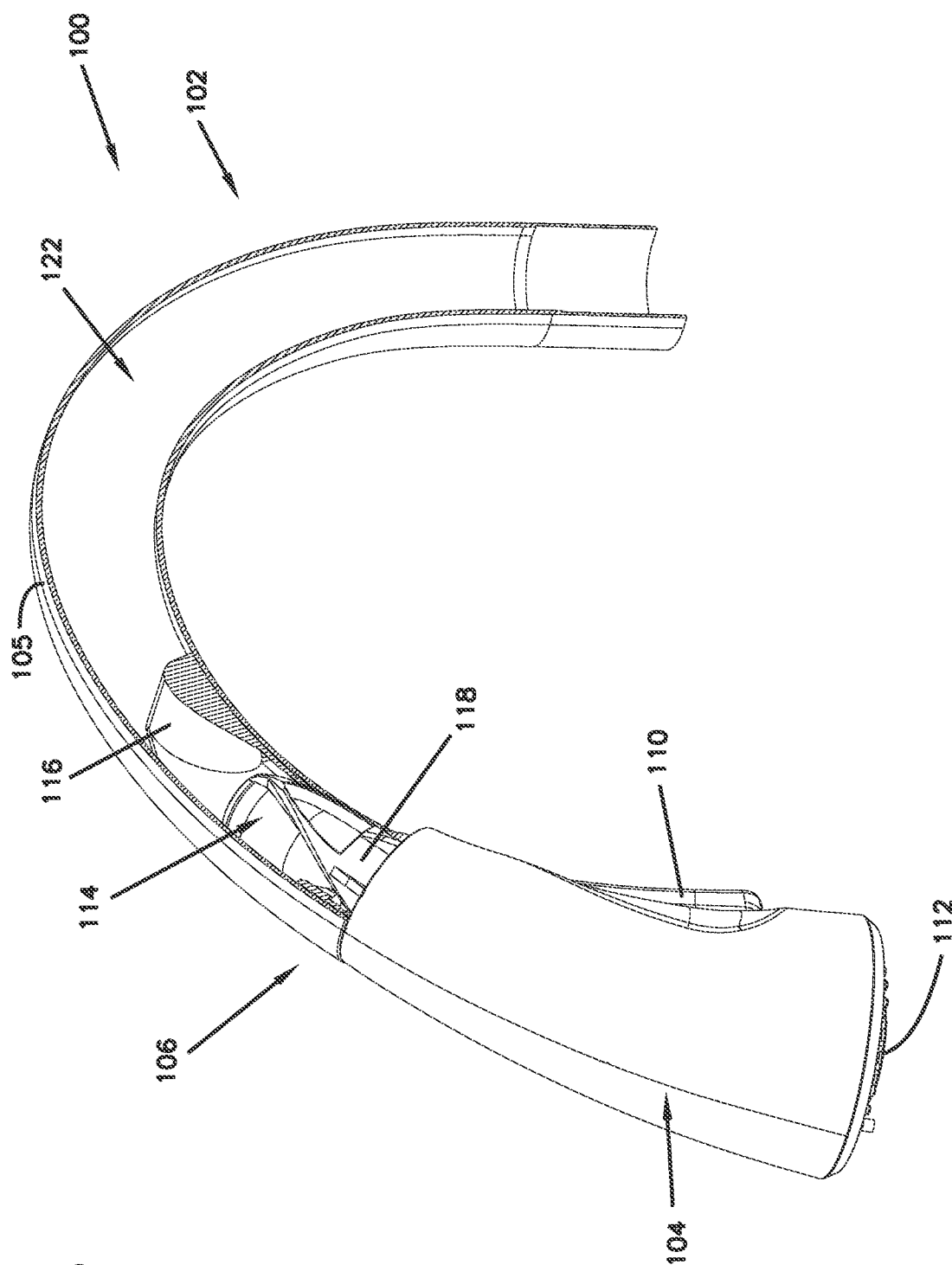
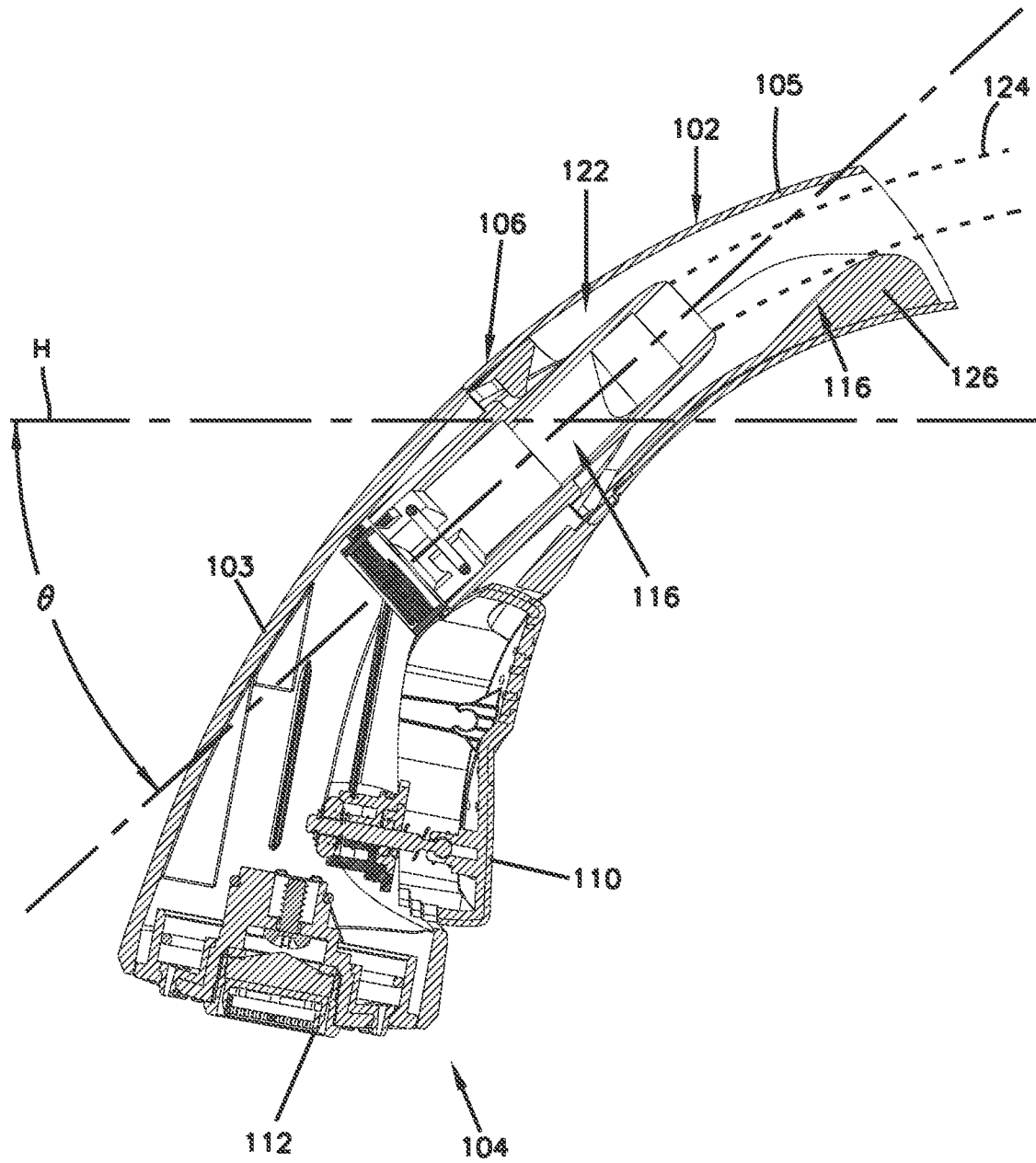


FIG. 4



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FIG. 6



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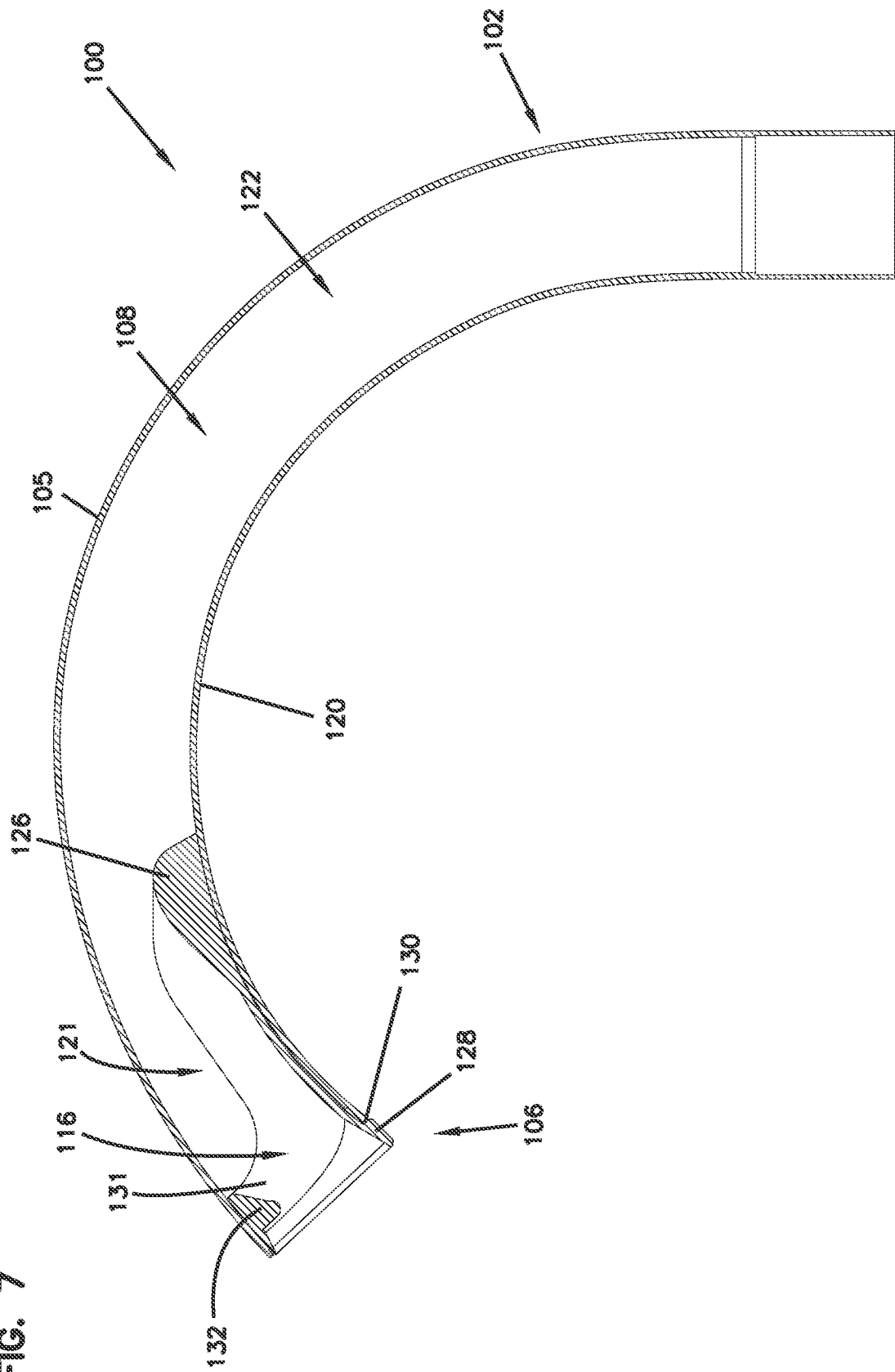


FIG. 8

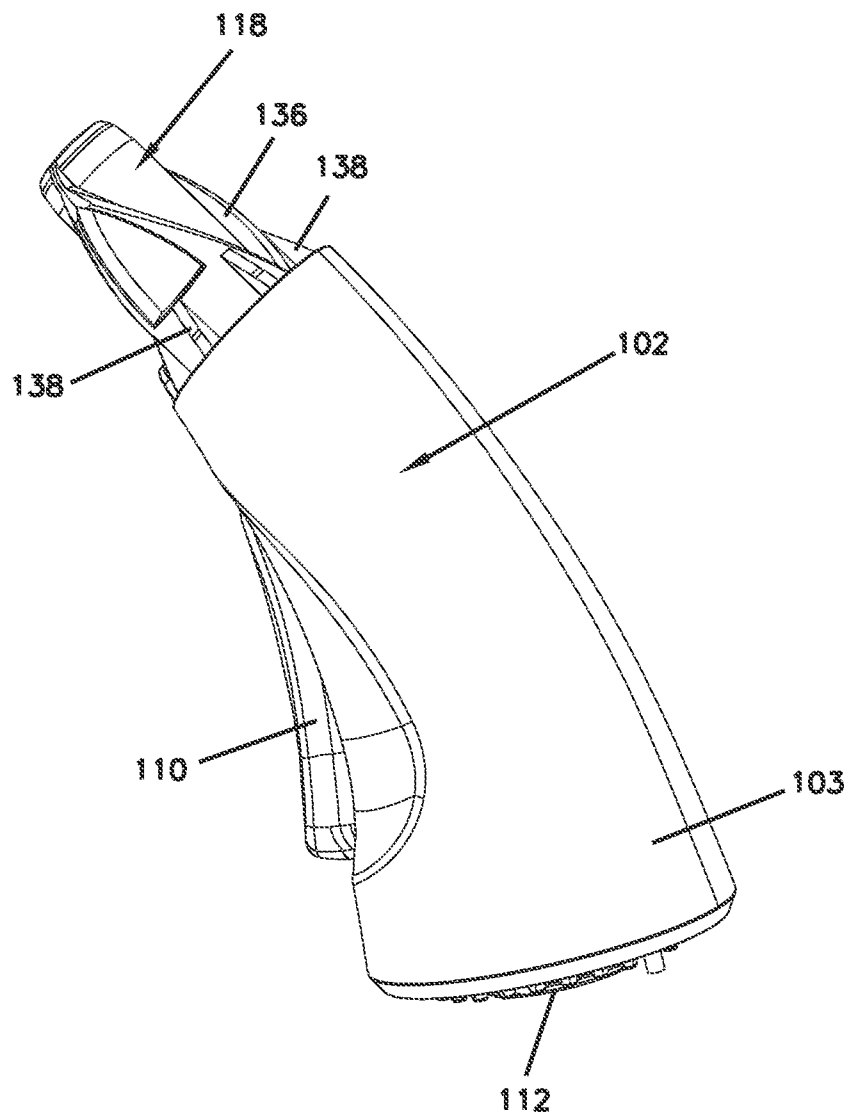


FIG. 9

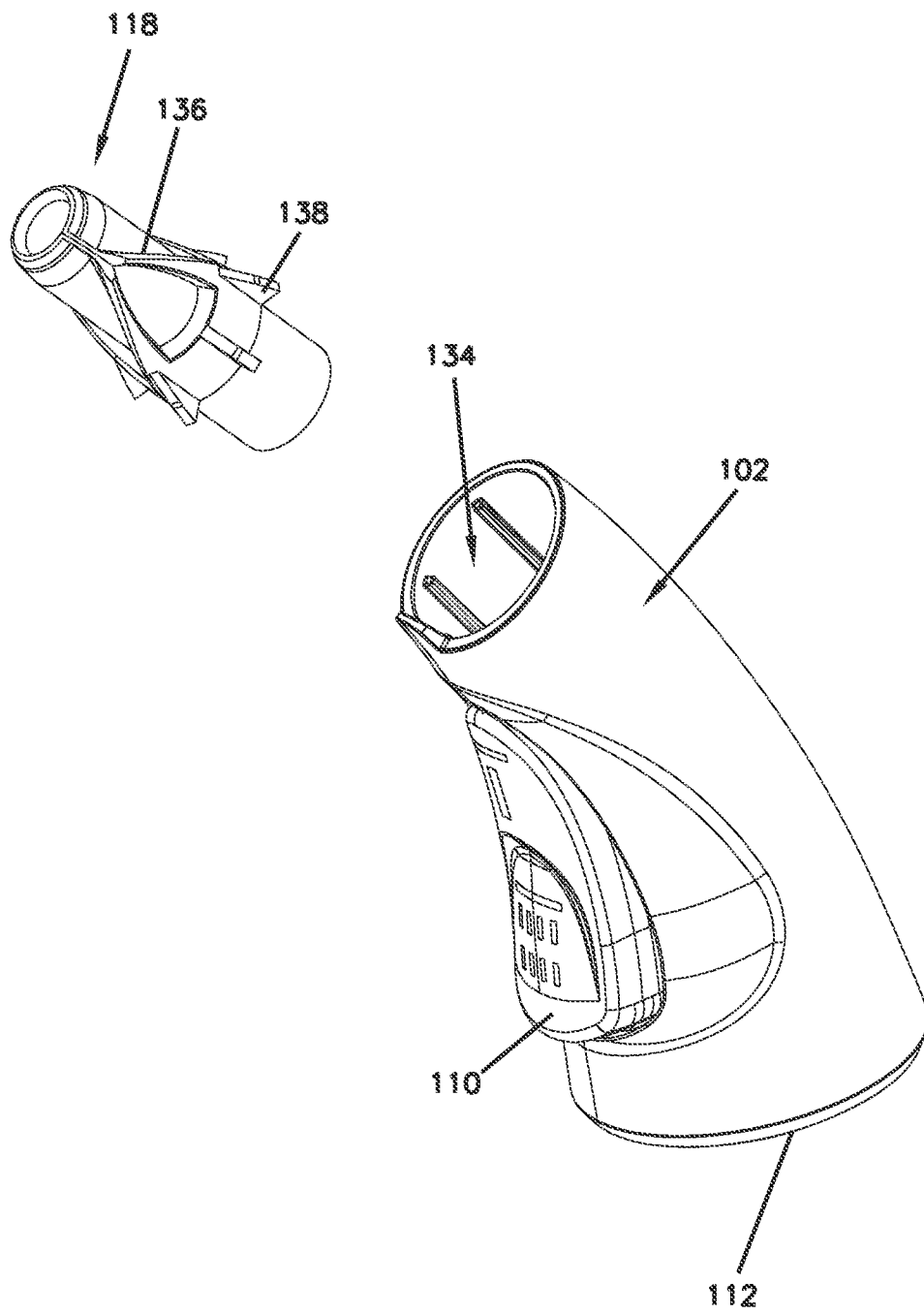


FIG. 10

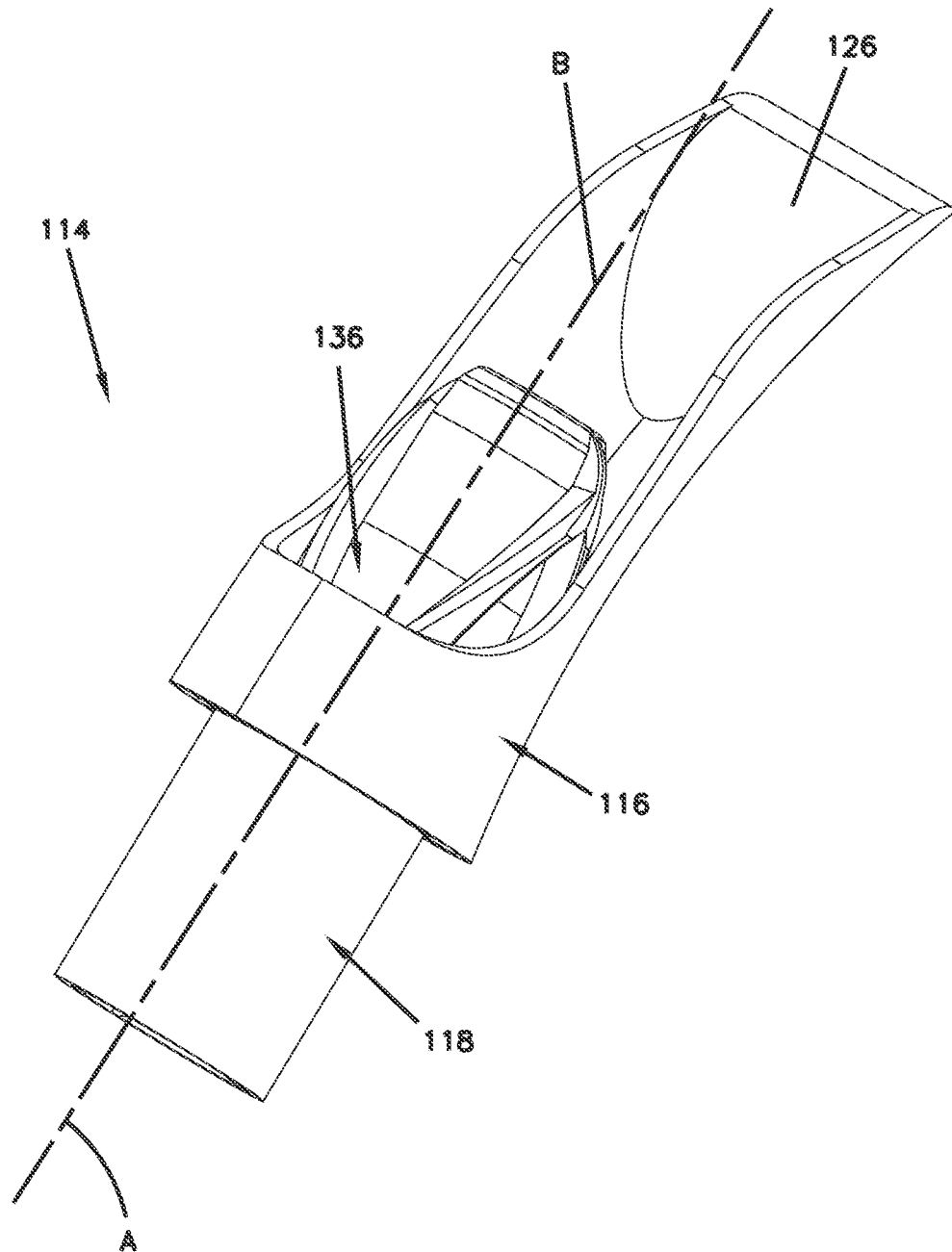


FIG. 11

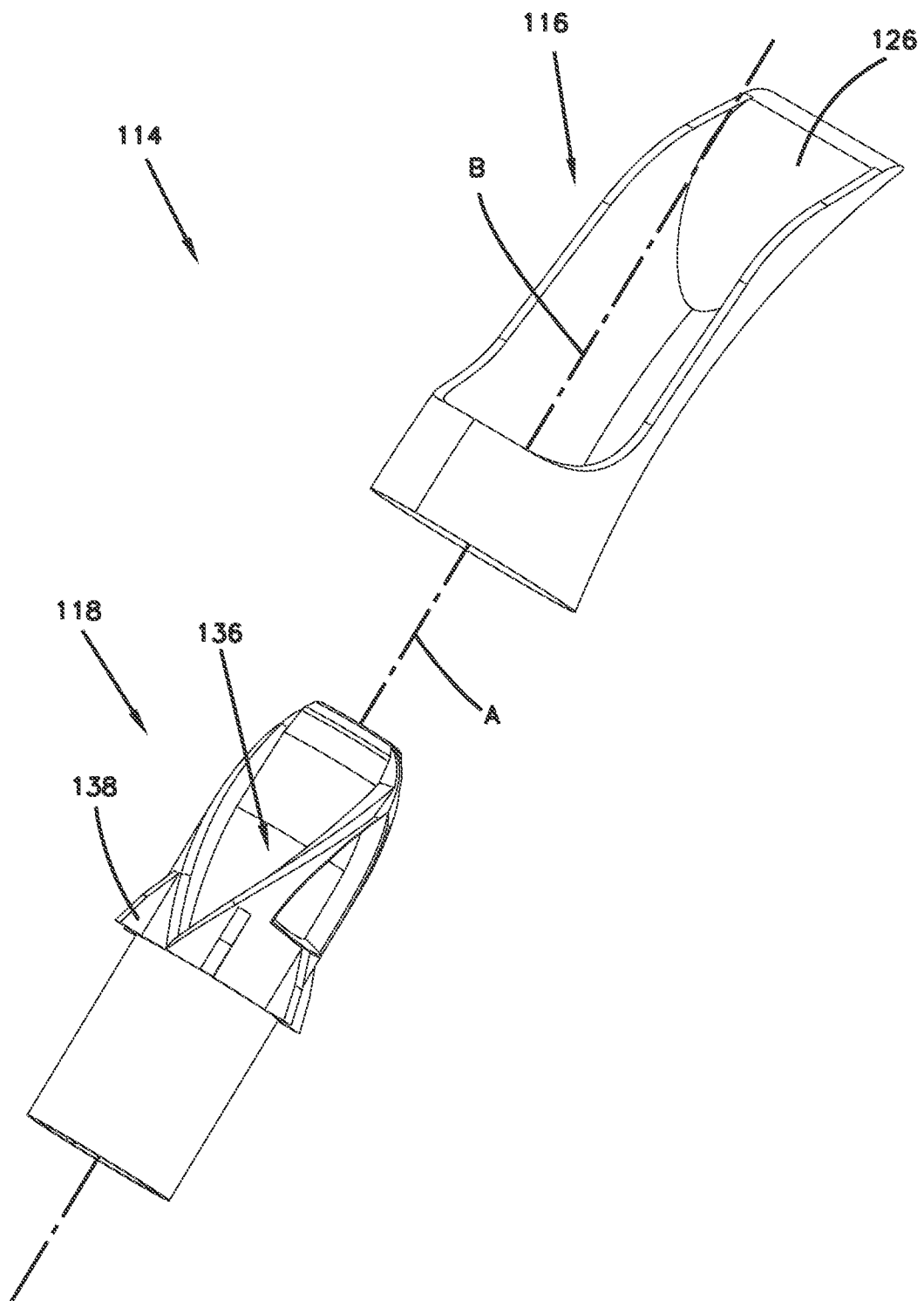


FIG. 12

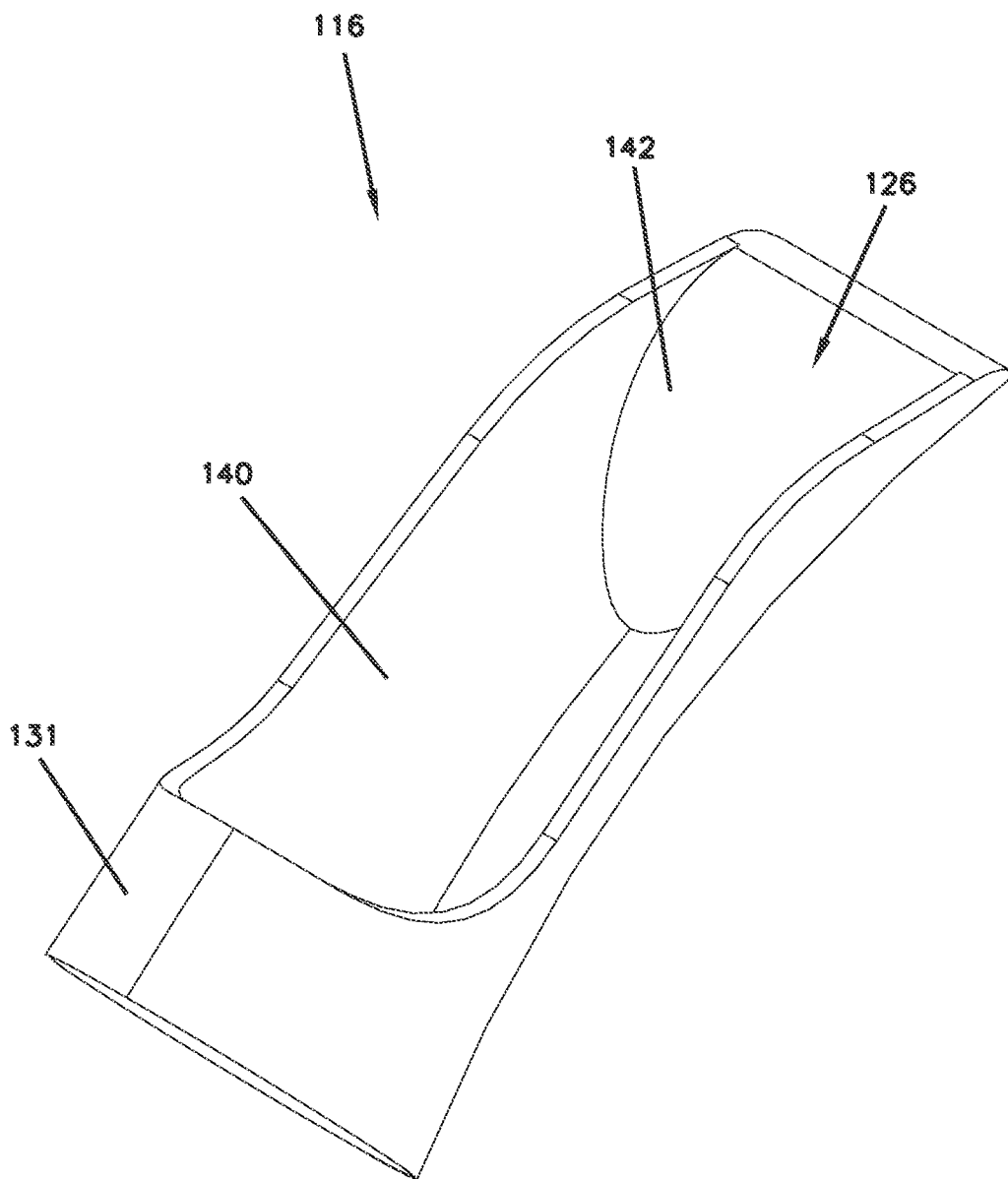


FIG. 13

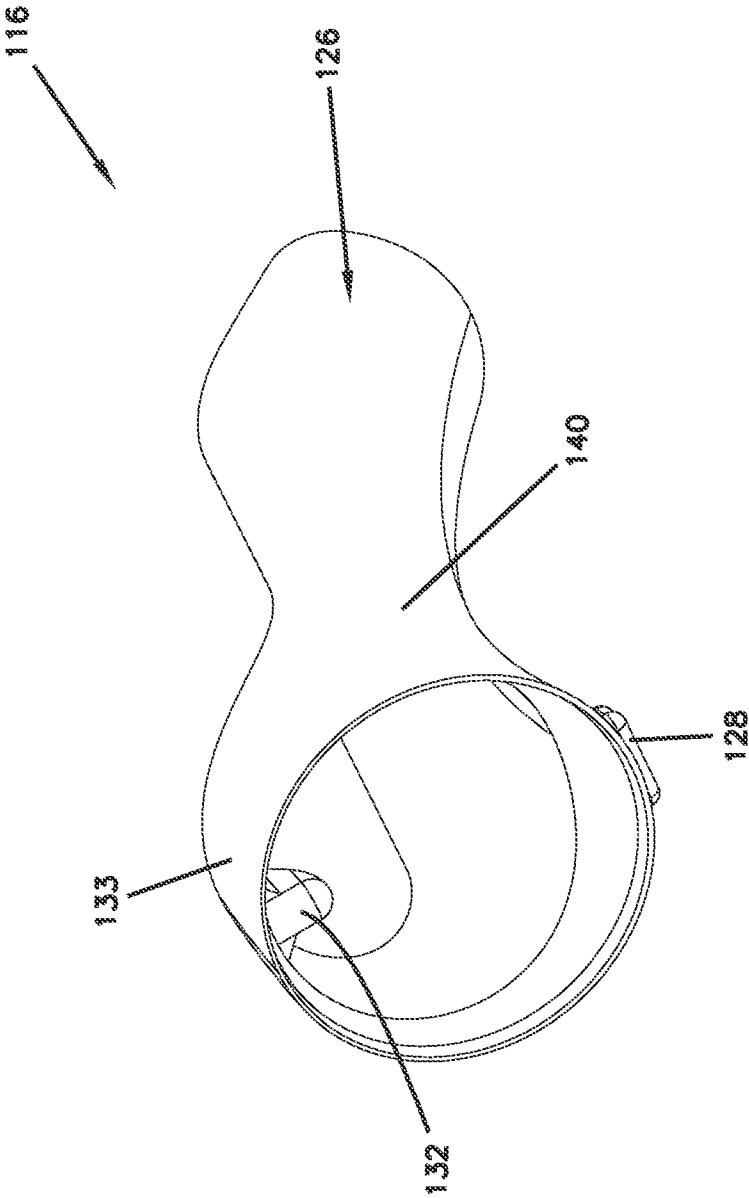


FIG. 14

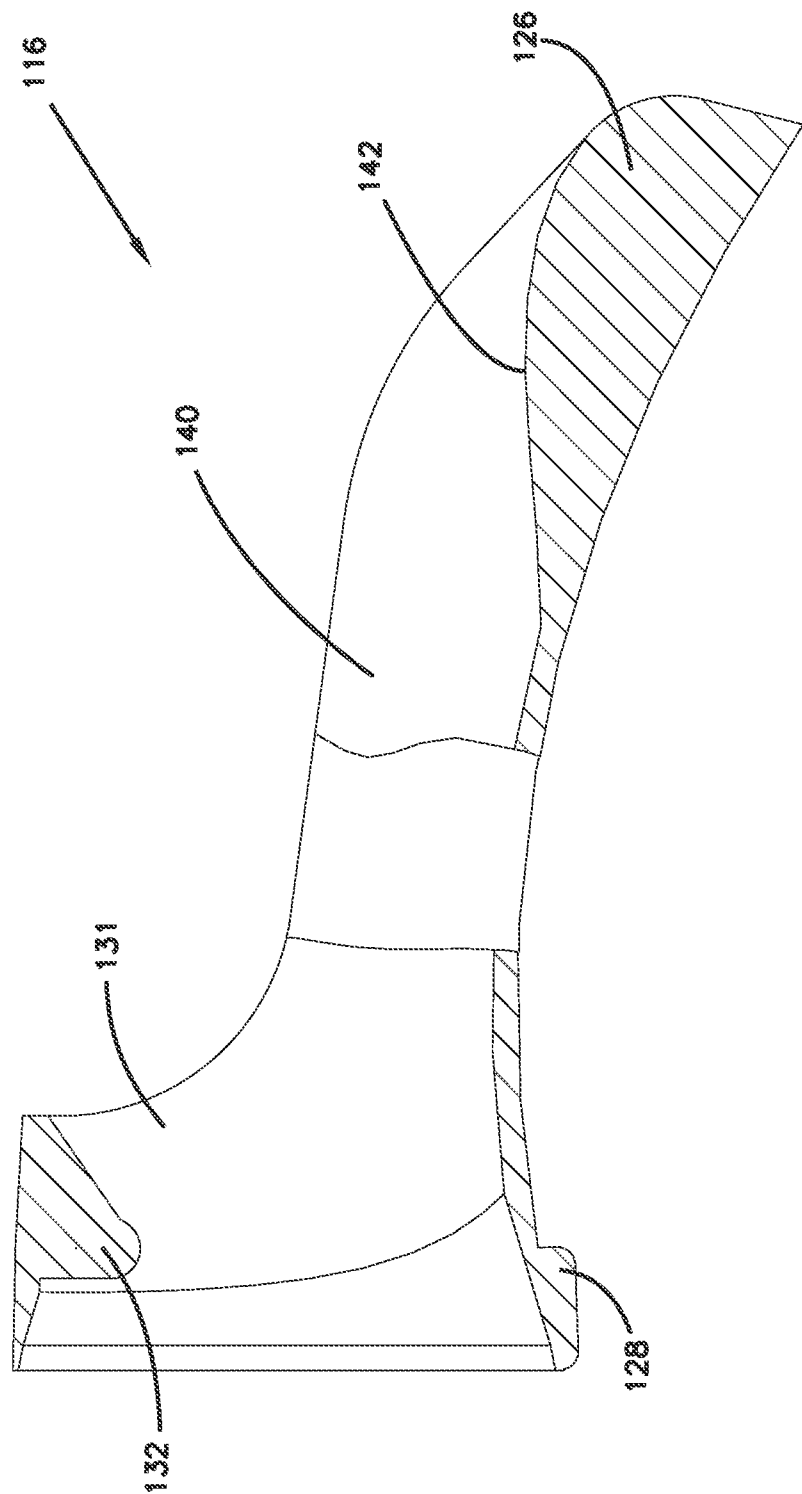
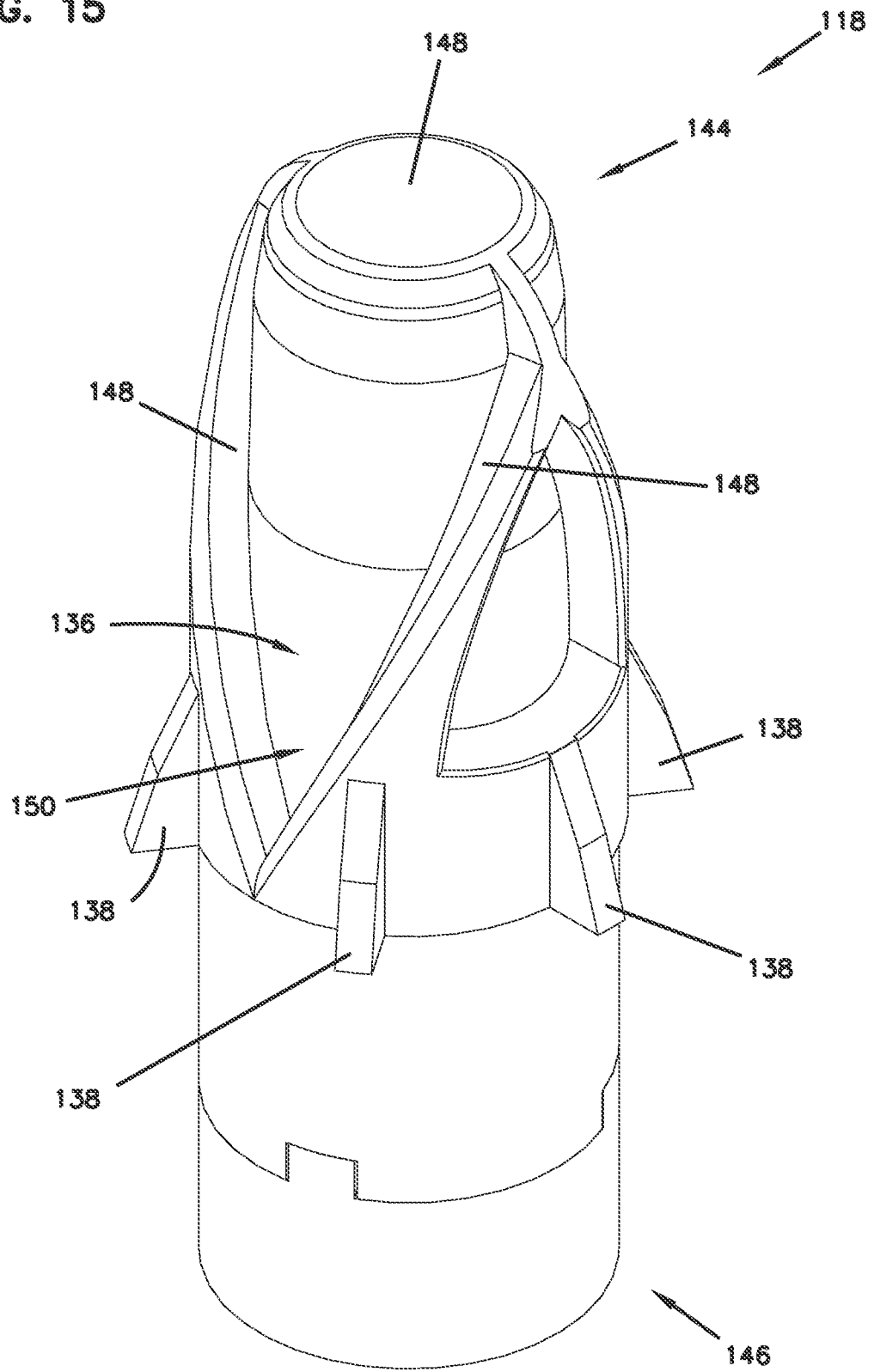


FIG. 15



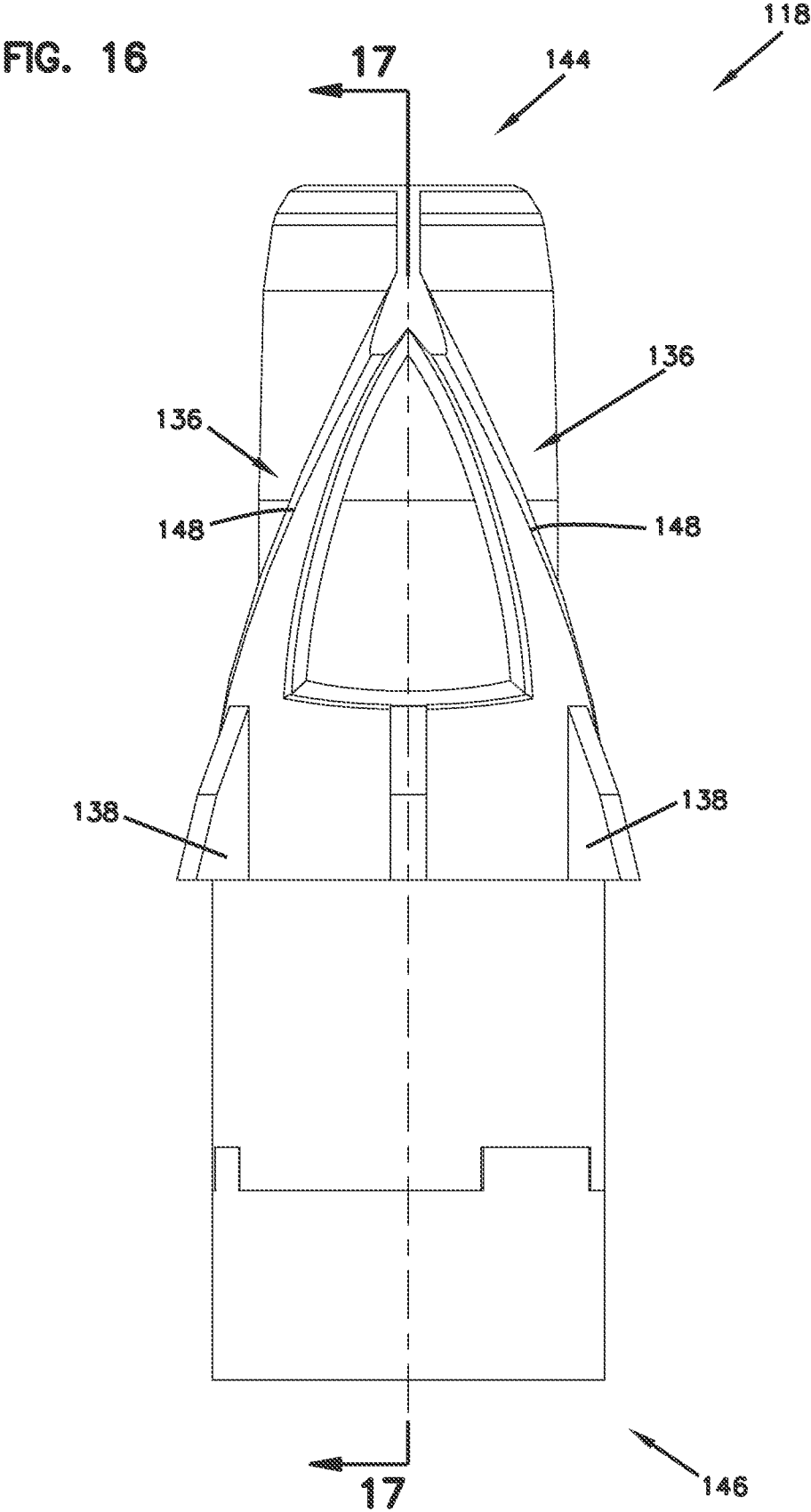
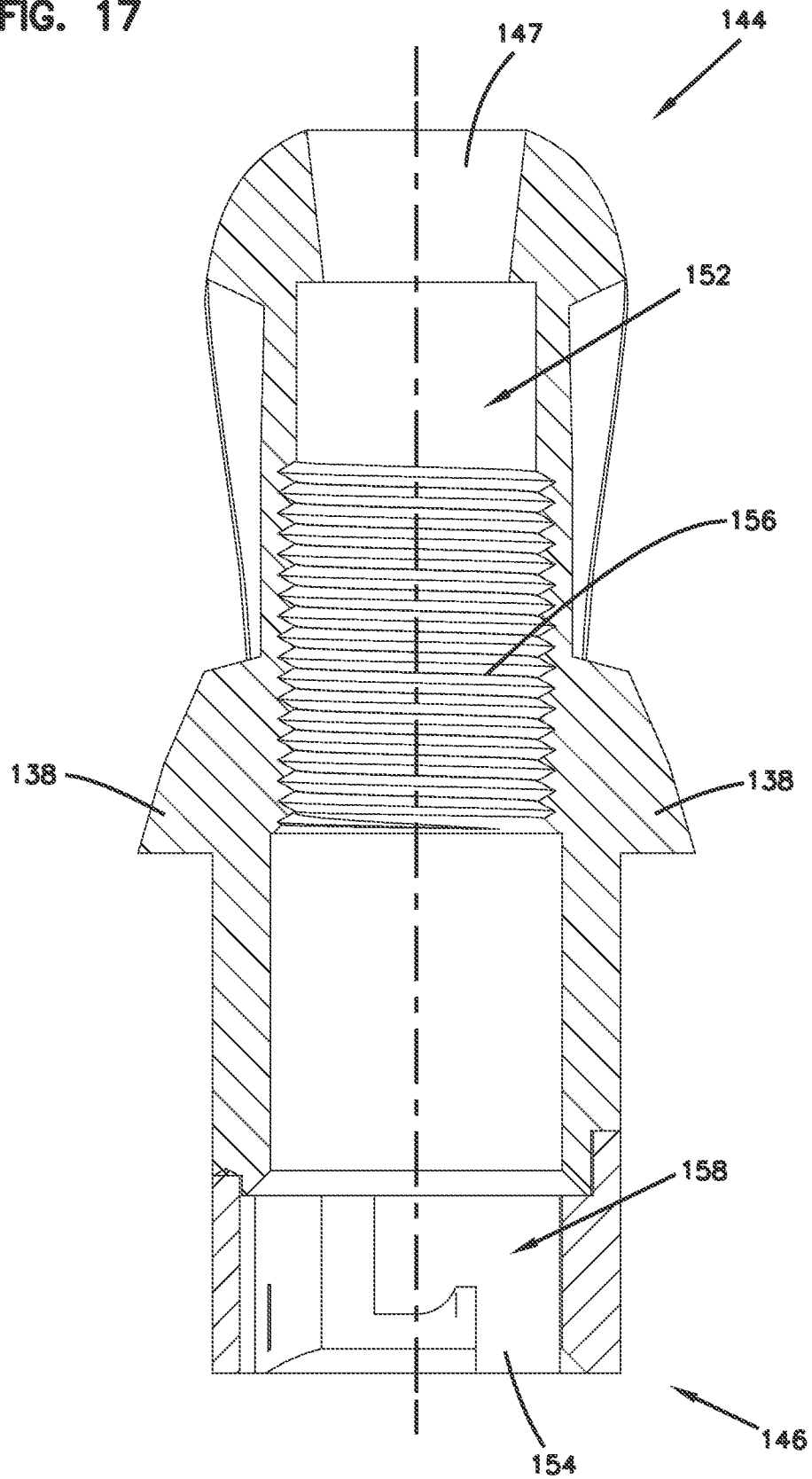


FIG. 17



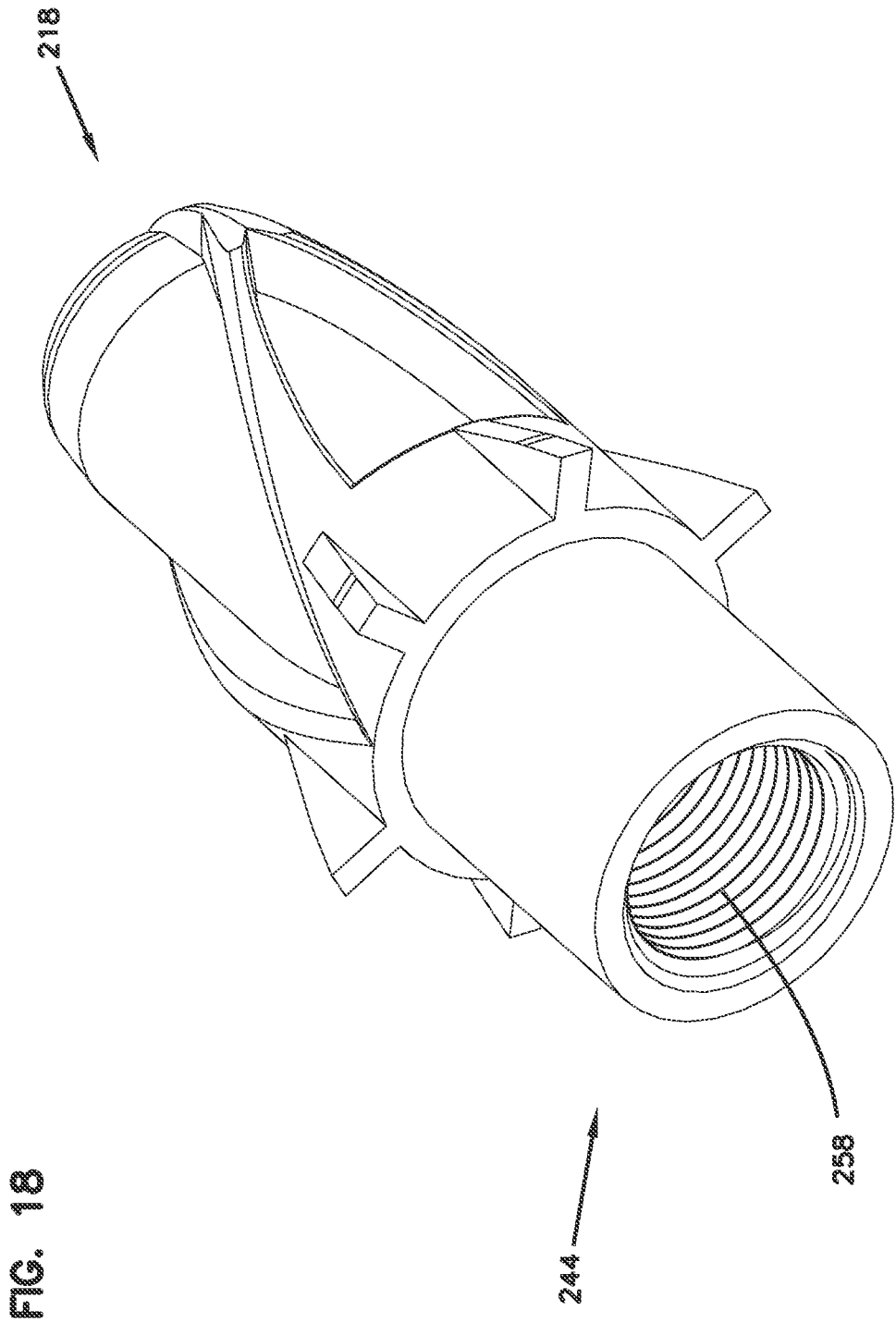


FIG. 19

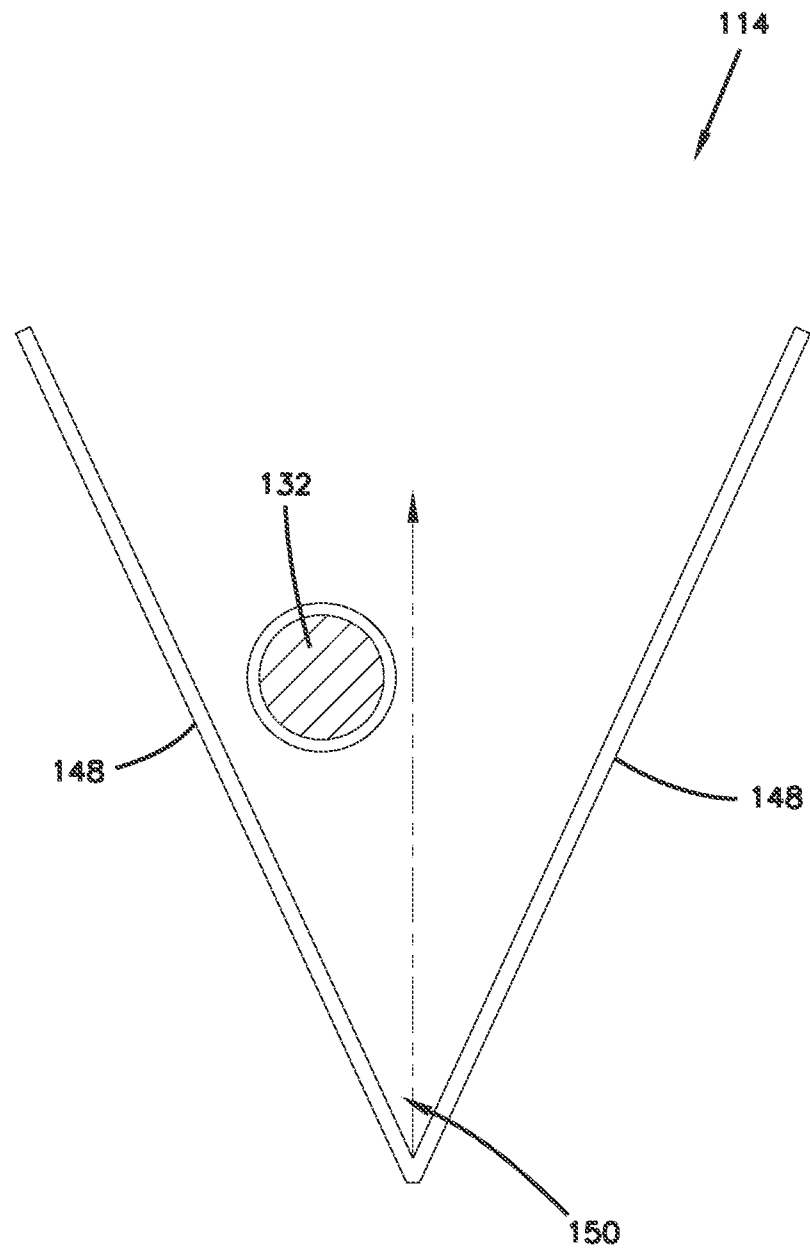


FIG. 20

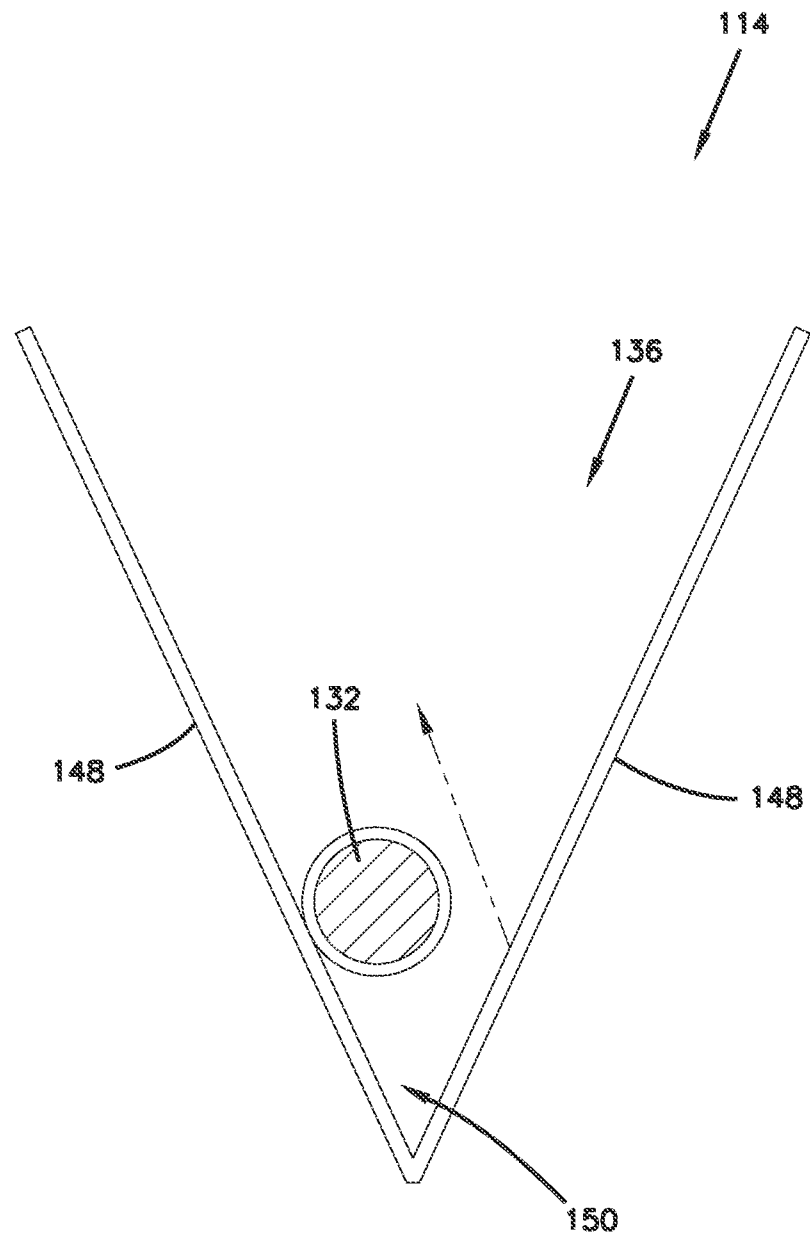


FIG. 21

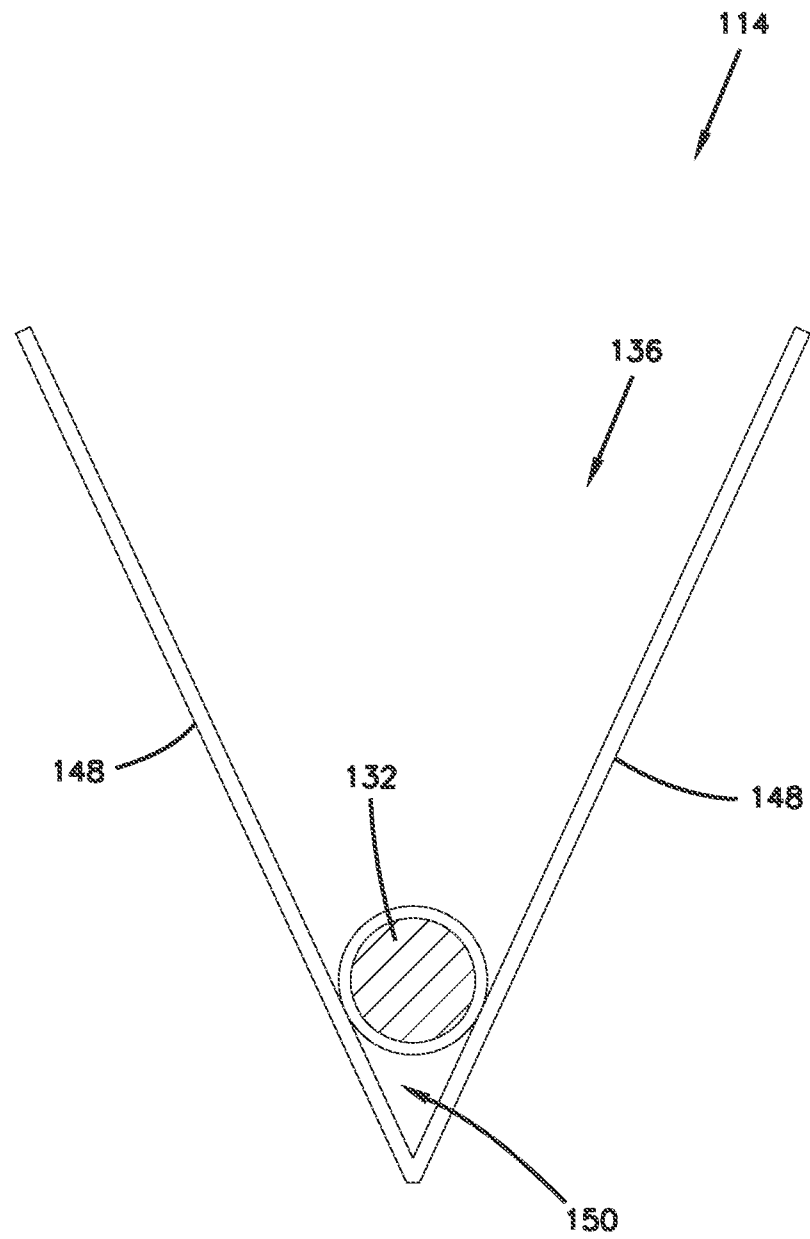


FIG. 22

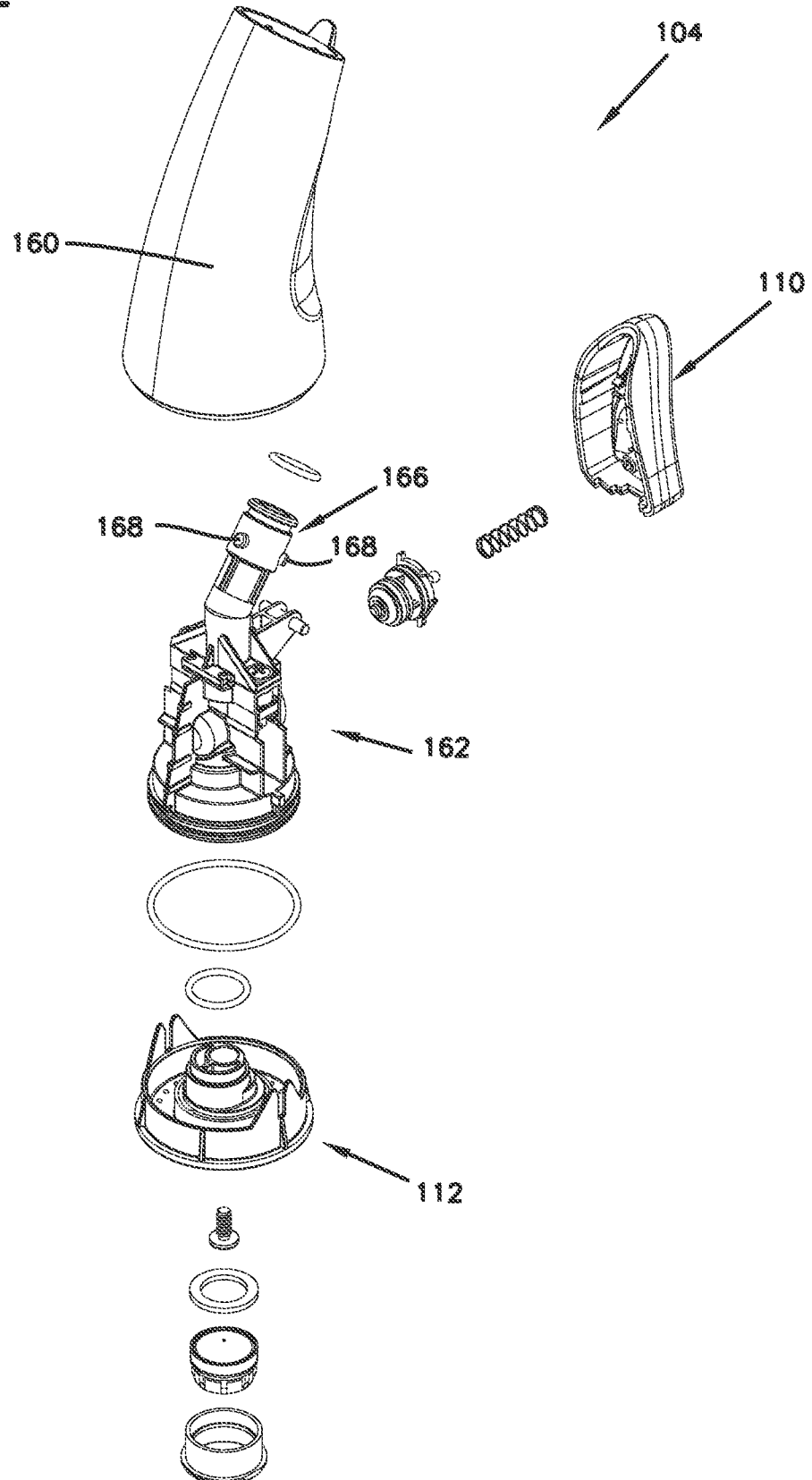


FIG. 23

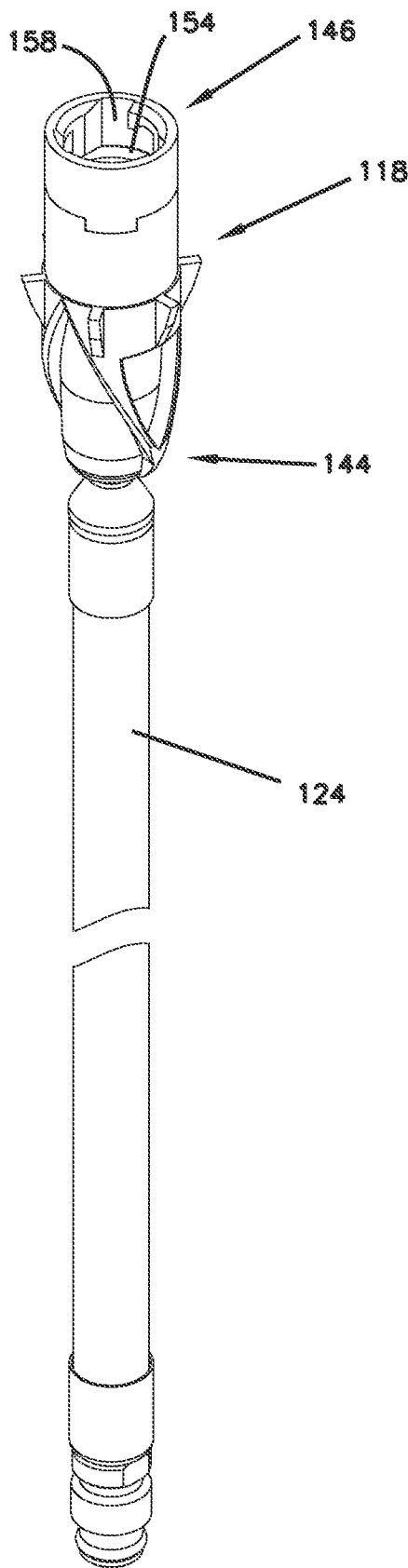


FIG. 24

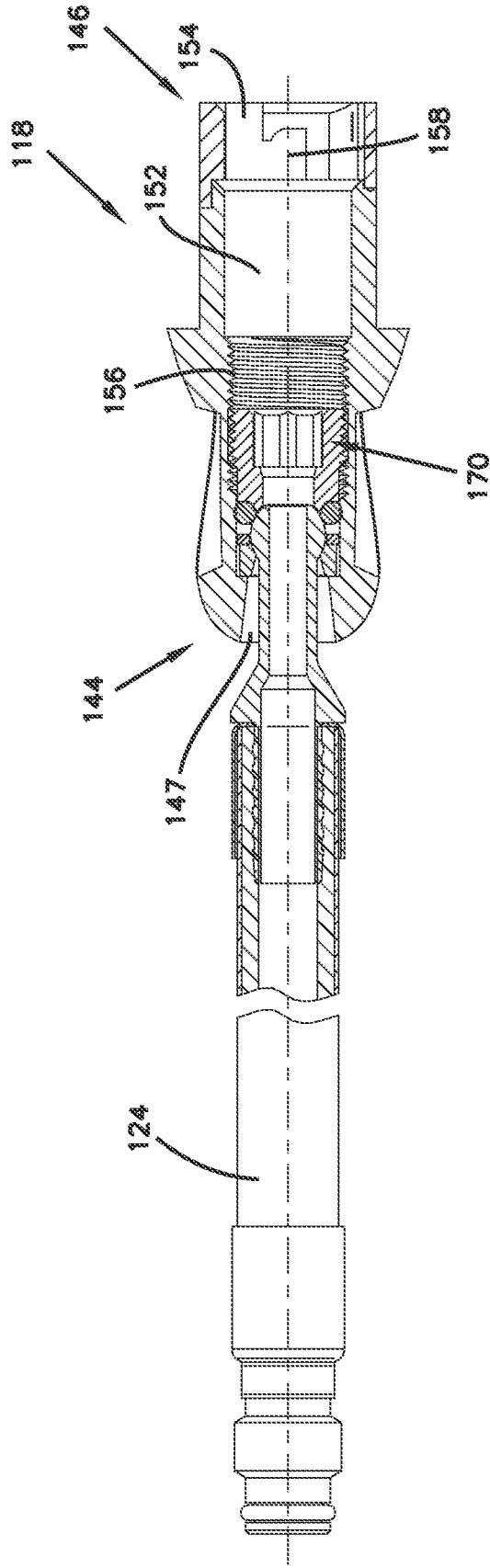


FIG. 25

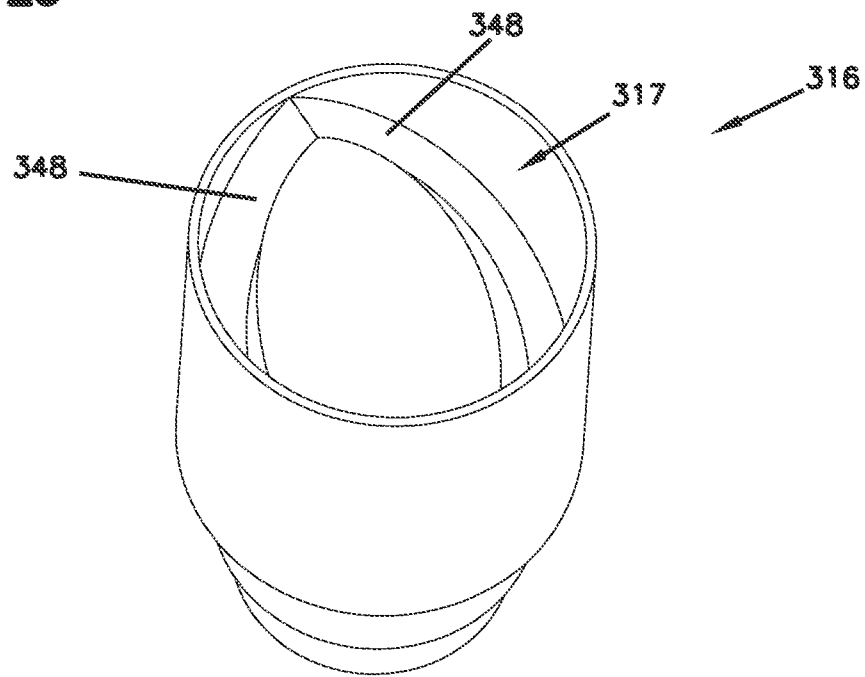
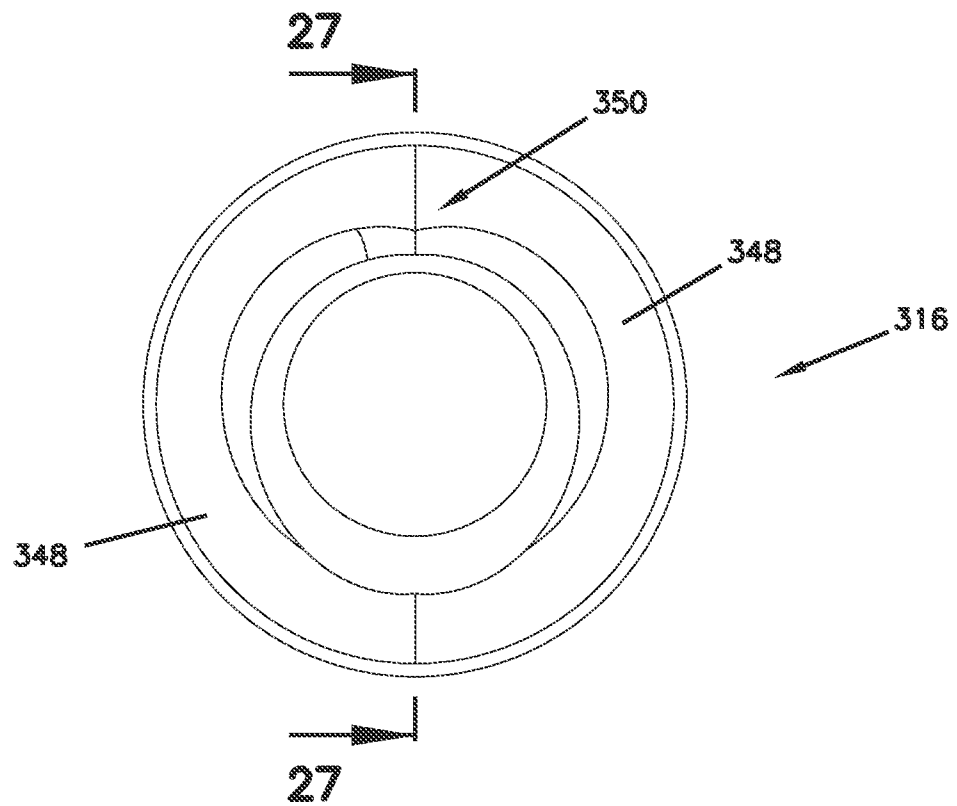


FIG. 26



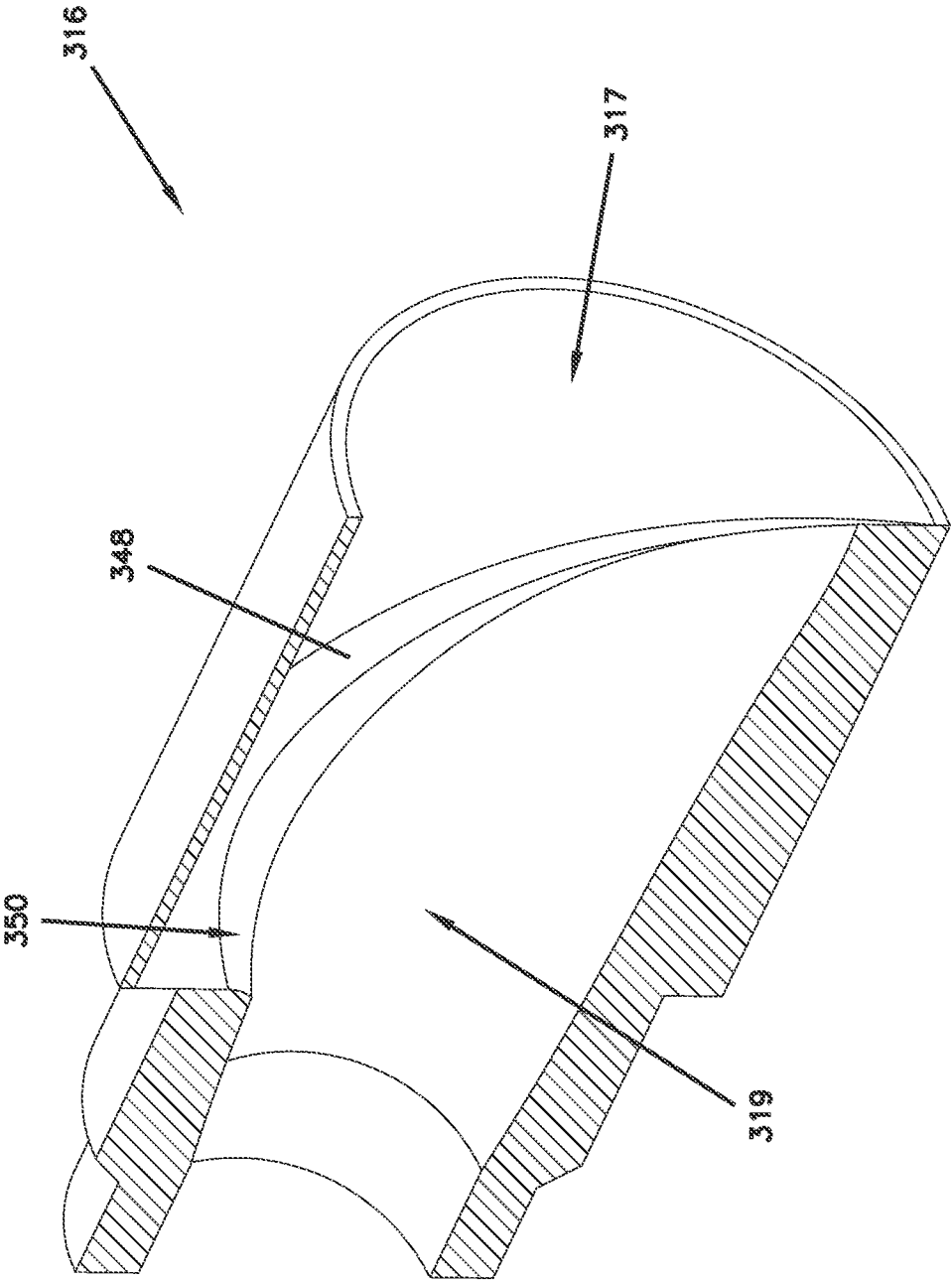


FIG. 27

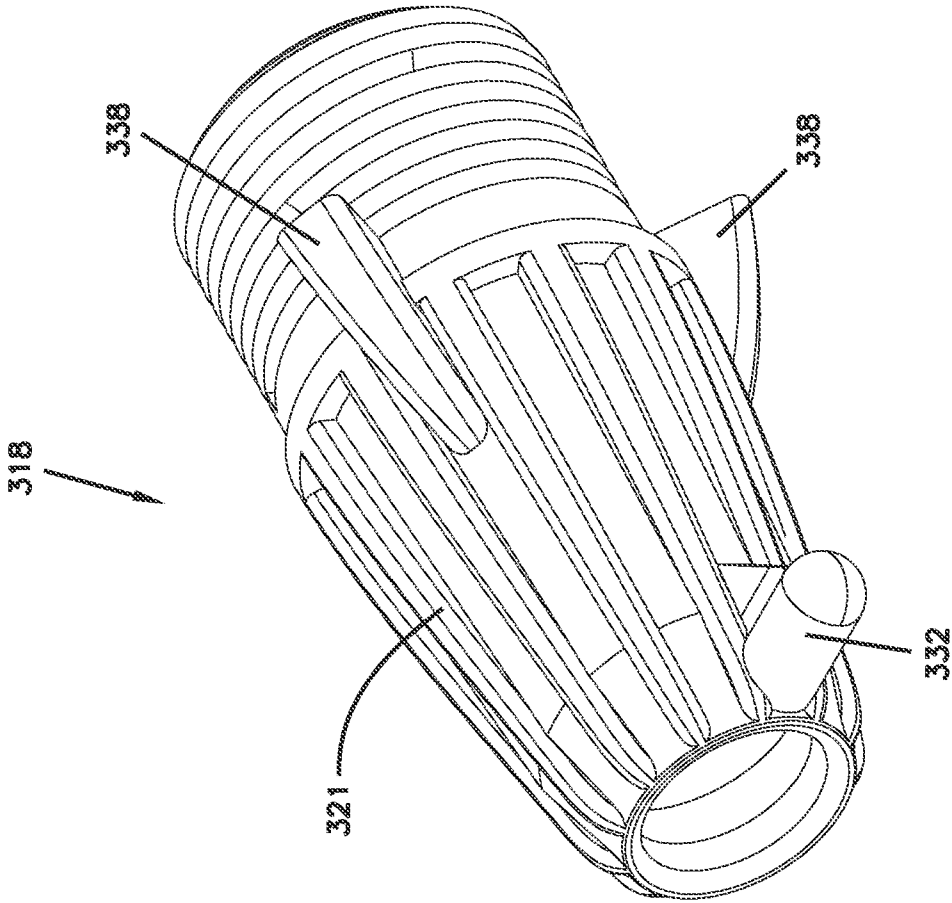


FIG. 28

FIG. 29

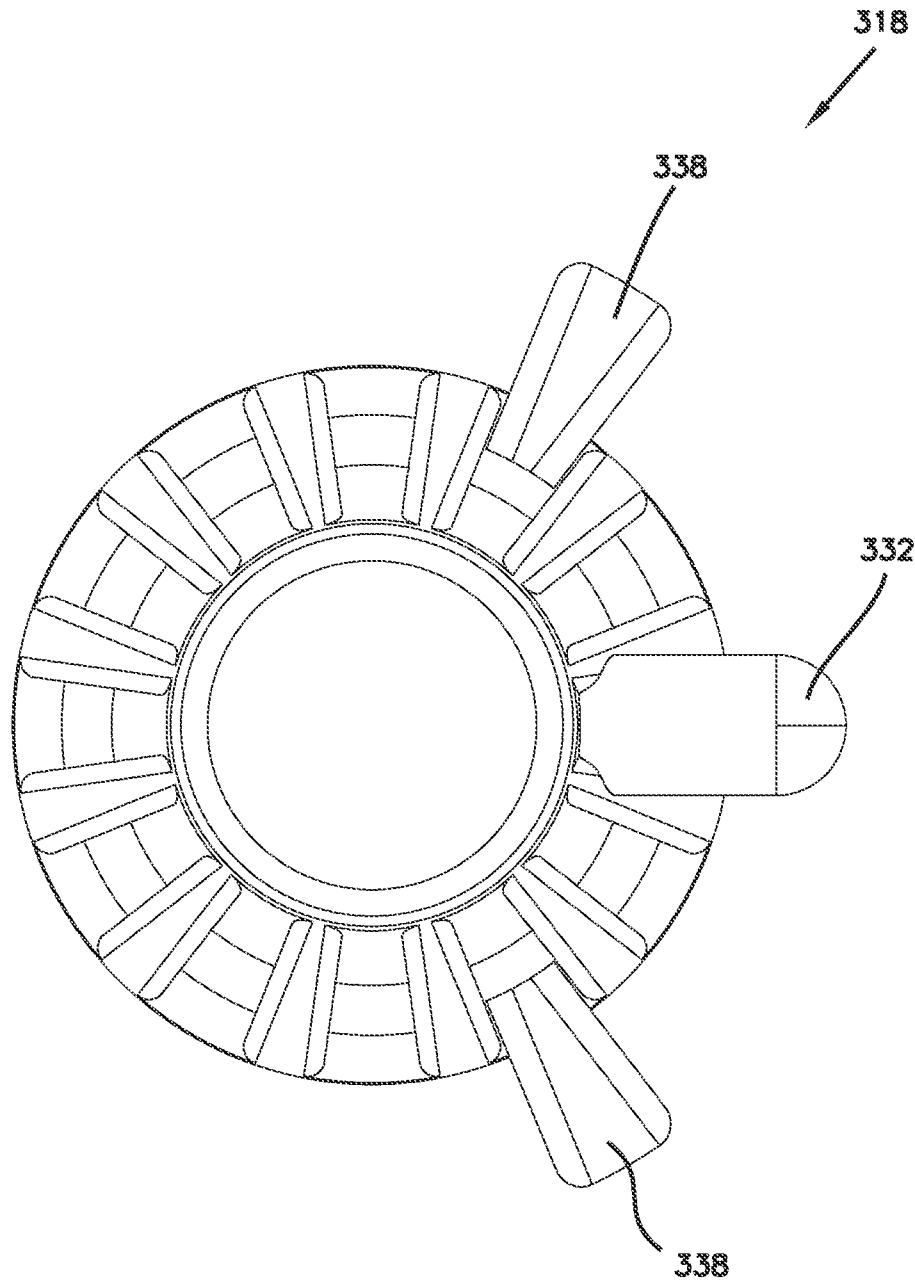


FIG. 30

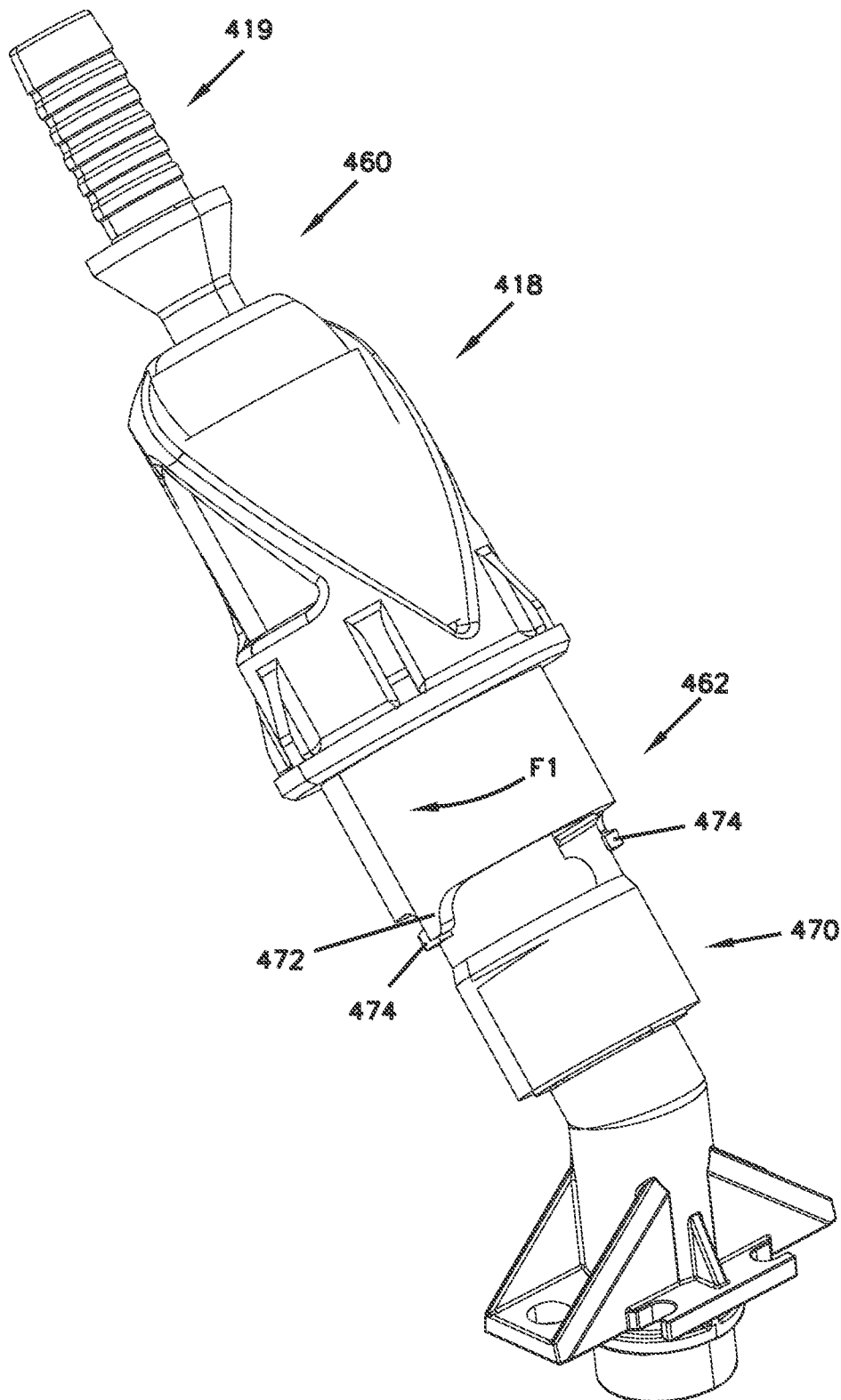


FIG. 31

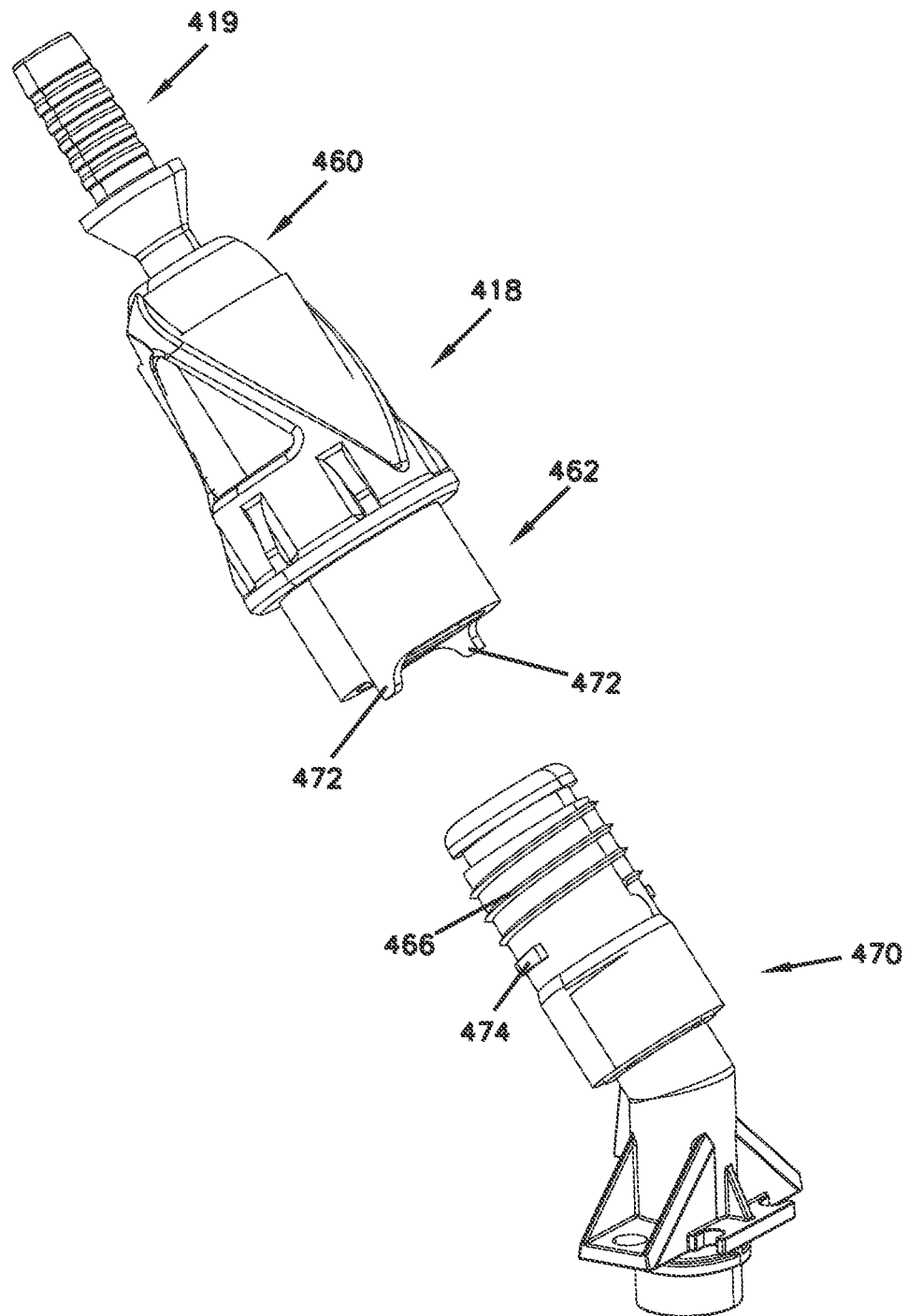


FIG. 32

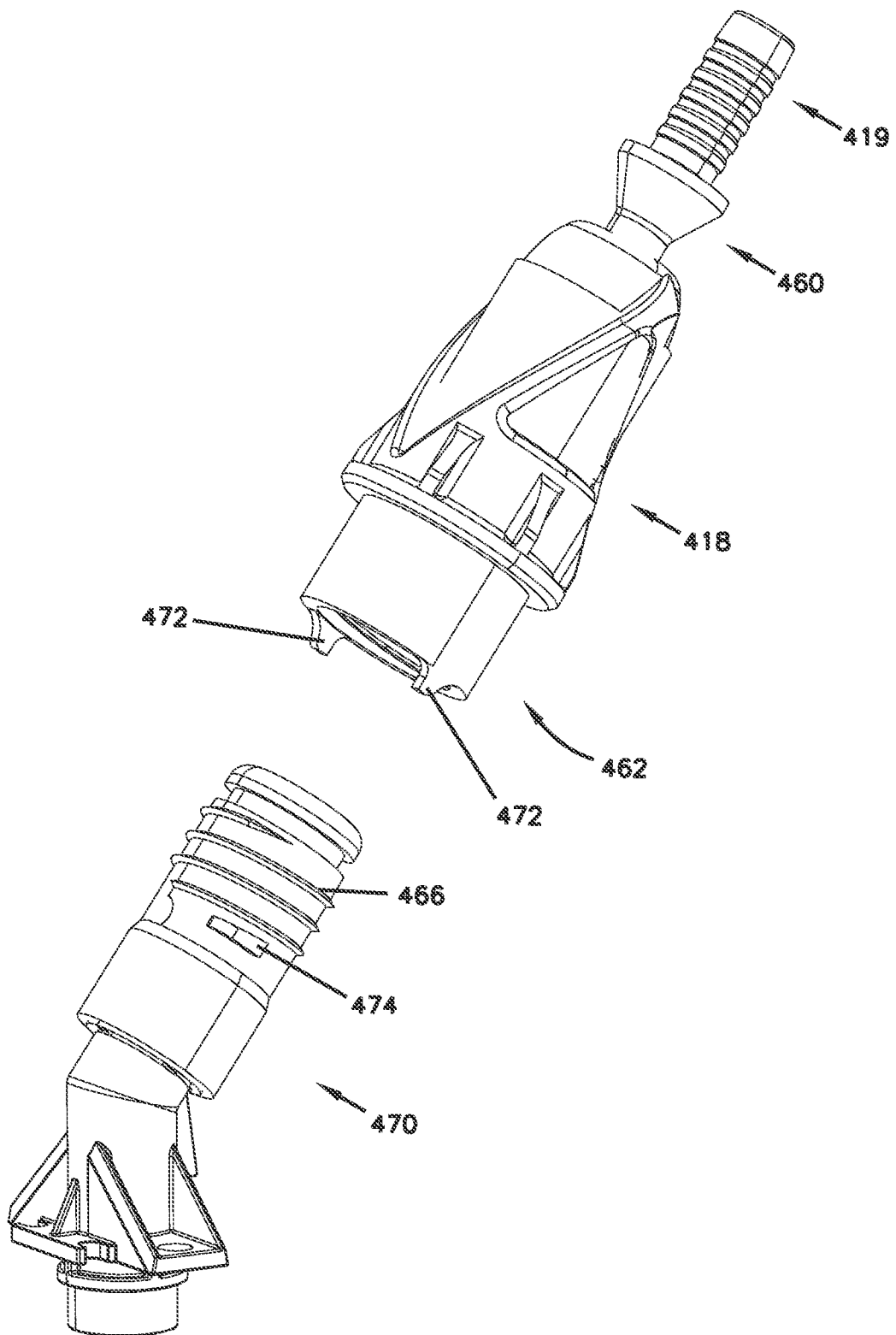


FIG. 33

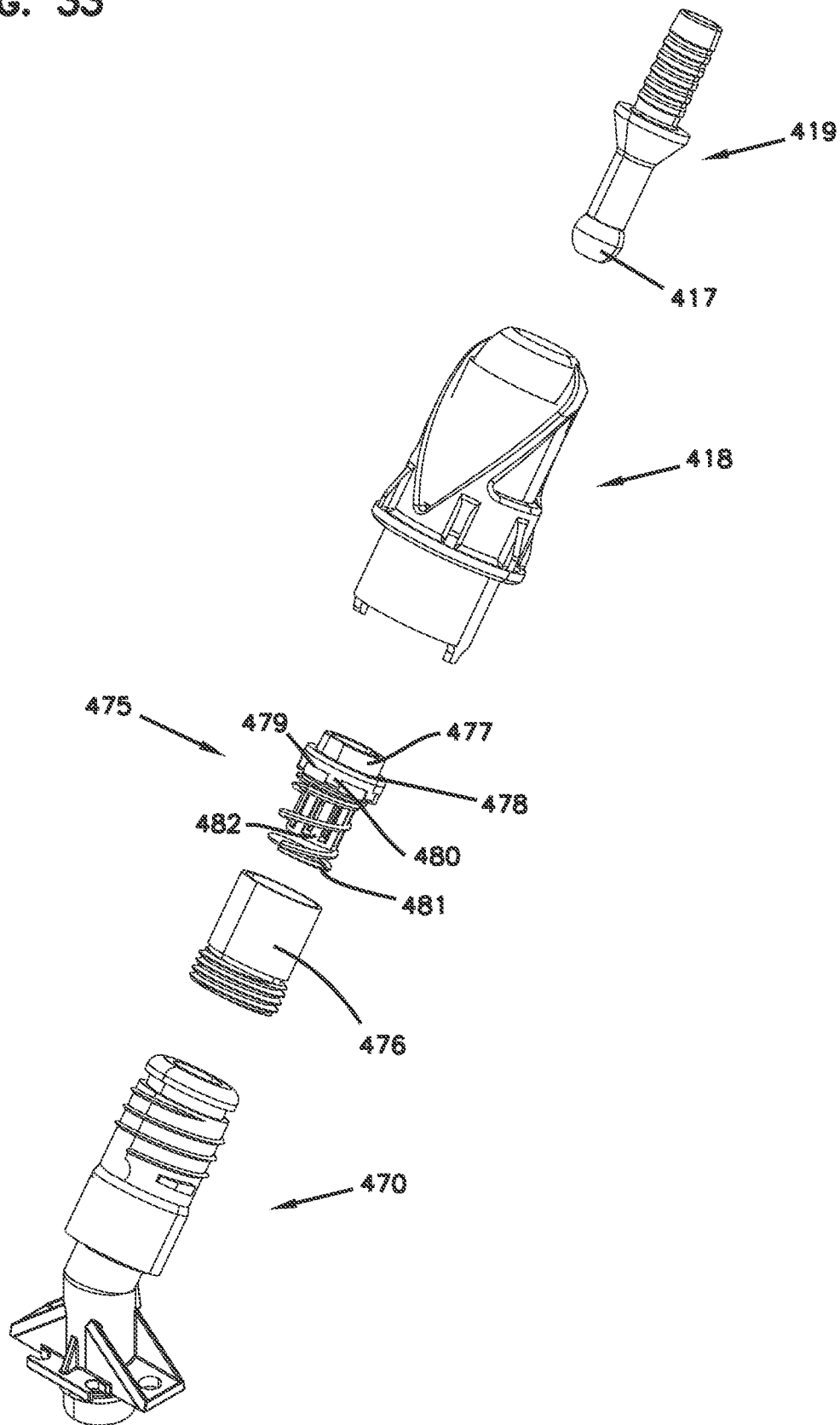


FIG. 34

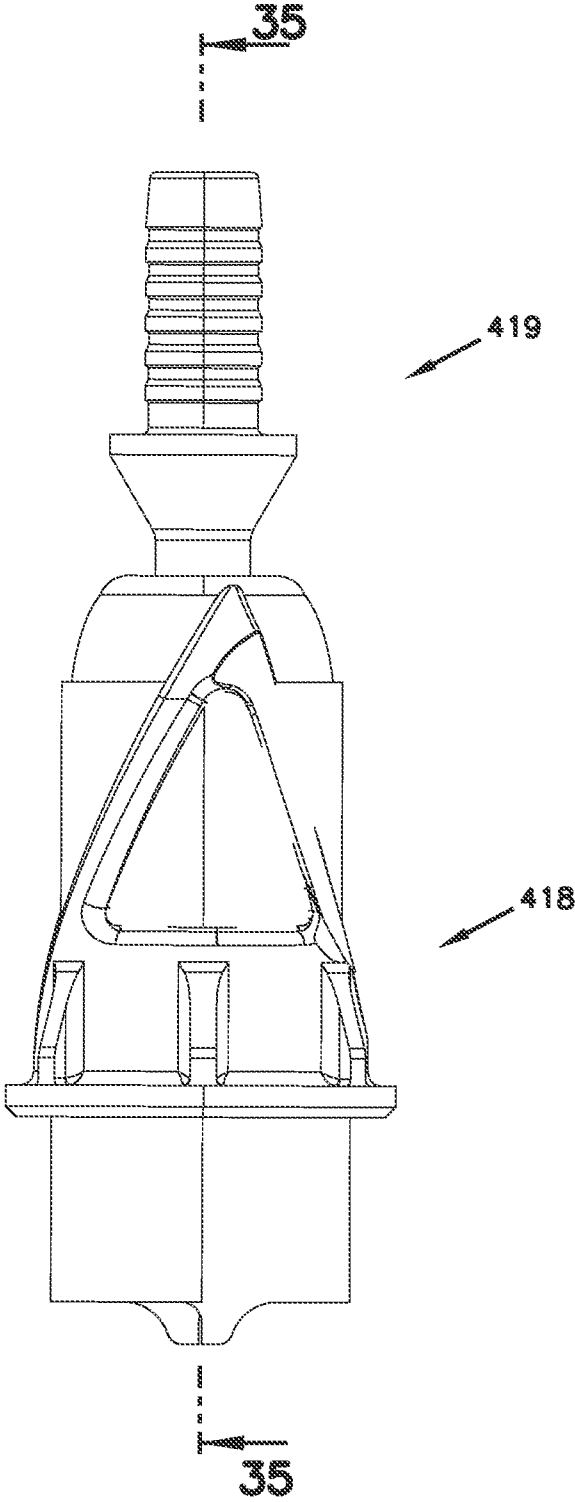
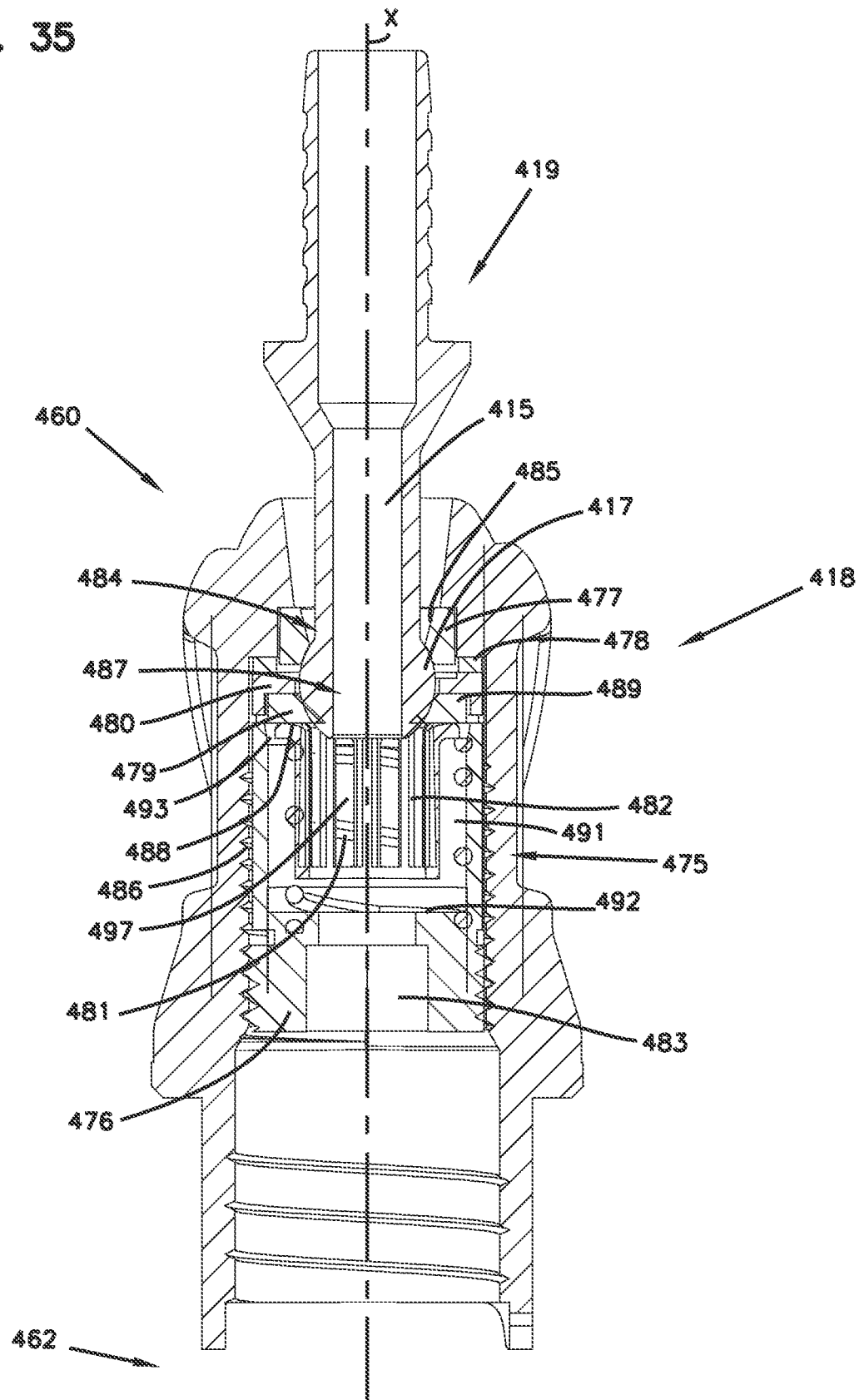


FIG. 35



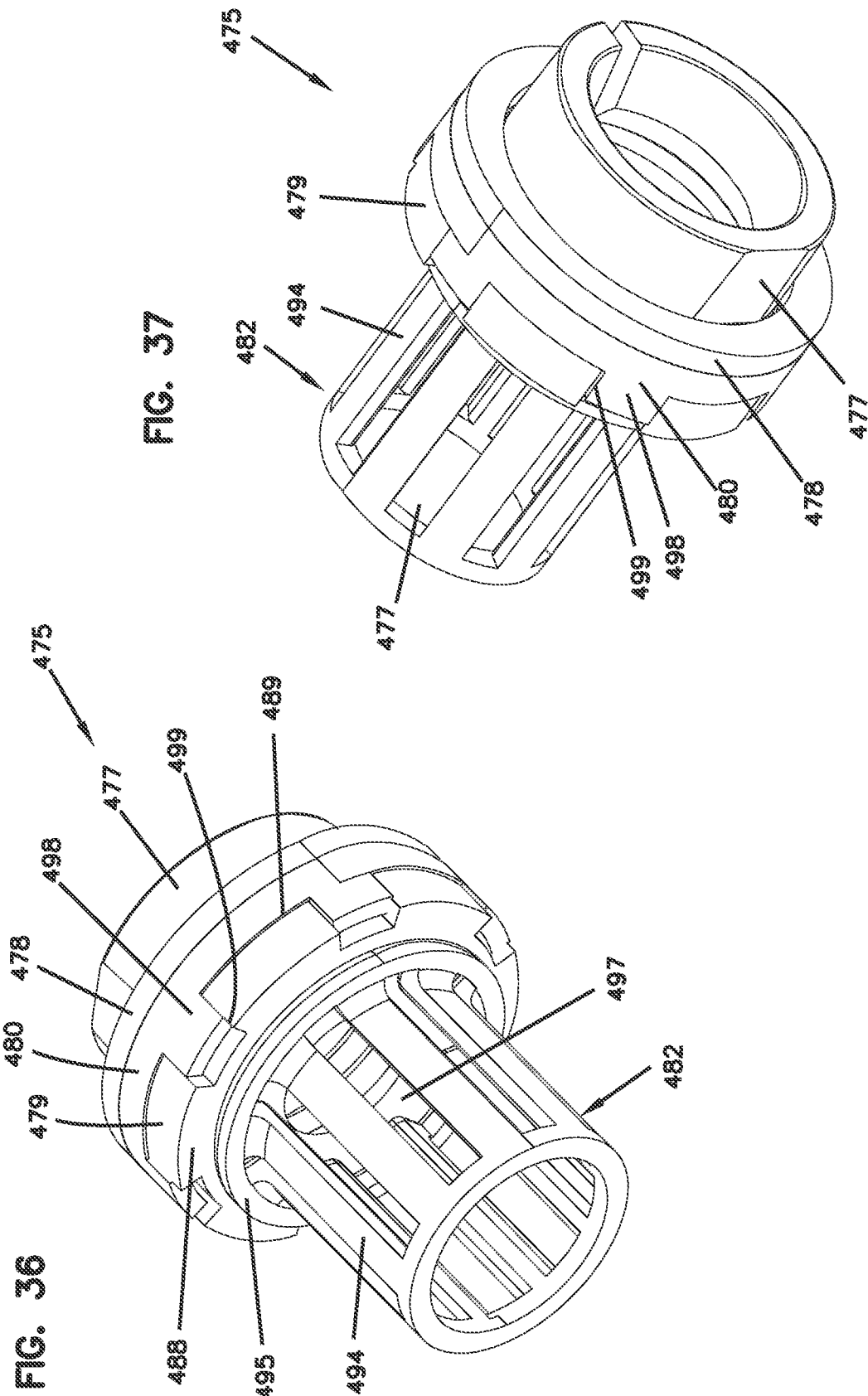
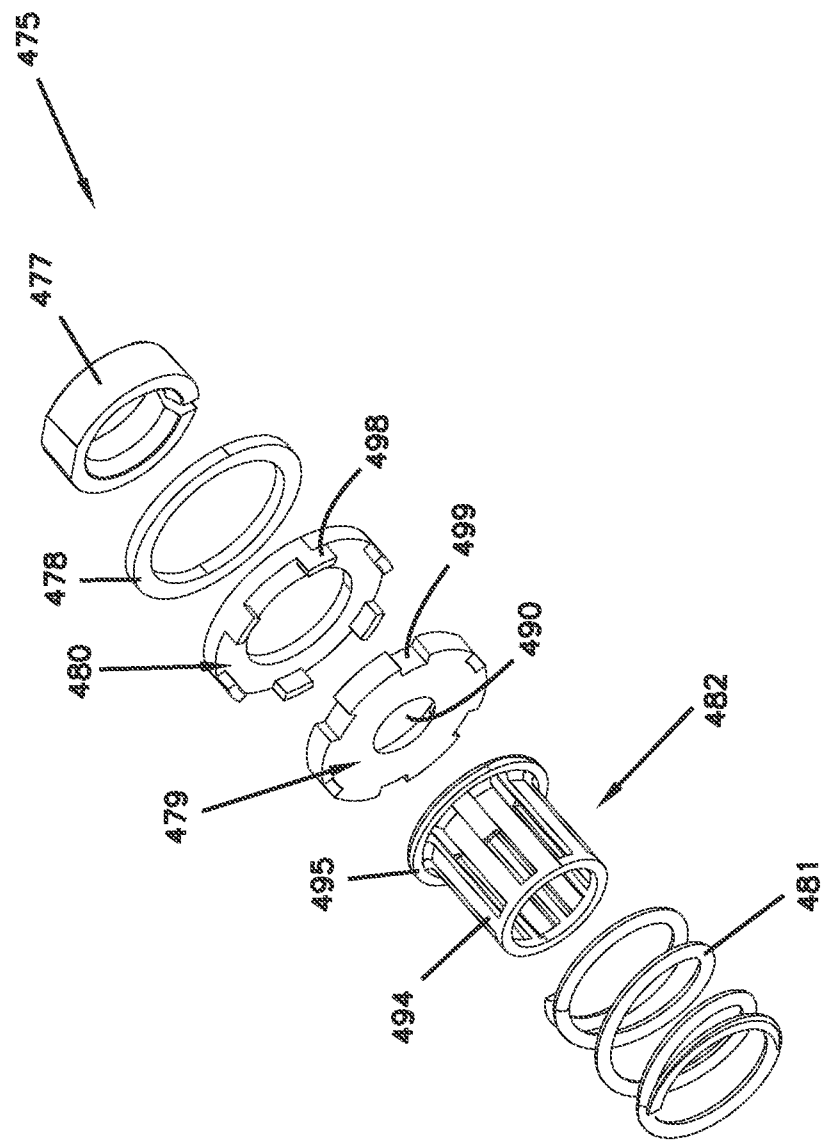
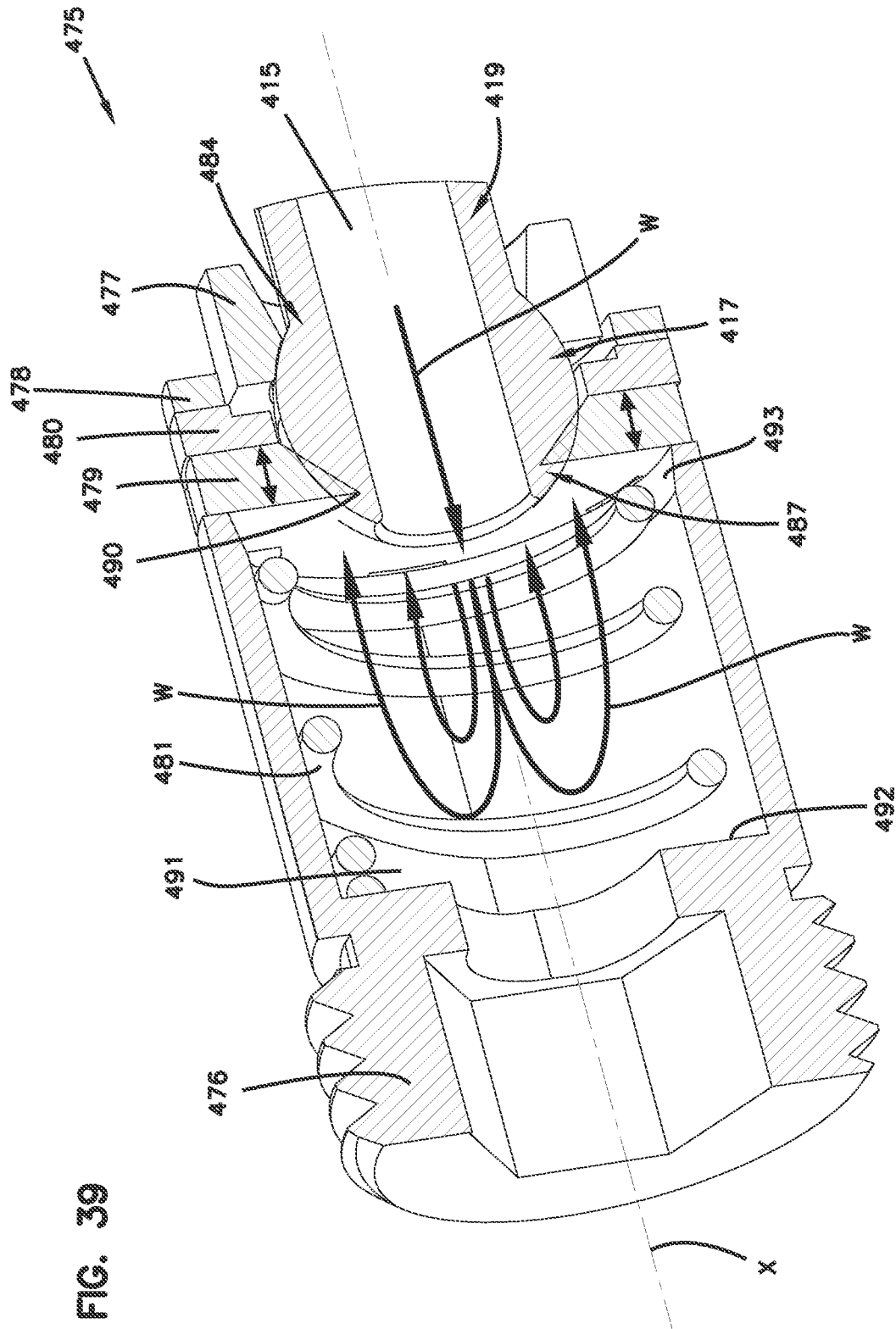


FIG. 38





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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2019/047958

A. CLASSIFICATION OF SUBJECT MATTER
 INV. E03C1/04
 ADD.

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)
 E03C

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, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP 3 228 763 A1 (XIAMEN SOLEX HIGH-TECH IND CO LTD [CN]) 11 October 2017 (2017-10-11) paragraphs [0003] - [0035]; figures 1-6 -----	1-28
X	US 2013/327853 A1 (KEITER DIETER [DE] ET AL) 12 December 2013 (2013-12-12) paragraphs [0007] - [0031]; figures 1-5 -----	1-28
X	WO 2005/110549 A1 (NEWFREY LLC [US]; BENSTEAD EVAN A [US]) 24 November 2005 (2005-11-24) pages 1-6; figures 1, 2 -----	1-4, 6-16, 18-21, 23-28



Further documents are listed in the continuation of Box C.



See patent family annex.

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"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

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"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

12 November 2019

Date of mailing of the international search report

20/11/2019

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 NL - 2280 HV Rijswijk
 Tel. (+31-70) 340-2040,
 Fax: (+31-70) 340-3016

Authorized officer

Posavec, Daniel

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2019/047958

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			WO 2005110549 A1 24-11-2005
