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(54) **VALVE COVER AND LINER RETAINER FOR A FLUID END OF A PUMP**

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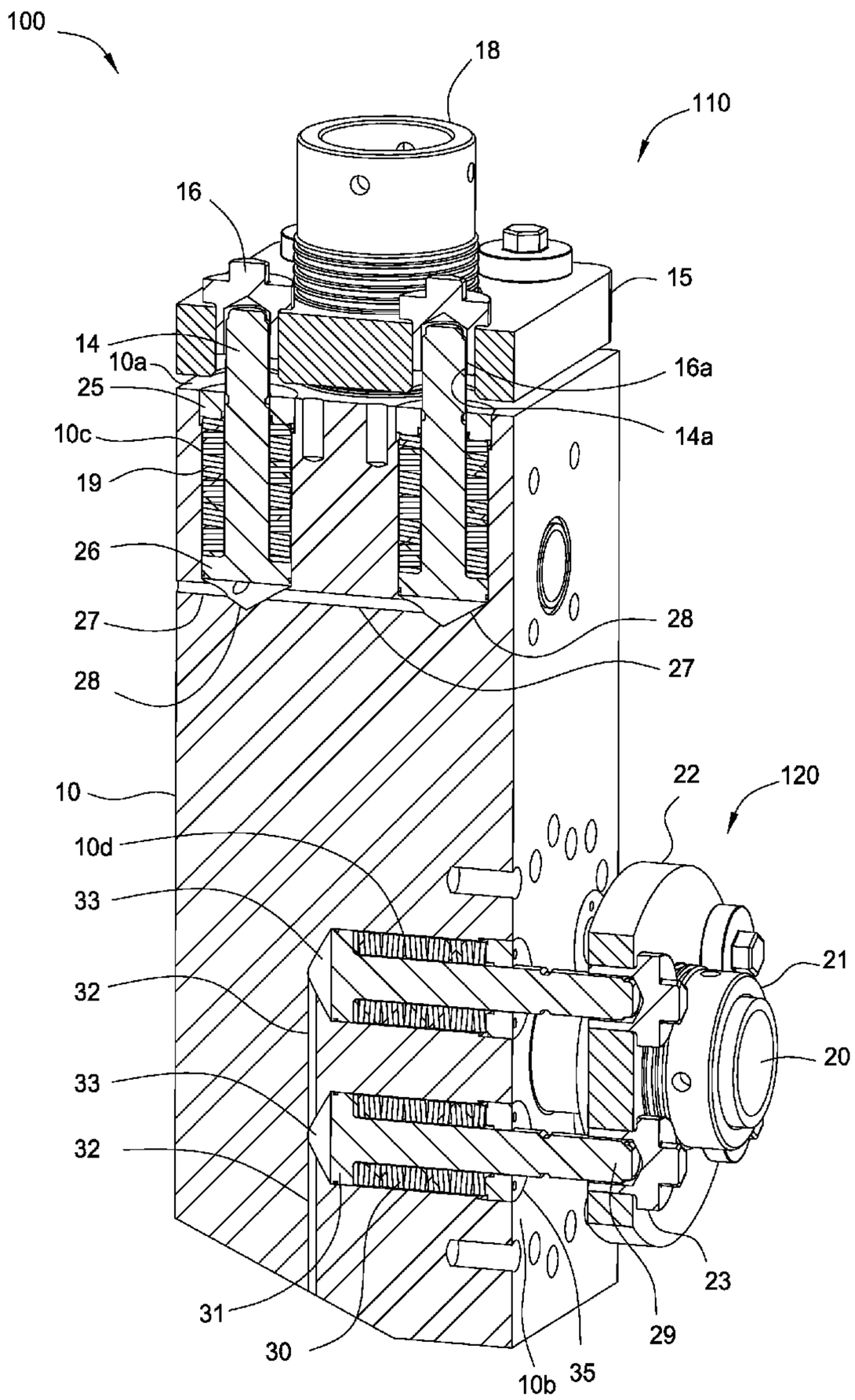
(57) **ABSTRACT**

A valve cover assembly and a liner retainer assembly configured to retain a plug, a liner, and/or a liner seal within or against a module or retention body of a fluid end of a pump. The valve cover assembly and the liner retainer assembly include pistons coupled to a retaining flange or a threaded gland. A bias applied to the pistons biases the retaining flange and a threaded gland that is coupled to the retaining flange, or the piston alone, into engagement with the module or retention body to retain the plug, the liner, and/or the liner seal on the module.



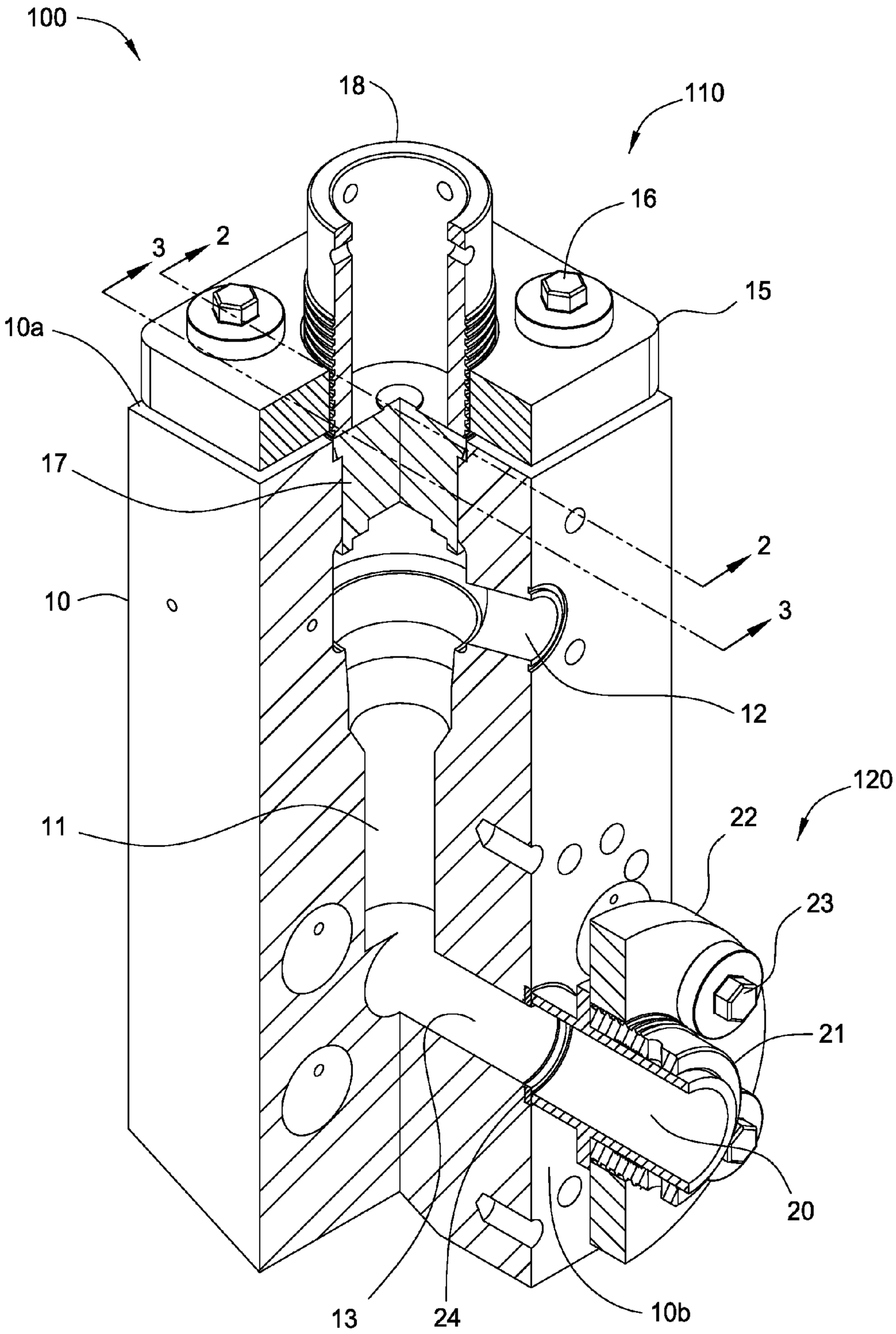


FIG. 1

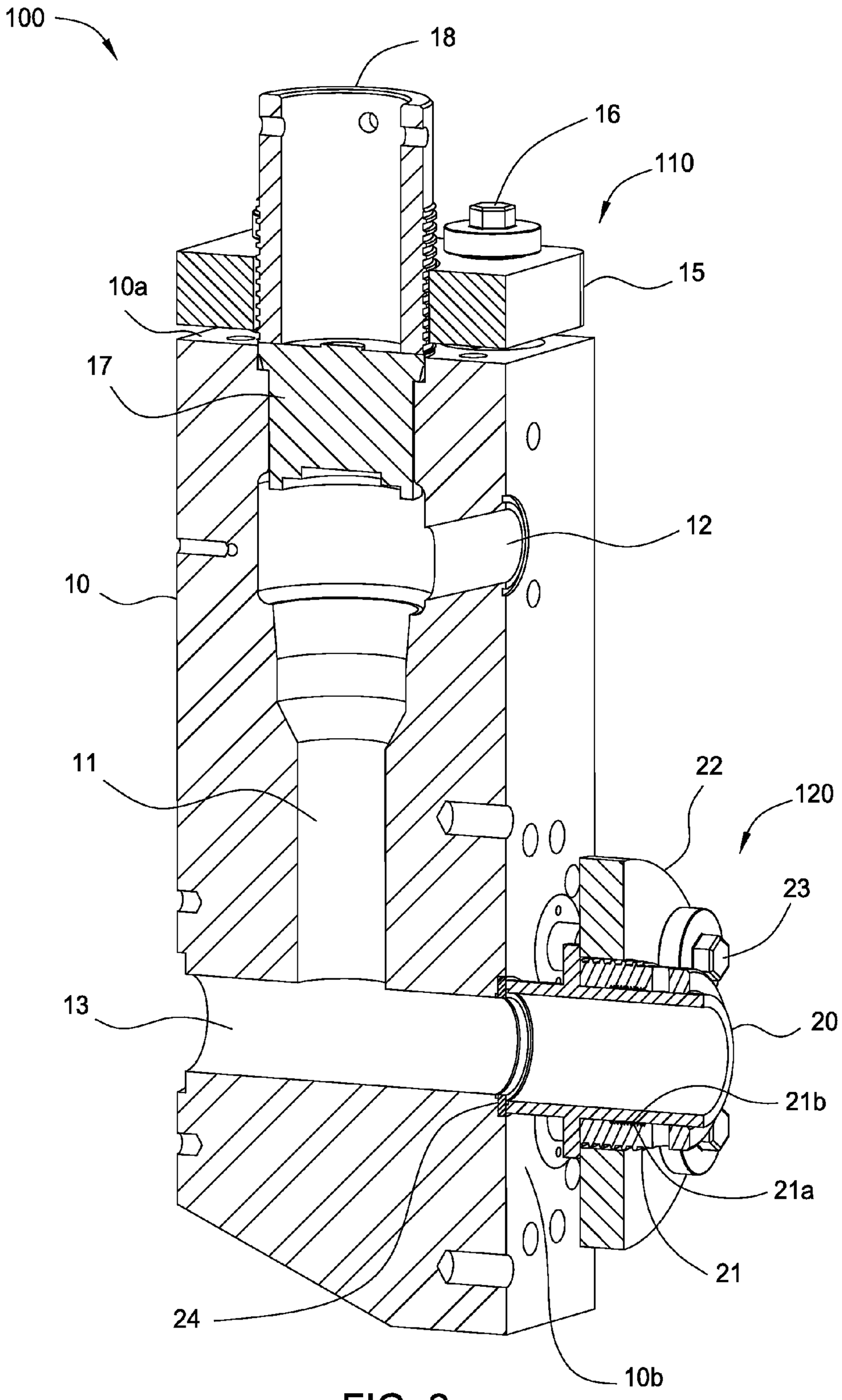
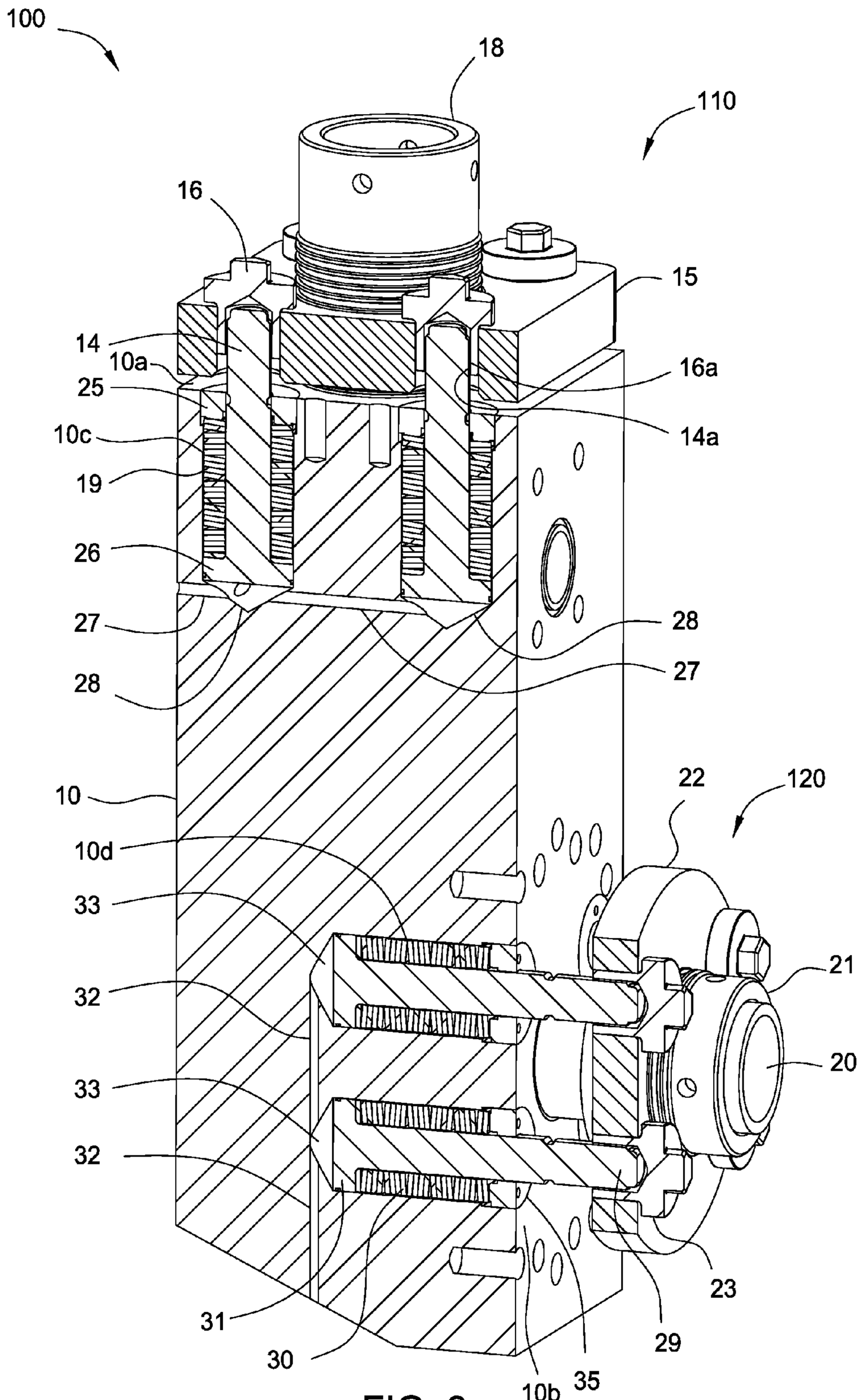


FIG. 2


100
18
110
16
15
14
10a
25
16a
10c
14a
19
26
27
28
28
27
10
22
120
10d
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21
33
20
32
23
31
29
30
10b
35

FIG. 3

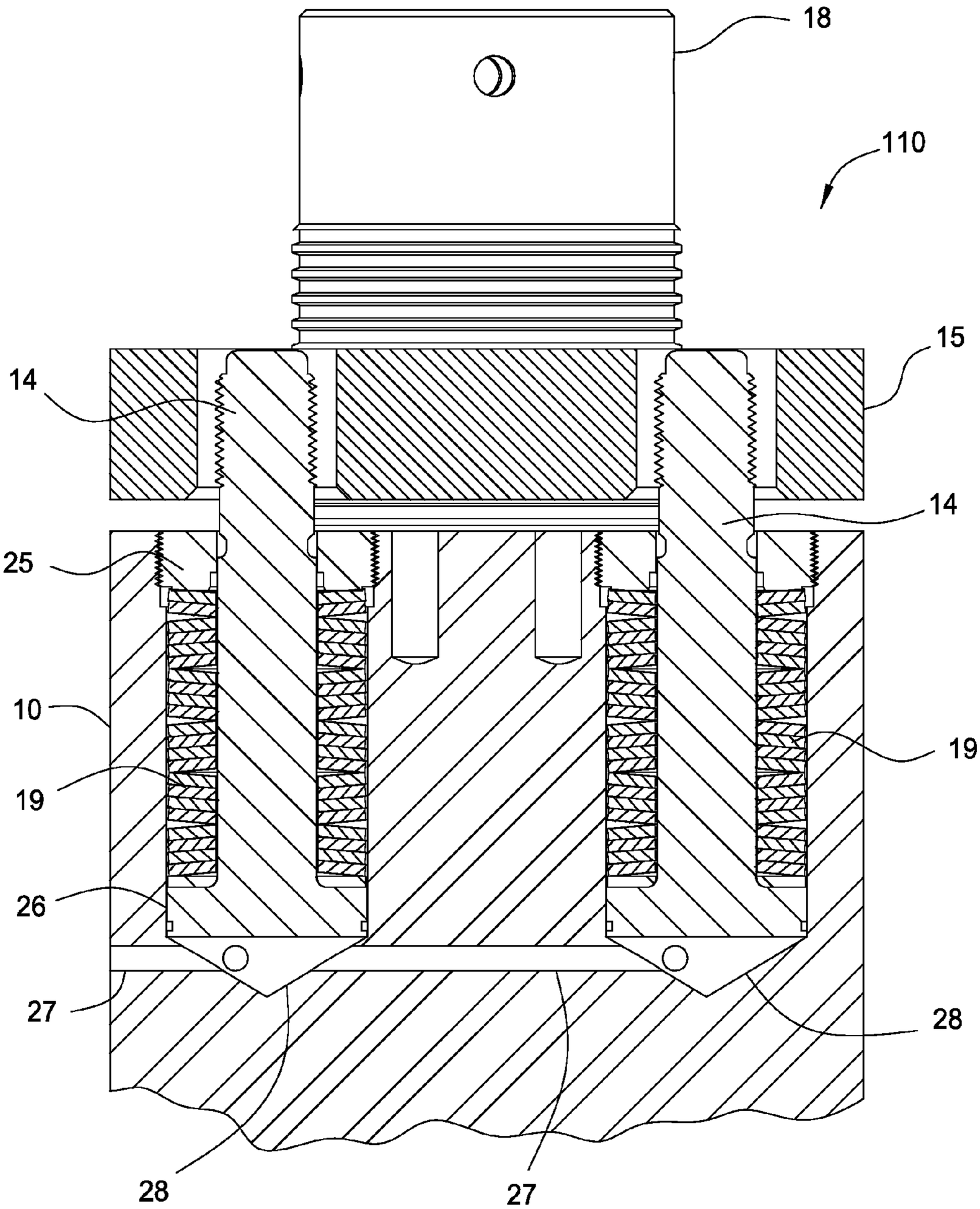

FIG. 4A

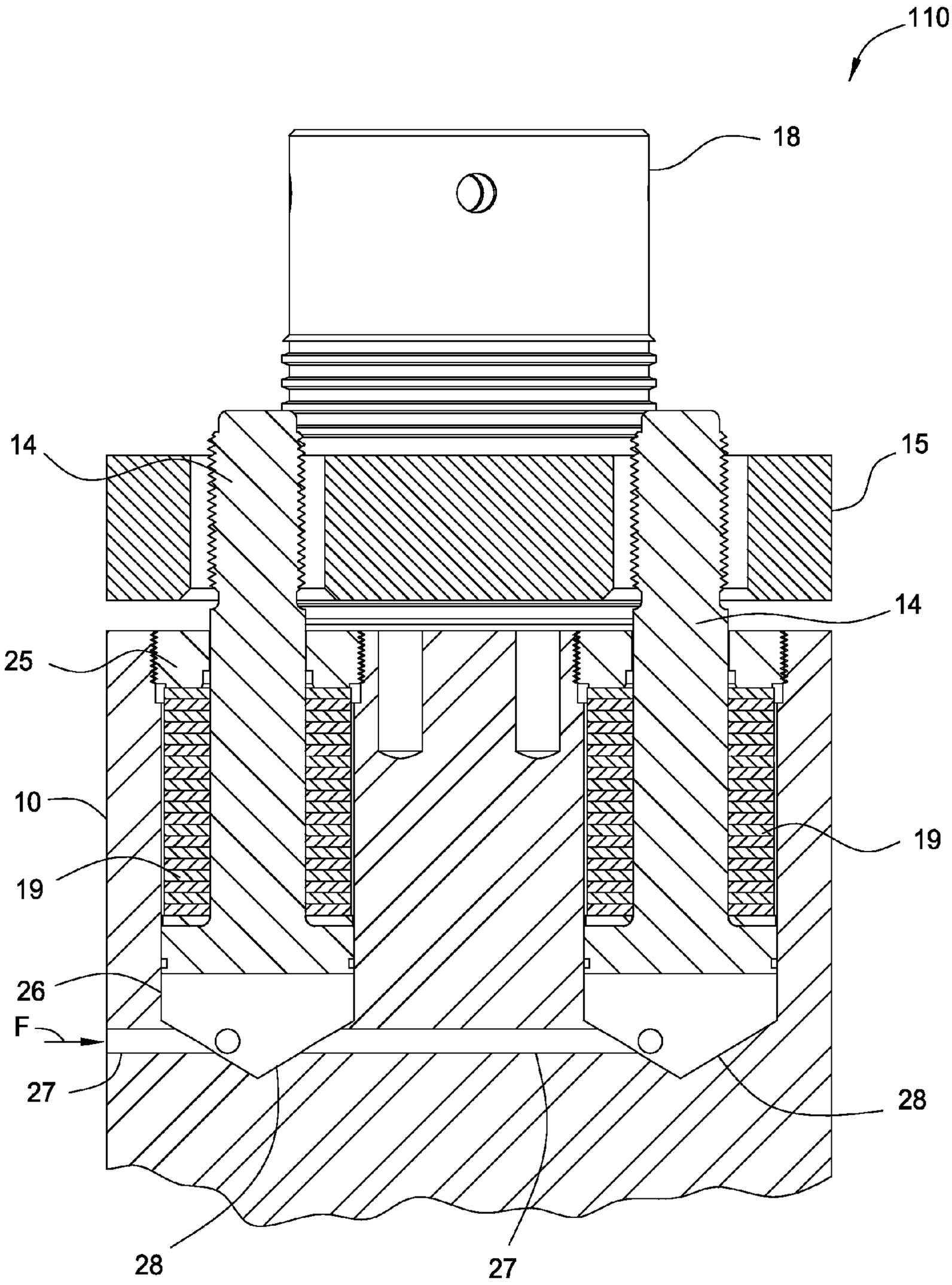

FIG. 4B

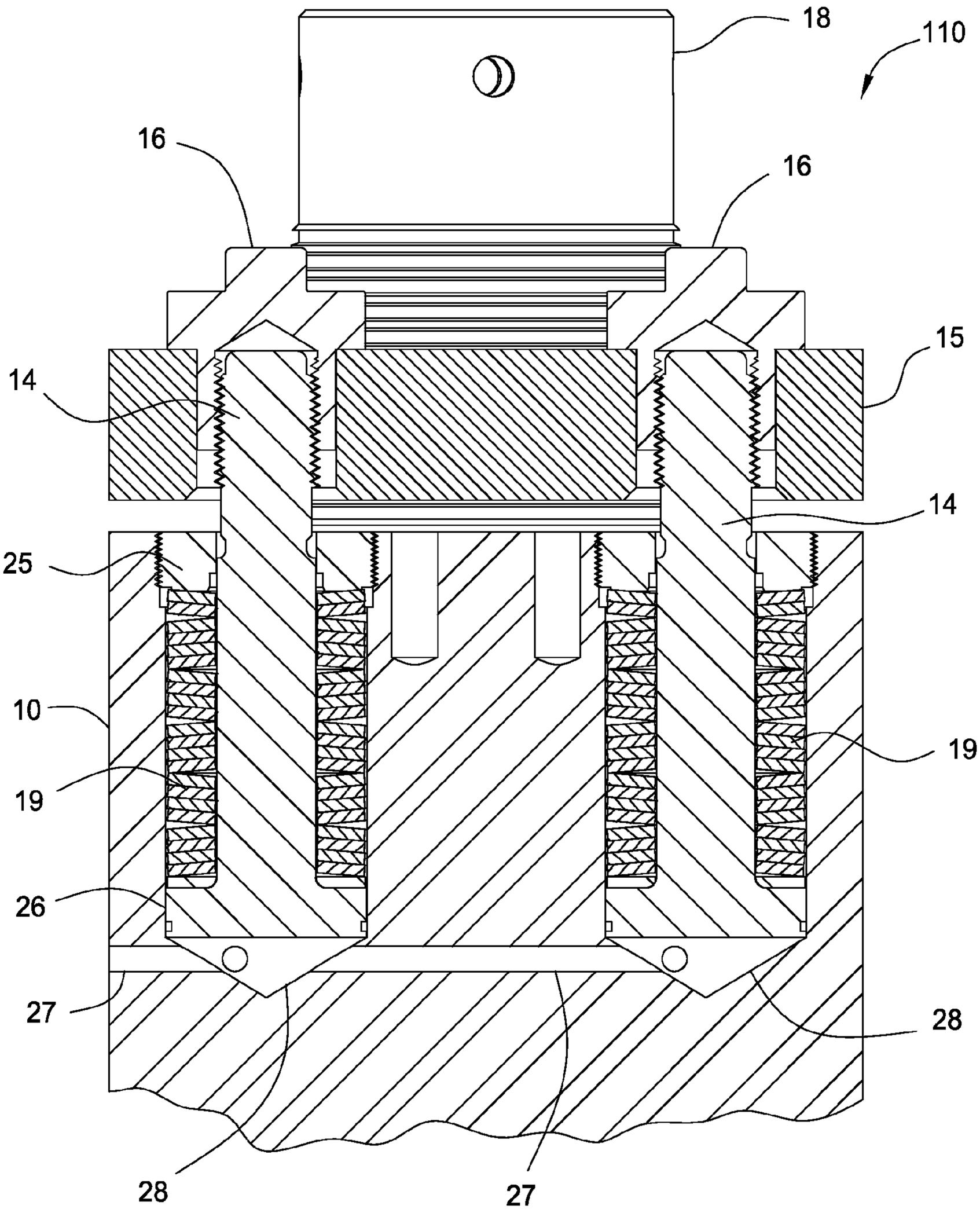

FIG. 4C

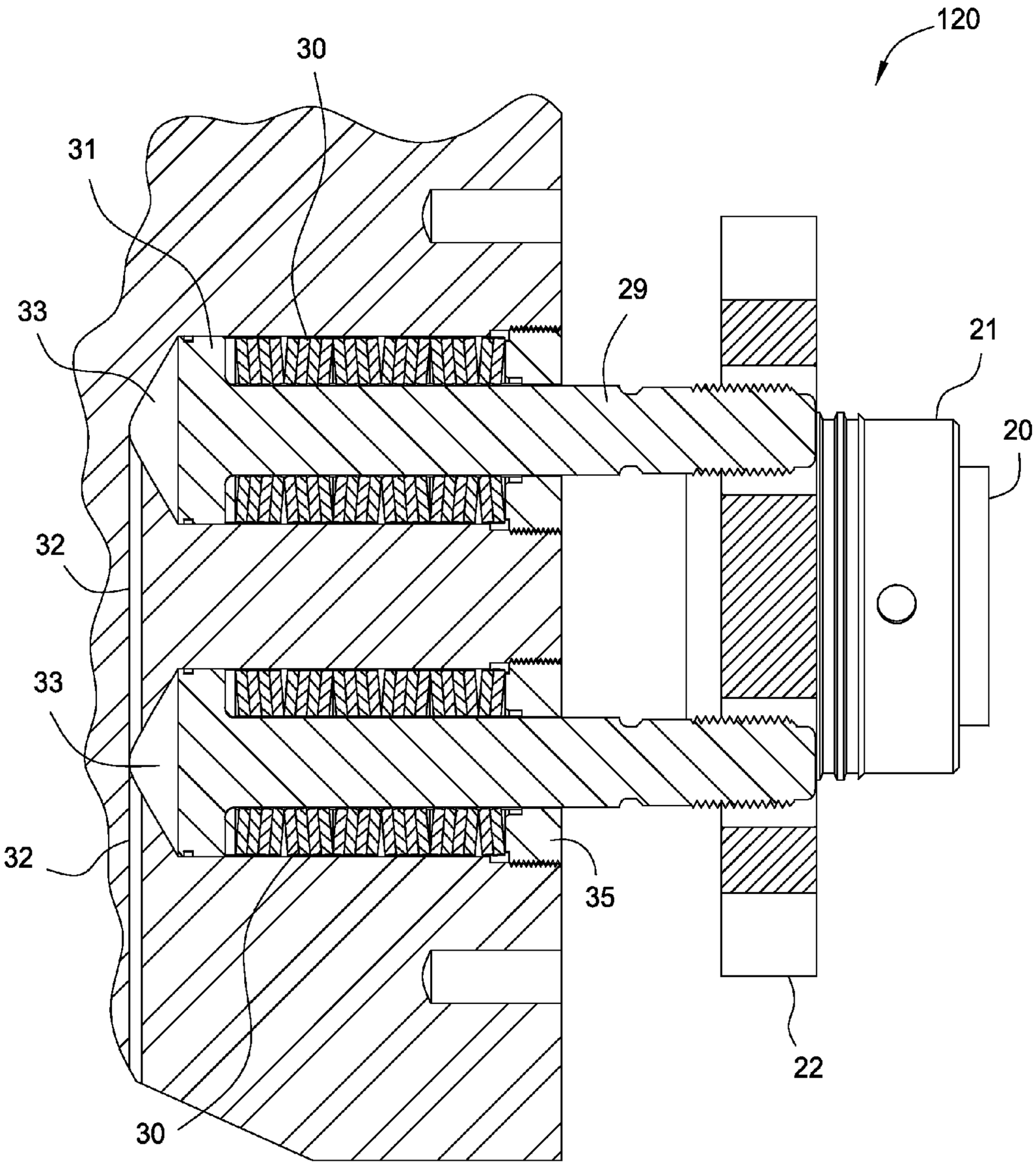

FIG. 5A

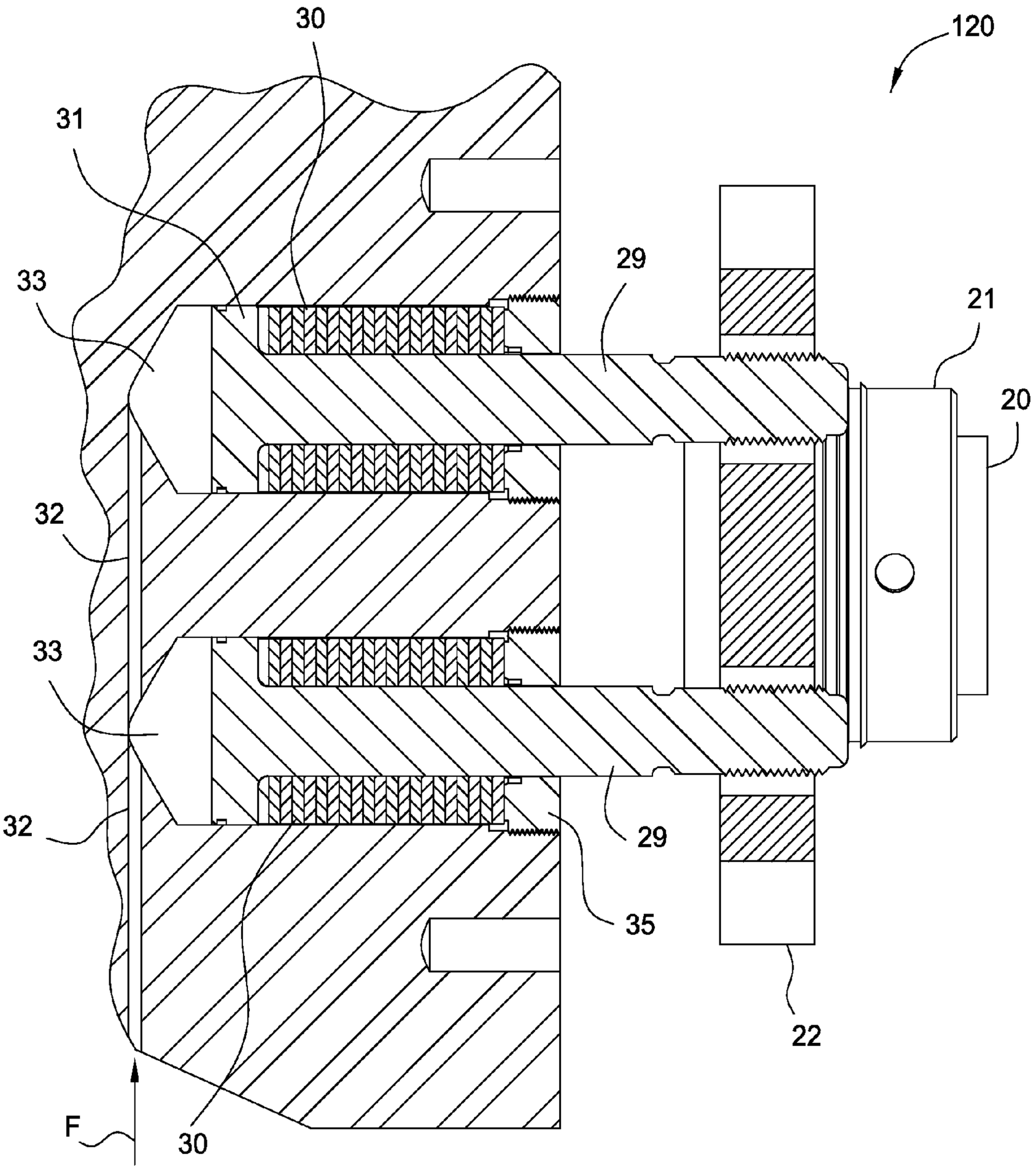

FIG. 5B

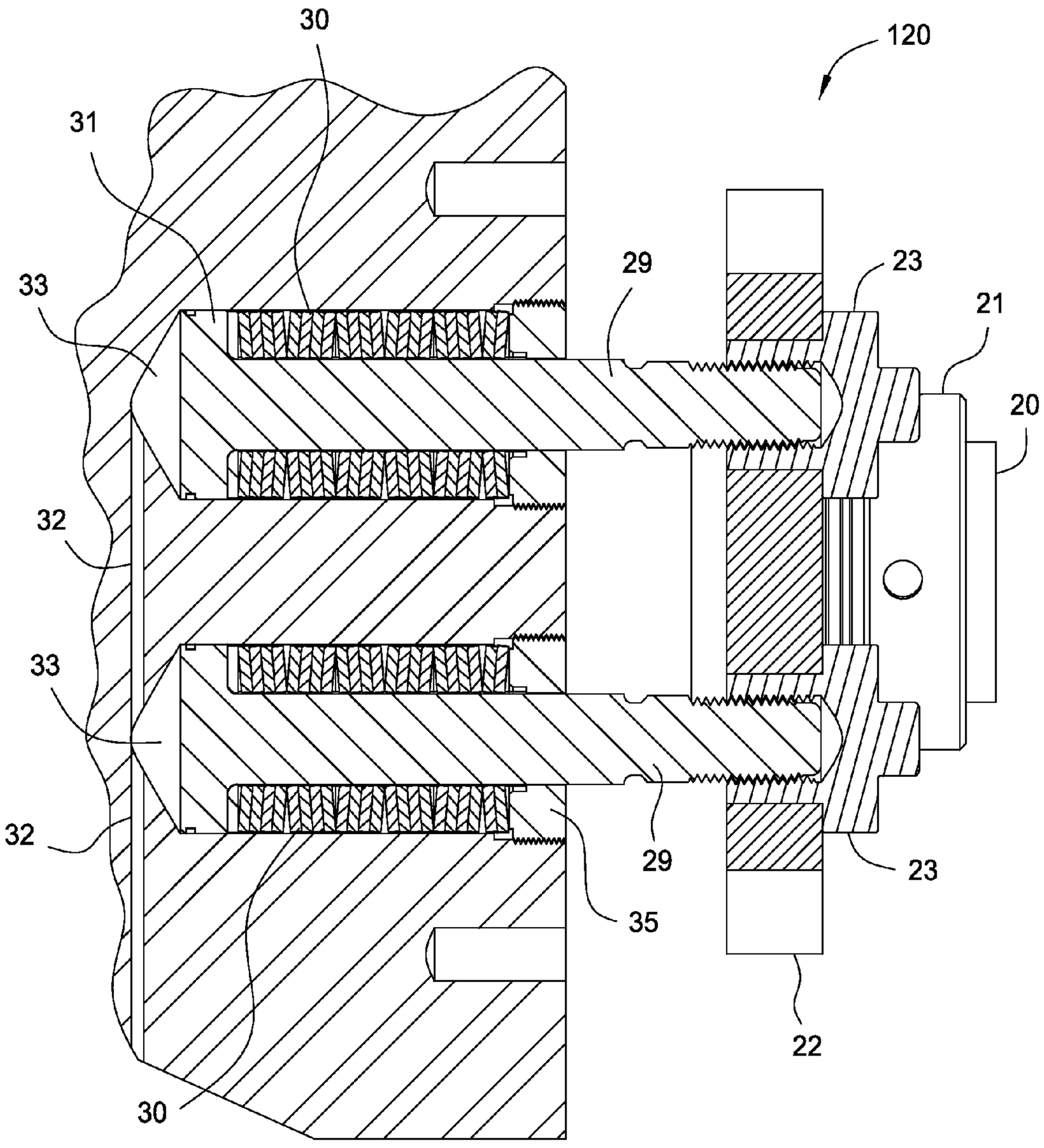

FIG. 5C

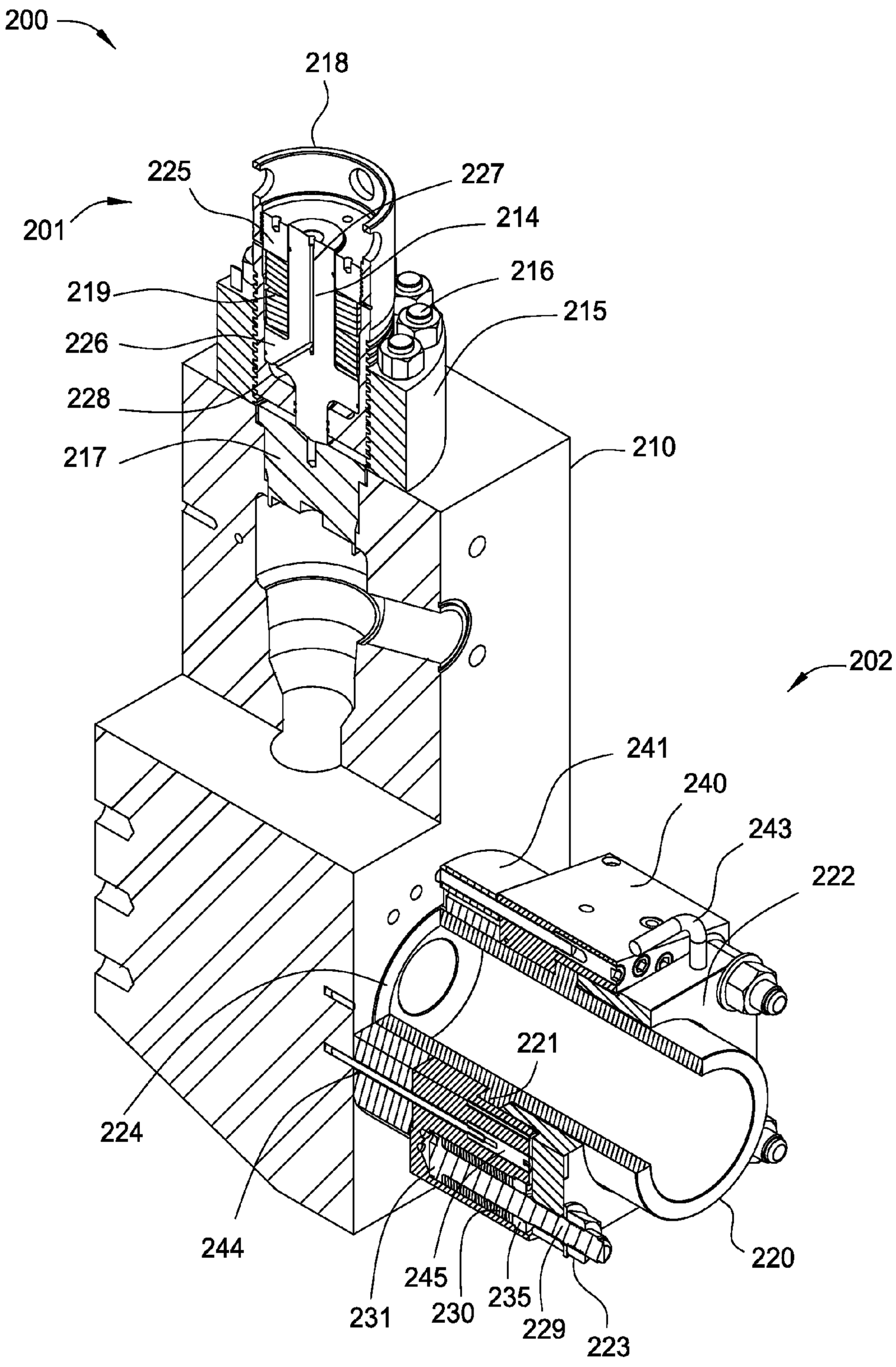
200
218
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FIG. 6

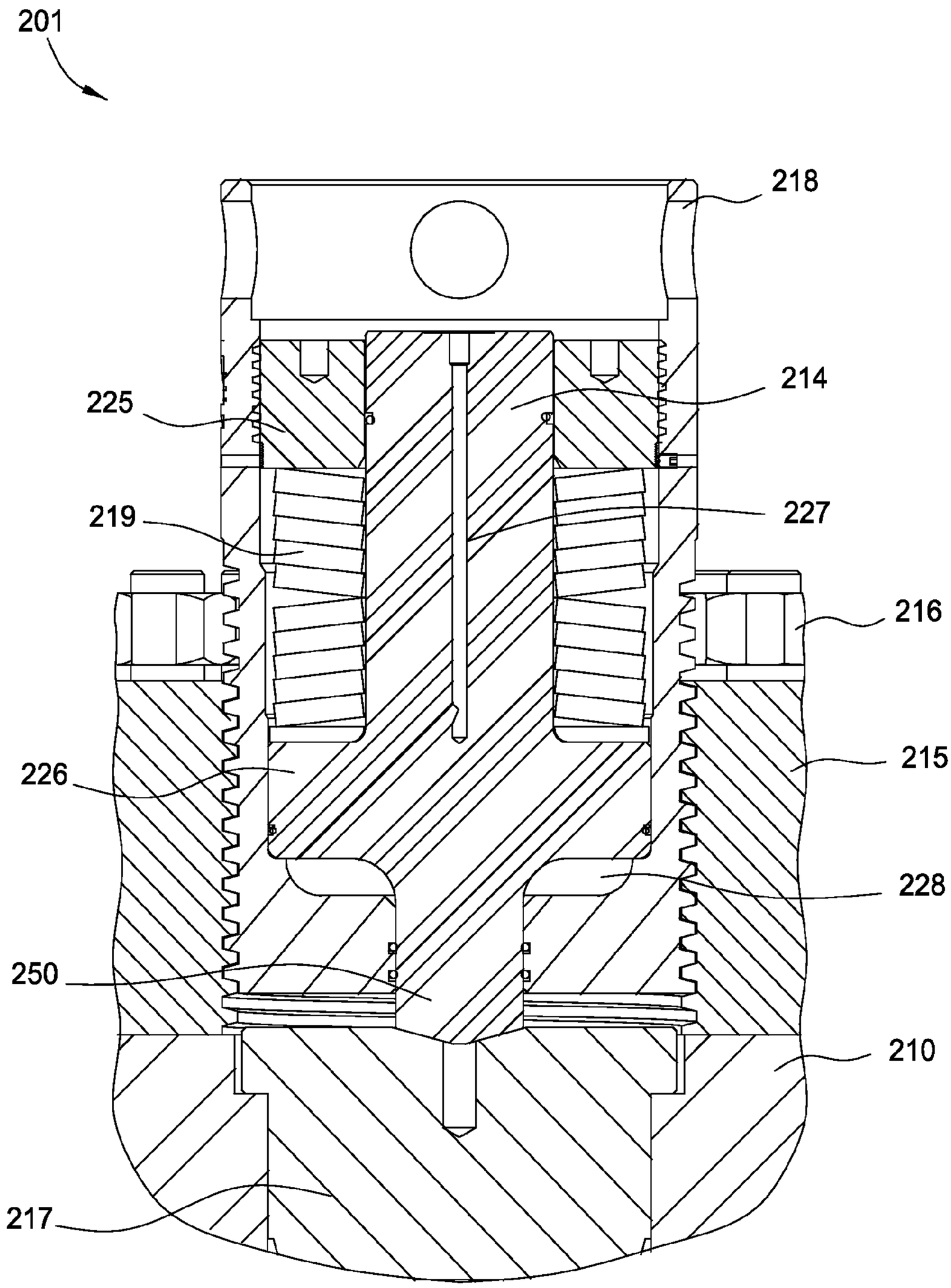

FIG. 7A

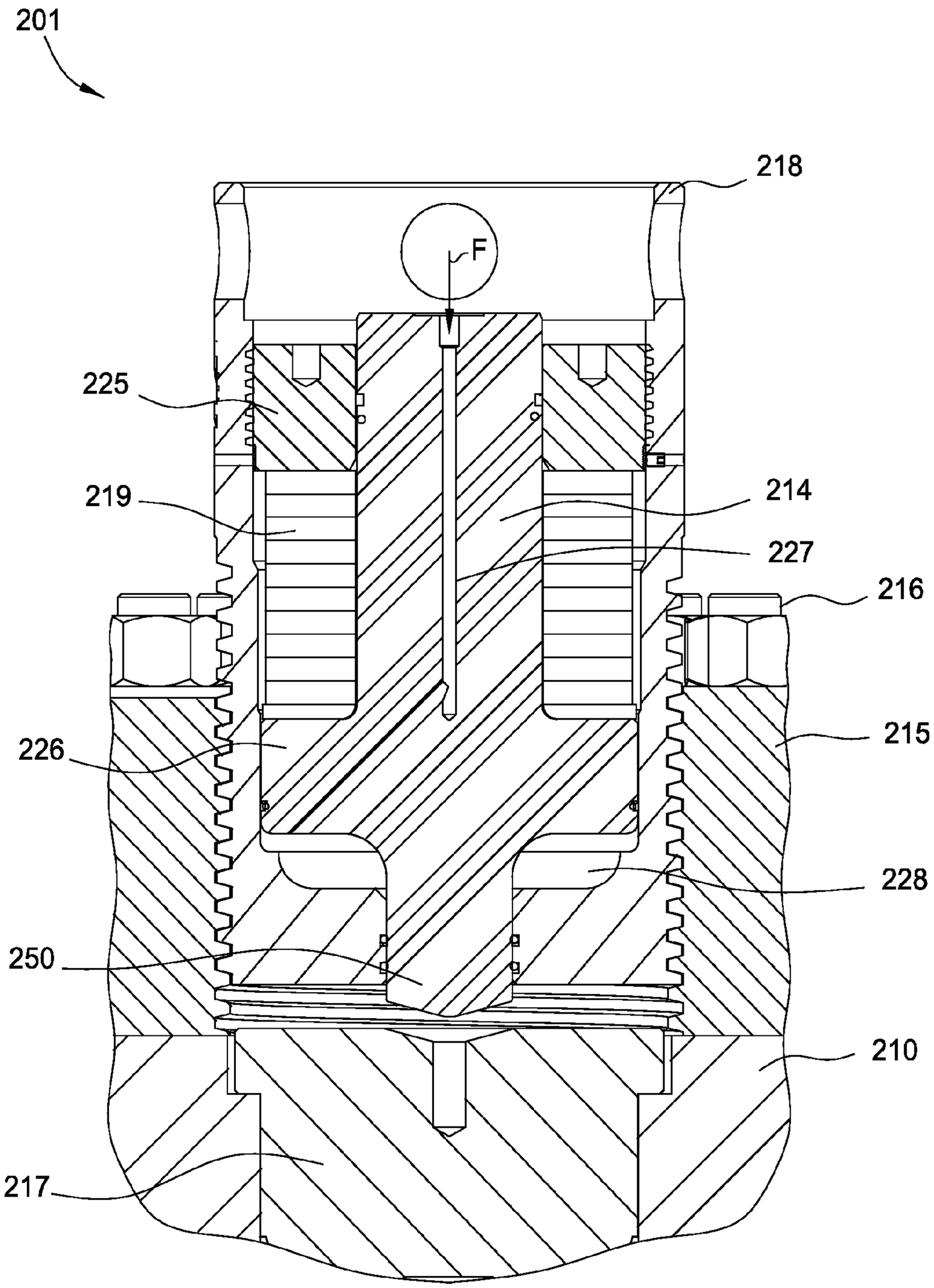

FIG. 7B

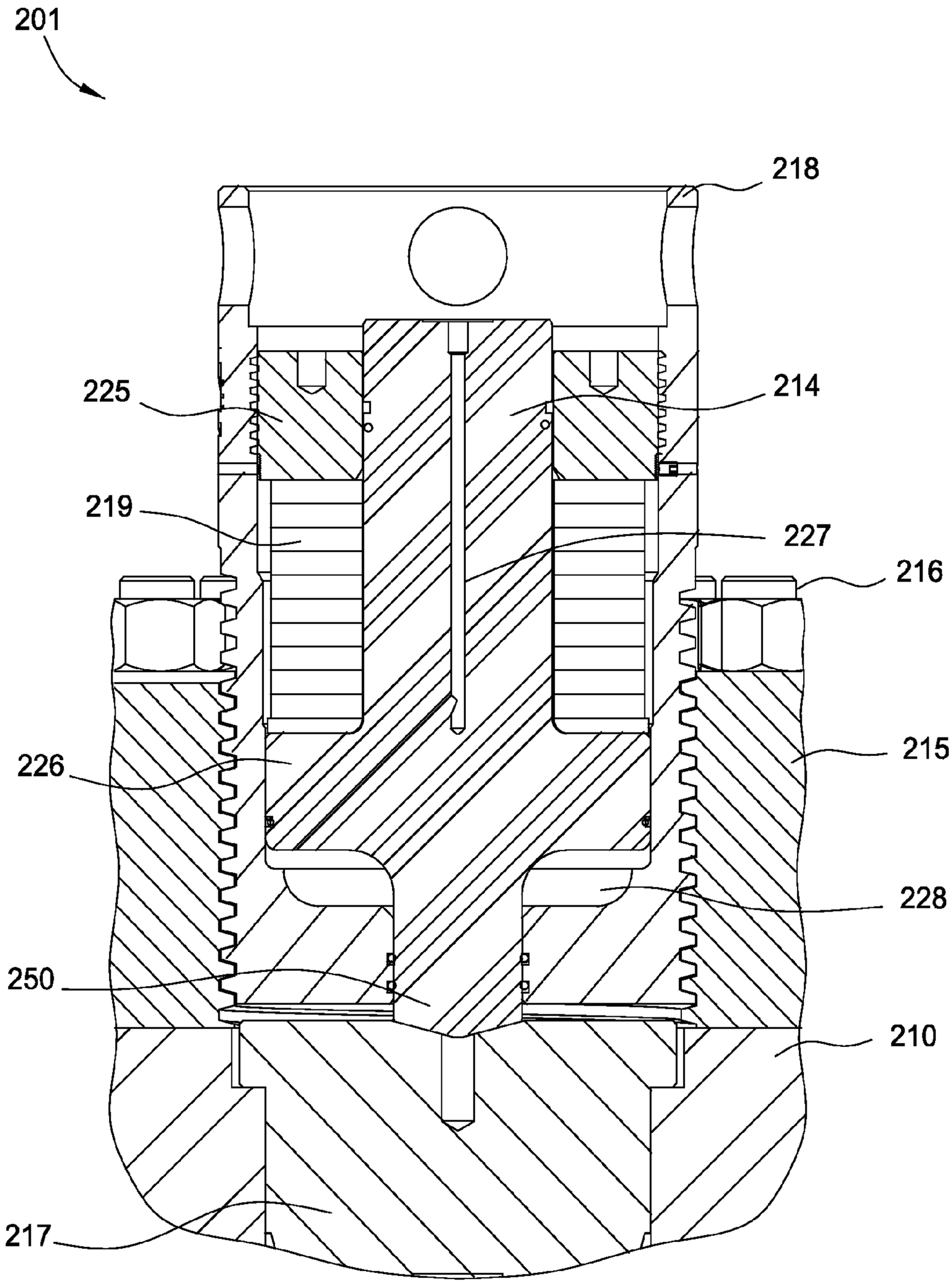

FIG. 7C

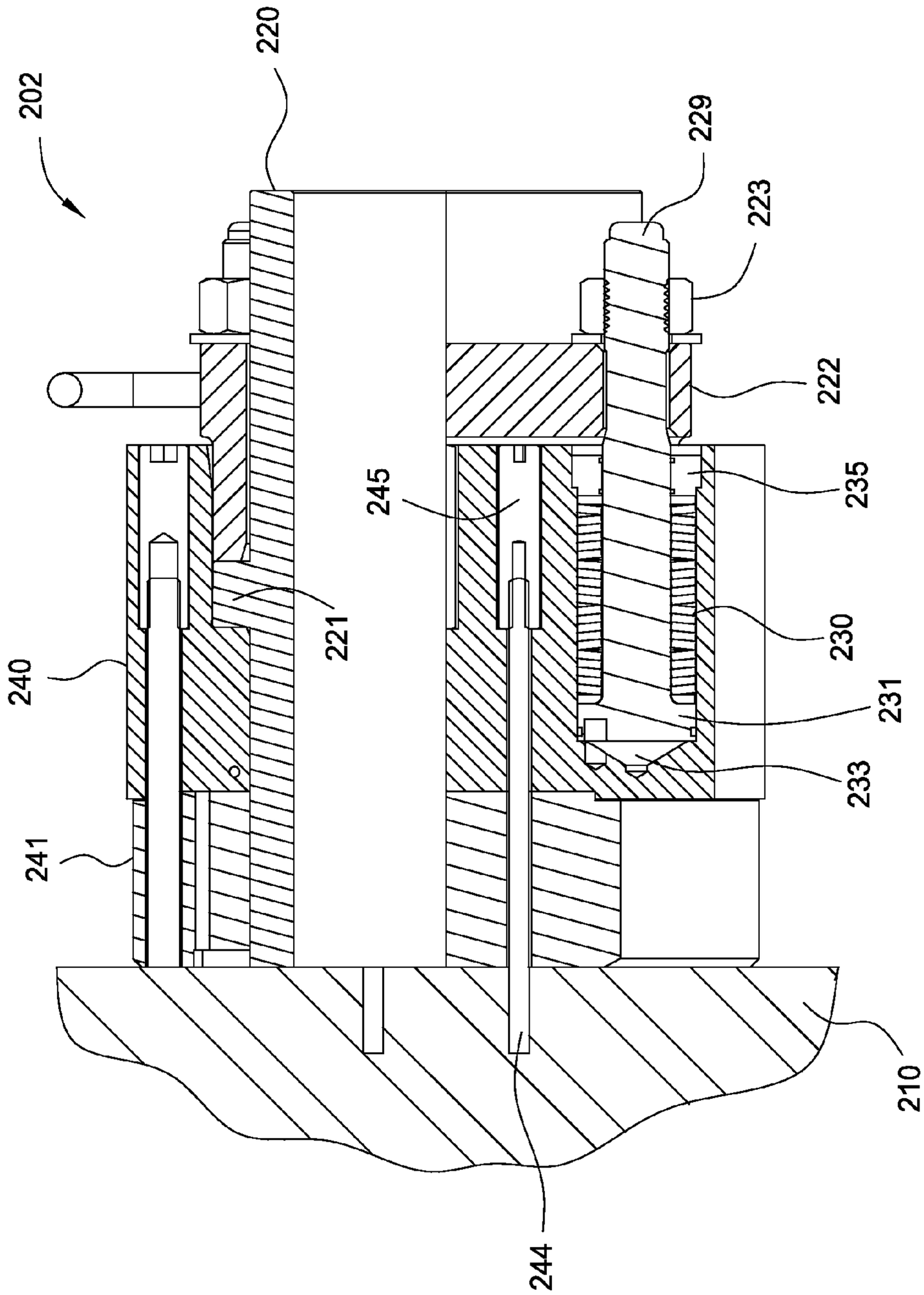

FIG. 8A

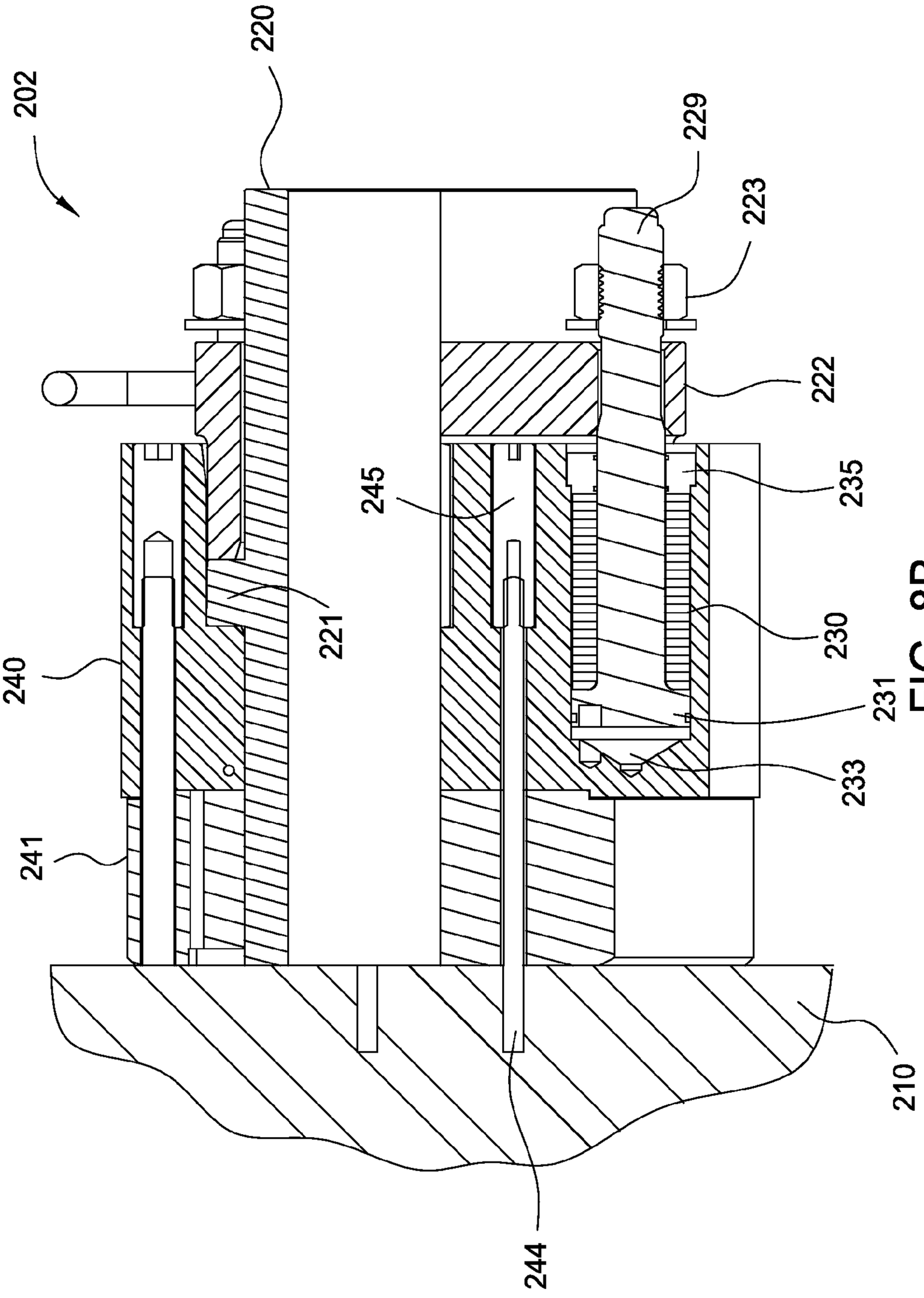

FIG. 8B

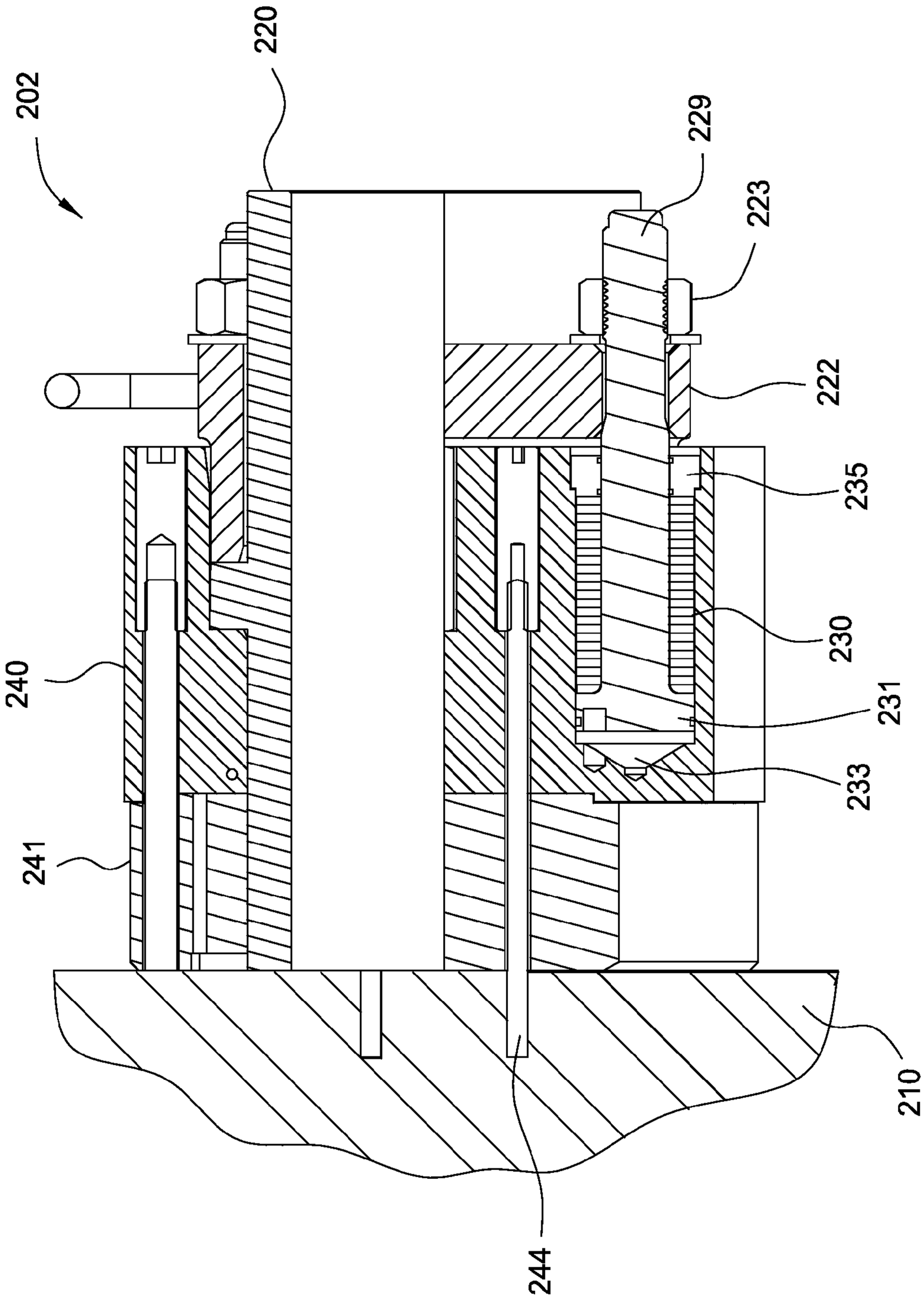

FIG. 8C

VALVE COVER AND LINER RETAINER FOR A FLUID END OF A PUMP

BACKGROUND

[0001] Field of the Disclosure

[0002] Embodiments of the present disclosure generally relate to a fluid end module that integrates a valve cover and/or liner retention system.

[0003] Description of the Related Art

[0004] Multiplex reciprocating pumps are commonly used in the oil and gas industry. The pumps are used to pump fluids at high pressure into one or more wells comprising boreholes that are drilled into the ground. Multiplex pumps comprise a power end housing a crankshaft and a crosshead, and a fluid end having fluid bores in which individual plungers having intake and discharge valves reciprocate. Connecting rods connect the crosshead to the plungers to cause reciprocating motion of the plungers in the fluid bores to move fluid from a suction end to a discharge end of the fluid bores. The fluid end components (e.g. screw glands, covers, valves, pistons, liners, seals, etc.) have to be replaced frequently because the fluids pumped through the fluid end are abrasive, corrosive, and/or are pumped at high pressures and flow rates, which cause wear on the fluid end components.

[0005] Removing one or more fluid end components, and installing replacement components therein, can be difficult due to space limitations and custom tools, which may be required for the installation/removal of components. Access to the fluid end may be limited by the presence of adjacent heavy machinery, including the power end of the pump, which limits the amount of working space available to access components needing to be replaced. Installing and removing a valve cover or a liner retainer of the fluid end, for example, requires using a long cheater bar, tommy bar, or C-spanner and a heavy hammer to provide sufficient torque to unbolt the valve cover or liner retainer, and the limited clearance between the fluid end and adjacent equipment may make it impossible to insert a long bar in a location to access the components being replaced. Also, hammering the long cheater bar, tommy bar, or C-spanner by swinging the heavy hammer to unbolt the valve cover or the liner retainer of the fluid end, when combined with the limited amount of working space, increases safety hazard risks for the workers installing/removing these components.

[0006] Therefore, there is a continuous need for new and improved fluid end designs with components that are easy to install/remove and that increase worker safety.

SUMMARY OF THE DISCLOSURE

[0007] In one embodiment, an assembly comprises a body; a piston extending from the body; a biasing member biasing the piston into the body; and a retaining flange coupled to the piston, wherein the retaining flange is biased toward the body by a bias applied to the piston by the biasing member.

[0008] In one embodiment, a method of installing an assembly comprises positioning a retaining flange relative to a body such that a piston extending from the body extends into an opening of the retaining flange; supplying pressurized fluid into a chamber formed in the body to move the piston against a bias applied on the piston by a biasing member disposed within the body; coupling a flange retaining nut to the piston such that the flange retaining nut engages the retaining flange; and forcing the retaining flange toward the body by the force applied to the piston by the biasing member.

[0009] In one embodiment, an assembly comprises a module; a threaded gland coupled to the module; a piston at least partially disposed within the threaded gland; and a biasing member disposed within the threaded gland and biasing the piston toward the module.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] So that the manner in which the above recited features can be understood in detail, a more particular description of the embodiments, briefly summarized above, may be had by reference to embodiments, some of which are illustrated in the appended drawings. It is to be noted, however, that the appended drawings illustrate only typical embodiments and are therefore not to be considered limiting of its scope, for the embodiments may admit to other equally effective embodiments.

[0011] FIG. **1** illustrates a first sectional view of a fluid end, according to one embodiment disclosed herein.

[0012] FIG. **2** illustrates a second sectional view of the fluid end, according to one embodiment disclosed herein.

[0013] FIG. **3** illustrates a third sectional view of the fluid end, according to one embodiment disclosed herein.

[0014] FIGS. **4**A, **4**B, and **4**C illustrate enlarged sectional views of a valve cover, according to one embodiment disclosed herein.

[0015] FIGS. **5**A, **5**B, and **5**C illustrate enlarged sectional views of a liner retainer, according to one embodiment disclosed herein.

[0016] FIG. **6** illustrates a first sectional view of another fluid end, according to one embodiment disclosed herein.

[0017] FIGS. **7**A, **7**B, and **7**C illustrate enlarged sectional views of another valve cover, according to one embodiment disclosed herein.

[0018] FIGS. **8**A, **8**B, and **8**C illustrate enlarged sectional views of another liner retainer, according to one embodiment disclosed herein.

DETAILED DESCRIPTION

[0019] FIG. **1** and FIG. **6** illustrate fluid ends **100**, **200** of a multiplex reciprocating pump. Examples of a multiplex reciprocating pump that can be used with the embodiments disclosed herein are described in U.S. Patent Application Publication No. 2013/0263932, filed on Mar. 15, 2013, the contents of which are herein incorporated by reference in its entirety. Although the embodiments of the fluid ends **100**, **200** are described herein as a component of a multiplex reciprocating pump, the embodiments of the fluid ends **100**, **200** can be used with other types of equipment.

[0020] As illustrated in FIG. **1** and FIG. **2**, the fluid end **100** includes a module **10** (e.g., a unitary metallic body) having an intermediate flow bore **11** in fluid communication with a discharge flow bore **12** at one end thereof and a suction flow bore **13** at an opposite end thereof. The internal components of the fluid end **100**, including a reciprocating plunger to pump fluid into the suction flow bore **13** and a valve to control fluid flow into the discharge flow bore **12**, have not been illustrated for clarity of the description of the fluid end **100**. The fluid end **100** includes a valve cover assembly **110** on one side **10***a* thereof, and a liner retainer

assembly **120** at a second side **10***b* thereof. The valve cover assembly **110** and the liner retainer assembly **120** are located at opposite ends of the flow bores **11**, **12**, **13**.

[0021] The valve cover assembly **110** includes a retaining flange **15** that is attached to one side **10***a* of the module **10** by one or more flange retaining nuts **16**. The retaining flange **15** includes a threaded bore into which a threaded gland **18** is threaded to retain a plug **17** within the module **10**. The threaded gland **18** can be un-threaded from the retaining flange **15** to remove the plug **17** and provide access to the components within the module **10** without having to remove the retaining flange **15**. The retaining flange **15**, the threaded gland **18**, and the plug **17** are configured to contain pressurized fluid flowing through the flow bores **11**, **12**, **13** within the body **10** during operation of the fluid end **100**.

[0022] The liner retainer assembly **120** includes a retaining flange **22** that is attached to the second side **10***b* of the module **10** by one or more flange retaining nuts **23**. The retaining flange **22** includes a threaded bore within which a threaded gland **21** is received to retain a liner **20** against a liner seal **24** that is held within the module **10**. The threaded gland **21** includes internal threads that are threaded into engagement with external threads formed on the outer surface from the liner **20**. The retaining flange **22**, the threaded gland **21**, the liner **20**, and the liner seal **24** are configured to contain pressurized fluid flowing through the flow bores **11**, **12**, **13** within the body **10** during operation of the fluid end **100**.

[0023] As illustrated in FIG. **3**, the valve cover assembly **110** further includes one or more pistons **14** that are at least partially disposed within bores **10***c* extending inwardly of the module **10**. The pistons **14** are biased inwardly of the module **10** by one or more biasing members **19**, such as springs, which at a first end thereof bear against a circumferential flange portion **26** extending around the pistons **14**. The biasing members **19** and the pistons **14** are retained within the bores **10***c* of the module **10** by one or more piston retaining nuts **25** that are coupled to the module **10**, and against which a second end of the biasing members **19** bear.

[0024] The piston retaining nuts **25** are threaded into threaded counterbores extending into the one side **10***a* of the module **10** to contain the biasing members **19** and the pistons **14** within the module **10**. One or more seals can be disposed between the pistons **14** and the piston retaining nuts **25**, as well as between the flange portions **26** of the pistons **14** and the module **10**, to form a seal between adjacent surfaces. Pressurized fluid can be supplied into chambers **28**, which are formed within the module **10** below the pistons **14**, via one or more fluid paths **27** disposed through the module **10** to cause the pistons **14** to move against the force of the biasing members **19**, as further described below with respect to FIGS. **4**A-**4**C.

[0025] The pistons **14**, in combination with the flange retaining nuts **16**, are configured to bias the retaining flange **15** against the one side **10***a* of the module **10**. The pistons **14** extend through the biasing members **19** and the piston retaining nuts **25**, and into corresponding openings formed in the retaining flange **15** for connection therein to the flange retaining nuts **16**. The flange retaining nuts **16** include an inner threaded bore **16***a* which is threaded into engagement with the threaded upper ends **14***a* of the pistons **14** until a shoulder of the flange retaining nuts **16** contacts the upper surface of the retaining flange **15**. To secure the retaining flange **15** to one side **10***a* of the module **10**, the biasing members **14** apply a force onto the flange portion **26** of the pistons **14** to bias the pistons **14** inwardly of the bores **10***c*, which biases the flange retaining nuts **16** and the retaining flange **15** over which they are positioned against the one side **10***a* of the module **10**, thereby biasing the threaded gland **18** against the plug **17**. Thus, the valve cover assembly **110** provides a force on the plug **17** to effectively seal and contain pressurized fluid within the module **10** during operation of the fluid end **100**.

[0026] As further illustrated in FIG. **3**, the liner retainer assembly **110** likewise includes one or more pistons **29** that are at least partially disposed within bores **10***d* extending inwardly of the module **10** at the second side **10***b*. The pistons **29** are biased inwardly of the module **10** by one or more biasing members **30**, such as springs, which contact a flange portion **31** of the pistons **29**. The biasing members **30** and the pistons **29** are retained within the bores **10***d* of the module **10** by one or more piston retaining nuts **35** that are coupled to the module **10**, and against which a second end of the biasing members **30** bear.

[0027] The piston retaining nuts **35** are threaded into threaded counterbores of the module **10** to contain the biasing members **30** and the pistons **29** within the module **10**. One or more seals can be disposed between the pistons **29** and the piston retaining nuts **35**, as well as between the flange portions **31** of the pistons **29** and the module **10**, to form a seal between adjacent surfaces. Pressurized fluid can be supplied into chambers **33**, which are formed within the module **10** below the pistons **29**, via one or more fluid paths **32** disposed through the module **10** to move the pistons **29** against the force of the biasing members **30**, as further described below with respect to FIGS. **5**A-**5**C.

[0028] The pistons **29** extend through the biasing members **30** and the piston retaining nuts **35**, and into corresponding openings formed in the retaining flange **22** for connection to the flange retaining nuts **23**. The flange retaining nuts **23** are threaded into engagement with the upper ends of the pistons **29** until a shoulder of the flange retaining nuts **23** contacts the upper surface of the retaining flange **22**. In this manner, the biasing members **30** apply a bias against the flange portion **31** of the pistons **29**, which pulls the flange retaining nuts **23** and the retaining flange **22** toward the module **10**, thereby forcing the threaded gland **21** and the liner **20** against the liner seal **24**. The liner retainer assembly **110** provides a force on the liner seal **24** to effectively seal and contain pressurized fluid within the module **10** during operation of the fluid end **100**.

[0029] FIG. **4**A, FIG. **4**B, and FIG. **4**C illustrate sectional views of the valve cover assembly **110** during installation, according to one embodiment. Referring to FIG. **4**A, after the plug **17** is installed in the module **10** (as shown in FIG. **2**), the retaining flange **15** is positioned on the module **10** such that the pistons **14** extend through the corresponding openings formed in the retaining flange **15**. The threaded gland **18** can be threaded into the retaining flange **15** and onto the plug **17** (as shown in FIG. **2**).

[0030] Referring to FIG. **4**B, pressurized fluid (identified by reference arrow "F") is supplied into the chambers **28** via the fluid paths **27**. The pressurized fluid forces the pistons **14** to extend further outwardly from the module **10** against the force of the biasing members **19** and thereby compress the biasing members **19**. The pressurized fluid is supplied at a pressure sufficient to generate a force on the flange portion **26** of the pistons **14** that compresses the biasing members **19**

between the flange portion **26** and the piston retaining nuts **25**. While the chambers **28** are pressurized and the pistons **14** are compressing the biasing members **19**, the flange retaining nuts **16** can be threaded onto the upper ends of the pistons **14** until the shoulder of the flange retaining nuts **16** contacts the upper surface of the retaining flange **15**.

[0031] Referring to FIG. **4**C, after the flange retaining nuts **16** are coupled to the pistons **14**, the pressurized fluid is vented from the chambers **28** and/or the pressure within the chambers **28** is reduced such that the biasing members **19** create a force on the pistons **14** that forces the pistons **14** to pull the retaining flange **15** and the threaded gland **18** against the plug **17** to seal off the flow bores **11**, **12**, **13** of the module **10**. In this manner, the plug **17** is held within the module **10** by the force produced by the biasing members **19** acting on the pistons **14**.

[0032] To remove the retaining flange **15**, the installation process described with respect to FIGS. **4**A-**4**C can be repeated in reverse order. Pressurized fluid may be supplied into the chambers **28** to force the pistons **14** to compress the biasing members **19** and at least partially extend the flange retaining nuts **16** away from the retaining flange **15** to unscrew the flange retaining nuts **16** from the pistons **14**. The pressurized fluid can be released from the chambers **29** before unthreading the threaded gland **18** from the retaining flange **15**. Alternatively, the threaded gland **21** can be unscrewed while supplying pressurized fluid into the chambers **28**. By extending the flange retaining nuts **16** away from the module **10**, the frictional sticking force between the underside of the flange retaining nuts **16** and the retaining flange **15** is reduced or eliminated, enabling the removal of the flange retaining nuts **16** and the retaining flange **15** without the high torque required in the prior art.

[0033] FIG. **5**A, FIG. **5**B, and FIG. **5**C illustrate sectional views of the liner retainer assembly **120** during installation, according to one embodiment. Referring to FIG. **5**A, after the liner seal **24** and the liner **20** are installed in the module **10** (as shown in FIG. **2**), the retaining flange **22** is positioned on the module **10** such that the pistons **29** extend through the corresponding openings formed in the retaining flange **22**. The threaded gland **21** can be threaded into the retaining flange **22** and onto a shoulder of the liner **20**.

[0034] Referring to FIG. **5**B, a pressurized fluid (identified by reference arrow "F") is supplied into the chambers **33** via the fluid paths **32**. The pressurized fluid forces the pistons **29** to extend further outwardly from the module **10** against the force of the biasing members **30**. The pressurized fluid is supplied at a pressure sufficient to generate a force on the flange portion **31** of the pistons **29** that compresses the biasing members **30** between the flange portion **31** and the piston retaining nuts **35**. While the chambers **33** are pressurized and the pistons **29** are compressing the biasing members **30**, the flange retaining nuts **23** are threaded onto the upper ends of the pistons **19** until the shoulder of the flange retaining nuts **23** contacts the upper surface of the retaining flange **22**.

[0035] Referring to FIG. **5**C, after the flange retaining nuts **23** are coupled to the pistons **29**, the pressurized fluid can be released from the chambers **33** and/or the pressure within the chambers **33** can be reduced such that the biasing members **30** create a force on the pistons **29** that biases the pistons **29** inwardly of the module **10** to bias the retaining flange **22** and the threaded gland **21** against the liner **20** and the liner seal **24** to seal off the flow bores **11**, **12**, **13** of the module **10**. In this manner, the liner seal **24** is held within the module **10** by the force produced by the biasing members **30** acting on the pistons **29**.

[0036] To remove the retaining flange **22**, the installation process described with respect to FIGS. **5**A-**5**C can be repeated in reverse order. Pressurized fluid may be supplied into the chambers **33** to force the pistons **29** to compress the biasing members **19** and at least partially extend the flange retaining nuts **23** away from the retaining flange **22** to unscrew the flange retaining nuts **23** from the pistons **29**. The pressurized fluid can be released from the chambers **33** before unthreading the threaded gland **21** from the retaining flange **22**. Alternatively, the threaded gland **21** can be unscrewed while supplying pressurized fluid into the chambers **33**. As with the retaining flange **15**, the retaining flange **22** is thus removed with lower unthreading torque on the flange retaining nuts **23**.

[0037] FIG. **6** illustrates a sectional view of a fluid end **200**. The fluid end **200** has many similar elements as the fluid end **100** and a full description of all the elements will not be repeated for brevity. Some elements of the fluid end **200** that are similar to the elements of the fluid end **100** are identified with the same reference number but having a **200** series designation. The embodiments of the fluid end **200** can be used with the embodiments of the fluid end **100** and vice versa.

[0038] The fluid end **200** includes a module **210** (e.g., a unitary metallic body) having a valve cover assembly **201** coupled to one side, and a liner retainer assembly **202** coupled to another side. The valve cover assembly **201** and the liner retainer assembly **202** are located at opposite ends of one or more flow bores formed through the module **210**. The valve cover assembly **201** and the liner retainer assembly **201** are configured to effectively seal and contain pressurized fluid within the module **210** during operation of the fluid end **200**.

[0039] The valve cover assembly **201** includes a retaining flange **215** that is attached to the module **210** by one or more flange retaining nuts/bolts **216**. The retaining flange **215** includes a threaded bore into which a threaded gland **218** is threaded to retain a plug **217** within the module **210**. The threaded gland **218** can be un-threaded from the retaining flange **215** to remove the plug **217** and provide access to the components within the module **210** without having to remove the retaining flange **215**. The retaining flange **215**, the threaded gland **218**, and the plug **217** are configured to contain pressurized fluid flowing through the flow bores within the module **210** during operation of the fluid end **200**.

[0040] The valve cover assembly **201** further includes a piston **214** that is at least partially disposed within a bore of the threaded gland **218**. The piston **214** is biased toward the module **210** by one or more biasing members **219**, such as springs, which at a first end thereof bear against a flange portion **226** extending around the piston **214**. The biasing members **219** and the piston **214** are retained within the bore of the threaded gland **218** by a piston retaining nut **225** that is coupled to the threaded gland **218**, and against which a second end of the biasing members **219** contact. An upper portion of the piston **214** extends through a bore of the piston retaining nut **225**.

[0041] The piston retaining nut **225** is threaded into engagement with internal threads formed in the bore of the threaded gland **218** to contain the biasing members **219** and the piston **214**. One or more seals can be disposed between

the piston **214** and the piston retaining nut **225**, as well as between the piston **214** and the threaded gland **218**, to form a seal between adjacent surfaces. Pressurized fluid can be supplied into a chamber **228**, which is formed within the threaded gland **218** below the flange portion **226** of the piston **214**, via one or more fluid paths **227** that are disposed through the piston **214**. The pressurized fluid supplied into the chamber **228** causes the piston **214** to move against the force of the biasing members **219**, as further described below with respect to FIGS. **7**A-**7**C.

[0042] The liner retainer assembly **202** is coupled to another side of the module **210**. The liner retainer assembly **202** includes a retaining flange **222** that is attached to a retention body **240** by one or more pistons **229** and one or more flange retaining nuts **223**. The retaining flange **222** has one or more handles **243** for ease of handling during installation and removal. A spacer **241** is positioned between the retention body **240** and the module **210**. One or more nuts **245** and bolts **244** are used to couple the retention body **240** and the spacer **241** to the module **210**.

[0043] The retaining flange **222**, the retention body **240**, and the spacer **241** include a bore through which a liner **220** is positioned to secure a liner seal **224** within the module **210**. The liner **220** includes an outer shoulder **221** that is disposed between one end of the retaining flange **222** and an inner shoulder of the retention body **240**. The retaining flange **222**, the retention body **240**, the spacer **241**, the liner **220**, and the liner seal **224** are configured to contain pressurized fluid flowing through the flow bores within the module **210** during operation of the fluid end **200**.

[0044] The pistons **229** are biased toward the module **210** (and inwardly relative to the retention body **240**) by one or more biasing members **230**, such as springs, which contact a flange portion **231** of the pistons **229** at a first end. The biasing members **230** and the pistons **229** are retained within the retention body **240** by one or more piston retaining nuts **235** that are coupled to the retention body **240**, and against which a second end of the biasing members **230** contact. The piston retaining nuts **235** are threaded into threaded counterbores of the retention body **240** to contain the biasing members **230** and the pistons **229**. One or more seals can be disposed between the pistons **229** and the piston retaining nuts **235**, as well as between the flange portions **231** of the pistons **229** and the retention body **240**, to form a seal between adjacent surfaces.

[0045] An upper portion of the pistons **229** extends through the biasing members **230** and the piston retaining nuts **235**, and into corresponding openings formed in the retaining flange **222** for connection to the flange retaining nuts **223**. The flange retaining nuts **223** are threaded into engagement with the upper ends of the pistons **229** until the flange retaining nuts **223** contact the upper surface of the retaining flange **222**. The biasing members **230** apply a bias against the flange portion **231** of the pistons **229**, which pulls the flange retaining nuts **223** and the retaining flange **222** against the outer shoulder **221** of the liner **220**, thereby forcing or retaining the liner **220** against the liner seal **224**, as further described below with respect to FIGS. **8**A-**8**C.

[0046] FIG. **7**A, FIG. **7**B, and FIG. **7**C illustrate sectional views of the valve cover assembly **201** during installation, according to one embodiment. Referring to FIG. **7**A, the retaining flange **215** is bolted to the module **210** using the flange retaining nuts/bolts **216**. The plug **217** is installed in the module **210** before or after the retaining flange **215** is attached to the module **210**. The threaded gland **218** is threaded into the retaining flange **215** until a lower portion **250** of the piston **214** engages a top surface of the plug **217**. The lower portion of **250** of the piston **214** is disposed through a bore formed in the bottom end of the threaded gland **218**.

[0047] Referring to FIG. **7**B, pressurized fluid (identified by reference arrow "F") is supplied into the chamber **228** via the fluid paths **227**. The pressurized fluid forces the piston **214** to move away from the plug **217** and against the force of the biasing members **219**, thereby compressing the biasing members **219**. The pressurized fluid is supplied at a pressure sufficient to generate a force on the flange portion **226** of the piston **214** that compresses the biasing members **219** between the flange portion **226** and the piston retaining nut **225**.

[0048] Referring to FIG. **7**C, while the chamber **228** is pressurized and the piston **214** is compressing the biasing members **219**, the threaded gland **218** can be threaded further into the retaining flange **215** until the lower portion **250** of the piston **214** engages the top surface of the plug **217**. The pressurized fluid is then vented from the chamber **228** and/or the pressure within the chamber **228** is reduced such that the biasing members **219** create a force on the piston **214** that forces the piston **214** against the plug **217**. In this manner, the plug **217** is held within the module **210** by the force produced by the biasing members **219** acting on the pistons **214**. To remove the retaining flange **215**, the installation process described with respect to FIGS. **7**A-**7**C can be repeated in reverse order.

[0049] FIG. **8**A, FIG. **8**B, and FIG. **8**C illustrate sectional views of the liner retainer assembly **202** as shown in FIG. **6** during installation, according to one embodiment. Referring to FIG. **8**A, the spacer **241** and the retention body **240** are coupled to the module **210** via the nuts **245** and bolts **244**. The liner **220** is inserted into the bores of the retention body **240** and the spacer **241** and against the liner seal **224** disposed within the module **210** (as shown in FIG. **6**). The retaining flange **222** is inserted into the bore of the retention body **240** such that the outer shoulder **221** of the liner **220** is disposed between the inner shoulder of the retention body **240** and the bottom end of the retaining flange **222**. The pistons **229** extend through corresponding openings formed in the retaining flange **222**, and the flange retaining nuts **223** are threaded onto the pistons **229** to couple the retaining flange **222** to the retention body **240**.

[0050] Referring to FIG. **8**B, a pressurized fluid is supplied into chambers **233** formed within the retention body **240** below the flange portion **231** of the pistons **229**. The pressurized fluid forces the pistons **229** to extend outwardly from the retention body **240** against the force of the biasing members **230**. The pressurized fluid is supplied at a pressure sufficient to generate a force on the flange portion **231** of the pistons **229** that compresses the biasing members **230** between the flange portion **231** and the piston retaining nuts **235**. While the chambers **233** are pressurized and the pistons **229** are compressing the biasing members **230**, the flange retaining nuts **223** are threaded further onto the upper ends of the pistons **229** and into contact with the upper surface of the retaining flange **222**.

[0051] Referring to FIG. **8**C, after the flange retaining nuts **223** are threaded further onto the pistons **229**, the pressurized fluid can be released from the chambers **233** and/or the pressure within the chambers **233** can be reduced such that

the biasing members **230** create a force on the pistons **229** that biases the retaining flange **222** against the outer shoulder **221** of the liner **220**. In this manner, the liner seal **224** is held within the module **210** by the force produced by the biasing members **230** acting on the pistons **229** to force the retaining flange **222** against the liner **220**. To remove the retaining flange **222**, the installation process described with respect to FIGS. **8**A-**8**C can be repeated in reverse order.

[0052] One advantage of the valve cover assembly **110**, **201** and the liner retainer assembly **120**, **202** is an increase in worker safety by eliminating the need for using heavy (sledge) hammers during installation and removal. Another advantage is a reduction of the installation and removal time by utilizing a bias member force rather than force supplied by threading a fastener into a retaining flange to seal around the openings in the sides of the modules **10**, **210** of the fluid ends **100**, **200**. Another advantage is that existing fluid end modules can be modified for use with the valve cover assembly **110**, **201** and the liner retainer assembly **120**, **201** as described herein.

[0053] While the foregoing is directed to certain embodiments, other and further embodiments may be devised without departing from the basic scope thereof, and the scope thereof is determined by the claims that follow.

1. An assembly, comprising:
a body;
a piston extending from the body;
a biasing member biasing the piston into the body; and
a retaining flange coupled to the piston, wherein the retaining flange is biased toward the body by a bias applied to the piston by the biasing member.

2. The assembly of claim **1**, wherein the body comprises a module of a fluid end or a separate retention body coupled to the module of the fluid end.

3. The assembly of claim **1**, wherein the piston includes a flange portion disposed within the body, and wherein the bias of the biasing member is applied to the flange portion.

4. The assembly of claim **1**, wherein the retaining flange is coupled to the piston by a flange retaining nut which engages the retaining flange.

5. The assembly of claim **1**, wherein the biasing member is retained within the body by a piston retaining nut that is coupled to the body.

6. The assembly of claim **1**, wherein a chamber is formed within the body at a position below the piston such that application of pressurized fluid into the chamber moves the piston against the bias of the biasing member.

7. The assembly of claim **1**, further comprising a threaded gland coupled to the retaining flange and configured to retain at least one of a plug, a liner, and a liner seal within or against the module.

8. The assembly of claim **1**, wherein the body comprises a separate retention body coupled to a module of a fluid end, and wherein the retaining flange is biased toward the retention body to retain a liner against the module.

9. A method of installing an assembly, comprising:
positioning a retaining flange relative to a body such that a piston extending from the body extends into an opening of the retaining flange;
supplying pressurized fluid into a chamber formed in the body to move the piston against a bias applied on the piston by a biasing member disposed within the body;
coupling a flange retaining nut to the piston such that the flange retaining nut engages the retaining flange; and
forcing the retaining flange toward the body by the force applied to the piston by the biasing member.

10. The method of claim **9**, wherein the body comprises a module of a fluid end or a separate retention body coupled to the module of the fluid end.

11. The method of claim **9**, further comprising reducing pressure within the chamber such that the force applied to the piston by the biasing member forces the piston into the body.

12. The method of claim **9**, wherein the piston includes a flange portion disposed within the body, and wherein the force of the biasing member is applied to the flange portion.

13. The method of claim **9**, further comprising threading a threaded gland into the retaining flange to retain at least one of a plug, a liner, and a liner seal within or against the module.

14. The method of claim **9**, wherein the body comprises a separate retention body coupled to a module of a fluid end, and wherein the retaining flange is biased toward the retention body to retain a liner against the module.

15. An assembly, comprising:
a module;
a threaded gland coupled to the module;
a piston at least partially disposed within the threaded gland; and
a biasing member disposed within the threaded gland and biasing the piston toward the module.

16. The assembly of claim **15**, wherein the biasing member is retained within the threaded gland by a piston retaining nut that is coupled to the threaded gland.

17. The assembly of claim **15**, wherein the piston includes a flange portion disposed within the threaded gland, and wherein the bias of the biasing member is applied to the flange portion.

18. The assembly of claim **17**, wherein a chamber is formed within the threaded gland at a position below the flange portion such that application of pressurized fluid into the chamber moves the piston against the bias of the biasing member.

19. The assembly of claim **18**, wherein a fluid path is formed through the piston to supply pressurized fluid to the chamber.

20. The assembly of claim **19**, wherein a lower portion of the piston extends through a bore formed in a bottom end of the threaded gland.

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