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(54) **CUTTING TOOL HOLDING MECHANISM**

(57) A cutting tool holding mechanism (100, 500) includes a base (200, 600), a handle (300, 700) and a locking assembly (400). The base (200, 600) includes an abutting portion (210, 610), a receiving groove (20, 220, 620), at least one limiting groove (230, 630) and at least one limiting hole (231, 631). The limiting hole (231, 631) is disposed at the base (200, 600) and communicated with the limiting groove (230, 630). The handle (300, 700) abutted against the base (200, 600) includes a sleeved portion (310, 710) and a plurality of positioning surfaces (301, 701). The locking assembly (400) includes a pack-

ing ring (410), a locking screw (420), a locking member (430) and a guiding bolt (440). The locking member (430) received inside the limiting groove (230, 630) includes a screwed hole (431) and a guiding groove (432). The guiding groove (432) disposed at one side of the locking member (430) and is aligned with the limiting hole (231, 631) when the locking member (430) is disposed inside the limiting groove (230, 630). The guiding bolt (440) is disposed in the limiting hole (231, 631) and is abutted against the guiding groove (432) to inhibit the locking member (430) from rotating.

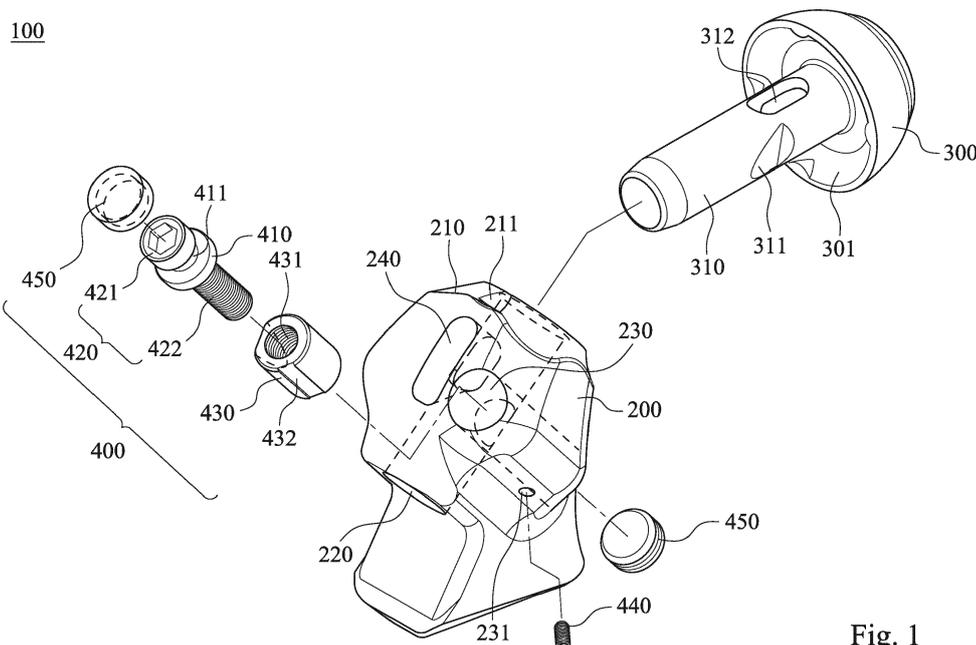


Fig. 1

Description**BACKGROUND**

Technical Field

[0001] The present disclosure relates to a cutting tool holding mechanism. More particularly, the present disclosure relates to a cutting tool holding mechanism applied to a road milling machine.

Description of Related Art

[0002] A cutting tool holding mechanism is a device which is disposed at a road milling machine for holding the cutting tool. The cutting tool will receive a huge impact due to the high resistance occurred in construction, and the cutting tool will be damaged even if it is made of the toughness material.

[0003] Owing to the bad working environment, there is a need to develop a cutting tool holding mechanism which can firmly secure the cutting tool onto the road milling machine. Moreover, because the lift time of the cutting tool is short, the cutting tool holding mechanism must be able to be assembled and separated quickly to change the cutting tool.

[0004] In order to provide enough clamping force and convenient assembling ability, the prior cutting tool holding mechanism includes a base and a clamping portion. The handle is passed through the base and the clamping portion to be installed in the cutting tool holding mechanism. The clamping portion and the base are fastened by screws or wedges, and the cutting tool is secured by the base and the clamping portion.

[0005] However, in order to assemble the handle, the clamping portion and the base together, the shapes of the handle, the clamping portion and the base must be coordinated accurately; consequently, the design of the modes is complex. Moreover, the mechanical strength is lower when the cutting tool holding mechanism is made by several components.

[0006] The reaction force applied on the cutting tool is parallel to a central axis of the cutting tool, that is, the force applied along the vertical direction; accordingly, the connecting surface between the base and the clamping portion is parallel to a horizontal direction which is perpendicular to the central axis of the cutting tool in order to provide enough supporting force.

[0007] A milling machine will include a plurality of cutting tool holding mechanisms disposed at a milling drum. For the prior cutting tool holding mechanism, the screws are inserted into the cutting tool holding mechanism along the horizontal direction, and the separating operation of the cutting tool holding mechanism will be affected by other cutting tool holding mechanisms. As a result, the cutting tool is not easily to be changed.

[0008] Therefore, although the cutting tool holding mechanism has enough clamping force, it still has the

disadvantage of high manufacturing cost. Furthermore, it spends much time and money to change the cutting tool.

5 **SUMMARY**

[0009] A cutting tool holding mechanism includes a base, a handle and at least one locking assembly. The base includes a receiving groove, at least one limiting groove and at least one limiting hole. The receiving groove is depressively disposed in the base. The at least one limiting groove is depressively disposed in the base and communicated with the receiving groove. The at least one limiting hole is disposed at the base and communicated with the limiting groove. The handle, which is abutted against the base, includes a sleeved portion disposed inside the receiving groove. The sleeved portion includes at least one butting portion, wherein the butting portion is located at an intersection of the receiving groove and the limiting groove when the sleeved portion is disposed inside the receiving groove. The at least one locking assembly includes a locking screw, a locking member and a guiding bolt. The locking screw includes a head portion and a screwing portion. The screwing portion is for protruding into the limiting groove. The locking member which is received inside the limiting groove includes a screwed hole and a guiding groove. The screwed hole is for securing the screwing portion. The guiding groove is disposed at one side of the locking member, and the guiding groove is aligned with the limiting hole when the locking member is disposed inside the limiting groove. An extending direction of the guiding groove is parallel to a central axis of the limiting groove. The guiding bolt is disposed in the limiting hole and abutted against the guiding groove to inhibit the locking member from rotating. The locking member is for moving along the central axis to push against the butting portion.

[0010] In one embodiment, the base includes an abutting portion which comprises a plurality of abutting surfaces circularly distribute at the abutting portion, the handle includes a plurality of positioning surfaces, and a number of the positioning surfaces is corresponding to a number of the abutting surfaces such that the handle can be positioned on the base.

[0011] In one embodiment, the receiving groove is surrounded by the abutting surfaces.

[0012] In one embodiment, an angle contained between the limiting groove and a virtual horizontal-surface is smaller than 180 degrees.

[0013] In one embodiment, the receiving groove passes through the base.

[0014] In one embodiment, the limiting groove passes through the base.

[0015] In one embodiment, the locking assembly further includes two covers. The covers are disposed at two sides of the limiting groove, respectively, such that the limiting groove is closed.

[0016] In one embodiment, the base includes a pin

hole. The sleeved portion includes an anchor hole which is corresponding to the pin hole, and the pin hole and the anchor hole are configured to allow a pin to insert so as to secure the handle.

[0017] In one embodiment, a number of the limiting grooves is two. A number of the limiting holes is two. A number of the butting portions is two. Two limiting groove and two limiting hole are disposed at two corresponding sides of the receiving groove, respectively, and two butting portion are depressively disposed at two corresponding sides of the sleeved portion, respectively.

[0018] In one embodiment, a number of the locking assemblies is two, and two locking assemblies are corresponding to two limiting grooves, respectively.

[0019] In one embodiment, the at least one locking assembly further includes a packing ring comprising a through hole. The screwing portion passes through the through hole to protrude into the limiting groove.

BRIEF DESCRIPTION OF THE DRAWINGS

[0020] The disclosure can be more fully understood by reading the following detailed description of the embodiments, with reference made to the accompanying drawings as follows:

Fig. 1 shows an exploded view of a cutting tool holding mechanism according to one embodiment of the present disclosure;

Fig. 2 shows a schematic view of a combination state of the cutting tool holding mechanism of Fig. 1;

Fig. 3 shows a schematic view of a handle of Fig. 1;

Fig. 4 shows a cross-sectional view of the cutting tool holding mechanism taken along line 4-4 of Fig. 2;

Fig. 5 shows a cross-sectional view of the cutting tool holding mechanism taken along line 5-5 of Fig. 2;

Fig. 6 shows an exploded view of a cutting tool holding mechanism according to another embodiment of the present disclosure;

Fig. 7 shows a schematic view of a combination state of the cutting tool holding mechanism of Fig. 6; and

Fig. 8 shows a cross-sectional view of the cutting tool holding mechanism taken along line 8-8 of Fig. 7.

DETAILED DESCRIPTION

[0021] Please refer to Fig. 1 and Fig. 2. Fig. 1 shows an exploded view of a cutting tool holding mechanism 100 according to one embodiment of the present disclosure. Fig. 2 shows a schematic view of a combination state of the cutting tool holding mechanism 100 of Fig.

1. The cutting tool holding mechanism 100 includes a base 200, a handle 300 and a locking assembly 400. The base 200 includes an abutting portion 210, a receiving groove 220 and a limiting groove 230. The abutting portion 210 includes a plurality of abutting surfaces 211, and a number of the abutting surfaces 211 and a position and a shape of each of abutting surfaces 211 are not limited thereto. The receiving groove 220 depressively disposed at the base 200. The limiting groove 230 is disposed at one side of the receiving groove 220 and is communicated with the receiving groove 220. A limiting hole 231 is disposed at the base 200 to correspond to the limiting groove 230.

[0022] The handle 300 is abutted against the base 200. The handle 300 includes a sleeved portion 310 and a plurality of positioning surfaces 301. The sleeved portion 310 is received inside the receiving groove 220. The number of the positioning surfaces 301 is corresponding to the number of the abutting surfaces 211, and the shapes of the positioning surfaces 301 are corresponding to the shapes of the abutting surfaces 211. Accordingly, the positioning surfaces 301 can provide positioning function to position the handle 300 on the base 200 when the sleeved portion 310 is inserted into the receiving groove 220. In the embodiment, the abutting surfaces 211 are annularly distributed at the base 200 to surround an opening of the receiving groove 20; thus, the handle 300 which is inserted into the receiving groove 220 can be auto-centering. Besides, the base 200 includes a pin hole 240, and the sleeved portion 310 includes an anchor hole 312 corresponding to the pin hole 240. When the handle 300 is abutted against the base 200, a pin (not shown) can be inserted into the pin hole 240 and the anchor hole 312 to secure the handle 300.

[0023] The sleeved portion 310 includes a butting portion 311. When the sleeved portion 310 is disposed inside the receiving groove 220, the butting portion 311 is located at an intersection of the receiving groove 220 and the limiting groove 230. As shown in Fig. 2, the locking assembly 400 is disposed inside the limiting groove 230 to push against the handle 300. The locking assembly 400 includes a packing ring 410, a locking screw 420, a locking member 430, a guiding bolt 440 and two covers 450. The packing ring 410 has a through hole 411 which is configured for the locking screw 420 to pass through. The locking screw 420 includes a head portion 421 and a screwing portion 422. The head portion 421 is abutted against the packing ring 410. The screwing portion 422 is inserted the through hole 411 to protrude into the limiting hole 231. The locking member 430 is received inside the limiting groove 230 and includes a screwed hole 431 and a guiding groove 432. The screwed hole 431 is for securing the screwing portion 422. The guiding groove 432 is disposed at one side of the locking member 430, and an extension direction of the locking member 430 is parallel to a central axis of the limiting groove 230. The guiding groove 432 is aligned with limiting hole 231 when the locking member is disposed inside the limiting groove

230, and the guiding bolt 440 is disposed inside the limiting hole 231.

[0024] To be more specific, the head portion 421 of the locking screw 420 is limited at one side of the packing ring 410. When the screwing portion 422 is rotated, the locking member 430 is moved along the extension direction due to the limitation of the guiding bolt 440. The locking member 430 will be moved toward the head portion 421 along the central axis when the locking screw 420 is fastened. As shown in Figs. 1 and 2, the limiting groove 230 runs through the base 200, and the locking assembly 400 can include two covers 450 for closing two openings of the limiting groove 230, respectively; thus, that foreign materials fall into the limiting groove 230 can be prevented.

[0025] Fig. 3 shows a schematic view of a handle 300 of Fig. 1. A shape of the butting portion 311 is corresponding to the moving direction of the locking member 430. That is, one side of the butting portion 311, which faces toward the locking member 430, is wide and thin. A thickness of the butting portion 311 is incrementally increased along the moving direction of the locking member 430.

[0026] Fig. 4 shows a cross-sectional view of the cutting tool holding mechanism 100 taken along line 4-4 of Fig. 2. Fig. 5 shows a cross-sectional view of the cutting tool holding mechanism 100 taken along line 5-5 of Fig. 2. When the locking screw 420 is fastened, the locking member 430 which is limited by the guiding bolt 440 is moved toward the upper left side of Fig. 4. As the thickness of the butting portion 311 becomes larger, the locking member 430 will push against the handle 300 when the locking member 430 keeps moving; thus, the handle 300 is pushed against an inner wall of the receiving groove 220 and is secured at the base 200.

[0027] In an embodiment, an angle A contained between the limiting groove 230 and a virtual horizontal-surface is smaller than 180 degrees, and the angle A is 45 degrees in this embodiment. In other words, a central line of the limiting groove 230 is not parallel to the horizontal-surface (X-Z surface) but is parallel to a virtual vertical-surface (X-Y surface). Hence, when an operator wants to change the cutting tool or repair the cutting tool holding mechanism 100, he/she can operate the locking assembly 400 easily and will not be limited by the other cutting tool holding mechanisms disposed nearby. Besides, the cutting tool holding mechanism 100 is easily checked and operated by the operator.

[0028] Please refer to Fig. 6 and Fig. 7. Fig. 6 shows an exploded view of a cutting tool holding mechanism 500 according to another embodiment of the present disclosure. Fig. 7 shows a schematic view of a combination state of the cutting tool holding mechanism 500 of Fig. 6. In another embodiment of the present disclosure, the cutting tool holding mechanism 500 includes a base 600, a handle 700 and two locking assemblies 400. The base 600 includes an abutting portion 610, a receiving groove 620 and two limiting grooves 630. The abutting portion 610 includes a plurality of abutting surfaces 611, and a

number of the abutting surfaces 611 and a position and a shape of each of abutting surfaces 611 are not limited thereto. The receiving groove 620 depressively disposed at the base 600. The limiting grooves 630 are disposed at two sides of the receiving groove 620, respectively, and are both communicated with the receiving groove 620. Two limiting holes 631 are disposed at two sides of the base 600 to correspond to two limiting grooves 630, respectively.

[0029] The handle 700 is abutted against the base 600. The handle 700 includes a sleeved portion 710 and a plurality of positioning surfaces 701. The sleeved portion 710 is received inside the receiving groove 620. The number of the positioning surfaces 701 is corresponding to the number of the abutting surfaces 611, and the shapes of the positioning surfaces 701 are corresponding to the shapes of the abutting surfaces 611. Accordingly, the positioning surfaces 701 can provide positioning function to position the handle 700 on the base 600 when the sleeved portion 710 is inserted into the receiving groove 620. In the embodiment, the abutting surfaces 611 are annularly distributed at the base 600 to surround an opening of the receiving groove 20; thus, the handle 700 which is inserted into the receiving groove 620 can be auto-centering. Besides, the base 600 includes a pin hole 640, and the sleeved portion 710 includes an anchor hole 712 corresponding to the pin hole 640. When the handle 700 is abutted against the base 600, a pin (not shown) can be inserted into the pin hole 640 and the anchor hole 712 to secure the handle 700.

[0030] The sleeved portion 710 includes a butting portion 711. When the sleeved portion 710 is disposed inside the receiving groove 620, the butting portion 711 is located at an intersection of the receiving groove 620 and the limiting groove 630. As shown in Fig. 7, the locking assemblies 400 are disposed inside two limiting grooves 630, respectively, to push against the handle 700. The locking assembly 400 includes a packing ring 410, a locking screw 420, a locking member 430, a guiding bolt 440 and two covers 450. The packing ring 410 has a through hole 411 which is configured for the locking screw 420 to pass through. The locking screw 420 includes a head portion 421 and a screwing portion 422. The head portion 421 is abutted against the packing ring 410. The screwing portion 422 is inserted the through hole 411 to protrude into the limiting groove 630. The locking member 430 is received inside the limiting groove 630 and includes a screwed hole 431 and a guiding groove 432. The screwed hole 431 is for securing the screwing portion 422. The guiding groove 432 is disposed at one side of the locking member 430, and an extension direction of the locking member 430 is parallel to a central axis of the limiting groove 630. The guiding groove 432 is aligned with limiting hole 631 when the locking member 430 is disposed inside the limiting groove 630, and the guiding bolt 440 is disposed inside the limiting hole 631. Covers 450 are for closing two openings of limiting groove 630 to prevent foreign materials falling into the limiting groove 630.

[0031] The operating principle and the efficient of the locking assembly 400 is disclosed in the above embodiment and will not be described again.

[0032] Please refer to Fig. 4 and Fig. 8. Fig. 8 shows a cross-sectional view of the cutting tool holding mechanism 500 taken along line 8-8 of Fig. 7. When the locking screw 420 is fastened, the locking member 430 which is limited by the guiding bolt 440 is moved toward the upper left side of Fig. 4. As the thickness of the butting portion 711 becomes larger, the locking member 430 will push against the handle 700 when the locking member 430 keeps moving; thus, the handle 700 is push against an inner wall of the receiving groove 620 and is secured at the base 600.

[0033] And in Fig. 8, two butting portions 711 of the sleeved portion 710 are pushed by two locking members 430 from two opposite sides of the sleeved portion 710, respectively; thus, the securing load adding on the sleeved portion 710 is increased and the stress on the sleeved portion 710 is balance. Therefore, damage due to overload can be prevented.

[0034] As described in the above embodiments, the cutting tool holding mechanism has the following advantages. 1. Because the base of the cutting tool holding mechanism is a one-piece element, the mechanical strength is increased and the design of the mold is simplified. Hence, the cost is decreased and the yield is increased. 2. When the central axis of the locking assembly is parallel to the virtual vertical-surface, the operation for changing new cutting tool or repair is easier. The repairing quality can be improved. 3. The annularly distribution of the positioning surfaces can be coordinated with the abutting surfaces to position the handle such that the handle can be auto-centering when disposed inside the base. The milling ability is increasing. 4. The moving direction of the locking member is parallel to the direction along which the milling force is applied to the cutting tool. Consequently, the cutting tool will not easily be separated from the handle, and the self-securing ability of the cutting tool is better. 5. Because the central axis of the locking assembly is parallel to the virtual vertical-surface, the securing ability between the handle and the base is sufficient such that the reaction force and supporting force distributing uniformly on the surface of the handle. Besides, due to the disposition of the limiting grooves, there is no necessary to separate the cutting tool holding mechanism when the fastening the handle into the base.

Claims

1. A cutting tool holding mechanism (100) comprising a base (200), a handle (300) and at least one locking assembly (400), **characterized in that:**

the base (200) comprising:

a receiving groove (220) depressively dis-

posed in the base (200);
at least one limiting groove (230) depressively disposed in the base (200) and communicated with the receiving groove (220);
and
at least one limiting hole (231) disposed at the base (200) and communicated with the limiting groove (230);

the handle (300), which is abutted against the base (200), comprising:

a sleeved portion (310), which is disposed inside the receiving groove (220), comprising at least one butting portion (311), wherein the butting portion (311) is located at an intersection of the receiving groove (220) and the limiting groove (230) when the sleeved portion (310) is disposed inside the receiving groove (220); and

the at least one locking assembly (400) comprising:

a locking screw (420), comprising:

a head portion (421); and
a screwing portion (422) for protruding into the limiting groove (230);

a locking member (430), which is received inside the limiting groove (230), comprising:

a screwed hole (431) for securing the screwing portion (422); and
a guiding groove (432) disposed at one side of the locking member (430), the guiding groove (432) being aligned with the limiting hole (231) when the locking member (430) being disposed inside the limiting groove (230), an extending direction of the guiding groove (432) being parallel to a central axis of the limiting groove (230); and

a guiding bolt (440) disposed in the limiting hole (231), the guiding bolt (440) abutted against the guiding groove (432) to inhibit the locking member (430) from rotating, the locking member (430) being for moving along the central axis to push against the butting portion (311).

2. The cutting tool holding mechanism (100) of claim 1, wherein the base (200) comprises an abutting portion (210) which comprises a plurality of abutting surfaces (211) circularly distribute at the abutting portion (210), the handle (300) comprises a plurality of po-

- sitioning surfaces (301), and a number of the positioning surfaces (301) is corresponding to a number of the abutting surfaces (211) such that the handle (300) can be positioned on the base (200).
3. The cutting tool holding mechanism (100) of claim 2, wherein the receiving groove (220) is surrounded by the abutting surfaces (211). 5
4. The cutting tool holding mechanism (100) of claim 1, wherein an angle contained between the limiting groove (230) and a virtual horizontal-surface is smaller than 180 degrees. 10
5. The cutting tool holding mechanism (100) of claim 1, wherein the limiting groove (230) is parallel to a virtual vertical surface. 15
6. The cutting tool holding mechanism (100) of claim 1, wherein the receiving groove (220) passes through the base. 20
7. The cutting tool holding mechanism (100) of claim 1, wherein the limiting groove (230) passes through the base (200). 25
8. The cutting tool holding mechanism (100) of claim 7, wherein the locking assembly (400) further comprises: 30
- two covers (450) disposed at two sides of the limiting groove (230), respectively, such that the limiting groove (230) is closed.
9. The cutting tool holding mechanism (100) of claim 1, wherein the base (200) comprises a pin hole (240), the sleeved portion (310) comprises an anchor hole (312) which is corresponding to the pin hole (240), and the pin hole (240) and the anchor hole (312) are configured to allow a pin to insert so as to secure the handle (300). 35 40
10. The cutting tool holding mechanism (100) of claim 2, wherein a number of the limiting grooves (230) is two, a number of the limiting holes (231) is two, a number of the butting portions (311) is two, two limiting grooves (230) and two limiting holes (231) are disposed at two corresponding sides of the receiving groove (220), respectively, and two butting portions (311) are depressively disposed at two corresponding sides of the sleeved portion (310), respectively. 45 50
11. The cutting tool holding mechanism (100) of claim 10, wherein a number of the locking assemblies (400) is two, and two locking assemblies (400) are corresponding to two limiting grooves (230), respectively. 55
12. The cutting tool holding mechanism (100) of claim 1, wherein the at least one locking assembly (400) further comprises; a packing ring (410) comprising a through hole (411); wherein the screwing portion (422) passes through the through hole (410) (411) to protrude into the limiting groove (230).

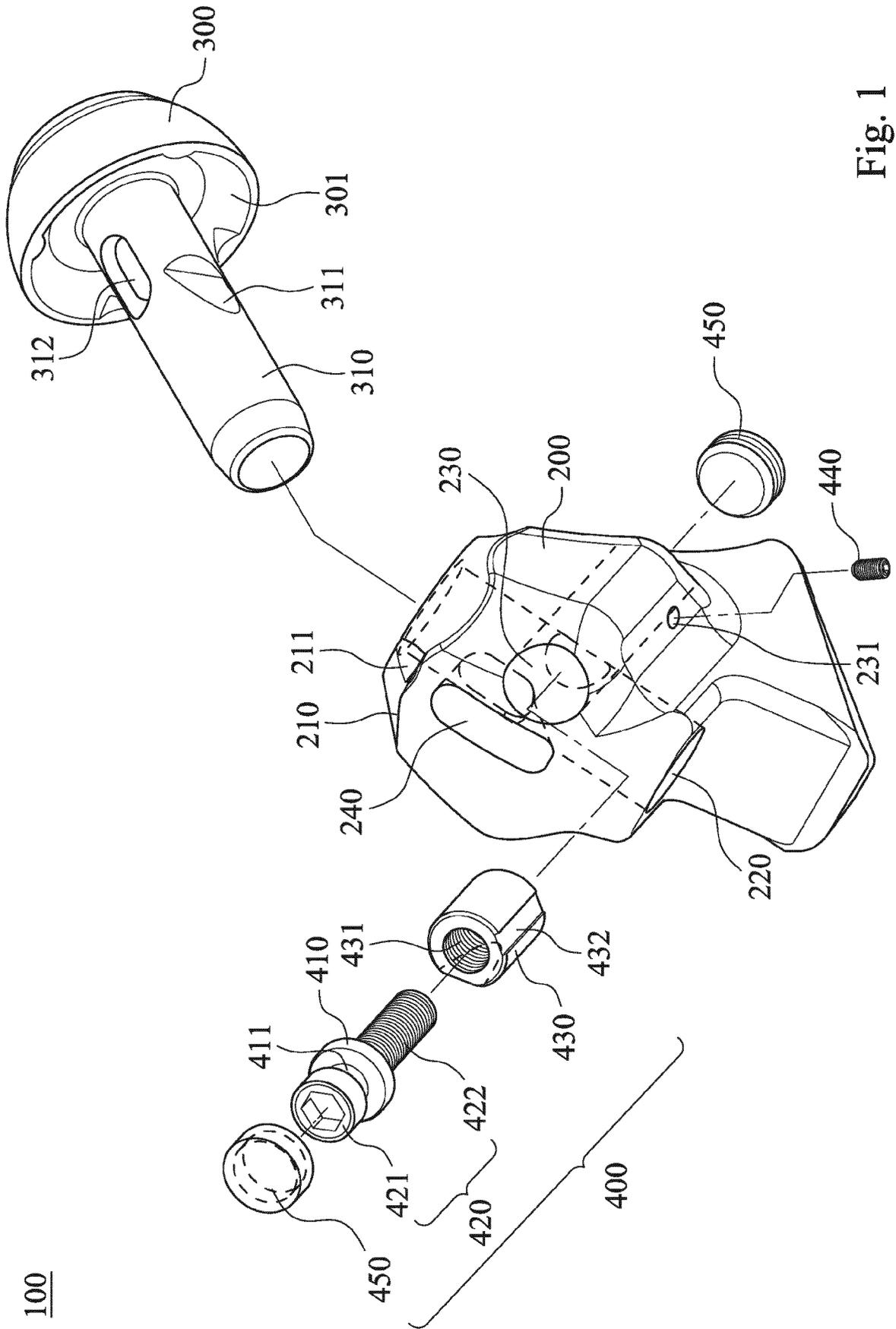


Fig. 1

100

100

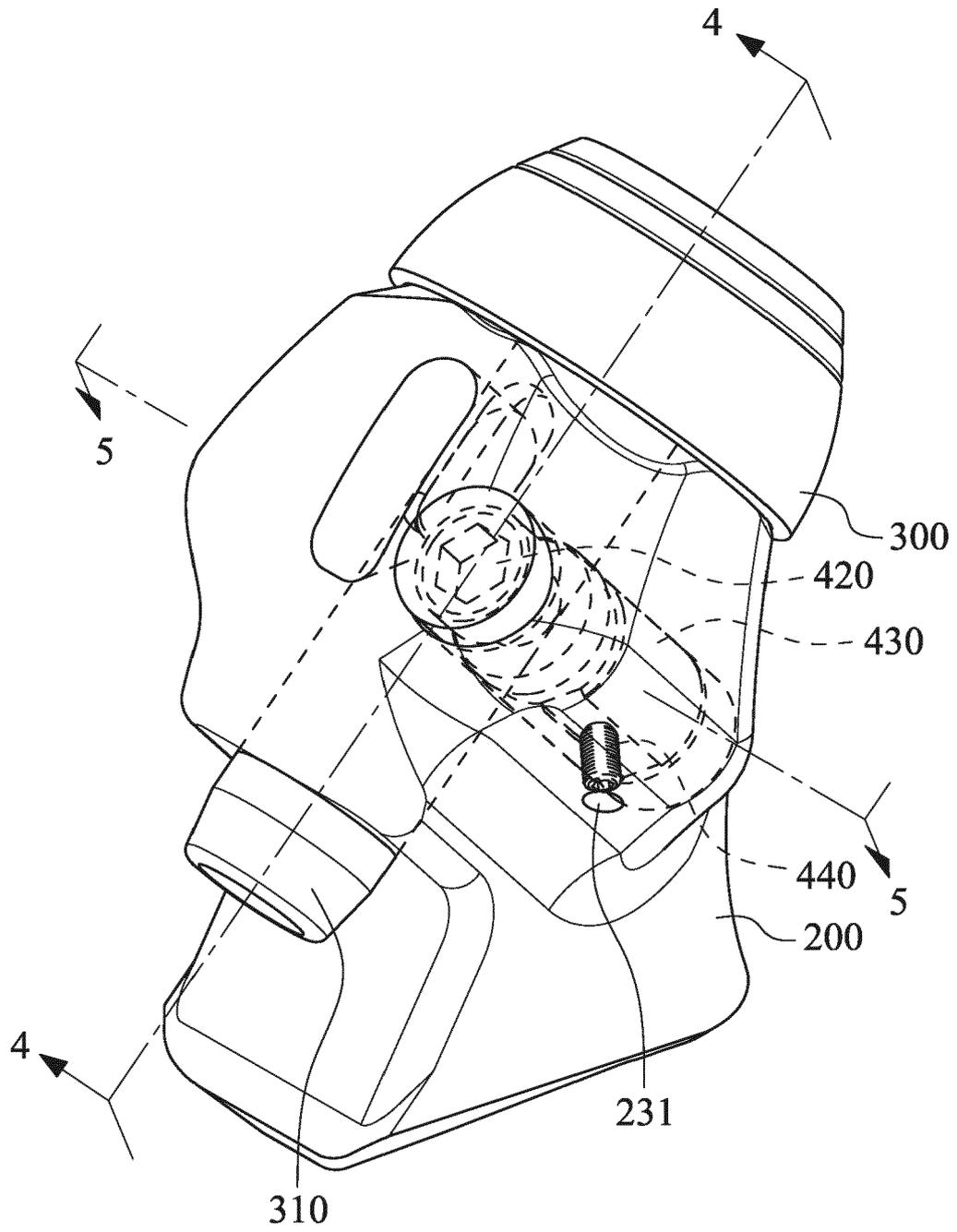


Fig. 2

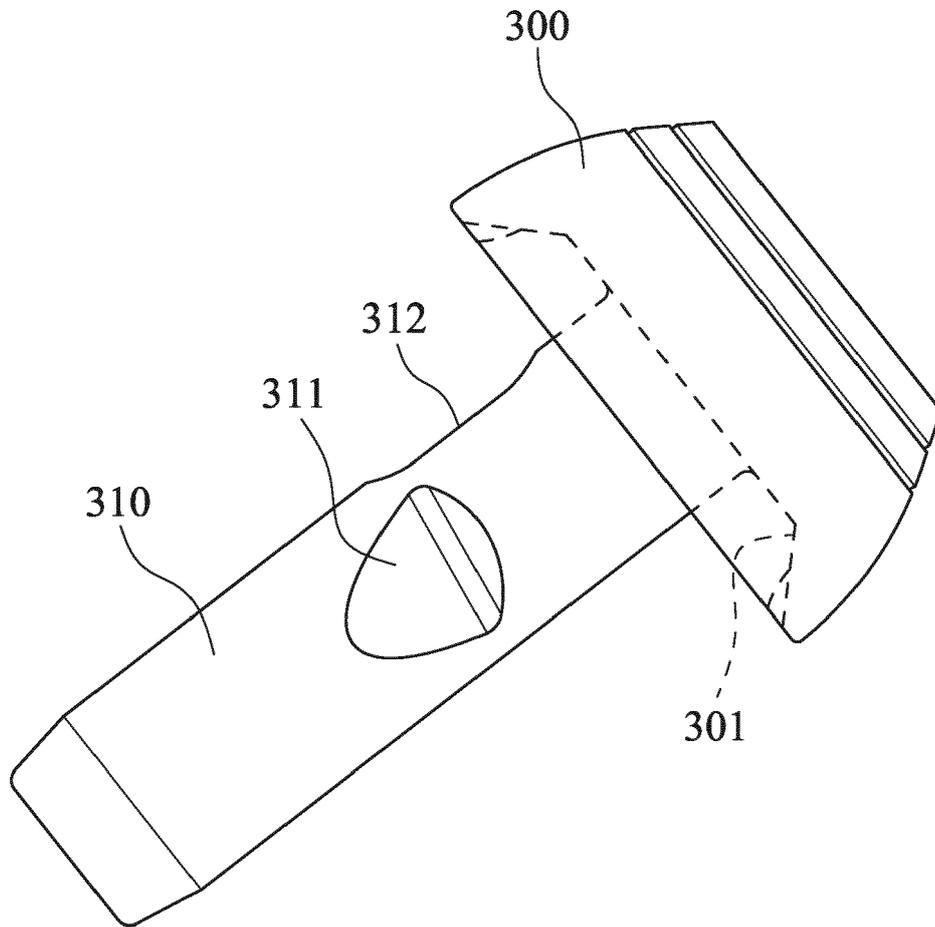


Fig. 3

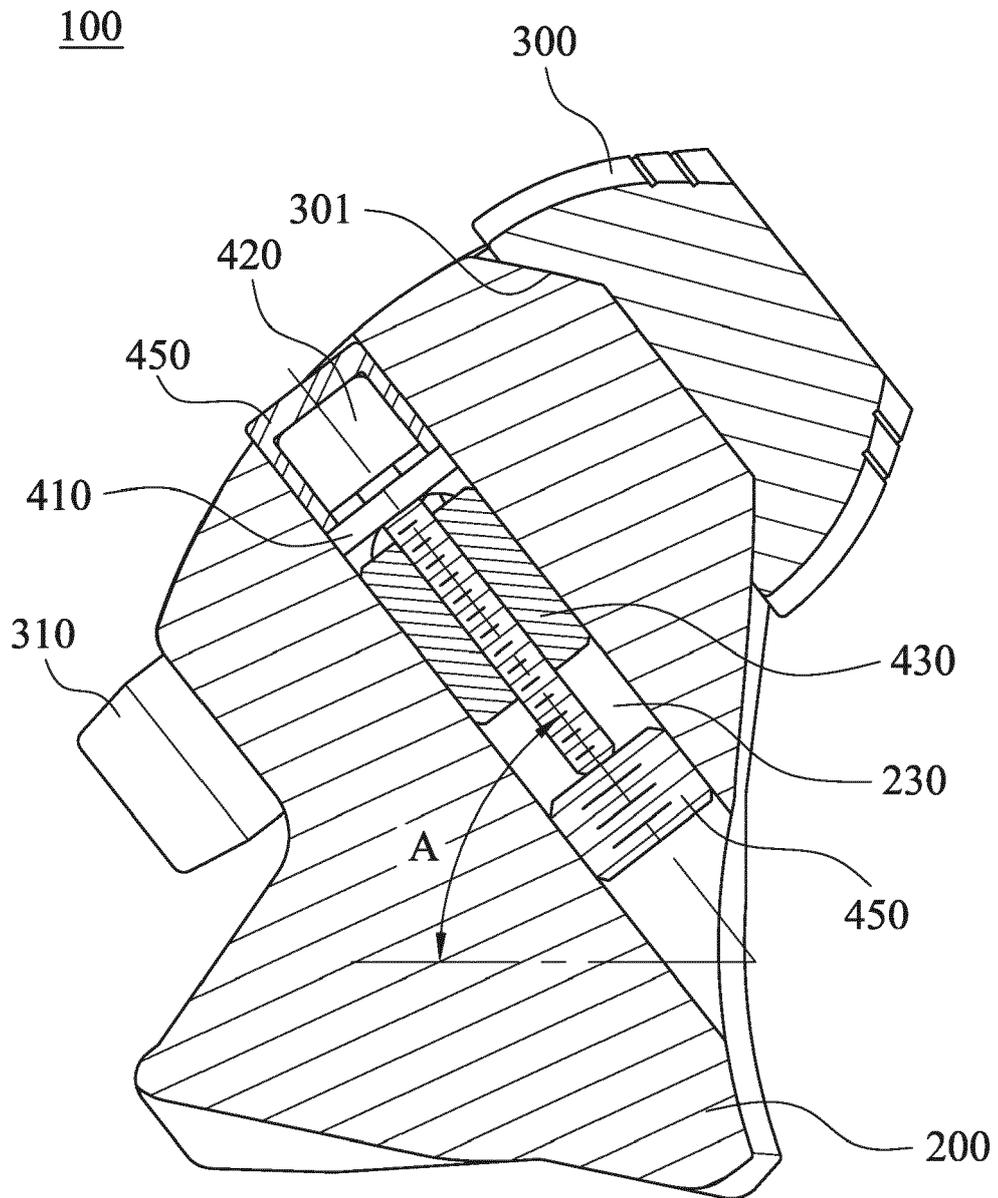


Fig. 4

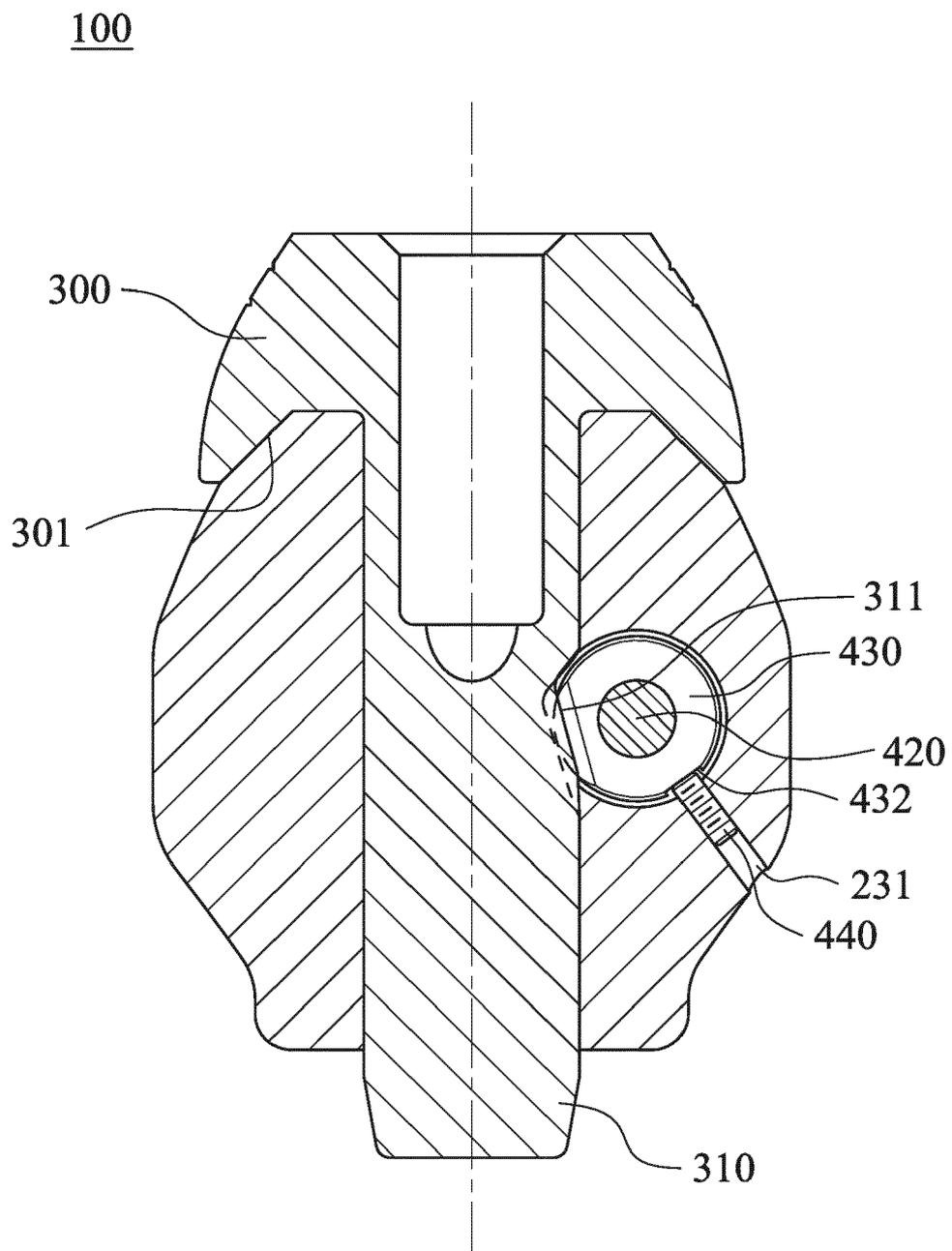


Fig. 5

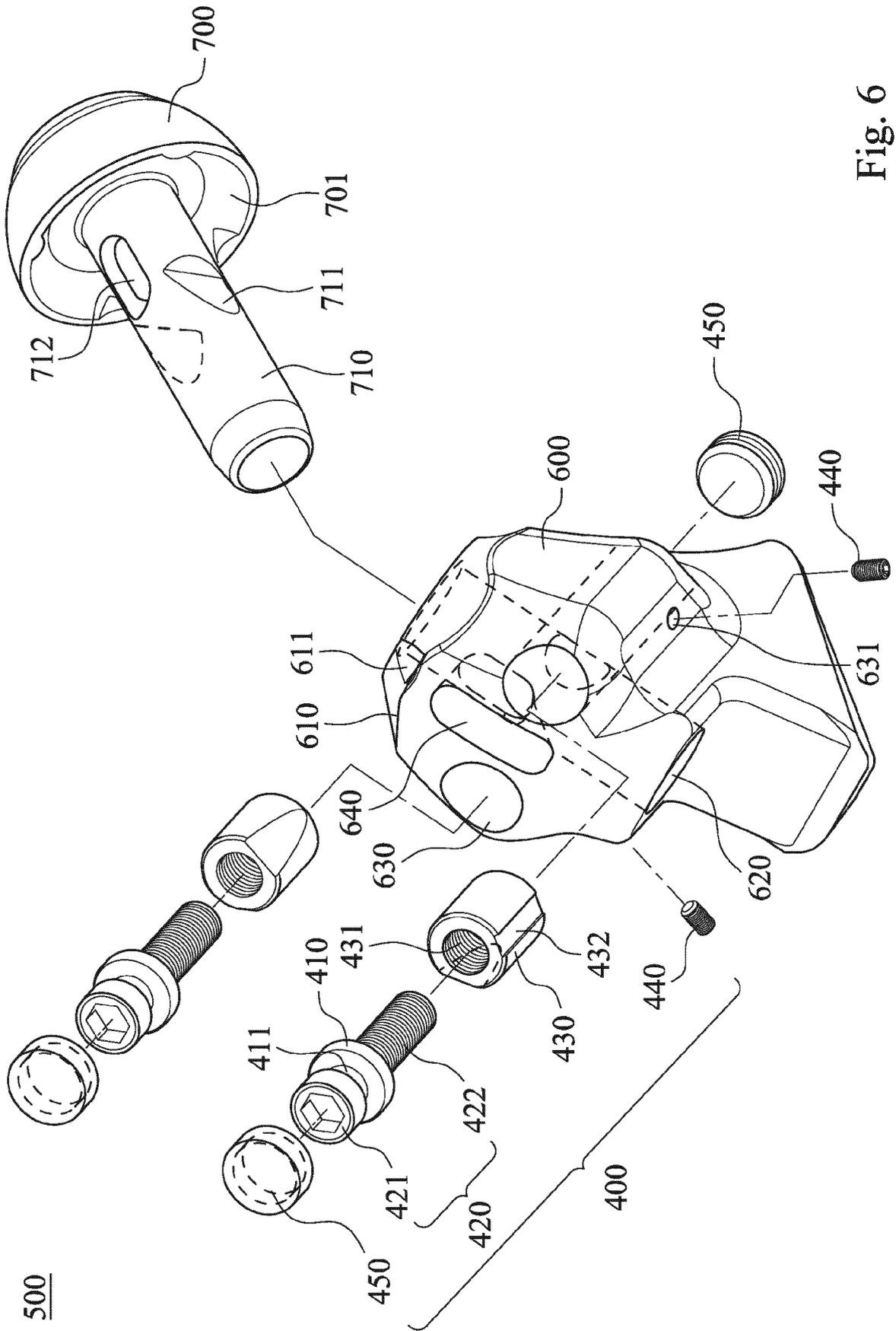


Fig. 6

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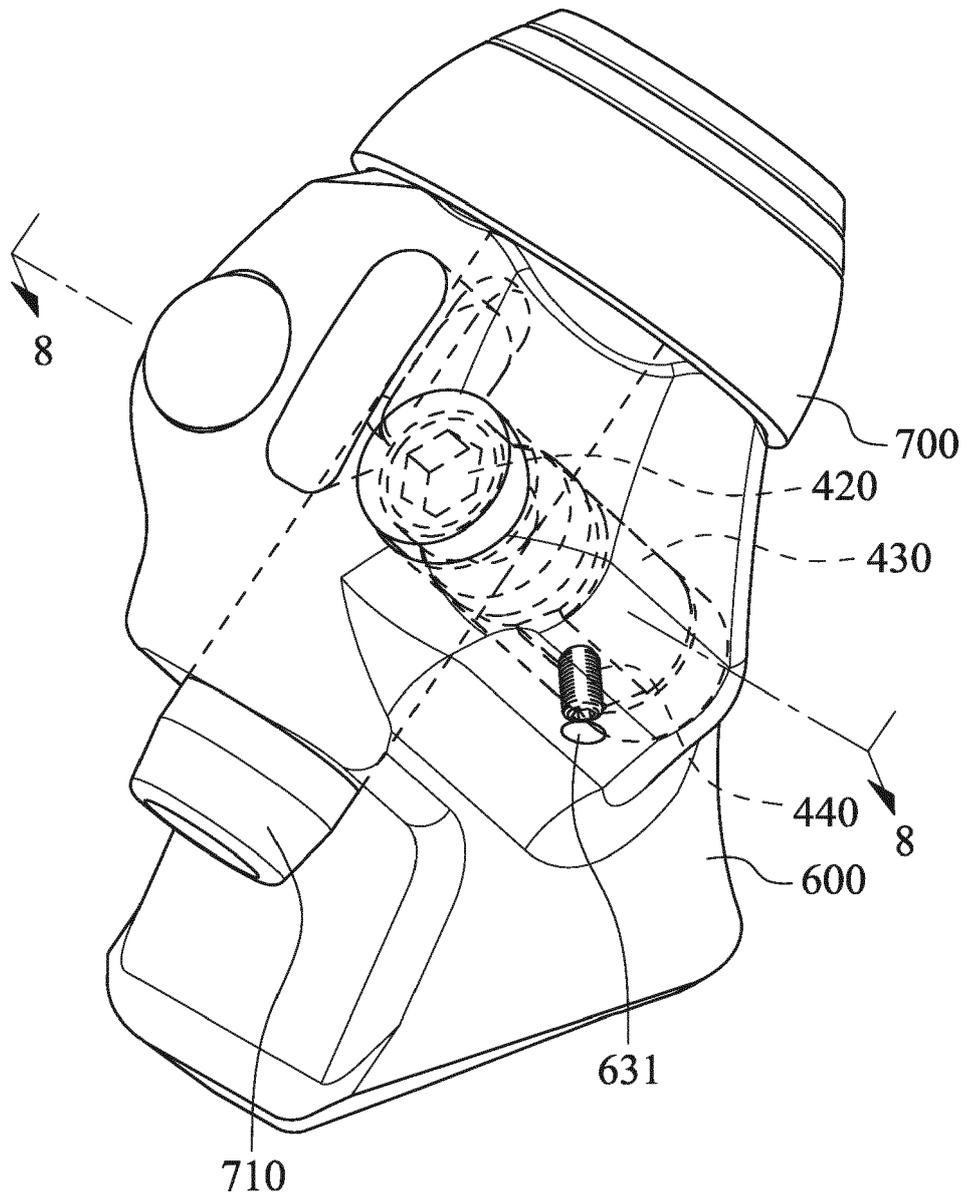


Fig. 7

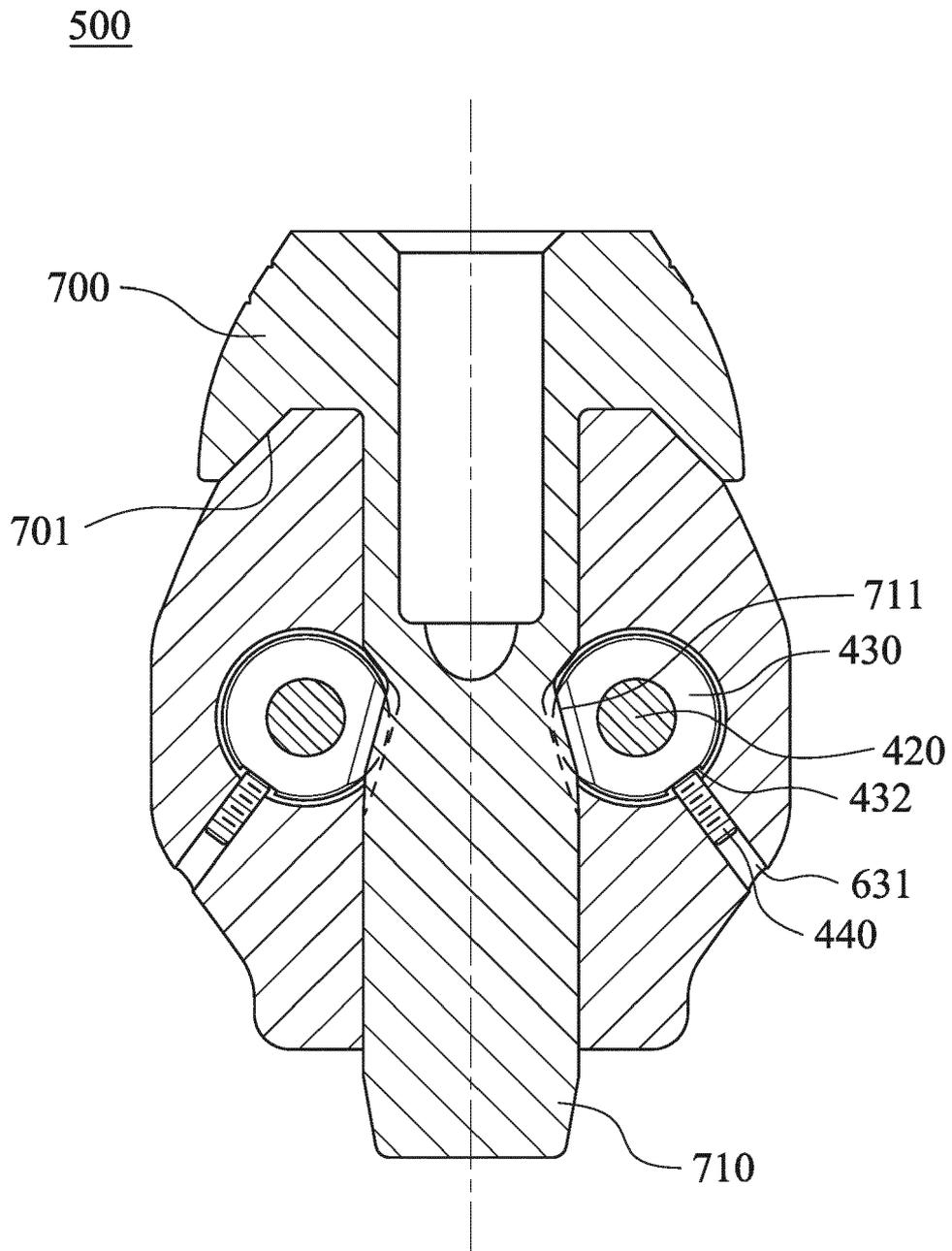


Fig. 8



EUROPEAN SEARCH REPORT

Application Number
EP 17 16 9514

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Place of search The Hague		Date of completion of the search 28 September 2017	Examiner Chariot, David
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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EUROPEAN SEARCH REPORT

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