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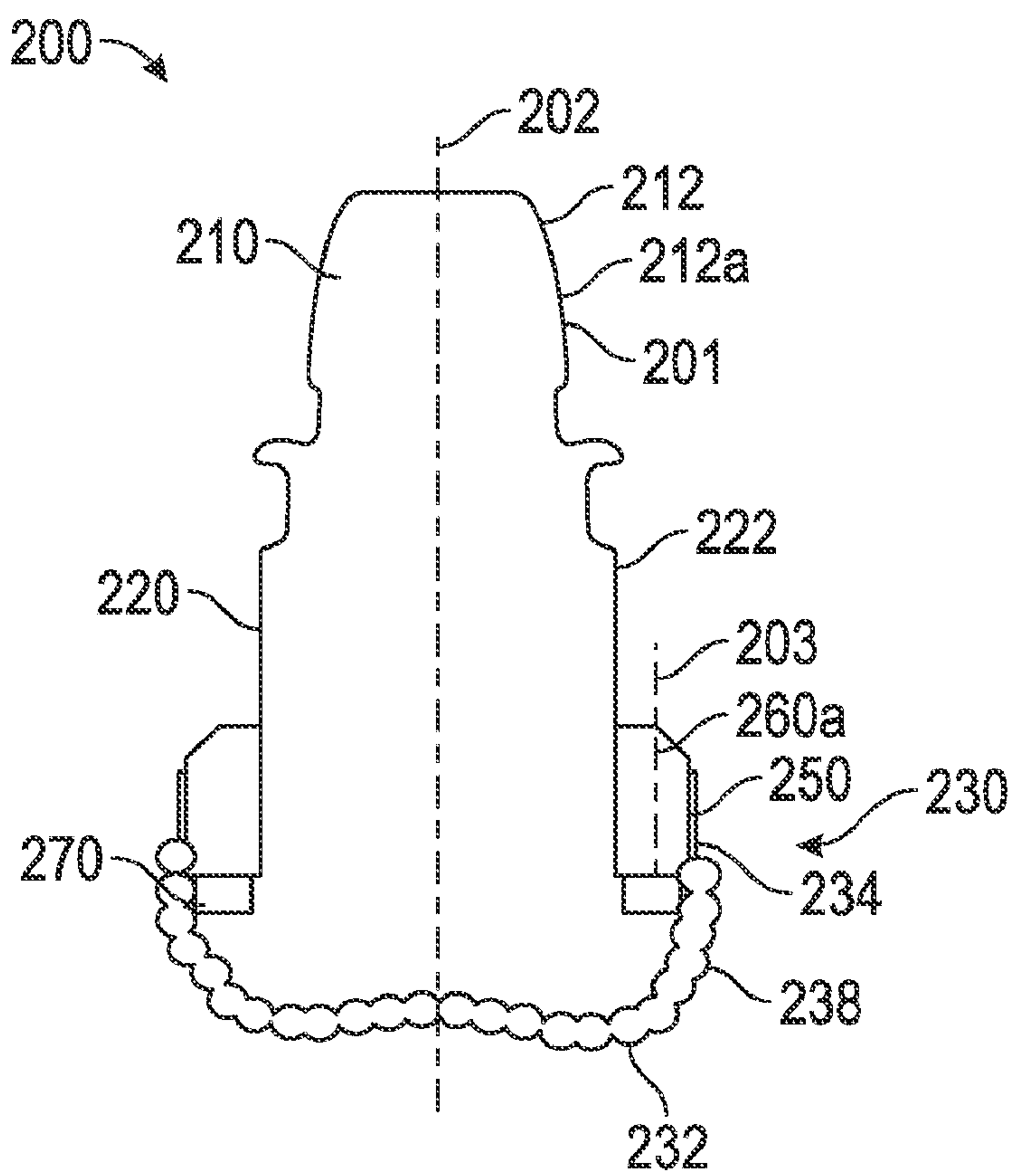
(54) **Titre : TREPAN DOTE DE PLAQUETTES DE CALIBRAGE DEPLOYABLES**
(54) **Title: DRILL BIT WITH EXTENDABLE GAUGE PADS**



(57) **Abrégé/Abstract:**
A drill bit for use in a wellbore is disclosed, including a bit body having a longitudinal axis; and at least one moveable member associated with a lateral extent of the bit body, wherein the at least one moveable member is configured to translate in a member

(57) **Abrégé(suite)/Abstract(continued):**
axis that is substantially longitudinal. Further, a method of drilling a wellbore is disclosed, including providing a drill bit including a bit body having a longitudinal axis and at least one movable member associated with a lateral extent of the bit body; conveying a drill string into a formation, the drill string having the drill bit at the end thereof; drilling the wellbore using the drill string; and selectively translating at least one movable member in a member axis that is substantially longitudinal.

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(54) Title: DRILL BIT WITH EXTENDABLE GAUGE PADS

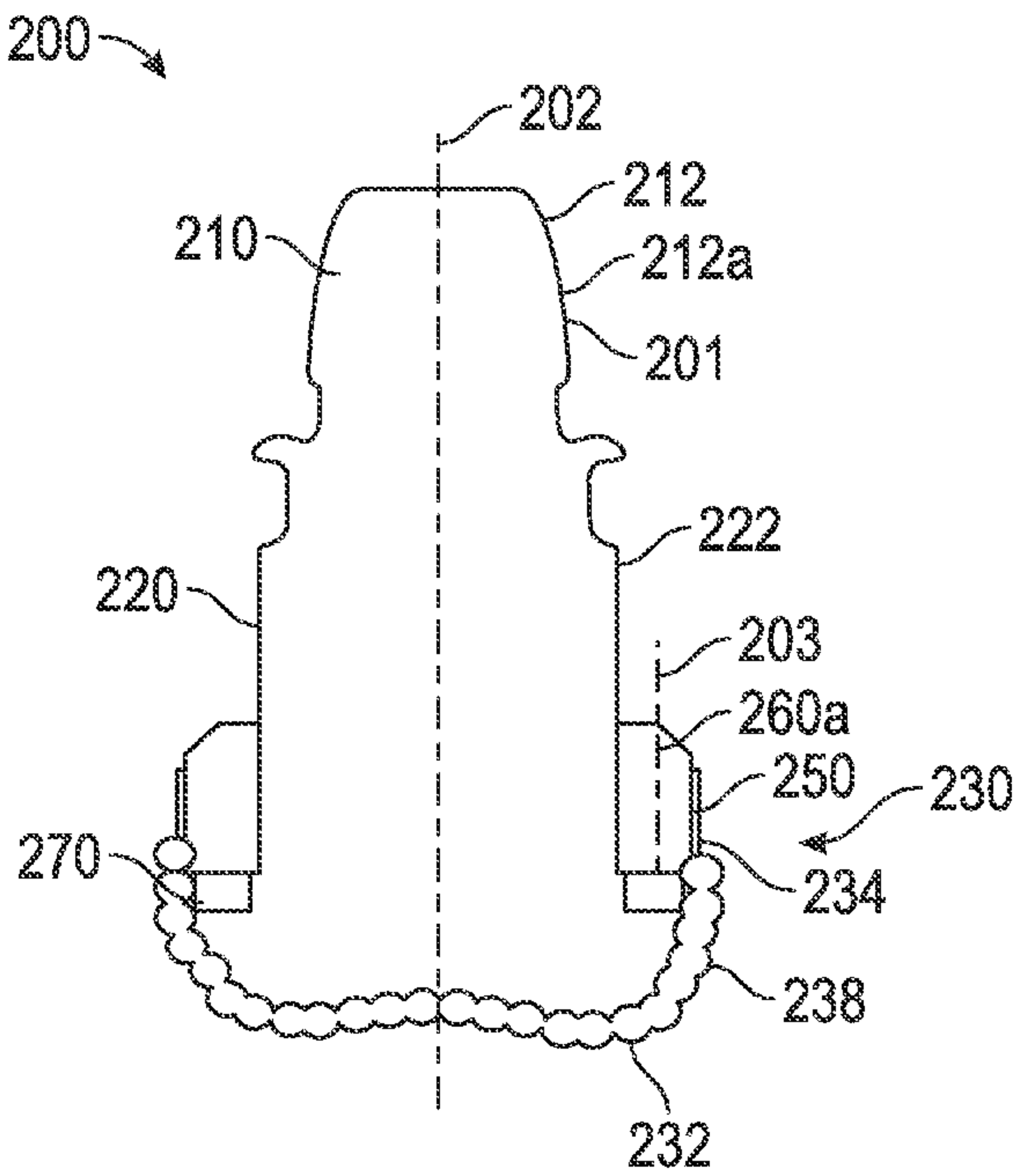

FIG. 2A

(57) Abstract: A drill bit for use in a wellbore is disclosed, including a bit body having a longitudinal axis; and at least one moveable member associated with a lateral extent of the bit body, wherein the at least one moveable member is configured to translate in a member axis that is substantially longitudinal. Further, a method of drilling a wellbore is disclosed, including providing a drill bit including a bit body having a longitudinal axis and at least one movable member associated with a lateral extent of the bit body; conveying a drill string into a formation, the drill string having the drill bit at the end thereof; drilling the wellbore using the drill string; and selectively translating at least one movable member in a member axis that is substantially longitudinal.

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DRILL BIT WITH EXTENDABLE GAUGE PADS

PRIORITY CLAIM

[0001] This application claims the benefit of the filing date of United States Provisional Patent Application Serial No. 14/506,730, filed October 06, 2014, for "Drill Bit With Extendable Gauge Pads."

BACKGROUND INFORMATION

1. Field of the Disclosure

[0002] This disclosure relates generally to drill bits and systems that utilize same for drilling wellbores.

2. Background Of The Art

[0003] Oil wells (also referred to as "wellbores" or "boreholes") are drilled with a drill string that includes a tubular member having a drilling assembly (also referred to as the "bottomhole assembly" or "BHA") at the bottom end of the tubular. The BHA typically includes devices and sensors that provide information relating to a variety of parameters relating to the drilling operations ("drilling parameters"), behavior of the BHA ("BHA parameters") and parameters relating to the formation surrounding the wellbore ("formation parameters"). A drill bit attached to the bottom end of the BHA is rotated by rotating the drill string and/or by a drilling motor (also referred to as a "mud motor") in the BHA to disintegrate the rock formation to drill the wellbore. A large number of wellbores are drilled along contoured trajectories. For example, a single wellbore may include one or more vertical sections, deviated sections, curved sections and horizontal sections through differing types of rock formations. Drilling conditions differ based on the wellbore contour, rock formation and wellbore depth. It is often desirable to have a drill bit with a longer vertical or longitudinal sections around the drill bit, also referred to as gauge pads, during drilling of a vertical well section to increase drill bit stability and wellbore quality and relatively short gauge pads for drilling deviated well sections, curved well sections, and horizontal well sections to allow greater deflection and bit control.

[0004] The disclosure herein provides a drill bit and drilling systems using the same that includes adjustable longitudinal sections or gauge pads.

SUMMARY

[0005] In one aspect, a drill bit for use in a wellbore is disclosed, including a bit body having a longitudinal axis; and at least one moveable member associated with a lateral extent of the bit body, wherein the at least one moveable member is configured to translate in a member axis that is substantially longitudinal.

[0006] In another aspect, a method of drilling a wellbore is disclosed, including providing a drill bit including a bit body having a longitudinal axis and at least one movable member associated with a lateral extent of the bit body; conveying a drill string into a formation, the drill string having the drill bit at the end thereof; drilling the wellbore using the drill string; and selectively translating at least one movable member in a member axis that is substantially longitudinal.

[0007] In another aspect, a system for drilling a wellbore is disclosed, including a drilling assembly having a drill bit configured to drill a wellbore, the drill bit including: a bit body having a longitudinal axis; and at least one moveable member associated with a lateral extent of the bit body, wherein the at least one moveable member is configured to translate in a member axis that is substantially longitudinal.

[0007a] In another aspect, a drill bit for use in a wellbore is disclosed, comprising: a bit body having a longitudinal axis, a crown including a plurality of cutters, wherein the crown is stationary relative to the bit body, and a gauge section associated with a lateral extent of the bit body, the gauge section including: a static member, a cavity formed in the bit body adjacent to the static member, and a moveable member received by the cavity and configured to translate relative to the bit body along a substantially longitudinal member axis, wherein the movable member extends from the cavity to increase a length of the gauge section and retracts into the cavity to decrease the length of the gauge section.

[0007b] In another aspect, a method of drilling a wellbore is disclosed, comprising: providing a drill bit including a bit body having a longitudinal axis, a crown including a plurality of cutters, wherein the crown is stationary relative to the bit body, and a gauge section associated with a lateral extent of the bit body, the gauge section including: a static member, a cavity formed in the bit body adjacent to the static member, and a moveable member received by the cavity and configured to translate relative to the bit body along a substantially longitudinal member axis, wherein the movable member extends from the cavity to increase a length of the gauge section and retracts into the cavity to decrease the length of the gauge section; conveying a drill string into a formation, the drill string having the drill bit at the end thereof; drilling the wellbore using the drill string; and selectively translating the movable member relative to the bit body along the substantially longitudinal member axis in order to change the length of the gauge section.

[0007c] In another aspect, a system for drilling a wellbore is disclosed, comprising: a drilling assembly having a drill bit configured to drill the wellbore, the drill bit including: a bit body having a longitudinal axis, a crown including a plurality of cutters, wherein the crown is stationary relative to the bit body, and a gauge section associated with a lateral extent of the bit body, the gauge section including: a static member, a cavity formed in the bit body adjacent to the static member, and a moveable member received by the cavity and configured to translate relative to the bit body along a substantially longitudinal member axis, wherein the movable member extends from the cavity to increase a length of the gauge section and retracts into the cavity to decrease the length of the gauge section.

[0008] Examples of certain features of the apparatus and method disclosed herein are summarized rather broadly in order that the detailed description thereof that follows may be better understood. There are, of course, additional features of the apparatus and method disclosed hereinafter that will form the subject of the claims appended hereto.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] For a detailed understanding of the apparatus and methods disclosed herein, reference should be made to the accompanying drawings and the detailed description thereof, wherein like elements are generally given same numerals and wherein:

FIG. 1 is a schematic diagram of an exemplary drilling system that includes a drill string that has a drill bit made according to one embodiment of the disclosure;

FIG. 2A shows a cross sectional view of an exemplary drill bit with an adjustable member on a bit body, in a retracted position, according to one embodiment of the disclosure;

FIG. 2B shows a cross sectional view of the drill bit of **FIG. 2A** with the adjustable member shown in an extended position;

FIG. 2C shows a partial cross sectional view of an embodiment of the drill bit shown in **FIG. 2A**;

FIG. 2D shows another partial cross section view of another embodiment of the drill bit shown in **FIG. 2A;**

FIG. 3A shows a cross sectional view of an exemplary drill bit with an adjustable member on a bit body, in a retracted position, according to another embodiment of the disclosure;

FIG. 3B shows a cross sectional view of the drill bit of **FIG. 3A** with the adjustable member shown in an extended position;

FIG. 4A shows a cross sectional view of an exemplary drill bit with an adjustable member on a bit body, in a retracted position, according to another embodiment of the disclosure; and

FIG. 4B shows a cross sectional view of the drill bit of **FIG. 4A** with the adjustable member shown in an extended position.

DESCRIPTION OF THE EMBODIMENTS

[0010] **FIG. 1** is a schematic diagram of an exemplary drilling system **100** that may utilize drill bits made according to the disclosure herein. **FIG. 1** shows a wellbore **110** having an upper section **111** with a casing **112** installed therein and a lower section **114** being drilled with a drill string **118**. The drill string **118** is shown to include a tubular member **116** with a BHA **130** attached at its bottom end. The tubular member **116** may be made up by joining drill pipe sections or it may be a coiled-tubing. A drill bit **150** is shown attached to the bottom end of the BHA **130** for disintegrating the rock formation **119** to drill the wellbore **110** of a selected diameter.

[0011] Drill string **118** is shown conveyed into the wellbore **110** from a rig **180** at the surface **167**. The exemplary rig **180** shown is a land rig for ease of explanation. The apparatus and methods disclosed herein may also be utilized with an offshore rig used for drilling wellbores under water. A rotary table **169** or a top drive (not shown) coupled to the drill string **118** may be utilized to rotate the drill string **118** to rotate the BHA **130** and thus the drill bit **150** to drill the wellbore **110**. A drilling motor **155** (also referred to as the "mud motor") may be provided in the BHA **130** to rotate the drill bit **150**. The drilling motor **155** may be used alone to rotate the drill bit **150** or to superimpose the rotation of the drill bit **150** by the drill string **118**. A control unit (or controller) **190**, which may be a computer-based unit, may be placed at the surface **167** to receive and process data transmitted by the sensors in the drill bit **150** and the sensors in the BHA **130,** and to control selected operations of the various devices and sensors in the BHA **130**. The surface controller **190**, in one embodiment, may include a processor **192,** a data storage device (or a computer-readable medium) **194** for storing data, algorithms and computer programs **196**. The data storage device **194** may be any suitable device, including, but not limited to, a read-only memory (ROM), a random-access memory (RAM), a flash memory, a magnetic tape, a hard disk and an optical disk. During drilling, a drilling fluid **179** from a source thereof is pumped under pressure into the tubular member **116.** The drilling fluid discharges at the bottom of the drill bit **150** and returns to the surface via the annular space (also referred as the "annulus") between the drill string **118** and the inside wall **142** of the wellbore **110**.

[0012] Still referring to **FIG. 1**, the drill bit **150** includes a face section (or bottom section) **151**. The face section **151** or a portion thereof faces the formation in front of the drill bit or the wellbore bottom during drilling. The drill bit **150**, in one aspect, includes one or more adjustable longitudinal members or pads **160** along the longitudinal side **162** of the drill bit **150**. The members **160** are "extensible members" or "adjustable members". A suitable actuation device (or actuation unit) **155** in the BHA **130** or a device **185** in the drill bit **150** or a combination thereof may be utilized to activate the members **160** during drilling of the wellbore **110**. Signals corresponding to the extension of the members **160** may be provided by one or more suitable sensors **178** associated with the members **160** or associated with the actuation units **155** or **185**.

[0013] The BHA **130** may further include one or more downhole sensors (collectively designated by numeral **175**). The sensors **175** may include any number and type of sensors, including, but not limited to, sensors generally known as the measurement-while-drilling (MWD) sensors or the logging-while-drilling (LWD) sensors, and sensors that provide information relating to the behavior of the BHA **130**, such as drill bit rotation (revolutions per minute or "RPM"), tool face, pressure, vibration, whirl, bending, and stick-slip. The BHA **130** may further include a control unit (or controller) **170** configured to control the operation of the members **160** and for at least partially processing data received from the sensors **175** and **178**. The controller **170** may include, among other things, circuits to process the sensor **175** and **178** signals (e.g., amplify and digitize the signals), a processor **172** (such as a microprocessor) to process the digitized signals, a data storage device **174** (such as a solid-state-memory), and a computer program **176**. The processor **172** may process the digitized signals, control the operation of the pads **160**, process data from other sensors downhole, control other downhole devices and sensors, and communicate data information with the controller **190** via a two-way telemetry unit **188**. In one aspect, the controller **170** in the BHA or a controller **185** in the drill bit **150** or the controller **190** at the surface or any combination thereof may adjust the extension of the pads members **160** to control the drill bit fluctuations and/or drilling parameters to increase the drilling effectiveness and to extend the life of the drill bit **150** and the BHA. Increasing the longitudinal gauge pad extension provides a longer vertical section or gauge pad section along the drill bit and acts as a stabilizer, which can effectively reduce vibration, whirl, stick-slip, etc. Reduction in these attributes can increase borehole quality. Similarly, retracting the pads to provide for a shorter vertical section can increase deflection, maneuverability and borehole quality while deviated, including curved and horizontal, portions of a borehole are created. Advantageously, being able to adjust the extension of the adjustable gauge pads **160** allows for enhanced performance and borehole quality in a greater variety of situations.

[0014] **FIG. 2A** shows an exemplary drill bit **200** made according to one embodiment of the disclosure. The drill bit **200** is a bit having a bit body **201** that includes a pin or pin section **210**, a shank **220**,a crown or crown section **230,** and moveable members **260a**. In an exemplary embodiment, the drill bit **200** is any suitable bit, including, but not limited to roller cone, hybrid, and polycrystalline diamond compact (PDC).

[0015] In an exemplary embodiment, the pin **210** has a tapered threaded upper end **212** having threads **212a** thereon for connecting the drill bit **200** to a box end of the drilling assembly **130** (**FIG. 1**). The shank **220** has a lower vertical or straight section **222**. The crown **230** includes a face or face section **232** that faces the formation during drilling.

[0016] In an exemplary embodiment, crown **230** includes cutters **238** on face section **232** as well as lateral extents of crown **230**. Such cutters **238** allow for removal of material in the formation.

[0017] In an exemplary embodiment, the lateral extents of bit body **201** include static gauge pads **234**. Static gauge pads **234** may be provided to combat stick slip, vibration, and whirl, and increase borehole quality. As previously contemplated, the optimal length of gauge pad depends on operating conditions and if vertical, horizontal deviated or curved wellbore path is desired. In certain conditions, a longer overall gauge pad length is desired for drill bit stability, while a shorter overall gauge pad length is desired for increased side cutting or steering capability. As previously contemplated, for wellbores wherein deviated, curved and non-deviated portions are required or desired, a static gauge pad may be optimized for a certain set of parameters and characteristics. In certain embodiments, static gauge pads **234** may be utilized with the movable members **260a** discussed herein.

[0018] In an exemplary embodiment, the drill bit **200** may further include one or more movable members **260a** that extend and retract (or translate) axially. In one aspect, the movable members **260a** (also referred to herein as "movable pads") may be associated with the lateral extents of the bit body **201**. In an exemplary embodiment, the moveable members **260a** are disposed adjacent to the static gauge pads **234** to augment or enhance the characteristics of the static gauge pads **234.** In certain embodiments, the moveable members **260a** are utilized without static gauge pads **234.**

[0019] In exemplary embodiments, by placing the moveable members **260a** near the lateral extents of the bit body **201** the effective length and width of the gauge pads (including gauge pads **234)** can be changed, increasing the stability or increasing the side cutting of the bit **200**.

[0020] In an exemplary embodiment, movable member **260** translates in a cavity or recess **250**. In certain embodiments, the recess **250** is disposed adjacent to the static gauge pads **234.** The movable member **260a** may extend and retract along the axis **203**. In an exemplary embodiment the axis **203** of the moveable member is parallel to longitudinal axis **202** of the drill bit. In other embodiments, the axis **203** is generally substantially longitudinal. Accordingly, movable member **260**a may generally have a longitudinal component of travel but may also move in a radial direction relative to the bit body **201**.

[0021] In certain embodiments, the movable member **260a** may be selectively extended from a retracted location to an extended location. **FIG. 2A** shows the moveable member **260a** in a fully retracted position, while **FIG. 2B** shows moveable member **260b** in a fully extended position. In an exemplary embodiment, the members **260a** can be extended up to 6 inches. In other embodiments, the members may extend any other suitable distance. In certain embodiments, a default location may be selected for the moveable members **260a,b.** The default location may be fully retracted, fully extended or some position therebetween. Accordingly, the moveable members **260a,b** may move relative to the default location.

[0022] Advantageously, moveable member **260a,b** may be positioned to facilitate or limit deflection (tilt) of the drill bit **200** and the resulting wellbore. Such tilt or inclination may be measured within drill bit **200** or from external sensors to provide feedback regarding the position of moveable members **260a,b.** Moveable members **260a,b** may be used in conjunction with deflection tools to facilitate contours and deflections of the wellbore. Similarly, extending, retracting and generally positioning movable members **260a,b** can be used to increase or decrease the amount of side cutting the drill bit **200** performs.

[0023] As may be appreciated, movable member **260a,b** may be extended to any location between the retracted location and the fully extended location by a device in the drill bit **200** such as actuator **270**. In an exemplary embodiment, actuator **270** is any suitable actuator, including, but not limited to hydraulic, electric, mechanical, and remote actuators. Further, in certain embodiments, the actuator **270** and the associated movable member **260a,b** is controlled autonomously via feedback systems, sensors, and integrated controlled. In other embodiments, the actuator **270** is controlled by controlled located at a surface location or from other downhole tools. In certain embodiments, actuator **270** may have communication lines to facilitate control and feedback regarding the moveable members **260a** to ensure desired operation and borehole quality.

[0024] Typically static gauge pads **234** experience loading forces within the wellbore as drill bit **200** is drilling through the formation. Similarly, moveable members **260a,b** may experience loading forces during operation. Advantageously, loading of moveable members **260a, b** is experienced in a generally radial direction. Accordingly, in certain embodiments, the movement of moveable members **260a,b** is generally not resisted or subject to loading forces experienced during operation. Therefore a non-linear amount of force is required to position and maintain the position of the moveable members **260a,b** relative to the displacement and position of the moveable members **260a,b.** Accordingly, actuators **270** are not required to supply as much force to maintain a gauge pad length compared to conventional designs.

[0025] **FIG. 2C** and **FIG. 2D** show partial cross sections of drill bit **200.** In **FIG. 2C** moveable member **260c** utilizes bit body **201** as a bearing surface. Further, in certain embodiments, moveable member **260c** maintains a sliding relationship with retainer **261** to support and capture moveable member **260c.** Similarly, recess **250** (not shown) may be used in conjunction with these bearing surfaces to provide support and a sliding surface for moveable member **260c.** Similarly, **FIG. 2D** shows alternative retainer **261** to retain and support moveable member **260d.** Advantageously, the use of retainers **261** allows for retention of moveable members **260c,d** while providing for loading forces experienced during operation.

[0026] **FIGS. 3A** and **3B** show an alternative embodiment of drill bit **300.** In certain embodiments, moveable member **360a,b** moves along an axis **303** tilted toward the central longitudinal axis **302** of the drill bit **300.** Accordingly, as the moveable member **360a,b** is moved to an extended position, the moveable member **360a,b** moves longitudinally, and radially inward toward the axis **302.** Similarly, as moveable members **360a,b** are retracted, the members **360a,b** move away from axis **302.**

[0027] FIGS. 4A and **4B** show an alternative embodiment of drill bit **400.** In certain embodiments, moveable member **460a,b** moves along an axis **403** tilted away from the central longitudinal axis **402** of the drill bit **400.** Accordingly, as the moveable member **460a,b** is moved to an extended position, the moveable member **460a,b** moves longitudinally, and radially outward away from the axis **402.** Similarly, as moveable members **460a,b** are retracted, the members **460a,b** move radially inward toward the axis **402.**

[0028] Therefore in one aspect, a drill bit for use in a wellbore is disclosed, including a bit body having a longitudinal axis; and at least one moveable member associated with a lateral extent of the bit body, wherein the at least one moveable member is configured to translate in a member axis that is substantially longitudinal. In certain embodiments, the member axis is parallel to the longitudinal axis. In certain embodiments, the member axis is disposed to configure the at least one movable member to extend toward the longitudinal axis. In certain embodiments, the member axis is disposed to configure the at least one movable member to extend away from the longitudinal axis. In certain embodiments, the drill bit includes at least one static member associated with a lateral extent of the bit body. In certain embodiments, the at least one moveable member has a sliding relationship with the bit body. In certain embodiments the drill bit includes at least one bearing surface of the bit body associated with the at least one moveable member. In certain embodiments, the at least one moveable member is retained by the bit body.

[0029] In another aspect, a method of drilling a wellbore is disclosed, including providing a drill bit including a bit body having a longitudinal axis and at least one movable member associated with a lateral extent of the bit body; conveying a drill string into a formation, the drill string having the drill bit at the end thereof; drilling the wellbore using the drill string; and selectively translating at least one movable member in a member axis that is substantially longitudinal. In certain embodiments, the method further includes drilling a vertical section of the wellbore using the drill string; selectively extending the at least one movable member. In certain embodiments, the method further includes drilling a deviated section of the wellbore using the drill string; selectively retracting the at least one movable member. In certain embodiments, the method further includes disposing the member axis to configure the at least one movable member to extend toward the longitudinal axis. In certain embodiments, the method further includes disposing the member axis to configure the at least one movable member to extend away from the longitudinal axis. In certain embodiments, the method further includes sliding the at least one movable member against the bit body.

[0030] In another aspect, a system for drilling a wellbore is disclosed, including a drilling assembly having a drill bit configured to drill a wellbore, the drill bit including: a bit body having a longitudinal axis; at least one moveable member associated with a lateral extent of the bit body, wherein the at least one moveable member is configured to translate in a member axis that is substantially longitudinal. In certain embodiments, the at least one movable member is configured to be controlled autonomously. In certain embodiments, the at least one movable member is configured to be controlled via a controller. In certain embodiments, the controller is a controller of a downhole tool. In certain embodiments, the member axis is disposed to configure the at least one movable member to extend toward the longitudinal axis. In certain embodiments, the member axis is disposed to configure the at least one movable member to extend away from the longitudinal axis.

What is claimed is:

1. A drill bit for use in a wellbore, the drill bit comprising:

a bit body having a longitudinal axis, a crown including a plurality of cutters, wherein the crown is stationary relative to the bit body, and a gauge section associated with a lateral extent of the bit body, the gauge section including:

a static member,

a cavity formed in the bit body adjacent to the static member, and

a moveable member received by the cavity and configured to translate relative to the bit body along a substantially longitudinal member axis, wherein the movable member extends from the cavity to increase a length of the gauge section and retracts into the cavity to decrease the length of the gauge section.

2. The drill bit of claim 1, wherein the substantially longitudinal member axis is parallel to the longitudinal axis.

3. The drill bit of claim 1, wherein the substantially longitudinal member axis is disposed to configure the movable member to extend from the cavity toward the longitudinal axis.

4. The drill bit of claim 1, wherein the substantially longitudinal member axis is disposed to configure the movable member to extend from the cavity away from the longitudinal axis.

5. The drill bit of any one of claims 1 to 4, wherein the moveable member has a sliding relationship with the bit body.

6. The drill bit of any one of claims 1 to 4, further comprising at least one bearing surface of the bit body associated with the moveable member.

7. The drill bit of any one of claims 1 to 4, wherein the moveable member is retained by the bit body.

8. The drill bit of any one of claims 1 to 7, wherein the moveable member is a moveable gauge pad.

9. A method of drilling a wellbore, the method comprising:

providing a drill bit including a bit body having a longitudinal axis, a crown including a plurality of cutters, wherein the crown is stationary relative to the bit body, and a gauge section associated with a lateral extent of the bit body, the gauge section including:

a static member,

a cavity formed in the bit body adjacent to the static member, and

a moveable member received by the cavity and configured to translate relative to the bit body along a substantially longitudinal member axis, wherein the movable member extends from the cavity to increase a length of the gauge section and retracts into the cavity to decrease the length of the gauge section;

conveying a drill string into a formation, the drill string having the drill bit at the end thereof;

drilling the wellbore using the drill string; and

selectively translating the movable member relative to the bit body along the substantially longitudinal member axis in order to change the length of the gauge section.

10. The method of claim 9, further comprising:

drilling a vertical section of the wellbore using the drill string; and

selectively extending the movable member.

11. The method of claim 9 or 10, further comprising:
drilling a deviated section of the wellbore using the drill string; and
selectively retracting the movable member.

12. The method of claim 9, further comprising disposing the substantially longitudinal member axis to configure the movable member to extend from the cavity toward the longitudinal axis.

13. The method of claim 9, further comprising disposing the substantially longitudinal member axis to configure the movable member to extend from the cavity away from the longitudinal axis.

14. The method of any one of claims 9 to 13, further comprising sliding the movable member against the bit body.

15. A system for drilling a wellbore, the system comprising:
a drilling assembly having a drill bit configured to drill the wellbore, the drill bit including:
a bit body having a longitudinal axis, a crown including a plurality of cutters, wherein the crown is stationary relative to the bit body, and a gauge section associated with a lateral extent of the bit body, the gauge section including:
a static member,
a cavity formed in the bit body adjacent to the static member, and
a moveable member received by the cavity and configured to translate relative to the bit body along a substantially longitudinal member axis, wherein the movable member extends from the cavity to increase a length of the gauge section and retracts into the cavity to decrease the length of the gauge section.

16. The system of claim 15, wherein the movable member is configured to be controlled autonomously.

17. The system of claim 15, wherein the movable member is configured to be controlled via a controller.

18. The system of claim 17, wherein the controller is a controller of a downhole tool.

19. The system of any one of claims 15 to 18, wherein the substantially longitudinal member axis is disposed to configure the movable member to extend from the cavity toward the longitudinal axis.

20. The system of any one of claims 15 to 19, wherein the substantially longitudinal member axis is disposed to configure the movable member to extend from the cavity away from the longitudinal axis.

21. The system of any one of claims 15 to 20, wherein the moveable member is a moveable gauge pad.

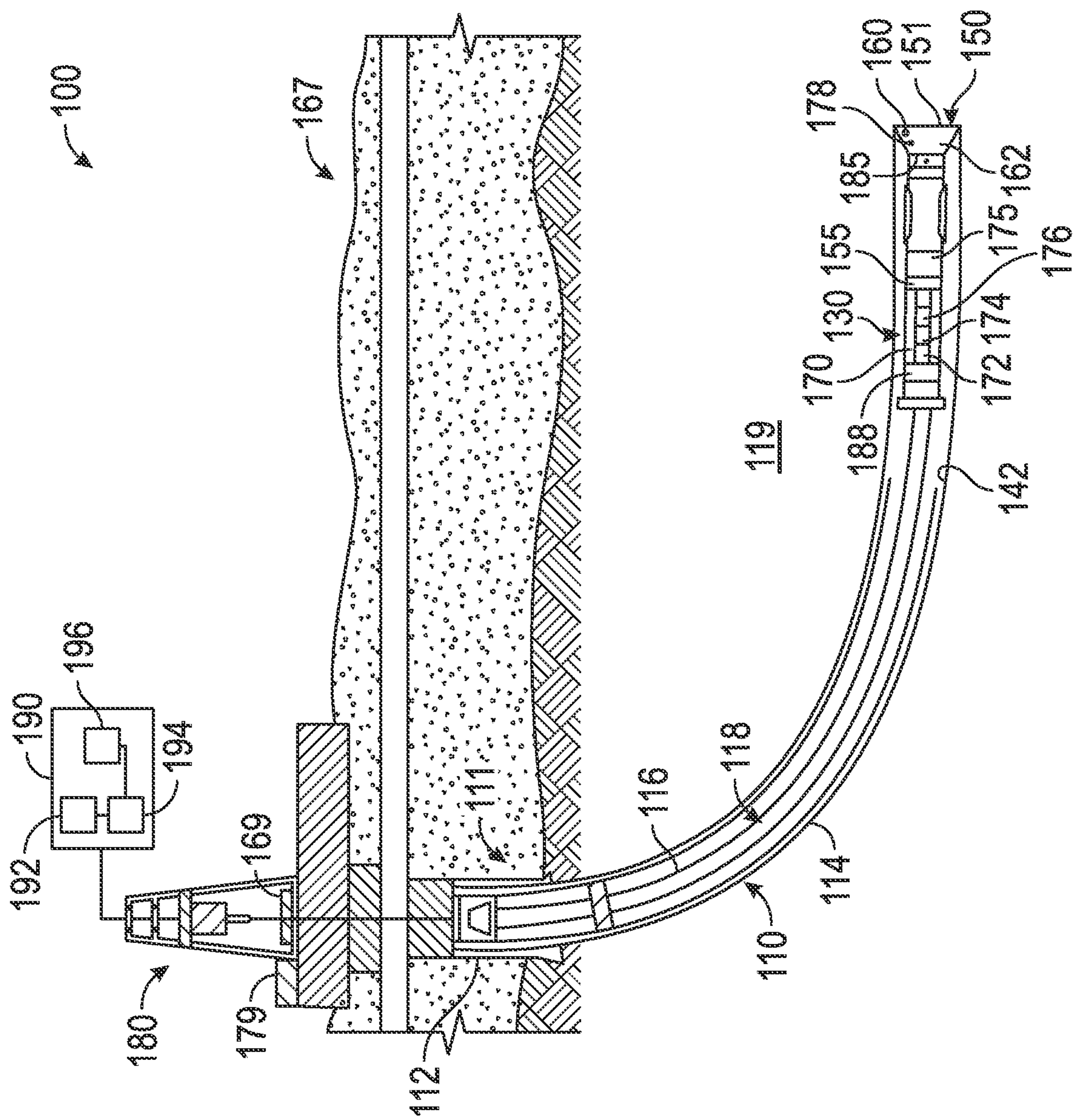
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FIG. 1

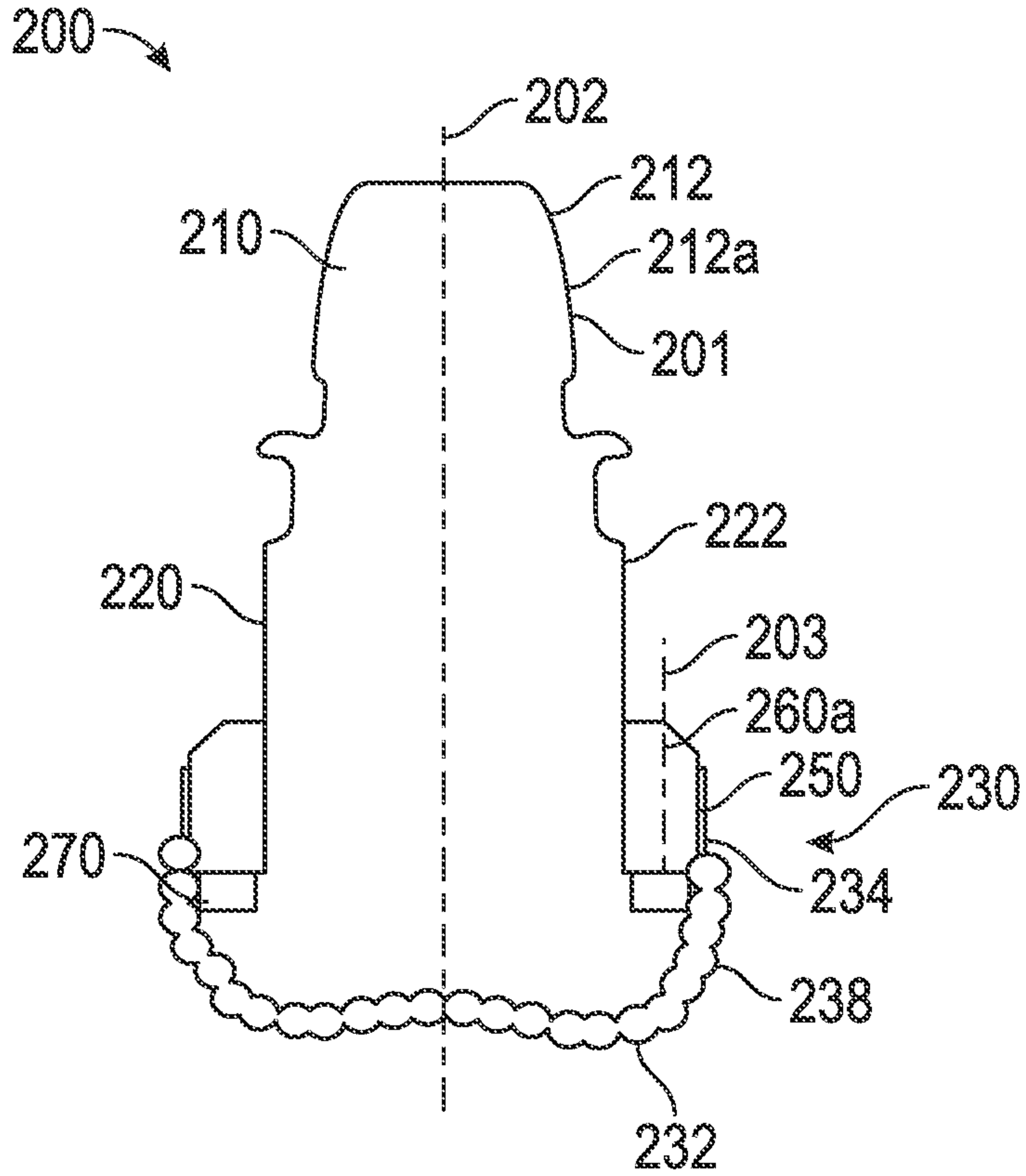
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FIG. 2A

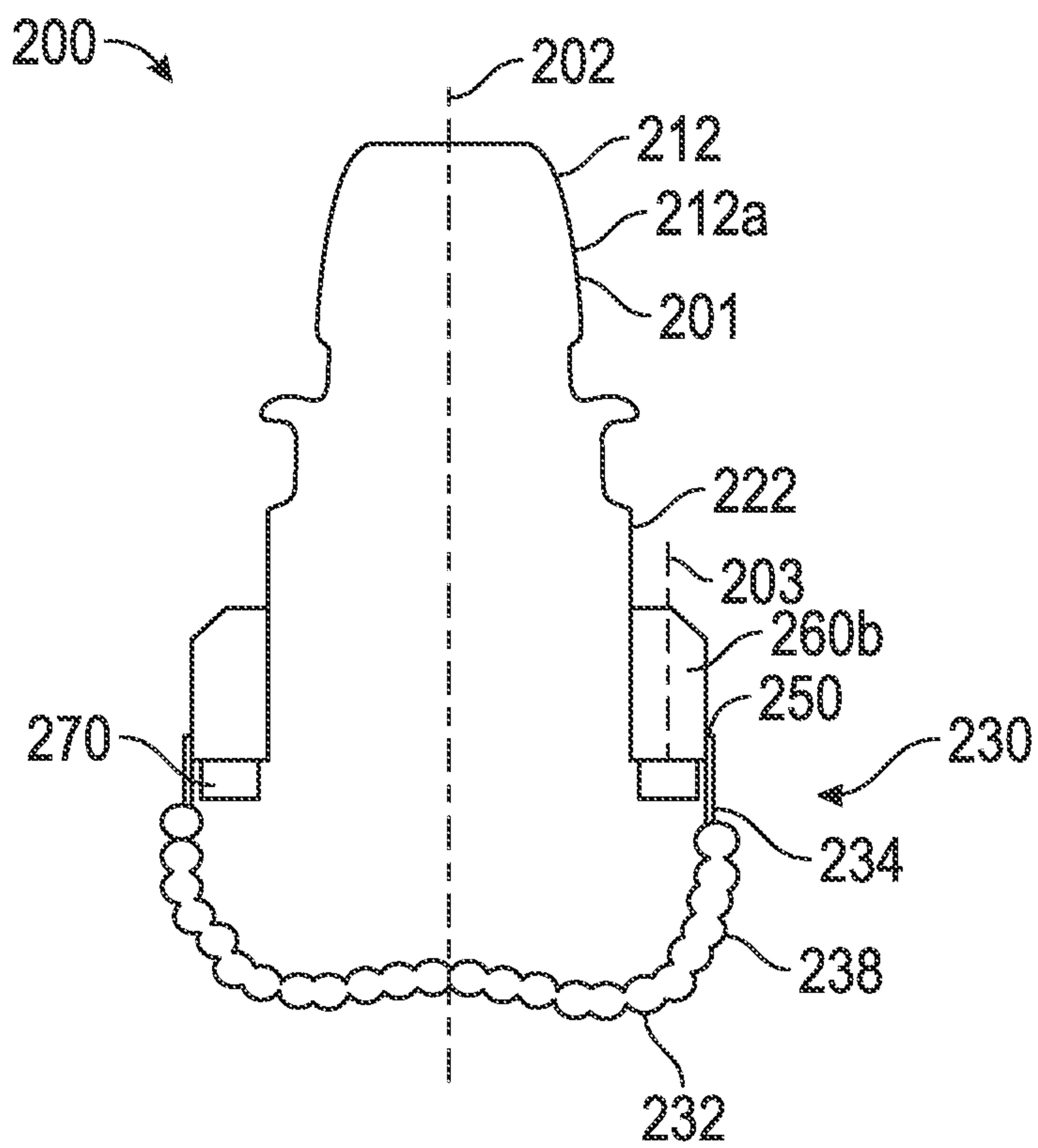
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FIG. 2B

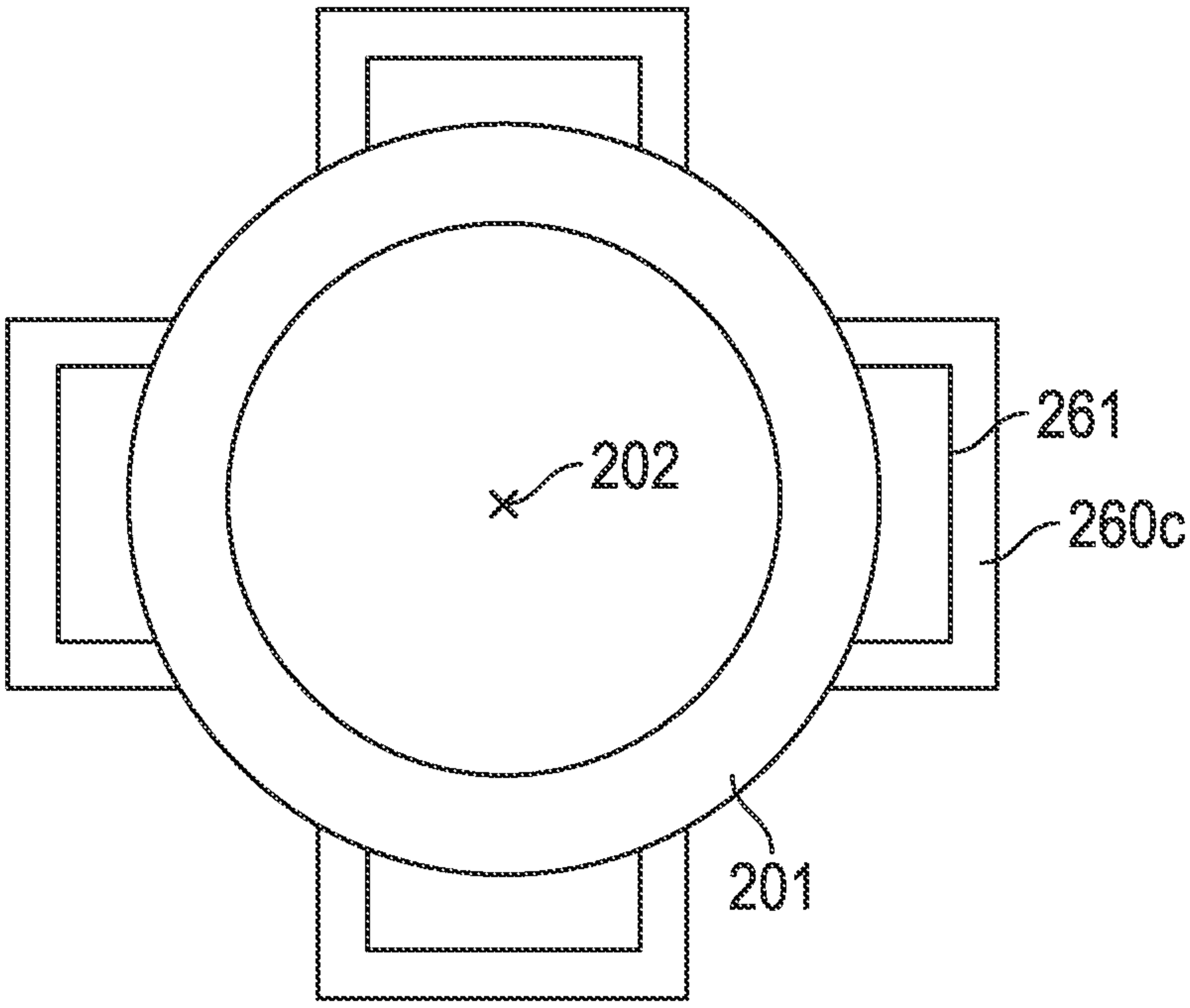

FIG. 2C

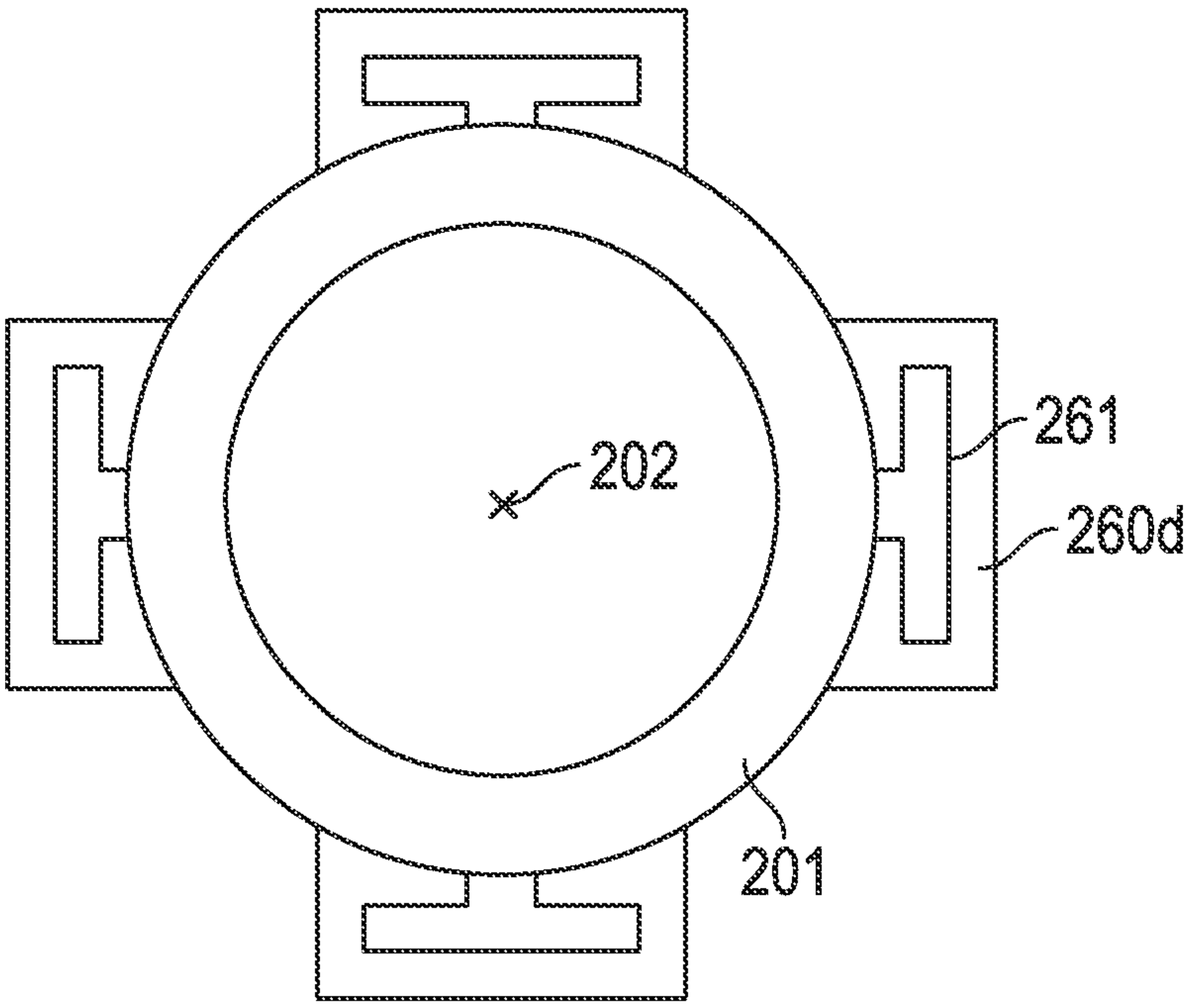

FIG. 2D

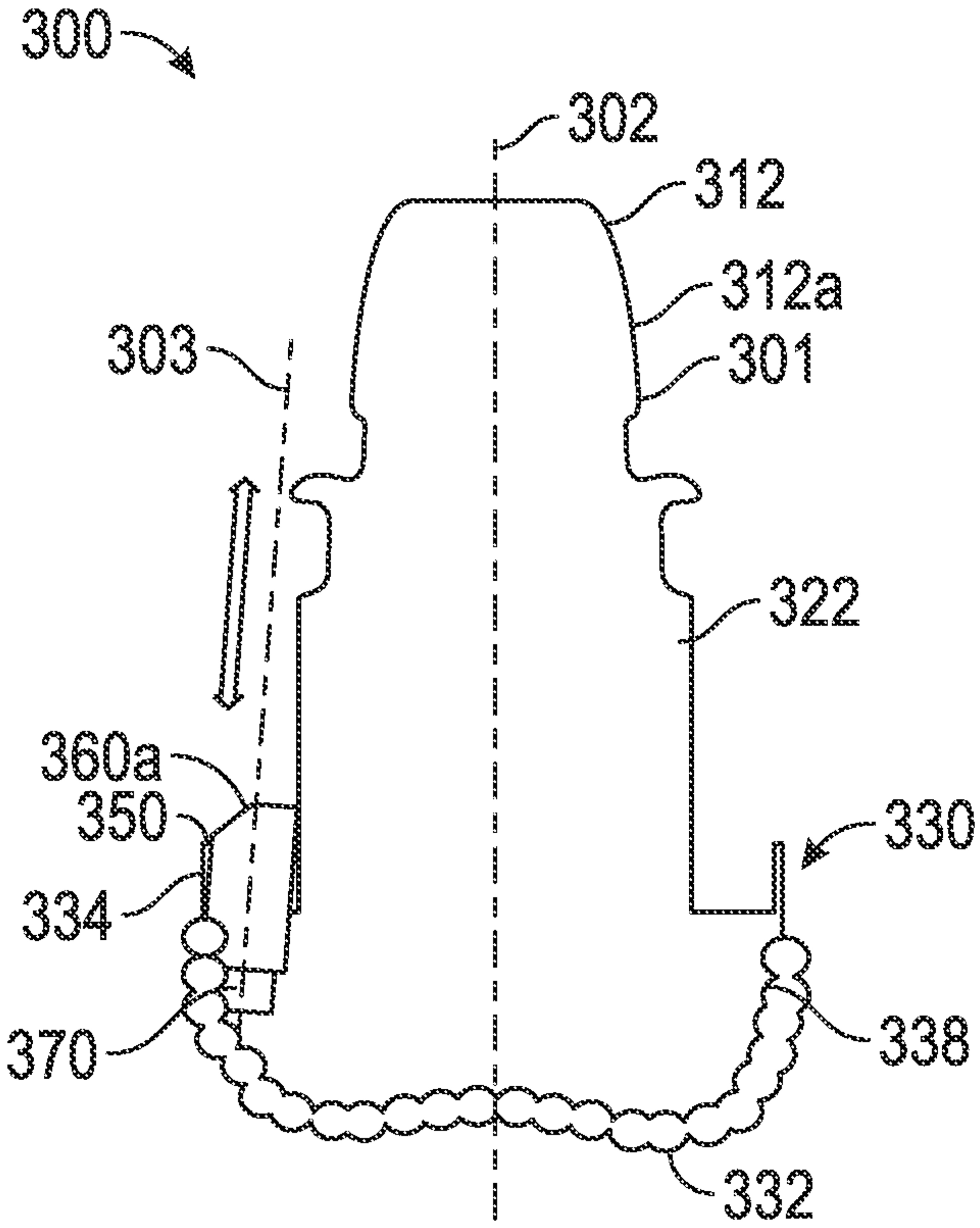
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FIG. 3A

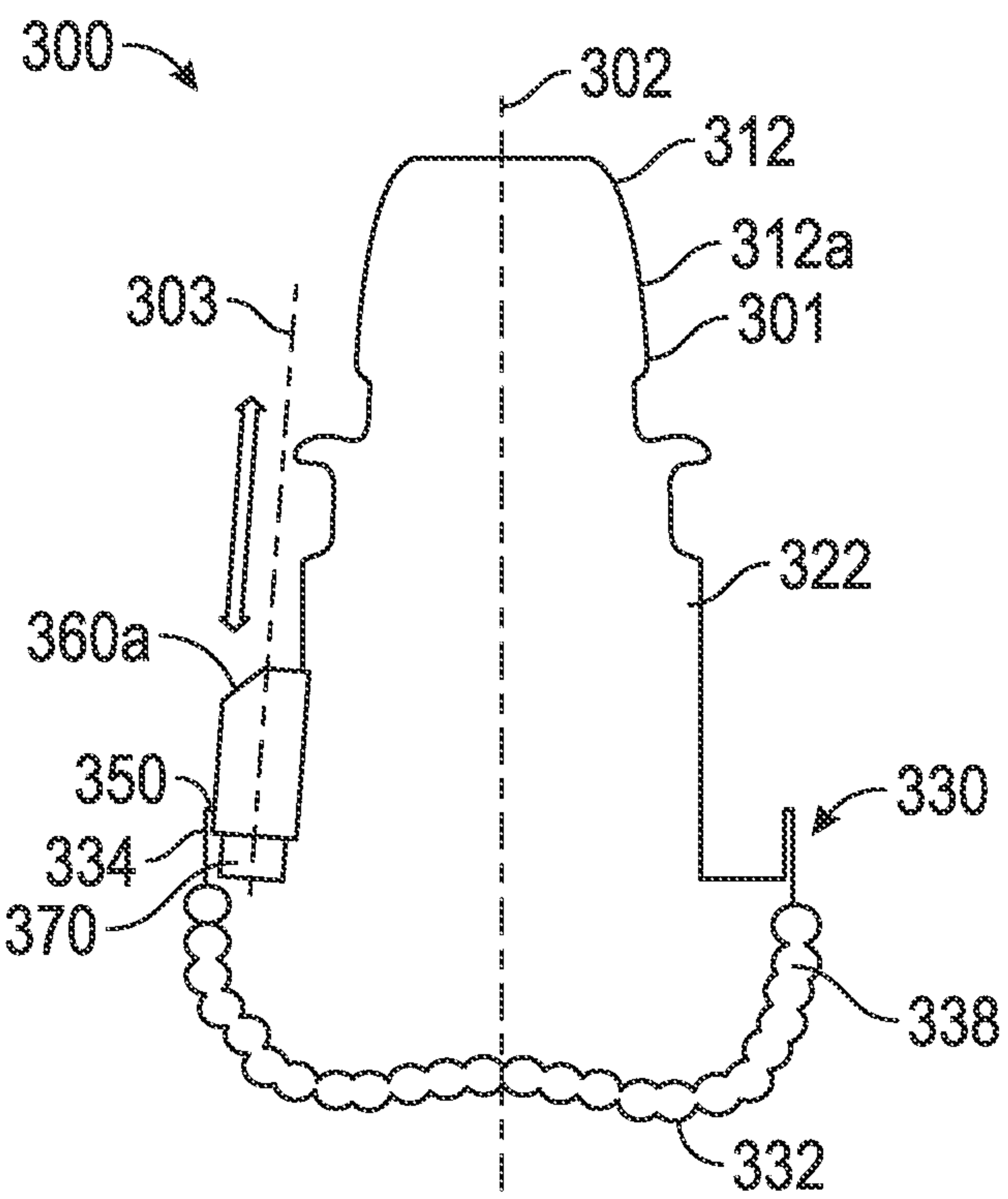
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FIG. 3B

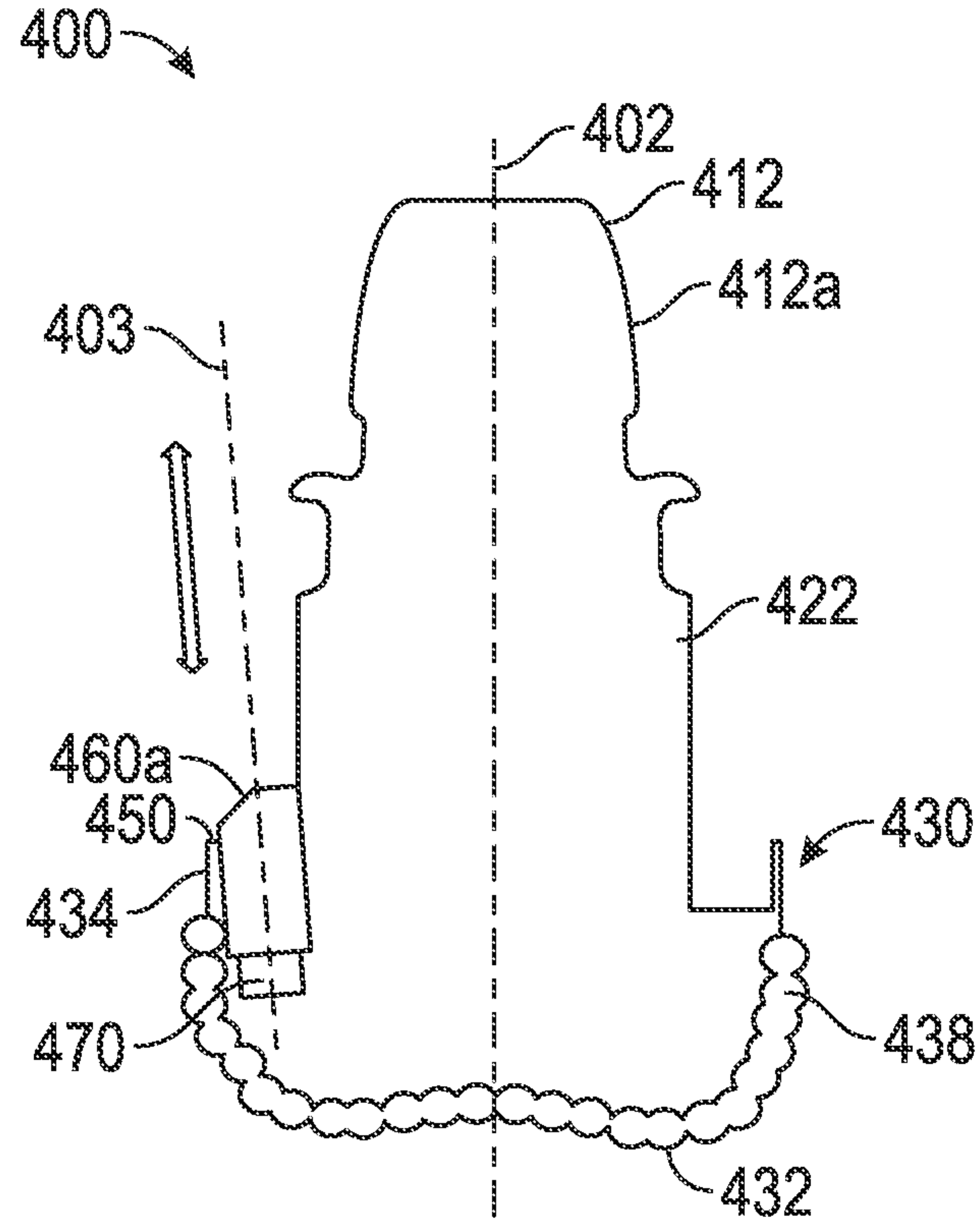
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FIG. 4A

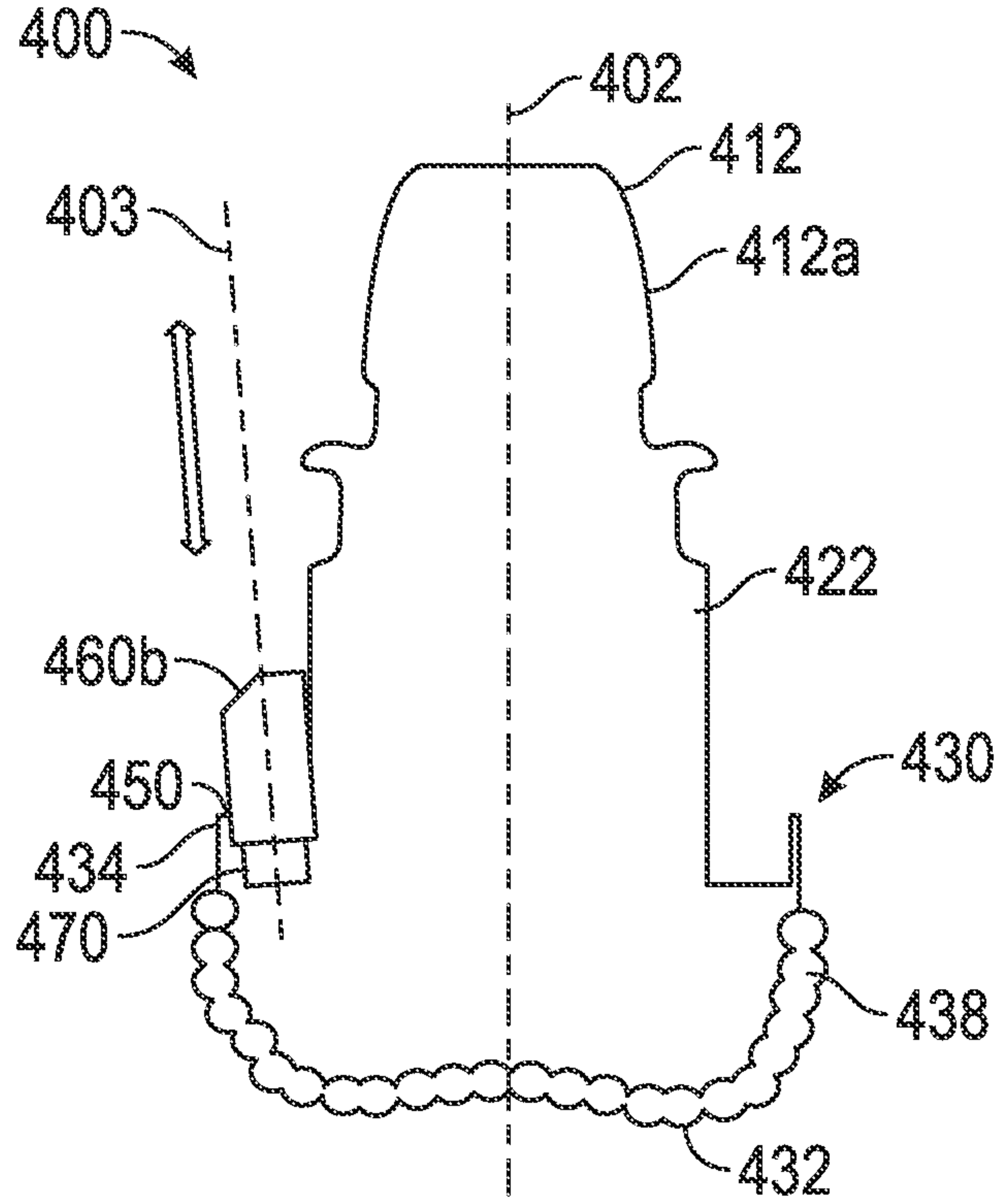
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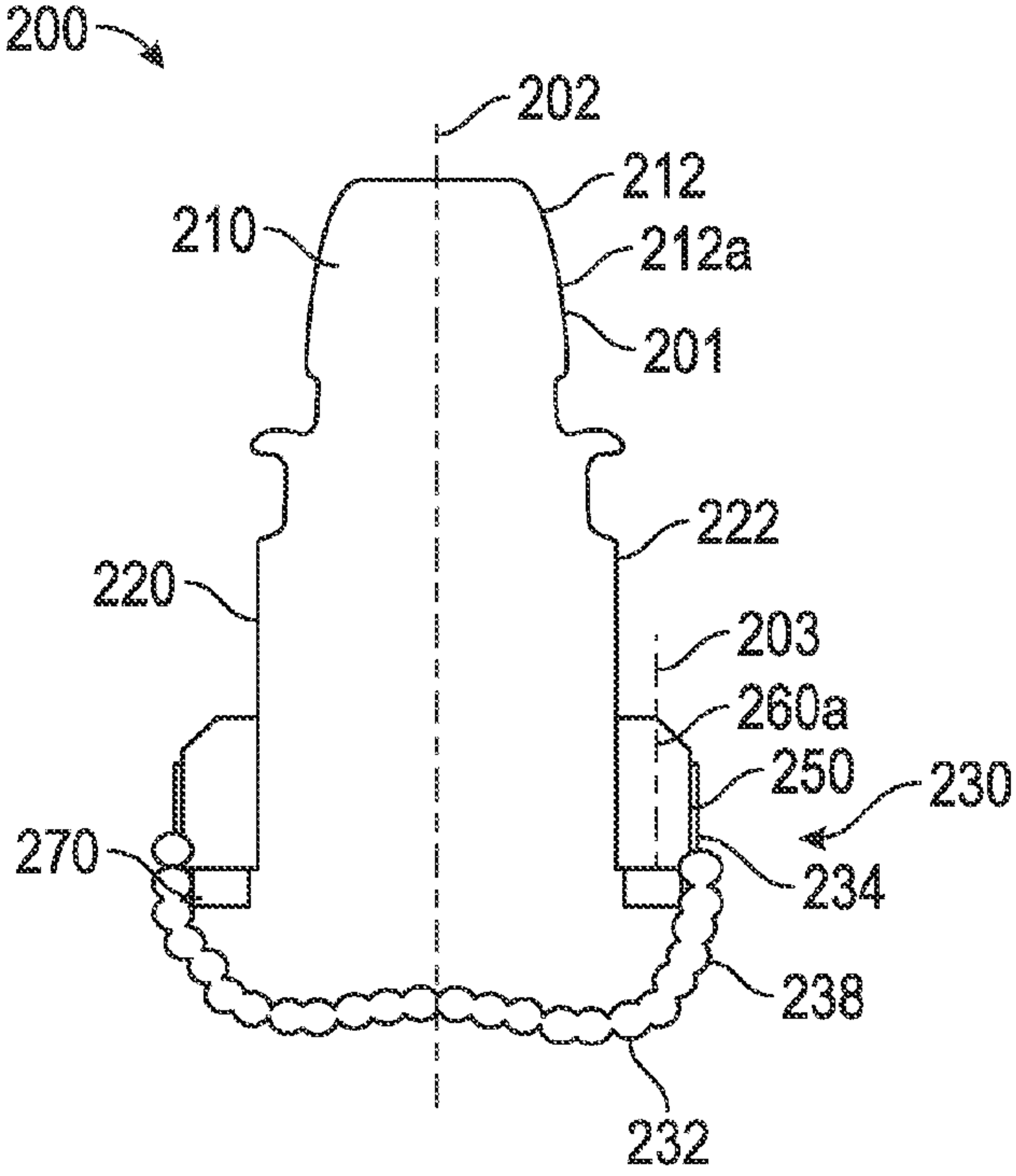
FIG. 4B



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