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(54) **Flange-disassembling device**

(57) A flange-disassembling device includes a pushing rim of a hydraulic cylinder and another pushing rim on a pushing rod driven by the hydraulic cylinder to disassemble two assembled flanges. In use, axes of the hydraulic cylinder and the pushing rod are parallel to axes of the flanges so that the flange-disassembling device consumes less operation space as compared with the prior art.

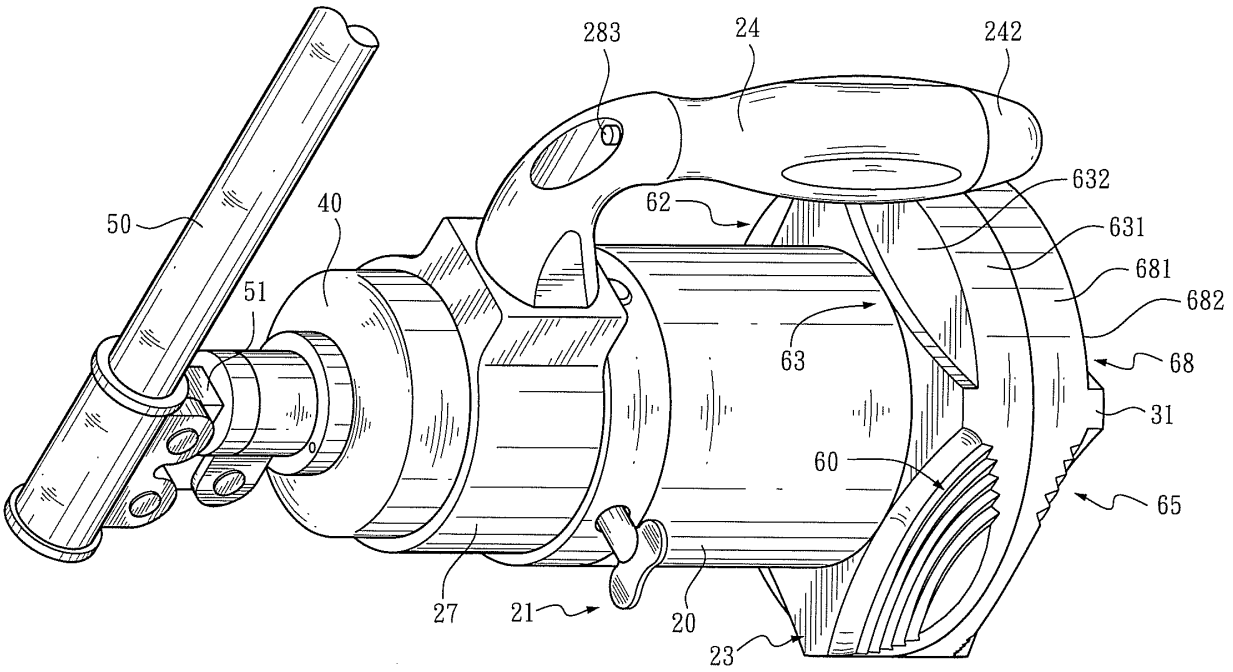

FIG. 4

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Description

BACKGROUND OF THE INVENTION

1. Technical Field

[0001] The present invention relates to a flange-disassembling device according to the preamble of Claim 1. Accordingly, the present invention relates to a flange-disassembling device requiring less operational space as compared with the conventional devices.

2. Description of Related Art

[0002] A traditional approach for disassembling bolted flanges substantially involves inserting a pinch bar between the flanges and then hammer the pinch bar to separate the flanges forcedly. However, this approach is not only time-consuming and effort-consuming, but also likely to damage surfaces of the flanges.

[0003] In view of this problem, a China Patent numbered CN2626675Y has taught a flange-disassembling device, shown herein through Figure 1. The patented flange-disassembling device comprises two expanding members **91** each having a triangular shape and a through hole **93** at a coupling end **92** for allowing a respective pin **95** to pass therethrough and thus combine the expanding member **91** with a body **94** of the device. The two expanding members **91** are such connected with the body **94** that the expanding members **91** are movable to spread apart or retract inward with respect to the body **94.** A means to move the expanding members **91** includes a tapered element **99** driven by a piston of a hydraulic cylinder **96** that is assembled behind the body **94.** In each said expanding member **91,** two sliding pins **97** are provided at each side thereof for contacting the ramp **991** of the tapered element **99.** Besides, each said expanding member **91** has a stepped spreading portion **98** opposite to the coupling end **92.**

[0004] Figure 2 illustrates operation of the prior device. In use, the spreading portions **98** of the expanding members **91** are inserted between two bolted flanges **10, 11** so that when the hand lever **912** connected with the hydraulic cylinder **96** is manually operated, the piston of the hydraulic cylinder **96** drives the tapered element **99** to move forward. As a result, the sliding pins **97** of the expanding members **91** are affected by the ramp of the tapered element **99** and the expanding members **91** are spread apart, thereby separating the flanges **10, 11.**

[0005] The problem of the prior device relates to the fact that, referring to Figures **2** and **3,** at the time the flanges **10, 11** are separated by the second steps of the spreading portions **98,** the tapered element **99** juts out of the spreading portions **98** and is obstructed from projecting any further by the bolt **100,** and the expanding members **91** cannot expand anymore until the tapered element **99** is retracted and the expanding members **91** are closed to have their third steps corresponding to the flanges **10, 11.** Similarly, when the tapered element **99** touches the bolt **100** again, the aforesaid operation has to be repeated so as to further separate the flanges **10, 11** with the fourth steps. Consequently, the overall operation for disassembling the flanges by using the prior art device is complicated and inconvenient.

[0006] An additional problem of the aforementioned prior device relates to its spatial consumption in operation. It is known that, during operation, the axis X of the aforementioned flange-disassembling device is perpendicular to the axis Y is the bolted flanges **10, 11.** However, the expanding members **91,** the body **94,** the hydraulic cylinder **96** and the hand lever **912** jointly define the axial length L of the flange-disassembling device. Therefore, application of the prior device is limited because the flange-disassembling device is only applicable when there is operational space around the flanges **10, 11** sufficient for accommodating the axial length L of the flange-disassembling device.

SUMMARY OF THE INVENTION

[0007] On objective of the present invention is to provide a flange-disassembling device for separating two bolted flanges.

[0008] Another objective of the present invention is to provide the foregoing flange-disassembling device that uses a pushing rim of a hydraulic cylinder and another pushing rim on a pushing rod driven by the hydraulic cylinder to disassemble two assembled flanges. The hydraulic cylinder and the pushing rod are coaxially connected. In use, axes of the hydraulic cylinder and the pushing rod are parallel to axes of the flanges so that the flange-disassembling device consumes less operation space as compared with the prior art.

[0009] Another objective of the present invention is to provide the foregoing flange-disassembling device wherein at least one toothed positioning segment and a plurality of stepped positioning segments are provided at the hydraulic cylinder and the pushing rod for fitting an interval between two flanges.

[0010] Another objective of the present invention is to provide the foregoing flange-disassembling device that has its output capacity variable due to the stepped positioning segments with different elevations.

[0011] A flange-disassembling device includes a pushing rim of a hydraulic cylinder and another pushing rim on a pushing rod driven by the hydraulic cylinder to disassemble two assembled flanges. In use, axes of the hydraulic cylinder and the pushing rod are parallel to axes of the flanges so that the flange-disassembling device consumes less operation space as compared with the prior art.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012]

Figure 1 is a lateral view of a known flange-disassembling device.

Figures 2 and **3** illustrate operation of the flange-disassembling device of Figure 1.

Figures 4 and **5** are perspective views of a flange-disassembling device of the present invention taken from different visual angles.

Figure 6 is a sectional view of the flange-disassembling device of the present invention.

Figure 7 is a lateral view of the flange-disassembling device of the present invention, showing toothed positioning segments thereof separating two bolted flanges.

Figure 8 is another lateral view of the flange-disassembling device of the present invention, showing stepped positioning segments thereof separating two bolted flanges.

Figure 9 is another lateral view of the flange-disassembling device of the present invention, showing other stepped positioning segments thereof separating two bolted flanges.

Figure 10 is another lateral view of the flange-disassembling device of the present invention, showing other stepped positioning segments thereof separating two bolted flanges.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0013] Referring to Figures 4 to 6, a flange-disassembling device of the present invention includes a hydraulic cylinder **20,** a pushing rod **30,** a shield housing **40** and a hand lever **50.** The pushing rod **30** is assembled in the hydraulic cylinder **20,** and the shield housing **40** is assembled at the tip of the hydraulic cylinder **20** with a hydraulic system therein communicated with the hydraulic cylinder **20.** The hand lever **50** is assembled at the tip of the shield housing **40** for controlling a driving shaft **51** to move back and forth in the hydraulic system so as to dispatch oil in the hydraulic cylinder **20.** Such hydraulic system is well known in the art and will not be discussed in great detail herein. The hydraulic system gives pushing rod **30** a hydraulic pressure to move the pushing rod **30** forward in the hydraulic cylinder **20.** Then a pressure relief unit **21** and a reverse spring **22** may be actuated to return the pushing rod **30.** The pressure relief unit **21** may be a T-head bolt for manual rotation to make the oil in the hydraulic cylinder **20** flow back to the hydraulic system, so that the reverse spring **22** draws the pushing rod back to its initial position.

[0014] The reverse spring **22** has a tapered end **221** mounted around a screw 222 whose head fittingly matches the tapered end **221** while a bottom of the screw **222** juts out of the tapered end **221** to be coupled with a threaded hole of the pushing rod **30.** An opposite end of the reverse spring **22** is fittingly mounted around a combining block **223** whose central threaded hole **224** is coupled with a positioning bolt **225** passing through the hydraulic cylinder **20.** Thereby, the reverse spring **22** has its one end fixed to the hydraulic cylinder **20** and the other end fixed to the pushing rod **30.** Consequently, moving forward of the pushing rod **30** stretches the reverse spring **22** and when the hydraulic pressure driving the pushing rod **30** forward reduces to a predetermined extent, resilience of the reverse spring **22** surpasses the hydraulic pressure and brings the pushing rod 30 to its initial position.

[0015] A circular pushing rim **23** is extended outward from a bottom of the hydraulic cylinder **20** while a circular pushing rim **31** is extended outward from a bottom of the pushing rod **30.** A bottom surface of the pushing rim **23** on the hydraulic cylinder **20** and a top surface of the pushing rim **31** on the pushing rod **30** contacting mutually are defined as contacting surfaces **231, 311.** When the pushing rod **30** is drawn back by the reverse spring **22** to a limit, the two contacting surfaces **231, 311** contact each other.

[0016] At least one toothed positioning segment **60** and a plurality of stepped positioning segments **61, 62, 63** are provided at a top periphery of the pushing rim **23** on the hydraulic cylinder **20.** The stepped positioning segments **61, 62, 63** each have a step portion **611, 621** or **631** that includes a pushing plane **612, 622** or **632,** wherein the pushing planes **612, 622** and **632** have different elevations.

[0017] The toothed positioning segment **60** is substantially an inclined, toothed surface.

[0018] Another toothed positioning segment **65** is formed at a bottom periphery of the pushing rim **31** on the pushing rod **30** as a mirror reflection of the toothed positioning segment **60** at the pushing rim **23** on the hydraulic cylinder 20. Stepped positioning segments **66, 67, 68** are provided at the bottom periphery of the pushing rim **31** on the pushing rod **30** as mirror reflections of the stepped positioning segments **61, 62, 63.** The stepped positioning segments **66, 67, 68** also have step portions **661, 671** and **681** that include pushing planes **662, 672** and **682,** wherein the pushing planes **661, 671** and **681** have different elevations.

[0019] **Figures 7 through 10** are herein provided for illustrating operation of the flange-disassembling device of the present invention. The hydraulic cylinder **20** and the pushing rod **30** are such positioned that the common axis thereof is parallel to the common axis of bolted flanges **53, 54** that are to be separated. As compared with the conventional device as described in Figures 1 through 3, it is clear that the device of the present invention requires relatively less operational space.

[0020] A suitable pair of the toothed positioning segments **60, 65** and the step portions **611, 661** or **621, 671** or **631, 681** maybe placed into the interval between the two flanges **53, 54.** As shown in Figure 7, the toothed positioning segments **60, 65** use their toothed surfaces that provide high friction to stably contact edges of the flanges **53, 54.** Alternatively, as shown in Figures 8, 9 and 10, the pushing planes **612, 662** or **622, 672** or **632,**

682 of the step portions **611, 661** or **621, 671** or **631, 681** also serve to stably contact the edges of the flanges **53, 54.** Such stable contact between the flange-disassembling device and the flanges facilitate the disassembling operation.

[0021] Seeing **Figures 7 through 10** again, when the hand lever **50** is repeatedly rotated, the pushing rod **30** moves forward to enable the toothed positioning segments **60, 65** or the pushing planes **612, 662** or **622, 672** or **632, 682** to separate the bolted flanges 53, 54.

[0022] Since the step portions **611, 661** or **621, 671** or **631, 681** have different elevations, output capacity of each forward travel of the pushing rod **30** is variable. For example, assuming that a single forward travel of the pushing rod **30** is D (cm), and the step portions **611, 661** have an equal elevation of L1 (cm), the output capacity of each forward travel of the pushing rod **30** is D+2L1 (cm). Similarly, assuming that the step portions **622, 672** have an equal elevation of L2 (cm), the output capacity of each forward travel of the pushing rod **30** is D+2L2 (cm). When the step portions **632, 682** have an equal elevation of L3 (cm), the output capacity of each forward travel of the pushing rod **30** is D+2L3 (cm).

[0023] The present invention implements the forward movement of the pushing rod **30** to make the pushing rims **23, 31** to separate and thus disassemble the flanges. The present invention completely remedies the problem of the prior art by eliminating the use of the tapered element and setting the device and the flanges axially parallel. Besides, the present invention allows a user with option in selecting the step portions with proper elevation, thus being more convenient to use as compared with the prior art device.

[0024] Referring to Figure 6, in the present invention, a wear-resisting ring **25** made of a wearproof material (such as copper) is settled between the hydraulic cylinder **20** and the pushing rod **30** for preventing friction therebetween.

[0025] In the present embodiment, a lengthwise recess **32** is axially extended on the pushing rod **30** and a screw **26** is radially assembled to the hydraulic cylinder **20,** wherein a distal end of the screw **26** is received in the lengthwise recess 32 so that the pushing rod 30 is retained in the hydraulic cylinder 20 from rotation.

[0026] The flange-disassembling device further includes a handle **24** as shown in Figure 6. The handle **24** is coupled with a sleeve **27** arranged outside the shield housing **40** through a bolt **241.** A plurality of lockwashers **271** is provided for ensuring close contact between the sleeve **27** and shield housing **40.** The bolt **241** has its distal end abutting against the shield housing **40** to firmly position the sleeve **27** on the shield housing **40.**

[0027] A lighting device **28** is assembled in the handle **24** so that an LED bulb **281** of the lighting device **28** is exposed at a distal end of the handle **24** while a switch **283** of the lighting device **28** is provided on the handle **24** for easy switching. A cap **242** is detachably assembled to the distal end of the handle **24** for allowing a battery **282** powering the lighting device **28** to be installed when removed. The lighting device **28** serves to provide illumination in operation of the flange-disassembling device.

[0028] The flange-disassembling device of the present invention may also be used to disassemble other pressingly assembled members in addition to flanges.

Claims

1. A flange-disassembling device for disassembling bolted flanges, the flange-disassembling device is **characterized in**:

   a hydraulic cylinder (20) assembled therein a pushing rod (30) that moves
   back and forth;
   a pushing rim (23) extended outward from a bottom of the hydraulic
   cylinder (20), and
   a pushing rim (31) extended outward from an end of the pushing rod 30
   jutting out of the hydraulic cylinder (20); and at least one toothed positioning segment (60)(65) and at least one stepped positioning segments (61)(66) provided at a top periphery of the pushing rim (23) on the hydraulic cylinder (20) and at a bottom periphery of the pushing rim 31 on the pushing rod (30), respectively.

2. The flange-disassembling device of Claim 1, wherein plural said stepped positioning segments (61)(62)(63) are provided at the top periphery of the pushing rim (23) on the hydraulic cylinder (20), and have different elevations.

3. The flange-disassembling device of Claim 2, wherein plural said stepped positioning segments (66) (67)(68) are provided at the bottom periphery of the pushing rim (31) on the pushing rod (30), and have different elevations.

4. The flange-disassembling device of Claim 3, wherein the stepped positioning segment (66) of the pushing rim (31) on the pushing rod (30) is a mirror refection of the stepped positioning segment (61) of the pushing rim (23) on the hydraulic cylinder (20).

5. The flange-disassembling device of Claim 1, wherein the toothed positioning segment 65 of the pushing rim 23 on the hydraulic cylinder 20 is a mirror refection of the toothed positioning segment 60 of the pushing rim 31 1 on the pushing rod 30.

6. The flange-disassembling device of Claim 1, wherein the stepped positioning segments 61, 66 each have a pushing plane (612)(622).

7. The flange-disassembling device of Claim 1, wherein a wear-resisting ring (25) is settled between the hydraulic cylinder (20) and the pushing rod (30).

8. The flange-disassembling device of Claim 1, wherein a lengthwise recess (32) is axially extended on the pushing rod (30) and a screw (26) is radially assembled to the hydraulic cylinder (20), wherein a distal end of the screw (26) is received in the lengthwise recess (32) so that the pushing rod (30) is retained in the hydraulic cylinder (20) from rotation.

9. The flange-disassembling device of Claim 1, further including a handle (24) that is coupled with a sleeve (27) arranged outside the shield housing (40) through a bolt (241).

10. The flange-disassembling device of Claim 9, wherein a lighting device (28) is assembled in the handle (24) so that an LED bulb (281) of the lighting device (28) is exposed at a distal end of the handle (24) while a switch (283) of the lighting device (28) is provided on the handle (24) for easy switching.

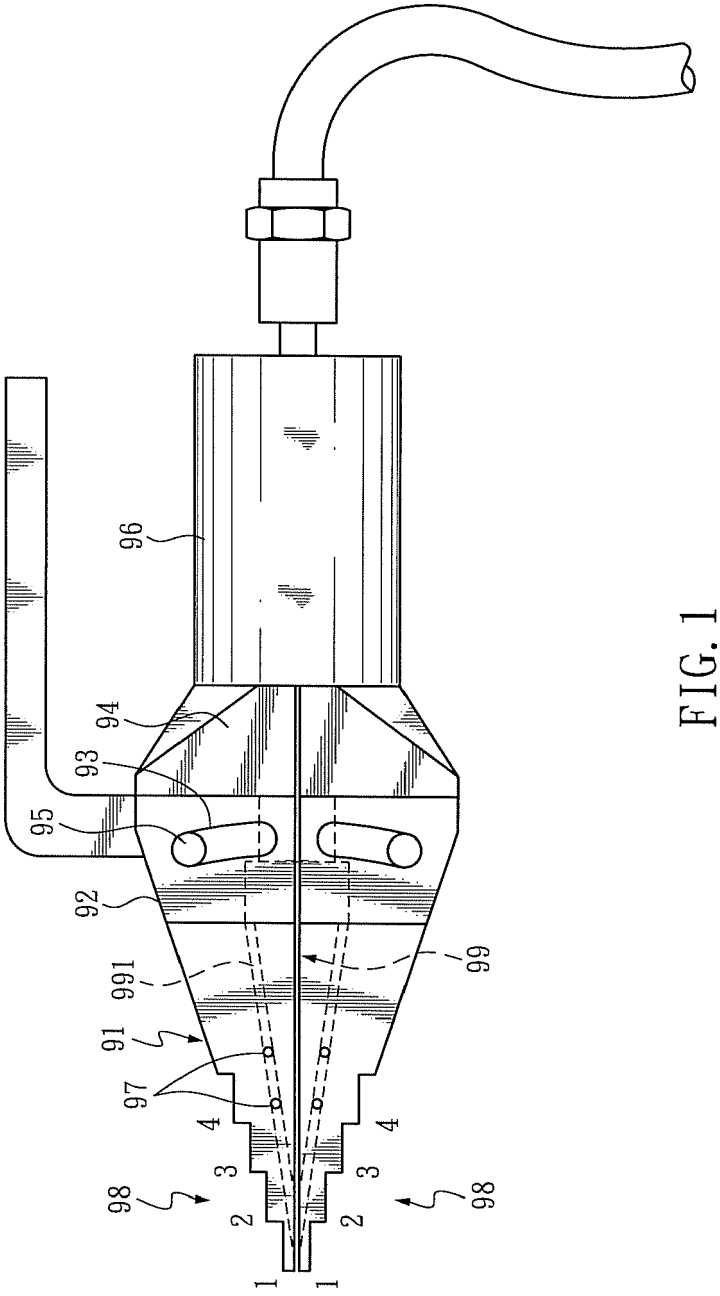

FIG. 1

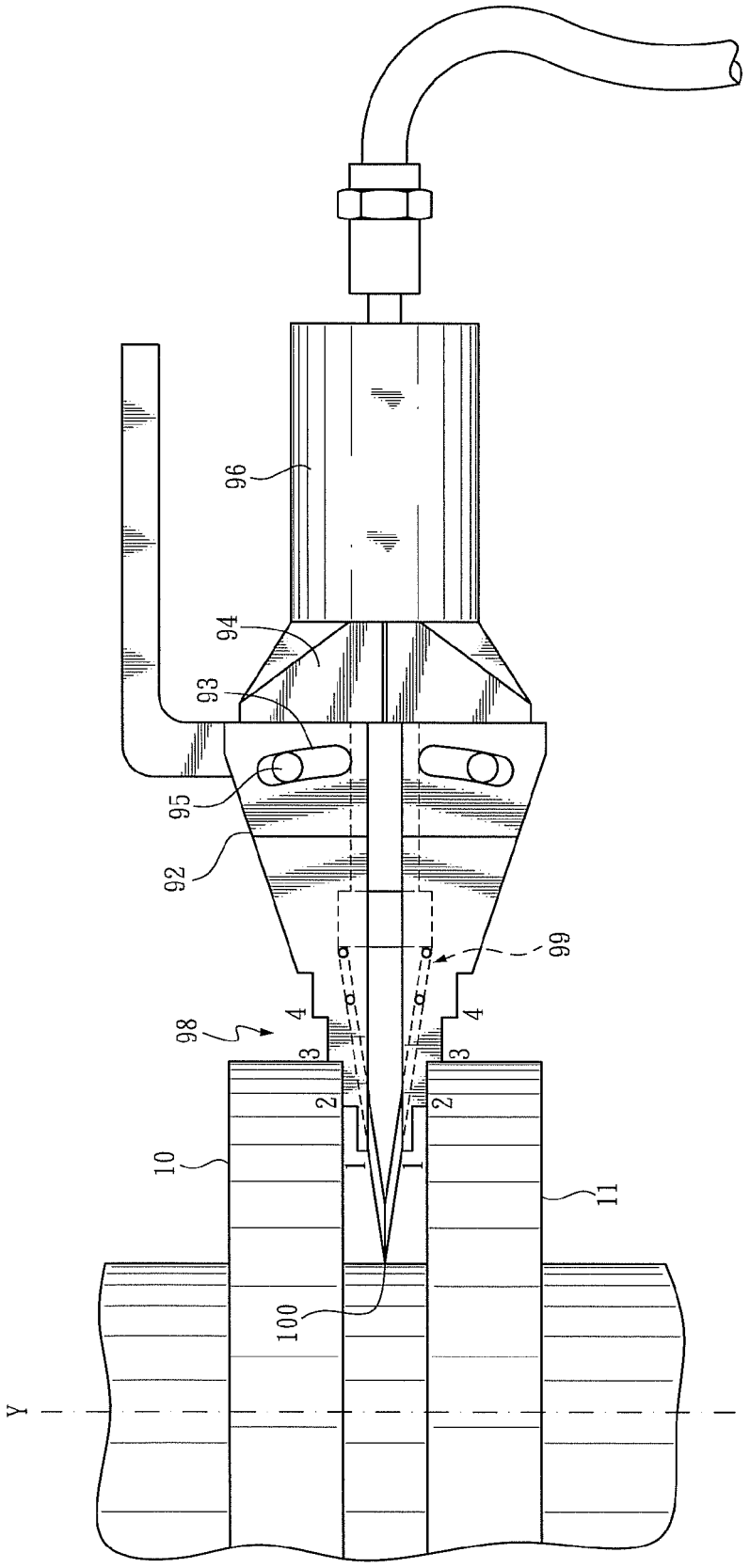

FIG. 2

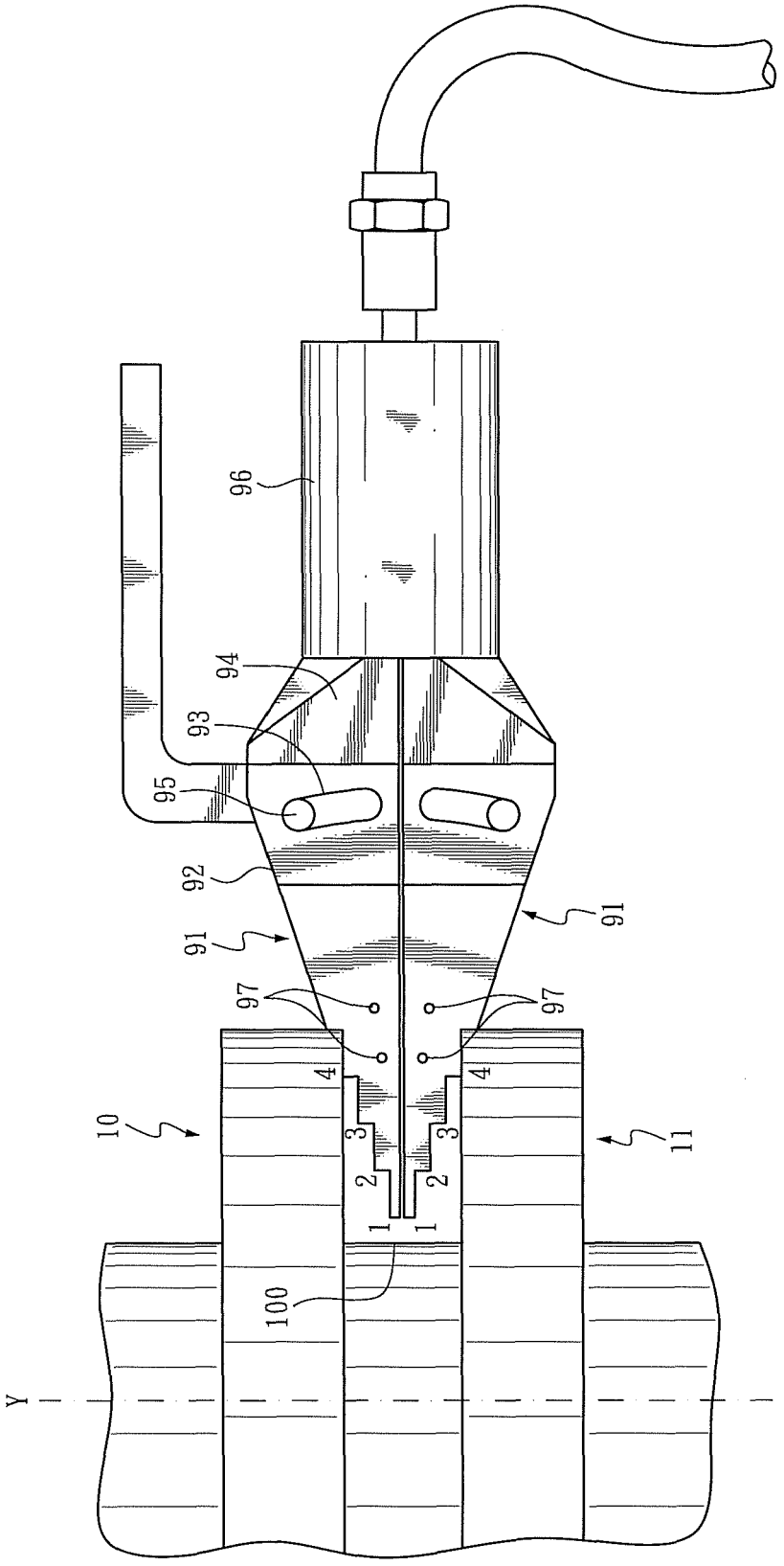

FIG. 3

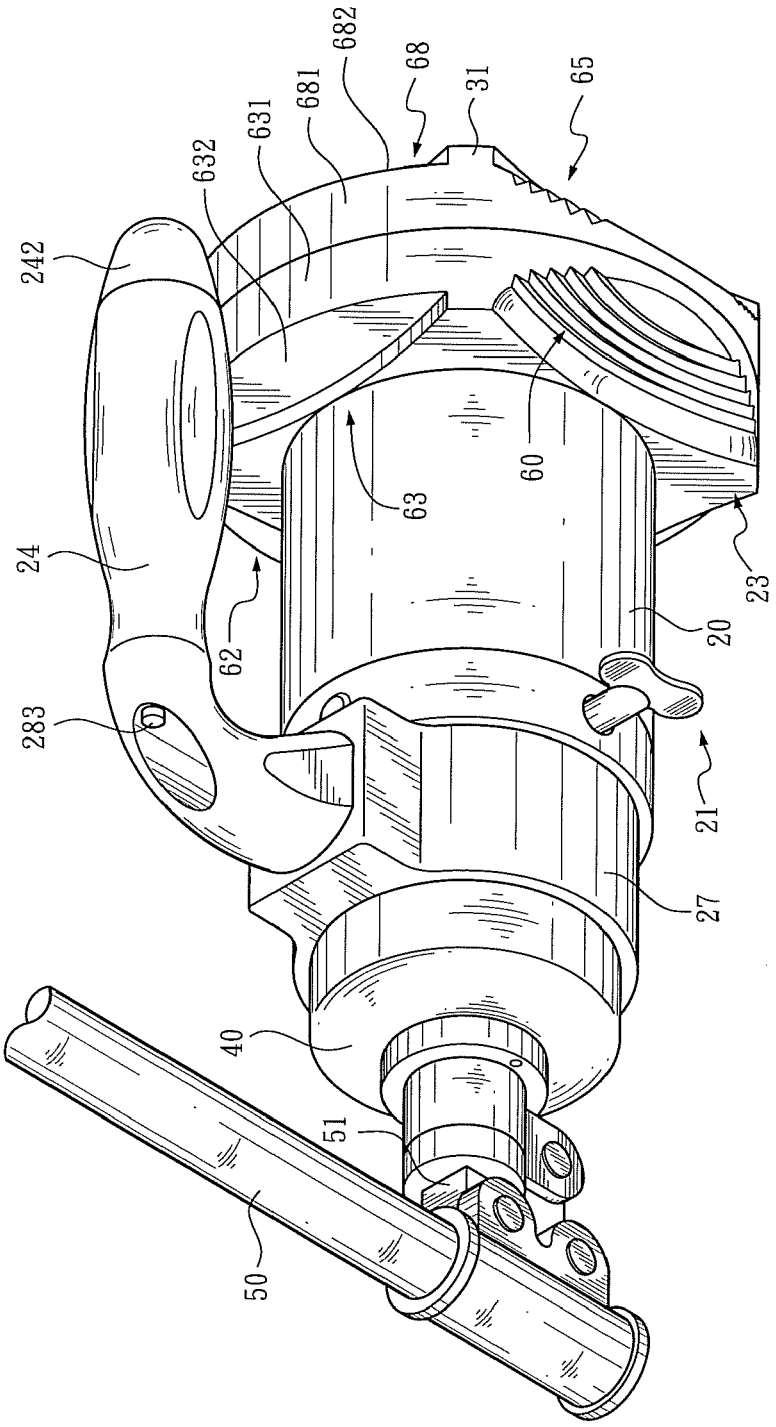

FIG. 4

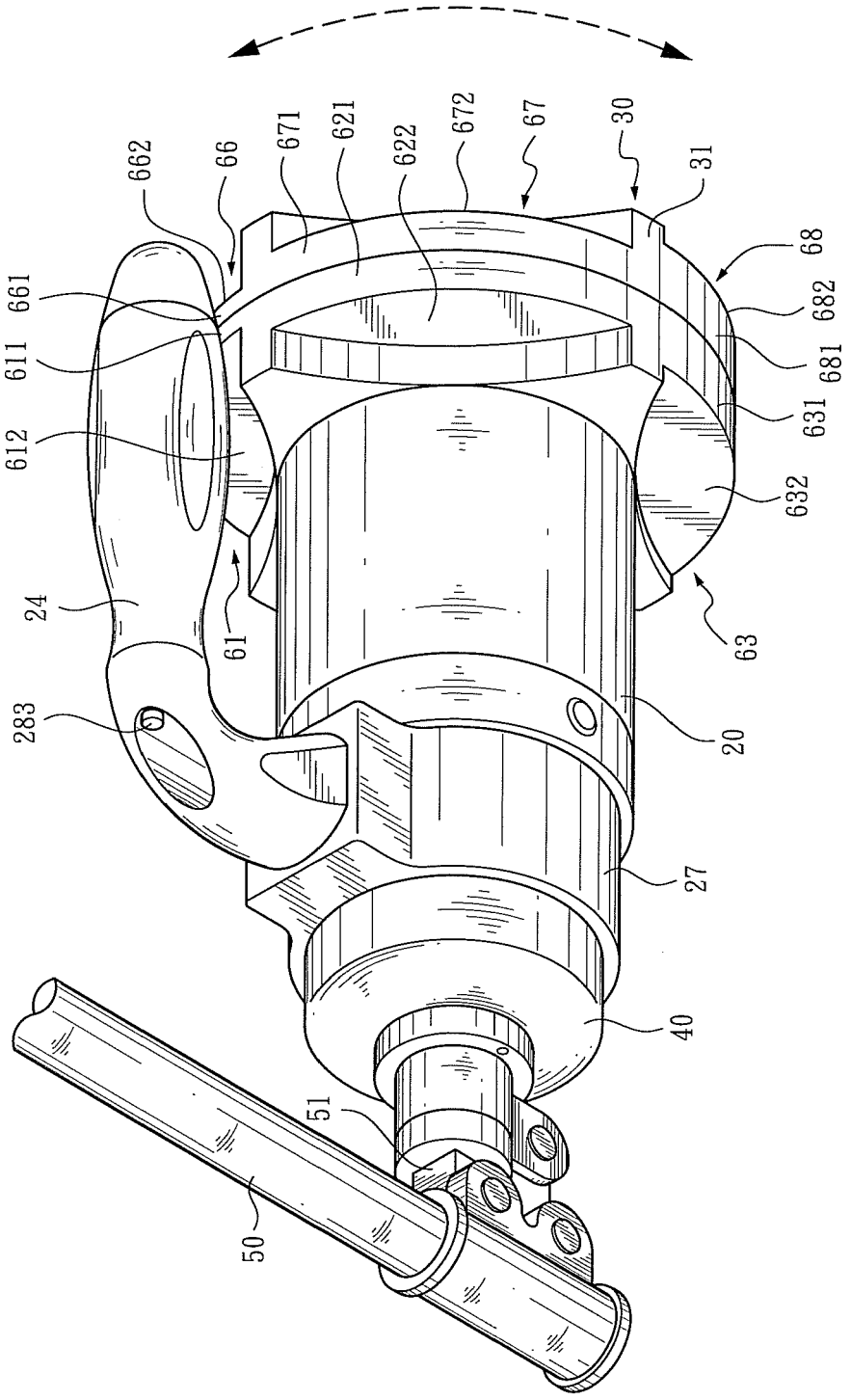
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FIG. 5

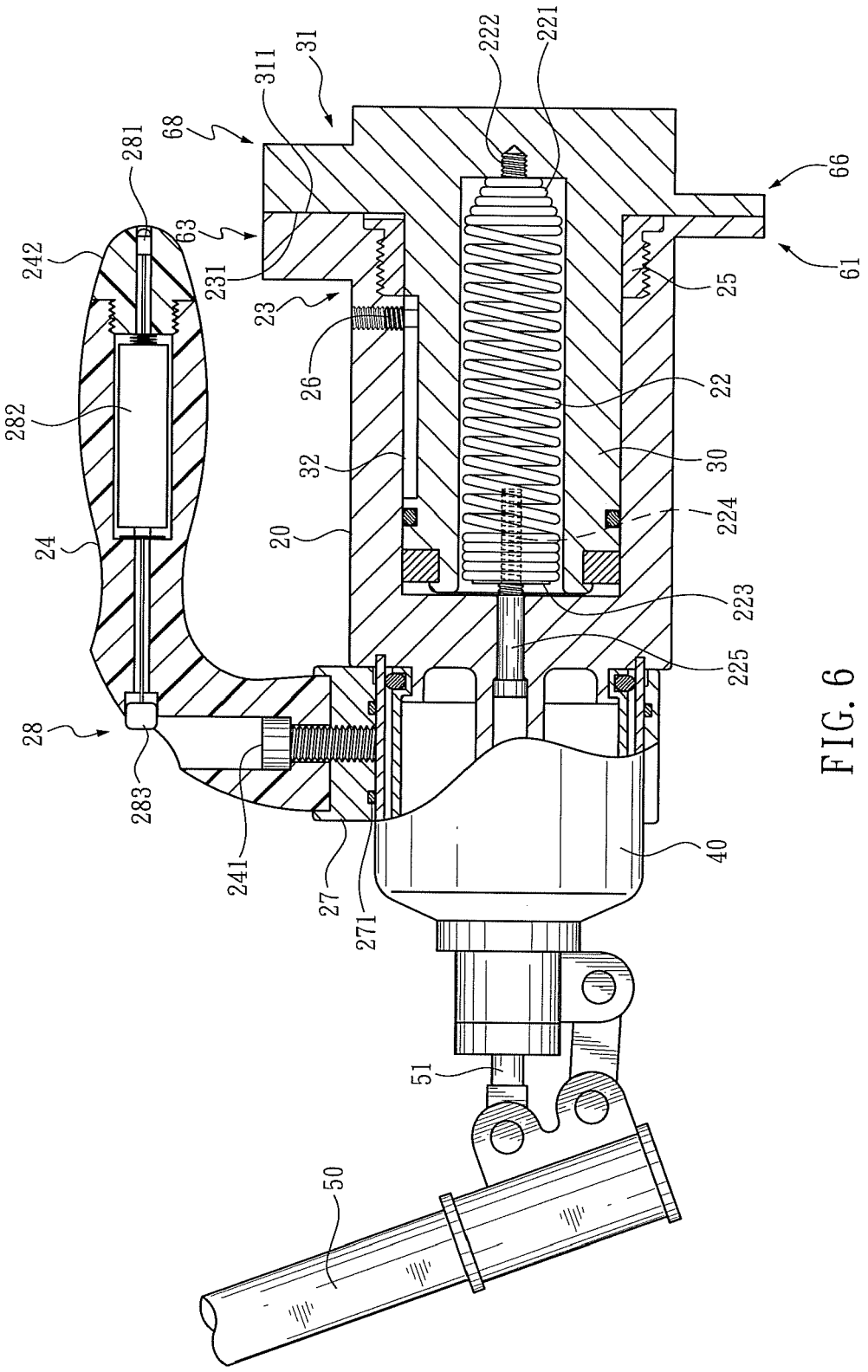
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FIG. 6

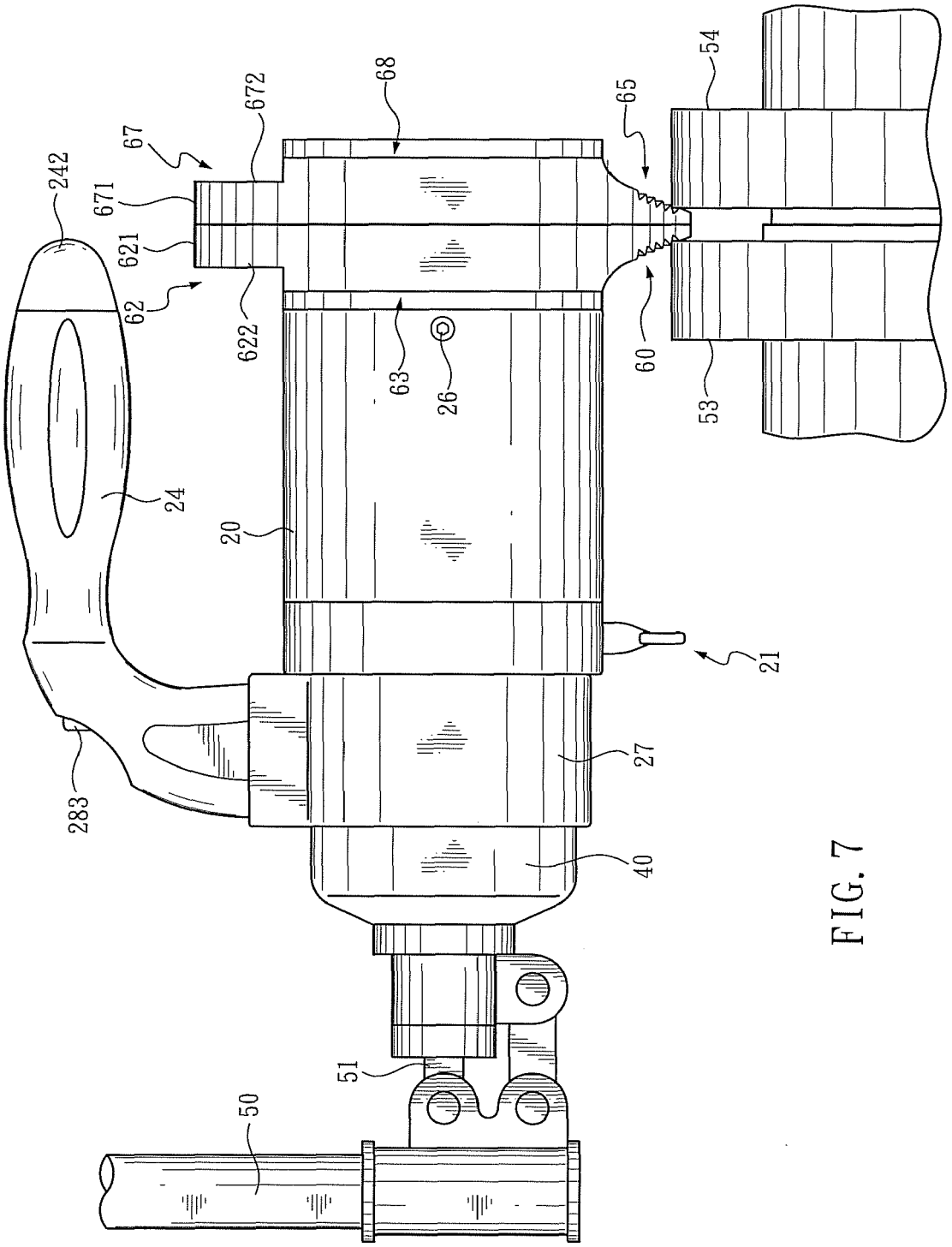
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FIG. 7

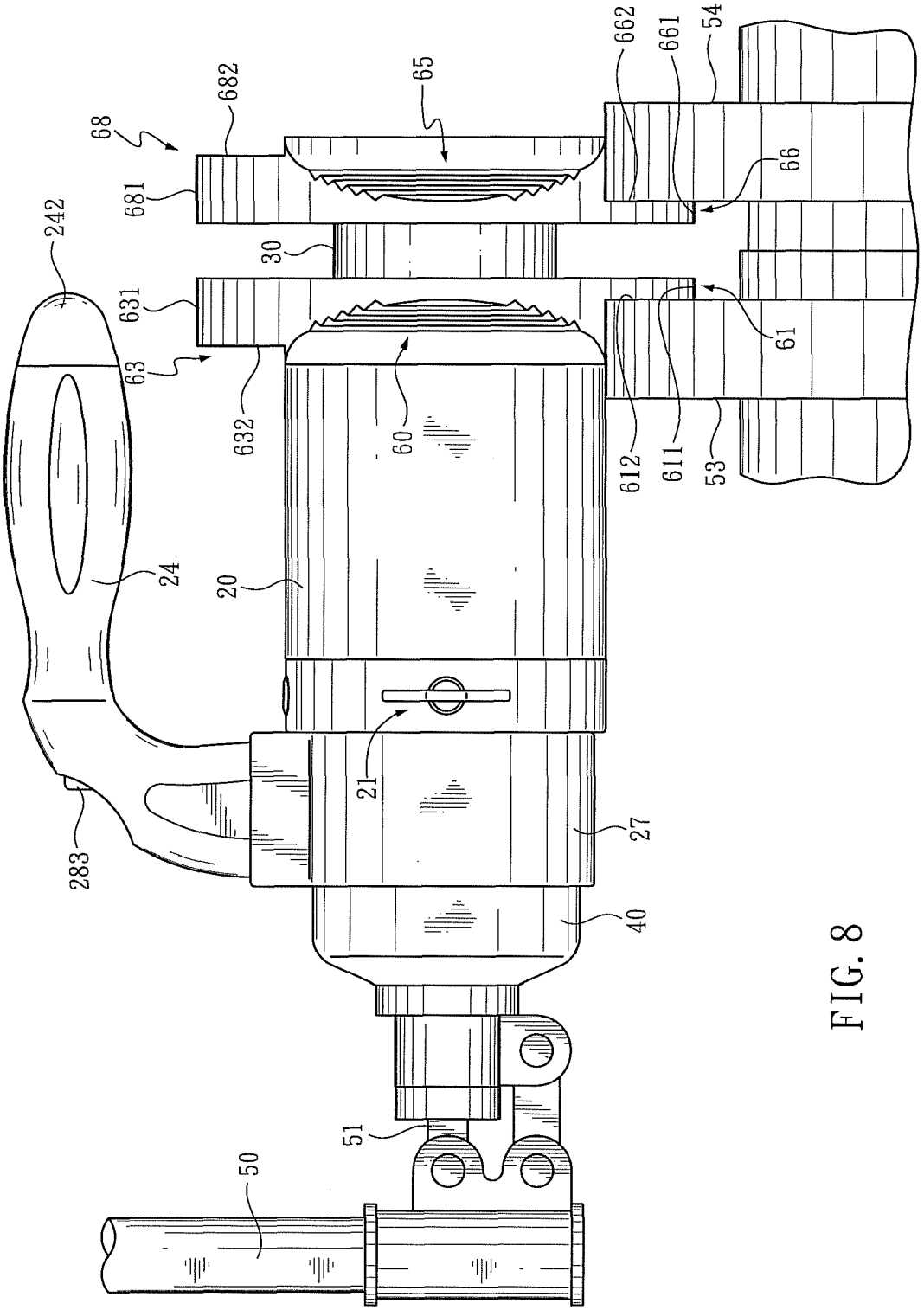
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FIG. 8

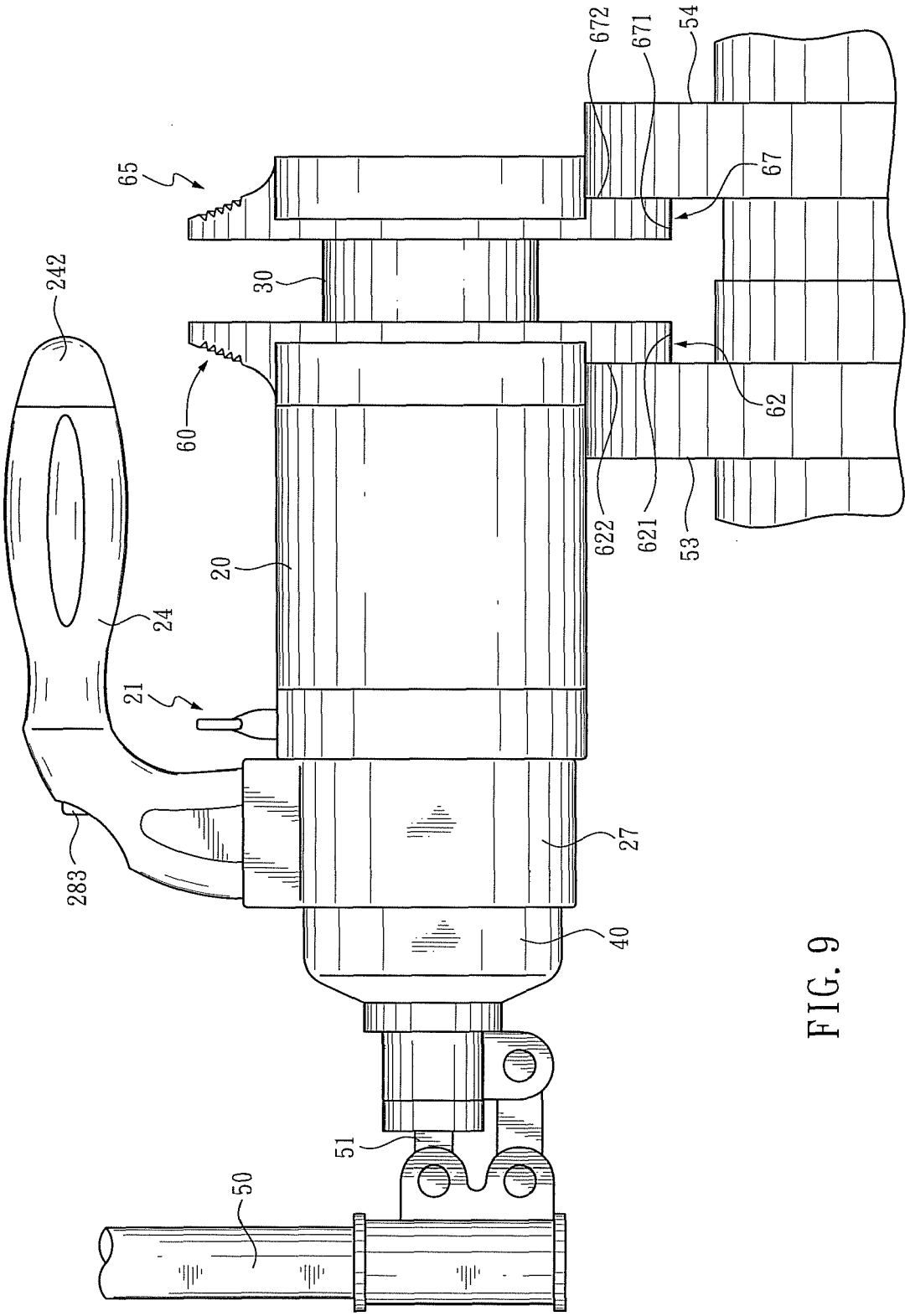

FIG. 9

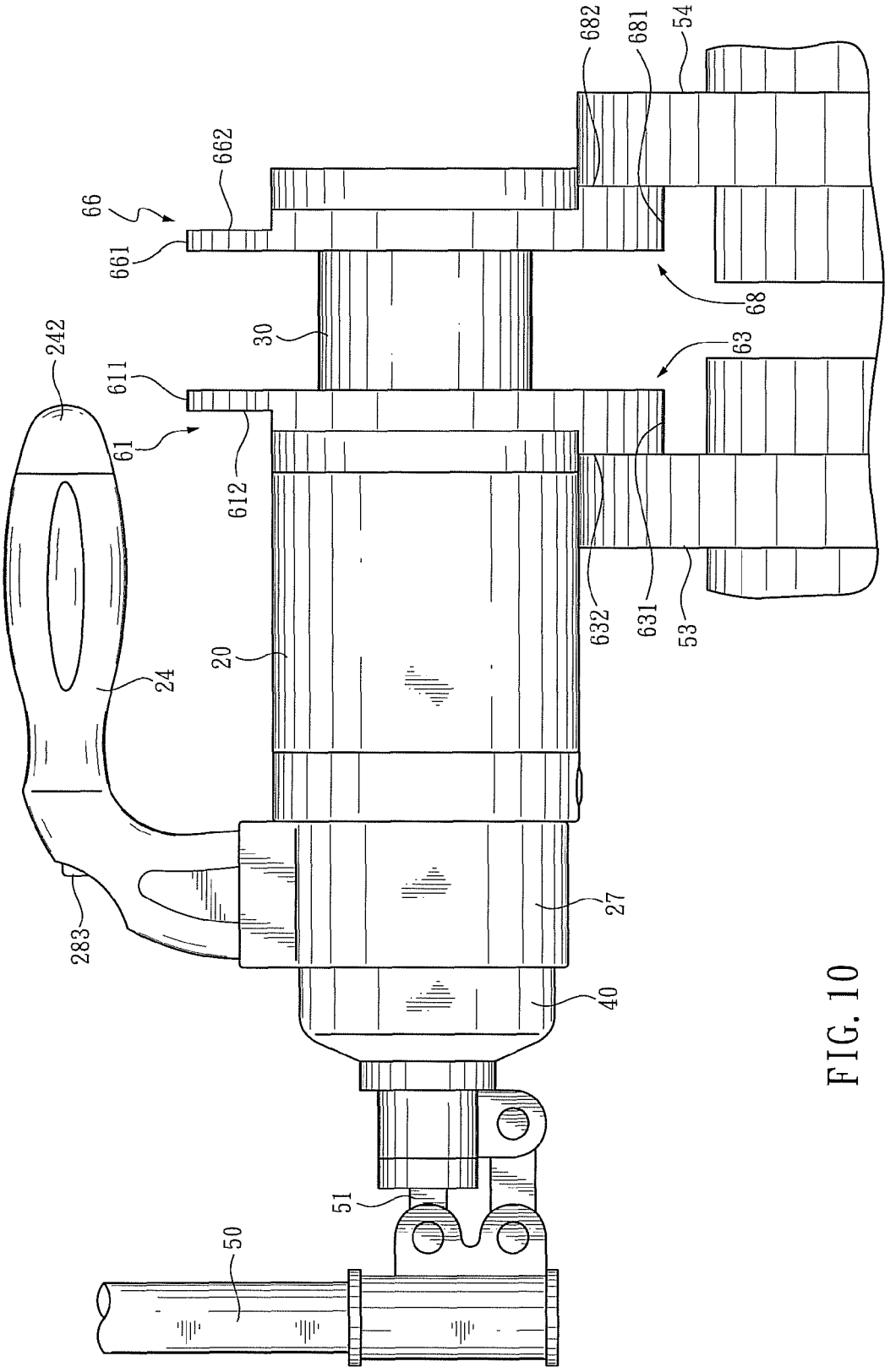
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FIG. 10

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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