



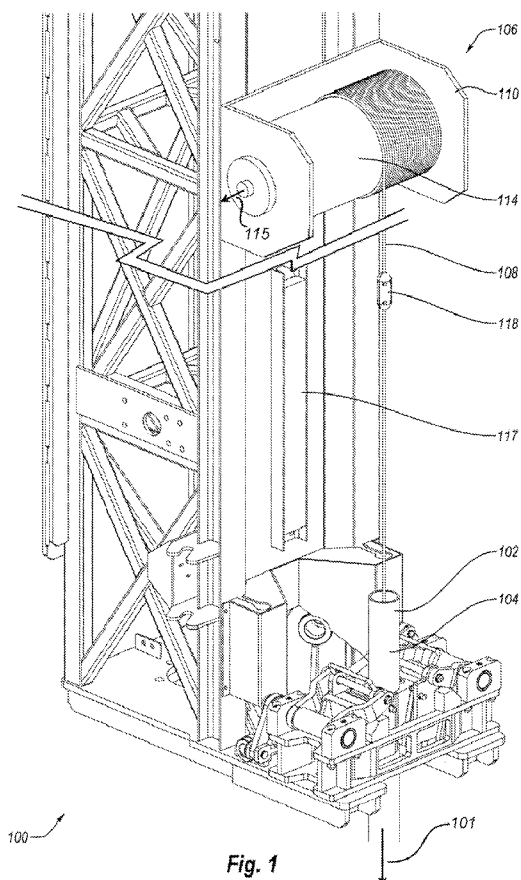
- (51) International Patent Classification:  
*B66D 1/56* (2006.01) *E21B 49/02* (2006.01)
- (21) International Application Number:  
PCT/US2012/040133
- (22) International Filing Date:  
31 May 2012 (31.05.2012)
- (25) Filing Language: English
- (26) Publication Language: English
- (30) Priority Data:  
61/491,628 31 May 2011 (31.05.2011) US
- (71) Applicant (for all designated States except US):  
**LONGYEAR TM, INC.** [US/US]; 10808 South River  
Front Parkway, Suite 600, South Jordan, UT 84095 (US).

- (72) Inventors; and  
(75) Inventors/Applicants (for US only): **RIBOLDI, Adam, John** [AU/AU]; 8 Maybury Street, Highfields, NSW, 2289 (AU). **ESCUDEIRO, Fernando Fidel, Aleite** [SE/AU]; 181 Diagonal Road, Warradale, Sa, 5046 (AU). **PEARCE, Michael, Luke** [AU/AU]; 17 Bauldry Avenue, Farrar, 0830 (AU).
- (74) Agents: **DECARLO, Kean, J.** et al.; Ballard Spahr LLP, 999 Peachtree Street, Suite 1000, Atlanta, GA 30309 (US).
- (81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ,

[Continued on next page]

(54) Title: SYSTEMS AND METHODS FOR LIMITING WINCH OVERRUN

(57) Abstract: A retrieval system for a wireline drilling system having a winch, a wireline rope connected to the winch, and a core sampler connected to the wireline rope. The retrieval system includes a radio-frequency identification (RFID) transponder and a controller that, in response to receiving a wireless signal from the RFID transponder, automatically adjusts a speed at which the winch retrieves the core sampler.





OM, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**(84) Designated States** (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK,

**Declarations under Rule 4.17:**

— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

**Published:**

— *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*

## SYSTEMS AND METHODS FOR LIMITING WINCH OVERRUN

### CROSS-REFERENCE TO RELATED APPLICATIONS

**[0001]** This application claims priority to U.S. Provisional Patent Application No. 61/491,628, filed on May 31, 2011, which is hereby incorporated by reference in its entirety.

### BACKGROUND

#### Field

**[0002]** This application relates generally to drilling systems and methods and, more particularly, to wireline drilling systems and methods.

#### Background Technology

**[0003]** Exploration drilling often includes retrieving a sample from a formation. The retrieved sample can then be evaluated to determine its contents.

**[0004]** In a wireline exploration drilling system, a drill string can be used to retrieve a sample from a formation. The drill string can include an open-faced drill bit, an outer tube of a core barrel assembly, and a series of connected drill rods, which can be assembled section-by-section as the drill bit and the core barrel assembly move deeper into the formation. The outer tube of the core barrel assembly can be connected to the drill bit and the series of drill rods. The core barrel assembly can also include an inner tube assembly, which can be releasably locked to the outer tube. With the inner tube assembly locked to the outer tube, the drill bit, the core barrel assembly and the drill rods can be rotated and/or pushed into the formation to allow a core sample to be collected within the inner tube assembly. After the core sample is collected, the inner tube assembly can be unlocked from the outer tube. The inner tube assembly can then be retrieved using a retrieval system, while portions of the drill string remain within the borehole. The core sample can be removed from the retrieved inner tube assembly, and after the core sample is removed, the inner tube assembly can be sent back and locked to the outer tube. With the inner tube assembly once again locked to the outer tube, the drill bit, the core barrel assembly and the drill rods can again be rotated and/or pushed farther into the formation to allow another core sample to be collected within

the inner tube assembly. Desirably, the inner tube assembly can be repeatedly retrieved and sent back in this manner to obtain several core samples, while portions of the drill string remain within the borehole. This can advantageously reduce the time necessary to obtain core samples because the drill string need not be tripped out of the borehole for each core sample.

**[0005]** The retrieval system used to retrieve the inner tube assembly can include an overshot connected to a wireline rope. For example, a trailing portion of the wireline rope can be connected to a winch drum of a winch, and a leading portion of the wireline rope can be connected to the overshot.

**[0006]** To retrieve the inner tube assembly, the winch drum can be rotated in a first direction to unwind the wireline rope, which lowers/advances the overshot into the drill string until it reaches the inner tube assembly. After the overshot reaches the inner tube assembly, the overshot can be connected to the inner tube assembly. With the overshot connected to the inner tube assembly, the winch drum can be rotated in an opposing second direction to re-wind the wireline rope, which raises/retrieves the overshot and the inner tube assembly out of the drill string.

**[0007]** To further reduce the time necessary to obtain core samples, the winch drum is typically rotated at a very high speed to quickly retrieve the overshot and the inner tube assembly. In some conventional systems, as the overshot exits the drill string, the overshot can slam into a mechanical trip lever of the retrieval system, which causes the winch drum to stop rotating to help prevent overrunning the winch. A user can then manually select an override button, or the like, to commence rotating the winch drum at a reduced speed to continue raising/retrieving the inner tube assembly.

**[0008]** Accordingly, there is a need in the pertinent art for retrieval systems that are capable of automatically adjusting the speed at which the winch retrieves the overshot and/or core sampler, such as, for example, an inner tube assembly.

## **SUMMARY**

**[0009]** Described herein is a retrieval system for use in a wireline drilling system. The retrieval system can include a winch, a wireline rope that can be connected to the winch, a core sampler (e.g., an inner tube assembly) connected to a retrieval tool (e.g., an overshot) which is connected to the wireline rope, a

radio-frequency identification (RFID) transponder and transponder carrier, a RFID antenna and reader assembly, and a controller in operative communication with the winch. In response to receiving a wireless signal from the RFID transponder indicative of the position of the RFID transponder, the controller can be configured to automatically adjust the speed at which the winch retrieves the core sampler.

**[0010]** In another aspect, the winch can include a winch drum, and the wireline rope can be at least partially wound around the winch drum. In response to receiving the wireless signal from the RFID transponder, the controller can be configured to automatically adjust the speed at which the winch drum rotates, thereby adjusting the speed at which the winch retrieves the core sampler.

**[0011]** In yet another aspect, the retrieval system can further include a housing that encloses at least a portion of the RFID transponder. The housing can have a clamp configuration that can be configured to clamp onto the wireline rope. Alternatively, the housing can be connected to a retrieval tool and/or retrieval tool adaptor (e.g., an overshoot and/or an overshoot adaptor) of the retrieval system.

### **DESCRIPTION OF THE DRAWINGS**

**[0012]** These and other features of the preferred embodiments of the invention will become more apparent in the detailed description in which reference is made to the appended drawings wherein:

**[0013]** Figure 1 is a perspective view of a first exemplary retrieval system as described herein;

**[0014]** Figure 2 is a perspective view of a portion of the retrieval system shown in Figure 1;

**[0015]** Figure 3 is an exploded view of a portion of the retrieval system shown in Figure 1;

**[0016]** Figure 4 is a perspective view of a portion of the retrieval system shown in Figure 1;

**[0017]** Figure 5 is an exploded view of a portion of the retrieval system shown in Figure 1;

**[0018]** Figure 6 is a diagram of a portion of the retrieval system shown in Figure 1;

**[0019]** Figure 7 is a perspective view of a second exemplary retrieval system as described herein;

**[0020]** Figure 8 is a perspective view of a portion of the retrieval system shown in Figure 7;

**[0021]** Figure 9 is a perspective view of a portion of the retrieval system shown in Figure 7; and

**[0022]** Figure 10 is a perspective view of a portion of the retrieval system shown in Figure 7.

### **DETAILED DESCRIPTION**

**[0023]** The present invention can be understood more readily by reference to the following detailed description, examples, drawings, and claims, and their previous and following description. However, before the present devices, systems, and/or methods are disclosed and described, it is to be understood that this invention is not limited to the specific devices, systems, and/or methods disclosed unless otherwise specified, and, as such, can, of course, vary. It is also to be understood that the terminology used herein is for the purpose of describing particular aspects only and is not intended to be limiting.

**[0024]** The following description of the invention is provided as an enabling teaching of the invention in its best, currently known embodiment. To this end, those skilled in the relevant art will recognize and appreciate that many changes can be made to the various aspects of the invention described herein, while still obtaining the beneficial results of the present invention. It will also be apparent that some of the desired benefits of the present invention can be obtained by selecting some of the features of the present invention without utilizing other features. Accordingly, those who work in the art will recognize that many modifications and adaptations to the present invention are possible and can even be desirable in certain circumstances and are a part of the present invention. Thus, the following description is provided as illustrative of the principles of the present invention and not in limitation thereof.

**[0025]** As used throughout, the singular forms “a,” “an” and “the” include plural referents unless the context clearly dictates otherwise. Thus, for example, reference to

“a drill rod” can include two or more such drill rods unless the context indicates otherwise.

**[0026]** Ranges can be expressed herein as from “about” one particular value, and/or to “about” another particular value. When such a range is expressed, another aspect includes from the one particular value and/or to the other particular value. Similarly, when values are expressed as approximations, by use of the antecedent “about,” it will be understood that the particular value forms another aspect. It will be further understood that the endpoints of each of the ranges are significant both in relation to the other endpoint, and independently of the other endpoint.

**[0027]** As used herein, the terms “optional” or “optionally” mean that the subsequently described event or circumstance may or may not occur, and that the description includes instances where said event or circumstance occurs and instances where it does not.

**[0028]** The word “or” as used herein means any one member of a particular list and also includes any combination of members of that list.

**[0029]** As shown in Figure 1, a drilling system 100 can be used to retrieve a sample from a formation along a drilling axis 101. The drilling system 100 can comprise a drill string 102 that can comprise a drill bit (for example, an open-faced drill bit or other type of drill bit) and/or one or more drill rods 104.

**[0030]** In one aspect, the drilling system 100 can comprise an in-hole assembly, such as a core barrel assembly, and the drill string 102 can comprise an outer portion of the in-hole assembly. For example, the drill string 102 can comprise an outer tube of the core barrel assembly, which can be connected to the drill bit and a set of one or more drill rods 104. It will be appreciated, however, that the outer tube and/or other portions of the core barrel assembly can be connected to the drill bit, the drill rods 104 and/or other portions of the drill string 102 using any other suitable components.

**[0031]** As part of a drilling process, it is contemplated that the drill bit, the core barrel assembly, the drill rods 104 and/or other portions of the drill string 102 can be rotated and/or pushed into the formation along the drilling axis 101 to form a borehole. During this process, a series of interconnected drill rods 104 can be assembled section-by-section.

**[0032]** In another aspect, the drilling system 100 can comprise a drill rig that can rotate and/or push the drill bit, the core barrel assembly, the drill rods 104 and/or other portions of the drill string 102 into the formation along the drilling axis 101. It will be appreciated, however, that the drilling system 100 does not require a drill rig and that the drilling system 100 can comprise other suitable components that are configured to rotate and/or push the drill bit, the core barrel assembly, the drill rods 104 and/or other portions of the drill string 102 into the formation.

**[0033]** In an additional aspect, the core barrel assembly can comprise a core sampler (not shown). In an exemplary aspect, the core sampler can comprise an inner tube assembly, such as, for example and without limitation, an inner core barrel as described in U.S. Patent Publication No. 2010/0012383, the disclosure of which is hereby incorporated by reference in its entirety. In this aspect, it is contemplated that the core sampler can be an inner tube assembly disposed within the drill string 102 and releasably locked to the outer tube of the core barrel assembly using, for example, one or more latches or any other suitable means. In a further aspect, it is contemplated that the core sampler can comprise one or more receptacles, such as, for example and without limitation, an inner tube, a core lifter case, and/or other known types of receptacles. However, it is contemplated that any known core sampler that is capable of receiving and/or housing a core sample and that is configured for retrieval as described herein can be used.

**[0034]** With the core sampler (e.g., inner tube assembly) locked to the outer tube of the core barrel assembly, it is contemplated that the drill bit, the core barrel assembly, the drill rods 104 and/or other portions of the drill string 102 can be rotated and/or pushed into the formation along the drilling axis 101 to allow a core sample to be collected within the one or more receptacles of the core sampler. It is further contemplated that, after the core sample is collected, the core sampler (e.g., inner tube assembly) can be unlocked from the outer tube of the core barrel assembly. It is still further contemplated that the core sampler can then be retrieved while the drill bit, the outer tube of the core barrel assembly, one or more of the drill rods 104 and/or other portions of the drill string 102 remain within the borehole. In exemplary aspects, the core sampler can be retrieved using a retrieval system 106. It is further contemplated that the core sample can be

removed from the retrieved core sampler, and after the core sample is removed from the core sampler, the core sampler can be sent back and locked to the outer tube of the core barrel assembly.

**[0035]** With the core sampler (e.g., inner tube assembly) once again locked to the outer tube of the core barrel assembly, it is contemplated that the drill bit, the core barrel assembly, the drill rods 104 and/or other portions of the drill string 102 can be rotated and/or pushed farther into the formation along the drilling axis 101 to allow another core sample to be collected within the one or more receptacles of the core sampler. Significantly, the core sampler can be repeatedly retrieved and sent back in this manner to obtain several core samples, while the drill bit, the outer tube of the core barrel assembly, one or more of the drill rods 104 and/or other portions of the drill string 102 remain within the borehole. It is contemplated that this can advantageously reduce the time necessary to obtain core samples because the drill string 102 need not be tripped out of the borehole for each core sample.

**[0036]** In one exemplary aspect, the retrieval system 106 shown in Figure 1 can be a wireline retrieval system and can comprise a wireline rope 108, a winch 110, a retrieval tool adaptor 112, such as an overshot adaptor as shown in Figures 4-5, and a retrieval tool 113, such as an overshot as shown in Figure 7. In this aspect, a trailing portion 109a of the wireline rope 108 can be connected to a winch drum 114 of the winch 110, and a leading portion 109b of the wireline rope 108 can be connected to the retrieval tool (e.g., overshot ) 113. Although the retrieval tool 113 is depicted in the Figures as an overshot, it is contemplated that the retrieval tool 113 can comprise any suitable means for retrieving a core sampler in a wireline drilling system as described herein.

**[0037]** To retrieve the core sampler (e.g., inner tube assembly), it is contemplated that the winch drum 114 can be rotated in a first direction about a rotation axis 115 to unwind the wireline rope 108, which can be configured to lower and/or advance the retrieval tool (e.g., overshot) 113 into the drill string 102 until it reaches the core sampler. After the retrieval tool 113 reaches the core sampler, the retrieval tool 113 can be configured for operative coupling to the core sampler. With the retrieval tool 113 coupled to the core sampler, it is contemplated that the winch drum 114 can be rotated in an opposing second direction about the rotation axis 115 to re-wind the wireline rope 108, which can be configured to

raise, retract, and/or retrieve the retrieval tool 113 and the core sampler out of and away from the drill string 102 along the drilling axis 101. To further reduce the time necessary to obtain core samples, the winch drum 114 can be rotated at a very high speed to quickly retrieve the retrieval tool 113 and/or the core sampler.

**[0038]** In an additional aspect, the retrieval system 106 can be configured to—in response to receiving a wireless signal, such as, a wireless signal from a radio-frequency identification (RFID) transponder—automatically stop and/or adjust the speed at which the winch 110 retrieves the retrieval tool (e.g., overshot) 113 and/or the core sampler. In this aspect, the RFID transponder can be operatively coupled to the wireline rope 108 at a selected location along the drilling axis 101 such that movement of the wireline rope along the drilling axis effects a corresponding movement of the RFID transponder. Optionally, it is contemplated that the selected location of the RFID transponder can be spaced from the winch 110 by a first distance along the drilling axis 101 and can be spaced from the core sampler by a second distance along the drilling axis 101, with the first distance being shorter than the second distance.

**[0039]** In exemplary aspects, the retrieval system 106 can comprise a controller that is configured to receive the wireless signal from the RFID transponder. In these aspects, the controller can be in operative communication with the winch drum such that, in response to receiving the wireless signal from the RFID transponder, the controller can be configured to automatically adjust the speed at which the winch drum 114 rotates about rotation axis 115, thereby adjusting the speed at which the winch 110 retrieves the retrieval tool 113 and/or the core sampler. In exemplary aspects, the retrieval system 106 can be configured to, in response to receiving the wireless signal, automatically reduce the speed of the rotation of the winch drum 114, and if desired, stop the rotation of the winch drum 114. By automatically reducing the speed of and/or stopping the rotation of the winch drum 114 in response to receiving the wireless signal, it is contemplated that the retrieval system 106 can advantageously provide a hands-free solution in which user interaction is not required to limit or prevent overrunning the winch 110. In another exemplary aspect, the retrieval system 106 can comprise an RFID antenna 117 that is in operative communication with the controller and that is configured to receive the wireless signal from the RFID transponder. In this aspect, it is contemplated that the retrieval system 106 can further comprise an RFID

reader that is configured to send an output which can be received and interpreted by the controller.

**[0040]** In another aspect, one or more of the RFID transponders 116 shown in Figure 2 can be connected to portions of the retrieval system 106. For example, one or more RFID transponders 116 can optionally be connected to the wireline rope 108 using a housing 118, as shown in Figure 1. Optionally, as shown in Figures 2-3, it is contemplated that the RFID transponders 116 can be enclosed by and/or connected to the housing 118, and the housing 118 can be connected to the wireline rope 108 as shown in Figure 1. In additional aspects, as described further herein, it is contemplated that one or more RFID transponders 116 can be operatively coupled and/or connected to the retrieval tool 113 and/or the retrieval tool adaptor 112.

**[0041]** In an additional aspect, to connect the housing 118 to the wireline rope 108, the housing 118 can have a clamp configuration including first and second portions 120, 122 as shown in Figure 2. In this aspect, the first and second housing portions 120, 122 can be configured to clamp onto the wireline rope 108. It is contemplated that one or more fasteners 124 can be used to clamp the first and second housing portions 120, 122 together. It is further contemplated that the housing 118 can optionally be a transducer housing, which can be constructed from nylon and/or other suitable materials.

**[0042]** As shown in Figure 2, in one exemplary aspect, a pair of RFID transponders 116 can be enclosed by and/or connected to the housing 118. (Alternatively, more than two or only a single RFID transponder can be enclosed by and/or connected to the housing 118.) For example, it is contemplated that the housing 118 can extend axially from a first end 126 to an opposing second end 128, and first and second RFID transponders 116 can be generally disposed centrally between the first and second ends 126, 128. However, in other configurations, it is contemplated that the first RFID transponder 116 can be generally disposed towards the first end 126, and the second RFID transponder 116 can be generally disposed towards the opposing second end 128. Optionally, in an additional aspect, and as shown in Figure 2, the first RFID transponder 116 can be offset from a central axis 130 of the housing 118 towards a first side 132 of the housing 118, and the second RFID transponder 116 can be

offset from the central axis 130 towards an opposing second side 134 of the housing 118. In an exemplary aspect, and as shown in Figures 2-3, a pair of connectors 136 can be used to connect the first and second RFID transponders 116 to the housing portions 120, 122. While a pair of RFID transponders 116 are illustrated in Figures 2-3, it is contemplated that a single RFID transponder 116 or more than two RFID transponders 116 can be used and can be positioned in other suitable locations within the housing 118.

**[0043]** If desired, it is contemplated that one or more RFID transponders can be connected to other portions of the retrieval system 106, such as the retrieval tool adaptor 112 shown in Figures 4-5, which couples the retrieval tool 113 to the core sampler. In exemplary aspects, the retrieval tool adaptor 112 can comprise a housing 138, and one or more RFID transponders can be enclosed by and/or connected to the housing 138. In these aspects, it is contemplated that the housing 138 can optionally comprise one or more passageways 140 into which one or more RFID transponders can be inserted.

**[0044]** As shown above, it is contemplated that the retrieval system 106 can be configured to—in response to receiving a wireless signal from an RFID transponder—automatically adjust (i.e., stop, decrease, or increase) the speed at which the winch 110 retrieves the retrieval tool (e.g., overshot) 113 and/or the core sampler. In a further aspect, as shown in Figure 6, the RFID antenna 117 of the retrieval system 106 can have a read range 142 in which the RFID reader of the retrieval system 106 can "read" an RFID transponder 116. Accordingly, in response to reading the RFID transponder 116 a desired number of reads, the RFID reader of the retrieval system 106 can be configured to automatically adjust the speed at which the winch drum 114 rotates. In one exemplary aspect, a preferred read time  $T$  for the RFID transponder 116 can be less than or equal to  $D / (V * R)$  where the RFID transponder 116 passes a distance  $D$  through the antenna's read range 142 at a velocity  $V$  and  $R$  is the desired number of reads. However, it is contemplated that an RFID read time capability that is larger than or equal to  $D / (V * R)$  can also be used.

**[0045]** Figure 7 shows an alternative drilling system 700 similar to the drilling system 100 of Figure 1, but differing in the manner in which an RFID transponder (and its optional housing) are coupled to the wireline rope 108. In an

exemplary aspect, instead of connecting the RFID transponder housing to the wireline rope 108 (e.g., the housing 118 of Figure 2) or to the retrieval tool adaptor (e.g., the housing 138 of Figures 4 and 5), an RFID transponder housing 170 (see Figure 8) can be connected to the retrieval tool 113. It is noted that, for simplicity of depiction, the retrieval tool (e.g., overshot) 113 shown in Figure 7 has been depicted at a smaller scale relative to the other components of the drilling system 100. In practice, it is contemplated that the retrieval tool 113 can have a diameter substantially corresponding in size to that of drill rods 104.

**[0046]** As shown in the more detailed depiction of the retrieval tool (e.g., overshot) 113 in Figure 8 and of the RFID transponder housing 170 in Figures 9 and 10, the housing 170 can be operatively coupled and/or adapted to a proximal end of the retrieval tool 113 that comprises a swivel assembly 172. In one aspect, the swivel assembly 172 can attach to the wireline rope 108. In this aspect, it is contemplated that the swivel assembly 172 can be connected by, for example and without limitation, a threaded connection, to the top of the housing 170, and it is contemplated that the housing 170 can be connected by, for example and without limitation, a threaded connection, to the remaining portions of the retrieval tool 113, including the retrieval tool adapter 112. In exemplary aspects, the retrieval tool 113 can have a distal end 173 that is configured for operative coupling to a core sampler as described herein.

**[0047]** As shown in Figures 9 and 10, in exemplary optional aspects, the housing 170 can comprise a carrier body 174 and a guard 176 (shown in Figure 10) to house an RFID transponder 178. In these aspects, the carrier body 174 can have a recess formed therein that is sized and configured to receive the RFID transponder 178. For example, it is contemplated that the recess can have length, width, and depth dimensions that are large enough to accommodate therein the corresponding dimensions of the RFID transponder 178. Optionally, in some aspects, the recess can be omitted. For example, it is contemplated that if the RFID transponder has a substantially flat profile and can be mounted in a sufficiently secure manner to avoid damage or loss during operation, then the RFID transponder 178 can be mounted to an exterior wall of the housing 170 and/or to the retrieval tool 113.

**[0048]** It is contemplated that the housing 170 can be made of a durable material, such as, for example and without limitation, high tensile steel or other metal material. Moreover, it is contemplated that the RFID transponder 178 can be a mount-on-metal RFID transponder. In one aspect, the guard 176 can be made of a non-metal material, such as, for example and without limitation, plastic, to facilitate transmission and reception of RF signals from and to the RFID antenna 117. In this aspect, the guard 176 can be sized and shaped to fill portions of the recess formed in the housing 170 that are not occupied by the RFID transponder 178. For example, it is contemplated that an inner side of the guard 176 can be shaped to substantially mate with an outer surface of the RFID transponder 178, and an outer surface of the guard 176 can be formed to be substantially flush with adjacent portions of the outer surface of the housing 170. It is further contemplated that, by forming the guard 176 and the housing 170 in this manner, the risk of damage to or loss of the guard 176 and the RFID transponder 178 during operation of the retrieval tool (e.g., overshot) 113 can be reduced.

**[0049]** The methods and systems described above require no particular component or function. Thus, any described component or function—despite its advantages—is optional. Also, some or all of the described components and functions described above can be used in connection with any number of other suitable components and functions.

**[0050]** Although the exemplary embodiments discussed above have been described with respect to a winch of a wireline retrieval system, these aspects and features can also be fitted, if necessary, for use in connection with other types of winches, such as a haul winch of a drilling system or other non-drilling systems in which a winch is used.

**[0051]** Although several embodiments of the invention have been disclosed in the foregoing specification, it is understood by those skilled in the art that many modifications and other embodiments of the invention will come to mind to which the invention pertains, having the benefit of the teaching presented in the foregoing description and associated drawings. It is thus understood that the invention is not limited to the specific embodiments disclosed hereinabove, and that many modifications and other embodiments are intended to be included within the scope of

the appended claims. Moreover, although specific terms are employed herein, as well as in the claims which follow, they are used only in a generic and descriptive sense, and not for the purposes of limiting the described invention, nor the claims which follow.

What is claimed is:

1. A retrieval system for retrieving a core sampler of a wireline drilling system from a drill string, the retrieval system comprising:

a winch comprising a winch drum, the winch drum being configured for selective rotation about a rotation axis;

a wireline rope at least partially wound around the winch drum of the winch such that, upon rotation of the winch drum about the rotation axis in a first direction, the wireline rope is further wound around the winch drum and retracted away from the drill string along a drilling axis;

a retrieval tool connected to a leading portion of the wireline rope, the retrieval tool being configured for operative coupling to the core sampler;

a radio-frequency identification (RFID) transponder coupled to the wireline rope at a selected location along the drilling axis, the RFID transponder being configured to transmit a wireless signal indicative of the location of the RFID transponder; and

an RFID antenna and reader assembly configured to receive the wireless signal from the RFID transponder; and

a controller in operative communication with the RFID antenna and reader assembly and the winch, wherein, in response to receiving the wireless signal, the controller is configured to automatically adjust the speed of rotation of the winch drum about the rotation axis in the first direction.

2. The retrieval system of Claim 1, wherein the retrieval system further comprises a housing enclosing at least a portion of the RFID transponder, the housing being connected to the wireline rope at the selected location.

3. The retrieval system of Claim 2, wherein the housing comprises a clamp configured to permit operative coupling to the wireline rope at the selected location.

4. The retrieval system of Claim 2, wherein the retrieval device comprises an overshot connected to the housing.
5. The retrieval system of Claim 2, wherein the retrieval device comprises an overshot and an overshot adaptor, wherein the overshot adaptor is connected to the housing.
6. The retrieval system of Claim 1, wherein the wireline rope is at least partially wound around the winch drum of the winch such that, upon rotation of the winch drum about the rotation axis in a second, opposed direction, the wireline rope is unwound from the winch drum and advanced into the drill string along the drilling axis.
7. The retrieval system of Claim 1, wherein, in response to receiving the first wireless signal, the controller is configured to automatically reduce the speed of rotation of the winch drum about the rotation axis in the first direction.
8. The retrieval system of Claim 1, wherein, in response to receiving the first wireless signal, the controller is configured to stop rotation of the winch drum about the rotation axis.
9. The retrieval system of Claim 1, wherein the selected location of the RFID transponder is spaced from the winch by a first distance along the drilling axis, wherein the selected location of the RFID transponder is spaced from the core sampler by a second distance along the drilling axis, and wherein the first distance is shorter than the second distance.
10. The retrieval system of Claim 4, wherein the RFID transponder is connected to the overshot.
11. The retrieval system of Claim 5, wherein the RFID transponder is connected to the overshot adaptor.
12. A retrieval system for retrieving a core sampler of a wireline drilling system from a drill string, the retrieval system comprising:

a winch comprising a winch drum, the winch drum being configured for selective rotation about a rotation axis;

a wireline rope at least partially wound around the winch drum of the winch such that, upon rotation of the winch drum about the rotation axis in a first direction, the wireline rope is further wound around the winch drum and retracted away from the drill string along a drilling axis;

an overshot connected to a leading portion of the wireline rope;

an overshot adaptor connected to the overshot, the overshot adaptor being configured for operative coupling to the core sampler;

at least one radio-frequency identification (RFID) transponder coupled to the wireline rope at a selected location along the drilling axis, each RFID transponder of the at least one RFID transponder being configured to transmit a wireless signal indicative of the location of the RFID transponder; and

an RFID antenna and reader assembly configured to receive the respective wireless signals from the at least one RFID transponder; and

a controller in operative communication with the RFID antenna and reader assembly and the winch, wherein, in response to receiving the respective wireless signals from the at least one RFID transponder, the controller is configured to automatically adjust the speed of rotation of the winch drum about the rotation axis in the first direction.

13. The retrieval system of Claim 12, wherein, in response to receiving the respective wireless signals from the at least one RFID transponder, the controller is configured to automatically reduce the speed of rotation of the winch drum about the rotation axis in the first direction.

14. The retrieval system of Claim 12, wherein, in response to receiving the respective wireless signals from the at least one RFID transponder, the controller is configured to stop rotation of the winch drum about the rotation axis.

15. The retrieval system of Claim 12, wherein the selected location of the at least one RFID transponder is spaced from the winch by a first distance along the drilling axis, wherein the selected location is spaced from the core sampler by a second distance along the drilling axis, and wherein the first distance is shorter than the second distance.

16. The retrieval system of Claim 12, wherein each RFID transponder of the at least one RFID transponder is connected to the overshot adaptor.

17. The retrieval system of Claim 12, wherein the overshot adaptor defines a plurality of passageways, and wherein each transponder of the at least one RFID transponder is positioned within a respective passageway of the overshot adaptor.

18. A method for retrieving a core sampler of a wireline drilling system from a drill string, the method comprising:

providing a wireline rope at least partially wound around a winch drum of a winch;

coupling a radio-frequency identification (RFID) transponder to the wireline rope at a selected location along a drilling axis;

operatively coupling a retrieval tool to a leading end of the wireline rope;

selectively rotating the winch drum in a first direction about a rotation axis such that the wireline rope is unwound from the winch drum and the leading end of the wireline rope is advanced into the drill string along the drilling axis;

operatively coupling the retrieval tool to the core sampler;

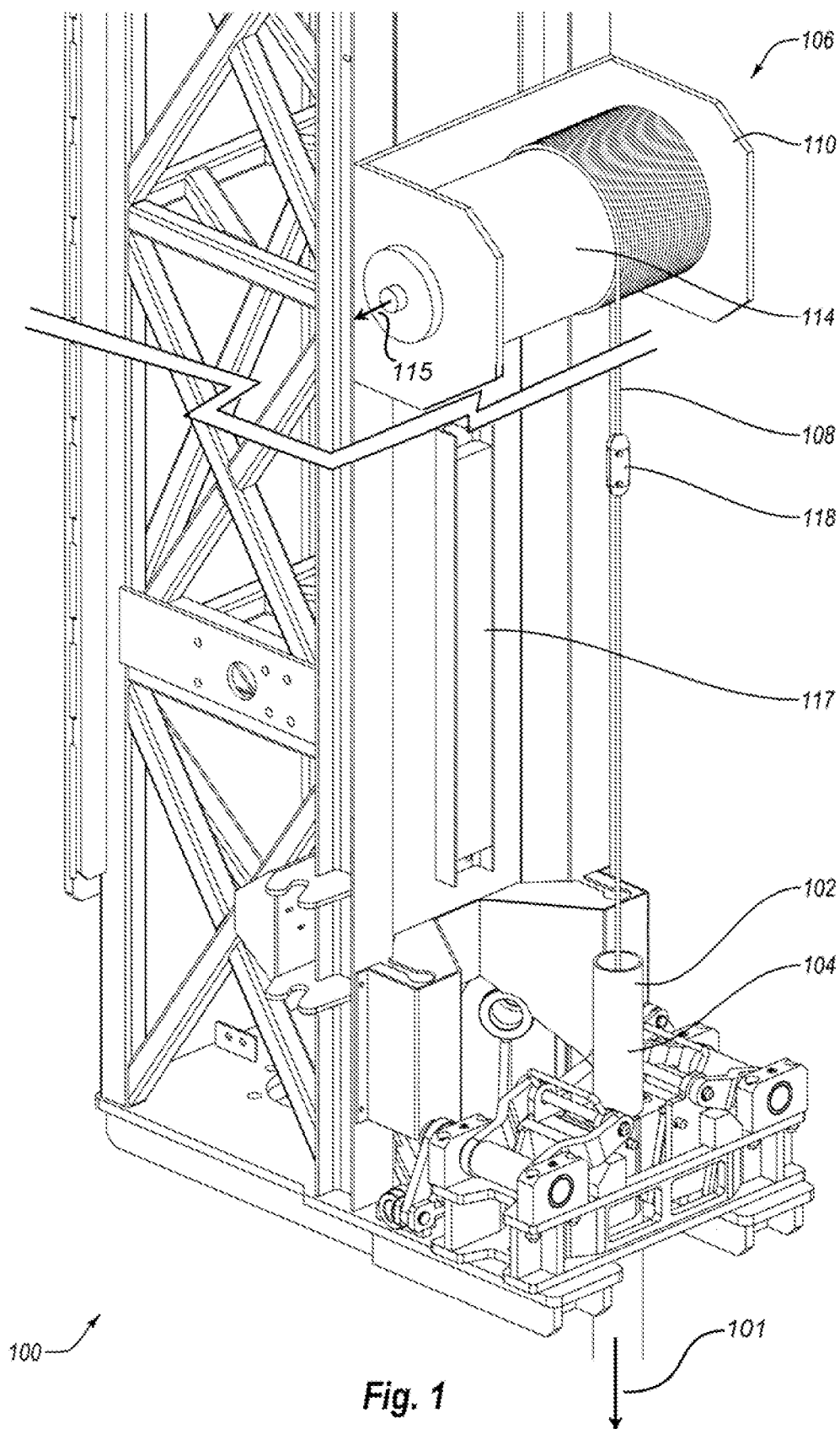
selectively rotating the winch drum in an opposed, second direction about the rotation axis such that the wireline rope is wound onto the winch drum and the wireline rope is retracted from the drill string along the drilling axis;

through a controller in operative communication with the winch drum, receiving a wireless signal from the RFID transponder indicative of the location of the RFID transponder; and

through the controller, automatically adjusting the speed of rotation of the winch drum about the rotation axis in the second direction.

19. The method of Claim 18, wherein the step of automatically adjusting the speed of rotation of the winch drum comprises automatically decreasing the speed of rotation of the winch drum about the rotation axis in the second direction.

20. The method of Claim 18, wherein the step of automatically adjusting the speed of rotation of the winch drum comprises stopping the rotation of the winch drum about the rotation axis.



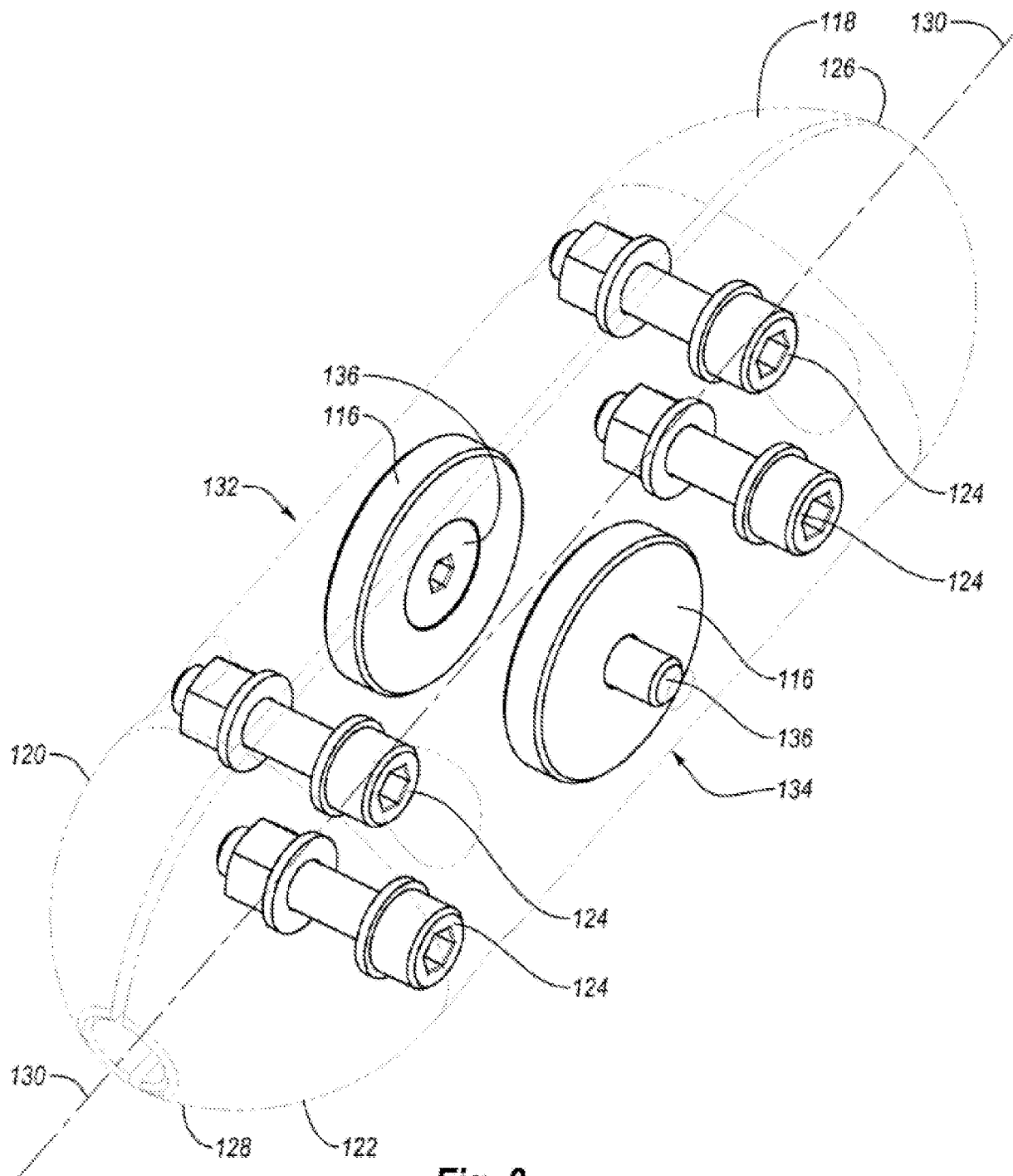


**Fig. 2**

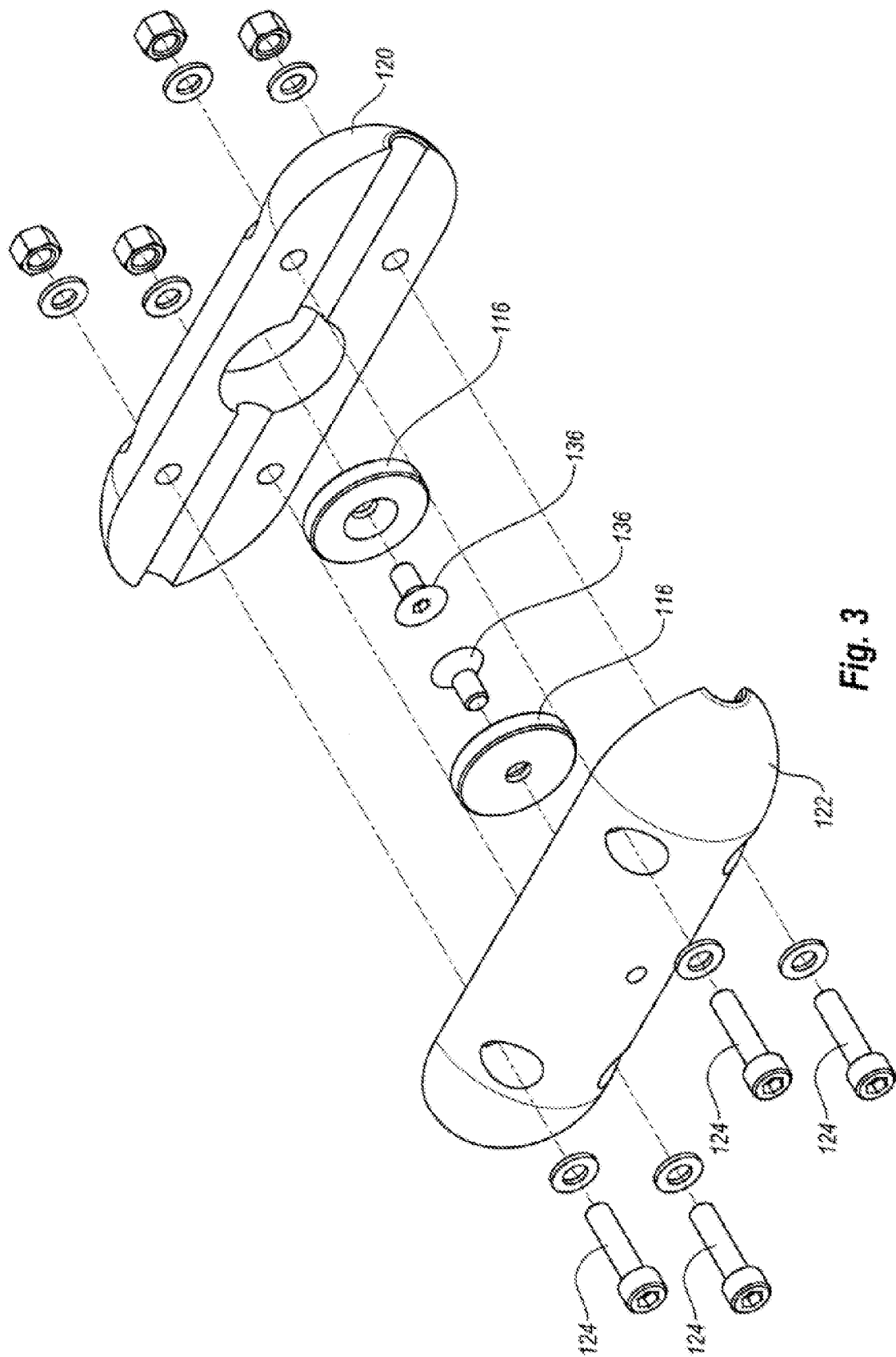


Fig. 3

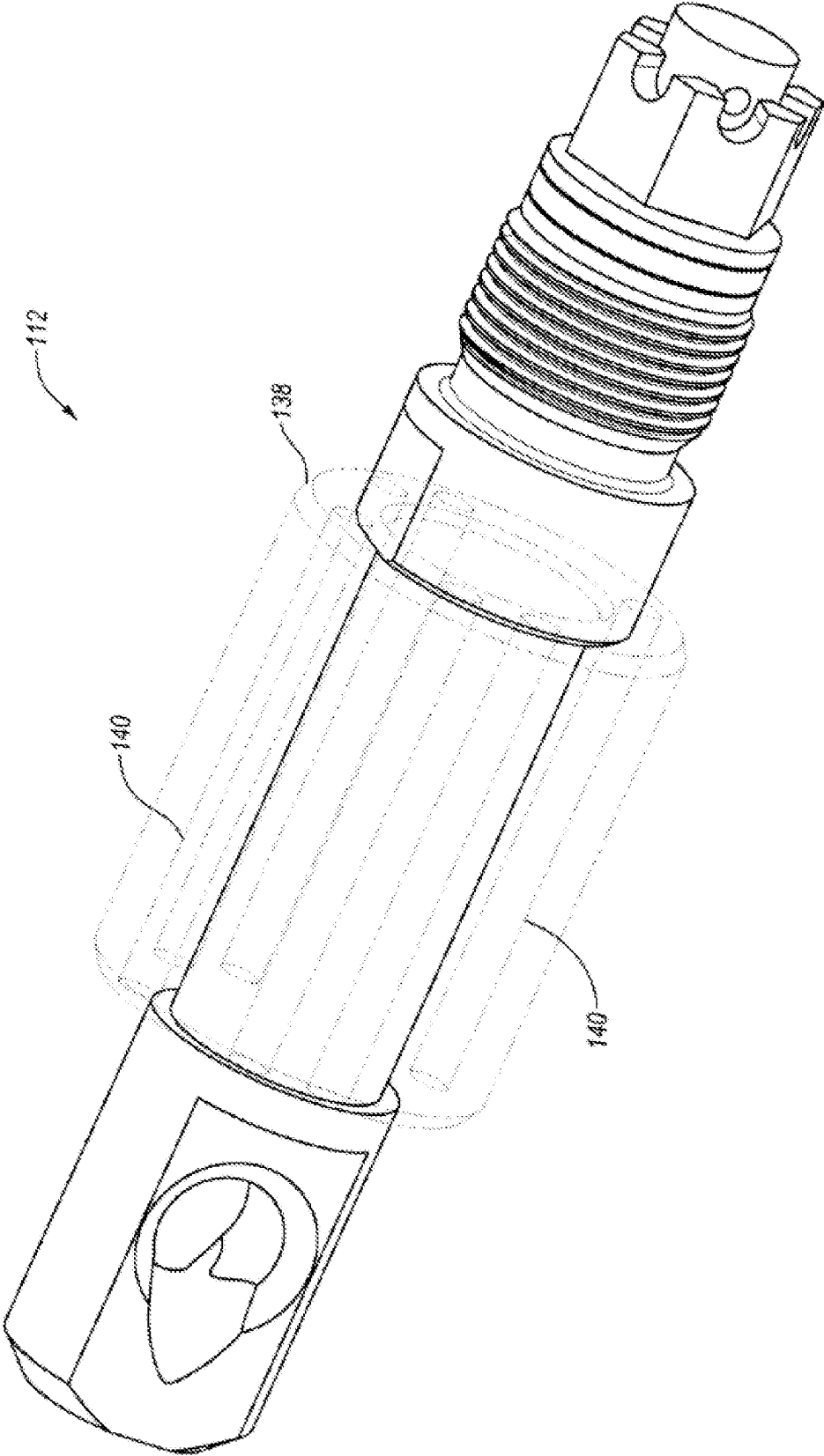


Fig. 4

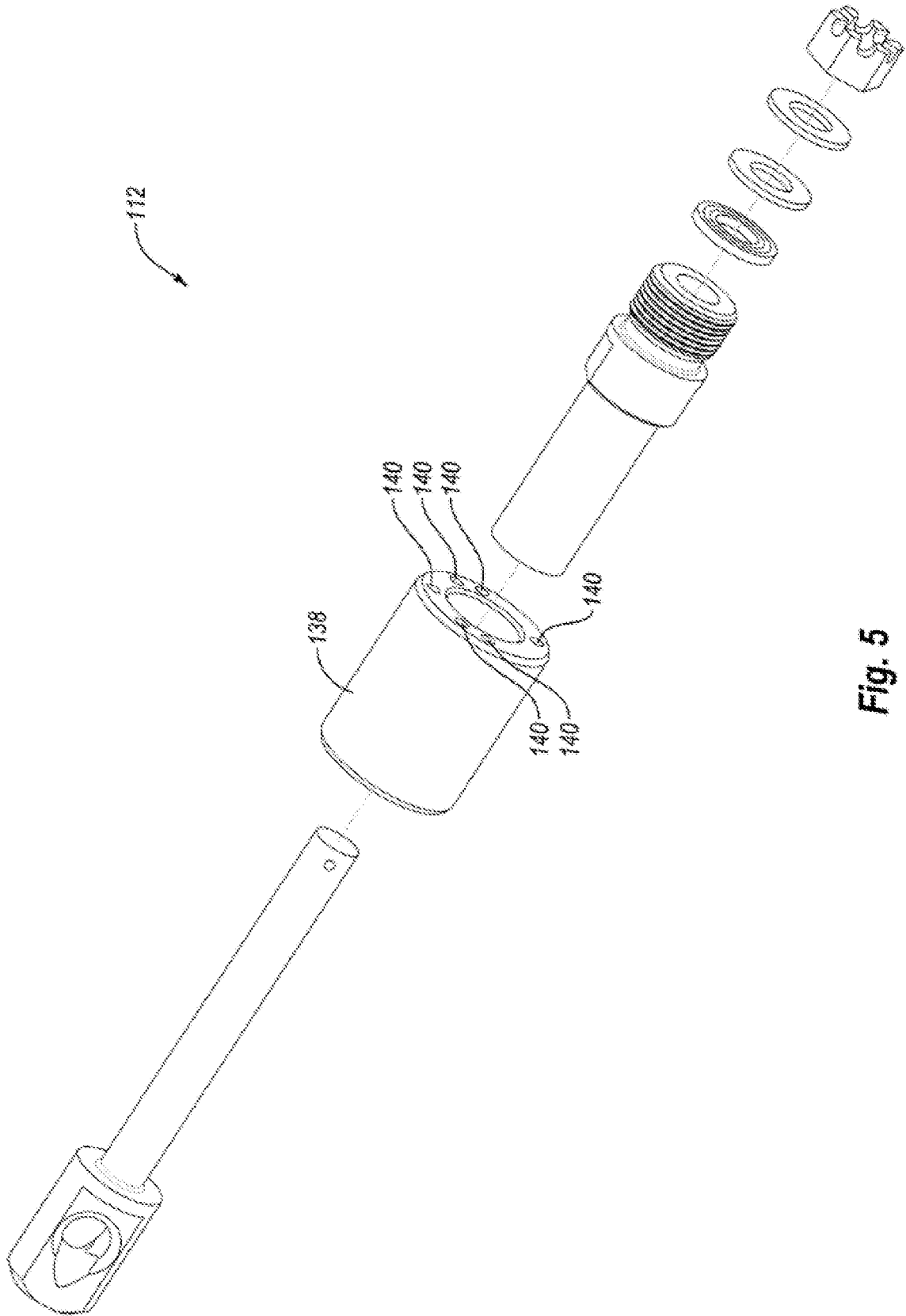


Fig. 5

6/10

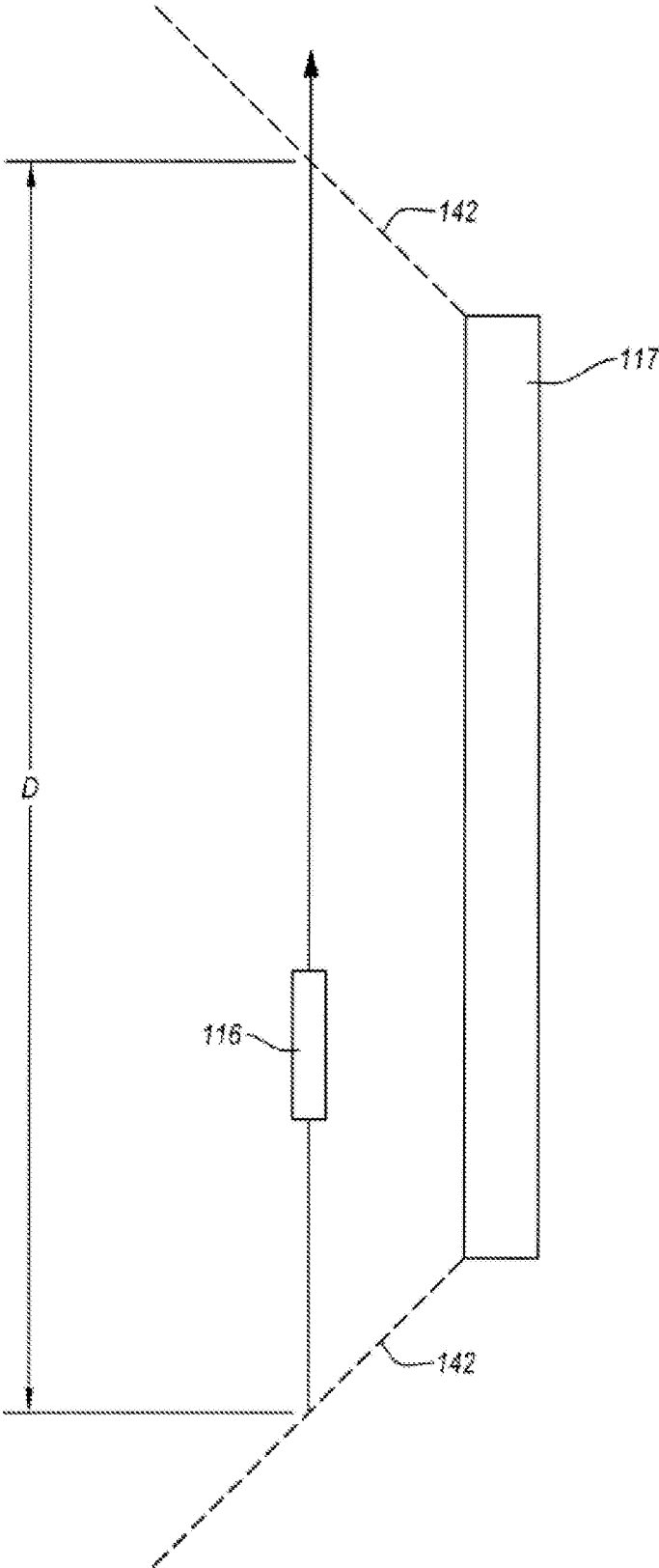


Fig. 6

7/10

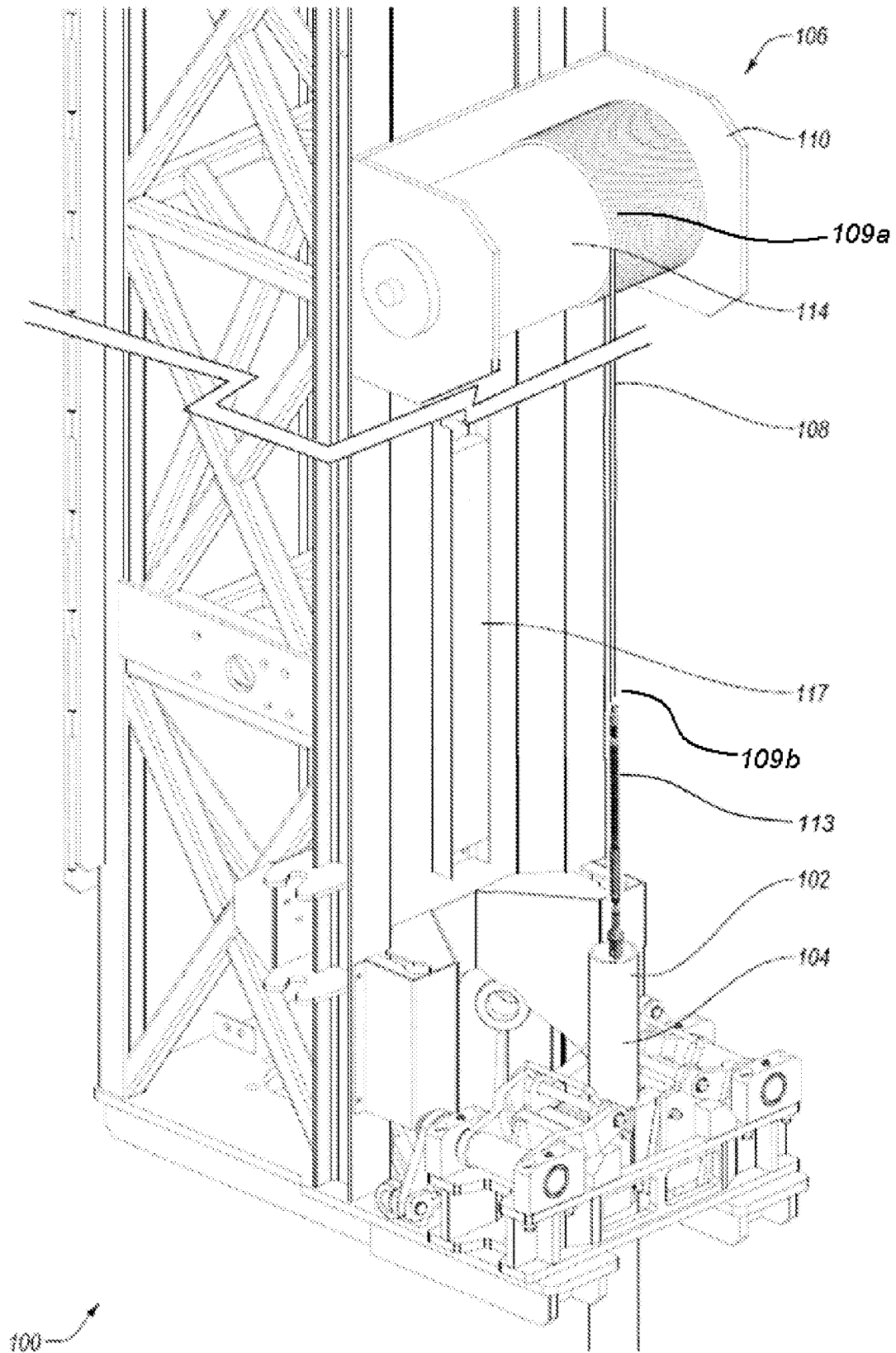


Fig. 7

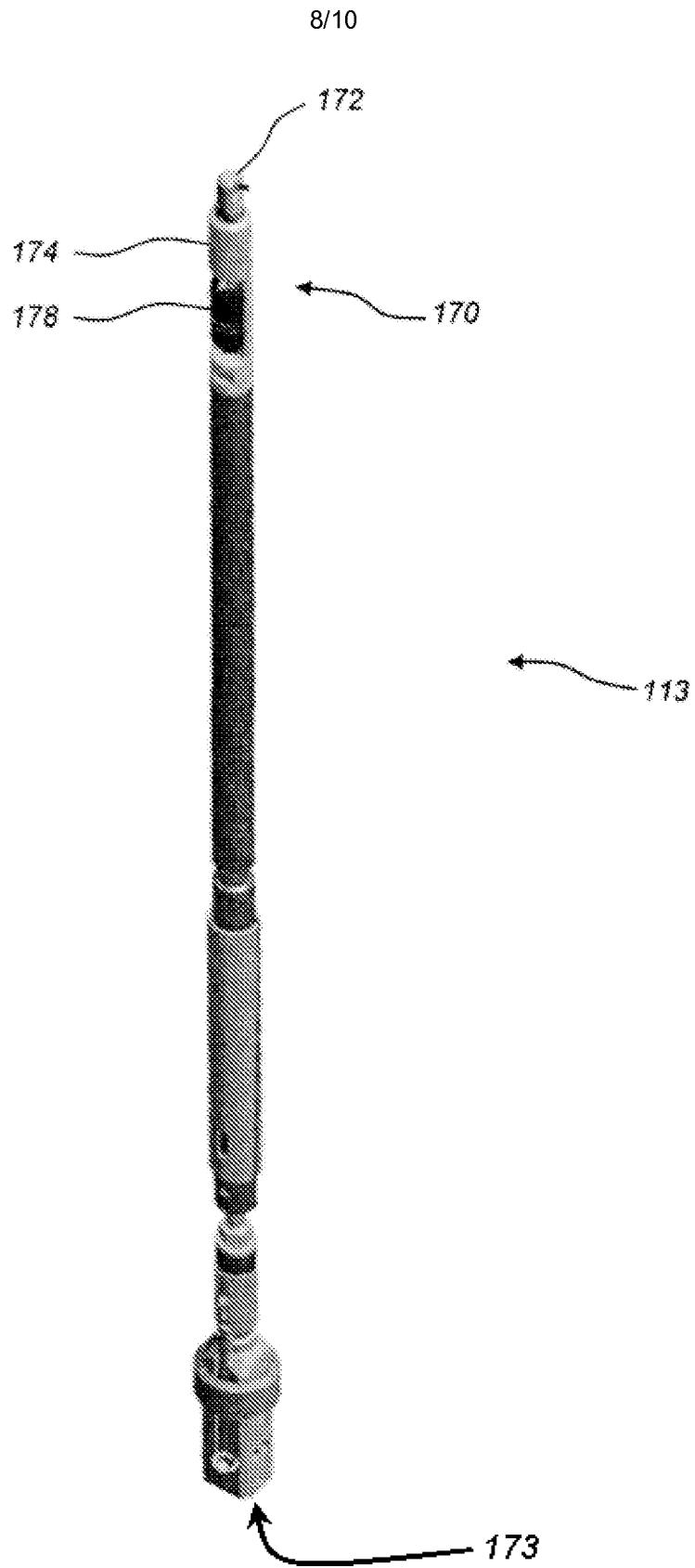


Fig. 8

9/10

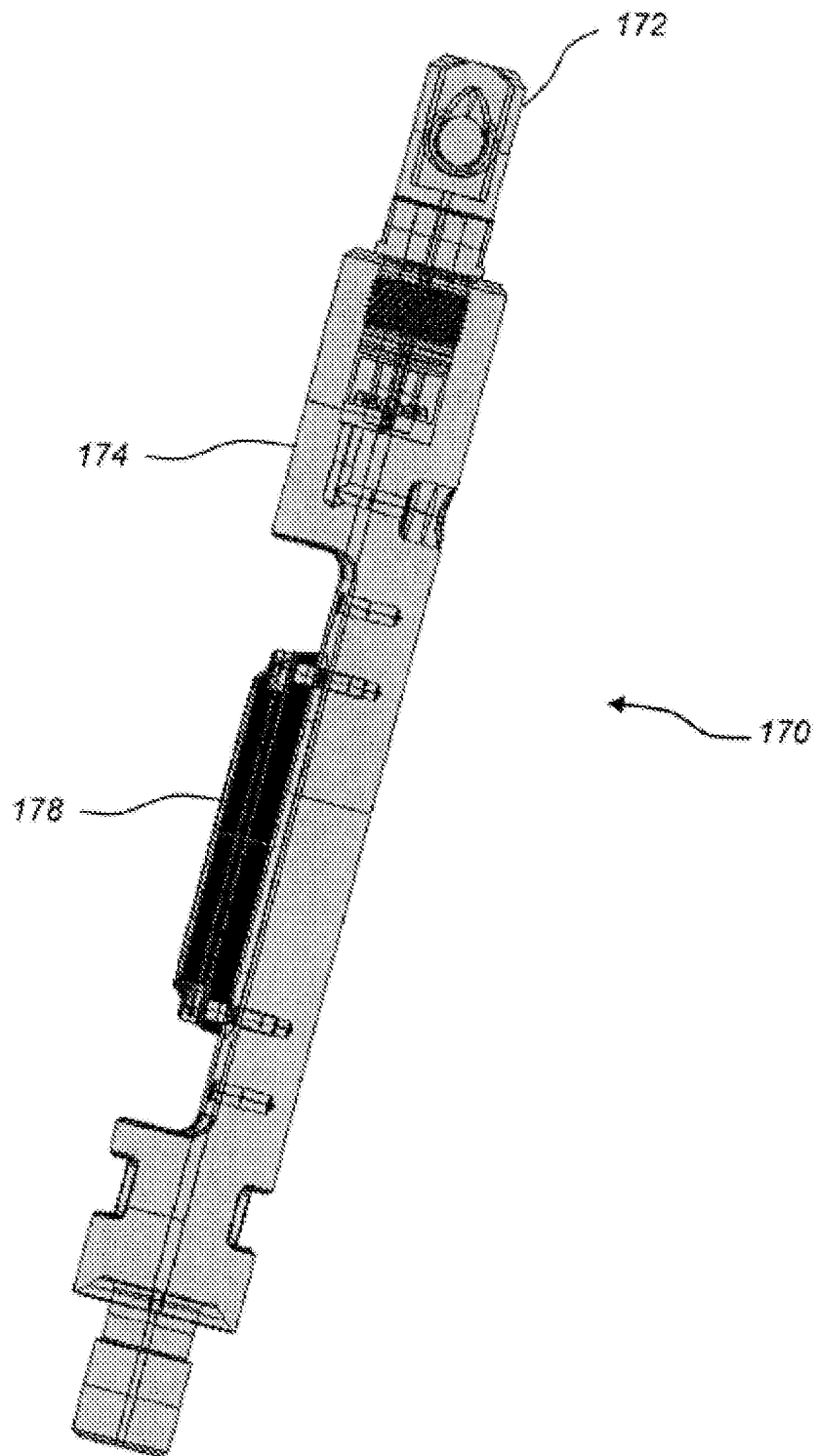


Fig. 9

10/10

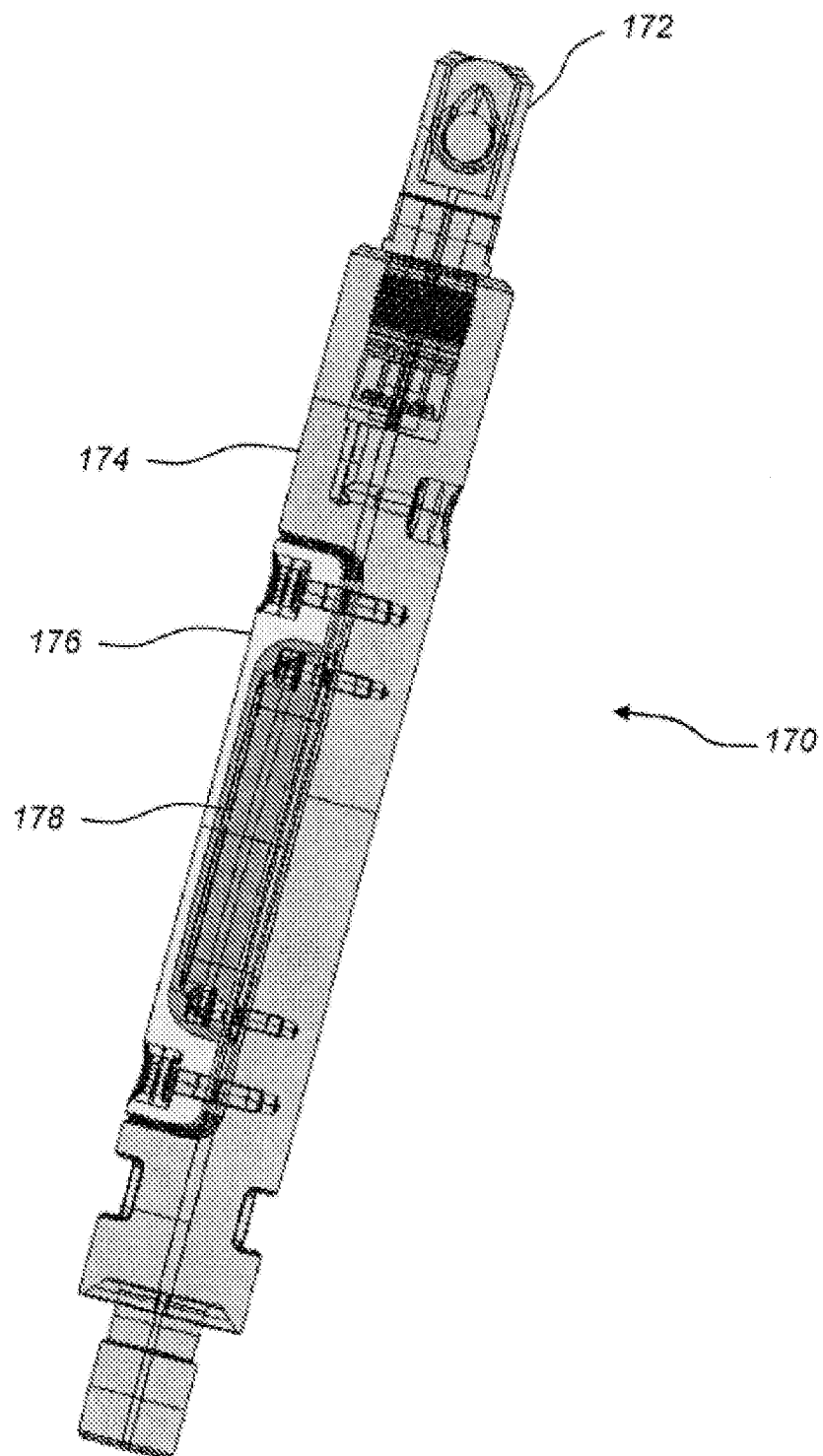


Fig. 10