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(54) DETECTING AND MEASURING A CORING SAMPLE

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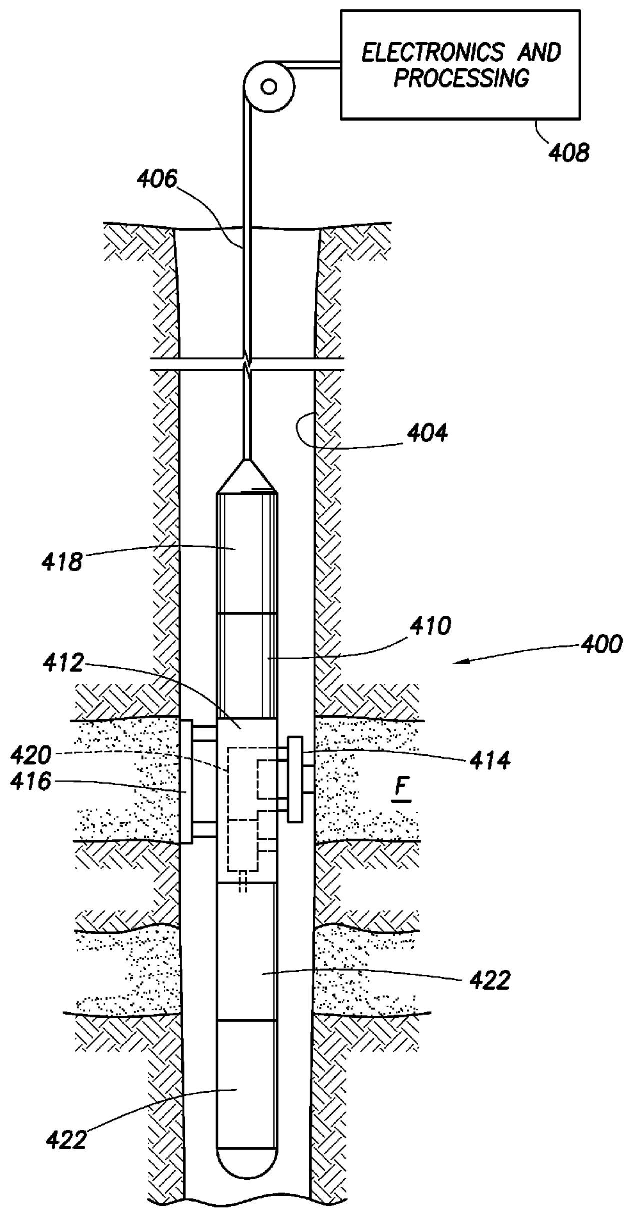
(52) **U.S. Cl.** **175/58**

(57) **ABSTRACT**

Detecting and measuring the presence of a coring sample within a coring tool. These include moving a handling piston of the coring tool from a first position to a second position with respect to the coring tool, measuring a distance of the movement of the handling piston between the first position and the second position, comparing the measured distance with a predetermined distance, and determining if a coring sample is present within the coring tool based upon the comparison of the measured distance with the predetermined distance.



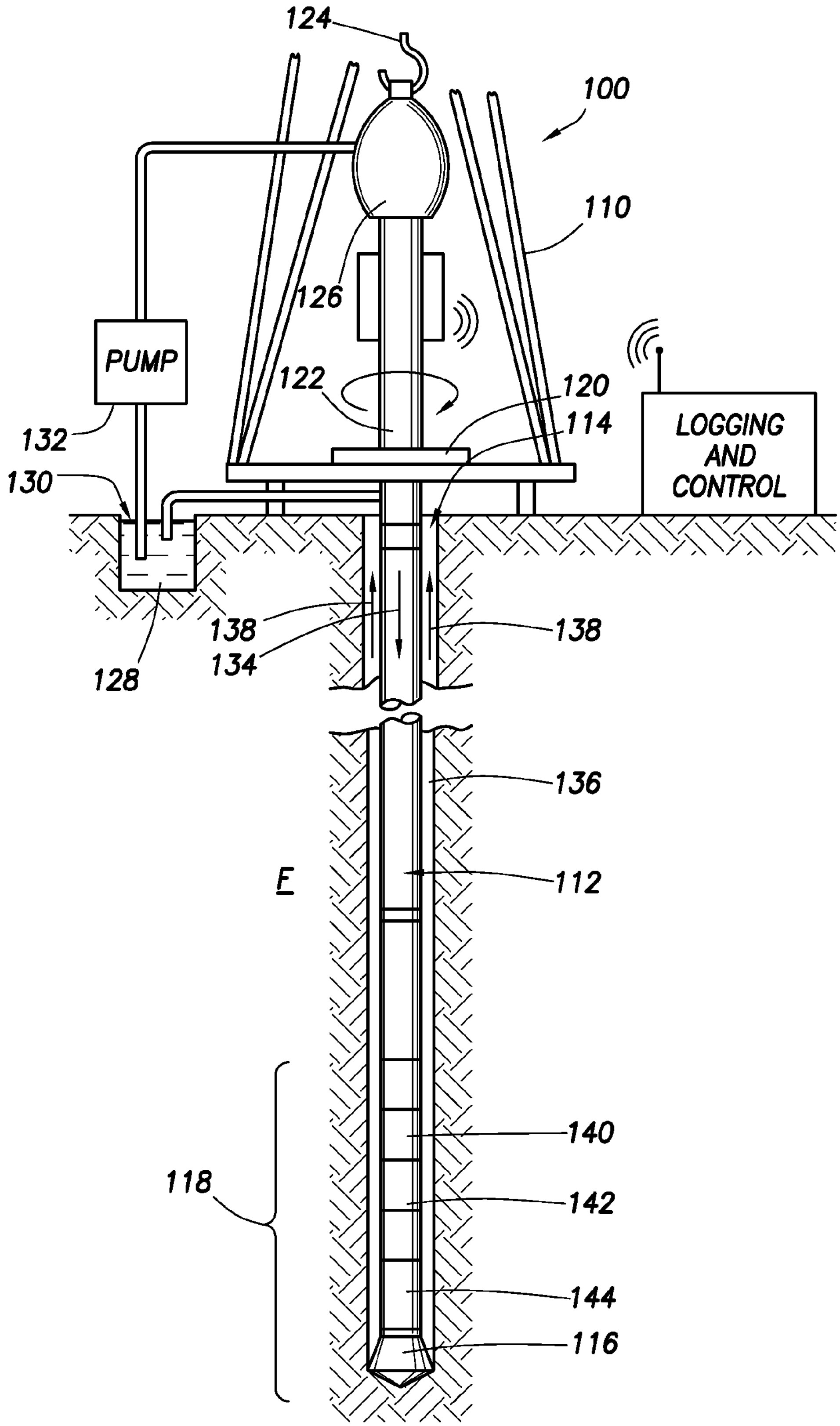

124
100
110
126
PUMP
122
120
114
132
130
LOGGING
AND
CONTROL
138
134
138
128
136
E
112
140
118
142
144
116

FIG. 1

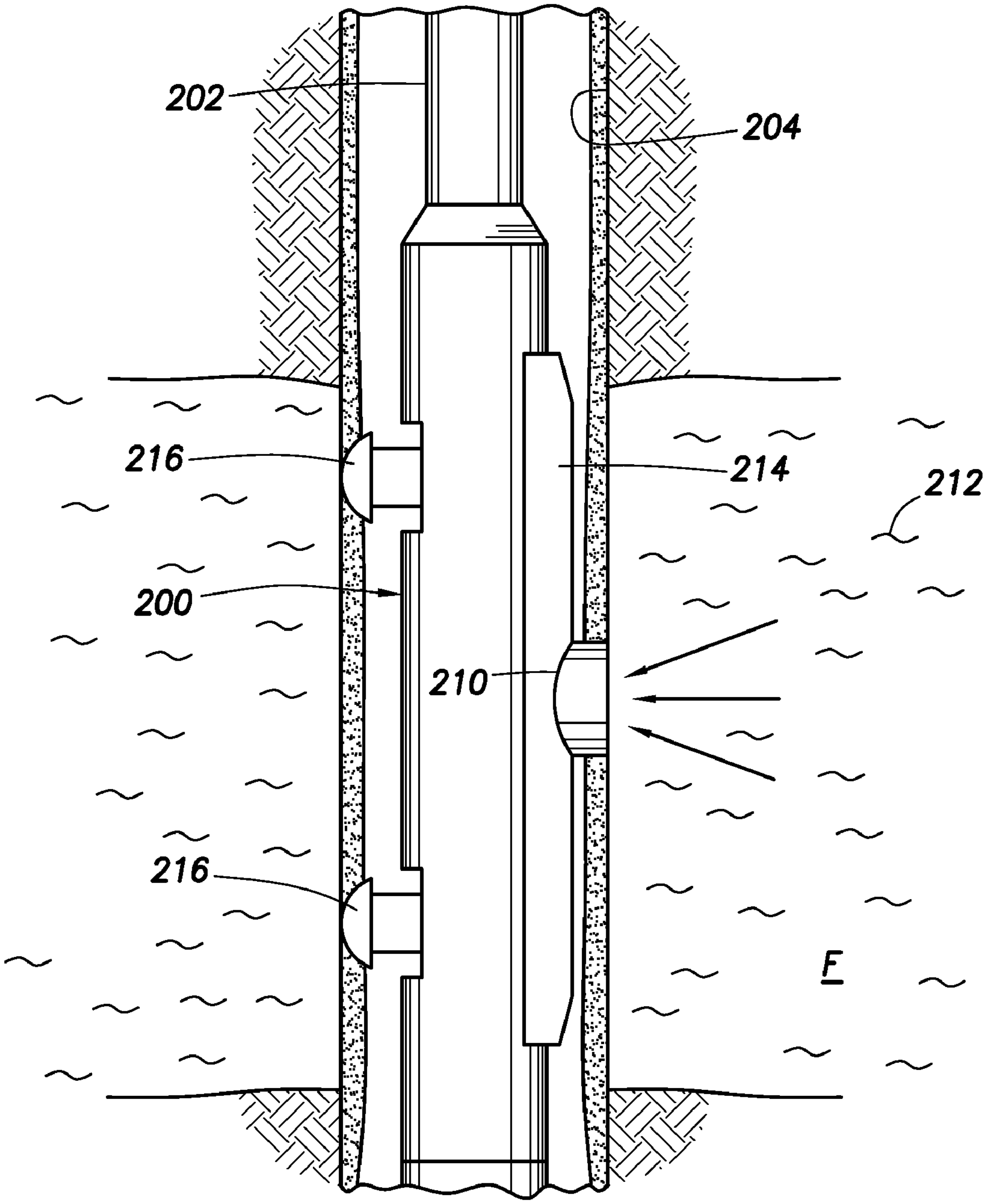


FIG.2

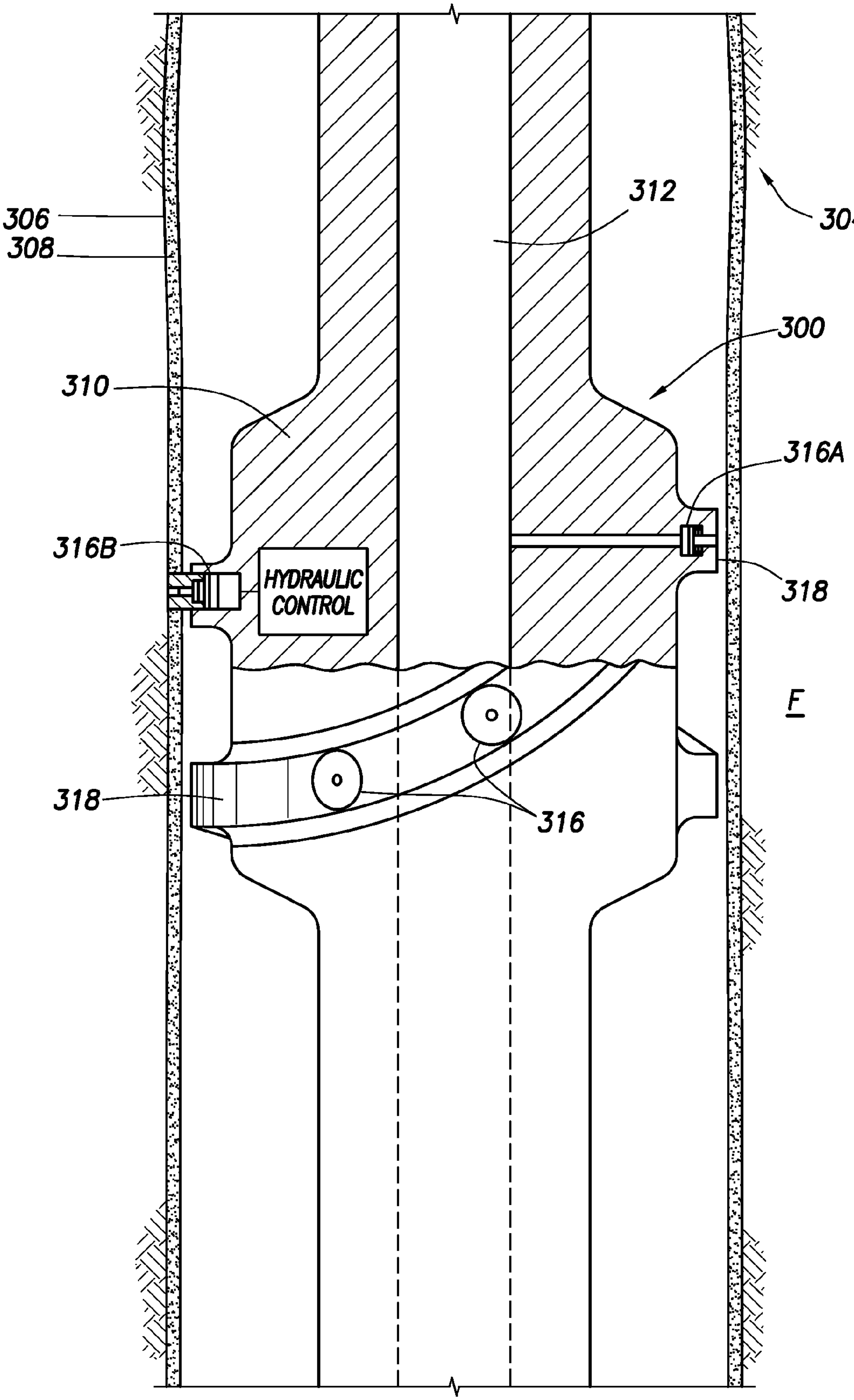

312
306
308
304
300
310
316A
316B
HYDRAULIC CONTROL
318
F
318
316

FIG.3

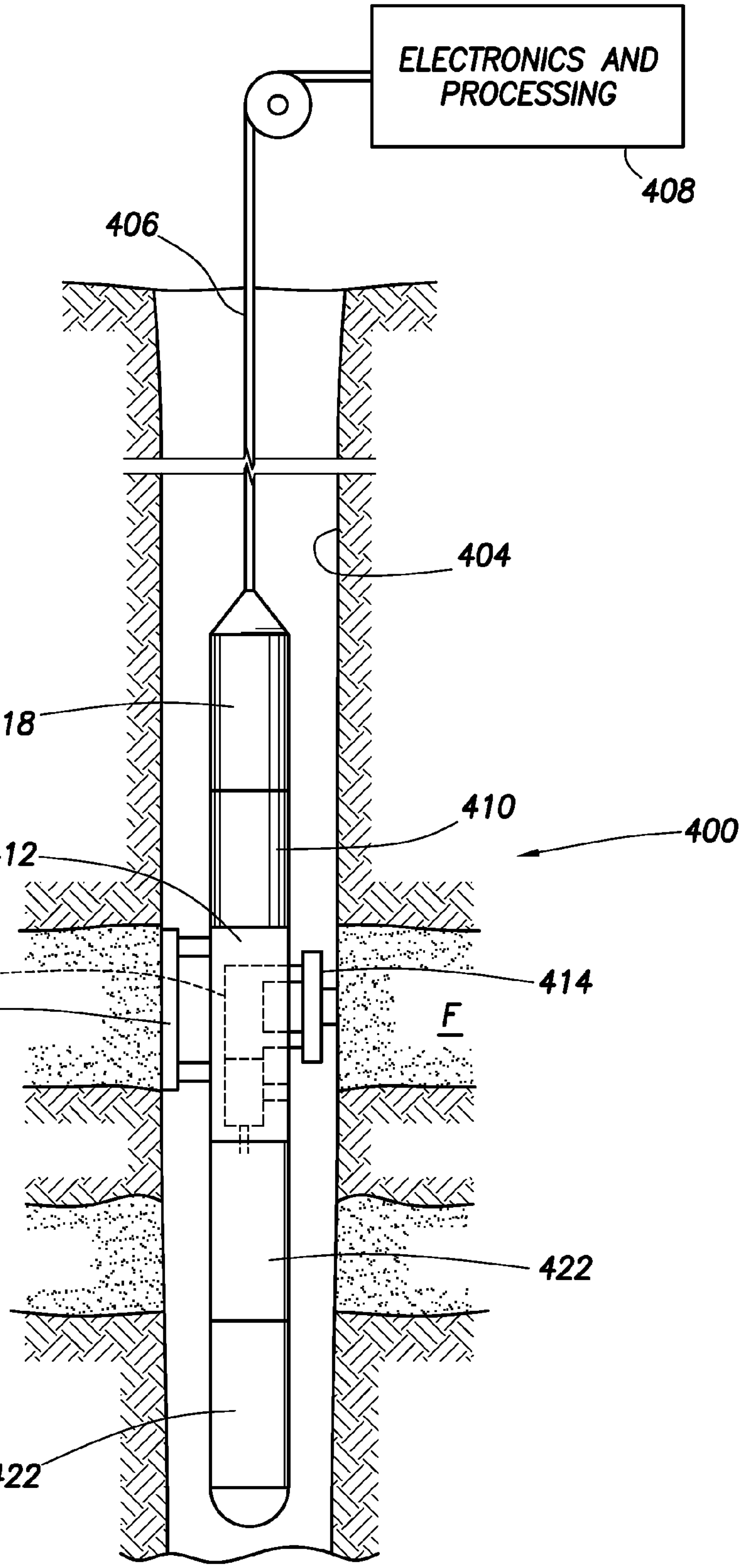

ELECTRONICS AND PROCESSING
408
406
404
418
410
400
412
420
416
414
F
422
422

FIG.4

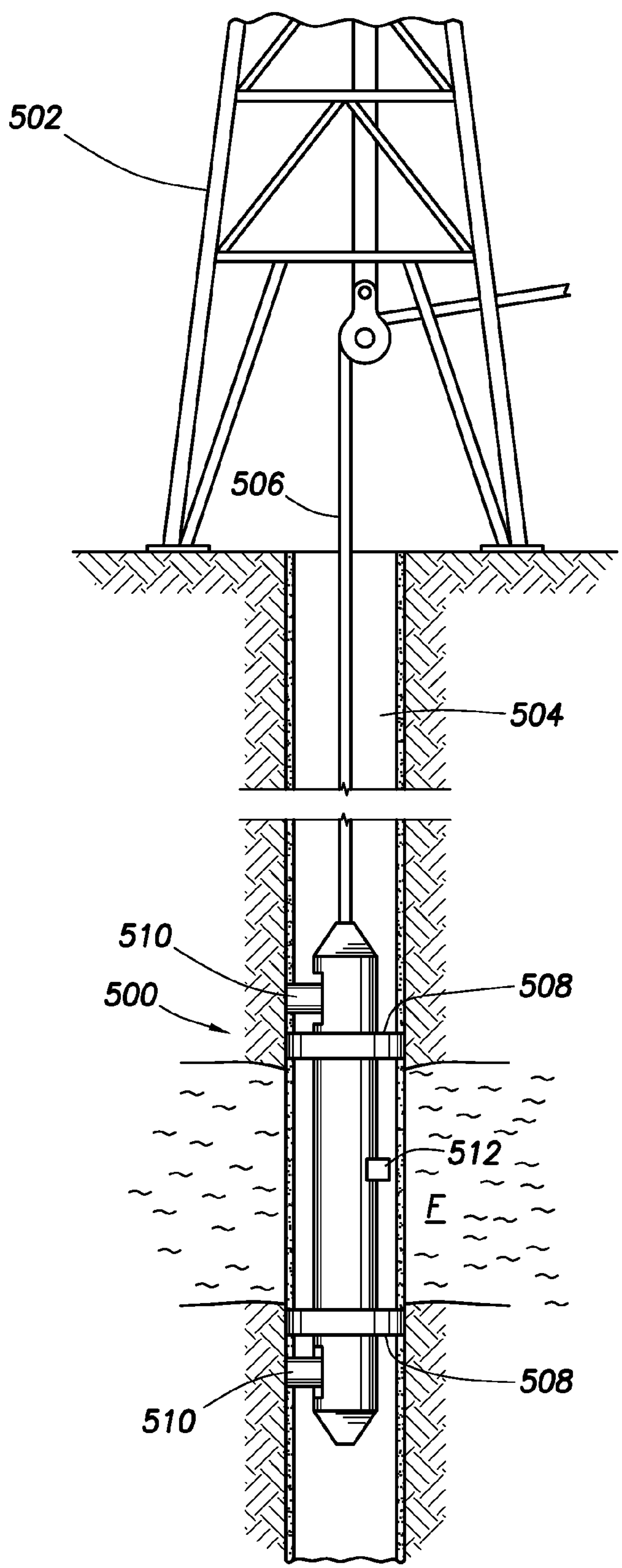


FIG.5

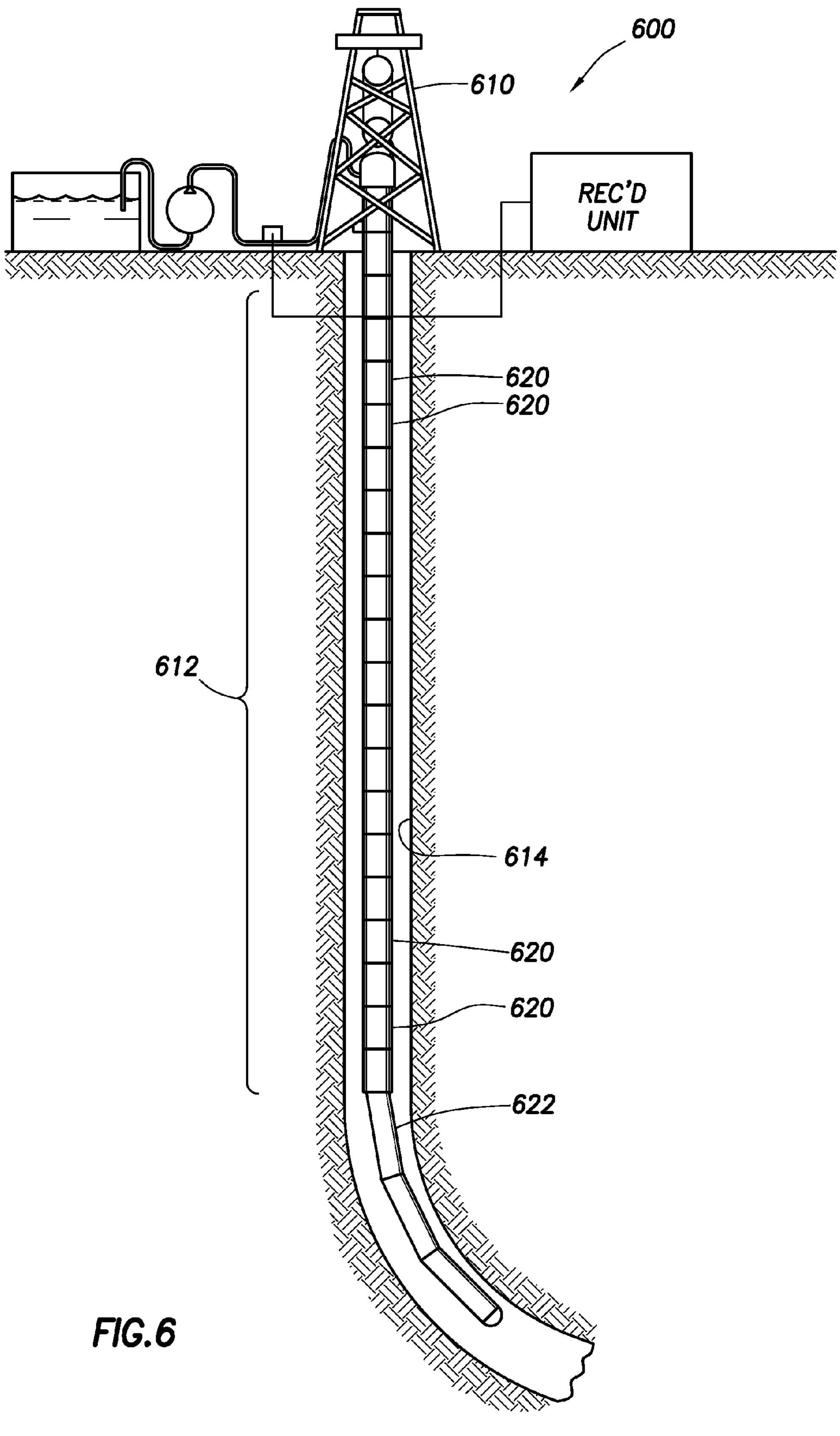


FIG.6

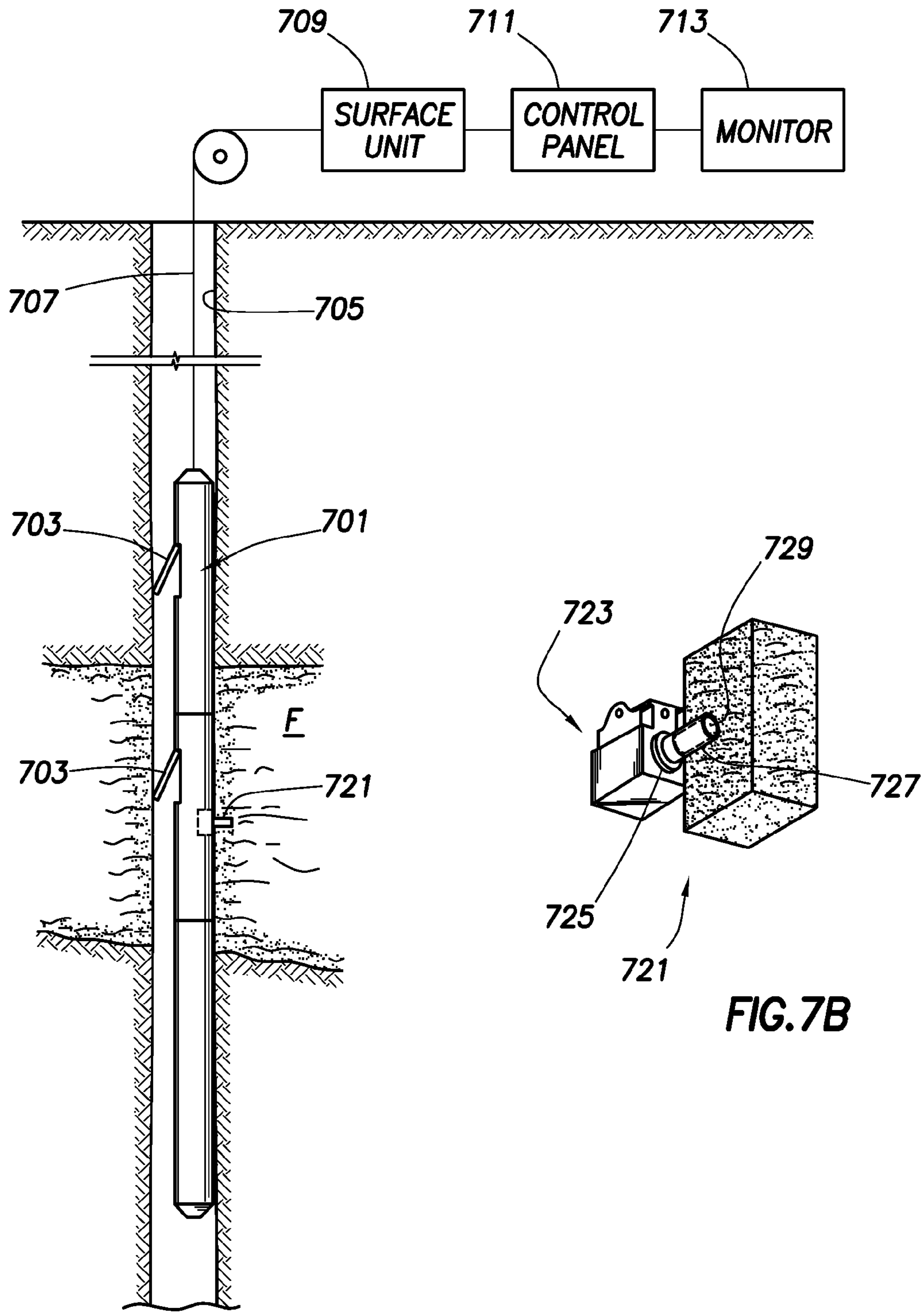

709
711
713
SURFACE UNIT
CONTROL PANEL
MONITOR
707
705
703
701
F
703
721
729
723
727
725
721

FIG.7A

FIG.7B

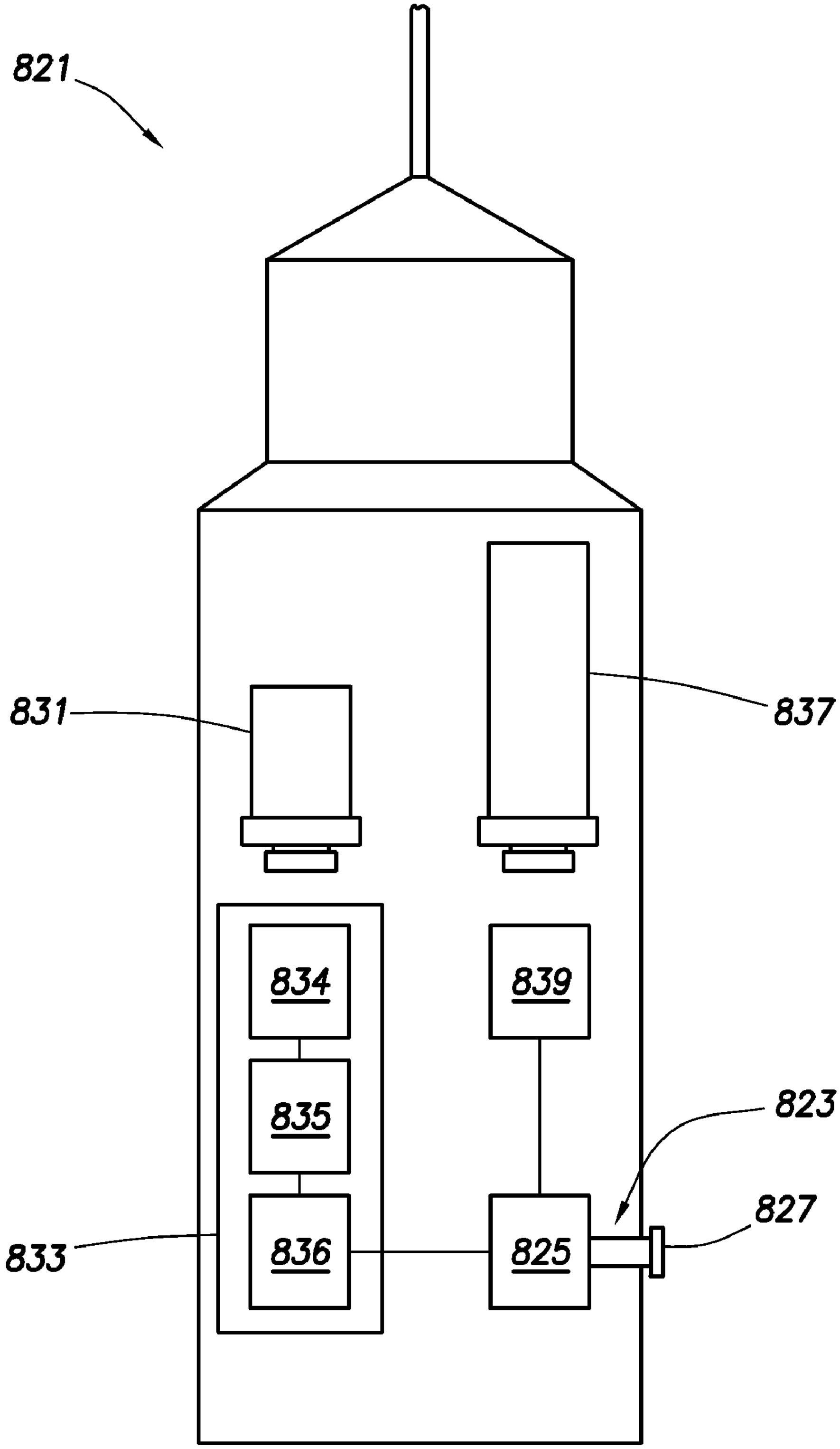


FIG.8

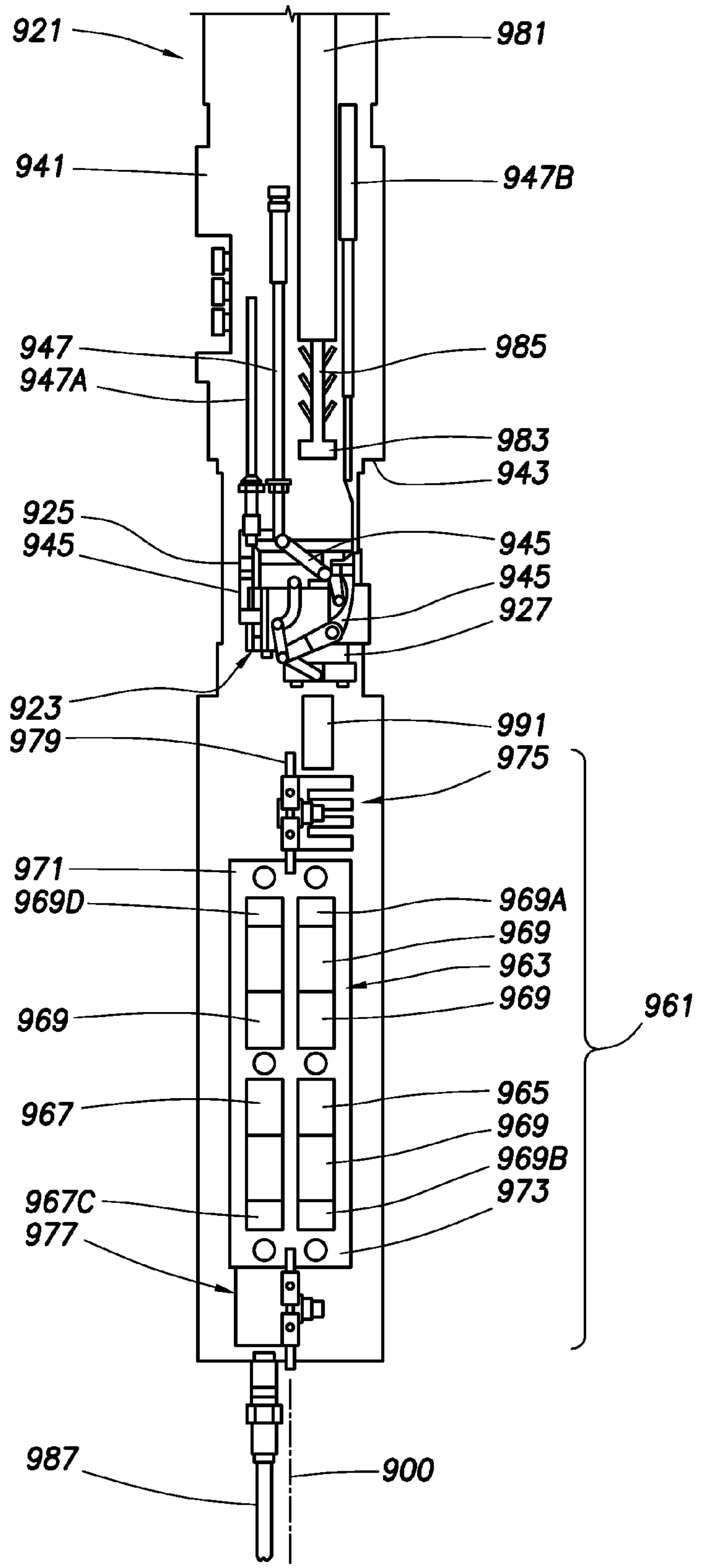
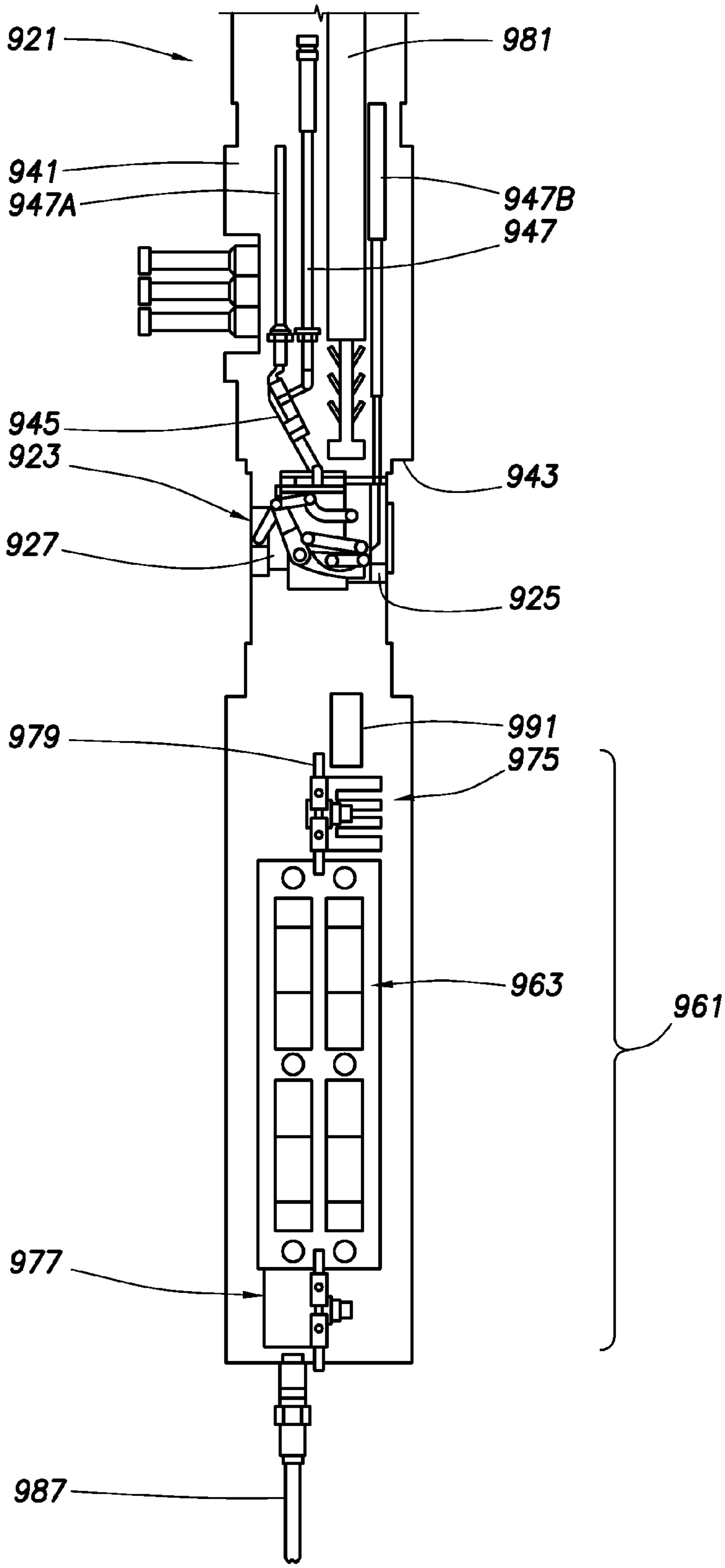

921
981
941
947B
947
947A
985
983
943
925
945
945
945
927
923
991
979
975
971
969D
969A
969
963
969
969
961
967
965
969
969B
967C
973
977
987
900

FIG.9A


921
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941
947A
947B
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945
923
943
927
925
979
991
975
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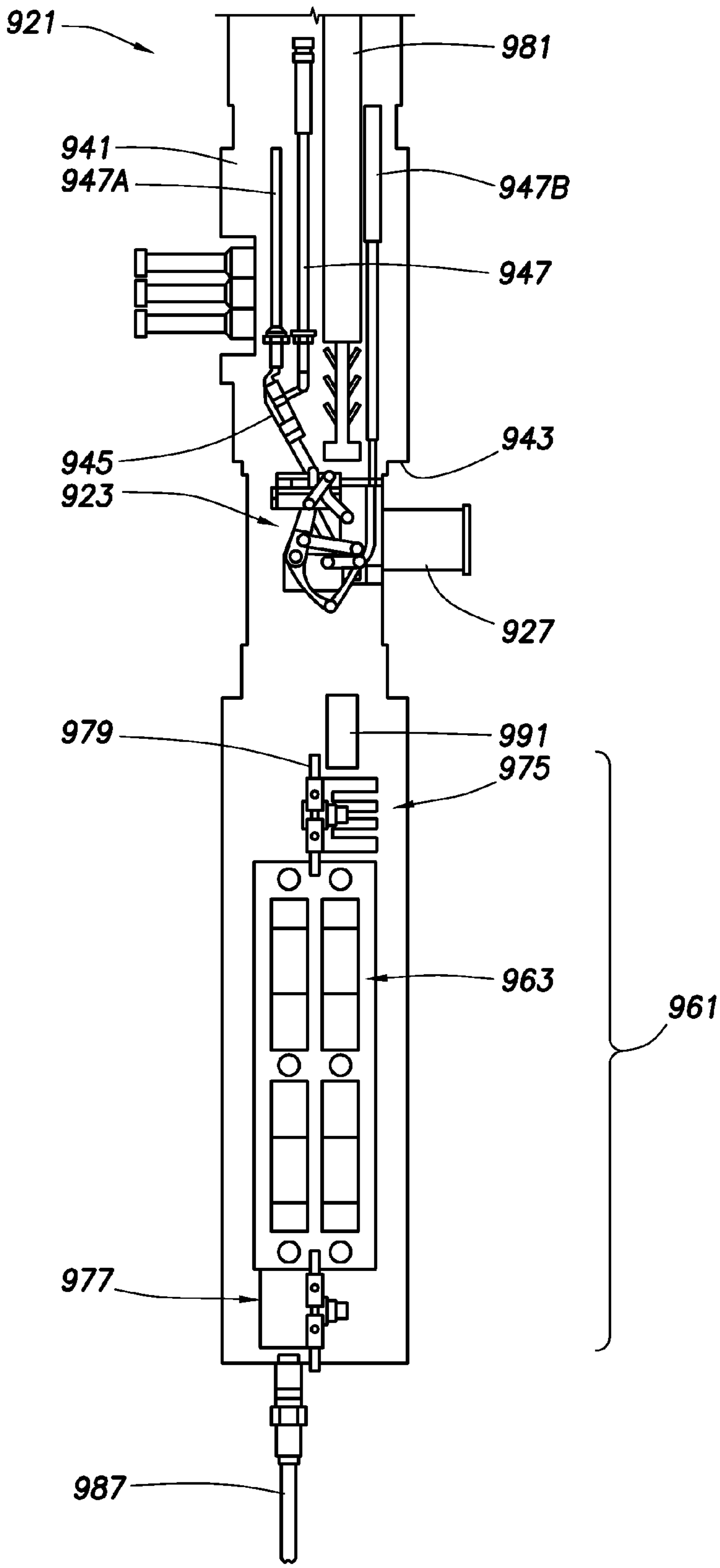
961
977
987

FIG.9B



921
981
941
947A
947B
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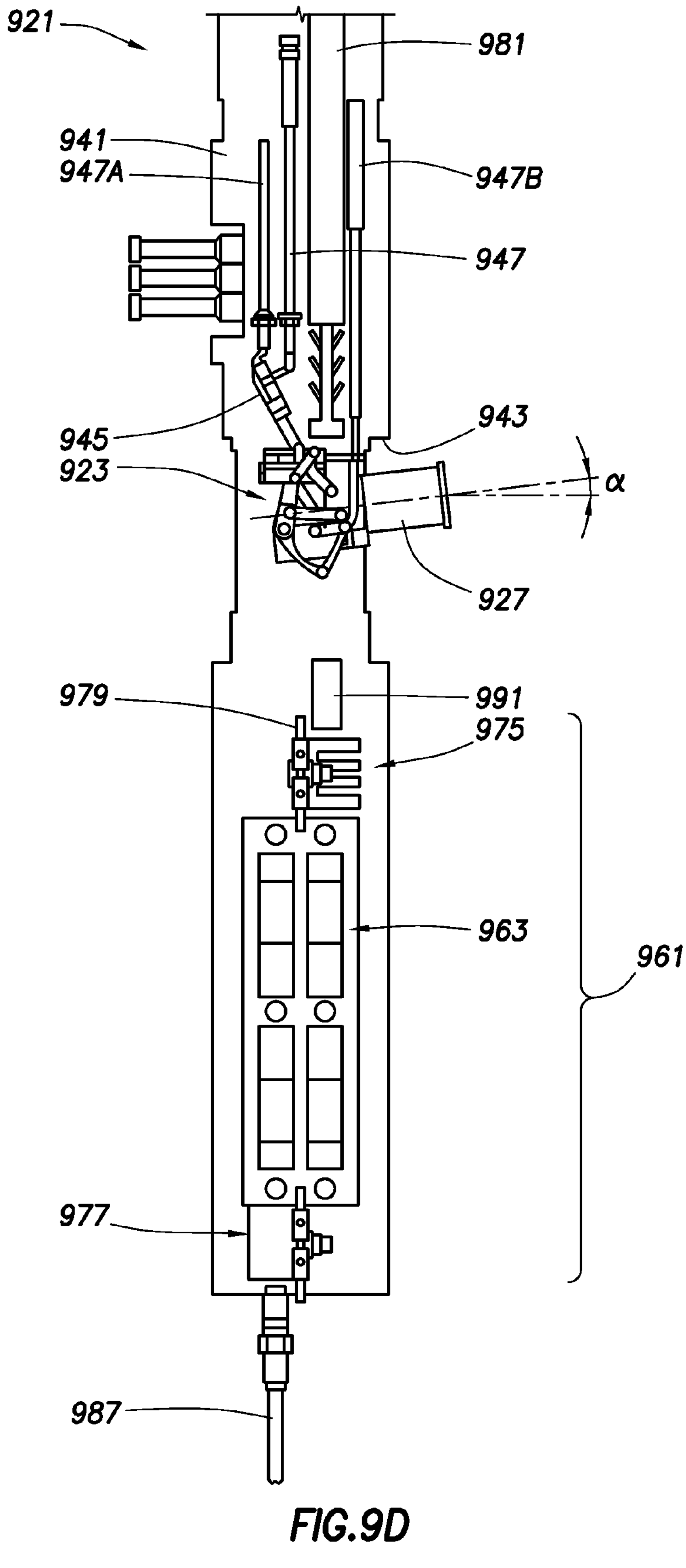
945
943
923
927
979
991
975
963
961
977
987

FIG.9C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981
941
947A
947B
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927
979
991
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961
977
987

FIG.9D

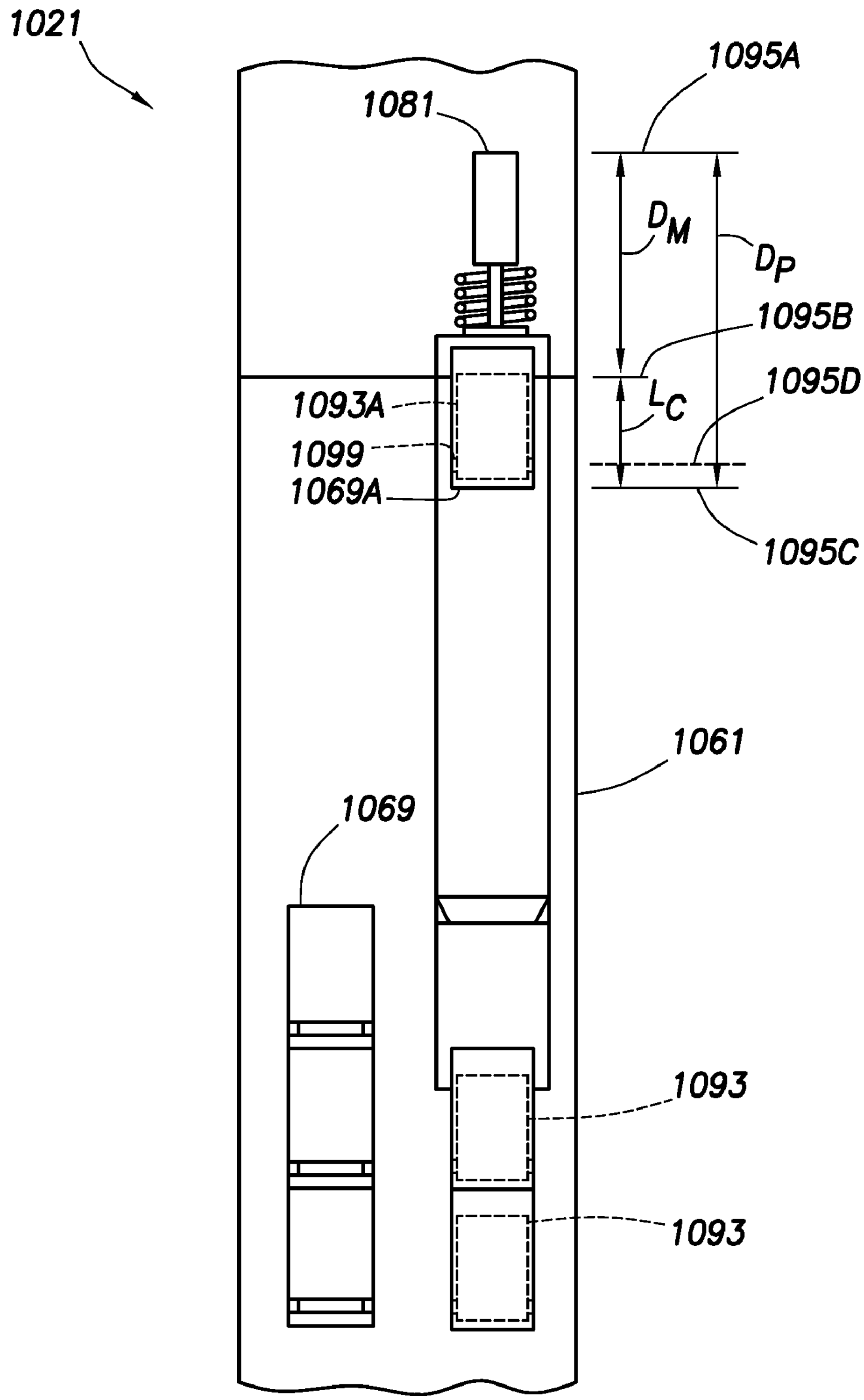
1021
1081
1095A
D_M
D_P
1095B
1095D
L_C
1093A
1099
1069A
1095C
1061
1069
1093
1093

FIG. 10

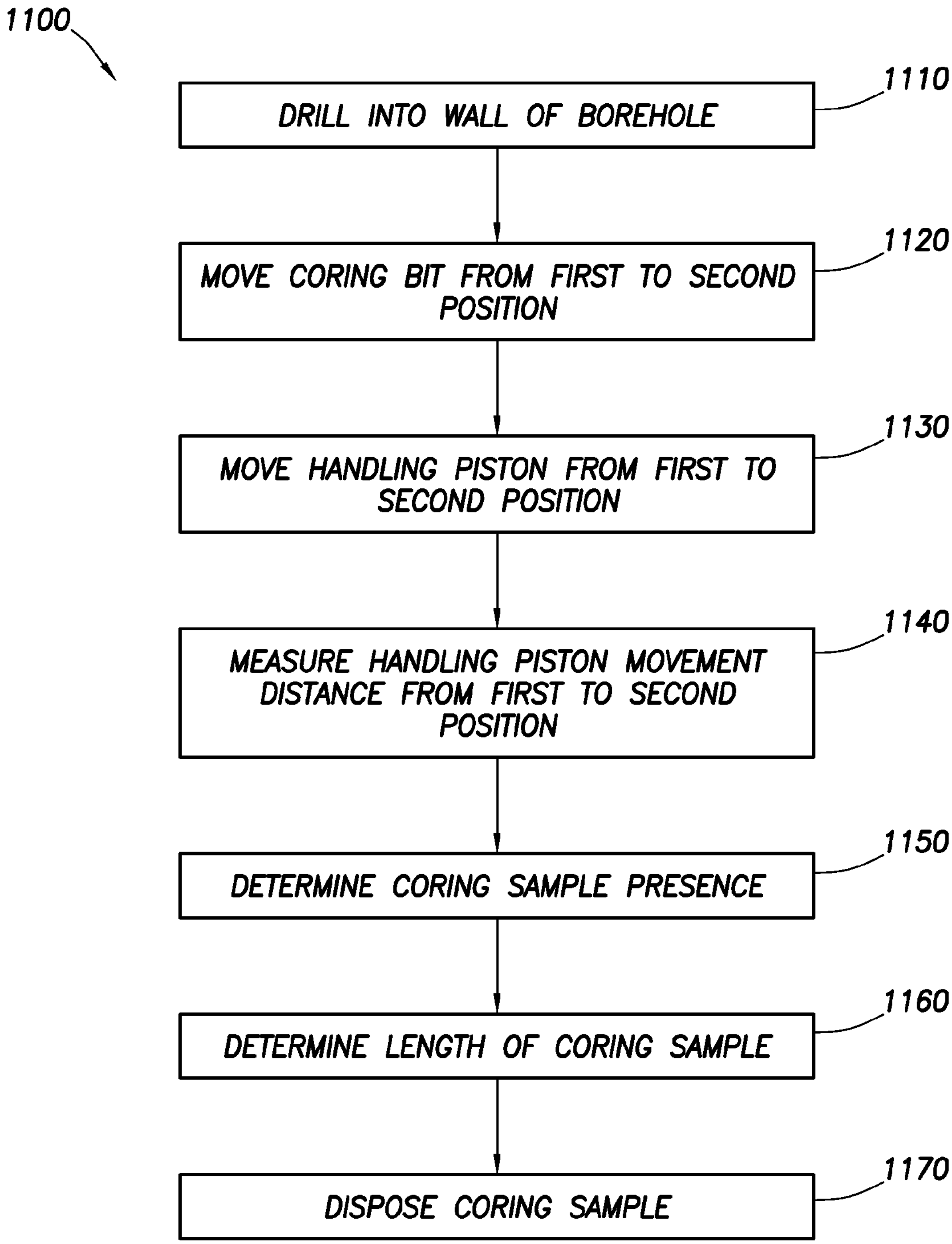
1100
DRILL INTO WALL OF BOREHOLE
1110
MOVE CORING BIT FROM FIRST TO SECOND POSITION
1120
MOVE HANDLING PISTON FROM FIRST TO SECOND POSITION
1130
MEASURE HANDLING PISTON MOVEMENT DISTANCE FROM FIRST TO SECOND POSITION
1140
DETERMINE CORING SAMPLE PRESENCE
1150
DETERMINE LENGTH OF CORING SAMPLE
1160
DISPOSE CORING SAMPLE
1170

FIG. 11

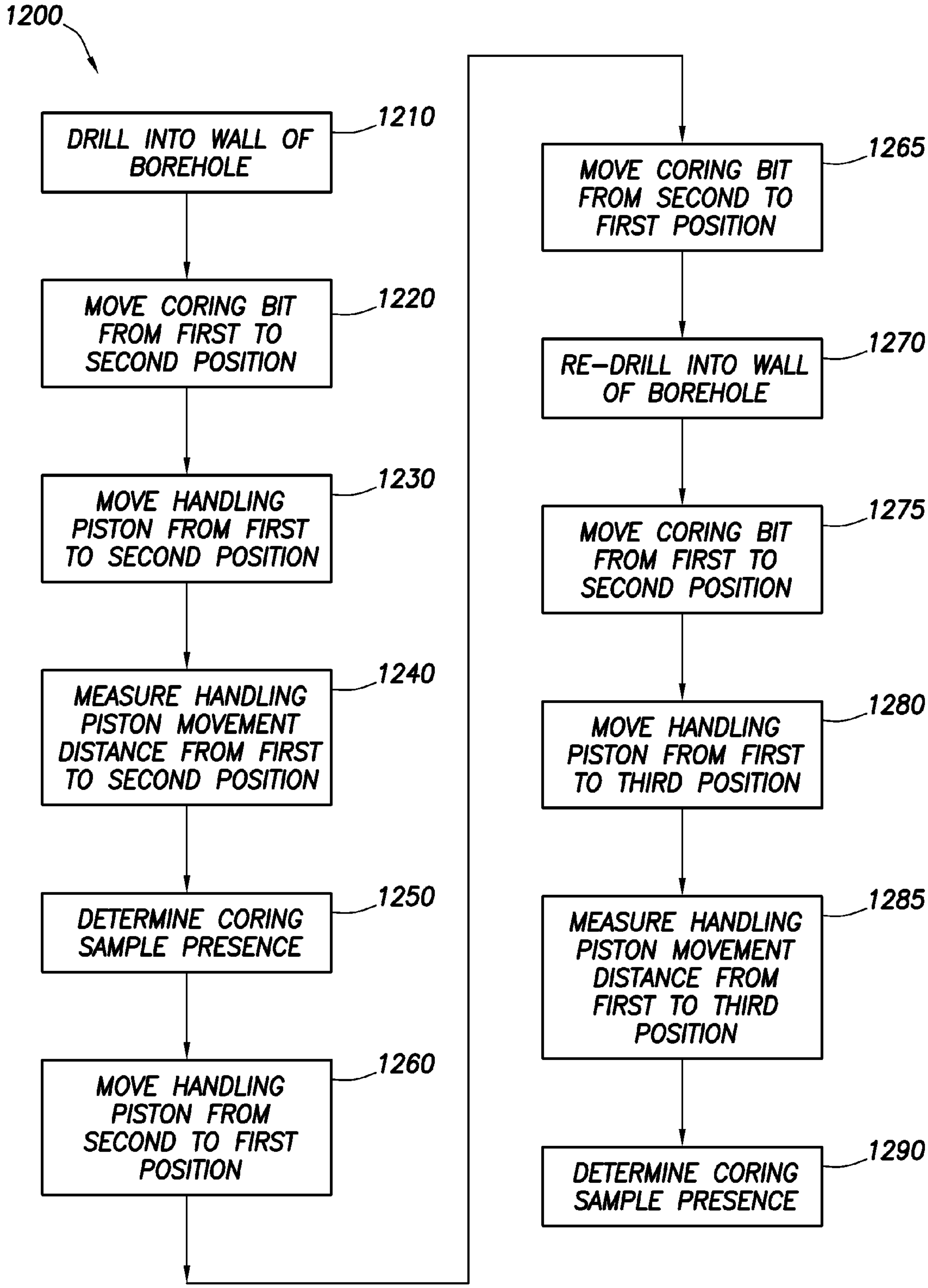
1200
DRILL INTO WALL OF BOREHOLE
1210
MOVE CORING BIT FROM FIRST TO SECOND POSITION
1220
MOVE HANDLING PISTON FROM FIRST TO SECOND POSITION
1230
MEASURE HANDLING PISTON MOVEMENT DISTANCE FROM FIRST TO SECOND POSITION
1240
DETERMINE CORING SAMPLE PRESENCE
1250
MOVE HANDLING PISTON FROM SECOND TO FIRST POSITION
1260
MOVE CORING BIT FROM SECOND TO FIRST POSITION
1265
RE-DRILL INTO WALL OF BOREHOLE
1270
MOVE CORING BIT FROM FIRST TO SECOND POSITION
1275
MOVE HANDLING PISTON FROM FIRST TO THIRD POSITION
1280
MEASURE HANDLING PISTON MOVEMENT DISTANCE FROM FIRST TO THIRD POSITION
1285
DETERMINE CORING SAMPLE PRESENCE
1290

FIG. 12

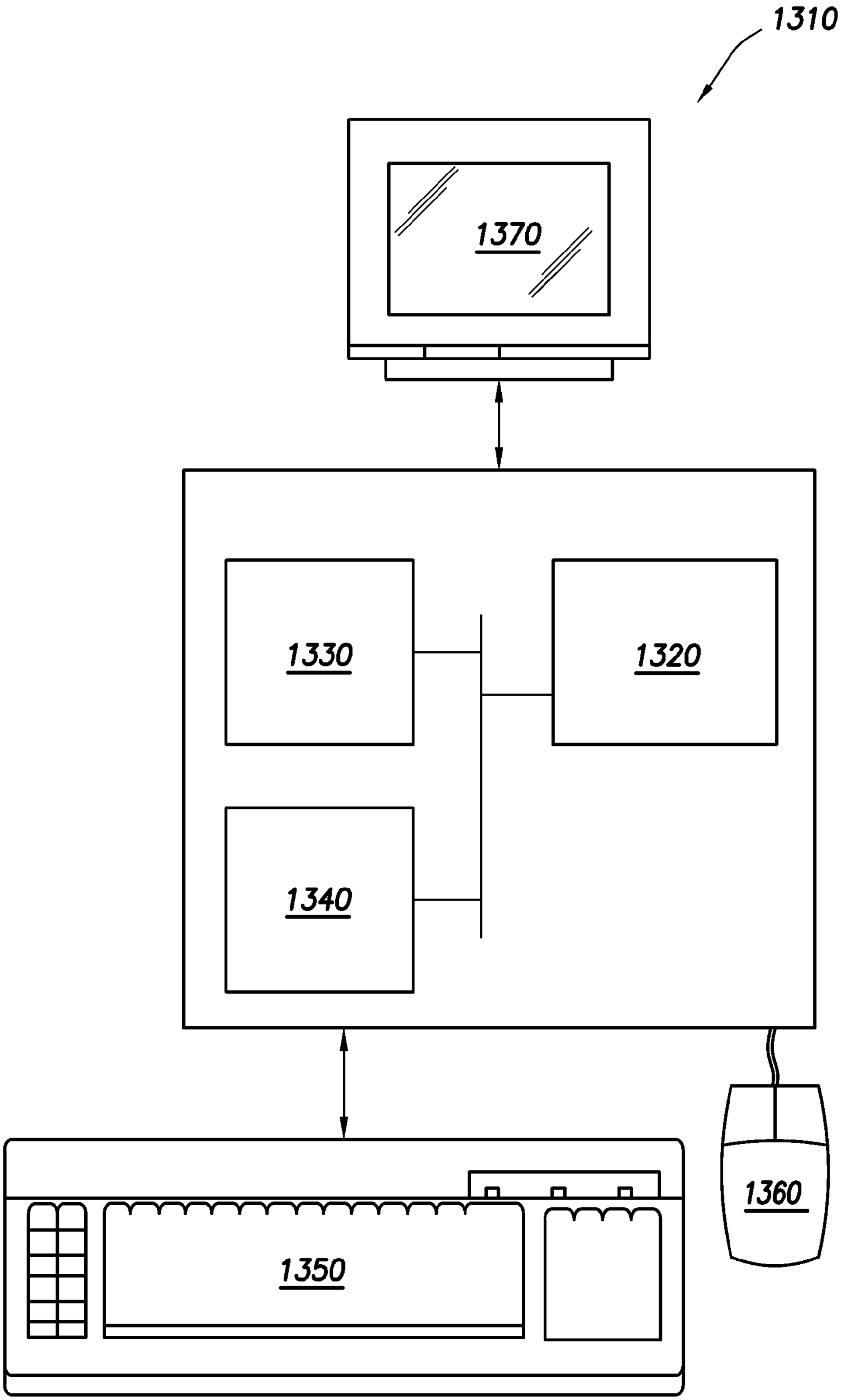

FIG. 13

DETECTING AND MEASURING A CORING SAMPLE

BACKGROUND OF THE DISCLOSURE

[0001] Wells are generally drilled into the ground or ocean bed to recover natural deposits of oil and gas, as well as other desirable materials that are trapped in geological formations in the Earth's crust. Wells are typically drilled using a drill bit attached to the lower end of a "drill string." Drilling fluid, or mud, is typically pumped down through the drill string to the drill bit. The drilling fluid lubricates and cools the bit, and may additionally carry drill cuttings from the borehole back to the surface.

[0002] In various oil and gas exploration operations, it may be beneficial to have information about the subsurface formations that are penetrated by a borehole. For example, certain formation evaluation schemes include measurement and analysis of the formation pressure and permeability. These measurements may be essential to predicting the production capacity and production lifetime of the subsurface formation.

[0003] Further, in addition to the formation testing tools, which may be primarily used to collect fluid samples, samples may also be taken of the formation rock within the borehole. For example, a coring tool may be used to take a coring sample of the formation rock within the borehole. The typical coring tool usually includes a hollow drill bit, such as a coring bit, that is advanced into the formation wall such that a sample, such as a coring sample, may be removed from the formation. Downhole coring operations generally include axial coring and sidewall coring. In axial coring, the coring tool may be disposed at the end of a drill string disposed within a borehole, in which the coring tool may be used to collect a coring sample at the bottom of the borehole. In sidewall coring, the coring bit from the coring tool may extend radially from the coring tool, in which the coring tool may be used to collect a coring sample from a side wall of the borehole.

[0004] As such, the coring sample may then be transported to the surface, in which the sample may be analyzed to assess, amongst other things, the reservoir storage capacity (porosity) and the permeability of the material that makes up the formation surrounding the borehole, such as the chemical and mineral composition of the fluids and mineral deposits contained in the pores of the formation and/or the irreducible water content contained in the formation. However, traditional coring tools may be limited in operation, such as by having limited storage area for coring samples, and further may not reliably break core samples away from the formation of the borehole.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] The present disclosure is best understood from the following detailed description when read with the accompanying figures. It is emphasized that, in accordance with the standard practice in the industry, various features are not drawn to scale. In fact, the dimensions of the various features may be arbitrarily increased or reduced for clarity of discussion.

[0006] FIG. **1** shows a side view of a wellsite having a drilling rig with a drill string suspended therefrom in accordance with one or more embodiments of the present disclosure.

[0007] FIG. **2** shows a side view of a tool in accordance with one or more embodiments of the present disclosure.

[0008] FIG. **3** shows a schematic view of a tool in accordance with one or more embodiments of the present disclosure.

[0009] FIG. **4** shows a side view of a tool in accordance with one or more embodiments of the present disclosure.

[0010] FIG. **5** shows a side view of a tool in accordance with one or more embodiments of the present disclosure.

[0011] FIG. **6** shows a side view of a wellsite having a drilling rig in accordance with one or more embodiments of the present disclosure.

[0012] FIGS. **7**A and **7**B show multiple views of a coring tool in accordance with one or more embodiments of the present disclosure.

[0013] FIG. **8** shows a schematic view of a coring tool in accordance with one or more embodiments of the present disclosure.

[0014] FIGS. **9**A-**9**D show multiple side views of a coring tool in accordance with one or more embodiments of the present disclosure.

[0015] FIG. **10** shows a schematic view of a coring tool in accordance with one or more embodiments of the present disclosure.

[0016] FIGS. **11** and **12** show multiple views of flow charts of methods and to drill with a coring tool in accordance with one or more embodiments of the present disclosure.

[0017] FIG. **13** shows a computer system that may be used in accordance with an embodiment disclosed herein.

DETAILED DESCRIPTION

[0018] It is to be understood that the following disclosure provides many different embodiments, or examples, for implementing different features of various embodiments. Specific examples of components and arrangements are described below to simplify the present disclosure. These are, of course, merely examples and are not intended to be limiting. In addition, the present disclosure may repeat reference numerals and/or letters in the various examples. This repetition is for the purpose of simplicity and clarity and does not in itself dictate a relationship between the various embodiments and/or configurations discussed. Moreover, the formation of a first feature over or on a second feature in the description that follows may include embodiments in which the first and second features are formed in direct contact, and may also include embodiments in which additional features may be formed interposing the first and second features, such that the first and second features may not be in direct contact.

[0019] Referring now to FIG. **1**, a side view of a wellsite **100** having a drilling rig **110** with a drill string **112** suspended therefrom in accordance with one or more embodiments of the present disclosure is shown. The wellsite **100** shown, or one similar thereto, may be used within onshore and/or offshore locations. In this embodiment, a borehole **114** may be formed within a subsurface formation F, such as by using rotary drilling, or any other method known in the art. As such, one or more embodiments in accordance with the present disclosure may be used within a wellsite, similar to the one as shown in FIG. **1** (discussed more below). Further, those having ordinary skill in the art will appreciate that the present disclosure may be used within other wellsites or drilling operations, such as within a directional drilling application, without departing from the scope of the present disclosure.

[0020] Continuing with FIG. **1**, the drill string **112** may suspend from the drilling rig **110** into the borehole **114**. The drill string **112** may include a bottom hole assembly **118** and a drill bit **116**, in which the drill bit **116** may be disposed at an end of the drill string **112**. The surface of the wellsite **100** may have the drilling rig **110** positioned over the borehole **114**, and the drilling rig **110** may include a rotary table **120**, a kelly **122**, a traveling block or hook **124**, and may additionally include a rotary swivel **126**. The rotary swivel **126** may be suspended from the drilling rig **110** through the hook **124**, and the kelly **122** may be connected to the rotary swivel **126** such that the kelly **122** may rotate with respect to the rotary swivel.

[0021] Further, an upper end of the drill string **112** may be connected to the kelly **122**, such as by threadingly connecting the drill string **112** to the kelly **122**, and the rotary table **120** may rotate the kelly **122**, thereby rotating the drill string **112** connected thereto. As such, the drill string **112** may be able to rotate with respect to the hook **124**. Those having ordinary skill in the art, however, will appreciate that though a rotary drilling system is shown in FIG. **1**, other drilling systems may be used without departing from the scope of the present disclosure. For example, a top-drive (also known as a "power swivel") system may be used in accordance with one or more embodiments without departing from the scope of the present disclosure. In such a top-drive system, the hook **124**, swivel **126**, and kelly **122** are replaced by a drive motor (electric or hydraulic) that may apply rotary torque and axial load directly to drill string **112**.

[0022] The wellsite **100** may further include drilling fluid **128** (also known as drilling "mud") stored in a pit **130**. The pit **130** may be formed adjacent to the wellsite **100**, as shown, in which a pump **132** may be used to pump the drilling fluid **128** into the wellbore **114**. In this embodiment, the pump **132** may pump and deliver the drilling fluid **128** into and through a port of the rotary swivel **126**, thereby enabling the drilling fluid **128** to flow into and downwardly through the drill string **112**, the flow of the drilling fluid **128** indicated generally by direction arrow **134**. This drilling fluid **128** may then exit the drill string **112** through one or more ports disposed within and/or fluidly connected to the drill string **112**. For example, in this embodiment, the drilling fluid **128** may exit the drill string **112** through one or more ports formed within the drill bit **116**.

[0023] As such, the drilling fluid **128** may flow back upwardly through the borehole **114**, such as through an annulus **136** formed between the exterior of the drill string **112** and the interior of the borehole **114**, the flow of the drilling fluid **128** indicated generally by direction arrow **138**. With the drilling fluid **128** following the flow pattern of direction arrows **134** and **138**, the drilling fluid **128** may be able to lubricate the drill string **112** and the drill bit **116**, and/or may be able to carry formation cuttings formed by the drill bit **116** (or formed by any other drilling components disposed within the borehole **114**) back to the surface of the wellsite **100**. As such, this drilling fluid **128** may be filtered and cleaned and/or returned back to the pit **130** for recirculation within the borehole **114**.

[0024] Though not shown in this embodiment, the drill string **112** may further include one or more stabilizing collars. A stabilizing collar may be disposed within and/or connected to the drill string **112**, in which the stabilizing collar may be used to engage and apply a force against the wall of the borehole **114**. This may enable the stabilizing collar to prevent the drill string **112** from deviating from the desired direction for the borehole **114**. For example, during drilling, the drill string **112** may "wobble" within the borehole **114**, thereby enabling the drill string **112** to deviate from the desired direction of the borehole **114**. This wobble may also be detrimental to the drill string **112**, components disposed therein, and the drill bit **116** connected thereto. However, a stabilizing collar may be used to minimize, if not overcome altogether, the wobble action of the drill string **112**, thereby possibly increasing the efficiency of the drilling performed at the wellsite **100** and/or increasing the overall life of the components at the wellsite **100**.

[0025] As discussed above, the drill string **112** may include a bottom hole assembly **118**, such as by having the bottom hole assembly **118** disposed adjacent to the drill bit **116** within the drill string **112**. The bottom hole assembly **118** may include one or more components included therein, such as components to measure, process, and store information. Further, the bottom hole assembly **118** may include components to communicate and relay information to the surface of the wellsite.

[0026] As such, in this embodiment shown in FIG. **1**, the bottom hole assembly **118** may include one or more logging-while-drilling ("LWD") tools **140** and/or one or more measuring-while-drilling ("MWD") tools **142**. Further, the bottom hole assembly **118** may also include a steering-while-drilling system (e.g., a rotary-steerable system) and motor **144**, in which the rotary-steerable system and motor **144** may be coupled to the drill bit **116**.

[0027] The LWD tool **140** shown in FIG. **1** may include a thick-walled housing, commonly referred to as a drill collar, and may include one or more of a number of logging tools known in the art. Thus, the LWD tool **140** may be capable of measuring, processing, and/or storing information therein, as well as capabilities for communicating with equipment disposed at the surface of the wellsite **100**.

[0028] Further, the MWD tool **142** may also include a housing (e.g., drill collar), and may include one or more of a number of measuring tools known in the art, such as tools used to measure characteristics of the drill string **112** and/or the drill bit **116**. The MWD tool **142** may also include an apparatus for generating and distributing power within the bottom hole assembly **118**. For example, a mud turbine generator powered by flowing drilling fluid therethrough may be disposed within the MWD tool **142**. Alternatively, other power generating sources and/or power storing sources (e.g., a battery) may be disposed within the MWD tool **142** to provide power within the bottom hole assembly **118**. As such, the MWD tool **142** may include one or more of the following measuring tools: a weight-on-bit measuring device, a torque measuring device, a vibration measuring device, a shock measuring device, a stick slip measuring device, a direction measuring device, an inclination measuring device, and/or any other device known in the art used within an MWD tool.

[0029] Referring now to FIG. **2**, a side view of a tool **200** in accordance with one or more embodiments of the present disclosure is shown. The tool **200** may be connected to and/or included within a drill string **202**, in which the tool **200** may be disposed within a borehole **204** formed within a subsurface formation F. As such, the tool **200** may be included and used within a bottom hole assembly, as described above.

[0030] Particularly, in this embodiment, the tool **200** may include a sampling-while drilling ("SWD") tool, such as that described within U.S. Pat. No. 7,114,562, filed on Nov. 24, 2003, entitled "Apparatus and Method for Acquiring Information While Drilling," and incorporated herein by reference in its entirety. As such, the tool **200** may include a probe **210** to hydraulically establish communication with the formation F and draw formation fluid **212** into the tool **200**.

[0031] In this embodiment, the tool **200** may also include a stabilizer blade **214** and/or one or more pistons **216**. As such, the probe **210** may be disposed on the stabilizer blade **214** and extend therefrom to engage the wall of the borehole **204**. The pistons, if present, may also extend from the tool **200** to assist probe **210** in engaging with the wall of the borehole **204**. In alternative embodiments, though, the probe **210** may not necessarily engage the wall of the borehole **204** when drawing fluid.

[0032] As such, fluid **212** drawn into the tool **200** may be measured to determine one or more parameters of the formation F, such as pressure and/or pretest parameters of the formation F. Additionally, the tool **200** may include one or more devices, such as sample chambers or sample bottles, that may be used to collect formation fluid samples. These formation fluid samples may be retrieved back at the surface with the tool **200**. Alternatively, rather than collecting formation fluid samples, the formation fluid **212** received within the tool **200** may be circulated back out into the formation F and/or borehole **204**. As such, a pumping system may be included within the tool **200** to pump the formation fluid **212** circulating within the tool **200**. For example, the pumping system may be used to pump formation fluid **212** from the probe **210** to the sample bottles and/or back into the formation F. Alternatively still, in one or more embodiments, rather than collecting formation fluid samples, a tool in accordance with embodiments disclosed herein may be used to collect samples from the formation F, such as one or more coring samples from the wall of the borehole **204**.

[0033] Referring now to FIG. **3**, a schematic view of a tool **300** in accordance with one or more embodiments of the present disclosure is shown. The tool **300** may be connected to and/or included within a bottom hole assembly, in which the tool **300** may be disposed within a borehole **304** formed within a subsurface formation F.

[0034] In this embodiment, the tool **300** may be a pressure LWD tool used to measure one or more downhole pressures, including annular pressure, formation pressure, and pore pressure, before, during, and/or after a drilling operation. Further, those having ordinary skill in the art will appreciate that other pressure LWD tools may also be utilized in one or more embodiments, such as that described within U.S. Pat. No. 6,986,282, filed on Feb. 18, 2003, entitled "Method and Apparatus for Determining Downhole Pressures During a Drilling Operation," and incorporated herein by reference.

[0035] As shown, the tool **300** may be formed as a modified stabilizer collar **310**, similar to a stabilizer collar as described above, and may have a passage **312** formed therethrough for drilling fluid. The flow of the drilling fluid through the tool **300** may create an internal pressure P_1, and the exterior of the tool **300** may be exposed to an annular pressure P_A of the surrounding borehole **304** and formation F. A differential pressure P_δ formed between the internal pressure P_1 and the annular pressure P_A may then be used to activate one or more pressure devices **316** included within the tool **300**.

[0036] In this particular embodiment, the tool **300** includes two pressure measuring devices **316**A and **316**B that may be disposed on stabilizer blades **318** formed on the stabilizer collar **310**. The pressure measuring device **316**A may be used to measure the annular pressure P_A in the borehole **304**, and/or may be used to measure the pressure of the formation F when positioned in engagement with a wall **306** of the borehole **304**. As shown in FIG. **3**, the pressure measuring device **316**A is not in engagement with the borehole wall **306**, thereby enabling the pressure measuring device **316**A to measure the annular pressure P_A, if desired. However, when the pressure measuring device **316**A is moved into engagement with the borehole wall **306**, the pressure measuring device **316**A may be used to measure pore pressure of the formation F.

[0037] As also shown in FIG. **3**, the pressure measuring device **316**B may be extendable from the stabilizer blade **318**, such as by using a hydraulic control disposed within the tool **300**. When extended from the stabilizer blade **318**, the pressure measuring device **316**B may establish sealing engagement with the wall **306** of the borehole **304** and/or a mudcake **308** of the borehole **304**. This may enable the pressure measuring device **316**B to take measurements of the formation F also. Other controllers and circuitry, not shown, may be used to couple the pressure measuring devices **316** and/or other components of the tool **300** to a processor and/or a controller. This processor and/or controller may then be used to communicate the measurements from the tool **300** to other tools within a bottom hole assembly or to the surface of a wellsite. As such, a pumping system may be included within the tool **300**, such as including the pumping system within one or more of the pressure devices **316** for activation and/or movement of the pressure devices **316**.

[0038] Referring now to FIG. **4**, a side view of a tool **400** in accordance with one or more embodiments of the present disclosure is shown. In this embodiment, the tool **400** may be a "wireline" tool, in which the tool **400** may be suspended within a borehole **404** formed within a subsurface formation F. As such, the tool **400** may be suspended from an end of a multi-conductor cable **406** located at the surface of the formation F, such as by having the multi-conductor cable **406** spooled around a winch (not shown) disposed on the surface of the formation F. The multi-conductor cable **406** is then couples the tool **400** with an electronics and processing system **408** disposed on the surface.

[0039] The tool **400** shown in this embodiment may have an elongated body **410** that includes a formation tester **412** disposed therein. The formation tester **412** may include an extendable probe **414** and an extendable anchoring member **416**, in which the probe **414** and anchoring member **416** may be disposed on opposite sides of the body **410**. One or more other components **418**, such as a measuring device, may also be included within the tool **400**.

[0040] The probe **414** may be included within the tool **400** such that the probe **414** may be able to extend from the body **410** and then selectively seal off and/or isolate selected portions of the wall of the borehole **404**. This may enable the probe **414** to establish pressure and/or fluid communication with the formation F to draw fluid samples from the formation F. The tool **400** may also include a fluid analysis tester **420** that is in fluid communication with the probe **414**, thereby enabling the fluid analysis tester **420** to measure one or more properties of the fluid. The fluid from the probe **414** may also be sent to one or more sample chambers or bottles **422**, which may receive and retain fluids obtained from the formation F for subsequent testing after being received at the surface. The fluid from the probe **414** may also be sent back out into the borehole **404** or formation F.

[0041] Referring now to FIG. **5**, a side view of another tool **500** in accordance with one or more embodiments of the present disclosure is shown. Similar to the above embodiment in FIG. **4**, the tool **500** may be suspended within a borehole **504** formed within a subsurface formation F using a multi-conductor cable **506**. In this embodiment, the multi-conductor cable **506** may be supported by a drilling rig **502**.

[0042] As shown in this embodiment, the tool **500** may include one or more packers **508** that may be configured to inflate, thereby selectively sealing off a portion of the borehole **504** for the tool **500**. Further, to test the formation F, the tool **500** may include one or more probes **510**, and the tool **500** may also include one or more outlets **512** that may be used to inject fluids within the sealed portion established by the packers **508** between the tool **500** and the formation F.

[0043] Referring now to FIG. **6**, a side view of a wellsite **600** having a drilling rig **610** in accordance with one or more embodiments of the present disclosure is shown. In this embodiment, a borehole **614** may be formed within a subsurface formation F, such as by using a drilling assembly, or any other method known in the art. Further, in this embodiment, a wired pipe string **612** may be suspended from the drilling rig **610**. The wired pipe string **612** may be extended into the borehole **614** by threadably coupling multiple segments **620** (i.e., joints) of wired drill pipe together in an end-to-end fashion. As such, the wired drill pipe segments **620** may be similar to that as described within U.S. Pat. No. 6,641,434, filed on May 31, 2002, entitled "Wired Pipe Joint with Current-Loop Inductive Couplers," and incorporated herein by reference.

[0044] Wired drill pipe may be structurally similar to that of typical drill pipe, however the wired drill pipe may additionally include a cable installed therein to enable communication through the wired drill pipe. The cable installed within the wired drill pipe may be any type of cable capable of transmitting data and/or signals therethrough, such an electrically conductive wire, a coaxial cable, an optical fiber cable, and or any other cable known in the art. Further, the wired drill pipe may include having a form of signal coupling, such as having inductive coupling, to communicate data and/or signals between adjacent pipe segments assembled together.

[0045] As such, the wired pipe string **612** may include one or more tools **622** and/or instruments disposed within the pipe string **612**. For example, as shown in FIG. **6**, a string of multiple borehole tools **622** may be coupled to a lower end of the wired pipe string **612**. The tools **622** may include one or more tools used within wireline applications, may include one or more LWD tools, may include one or more formation evaluation or sampling tools, and/or may include any other tools capable of measuring a characteristic of the formation F.

[0046] The tools **622** may be connected to the wired pipe string **612** during drilling the borehole **614**, or, if desired, the tools **622** may be installed after drilling the borehole **614**. If installed after drilling the borehole **614**, the wired pipe string **612** may be brought to the surface to install the tools **622**, or, alternatively, the tools **622** may be connected or positioned within the wired pipe string **612** using other methods, such as by pumping or otherwise moving the tools **622** down the wired pipe string **612** while still within the borehole **614**. The tools **622** may then be positioned within the borehole **614**, as desired, through the selective movement of the wired pipe string **612**, in which the tools **622** may gather measurements and data. These measurements and data from the tools **622** may then be transmitted to the surface of the borehole **614** using the cable within the wired drill pipe **612**.

[0047] As such, a coring tool, and one or more methods of using a coring tool, in accordance with the present disclosure may be included within one or more of the embodiments shown in FIGS. **1-6**, in addition to being included within other tools and/or devices that may be disposed downhole within a formation. The coring tool, thus, may be used to extract one or more coring samples from the borehole of a formation. The coring tool may be an axial coring tool and/or a sidewall coring tool, in which the coring tool includes a coring bit that may be used to extract a coring sample from the wall of the borehole. As shown in the following figures, only a sidewall coring tool is shown. However, those having ordinary skill in the art will appreciate that other coring tools may also be included within one or more embodiments with departing from the scope of the present disclosure.

[0048] A coring tool in accordance with one or more embodiments of the present disclosure may include, at least, a coring bit movably attached to the coring tool. For example, the coring bit may be able to extend and retract from the coring tool such that the coring bit may be able to be received within a wall of a borehole. Further, the coring bit may be able to rotate with respect to the coring tool, such as when the coring bit is extended from the coring tool. This may enable the coring bit to drill into and collect a coring sample from the wall of the borehole when disposed downhole. Furthermore, the coring bit may be able to rotate with respect to the coring tool, such as by having the coring bit rotate between positions when disposed within the coring tool. For example, the coring bit may further be able to rotate between a coring position and an ejection position within the coring tool.

[0049] The coring tool may further include a handling piston disposed therein, in which the handling piston may also be movably disposed within the coring tool. For example, the handling piston may be able to move between multiple positions, such as move between a retracted position and an extended position. When moving between positions, the coring bit may be disposed within the ejection position. As such, the handling piston may be able to move from the retracted position, through the coring bit, and into an extended position.

[0050] Such movement of the handling piston may enable the handling piston to determine the presence and/or length of a coring sample if a coring sample has been successfully drilled from a borehole wall and received into the coring tool with the coring bit. For example, as the handling piston moves through the coring bit, the handling piston may push a coring sample out of the coring bit, if such a coring sample is present within the coring bit of the coring tool. The handling piston may then push the coring sample into a coring sample holder, for example, disposed within the coring tool. As the handling piston moves through the coring bit and into an extended position, the handling piston may then engage the top of the coring sample, if such a coring sample is present within the coring tool, or the handling piston may engage the inner bottom of the coring sample holder, if such a coring sample is not present within the coring tool.

[0051] As such, the distance of the movement of the handling piston between the retracted position and the extended position may be measured. Such a measurement of the distance of movement of the handling piston may then enable the presence and/or length of a coring sample to be determined. If a coring sample is determined to be present within the coring tool, the coring sample may then be stored within a storage area of the coring tool. On the other hand, if a coring sample is determined to not be present within the coring tool, the coring tool may then re-drill into the wall of the borehole for another attempt to successfully retrieve a coring sample from the formation, and thus avoid having to store an empty sample holder into the storage area of the coring tool. As such, the present disclosure contemplates one or more methods to drill within a borehole with a coring tool and/or one or more methods to detect the presence and/or determine the length of a coring sample within a coring tool.

[0052] Referring now to FIGS. **7**A and **7**B, multiple views of a coring tool **721** in accordance with one or more embodiments of the present disclosure are shown. Particularly, in FIG. **7**A, a side view of a wireline tool **701** is shown, in which the wireline tool **701** may include the coring tool **721**. Further, FIG. **7**B shows a perspective view of the coring tool **721**.

[0053] In this embodiment, the tool **701** may be suspended within a borehole **705** formed within a subsurface formation F, in which the tool **701** may be suspended from an end of a multi-conductor cable **707** located at the surface of the formation F. As such, the cable **707** may enable the wireline tool **701** and the coring tool **721** to be electrically coupled to a surface unit **709**, in which the surface unit **709** may further include a control panel **711** and/or a monitor **713**. The surface unit **709** may be able to provide electrical power to the coring tool **721**, such as to monitor the status of the downhole coring and other activities of downhole equipment with the tool **701**, in addition to being able to control the activities of the coring tool **721** and other downhole equipment with the tool **701**.

[0054] As shown, the coring tool **721** may be disposed within an elongate housing of the wireline tool **701** such that the coring tool **721** may be disposed downhole within the borehole **705**. The coring tool **721** may include a coring assembly **723**, which may include one or more motors **725** that may be powered, for example, through the use of the power provided from the cable **707**. The coring tool **721** may further include a coring bit **727**, in which the coring bit **727** may have an open end **729** for cutting into the formation F and receiving a coring sample. Further, the coring tool **721** may be able to extend and retract the coring bit **727** into and out of the coring tool **721**, and may also be able to rotate the coring bit **727** against the wall of the borehole **705**.

[0055] FIGS. **7**A and **7**B show the coring tool **721** in the coring position, in which the coring tool **721** is used to drill into the wall of the borehole **705** and receive a coring sample. Particularly, the coring bit **727** may be rotated by the motor **725**, in which the coring bit **727** receives the coring sample into the coring bit **727** through the open end **729**. The coring bit **727** may then be retracted within the coring assembly **723**, in which the coring sample may be stored within a storage area (discussed more below) of the coring tool **721**.

[0056] As shown, the tool **701** may include one or more pistons **703** (e.g., anchoring shoes) that may be able to extend from the housing of the tool **701** and engage the wall of the borehole **705**. As such, this may enable the pistons **703** to provide stability to the tool **701** and coring tool **721**, particularly when the coring tool **721** is drilling into the formation F. Further, the coring tool **721** may include at least two motors, in which one motor may be used to rotate and apply torque to the coring bit **727**, and the other may be used to extend/retract and apply weight on the coring bit **727**. Further, though the embodiments shown in FIGS. **7**A and **7**B show the cable **707** used to provide power to the coring tool **721**, those having ordinary skill in the art will appreciate that other methods may be used to provide power to a coring tool, such as by the use of a battery, a power cell, and/or an electrically charged accumulator disposed downhole. Furthermore, a coring tool in accordance with embodiments disclosed herein may be included within one or more other embodiments, such as within one of the embodiments shown within FIGS. **1-6**.

[0057] Referring now to FIG. **8**, a schematic view of a coring tool **821** in accordance with one or more embodiments of the present disclosure is shown. As with the above embodiment, the coring tool **821** includes a coring assembly **823** with a coring motor **825**, and further includes a coring bit **827** operatively coupled to the motor **825**. As such, the motor **825** may be able to drive the coring bit **827** such that the coring bit **827** may be able to drill into the formation (e.g., wall of a borehole) and obtain a coring sample.

[0058] When driving the coring bit **827** into the formation, the coring bit **827** may be pressed against and into the formation while also being rotated. Thus, the coring tool **821** may apply a weight-on-bit ("WOB") (e.g., a force that presses the coring bit **827** into the formation) and a torque on the coring bit **827**. As such, and as shown in FIG. **8**, the WOB applied to the coring bit **827** may be generated by a motor **831**, in which the motor **831** may be an AC motor, a brushless DC motor, and/or any other power source, and a control assembly **833**. As shown, the control assembly **833** may include a hydraulic pump **834**, a valve **835**, such as a feedback flow control valve, and a piston **836**. In such an embodiment, the motor **831** may be used to supply power to the hydraulic pump **834**, in which the flow of hydraulic fluid from the pump **834** may be controlled and/or regulated by the valve **835**. Pressure then from the hydraulic fluid from the pump **834** may be used to drive the piston **836**, in which the piston **836** may be used to apply a WOB upon the coring bit **827**.

[0059] Further, in one or more embodiments, torque for the coring bit **827** may be supplied by another motor **837**, in which the motor **837** may also be an AC motor, a brushless DC motor, and/or any other power source, and a gear pump **839**. The motor **837** may be used to drive the gear pump **839**, in which the gear pump **839** may be used to supply a flow of hydraulic fluid to the coring motor **825**. As such, the coring motor **825**, which thus may be a hydraulic coring motor, may impart a torque to the coring bit **827** that enables the coring bit **827** to rotate.

[0060] Those having ordinary skill in the art will appreciate that, in addition to the above embodiments shown and described above with respect to a coring tool, other arrangements and mechanisms may be used to apply such forces as WOB and torque to a coring bit without departing from the scope of the present disclosure. As such, additional examples of mechanisms that may be used to apply WOB and torque within a coring tool are disclosed within U.S. Pat. Nos. 6,371,221 and 7,191,831, both of which are assigned to the assignee of the present application and are incorporated herein by reference in their entirety.

[0061] Referring now to FIGS. **9**A-**9**D, multiple side views of a coring tool **921** in accordance with one or more embodiments of the present disclosure are shown. As with the above embodiments, the coring tool **921** includes a coring assembly **923** with a motor **925**, and further includes a coring bit **927** operatively coupled to the motor **925**. Further, the motor **925** may be able to drive the coring bit **927** such that the coring bit **927** may be able to drill into the formation (e.g., wall of a borehole) and obtain a coring sample. As such, the coring assembly **923** may include the motor **925**, in which the coring bit **927** may be able to slide axially and rotate with respect to the coring assembly **923**. Thus, FIGS. **9**A-**9**D show the coring bit **927** disposed within different positions with respect to the coring tool **921** (discussed more below).

[0062] As shown in this embodiment, the coring tool **921** includes a tool housing **941** extending along a longitudinal axis **900** of the tool **921**. In one or more embodiments, the tool housing **941** may have a coring aperture **943** formed therein, in which coring samples may be received through the coring aperture **943**. Further, as shown, the coring assembly **923** may be disposed within the tool housing **941**, in addition to a storage area **961** disposed within the tool housing **941**.

[0063] Further, as discussed above, the coring bit **927** may disposed within the coring tool **921** such that the coring bit **927** is movable between multiple positions with respect to the coring tool **921**. As such, in one embodiment, one or more rotation link arms **945** and/or one or more rotation pistons **947** may be provided within the coring tool **921** for rotatably mounting the coring assembly **923**, and the coring bit **927** coupled thereto, within the coring tool **921**. For example, as shown in FIGS. **9**A-**9**D, the rotation link arms **945** may be pivotably coupled to the coring assembly **923**, in which the rotation pistons **947** may be mounted within the tool housing **941** and pivotably coupled to the rotation link arms **945**. As such, one or more of the pistons **947** may be actuated to extend and/or retract, in which the movement of the pistons **947** may be transferred to the rotation link arms **945** to correspondingly move (e.g., rotate) the coring assembly **923**. As used herein, the terms "pivotably coupled" or "pivotably connected" may mean a connection between two tool components that allows relative rotating or pivoting movement of one of the components with respect to the other component, but does not allow sliding or translational movement of the one component with respect to the other.

[0064] For example, by extending the rotation piston **947**A, this movement may correspondingly enable the rotation link arms **945** to rotate the coring assembly **923** and the coring bit **927** in the counter-clockwise direction, such as shown in a movement from FIG. **9**B to FIG. **9**A. Similarly, by extending the rotation the piston **947**B and retracting the piston **947**A, this movement may correspondingly enable the rotation link arms **945** to rotate the coring assembly **923** and the coring bit **927** in the clockwise direction, such as shown in a movement from FIG. **9**A to FIG. **9**B. Thus, this arrangement may enable the coring bit **927** to be movable between multiple positions with respect to the coring tool **921**.

[0065] Those having ordinary skill in the art will appreciate that, in addition to the above embodiments shown and described above with respect to a coring tool, other arrangements and mechanisms may be used to enable a coring assembly and/or a coring bit to move between multiple positions within a coring tool without departing from the scope of the present disclosure. Additional examples of mechanisms that may be used within a coring tool are disclosed within US. Patent Publication No. 2009/0114447, which is assigned to the assignee of the present application and is incorporated herein by reference in their entirety.

[0066] As mentioned above, the coring assembly **923** and/or the coring bit **927** may be able to move between multiple positions within the coring tool **921**. Accordingly, in accordance with one or more embodiments of the present disclosure, the coring assembly **923** and/or the coring bit **927** may be able to move between a coring position and an ejection position. In the coring position, the coring bit **927** may be disposed substantially perpendicular to the longitudinal axis **900** of the coring tool **921**. FIGS. **9**B-**9**D show examples of the coring bit **927** disposed in the coring position. Further, in the ejection position, the coring bit **927** may be disposed substantially parallel to the longitudinal axis **900** of the coring tool **921**. FIG. **9**A shows an example of the coring bit **927** disposed in the ejection position.

[0067] When the coring bit **927** is in the coring position, the coring bit **927** may be able to extend and retract from the coring tool **921**, such as shown through the movement of the coring bit **927** in FIGS. **9**B-**9**D. As such, in one or more embodiments, in the coring position, the open end of the coring bit **927** may register with the coring aperture **943** of the tool housing **941**, and conversely in the ejection position, the open end of the coring bit **927** may register with the storage area **961**. As used herein, the term "register" may be used to indicate that voids or spaces defined by two components, such as the open end of the coring bit and the storage area and/or the coring aperture, may be substantially aligned with each other.

[0068] Referring still to FIGS. **9**A-**9**D, the coring tool **921** may include a system to handle and/or store one or more coring samples. As such, and as mentioned above, the coring tool **921** may include the storage area **961**. In this embodiment, the storage area **961** may include a coring sample receptacle **963**, in which the coring sample receptacle **963** may include at least two storage columns **965** and **967**. The storage columns **965** and **967** may each be sized to receive one or more coring sample holders **969**, such as one or more canisters, in which the coring sample holders **969** may be adapted to receive and hold coring samples. As shown particularly in FIGS. **9**A-**9**D, each storage column **965** and **967** may be sized to receive six coring sample holders **969**. However, those having ordinary skill in the art will appreciate that the present application is not so limited, as the storage columns may be sized to hold more or less than six coring sample holders. For example, in one embodiment, the storage columns may be sized to hold twenty five coring sample holders. Further, as shown, the coring sample receptacle **963** may have a proximal end **971** positioned closer to the coring bit **927** and a distal end **973** positioned farther from the coring bit **927**.

[0069] The storage area **961** may include one or more shifters **975** and **977** included therewith, in which the shifters **975** and **977** may be able to move the coring sample holders **969** between the storage columns **965** and **967**. For example, as shown in FIGS. **9**A-**9**D, the shifter **975** may be coupled to the proximal end **971** and may include fingers, for example, adapted to grip an exterior of the coring sample holders **969**. The shifter **975** may be mounted on a spindle **979**, in which the shifter **975** may be able to rotate from a first position, in which the shifter **975** registers with the proximal end **971** of the first storage column **965**, to a second position, in which the shifter **975** registers with the proximal end **971** of the second storage column **967**. Similarly, the second shifter **977** may be coupled to the distal end **973** and may similarly rotate between a first position, in which the shifter **977** registers with the distal end **973** of the first storage column **965**, and a second position, in which the shifter **977** registers with the distal end **973** of the second storage column **967**.

[0070] The coring tool **921** may further include one or more transporters to assist in moving the coring sample holders **969**. As such, a first transporter may be provided for transferring an empty coring sample holder **969** (not having a coring sample disposed therein) from the shifter **975** up to and into the coring bit **927** as the first transporter moves from an extended position to a retracted position. For example, in the embodiment shown in FIGS. **9**A-9D, the first transporter may include a handling piston **981**, such as a ball-screw piston, in which the handling piston **981** may be disposed substantially coaxial with respect to the first storage column **965**. Further, the handling piston **981** may be disposed substantially coaxial with the coring bit **927** when the coring bit **927** is disposed within the ejection position, as shown in FIG. **9**A.

[0071] A core transfer tube **991** may be included within the coring tool **921**, in which the core transfer tube **991** may be disposed between the coring bit **927** and the shifter **975**. The core transfer tube **991** may thereby facilitate the transfer of a coring sampler holder **969** between the coring bit **927** and the shifter **975**. The handling piston **981** may include a gripper, such as gripper brush **985**, in which the gripper may be adapted to engage an interior surface of a coring sample holder **969**. Accordingly, the handling piston **981** may extend into and through the coring bit **927** as the handling piston **981** moves to an extended position. The gripper brush **985** may be disposed at the end of the handling piston **981** and may further be used to hold the coring sample holder **969** as the coring sample holder **969** is transferred from the shifter **975** to the coring bit **927**.

[0072] As such, the coring bit **927** may be configured to retain a coring sample and/or coring sample holder **969** within the coring bit **927** until the coring sample holder **969** is to be discharged from the coring bit **927**. Examples regarding one or more coring bits that may be used within one or more embodiments of the present disclosure are disclosed within U.S. Patent Application Publication No. 2005/0133267 A1, which is incorporated herein by reference in its entirety.

[0073] The handling piston **981** may also be used to advance a coring sample holder **969** from the coring bit **927** to the shifter **975** and/or to the proximal end **971** of the first storage column **965**. As shown in FIGS. **9**A-9D, the handling piston **981** may include a foot **983** that is adapted to engage a coring sample and/or the inner diameter of the coring sample holder **969**. The handling piston **981** may be actuated to an extended position, in which the handling piston **981** may pass through the coring bit **927** and/or through the proximal shifter **975** and partially into the proximal end **971** of the first storage column **965**. This movement may enable the coring sample holder **969** to be transported from the coring bit **927** to the shifter **975** and/or to the first storage column **965**. A coring sample holder **969** disposed inside the coring bit **927** and having a recently obtained coring sample disposed therein may, thus, be transferred from the coring bit **927** to the shifter **975** and/or the first storage column **965** by the handling piston **981**.

[0074] In another embodiment (not shown), the handling piston **981** may be used to transfer an empty coring sample holder **969** from the shifter **975** up to and into the transfer tube **991**, in which the coring sample holder **969** may be secured within the transfer tube **991**. A collet, a retaining pin, and/or other retention device, may then be disposed inside the transfer tube **991** to retain the coring sample holder **969** within the upper end of the transfer tube **991** and not be further transported by the handling piston **981**. In such an embodiment, the handling piston **981** may also then be used to advance a coring sample from the coring bit **927** into the coring sample holder **969** secured in the transfer tube **991**. As such, the handling piston **981** may further be used to transfer the coring sample holder **969** disposed inside the transfer tube **991**, the coring sample holder **969** holding a recently obtained coring sample from the coring bit **927**, from the transfer tube **991** to the shifter **975** and/or the first storage column **965** using the handling piston **981**. Further, in this embodiment, as a coring sample holder is not provided within the coring bit **927**, the coring bit **927** may include a non-rotating coring sleeve for receiving the coring sample.

[0075] Further, a second transporter may be included within the coring tool **921**, such as lift piston **987**, in which the lift piston **987** may be used to advance a coring sample holder **969** from the shifter **977** to the second storage column **967**. As shown in FIGS. **9**A-9D, the lift piston **987** may be disposed coaxially with the second storage column **987**, in which the lift piston **987** may be adapted to move from a retracted position to an extended position. With such movement, the lift piston **987** may be able to pass through the shifter **977** and partially into the second storage column **967**. As the lift piston **987** moves into the extended position, the lift piston **987** may transport a coring sample holder **969** disposed inside the shifter **977** into the distal end **973** of the second storage column **967**.

[0076] As such, during operation, the coring tool **921** may be used to transfer one or more coring samples between the storage area **961** and the coring bit **927**, and may further store the coring sample holders **969** with the storage columns **965** and **967**. Prior to obtaining a first coring sample, the first and second storage columns **965** and **967** of the receptacle **963** may contain empty coring sample holders **969**.

[0077] These coring sample holders **969** may include a first coring sample holder **969**A positioned at the proximal end **971** of the first storage column **965**, a second coring sample holder **969**B positioned at a distal end **973** of the first storage column **965**, a third coring sample holder **969**C positioned at a distal end **973** of the second storage column **967**, and a fourth coring sample holder **969**D positioned at a proximal end **971** of the second storage column **967**. Further, an additional coring sample holder **969** may be disposed within the coring bit **927** and/or the transfer tube **991**, in which the coring sample holder **969** may be adapted to receive the first coring sample formed therein.

[0078] The coring bit **927** may then be operated to drill and obtain a coring sample from the wall of a borehole, in which the coring sample may be disposed within the coring sample holder **969**. If the coring bit **927** has the coring sample holder **969** disposed therein, the coring sample may be received within the coring sample holder **969** while the coring bit **927** and the coring assembly **923** is disposed within the coring position. If the coring sample holder **969** is instead within the transfer tube **991**, the coring bit **927** may be rotated into the ejection position and the handling piston **981** may be moved from the retracted position into the extended position to have the coring sample inside the coring bit **927** transported and disposed within the coring sample holder **969** retained by the transfer tube **991**.

[0079] The handling piston **981** may then be further extended within the extended position such that the handling piston **981** transports the current coring sample holder **969** to the receptacle **963** such that the current coring sample holder **969** may be disposed adjacent the proximal end **971** of the first storage column **965**. Still, further extension of the handling piston **981** may insert the current coring sample holder **969** in the first storage column **965** such that the coring sample holder **969** engages with the first coring sample holder **969**A. This engagement may advance the first series of stacked coring sample holders **969** in the first storage column **965** to eject the second coring sample holder **969**B from the distal end **973** thereof. As such, the shifter **977** may be positioned to register with the first storage column **965**, thereby enabling the shifter **977** to receive the ejected coring sample holder **969**B.

[0080] The shifter **977** may then be rotated to register with the second storage column **967**, in which the lift piston **987** may be extended to insert the second coring sample holder **969**B into the second storage column **967**. As the second coring sample holder **969**B is inserted into the second storage column **967**, the entire second series of stacked coring sample holders **969** may advanced in a direction along the second storage column **967**, thereby ejecting the fourth coring sample holder **969**D from the proximal end **971** of the second storage column **967**. As such, the shifter **975** may be positioned to register with the second storage column **967**, thereby enabling the shifter **975** to receive the ejected fourth coring sample holder **969**D. By this time, the handling piston **981** may be at least partially retracted such that the handling piston **981** may be clear of the shifter **975**. The shifter **975** may then rotate to register with the first storage column **965**, thereby transferring the fourth coring sample holder **969**D to be positioned adjacent the proximal end **971** of the first storage column **965**.

[0081] The handling piston **981** may then again be extended until the gripper **985** engages the fourth coring sample holder **969**D. The handling piston **981** may then be retracted to transfer the fourth coring sample holder **969**D from the receptacle **963** to the transfer tube **991** and/or the coring bit **927**. If received within the coring bit **927**, the fourth coring sample holder **969**D may be disengaged from the handling piston **981** as the handling piston **981** retracts through the coring bit **927**, thereby enabling the fourth coring sample holder **969**D to remain inside the coring bit **927** to receive the next coring sample. If received within the transfer tube **991**, the fourth coring sample holder **969**D may be disengaged from the handling piston **981** as the handling piston **981** retracts through the transfer tube **991**, thereby enabling the fourth coring sample holder **969**D to remain inside the transfer tube **991** to receive the next coring sample.

[0082] The above steps may be repeated until each coring sample holder contains a coring sample therein. The coring sample holders with coring samples may be stored in order inside the receptacle **963**, with the oldest or first coring sample ultimately being located at the proximal end **971** of the second storage column **969** and the last or most recent coring sample being located at the proximal end **971** of the first storage column **965**. While one method of handling and storing cores is shown and described herein, those having ordinary skill in the art may appreciate that additional methods of handling/storing coring samples may be used in one or more embodiments disclosed herein without departing from the scope of this disclosure.

[0083] A coring tool in accordance with one or more embodiments disclosed herein may include one or more sensors for detecting the presence and/or geophysical properties of coring samples obtained from the formation. For example, the tool **921** may include a geophysical-property measuring unit that may connected by a bus of the coring tool **921** to a telemetry unit, thereby enabling the coring tool **921** to transmit data to a data acquisition and processing apparatus located at the surface. The geophysical-property measuring unit may be a gamma-ray detection unit, NMR sensors, electromagnetic sensor, and/or any other device known in the art. Additional details regarding the geophysical-property measuring unit are provided in U.S. Patent Application Publication No. 2007/0137894 in the name of Fujisawa et al., which is incorporated herein by reference in its entirety.

[0084] As such, in accordance with one or more embodiments disclosed herein, a coring tool in accordance with embodiments disclosed herein may enable the coring tool to detect the presence of a coring sample within a coring tool, in addition to measuring the length of the coring sample obtained from the formation if such a coring sample is present within the coring tool.

[0085] For example, with reference to FIG. **10**, in which a schematic view of a coring tool **1021** in accordance with one or more embodiments of the present disclosure is shown, a first position (retracted position) of the handling piston **1081** may be obtained during the course of operation of the coring tool **1021**. The coring bit (not shown in this embodiment) may be disposed also within a first position (coring position), in which the coring bit is operated to retrieve a coring sample, as described above. Subsequently, the coring bit may be moved from the first position to a second position (ejection position), such as by rotating the coring bit from the coring position to the ejection position. The handling piston **1081** may then be extended from the retracted position to an extended position, in which this movement will eject the coring sample from the coring bit. A coring sample holder **1069** may also be disposed within the coring bit with the coring sample, in which the handling piston **1081** may also eject the coring sample holder **1069** from the coring bit. The handling piston **1081** may then continue to extend such that the coring sample and the coring sample holder **1069** is disposed within a transfer tube and/or a shifter, as discussed above. Otherwise, as the coring sample is ejected from the coring bit, the coring sample may be received by the coring sample holder **1069** disposed in a coaxial alignment with the coring bit within a transfer tube and/or a shifter.

[0086] Further, as shown in FIG. **10**, a retaining mechanism **1099** may be included within the coring tool **1021**, in which the retaining mechanism **1099** may be disposed within or adjacent to a transfer tube and/or a shifter of the coring tool **1021**, if such components are included within the coring tool **1021**. The retaining mechanism **1099** may be configured to hold the coring sample holder **1069**A at a desired location within the coring tool **1021**, such as at a desired location within a transfer tube and/or a shifter. The retaining mechanism **1099** may include a collet, a retaining pin, and/or any other retaining mechanism known in the art. As such, the retaining mechanism **1099** may be selectively activated to retain the coring sample holder **1069**A. For example, the retaining mechanism **1099** may be selectively activated, thereby extending the retaining mechanism **1099**, or a portion thereof, to retain the coring sample holder **1069**A, and may be selectively de-activated, thereby retracting the retaining mechanism **1099**, or a portion thereof, to no longer retain the coring sample holder **1069**A. Further, when activated, the retaining mechanism **1099** may prevent the coring sample holder **1069**A from any undesired movement, such as by preventing the coring sample holder **1069**A from movement, particularly when the handling piston **1081** extends to engage the coring sample holder **1069**A. When de-activated, the retaining mechanism **1099** may enable the coring sample holder **1069**A to be disposed and stored within the storage area **1061** of the coring tool **1021**.

[0087] As such, as the handling piston **1081** extends, the handling piston **1081** may engage the coring sample disposed within the coring sample holder **1069**, if such a coring sample is present within the coring sample holder **1069**, or the handling piston **1081** may engage the bottom surface of the coring sample holder **1069** (or some other known object or surface not the coring sample), if such a coring sample is not present within the coring sample holder **1069**. For example, the coring bit may not be successful when attempting to obtain a coring sample from the formation. As such, if the coring bit is not successful when attempting to obtain a coring sample from the formation, a coring sample may not be present within the coring tool **1021**, particularly as the handling piston **1081** extends downward to engage the upper surface of the coring sample within the coring sample holder **1069**. Thus, in one or more embodiments of the present disclosure, the handling piston **1081** may extend to a second position (extended position), in which the handling piston **1081** may engage either the upper surface of the coring sample, if a coring sample is present, or may engage the bottom surface of the coring sample holder **1069** (or some other known object or surface not the coring sample), if a coring sample is not present.

[0088] Based upon the measured distance between the first position (retracted position) and the second position (extended position) of the handling piston **1081**, the presence of a coring sample within the coring sample holder **1069** may be determined. If the presence of a coring sample is determined to be present within the coring sample holder **1069**, the length of the coring sample may be determined based upon the measured distance between the first position and the second position of the handling piston **1081**. Otherwise, if a coring sample is determined to not be present within the coring sample holder **1069**, the coring tool **1021** may be used to attempt to obtain another coring sample from the formation before the coring sample holder **1069** is stored within the storage area **1061**.

[0089] For example, with reference to FIG. **10**, the coring bit of the coring tool **1021** may successfully obtain a coring sample **1093**A from the wall of a borehole, thereby having the coring sample **1093**A disposed within the coring sample holder **1069**A, as discussed above. As such, the handling piston **1081** may be disposed at a position **1095**A (retracted position), in which the handling piston **1081** may move and extend into a position **1095**B (extended position), in which the handling piston **1081** may engage the top surface of the coring sample **1093**A. However, if the coring sample **1093**A is not present within the coring sample holder **1069**A, rather than stopping at the position **1095**B, the handling piston **1081** may instead be able to move and extend into a position **1095**C (also an extended position).

[0090] In such embodiments, the distance between the movement of the handling piston **1081** between a first position, such as the position **1095**A, and a second position, such as the position **1095**B and/or **1095**C, may be measured. This measured distance may then be compared with a predetermined distance, such as a predetermined distance defined by the distance from the position **1095**A, when the handling piston **1081** may be within a retracted position, and the position **1095**C, when the handling piston **1081** may be within an extended position such that the handling piston **1081** engages the bottom of the coring sample holder **1069**A. Based upon the comparison of the measured distance with the predetermined distance, the presence of a coring sample **1095**A and/or the length of the coring sample **1095**A may be determined.

[0091] As such, in accordance with one or more embodiments disclosed herein, the measured distance and the predetermined distance may be compared against each other by subtracting one of the distances from the other. For example, a measured distance D_M, such as the distance of the movement of the handling piston **1081** from a first position to a second position, may be subtracted from a predetermined distance D_P, such as the distance of the movement for the handling piston **1081** to extend from the position **1095**A to the position **1095**C, thereby resulting in a differential distance D_D, as shown below:

$$D_D = D_P - D_M \qquad \text{Equation (1)}$$

[0092] If the measured distance D_M and the predetermined distance D_P are substantially equal to each other, such that the measured distance D_M of the handling piston **1081** may be able to move from the position **1095**A to the position **1095**C in one embodiment, the differential distance D_D may be substantially equal to zero, or may be a minimal amount. In such a scenario, with the differential distance D_D being substantially zero or a minimal amount, one may determine a coring sample is not present within the coring sample holder **1069**A of the coring tool **1021**, as the handling piston **1081** was able to move from the position **1095**A to the position **1095**C without being impeded by the presence of a coring sample within the coring sample holder **1069**A.

[0093] However, if the measured distance D_M and the predetermined distance D_P are not substantially equal to each other, such that the measured distance D_M of the handling piston **1081** may be able to move from the position **1095**A to the position **1095**B in one embodiment, the differential distance D_D may be substantially more than a minimal amount. In such a scenario, with the differential distance D_D being substantially more than a minimal amount, one may determine a coring sample is present within the coring sample holder **1069**A of the coring tool **1021**, as the handling piston **1081** was impeded from moving from the position **1095**A and past the position **1095**B, in which the top surface of the coring sample **1093**A may be disposed at the position **1095**B. Further, in such a scenario, as the differential distance D_D may be substantially more than a minimal amount, the differential distance D_D may be substantially equal to the length L_C of the sampling core **1093**A. For example, with reference to FIG. **10**, the length L_C of the sampling core **1093**A, which corresponds to the differential distance D_D from Equation (1), may be substantially equal to the measured distance D_M, the distance measured between the position **1095**A and the position **1095**B, subtracted from the predetermined distance D_P, the distance known between the position **1095**A and the position **1095**C.

[0094] As such, in accordance with one or more embodiments, a threshold value may be selected for the differential distance D_D such that if the differential distance D_D is greater than the threshold value, one may determine that a coring sample is present within a coring sample holder, and if the differential distance D_D is no greater than the threshold value, one may determine that a coring sample is present within a coring sample holder. For example, in one embodiment, a threshold valve of about 0.25 inches (0.64 centimeters) may be selected such for the differential distance D_D such that if the differential distance D_D is greater than about 0.25 inches (0.64 centimeters), one may determine that a coring sample is present within a coring sample holder, and if the differential distance D_D is no greater than about 0.25 inches (0.64 centimeters), one may determine that a coring sample is not present within a coring sample holder. In such embodiments, the measured length L_C of the sampling core may need to exceed the threshold valve, such as of about 0.25 inches (0.64 centimeters), to determine that a sampling core is present within the coring sample holder. Further, though a threshold value may be selected and used within one or more embodiments disclosed herein, such as a threshold value of about 0.25 inches (0.64 centimeters), those having ordinary skill in the art will appreciate the present disclosure contemplates other embodiments, such as by using threshold values of different amounts, or by also by excluding the use of a threshold amount.

[0095] Those having ordinary skill in the art will appreciate that, though the present disclosure discusses one or more methods, the present disclosure is not so limited to only the embodiments disclosed, as other embodiments are contemplated for the present disclosure. For example, as shown within FIG. **10**, one or more other positions may be used in addition or in alternative to the positions **1095**A-**1095**C discussed above. As such, in one embodiment, rather than using the position **1095**C, another position may be used, such as a position **1095**D may be used, in which the handling piston **1081** may engage a surface or component within the coring sample holder **1069**A (such as a retaining device within the coring sample holder **1069**A). In such an embodiment, rather than using the position **1095**C within the predetermined distance, for example, the position **1095**D may instead be used. Thus, one or more positions may be used in addition or in alternative to the positions shown in FIG. **10**.

[0096] Further, one or more other methods may be used in addition or in alternative to the methods discussed above when comparing the predetermined distance with the measured distance to determine the presence of a coring sample within a coring tool. For example, rather than subtracting the measured distance from the predetermined distance, as discussed above and shown with respect to Equation (1), the measured distance may instead be divided by the predetermined distance. Such a comparison of the measured distance with the predetermined distance may enable a fraction and/or a percentage to be determined, in which the fraction and/or percentage may enable one to determine the presence of a coring sample within the coring tool. As such, though the present disclosure is discussed and described with respect to a limited number of embodiments disclosed herein, those having ordinary skill in the art will appreciate that the present disclosure contemplates one or more other methods and embodiments.

[0097] As such, in accordance with one or more embodiments, after the presence of a coring sample within the coring tool has been determined, the coring tool may either be used to re-drill for a coring sample and/or may be used to dispose the coring sample within the storage area of the coring tool. For example, in an embodiment in which a coring sample is determined as present within a coring sample holder of the coring tool, the coring sample holder may be disposed within the storage area of the coring tool. As such, another coring sample may then be attempted to be retrieved with the coring tool. Further, in an embodiment in which a coring sample is determined as not present within a coring sample holder of the coring tool, the coring bit may be used to attempt obtaining a coring sample again for the coring sample holder. As such, this may prevent a coring sample holder that is substantially empty from being disposed within the storage area of the coring tool.

[0098] Referring now to FIGS. **11** and **12**, multiple views of flow charts of methods **1100** and **1200** to drill with a coring tool in accordance with one or more embodiments of the present disclosure are shown. Particularly, FIG. **11** shows a flow chart of a method **1100** to drill with a coring tool if a coring sample is determined as present within the coring tool. Further, FIG. **12** shows a flow chart of a method **1200** to drill with a coring tool if a coring sample is determined as not present within the coring tool.

[0099] Referring specifically to FIG. **11**, the method **1100** may include drilling into a wall of a borehole **1110**, in which a coring bit of a coring tool may be used to drill into the wall of the wellbore. As such, when drilling into the borehole, the coring bit may attempt to retrieve a coring sample from a formation that the borehole is formed within.

[0100] Further, the method **1100** may include moving the coring bit from a first position to a second position **1120** and moving a handling piston from a first position to a second position **1130**. For example, the coring bit may move from a first position, such as a coring position, to a second position, such as an ejection position. Further, the handling piston may then move from a first position, such as a retracted position, to a second position, such as an extended position. With such movement, the handling piston may be able to move through the coring bit, such that a coring sample, if present within the coring tool, and the coring sample holder may be urged out from the coring bit and into a defined position, such as by having the coring sample holder positioned within a transfer tube and/or a shifter. Further, in one or more embodiments, the coring sample holder may not be retained within the coring bit, such as during drilling with the coring bit. In such embodiments, the coring sample may be urged out of the coring bit and into the coring sample holder. Furthermore, with such movement, the handling piston may then stop at a second position, such as at the top surface of a coring sample disposed within the coring sample holder.

[0101] The method **1100** may then continue on to measure the handling piston movement from the first position to the second position **1140** and determine the coring sample presence within the coring tool **1150**. For example, the distance of the movement of the handling piston between the first position, such as the retracted position, and the second position, such as the extended position, in which the handling piston engaged with the top surface of the coring sample, may be measured. This measured distance may be provided, for example, with one or more sensors or devices disposed within the coring tool and operably coupled to the handling piston. For example, the handling piston may be connected to an electrical motor, such as through a lead screw. The distance may then be measured by a rotational position sensor, such as a resolver, coupled with the electrical motor. Further, based upon the measured distance, the presence of a coring sample may be determined, such as by comparing the measured distance with a predetermined distance, as discussed above.

[0102] Referring still to FIG. **11**, because a coring sample may be determined as present within the coring tool in the method **1100**, the method **1100** may further include determining the length of a coring sample within the coring tool **1160** and disposing the coring sample within a storage area **1170**. For example, as a measured distance of the handling piston was determined, a length of the coring sample may be determined, such as by comparing the measured distance with the predetermined distance, as discussed above. Further, because a coring sample is determined as present within the coring tool in method **1100**, the coring sample and the coring sample holder may be disposed within the storage area of the coring tool. As such, in one or more embodiments, another coring sample holder may then be made available in the transfer tube and/or the coring bit of the coring tool, in which the other coring sample holder may be used to retrieve yet another coring sample with the coring tool.

[0103] Referring now specifically to FIG. **12**, the method **1200** may be used to drill into the wall of a wellbore, in which a coring sample may not be retrieved, at least upon the first attempt. As such, the method **1200** may include one or more steps similar to that of the method **1100** shown in FIG. **11**. For example, as shown, the method **1200** may include steps **1210-1250** that may be substantially similar to that of steps **1110-1150** of the method **1100**. However, in method **1200**, when the handling piston moves from a first position, such as a retracted position, to a second position, such as an extended position, the handling piston may not engage with the upper surface of the coring sample. Rather, because a coring sample may not have substantially been received within the coring sample holder, the handling piston may engage the bottom surface of the coring sample holder, or another known surface within the coring sample holder (such as a retaining mechanism), in which the handling piston may then stop as this second position. As such, a coring sample may be determined as not present within the coring tool and the coring sample holder, such as by comparing the measured distance of the movement of the handling piston between the first position and the second position, as discussed above.

[0104] Thus, because a coring sample may be determined as not present within the coring tool in the method **1200**, the method **1200** may further include moving the handling piston from the second position back to the first position **1260**, and then moving the coring bit from the second position back to the first position **1265**. For example, the handling piston may be moved from the second position, such as the extended position, back to the first position, such as the retracted position. In one or more embodiments in which the coring sample holder is configured to fit and/or be received within the coring bit of the coring tool, the coring sample holder may be brought back into the coring bit. Otherwise, in other embodiments, the coring sample holder may remain in a position in the transfer tube of the coring tool. Further, as the handling piston is no longer disposed within the coring bit, as the handling piston may be disposed within the retracted piston, the coring bit may be rotated from the second position, such as the ejection position, back to the first position, such as the coring position.

[0105] Further, the method **1200** may include re-drilling into the wall of the wellbore **1270**, in which a coring bit of a coring tool may be used to re-drill into the wall of the wellbore. As such, when re-drilling into the borehole, the coring bit may again attempt to retrieve a coring sample from a formation that the borehole is formed within.

[0106] Furthermore, the method **1200** may include moving the coring bit from the first position to the second position **1275** and moving a handling piston from the first position to a third position **1280**. For example, the coring bit may move from the first position, such as the coring position, to the second position, such as the ejection position. The handling piston may then move from the first position, such as the retracted position, to a third position, such as another an extended position. With such movement, the handling piston may be able to move through the coring bit again, such that a coring sample, if present within the coring tool, and/or the coring sample holder may be urged out from the coring bit and into a defined position, such as by having the coring sample holder positioned within a transfer tube and/or a shifter. Additionally, with such movement, the handling piston may then stop at a third position, in which the third position may, for example, be at the top surface of a coring sample disposed within the coring sample holder or, alternatively, be at the bottom surface of the coring sample holder.

[0107] The method **1200** may then continue on to measure the handling piston movement from the first position to the third position **1285** and determine the coring sample presence within the coring tool **1290**. For example, the distance of the movement of the handling piston between the first position, such as the retracted position, and the third position, such as another extended position, may be measured. As such, based upon the measured distance, the presence of a coring sample may be determined, such as by comparing the measured distance with a predetermined distance, as discussed above. Accordingly, if a coring sample is determined as present within the coring tool in step **1290**, the method **1200** may then follow the steps **1160** and **1170** of the method **1100** shown in FIG. **11**, or if a coring sample is determined as not present within the coring tool in step **1290**, the method **1200** may then repeat one or more of the steps **1260-1290** to re-drill and attempt to receive a coring sample within the coring tool again.

[0108] In accordance with one or more embodiments disclosed herein, the handling piston may be able to move at a duty cycle less than 100 percent. For example, in one embodiment, the handling piston may be able to move at a duty cycle of about 20 percent. In such an embodiment, this may enable the handling piston to move with a slower and more desired speed and/or a smaller and more desired force. As such, a smaller duty cycle for the handling piston may enable the piston to be more sensitive to the presence of a coring sample, in which the handling piston may be able to more accurately stop at a second position within a coring tool. Accordingly, the handling piston may move at various duty cycles within the coring bit to perform various tasks. For example, the handling piston may move at a higher duty cycle when attempting to urge a coring sample out from a coring bit, and may move at a lower duty cycle when moving to stop at the second position to detect the presence of the coring sample. When moving at a duty cycle in accordance with one or more embodiments disclosed herein, the handling piston may then stop in movement, such as by a stalling of the motor driving the handling piston. As such, in one embodiment, the stopping in movement of the handling piston may then be detected when the measured position of the handling piston remains constant with time, a position that may be calculated from a resolver signal, while the motor driving coupled to the handling piston has power applied thereto (e.g., an electrical current) to drive the handling piston.

[0109] Further, in accordance with one or more embodiments of the present disclosure, a coring tool of the present disclosure may include one or more sensors included therein and/or operably coupled thereto. As such, in one embodiment, a coring tool may include a pressure sensor operably coupled to the handling piston, in which the pressure sensor may be able to measure pressure received upon the handling piston. In such an embodiment, the handling piston may stop in movement, such as stop at the second position in movement, when the pressure measured by the pressure sensor reaches or exceeds a predetermined pressure. For example, a predetermined pressure may be selected, such as a threshold pressure, in which once the measured pressure exceeds the predetermined pressure, the handling piston may stop in movement. As such, this may enable the handling piston to stop at the second position, such as when the handling piston engages the top surface of a coring sample or engages the bottom surface of a coring sample holder. Those having ordinary skill in the art will appreciate that in addition or in alternative to a pressure sensor, or any other type of sensor, other devices may be used to stop the handling piston at a desired second position in accordance with one or more embodiments disclosed herein.

[0110] Further, aspects of embodiments disclosed herein, such as detecting a coring sample presence and measuring the length of a coring sample, may be implemented on any type of computer regardless of the platform being used. For example, as shown in FIG. **13**, a networked computer system **1310** that may be used in accordance with an embodiment disclosed herein includes a processor **1320**, associated memory **1330**, a storage device **1340**, and numerous other elements and functionalities typical of today's computers (not shown). The networked computer system **1310** may also include input means, such as a keyboard **1350** and a mouse **1360**, and output means, such as a monitor **1370**. The networked computer system **1310** is connected to a local area network (LAN) or a wide area network (e.g., the Internet) (not shown) via a network interface connection (not shown). Those skilled in the art will appreciate that these input and output means may take many other forms. Additionally, the computer system may not be connected to a network. Further, those skilled in the art will appreciate that one or more elements of aforementioned computer **1310** may be located at a remote location and connected to the other elements over a network. As such, a computer system, such as the networked computer system **1310**, and/or any other computer system known in the art may be used in accordance with embodiments disclosed herein, such as by having a computer system coupled to and/or included within a coring tool of the present disclosure.

[0111] Embodiments disclosed herein may provide for one or more of the following advantages. A tool and method in accordance with the present disclosure may be included within one or more of the embodiments shown in FIGS. **1-6**, in addition to being included within other tools and/or devices that may be disposed downhole within a formation. Further, a tool and a method in accordance with one or more embodiments of the present disclosure may be able to detect the presence of a coring sample within a coring sample holder before the coring sample holder is disposed within the storage area of the coring tool. This may enable the coring tool to re-drill to attempt to retrieve a coring sample for the coring sample holder, thereby preventing an empty coring sample holder from being disposed within the storage area of the coring tool. Furthermore, a tool and a method in accordance with one or more embodiments of the present disclosure may be able to determine the length of a coring sample within a coring tool.

[0112] In accordance with one or more aspects of the present disclosure, one or more embodiments disclosed herein relate to a method to detect the presence of a coring sample within a coring tool. The method includes moving a handling piston of the coring tool from a first position to a second position with respect to the coring tool, the handling piston moving through a coring bit to the second position, measuring a distance of the movement of the handling piston between the first position and the second position, comparing the measured distance with a predetermined distance, and determining if the coring sample is present within the coring tool based upon the comparison of the measured distance with the predetermined distance.

[0113] In accordance with one or more aspects of the present disclosure, one or more embodiments disclosed herein relate to a method to drill within a borehole with a coring tool, the method includes drilling into a wall of the borehole with a coring bit of the coring tool, the coring bit disposed in a coring position with respect to the coring tool and the coring tool having an axis extending therethrough, rotating the coring bit from the coring position to an ejection position with respect to the coring tool, extending a handling piston of the coring tool from a retracted position to an extended position with respect to the coring tool, measuring a distance of the movement of the handling piston between the retracted position and the extended position, comparing the measured distance with a predetermined distance, and determining if a coring sample is present within the coring tool based upon the comparison of the measured distance with the predetermined distance.

[0114] In accordance with one or more aspects of the present disclosure, one or more embodiments disclosed herein relate to a method to detect the presence of a coring sample within a coring tool. The method includes moving a transporter of the coring sample from a first position to a second position with respect to the coring tool, measuring the distance of the movement of the transporter between the first position and the second position, comparing the measured distance with a predetermined distance, and determining if the coring sample is present within the coring tool based upon the comparison of the measured distance with the predetermined distance.

[0115] The foregoing outlines feature several embodiments so that those skilled in the art may better understand the aspects of the present disclosure. Those skilled in the art should appreciate that they may readily use the present disclosure as a basis for designing or modifying other processes and structures for carrying out the same purposes and/or achieving the same advantages of the embodiments introduced herein. Those skilled in the art should also realize that such equivalent constructions do not depart from the spirit and scope of the present disclosure, and that they may make various changes, substitutions and alterations herein without departing from the spirit and scope of the present disclosure.

[0116] The Abstract at the end of this disclosure is provided to comply with 37 C.F.R. §1.72(b) to allow the reader to quickly ascertain the nature of the technical disclosure. It is submitted with the understanding that it will not be used to interpret or limit the scope or meaning of the claims.

What is claimed is:

1. A method to detect the presence of a coring sample within a coring tool, the method comprising:

moving a handling piston of the coring tool from a first position to a second position with respect to the coring tool, the handling piston moving through a coring bit to the second position;

measuring the distance of the movement of the handling piston between the first position and the second position;

comparing the measured distance with a predetermined distance; and

determining if the coring sample is present within the coring tool based upon the comparison of the measured distance with the predetermined distance.

2. The method of claim **1**, wherein, if determined the coring sample is present within the coring tool, the method further comprises:

determining a length of the coring sample based upon the measured distance of the movement of the handling piston.

3. The method of claim **1**, wherein, if determined the coring sample is present within the coring tool, the method further comprises:

disposing the coring sample within a storage area of the coring tool.

4. The method of claim **1**, wherein, if determined the coring sample is not present within the coring tool, the method further comprises:

moving the handling piston from the second position to the first position with respect to the coring tool;

moving the coring bit from a second position to a first position with respect to the coring tool; and

re-drilling into a wall of the borehole with the coring bit of the coring tool.

5. The method of claim **4**, further comprising:

moving the coring bit from the first position to the second position with respect to the coring tool;

moving the handling piston of the coring tool from the first position to a third position with respect to the coring tool, the handling piston being at least partially disposed within the coring bit in the third position;

measuring a second distance of the movement of the handling piston between the first position and the third position; and

determining if a coring sample is present within the coring tool based upon the comparison of the second measured distance with the predetermined distance

6. The method of claim **1**, wherein the comparing the measured distance with the predetermined distance comprises:

subtracting the measured distance from the predetermined distance, thereby resulting in a differential distance between the measured distance and the predetermined distance; and

comparing the differential distance with a threshold value.

7. The method of claim **1**, wherein the moving the handling piston of the coring tool from the first position to the second position with respect to the coring tool comprises:

moving the handling piston from the first position with respect to the coring tool;

measuring pressure upon the handling piston with a pressure sensor; and

stopping movement of the handling piston when the measured pressure upon the handling piston is more than a predetermined pressure;

wherein the handling piston stops in movement at the second position with respect to the coring tool.

8. The method of claim **1**, wherein, when the handling piston moves from the first position to the second position with respect to the coring tool, the handling piston moves, at least partially, at a duty cycle less than about 100 percent.

9. The method of claim **1**, wherein the moving a coring bit from a first position to a second position with respect to the coring tool comprises rotating the coring bit from a coring position to an ejection position with respect to the coring tool.

10. The method of claim **1**, wherein the moving the handling piston of the coring tool from the first position to the second position with respect to the coring tool comprises extending the handling piston of the coring tool from a retracted position to an extended position with respect to the coring tool.

11. A method to drill within a borehole with a coring tool, the method comprising:

drilling into a wall of the borehole with a coring bit of the coring tool, the coring bit disposed in a coring position with respect to the coring tool and the coring tool having an axis extending therethrough;

rotating the coring bit from the coring position to an ejection position with respect to the coring tool;

extending a handling piston of the coring tool from a retracted position to an extended position with respect to the coring tool;

measuring a distance of the movement of the handling piston between the retracted position and the extended position;

comparing the measured distance with a predetermined distance; and

determining if a coring sample is present within the coring tool based upon the comparison of the measured distance with the predetermined distance.

12. The method of claim **11**, wherein, if determined the coring sample is present within the coring tool, the method further comprises:

determining a length of the coring sample if determined the coring sample is present within the coring tool; and

storing the coring sample within a storage area of the coring tool if determined the coring sample is present within the coring tool.

13. The method of claim **12**, wherein the coring sample is disposed within a coring sample holder before disposing the coring sample within the storage area of the coring tool.

14. The method of claim **12**, further comprising:

retracting the handling piston from the extended position to the retracted position with respect to the coring tool;

rotating the coring bit from the ejection position to the coring position with respect to the coring tool; and

re-drilling into the wall of the borehole with the coring bit of the coring tool.

rotating the coring bit from the coring position to the ejection position with respect to the coring tool;

extending the handling piston of the coring tool from the retracted position to a second extended position with respect to the coring tool, the handling piston being at least partially disposed within the coring bit in the second extended position;

measuring a second distance of the movement of the handling piston between the retracted position and the second extended position;

comparing the second measured distance with the predetermined distance; and

determining if a second coring sample is present within the coring tool based upon the second comparison of the measured distance with the predetermined distance.

15. The method of claim **11**, wherein, if determined the coring sample is not present within the coring tool, the method further comprises:

re-drilling into the wall of the borehole with the coring bit of the coring tool if determined the coring sample is not present within the coring tool.

16. The method of claim **11**, wherein the handling piston stops in movement at the extended position when the pressure upon the handling piston is more than a predetermined pressure.

17. The method of claim **11**, wherein, when the handling piston extends from the first position to the second position with respect to the coring tool, the handling piston extends, at least partially, at a duty cycle less than about 100 percent.

18. The method of claim **11**, wherein the comparing the measured distance with the predetermined distance comprises:

subtracting the measured distance from the predetermined distance, thereby resulting in a differential distance between the measured distance and the predetermined distance; and

comparing the differential distance with a threshold value.

19. A method to detect the presence of a coring sample within a coring tool, the method comprising:

moving a transporter of the coring tool from a first position to a second position with respect to a borehole;

measuring a distance of the movement of the transporter between the first position and the second position;

comparing the measured distance with a predetermined distance; and

determining if the coring sample is present within the coring tool based upon the comparison of the measured distance with the predetermined distance.

20. The method of claim **19**, wherein the transporter comprises a handling piston.

21. The method of claim **20**, further comprising:

drilling into a wall of the borehole with a coring bit of the coring tool, the coring bit disposed in a first position with respect to the coring tool and the coring tool having an axis extending therethrough; and

moving the coring bit from the first position to a second position with respect to the coring tool.

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