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(71) Applicant: SAUDI ARABIAN OIL COMPANY
[SA/SA]; 1 Eastern Avenue, Dhahran, 31311 (SA).

(71) Applicant (for AG only): ARAMCO SERVICES COMPANY [US/US]; 9009 West Loop South, Houston, Texas 77210-4535 (US).

(72) Inventor: ZHOU, Shaohua; Saudi Aramco, P.O. Box 8803, Dhahran, 31311 (SA).

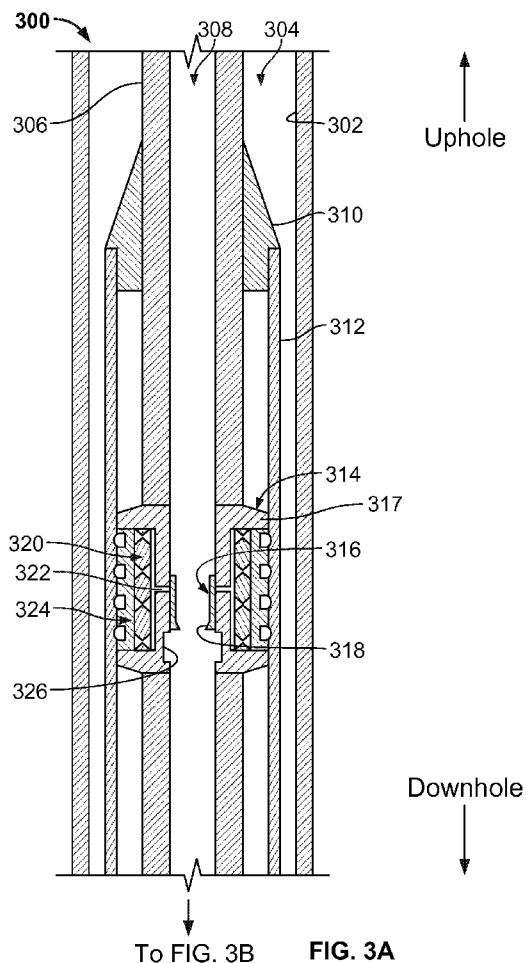
(74) Agents: BRUCE, Carl E. et al.; Fish & Richardson P.C., P.O. Box 1022, Minneapolis, Minnesota 55440-1022 (US).

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(54) Title: WELLBORE CENTRALIZER

(57) Abstract: A wellbore tool centralizer includes a housing (317) that includes a bore to receive a wellbore tubular (306); an expandable element (324) radially mounted to the housing; and a fluid pathway (322) that extends through the housing to fluidly connect the bore and the expandable element and expose the expandable element to a fluid pressure sufficient to radially expand the expandable element.





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WELLBORE CENTRALIZER

CLAIM OF PRIORITY

[0001] This application claims priority to U.S. Patent Application No. 14/736,575 filed on June 11, 2015, the entire contents of which are hereby incorporated by reference.

TECHNICAL FIELD

[0002] This disclosure relates to positioning a tubular member in a wellbore and, more particularly, to positioning a tubular member in a wellbore with a downhole tool centralizer.

BACKGROUND

[0003] During a well construction process, an expandable liner can be installed to provide zonal isolation or to isolate zones that experience fluid circulation issues. Sometimes failures of expandable liners, such as a failure to expand, occurs, which then leaves an annulus unisolated or unplugged. In such cases, the unexpanded (and uncemented) liner may impose a challenge to further wellbore operations. For example, without a pressure seal at a top of a liner, then a drilling operation may not be able to restart, particularly if there is severe loss zone that is not effectively isolated. Consequently, drilling operation may lose a considerable length of existing wellbore and sidetrack operations may be required above the unexpanded liner top in order to continue the process of well construction. Further, remedial actions may require to cut and retrieve liner out of the wellbore. This can lead to the loss of rig days or even weeks. Conventional liner hanger systems, however, may not offer any effective remedial option in terms of post equipment failure solution.

SUMMARY

[0004] In a general implementation, a wellbore tool centralizer includes a housing that includes a bore to receive a wellbore tubular; an expandable element radially mounted to the housing; and a fluid pathway that extends through the housing

to fluidly connect the bore and the expandable element and expose the expandable element to a fluid pressure sufficient to radially expand the expandable element.

[0005] A first aspect combinable with the general implementation further includes a slideable sleeve positionable within the bore of the housing and adjustable in response to a fluid pressure in the wellbore tubular.

[0006] In a second aspect combinable with any of the previous aspects, the slideable sleeve includes a seat arranged to receive a member circulated through the wellbore tubular.

[0007] In a third aspect combinable with any of the previous aspects, the slideable sleeve is adjustable based on the fluid pressure uphole of the member positioned in the seat.

[0008] In a fourth aspect combinable with any of the previous aspects, the housing includes a recess positioned to receive the seat of the sliding sleeve to release the member from the seat.

[0009] In a fifth aspect combinable with any of the previous aspects, the slideable sleeve is adjustable between a first position fluidly sealing a first end of the fluid pathway and a second position fluidly exposing the first end of the fluid pathway.

[0010] In a sixth aspect combinable with any of the previous aspects, the first end of the fluid pathway is adjacent an inner radial surface of the housing, the fluid pathway including a second end adjacent the expandable element.

[0011] A seventh aspect combinable with any of the previous aspects further includes a bearing surface radially mounted to the expandable element that is configured to engage a wellbore surface.

[0012] In an eighth aspect combinable with any of the previous aspects, the bearing surface includes rollers.

[0013] In a ninth aspect combinable with any of the previous aspects, the expandable element includes one or more expandable disks.

[0014] In a tenth aspect combinable with any of the previous aspects, the fluid pathway extends through the housing in a radial direction from a centerline of the bore.

[0015] Another general implementation includes a method for positioning a tubular in a wellbore, including positioning a centralizer mounted on a tubular member in a wellbore, the centralizer including a housing that includes a bore to receive the tubular; circulating a wellbore fluid through the wellbore at a particular fluid pressure;

adjusting the centralizer to expose, based on the wellbore fluid at the particular fluid pressure, a fluid pathway that extends through the housing to the wellbore fluid; expanding an expandable element that is radially mounted to the housing with the wellbore fluid at the particular fluid pressure.

[0016] A first aspect combinable with the general implementation further includes radially adjusting a bearing surface of the centralizer with the expanded expandable element; contacting the bearing surface to a wellbore wall; and radially positioning the tubular at or near a centerline of the wellbore.

[0017] A second aspect combinable with any of the previous aspects further includes performing an operation in the wellbore with the tubular positioned at or near the centerline of the wellbore; subsequent to performing the operation, deflating the expandable element to remove contact between the bearing surface and the wellbore wall; and tripping the centralizer out of the wellbore.

[0018] In a third aspect combinable with any of the previous aspects, adjusting the centralizer includes adjusting a slideable sleeve positioned in the bore of the housing to expose the fluid pathway to the wellbore fluid.

[0019] In a fourth aspect combinable with any of the previous aspects, adjusting the slideable sleeve includes circulating a member through the wellbore to land in a seat of the slideable sleeve; circulating the wellbore fluid through the wellbore at the particular fluid pressure; and moving the slideable sleeve in the bore to fluidly connect the fluid pathway to the bore.

[0020] A fifth aspect combinable with any of the previous aspects further includes further moving the slideable sleeve in the bore with the wellbore fluid to allow the seat to fall into a recess of the housing; and circulating the member out of the seat and past the slideable sleeve in the bore..

[0021] In a sixth aspect combinable with any of the previous aspects, expanding the expandable element includes expanding one or more expandable disks radially mounted in or to the housing.

[0022] A seventh aspect combinable with any of the previous aspects further includes circulating the wellbore fluid, at the particular fluid pressure, through the fluid pathway from the bore.

[0023] In an eighth aspect combinable with any of the previous aspects, circulating the wellbore fluid includes circulating the wellbore fluid in a radial

direction from the bore to an inlet of the fluid pathway, and through the fluid pathway, to an outlet of the fluid pathway adjacent the expandable element.

[0024] Implementations of a liner top system according to the present disclosure may include one or more of the following features. For example, the liner top system may provide for a simple and robust tool design as compared to conventional top packer used to provide a seal. Further, the liner top system according to the present disclosure may offer a quick installation of a liner top pack-off element as compared to conventional systems. As another example, the liner top system may eliminate a liner hanger and a top packer for non-reservoir sections of the wellbore, thereby decreasing well equipment cost. Further, the described implementations of the liner top system may more effectively operate, as compared to conventional systems, in deviated or horizontal wells in which a liner weight is typically supported by a wellbore due to gravity. As yet another example, the liner top system may mitigate potential rig non-productive time and save well cost as, for example, a complimentary tool string to either an expandable line system or a regular tight clearance drilling liner system. In addition the liner top system may be utilized to provide a cost effective solution to fix a production packer leak by installing a pack-off element at the top of tie-back or polish bore receptacle.

[0025] The details of one or more implementations of the subject matter described in this disclosure are set forth in the accompanying drawings and the description below. Other features, aspects, and advantages of the subject matter will become apparent from the description, the drawings, and the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] FIG. 1 is a schematic diagram of an example wellbore system that includes a liner top system.

[0027] FIGS. 2A-2E are schematic diagrams that show an operation of an example implementation of a liner top system that includes an expandable centralizer and an expandable pack-off element.

[0028] FIGS. 3A-3B are schematic diagrams that show another example implementation of a liner top system that includes an expandable centralizer and an expandable pack-off element.

[0029] FIGS. 4A-4F are schematic diagrams that show an operation of the example implementation of the liner top system of FIGS. 3A-3B.

[0030] FIG. 5 is an illustration of an example pack-off element for a liner top system.

DETAILED DESCRIPTION

[0031] FIG. 1 is a schematic diagram of an example wellbore system 100 that includes a liner top system 140. Generally, FIG. 1 illustrates a portion of one embodiment of a wellbore system 100 according to the present disclosure in which the liner top system 140 may be run into a wellbore 120 to install a liner 145 adjacent a casing 125 (for example, a production or other casing type). In some aspects, the liner top system 140 may also centralize the liner 145 prior to installation, as well as install a sealing member (for example, a packer, liner top packer, or pack-off element) at a top of the liner 145.

[0032] In some aspects, the liner 145 is a bare casing joint, which may replace a conventional liner hanger system (for example, that includes a liner hanger with slips, liner top packer and tie-back or polish bore receptacle). For example, in cases in which the wellbore 120 is a deviated or horizontal hole section, a weight of the liner may be supported by the wellbore 120 (for example, due to gravity and a wellbore frictional force), thus eliminating or partially eliminating the need for liner hanger slips. Thus, while wellbore system 100 may include a conventional liner running tool that engages and carries the liner weight into the wellbore 120 in addition to the illustrated liner top system 140, FIG. 1 does not show this conventional liner running tool.

[0033] As shown, the wellbore system 100 accesses a subterranean formations 110, and provides access to hydrocarbons located in such subterranean formation 110. In an example implementation of system 100, the system 100 may be used for a drilling operation to form the wellbore 120. In another example implementation of system 100, the system 100 may be used for a completion operation to install the liner 145 after the wellbore 120 has been completed. The subterranean zone 110 is located under a terranean surface 105. As illustrated, one or more wellbore casings, such as a surface (or conductor) casing 115 and an intermediate (or production) casing 125, may be installed in at least a portion of the wellbore 120.

[0034] Although illustrated in this example on a terranean surface 105 that is above sea level (or above a level of another body of water), the system 100 may be deployed on a body of water rather than the terranean surface 105. For instance, in some embodiments, the terranean surface 105 may be an ocean, gulf, sea, or any other body of water under which hydrocarbon-bearing formations may be found. In short, reference to the terranean surface 105 includes both land and water surfaces and contemplates forming and developing one or more wellbore systems 100 from either or both locations.

[0035] In this example, the wellbore 120 is shown as a vertical wellbore. The present disclosure, however, contemplates that the wellbore 120 may be vertical, deviated, lateral, horizontal, or any combination thereof. Thus, reference to a “wellbore,” can include bore holes that extend through the terranean surface and one or more subterranean zones in any direction.

[0036] The liner top system 140, as shown in this example, is positioned in the wellbore 120 on a tool string 205 (also shown in FIGS. 2A-2E). The tool string 205 is formed from tubular sections that are coupled (for example, threadingly) to form the string 205 that is connected to the liner top system 140. The tool string 205 may be lowered into the wellbore 120 (for example, tripped into the hole) and raised out of the wellbore 120 (for example, tripped out of the hole) as required during a liner top operation or otherwise. Generally, the tool string 205 includes a bore therethrough (shown in more detail in FIGS. 2A-2E) through which a fluid may be circulated to assist in or perform operations associated with the liner top system 140.

[0037] FIGS. 2A-2E are schematic diagrams that show an operation of an example implementation of a liner top system 200 that includes an expandable centralizer 230 and an expandable pack-off element 235. In some implementations, the liner top system 200 may be used as liner top system 140 in the well system 100 shown in FIG. 1. As illustrated in FIG. 2A, the liner top system 200 is positioned on the tool string 205 in the wellbore that includes casing 125 cemented (with cement 150) to form an annulus 130 between the casing 125 and the tool string 205.

[0038] In this example implementation, the liner top system 200 includes a debris cover 210 that rides on the tool string 205 and includes one or more fluid bypass 215 that are axially formed through the cover 210. The debris cover 210 includes, in this example, a cap 220 that is coupled to cover 210 and seals or helps seal the debris

cover 210 to the tool string 205. In example aspects, the debris cover 210 may prevent or reduce debris (for example, filings, pieces of rock, and otherwise) within a wellbore fluid from interfering with operation of the liner top system 200.

[0039] As shown, a liner top 225 is coupled to a portion of the debris cover 210 and extends within the wellbore 120 toward a downhole end of the wellbore 120. Positioned radially between the liner top 225 and the tool string 205, in FIG. 2A, are a centralizer 230, an expandable element 235, and a stabilizer 240. FIG. 2A shows the liner top system 200 in a ready position in the wellbore 120, prior to an operation with the liner top system 200. For example, FIG. 2A shows the liner top system 200 positioned in the wellbore subsequent to an operation to cement (with cement 150) the casing 125 in place.

[0040] FIG. 2B illustrates the liner top system 200 as an operation to secure the liner top 225 to the casing 125 begins. As shown in this example, the liner top 225 is separated from the debris cover 210 and moved relatively downhole of, for example, the centralizer 230 and the expandable element 225. For instance, as shown in FIG. 2B, the liner top 225 may be moved downhole relatively by moving (for example, pulling) the tool string 205 uphole toward a terranean surface, thereby moving the centralizer 230 and expandable element 235 toward the surface and away from the liner top 225.

[0041] FIG. 2C illustrates a next step of the liner top system 200 in operation. As shown in FIG. 2C, the centralizer 230 is expanded (for example, fluidly, mechanically, or a combination thereof) to radially contact the casing 125. With radially contact, the centralizer 230 adjusts the tool string 205 in the wellbore 120 so that a base pipe of the tool string is radially centered with respect to the casing 125. For example, in a deviated, directional, or non-vertical wellbore 125, the centralizer 230 that is expanded to engage the casing 125 may ensure or help ensure that the tool string 205 correctly performs the liner top operations (for example, by ensuring that the expandable element 235 is radially centered).

[0042] As further shown in FIG. 2C, at least a portion of the expandable element 235 is also expanded (for example, fluidly, mechanically, or a combination thereof) to contact the casing 125. In this figure, for instance, a pack-off seal 245 of the expandable element 235 is expanded radially from the element 245 to engage the casing 125.

[0043] FIG. 2D illustrates a next step of the liner top system 200 in operation. As shown in this figure, the pack-off seal is separated (for example, sheared) from the expandable element 235 to remain in contact with casing 125. During or subsequent to the separation of the pack-off seal 245 from the expandable element 235, the tool string 205 may be adjusted so as to move the liner top 225 into position between the pack-off seal 245 and the expandable element 235. For example, the tool string 205 may be moved downhole so that the liner top 225 is positioned in place to contact and engage the pack-off seal. As shown in FIG. 2D, the pack-off seal 245 seals between a top of the liner 225 (at an uphole end of the liner 225) and the casing 125.

[0044] FIG. 2D illustrates a next step of the liner top system 200 in operation. In this illustration, once the liner top 225 has engaged the pack-off seal 245, the tool string 205 may be removed from the wellbore 120. As shown in FIG. 2E, for instance, a full bore of the liner 225 (and casing 125 above the liner 225) may then be used for fluid production (for example, hydrocarbon production) as well as fluid injection, as well as for running additional tool strings into the wellbore 120.

[0045] FIGS. 3A-3B are schematic diagrams that show another example implementation of a liner top system 300 that includes an expandable centralizer 314 and an expandable pack-off element 328. As shown in FIG. 3A, the liner top system 300 includes a base pipe 306 in position in a wellbore that includes (in this example) a casing 302. A radial volume of the wellbore between the base pipe 306 and the casing 302 includes an annulus 304. The base pipe 306 includes a bore 308 therethrough.

[0046] A top, or uphole, portion of the liner top system 300 is shown in FIG. 3A. The example liner top system 300 includes a cover 310 that is secured to, or rides, the base pipe 306. A liner 312 is, at least initially, coupled to the cover 310 and the cover 310 seals against entry of particles between the liner 312 and the base pipe 306 as shown in FIG. 3A.

[0047] Positioned downhole of the cover 310 and also riding or secured to the base pipe 306 is the centralizer 314. In this example embodiment, the centralizer 314 includes a housing 317 that rides on the base tubing 306.

[0048] In this example, the centralizer 314 is radially expandable from the base pipe 306 and includes a sliding sleeve 316 that is moveable to cover or expose one or more fluid inlets 322 to the bore 308 of the base pipe 306. In this example, the sliding sleeve 316 includes a narrowed diameter seat 318 at a downhole end of the sleeve 316.

[0049] The centralizer 314 also includes an expandable disk assembly 320 that is radially positioned within the centralizer 314 and is expandable by, for example, an increase in fluid pressure in the bore 308. The centralizer 314 further includes a radial bearing surface 324 (for example, rollers, ball bearings, skates, or other low friction surface) that forms at least a portion of an outer radial surface of the centralizer 314. As shown in this example, the bearing surface 324 is positioned radially about the expandable disk assembly 320 in the centralizer 314.

[0050] In this example, the centralizer 314 also includes a recess 326 that forms a larger diameter portion of the centralizer 314 relative to the sliding sleeve 316. As shown here, in an initial position, the sliding sleeve 316 is located uphole of the recess 326 and covering the fluid inlets 322.

[0051] FIG. 3B illustrates a downhole portion of the liner top system 300. As shown, the liner 312 extends downward (in this position of the system 300) past the pack-off element 328 that is detachably coupled to the base pipe 306. As illustrated in this example, the pack-off element 328 is coupled to the base pipe 306 with one or more retaining pins 330. The illustrated pack-off element 328 also includes a radially gap 332 that separates the element 328 from the base pipe 306 at a downhole end of the element 328. The pack-off element 328 also includes a radial shoulder 315 near an uphole end of the element 328 that couples the element 328 to the base pipe 306.

[0052] The liner top system 300 also includes a wedge 334 that rides on the base pipe 306 and is positioned downhole of the pack-off element 328. The wedge 334, in this example, includes a ramp 336 toward an uphole end of the wedge 334 and a shoulder 346 at a downhole end of the wedge 334. As shown in the position of FIG. 3B, the wedge 334 is coupled to the base pipe 306 with one or more locking pins 340. The locking pins 340 are positioned in engaging contact with biasing members 338, which, in the illustrated position of FIG. 3B, are recessed in the base pipe 306.

[0053] The liner top system 300 also includes an inner sleeve 342 positioned within the bore 308 of the base pipe 306. In an initial position, the inner sleeve 342 is positioned radially adjacent the biasing members 338 to constrain the retaining pins 340 in place in coupling engagement with the wedge 334. As shown in FIG. 3B, the inner sleeve 342 includes a seat 344 in a downhole portion of the sleeve 342. A diameter of the seat 344, relative to a diameter of the sleeve 342, is smaller in this example.

[0054] The illustrated liner top system 300 includes a spring member 348 (for example, one or more compression springs, one or more Belleville washers, one or more piston members) positioned radially around the base pipe 306 within a chamber 350. The spring member 348 is positioned downhole of the wedge 334 and adjacent the shoulder 346 of the wedge 334.

[0055] The liner top system 300 also includes a stop ring 352 positioned on an inner radial surface of the bore 308. As illustrated, the stop ring 352 is coupled to or with the base pipe 306 downhole of the inner sleeve 342 and has a diameter less than the bore 308.

[0056] FIGS. 4A-4F are schematic diagrams that show an operation of the example implementation of the liner top system of FIGS. 3A-3B. In this example, the operation includes installing the liner 312 in sealing contact with at least a portion of the pack-off element 328, which is, in turn, sealingly engaged with the casing 302 to prevent fluid or debris from circulating downhole between the liner 312 and the casing 302. FIGS. 3A-3B illustrate the liner top system 300 positioned at a location in a wellbore prior to commencement of a liner top operation. Prior operations, such as a cementing operation to cement the casing 302 in place. For instance, prior to a liner top operation, the liner top system 300 may be run into the wellbore to a particular depth. Fluid (for example, water or otherwise) may be circulated to clean the bore 308 and the annulus 304. Next, a spacer and cement may be pumped (for example, per a cementing plan). Next, a dart (for example, wiper dart) may be inserted into the wellbore and the cement may be displaced to secure the casing 302 to a wall of the wellbore. Once the dart lands properly, fluid pressure may be conventionally used to initiate expansion of the liner 312 from a downhole end of the liner 312 to an uphole end of the liner 312. In some cases, however, a pressure leak or other problem may occur causing insufficient expansion (or no expansion) of the liner 312. In such cases, the liner top system 300 may be used to install and seal a top of the liner 312 to the casing 312 with the pack-off element 328. In alternative aspects, the liner top system 300 may be a primary liner installation system in the wellbore.

[0057] For example, FIGS. 4A-4B illustrates the liner top system 300 pulled uphole so that the pack-off element 328 is uphole of the top of the liner 312. In some aspects, the liner 312 is first decoupled from the cover 310 and then the base pipe 306

is pulled uphole so that the pack-off element 328 is slightly above the top of the liner 312.

[0058] Once the base pipe 306 is pulled up so that the pack-off element 328 is above the top of the liner 312, the centralizer 314 may be expanded to center the liner top system 300 in the wellbore. A ball 402 is pumped through the bore 308 by a wellbore fluid 400 until the ball 402 lands on the seat 318. As fluid pressure of the fluid 400 is increased, the ball 402 shifts the sleeve 316 in a downhole direction until the fluid inlets 322 are uncovered.

[0059] Once uncovered, continued fluid pressure by the fluid 400 may be applied to the one or more disks 320 through the fluid inlets 322. The one or more disks 320 are then expanded by the fluid pressure to push the bearing surface 324 against the casing 302.

[0060] As the fluid pressure radially expands the disks 320 to engage the bearing surface 324 with the casing 302, the base pipe 306 (and components riding on the base pipe 306) is centered in the wellbore. Continued fluid pressure by the fluid 400 may further move the sleeve 316 downhole so that the seat 318 retracts (for example, radially) into the recess 326. As the seat 318 retracts into the recess 326, the ball 402 continues to circulate downhole through the bore 308 until it lands on the seat 344, as shown in FIG. 4B.

[0061] Turning to FIG. 4C, as fluid pressure of the fluid 400 is increased, the ball 402 shifts the sleeve 342 downhole to uncover the locking pins 340. Prior to uncovering, the locking pins 340 couple the wedge 334 to the base pipe 306 by being set in notches 360 formed in the radially inner surface of the wedge 334. As shown in FIG. 4C, once the sleeve 344 moves to uncover the locking pins 340, the biasing member 342 urges the locking pins 340 out of the notches 360 to decouple the wedge 334 from the base pipe 306. As further shown in FIG. 4C, the sleeve 342 may be urged downhole by the pressurized ball 402 until the sleeve 342 abuts the stop ring 352. Once the pack-off element 328 is set at a final position (for example, as shown in FIG. 4F), if desired, increased pressure on the ball 402 may shear the seat 344 and circulate the ball 402 further downhole, thereby facilitating fluid communication through the bore 308 of the liner hanger system 300.

[0062] Turning to FIG. 4D, once the wedge 334 is decoupled from the base pipe 306, the wedge 334 is urged uphole by the power spring 348. For example, when

constrained in the spring chamber 350 as the shoulder 346 abuts the power spring 348, the power spring 348 may store a significant magnitude of potential energy in compression. Once unconstrained, for example, by decoupling the wedge 334 from the base pipe 306, the potential energy in compression can be released to apply force against the shoulder 346 of the wedge 334 by the power spring 348. The wedge 334 may then be driven uphole toward the pack-off element 328. As the ramp 336 slides under the pack-off element 328 (for example, into the slot 332 of the element 328), the pack-off element 328 expands to engage the casing 302 as shown in FIG. 4D.

[0063] Turning to FIG. 4E, the wedge 334 expands the pack-off element 328 from the base pipe 306 to shear the retaining pins 330, thus allowing the pack-off element 328 to decouple from the base pipe 306. The pack-off element 328 is expanded until it engages the casing 302. Once the pack-off element 328 is engaged to the casing 302 (for example, expanded into plastic deformation against the casing 302), the power spring 348 retracts to a neutral state (for example, neither in compression nor tension).

[0064] As shown in FIG. 4E, once the pack-off element 328 is engaged with the casing 302, the centralizer 314 may be moved downhole (for example, on the base pipe 306 to contact a top surface of the expanded pack-off element 328. Once contact is made, the centralizer 314 may be used to push the pack-off element 328 downhole until the element 328 engages a top of the liner 312.

[0065] Once engaged with the top of the liner 312, the expanded pack-off element 328 may seal a portion of the wellbore between the liner 312 and the casing 302 so that, for example, no or little fluid may circulate from uphole between the liner 312 and the casing 302. Turning to FIG. 4F, once the pack-off element 328 is expanded to the casing 302 and engaged with the liner 312, the base pipe 306 may be removed from the wellbore, thereby allowing full fluid communication through the wellbore and liner 312.

[0066] FIG. 5 is an illustration of an example pack-off element 500 for a liner top system. In some implementations, the pack-off element 500 may be used in the liner top system 300. As illustrated in this example implementation, the pack-off element 500 includes a tubular 504 that includes retaining pins 502 and slotted fingers 506 that extend radially around the tubular 504. The tubular also includes a solid

wedge cone 508 at a bottom end of the tubular 504. As shown in FIG. 5, the pack-off element 500 can ride on a base pipe 510.

[0067] In operation, as described more fully with respect to FIG. 4A-4F, a wedge may ride on the base pipe 510 and urged under the solid wedge cone 508 (for example, by a biasing member). As the wedge expands the solid wedge cone 508, the slotted fingers 506 are expanded radially outward to engage a casing or wellbore wall.

[0068] A number of implementations have been described. Nevertheless, it will be understood that various modifications may be made without departing from the spirit and scope of the disclosure. For example, example operations, methods, or processes described herein may include more steps or fewer steps than those described. Further, the steps in such example operations, methods, or processes may be performed in different successions than that described or illustrated in the figures. Accordingly, other implementations are within the scope of the following claims.

WHAT IS CLAIMED IS:

1. A wellbore tool centralizer, comprising:
a housing that comprises a bore to receive a wellbore tubular;
an expandable element radially mounted to the housing; and
a fluid pathway that extends through the housing to fluidly connect the bore and the expandable element and expose the expandable element to a fluid pressure sufficient to radially expand the expandable element.
2. The wellbore tool centralizer of claim 1, further comprising a slideable sleeve positionable within the bore of the housing and adjustable in response to a fluid pressure in the wellbore tubular.
3. The wellbore tool centralizer of claim 2, wherein the slideable sleeve comprises a seat arranged to receive a member circulated through the wellbore tubular.
4. The wellbore tool centralizer of claim 3, wherein the slideable sleeve is adjustable based on the fluid pressure uphole of the member positioned in the seat.
5. The wellbore tool centralizer of claim 3, wherein the housing comprises a recess positioned to receive the seat of the sliding sleeve to release the member from the seat.
6. The wellbore tool centralizer of claim 2, wherein the slideable sleeve is adjustable between a first position fluidly sealing a first end of the fluid pathway and a second position fluidly exposing the first end of the fluid pathway.
7. The wellbore tool centralizer of claim 6, wherein the first end of the fluid pathway is adjacent an inner radial surface of the housing, the fluid pathway comprising a second end adjacent the expandable element.
8. The wellbore tool centralizer of claim 1, further comprising a bearing surface radially mounted to the expandable element that is configured to engage a wellbore surface.
9. The wellbore tool centralizer of claim 8, wherein the bearing surface comprises rollers.

10. The wellbore tool centralizer of claim 1, wherein the expandable element comprises one or more expandable disks.

11. The wellbore tool centralizer of claim 1, wherein the fluid pathway extends through the housing in a radial direction from a centerline of the bore.

12. A method for positioning a tubular in a wellbore, comprising:
positioning a centralizer mounted on a tubular member in a wellbore, the centralizer comprising a housing that comprises a bore to receive the tubular;
circulating a wellbore fluid through the wellbore at a particular fluid pressure;

adjusting the centralizer to expose, based on the wellbore fluid at the particular fluid pressure, a fluid pathway that extends through the housing to the wellbore fluid;

expanding an expandable element that is radially mounted to the housing with the wellbore fluid at the particular fluid pressure.

13. The method of claim 12, further comprising:
radially adjusting a bearing surface of the centralizer with the expanded expandable element;
contacting the bearing surface to a wellbore wall; and
radially positioning the tubular at or near a centerline of the wellbore.

14. The method of claim 13, further comprising:
performing an operation in the wellbore with the tubular positioned at or near the centerline of the wellbore;
subsequent to performing the operation, deflating the expandable element to remove contact between the bearing surface and the wellbore wall; and
tripping the centralizer out of the wellbore.

15. The method of claim 12, wherein adjusting the centralizer comprises adjusting a slideable sleeve positioned in the bore of the housing to expose the fluid pathway to the wellbore fluid.

16. The method of claim 13, wherein adjusting the slideable sleeve comprises:

circulating a member through the wellbore to land in a seat of the slideable sleeve;

circulating the wellbore fluid through the wellbore at the particular fluid pressure; and

moving the slideable sleeve in the bore to fluidly connect the fluid pathway to the bore.

17. The method of claim 16, further comprising:

further moving the slideable sleeve in the bore with the wellbore fluid to allow the seat to fall into a recess of the housing; and

circulating the member out of the seat and past the slideable sleeve in the bore..

18. The method of claim 12, wherein expanding the expandable element comprises expanding one or more expandable disks radially mounted in or to the housing.

19. The method of claim 12, further comprising circulating the wellbore fluid, at the particular fluid pressure, through the fluid pathway from the bore.

20. The method of claim 19, wherein circulating the wellbore fluid comprises circulating the wellbore fluid in a radial direction from the bore to an inlet of the fluid pathway, and through the fluid pathway, to an outlet of the fluid pathway adjacent the expandable element.

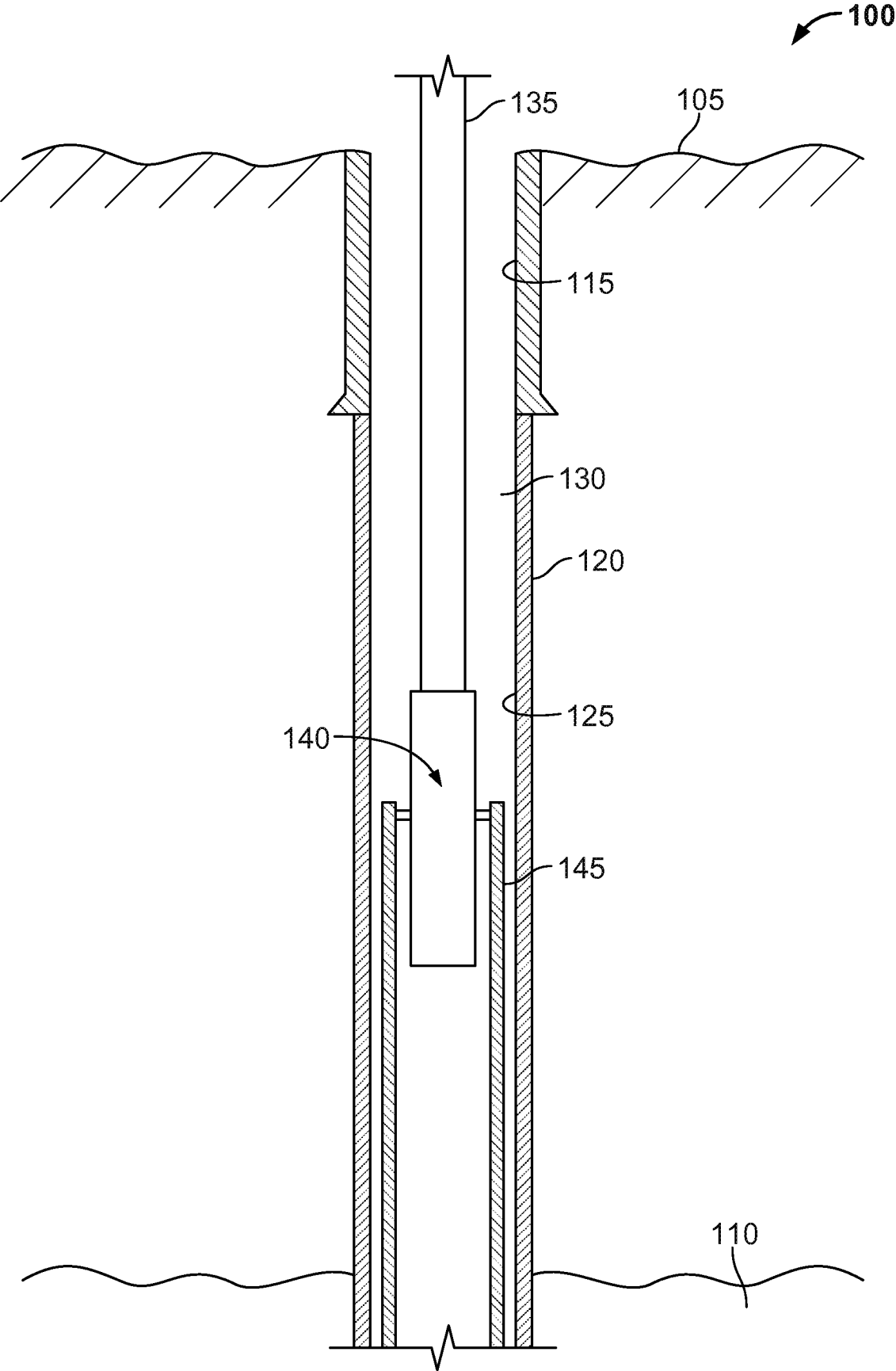


FIG. 1

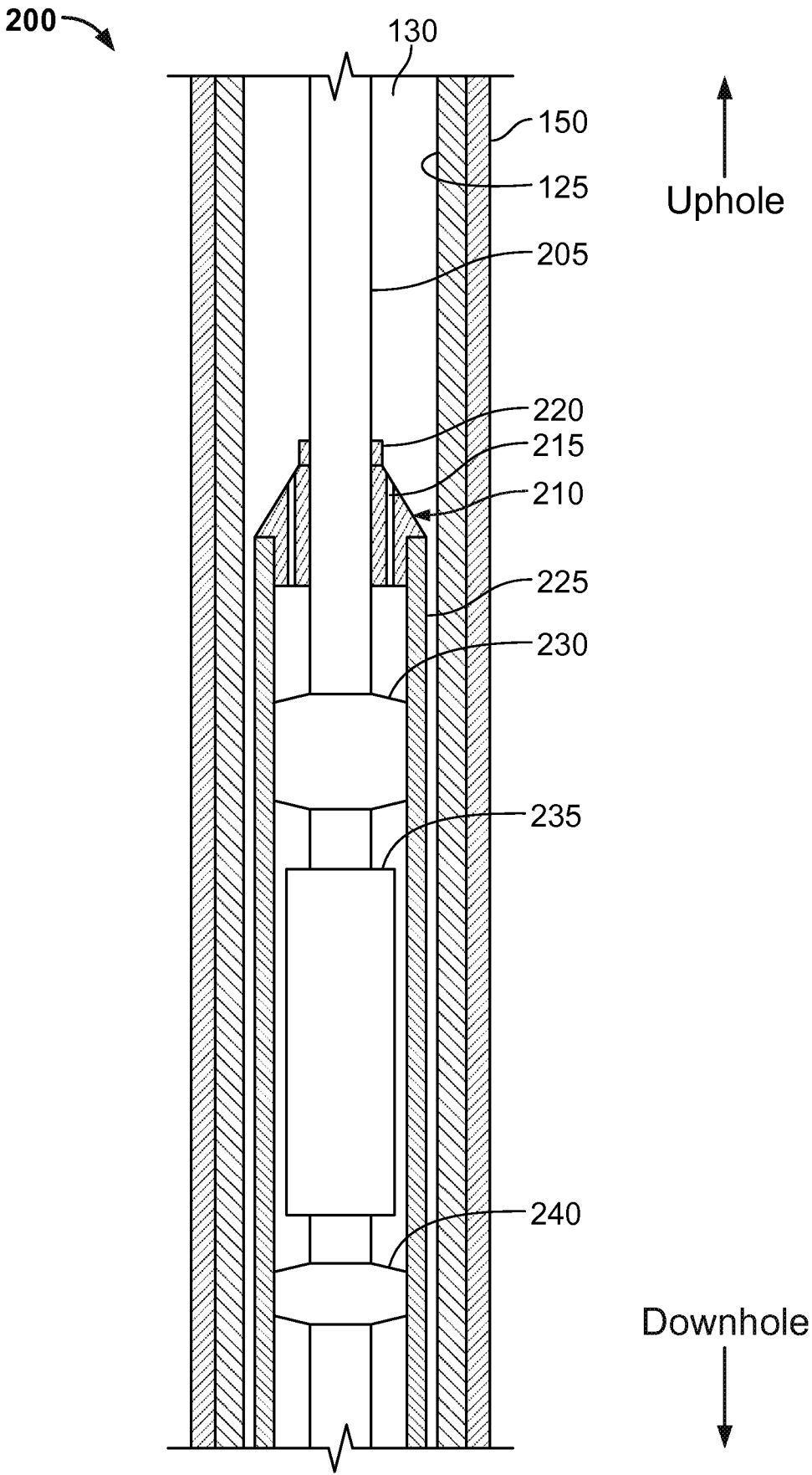


FIG. 2A

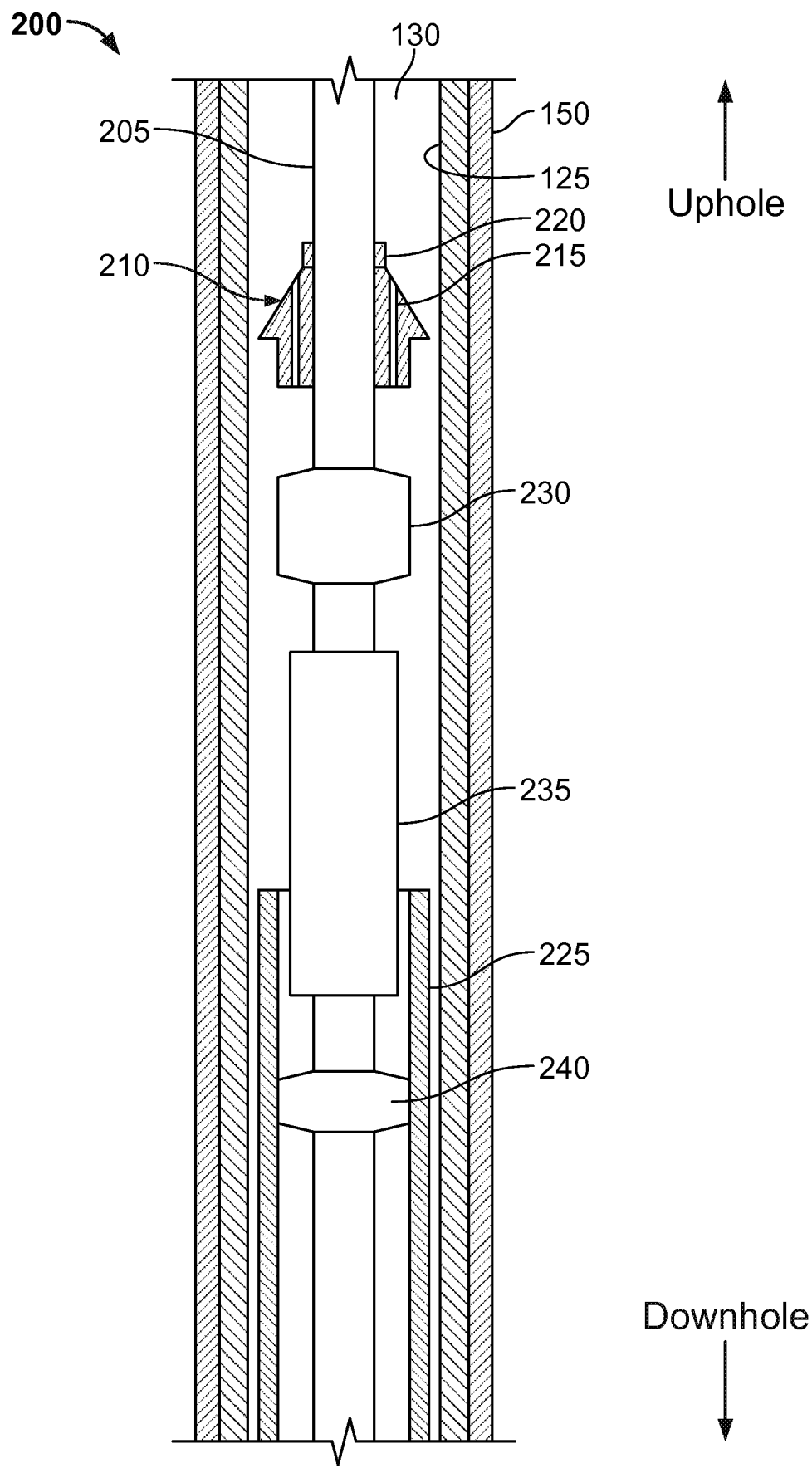


FIG. 2B

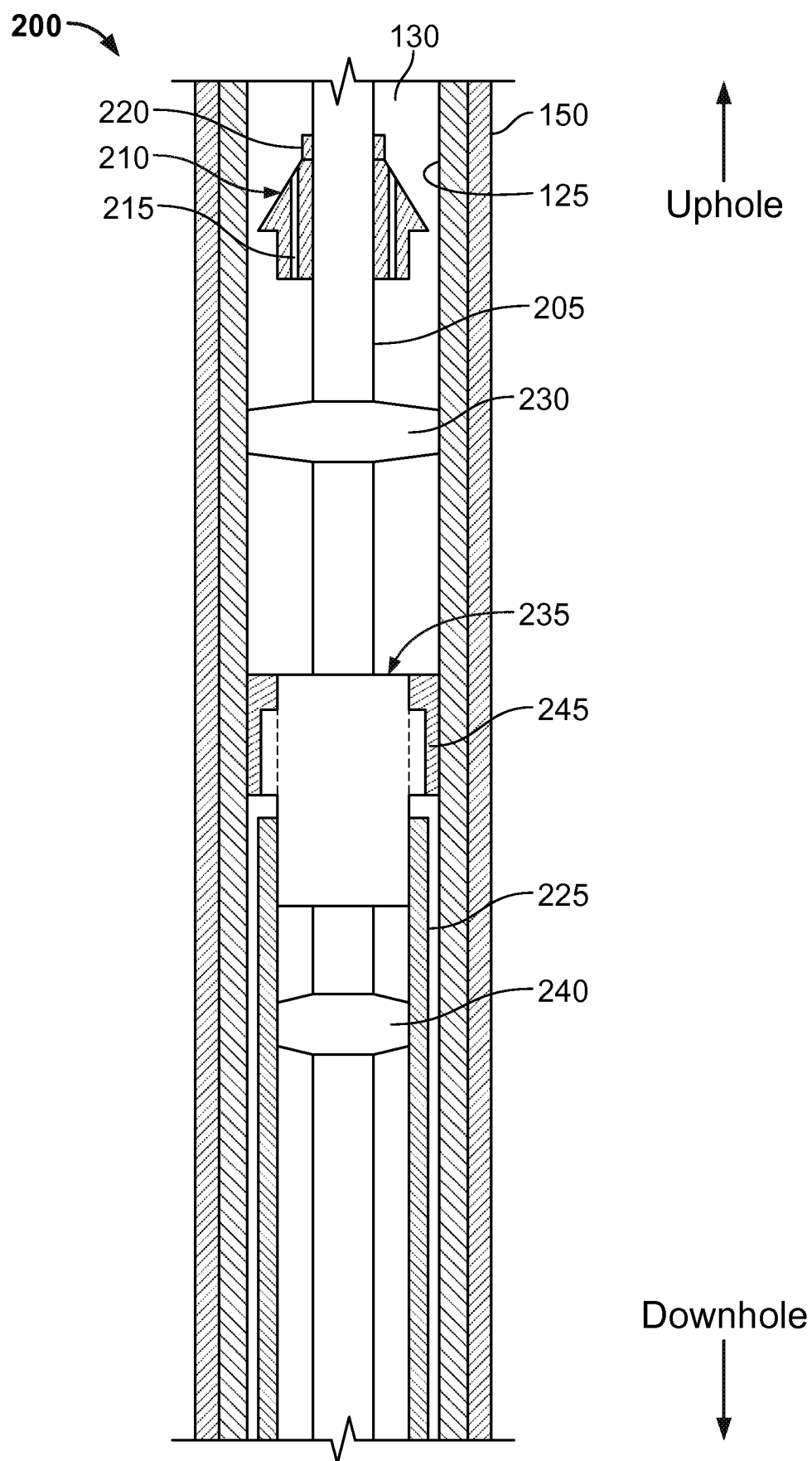


FIG. 2C

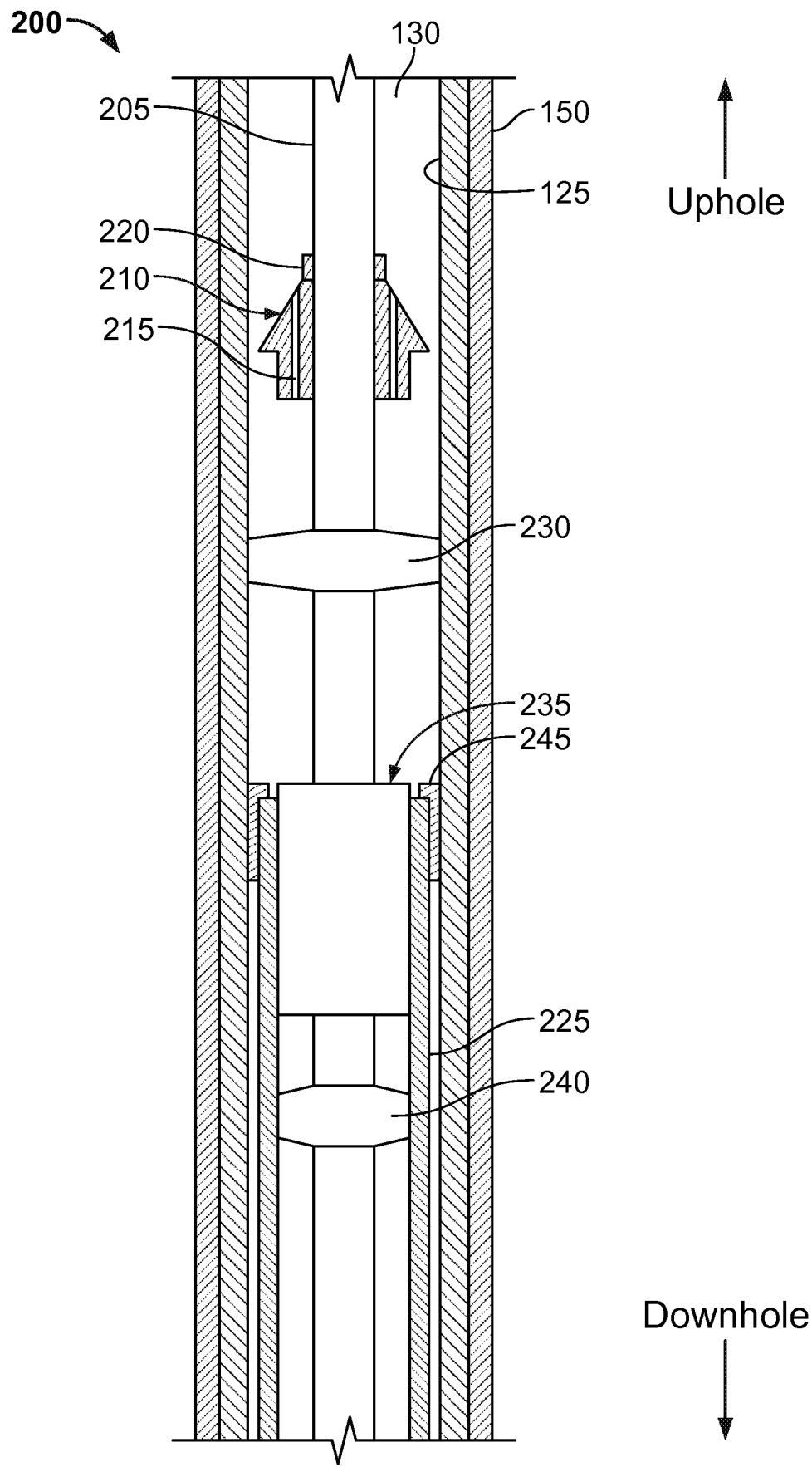


FIG. 2D

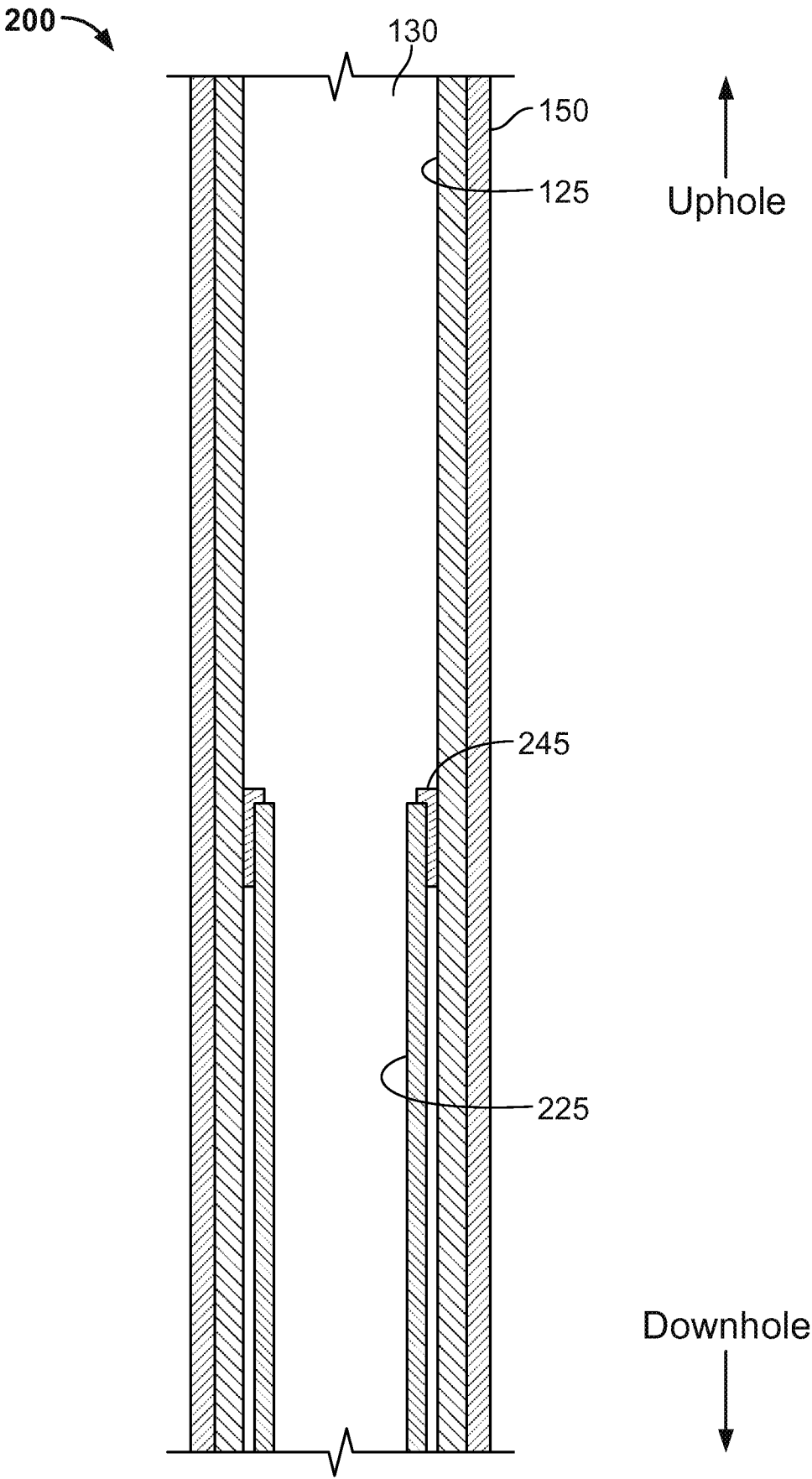
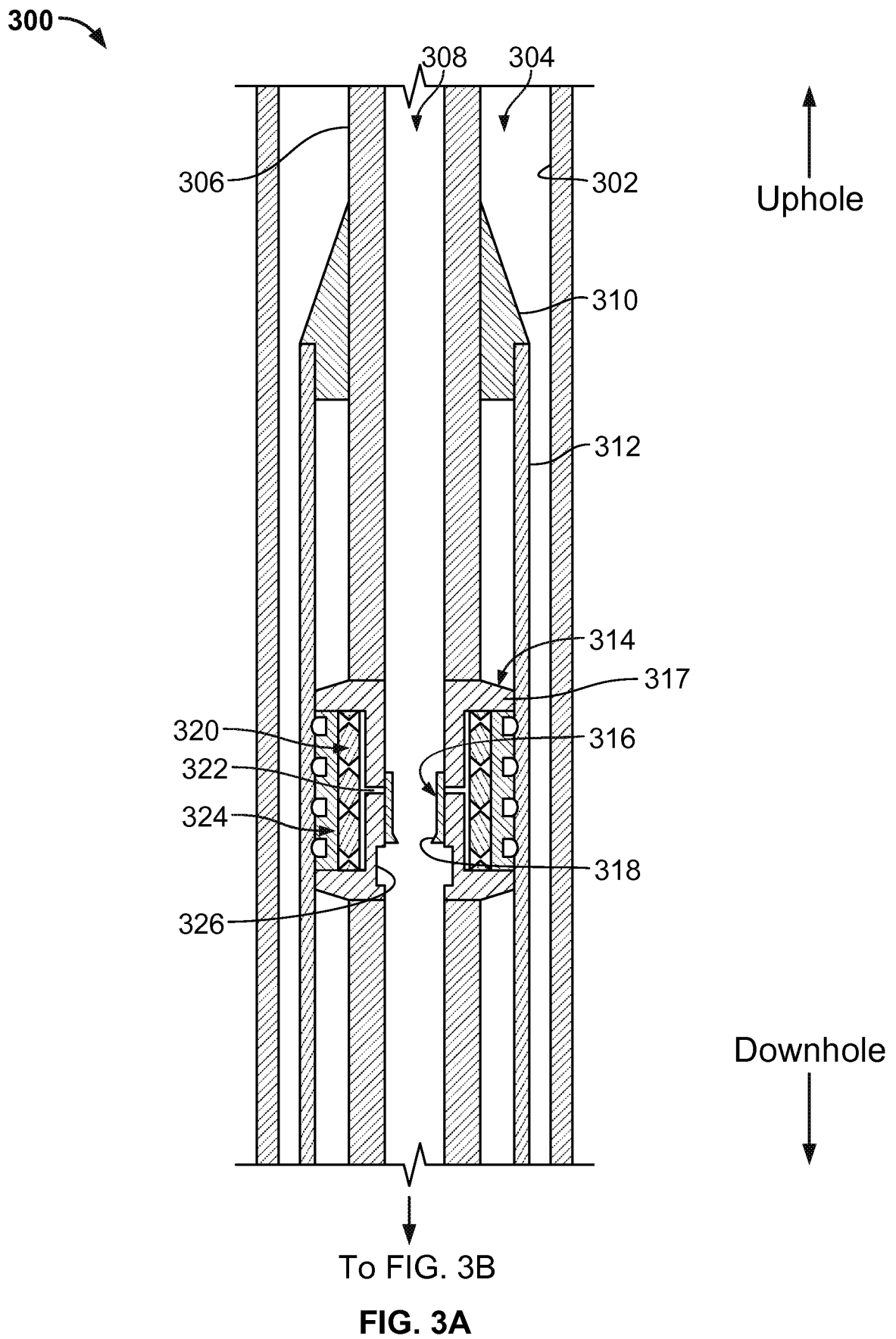


FIG. 2E



300

From FIG. 3A

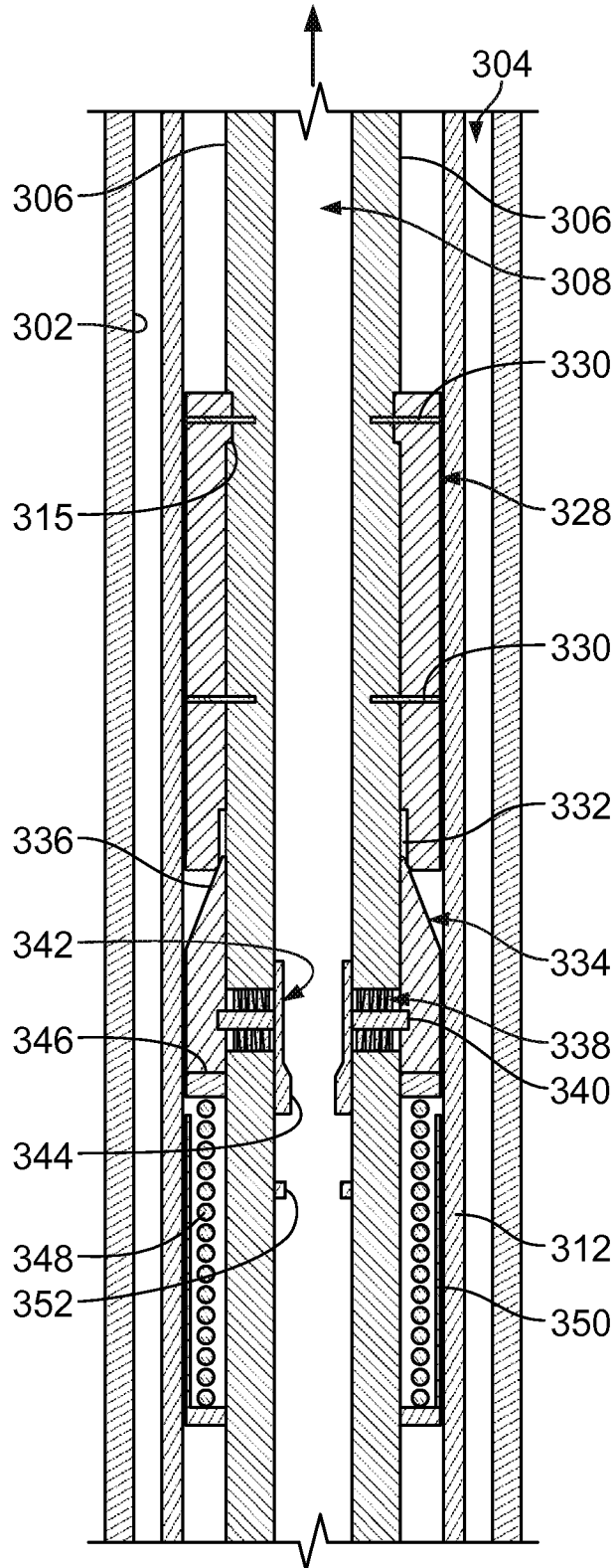


FIG. 3B

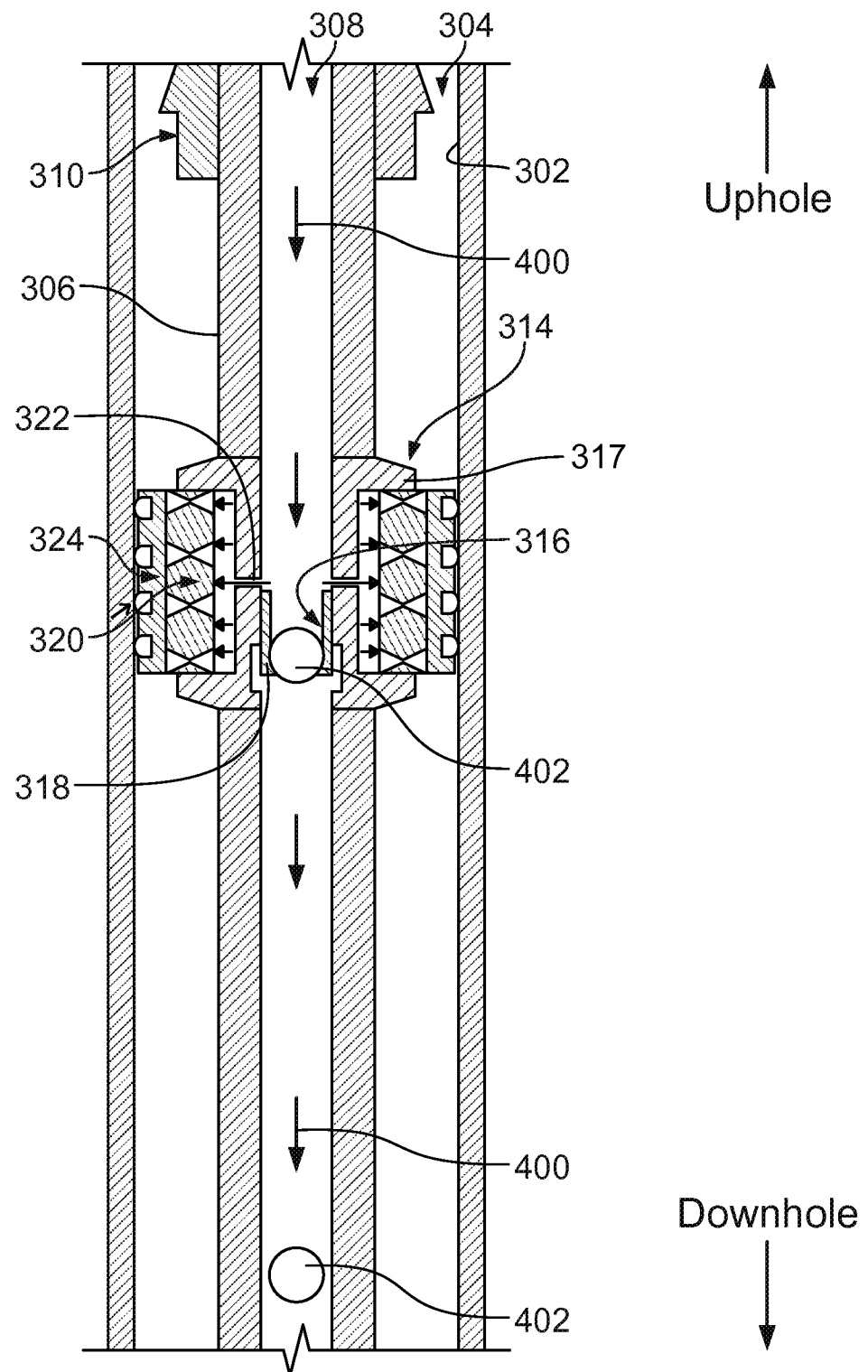


FIG. 4A

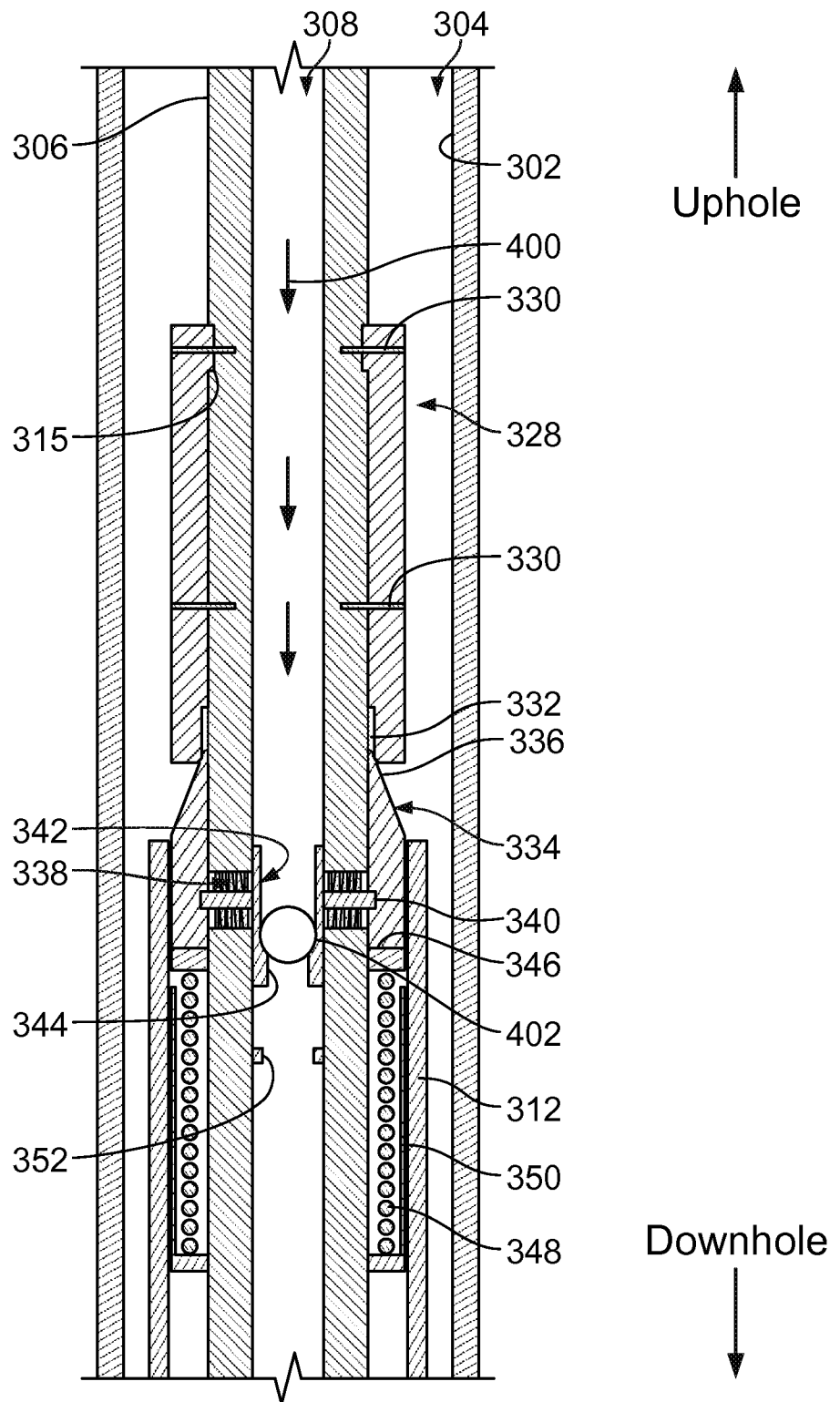


FIG. 4B

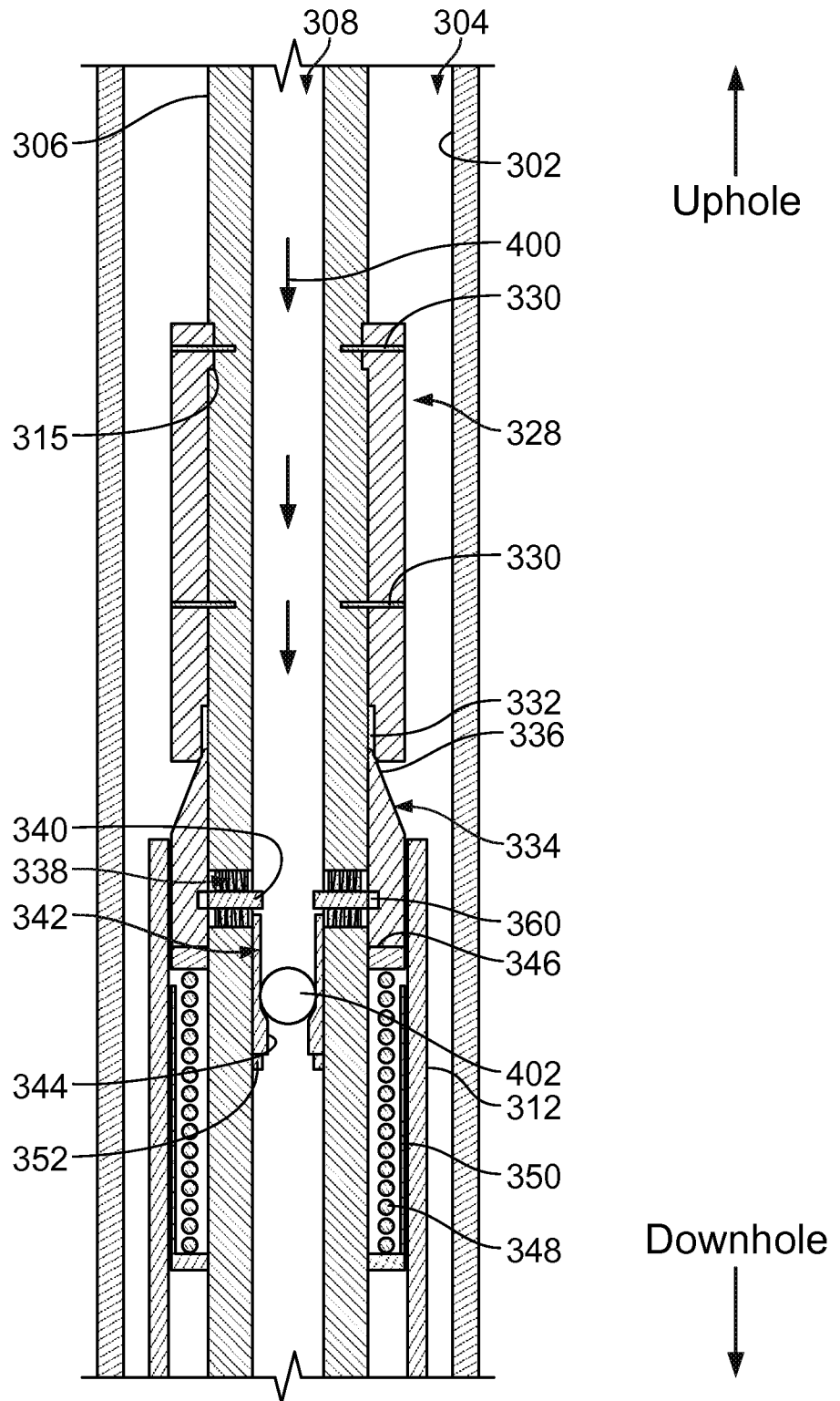


FIG. 4C

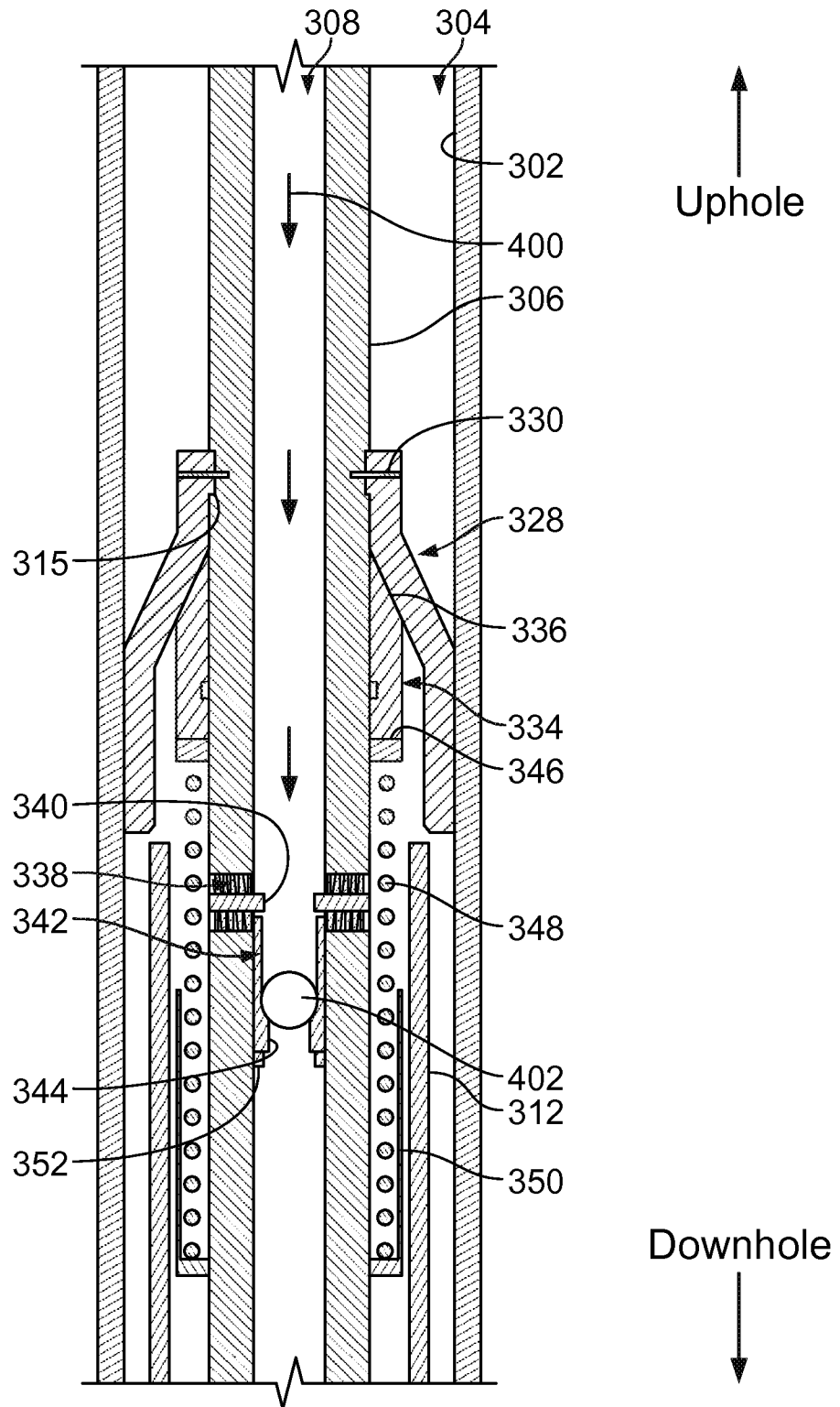


FIG. 4D

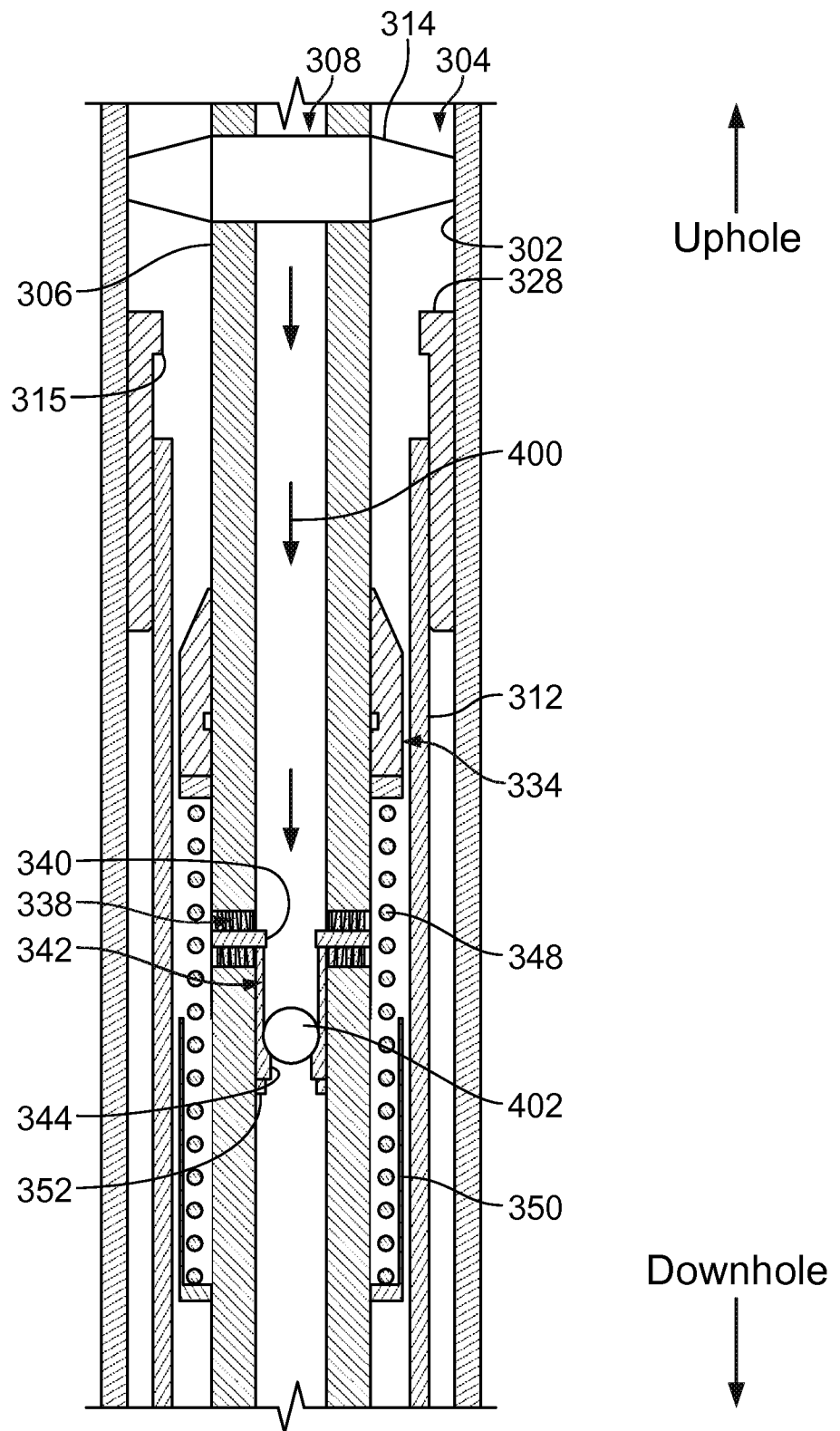


FIG. 4E

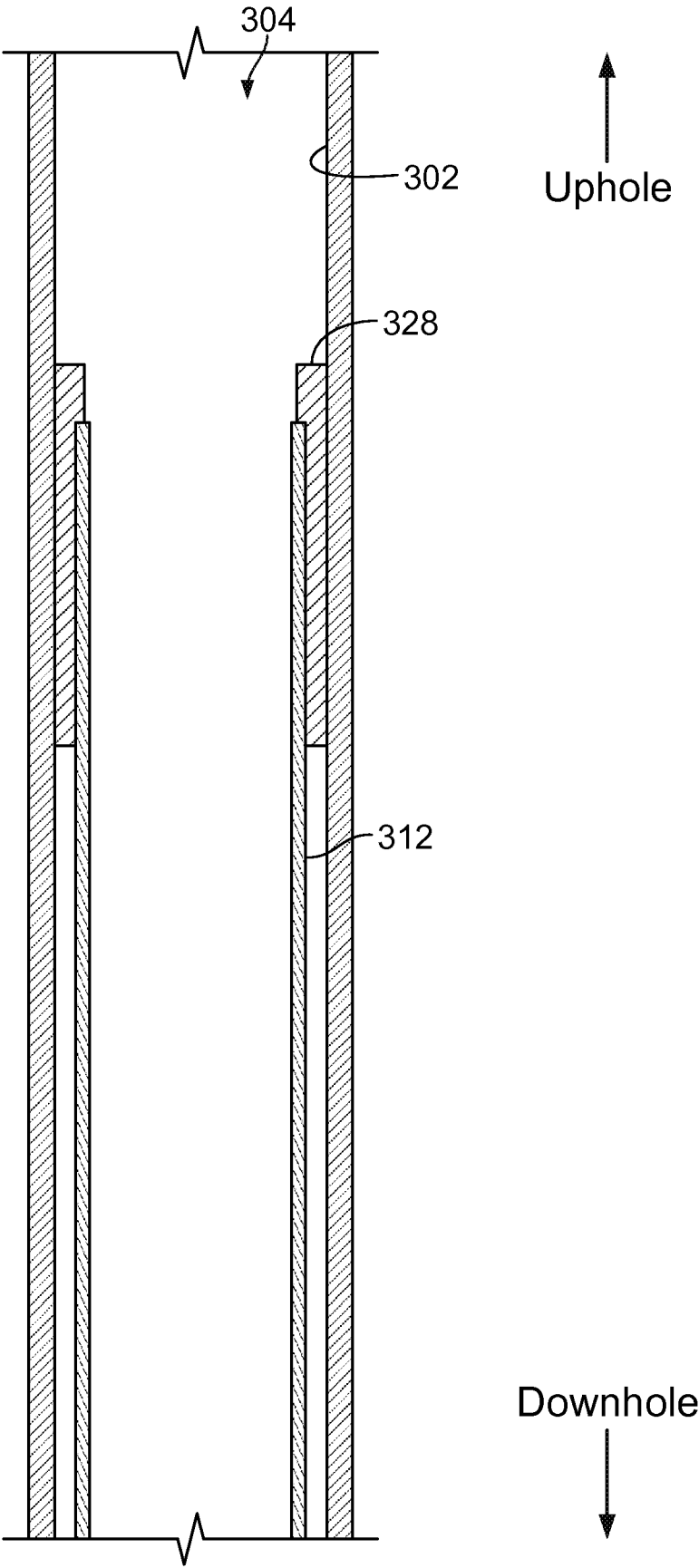


FIG. 4F

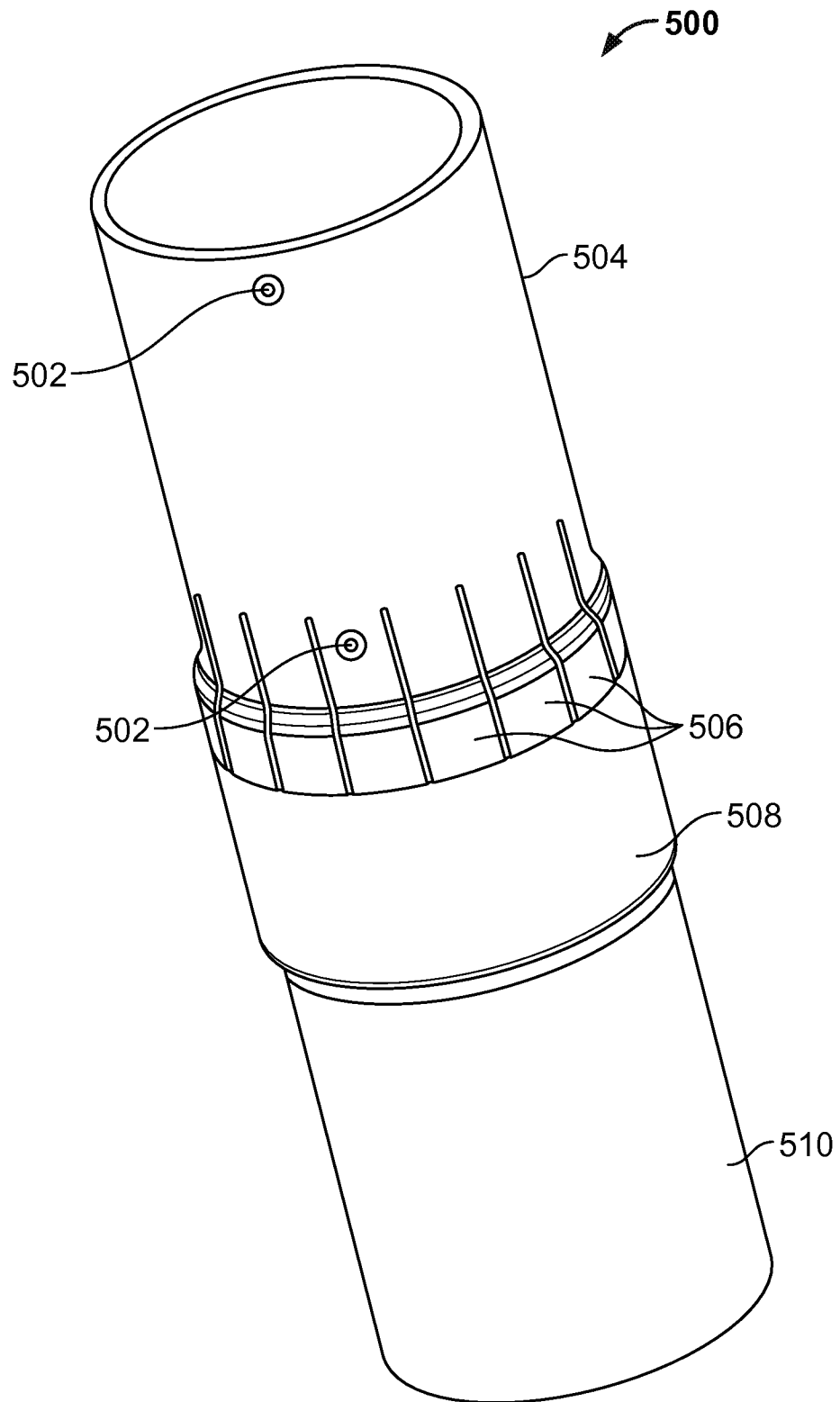


FIG. 5

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2015/060567

A. CLASSIFICATION OF SUBJECT MATTER

INV. E21B33/10 E21B17/10
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)
E21B

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

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

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X Y A	US 2 874 783 A (HAINES MARCUS W) 24 February 1959 (1959-02-24) column 2, line 48 - line 62 column 3, line 73 - column 4, line 15 -----	1,7,8, 10,11 2-7,9 12
X	US 3 126 971 A (KELLNER ET AL.) 31 March 1964 (1964-03-31) column 4, line 14 - line 21 column 7, line 2 - line 23 -----	1
X	US 2006/042801 A1 (HACKWORTH MATTHEW R [US] ET AL) 2 March 2006 (2006-03-02) paragraphs [0018], [0022] - [0024] -----	1
X	WO 2013/082376 A1 (SCHLUMBERGER CA LTD [CA]; SCHLUMBERGER SERVICES PETROL [FR]; SCHLUMBER) 6 June 2013 (2013-06-06) paragraphs [0029], [0034] ----- -/-	1



Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

15 February 2016

Date of mailing of the international search report

24/02/2016

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Rampelmann, Klaus

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2015/060567

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 849 070 A (MALY GEORGE P) 26 August 1958 (1958-08-26) column 2, line 15 - line 44 -----	1
X	US 2 674 199 A (PAGE JOHN S) 6 April 1954 (1954-04-06) column 7, line 33 - line 41 -----	1
Y	US 5 375 662 A (ECHOLS III RALPH H [US] ET AL) 27 December 1994 (1994-12-27) column 4, line 25 - line 31 column 4, line 51 - line 55 column 5, line 1 - line 25 -----	2-7
Y	US 2014/352970 A1 (KRISTOFFER BRAEKKER [NO]) 4 December 2014 (2014-12-04) paragraphs [0049] - [0055] -----	2-7
Y	US 6 585 043 B1 (MURRAY GEOFFREY NEIL [US]) 1 July 2003 (2003-07-01) abstract -----	9

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2015/060567

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2874783	A	24-02-1959	GB 771043 A 27-03-1957 US 2874783 A 24-02-1959
US 3126971	A	31-03-1964	NONE
US 2006042801	A1	02-03-2006	NONE
WO 2013082376	A1	06-06-2013	NONE
US 2849070	A	26-08-1958	NONE
US 2674199	A	06-04-1954	NONE
US 5375662	A	27-12-1994	GB 2279385 A 04-01-1995 NO 942416 A 02-01-1995 US 5375662 A 27-12-1994
US 2014352970	A1	04-12-2014	CA 2914410 A1 11-12-2014 NO 336666 B1 19-10-2015 US 2014352970 A1 04-12-2014 WO 2014195795 A2 11-12-2014
US 6585043	B1	01-07-2003	AU 739602 B2 18-10-2001 AU 9767798 A 31-05-1999 CA 2309615 A1 20-05-1999 DE 69826885 D1 11-11-2004 DE 69826885 T2 27-10-2005 EP 1029146 A1 23-08-2000 NO 20002106 A 23-06-2000 US 6585043 B1 01-07-2003 WO 9924690 A1 20-05-1999