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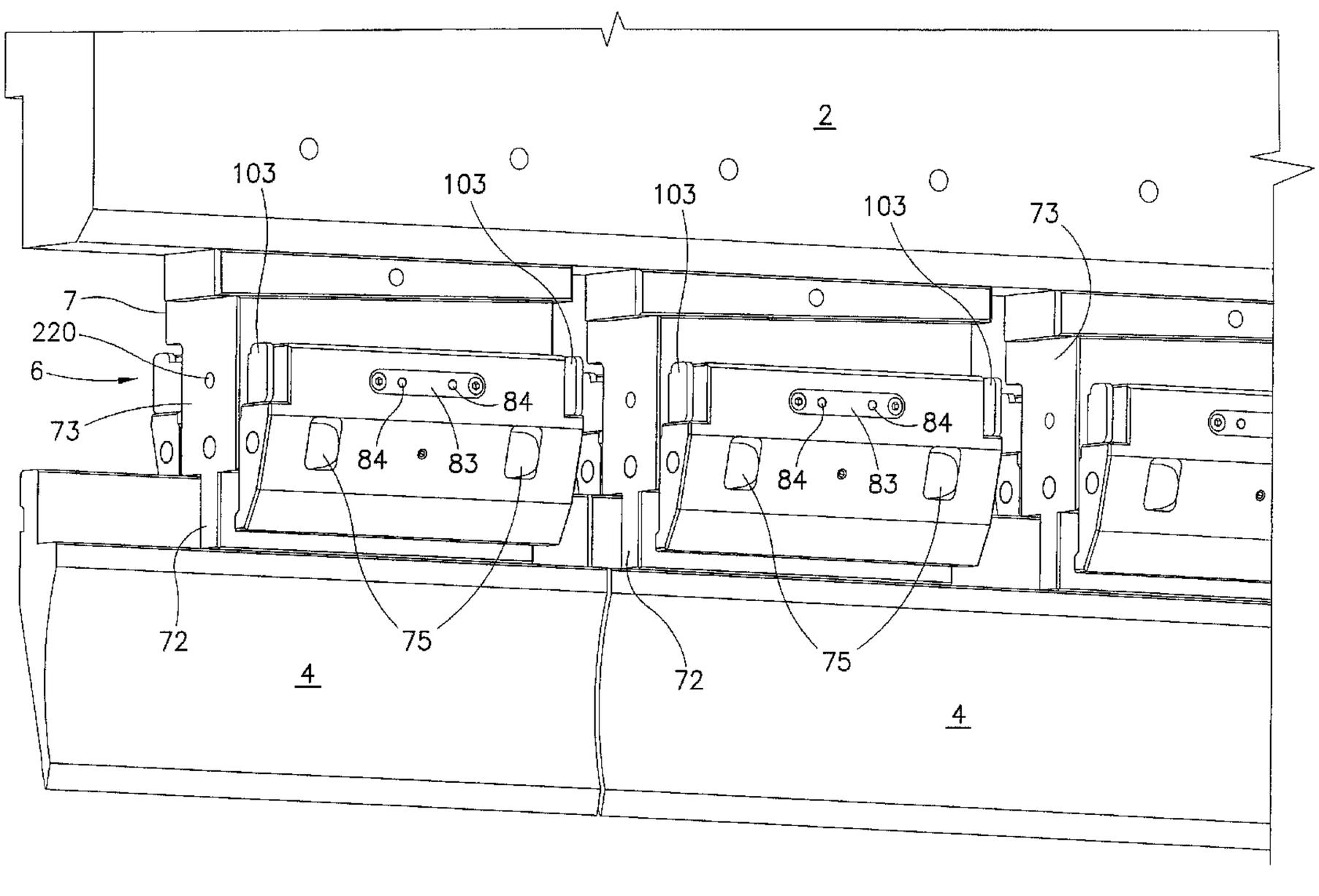
(54) Titre : ELEMENT DE SUPPORT D'OUTIL MODULAIRE DANS DES PRESSES DE CINTRAGE DE TOLE
(54) Title: MODULAR TOOL SUPPORT ELEMENT IN SHEET METAL BENDING BRAKES



(57) Abrégé/Abstract:
In sheet metal bending brakes a modular tool support element comprising an intermediary (6) fixed to the respective toolplate (2) and having a lower channel for receiving the tool shank provided with a groove along its entire length, means for supporting the shank in said channel while leaving it free to slide along the channel, and means for clamping the shank in said channel; the modular element comprises at least one lower channel a lateral wall of which is a movable jaw (81) rotatable about a fixed shaft rigid with the body of the intermediary, there being provided means for causing said jaw to rotate in the tool clamping direction, and movable abutments on said jaw (81) which are able to be positioned in front of or respectively moved away from said rotation-causing means.

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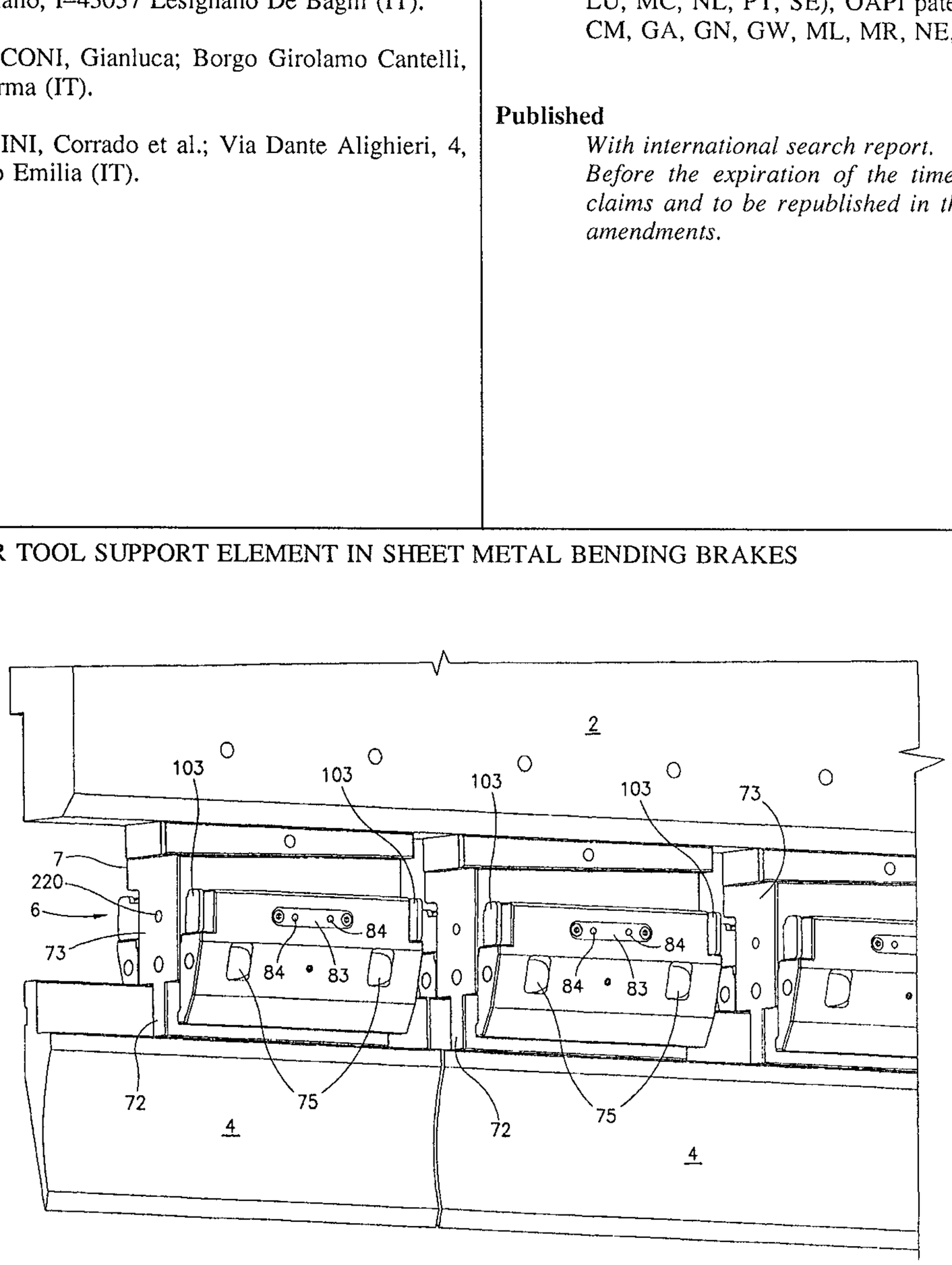

(57) Abstract

In sheet metal bending brakes a modular tool support element comprising an intermediary (6) fixed to the respective toolplate (2) and having a lower channel for receiving the tool shank provided with a groove along its entire length, means for supporting the shank in said channel while leaving it free to slide along the channel, and means for clamping the shank in said channel; the modular element comprises at least one lower channel a lateral wall of which is a movable jaw (81) rotatable about a fixed shaft rigid with the body of the intermediary, there being provided means for causing said jaw to rotate in the tool clamping direction, and movable abutments on said jaw (81) which are able to be positioned in front of or respectively moved away from said rotation–causing means.

Description

Modular Tool Support Element in Sheet Metal Bending Brakes

Technical field

This invention relates to bending brakes and more particularly to the means for retaining and locking the working tools used by these brakes.

Background art

Bending brakes generally comprise a structure supporting two vertically-positioned substantially coplanar opposing toolplates, of which one can move vertically.

To the facing edges of the toolplates are fixed the means for retaining and locking the punch and die respectively, each of these being formed from a plurality of tools aligned in succession, they having the same shape but different lengths.

The modular means for retaining and locking the tool are fixed to the respective toolplates by known means, and are arranged to receive the tool shank in a manner enabling it to be slid along an axis parallel to the toolplate edge and be locked in the desired position.

When the type of work changes, one or more tools have also to be changed, this being generally done by withdrawing or inserting the tools laterally from or into the respective retention and locking means in the direction of the edge of the metal sheet.

Withdrawing, adding or changing a tool is a particularly delicate and even dangerous operation, in particular with regard to the upper tools, which can also be very long and heavy.

For this reason, tool retention and locking means have been developed for bending brakes which enable the tool to be withdrawn vertically, in the brake working direction.

These known means are rather complicated because they have to comprise safety means to prevent the tool falling down when it is released.

Equipment of the known art, comprising said tool retention and

which the device of the invention is mounted.

Figure 2 is a front view of the intermediary of Figure 1.

Figure 3 is a section on the line III-III of Figure 2.

Figure 4 is a section on the line IV-IV of Figure 3.

Figure 5 is a section on the line V-V of Figure 2.

Figure 6 is an isometric view of a second embodiment of the invention.

Figure 7 is a front view in the direction VII of Figure 6.

Figure 8 is a section on the line VIII-VIII of Figure 7.

Figure 9 is a section on the line IX-IX of Figure 7.

Figure 10 is a section on the line X-X of Figure 7.

Figure 11 is a section on the line XI-XI of Figure 8.

Figure 12 is an isometric view of a third embodiment of the invention.

Figure 13 is a front view in the direction XIII of Figure 12.

Figure 14 is a section on the line XIV-XIV of Figure 13.

Figure 15 is a section on the line XV-XV of Figure 13.

Figure 16 is a section on the line XVI-XVI of Figure 15.

Figure 17 is a schematic view of a detail of the invention.

Figure 18 is a side view of a variant of the third embodiment of the invention.

Figure 19 is a section on the line XIX-XIX of Figure 18.

Figure 20 is an exploded detail of said variant of the third embodiment of the invention.

The figures show the movable upper toolplate 2 of a sheet metal bending brake, which lowerly carries a series of aligned tools 4 having the same shape but different lengths, they forming overall the punch of the brake. Likewise the lower toolplate of the brake carries a series of usual counter-tools which do not concern this description and are therefore not shown.

In detail, the tools 4 forming the punch are secured to the respective toolplate 2 by a series of aligned intermediary members ~~X~~, known hereinafter simply as intermediaries, which are in mutual contact.

The intermediaries ~~X~~ 7 are fixed to the respective upper and lower toolplates by usual means.

which the device of the invention is mounted.

Figure 2 is a front view of the intermediary of Figure 1.

Figure 3 is a section on the line III-III of Figure 2.

Figure 4 is a section on the line IV-IV of Figure 3.

Figure 5 is a section on the line V-V of Figure 2.

Figure 6 is an isometric view of a second embodiment of the invention.

Figure 7 is a front view in the direction VII of Figure 6.

Figure 8 is a section on the line VIII-VIII of Figure 7.

Figure 9 is a section on the line IX-IX of Figure 7.

Figure 10 is a section on the line X-X of Figure 7.

Figure 11 is a section on the line XI-XI of Figure 8.

Figure 12 is an isometric view of a third embodiment of the invention.

Figure 13 is a front view in the direction XIII of Figure 12.

Figure 14 is a section on the line XIV-XIV of Figure 13.

Figure 15 is a section on the line XV-XV of Figure 13.

Figure 16 is a section on the line XVI-XVI of Figure 15.

Figure 17 is a schematic view of a detail of the invention.

Figure 18 is a side view of a variant of the third embodiment of the invention.

Figure 19 is a section on the line XIX-XIX of Figure 18.

Figure 20 is an exploded detail of said variant of the third embodiment of the invention.

The figures show the movable upper toolplate 2 of a sheet metal bending brake, which lowerly carries a series of aligned tools 4 having the same shape but different lengths, they forming overall the punch of the brake. Likewise the lower toolplate of the brake carries a series of usual counter-tools which do not concern this description and are therefore not shown.

In detail, the tools 4 forming the punch are secured to the respective toolplate 2 by a series of aligned intermediary members 6, known hereinafter simply as intermediaries, which are in mutual contact.

The intermediaries 6 are fixed to the respective upper and lower toolplates by usual means.

In the first embodiment shown in Figures 1 to 5, each intermediary comprises a central body 7 provided upperly with a salient lateral flange 71 for fixing the intermediary to the brake toolplate (Figure 4).

In an opposite position to the position of the flange 71, the central body comprises along its entire length a lower portion 72 and an intermediate portion 73, which is wider than the portion 72.

At the base of the portion 73 two symmetrical milled recesses 74 (Figure 5) are provided equidistant from the centre of the central body and perpendicular to the axis of the intermediary 7, each of them receiving a bar 75 maintained in position by a central pin 76 of length equal to the length of the central body 7 and locked in position by a central setscrew 77, as shown in Figure 4.

To the ends of each bar 75 there are hinged two symmetrical profiled jaws 81 and 82 which with the portion 72 of the body 7 define two symmetrical seats for receiving the shank of a tool.

Each jaw has at its end a raised edge 800, the connection surface 801 of which is inclined, and which defines a channel in which the longitudinal tooth 802 of the shank of the tool 4 is positioned, as shown in Figure 4.

The profiled jaws are hinged to the respective bars by pins 78 of length equal to the length of the ~~body~~ INTERMEDIARY 7, and maintained in position by a central setscrew 79.

Above the pin 76 the body 7 receives a profiled rotatable shaft 9, positioned through the centre of the portion 73.

In proximity to its ends, the shaft 9 comprises two pairs of parallel milled cavities facing two through holes 92 in the body 7 having their axis perpendicular to the axis of the shaft 9.

Each hole 92 receives, on one side of the shaft 9 and the other, a cup-shaped piece 93 the base of which rests against that milled recess 91 which faces it.

Each cup-shaped piece receives a pack of spring washers 94 through which a profiled pin 95 with a large head is inserted.

At its centre, the shaft 9 presents a circumferential groove 96 extending through about 110° and receiving a stop piece 97 inserted through a hole in the body 7.

It should be noted that in certain embodiments of the invention, said circumferential groove can conveniently extend through a different angle.

The upper portion of each of the jaws 81 and 82 is shorter, as can be seen in Figures 2 and 3.

In said portion there is provided an elongate cavity closed by a cover 83 provided with two projecting pins 84 which extend into the cavity.

Between the pins 84, acting as stop pins, there is positioned a spring 85, the purpose of which will be apparent hereinafter.

In an opposite position to the cover, each jaw has a slot 86 extending along its entire length, to movably receive a latch 100 comprising two opposing pairs of stop pins 101 which, when the latch is within the groove, lie respectively at the ends of the spring 85 (Figure 4).

The latch 100 is therefore free to undergo movement in both directions, being always returned into a central position by the spring 85.

The movements of the latch 100 are produced by the operator acting on its bent ends 103.

The latch 100 is retained in the groove 101 by a central plate 104 (Figure 4) screwed to the respective jaw 81, 82 by two fixing screws 105.

To the sides of the plate 104 the latch 100 comprises two abutments 106 facing the large-headed pins 95 inserted through the spring washers 94, as shown in Figure 5.

When the latch is in its central rest position, rotation of the shaft 9 through 110° causes the cup-shaped pieces 93 to emerge, the large-headed pins 95 consequently elastically acting on the abutments 106 to rotate the jaw about the pins 78 and clamp the tool.

When the latch 100 is moved from this position, the abutments 106 no longer lie in front of the large-headed pins 95, so that the jaw can no longer be urged into its closed position, and moreover is free to open completely by rotating in the opposite direction, to enable the tool to be withdrawn from below.

The second embodiment of the invention is shown in Figures 6 to 11, in which elements corresponding to those of Figures 1 to 5 are indicated by the same reference numerals.

In the second embodiment, each intermediary 7 comprises a central body 7 provided upperly with a salient lateral flange 71 for fixing the intermediary to the brake toolplate.

In an opposite position to the position of the flange 71, the central body comprises along its entire length a lower portion 72 and an intermediate portion 73, which is wider than the portion 72.

At the base of the portion 73 two symmetrical milled recesses 74 are provided equidistant from the centre of the central body and having their axis perpendicular to the axis of the intermediary 7, each of them receiving a bar 75 maintained in position by a central pin 76 of length equal to the length of the central body and locked in position by a central setscrew 77.

To the ends of each bar 75 there are hinged two symmetrical profiled jaws 81 and 82 which with the portion 72 of the body 7 define two symmetrical seats for receiving the shank of a tool.

The profiled jaws are hinged to the respective bars by pins 78 of length equal to the length of the body 7, and maintained in position by a central setscrew 79.

The portion 73 comprises two through holes 210 in proximity to its ends, in positions symmetrical about its centre (Figure 8).

Each hole 210 receives two identical guide pieces 211 arranged symmetrical to each other, and prevented from escaping from their respective hole by a locking ring 212.

In the inside of each guide piece 211 there slides a piston having an end head 213 and a wide base 214.

The base 214 of the two aligned pistons is maintained against a snap ring 215 located in a groove positioned at the centre of the hole 210, but can freely move a certain distance towards the outside of the hole.

A compression spring 216 positioned between a shoulder on the guide piece 211 and the wide base 214 of the piston maintains this latter in said position as shown in Figure 10.

The body 7 has a through conduit 220 which intersects the axis of

the holes 210 at the snap ring 215 against which the piston bases 214 rest.

Feed and shut-off means for a pressurized fluid (oil) are provided at the ends of the conduit 220, these not being shown as they are easily implemented by an expert of the art.

The jaws 91 and 92 are provided with the same means as in the first embodiment, to the detailed description of which reference should be made.

Their operation is also very similar to the first embodiment.

Feeding the pressurized fluid to the conduit 220 causes the pistons 212 to emerge so that they act on the abutments 106 of the latch 100.

Said action causes the jaw to rotate about the pins 78, with consequent clamping of the tool.

When the latch 100 is moved, the abutments 106 no longer lie in front of the heads 213, hence the jaw is not only no longer urged towards its closed position but is free to open completely by rotating in the opposite direction.

From the aforegoing it will be apparent that when the latch 100 is in its central rest position and the shaft 9 or the pistons 212 are also in their rest position, the tool is supported by the modular support element without being clamped, and hence can be withdrawn from the modular element by sliding it in a horizontal direction.

When the latch 100 is moved from its rest position, the jaws can be moved further apart to enable the tool to be withdrawn from below.

In contrast, when the latch is in its rest position and the shaft 9 or the pistons 212 are operated, the tool is clamped in its working position.

The third embodiment of the invention is shown in Figures 12 to 17, in which elements corresponding to Figures 1 to 5, which show the initially described embodiment of the invention, are indicated by the same reference numerals.

In the third embodiment each intermediary 7 comprises a central body 7 provided upperly with a salient lateral flange 71 for fixing the intermediary to the brake toolplate.

In an opposite position to the position of the flange 71, the

central body comprises along its entire length a lower portion 72 and an intermediate portion 73, which is wider than the portion 72. With reference to Figure 16, at the base of the portion 73 two symmetrical milled recesses 74 are provided equidistant from the centre of the central body and having their axis perpendicular to the axis of the intermediary, each of them receiving a bar 75 maintained in position by a central pin 760 locked in position by a central setscrew 761.

To the ends of each bar 75 there are hinged two symmetrical profiled jaws 300 and 301 which with the portion 72 of the body 7 define two symmetrical seats for receiving the shank of a tool. The profiled jaws 300 and 301 are hinged to the respective bars 75 by pins 780, each of which is locked in position by a setscrew 790.

Above the central pin 760 the body comprises, in positions symmetrical about its centre, a longitudinal through hole 700 and three transverse through holes 701, 702 and 703, the axes B, C, D of which are perpendicular to the axis A of the through hole 700.

The axis C of the hole 701 coincides with the axis of transverse symmetry of the body 7, the holes 702 and 703 being equidistant from said axis C.

Each end of the holes 702 and 703 receives a cup-shaped piece 93 receiving a pack of spring washers 94 through which a profiled pin 95 with a large head is inserted.

The base of said cup-shaped pieces 93 rests against a vertical cylinder 303 which is inserted into the fork-shaped end 304 of a cylindrical piece 305 received in the hole 700. In detail, as shown in Figure 17, from the crosspiece of said fork 304 there extends a cusp 306 the vertex of which is perpendicular to the inner facing faces of the arms 304' of said fork 304. The vertex of the cusp 306 is spaced from the free end of the arms 304' of the fork 304.

The hole 701 receives a shaft 307, one end of which has a stem 308 which emerges from the body 7 to be fixed to an operating lever 309 for rotating said shaft 307. At the hole 700 the shaft 307 has two parallel milled recesses, each of which receives the rear end of the cylindrical pieces 304 inserted into the hole 700.

Into each end of the hole 700 there is screwed a plug 311 provided with two parallel threaded holes 312 equidistant from its centre. Each of said holes 312 receives a roller 313 of horizontal axis having its front face resting against one of the vertical cylinders 303. The rollers are retained in position by a rear setscrew 314 screwed into the hole 312.

Each of the jaws 301 and 302 upperly comprises a central projection 315 and two lateral projections 316.

The central projection 315 on the jaw 302 is provided with a hollow 317 for passage of the cylindrical stem 308 connecting the shaft 307 to the lever 309.

The two lateral projections 316 have a through hole 319 with different sections 319' and 319", which receives a pin 318 about which a spring 320 is mounted. One end of the pin 318 emerges laterally from said projection 316 and is locked by a pin 321. The opposite end of the pin 318 is enlarged to form a base for one end of the spring 320, the other end of which rests on the base of the section 319' of the hole 319, as shown in Figure 14.

The enlarged ends of the two pins 318 are fixed by a screw 322 to one and the other end of a latch 323 having the same length as one of the jaws 301 or 302.

The screws 322 also fix an external cover 324 to the jaw 301 and 302.

The latch 323 is hence free to move in both directions, being always returned to its central rest position by the springs 320.

From Figure 14 it can be seen that the latch 323 is provided with two abutments 325 which when the latch 323 is in its rest position lie in front of the pins 95.

The movements of the latch 323 are produced by the operator acting on its bent ends.

When the latch is in its central rest position, rotating the shaft 307 through 90° causes the pieces 305 to move and act on the cylinders 303, so causing the cup-shaped pieces 93 to emerge and the large-headed pins 95 to act elastically on the abutments 325, so that the jaws 301 and 302 rotate about the pins 780 with consequent clamping of the tool 4.

To remove the tool 4, the operator rotates the lever through 90°. after which he moves the latch 323. In this manner the abutments 325 on the latch 323 no longer lie in front of the large-headed pins 95, hence the jaws 301 and 302 are not only no longer urged towards their closed position but are free to open completely by rotating in the opposite direction, to enable the tool to be withdrawn from below.

Figures 18 to 20 show a variant of the third embodiment of the invention. In said figures, elements corresponding to those of Figures 12 to 17, which show the third described embodiment of the invention, are indicated by the same reference numerals.

This latter variant of the third embodiment of the invention differs therefrom in the means for rotating the jaws 301 in order to clamp and release the tool 4.

In this variant, from the rear of the cup-shaped members 93 there branches a fork 330, the arms 331 and 332 of which have a hole through which a cylinder 333 is inserted. Said cylinder 333 interferes with the conical end of a cylindrical element 334, the other end of which rests on the base of two milled recesses 310 in the shaft 307.

Two closure plugs 335 are inserted into the ends of the hole 700.

In this case, when the operator rotates the shaft through 90° by means of the lever 309, the cylindrical elements 334 are made to move and press against the lateral surface of the cylinders 333 to cause the cup-shaped pieces 93 and hence the large-headed pins 95 to move outwards. These latter rotate the jaws 301 and 302, which clamp the tool in position.

To release the tool, the operator rotates the lever 309 in the reverse direction. In this manner the spring washers 94 retract the cup-shaped pieces 93 and the pins 95, at the same time the cylinders 333 shifting the cylindrical elements 334.

It should be noted that the invention can receive the tool 5 either from the front or the rear, and that although four possible versions of the invention all with two jaws have been described, it can also be usefully implemented with only one jaw.

Claims as originally filed, with reference signs
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Claims

1. In sheet metal bending brakes a modular tool support element comprising an intermediary fixed to the respective toolplate and having a lower channel for receiving the tool shank provided with a groove along its entire length, means for supporting the shank in said channel while leaving it free to slide along the channel, and means for clamping the shank in said channel, characterised by comprising at least one lower channel a lateral wall of which is a movable jaw (81, 82, 300, 301) rotatable about a fixed shaft (78) rigid with the body of the intermediary (7), there being provided means (95, 213) for causing said jaw to rotate in the tool clamping direction, and movable abutment means (106, 325) on said jaw which are able to be positioned in front of or respectively moved away from said rotation-causing means.

2. An element as claimed in claim 1, characterised in that when said movable abutment means (106, 325) are present in front of the rotation-causing means (95, 213), the rotation of the movable wall is limited to an extent such as to enable the tool shank to slide along the intermediary, but to not enable the tool to be withdrawn in the vertical direction.

3. An element as claimed in claim 1, characterised in that when said movable abutment means (106, 325) are absent in front of the rotation-causing means (95, 213),

Claims as originally filed, with reference signs
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the jaw can rotate freely until the tool can be withdrawn in the vertical direction.

4. An element as claimed in claim 1, characterised in that the means for causing said wall to rotate in the tool clamping direction comprise a rotatable shaft (9) which occupies the entire length of the intermediary (7) and has at least one milled flat recess (91) against which there elastically rests a large-headed pin (95) which as a result of rotating the shaft is urged against said movable abutment means.

5. An element as claimed in claim 1, characterised in that the means for causing said wall to rotate in the tool clamping direction comprise at least one piston (213-214) with its axis perpendicular to the intermediary (7) axis, which is maintained elastically in a retracted position, and is urged by the action of a pressurised fluid against said movable abutment means (106) provided on the jaws.

6. An element as claimed in claim 1, characterised in that said movable abutment means comprise, slidable in the direction of the intermediary axis and maintained in its rest position by at least one spring, a latch (100, 323) comprising at least one abutment (106, 325) which when in said rest position faces said jaw rotation-causing means (95), and when in its working position does not face said means.

Claims as originally filed, with reference signs
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7. An element as claimed in claim 1, characterised in that said jaw rotation-causing means comprise a rotatable shaft (307) which occupies the entire width of the intermediary (7) and has at least one milled flat recess which receives the end of an actuator member (305), the other end of which is associated with at least one vertical cylinder (303) against which there elastically rests a large-headed pin which as a result of rotating the shaft (307) is urged against said movable abutment means (95).

8. An element as claimed in claim 7, characterised in that that end (304) of said actuator member (305) associated with said at least one cylinder (303) is shaped as a fork, with a cusp (306) forming the crosspiece of said fork.

9. An element as claimed in claims 7 and 8, characterised in that said at least one cylinder (303) is partially received between the arms of said fork and rests against one of the walls of said cusp (306).

10. An element as claimed in claim 7, characterised in that said at least one cylinder (303) also rests against a roller (313), of horizontal axis, the position of which can be regulated by means of a rear-lying setscrew (314).

11. An element as claimed in claim 1. characterised in that said jaw rotation-causing means comprise a rotatable shaft (307) which occupies the entire width of the intermediary (7) and has at least one milled flat recess which receives the end of an actuator member (334) the other end of which is associated with at least one

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vertical cylinder (333) which is constrained to a large-headed pin arranged to maintain said cylinder elastically resting against the end of said actuator member, said large-headed pin being urged against said movable abutment means as a result of rotating said shaft.

12. An element as claimed in claim 11 characterised in that that end of said actuator member (334) associated with said at least one cylinder (333) is conical.

13. An element as claimed in the preceding claims characterised by comprising for receiving and locking the tool shank two parallel lower channels a lateral wall of which is a respective movable jaw (81, 82, 301, 302).

14. An element as claimed in claim 13 characterised in that the means for causing the jaws to rotate in the tool clamping direction comprise a rotatable shaft (9) which occupies the entire length of the intermediary (7) and has at least two opposing parallel flat milled recesses (91) against each of which there elastically rests a large-headed pin (95) which as a result of rotating the shaft is urged against said movable abutment means (106) provided on the jaws.

15. An element as claimed in claim 14 characterised in that said large-headed pins (95) are coaxial.

16. An element as claimed in claim 13 characterised in that the jaw rotation-causing means comprise a rotatable shaft (307) which occupies the entire width of the

Claims as originally filed, with reference signs
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intermediary (7) and has at least two milled flat recesses each of which receives the end of an actuator member (305), the other end of which is associated with a vertical cylinder (303) against which there elastically rests a large-headed pin which as a result of rotating the shaft (307) is urged against said movable abutment means (95).

17. An element as claimed in claim 16, characterised in that that end of said actuator member associated with said at least one cylinder (303) is shaped as a fork, with a cusp (306) forming the crosspiece of said fork.

18. An element as claimed in claims 16 and 17, characterised in that said at least one cylinder (303) is partially received between the arms of said fork and rests against one of the walls of said cusp (306).

19. An element as claimed in claims 16 and 17, characterised in that said at least one cylinder also rests against a roller (313) of horizontal axis, the position of which can be regulated by means of a rear-lying setscrew (314).

20. An element as claimed in claim 13, characterised in that the jaw rotation-causing means comprise a rotatable shaft (307) which occupies the entire width of the intermediary (7) and has at least two milled flat recesses each of which receives the end of an actuator member (334), the other end of which is associated with at least one vertical cylinder (333) which is constrained

Claims as originally filed, with reference signs
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to a large-headed pin arranged to maintain said cylinder elastically resting against the end of said actuator member, said large-headed pin being urged against said movable abutment means as a result of rotating said shaft.

21. An element as claimed in claim 20, characterised in that that end of said actuator member (334) associated with said at least one cylinder (333) is conical.

22. An element as claimed in claim 13, characterised in that means for causing said jaws to rotate in the tool clamping direction comprise two pistons (213-214) aligned within one and the same hole having its axis perpendicular to the intermediary (7) axis, each of which is maintained elastically in a retracted position in contact with an annular stop element positioned at the centre of the hole. and is urged simultaneously with the other piston against said movable abutment means (306) provided on the jaws by the action of a pressurised fluid.

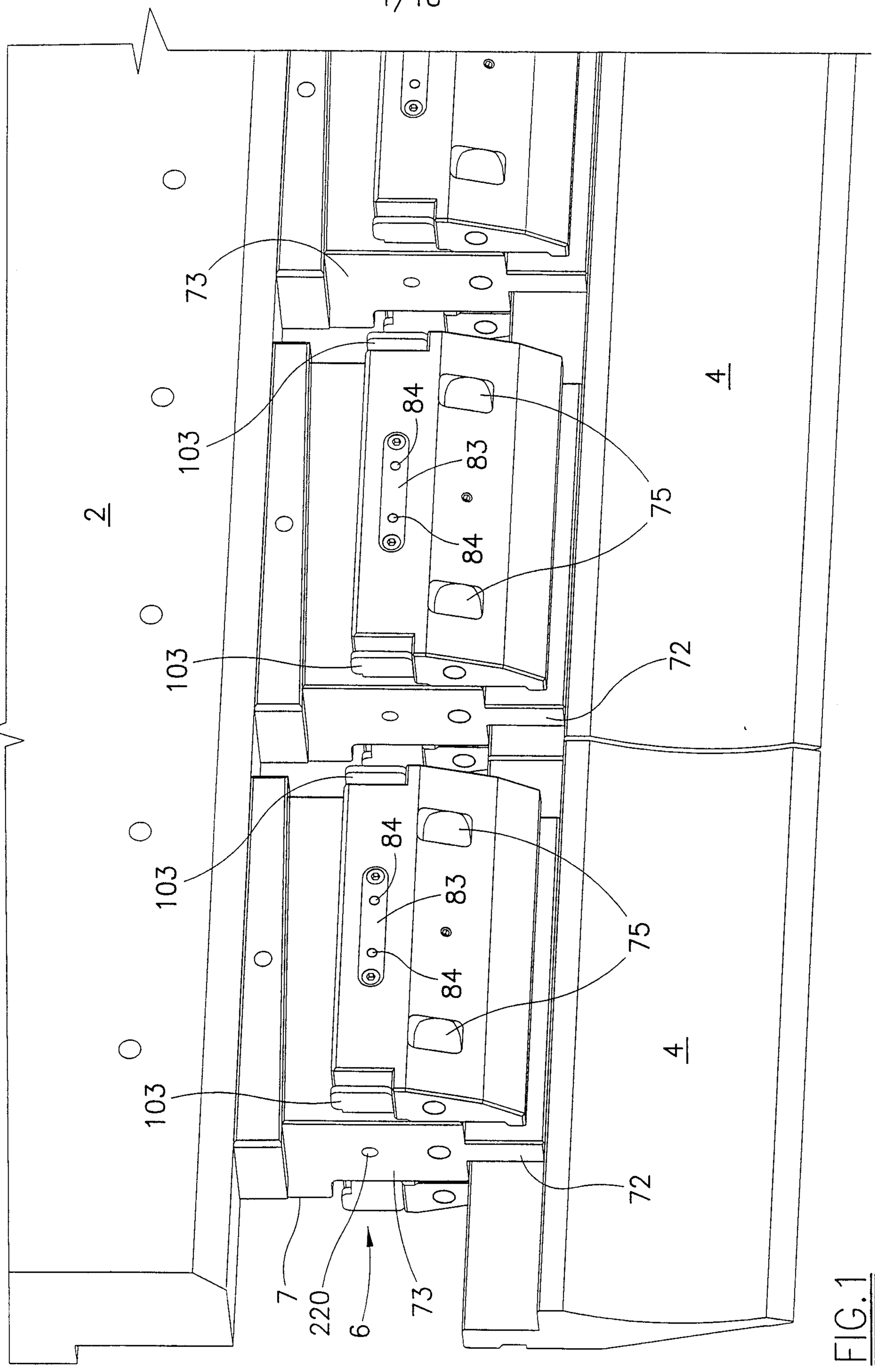


FIG.1

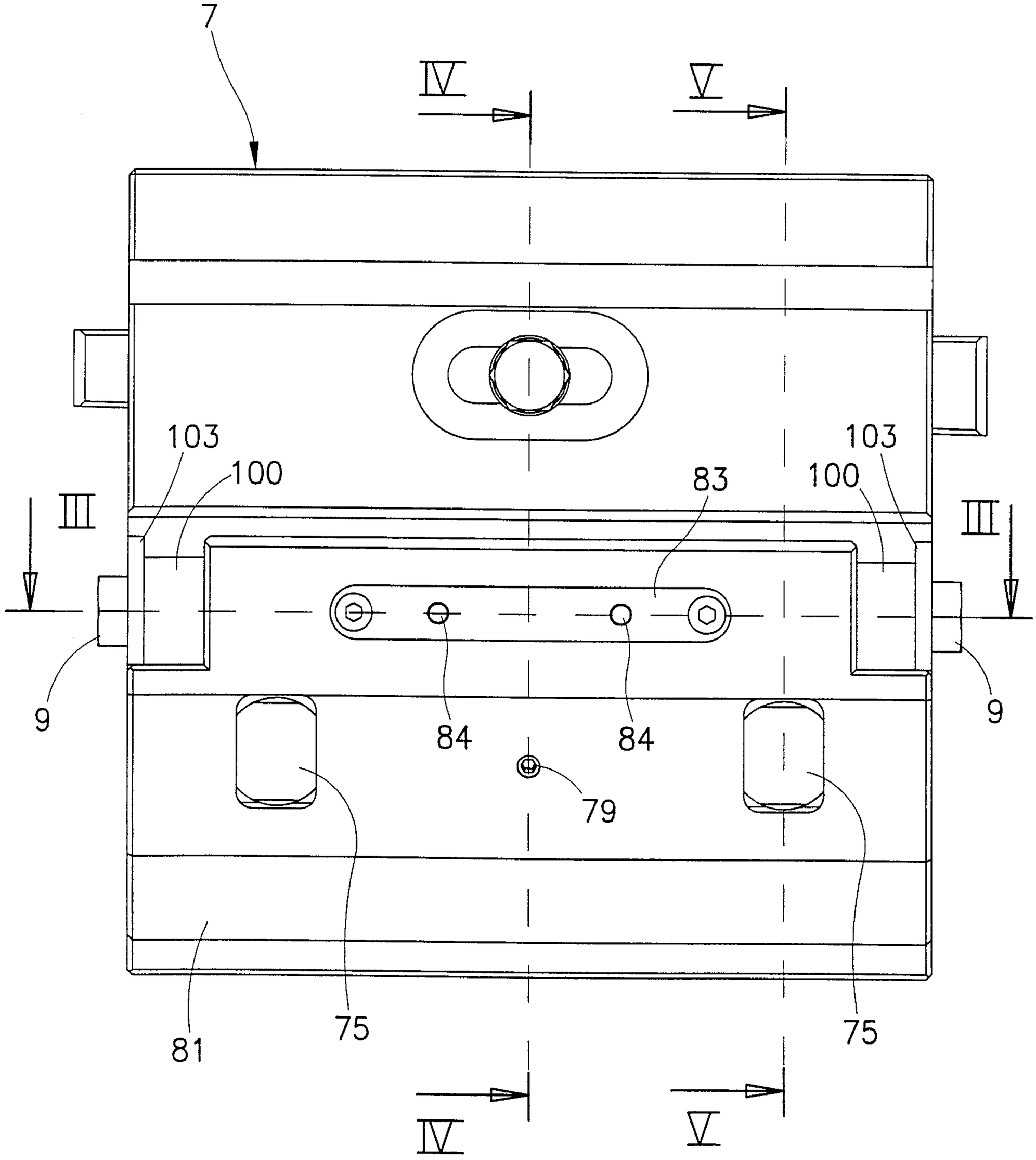
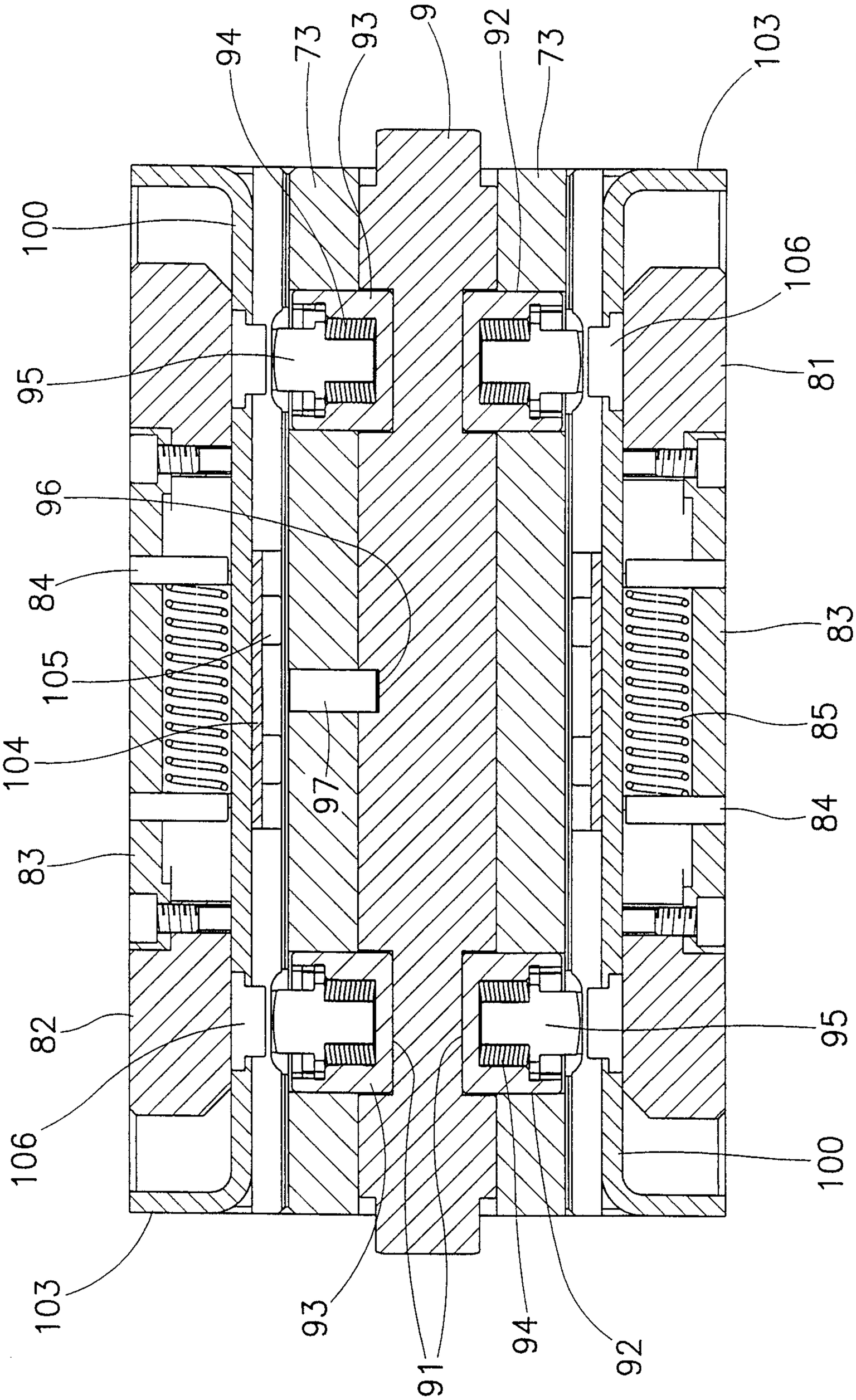


FIG.2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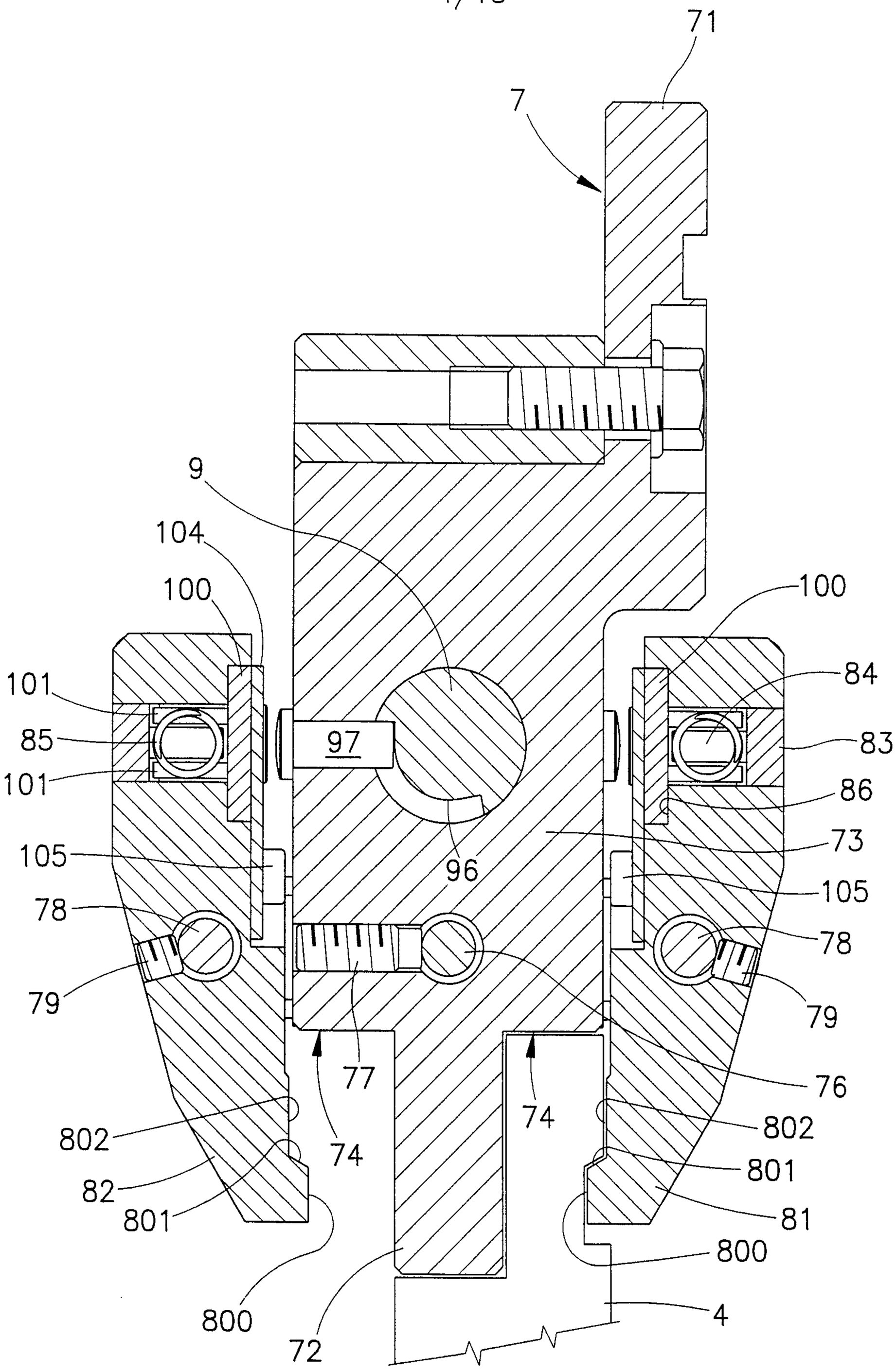
94
92

FIG. 3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801
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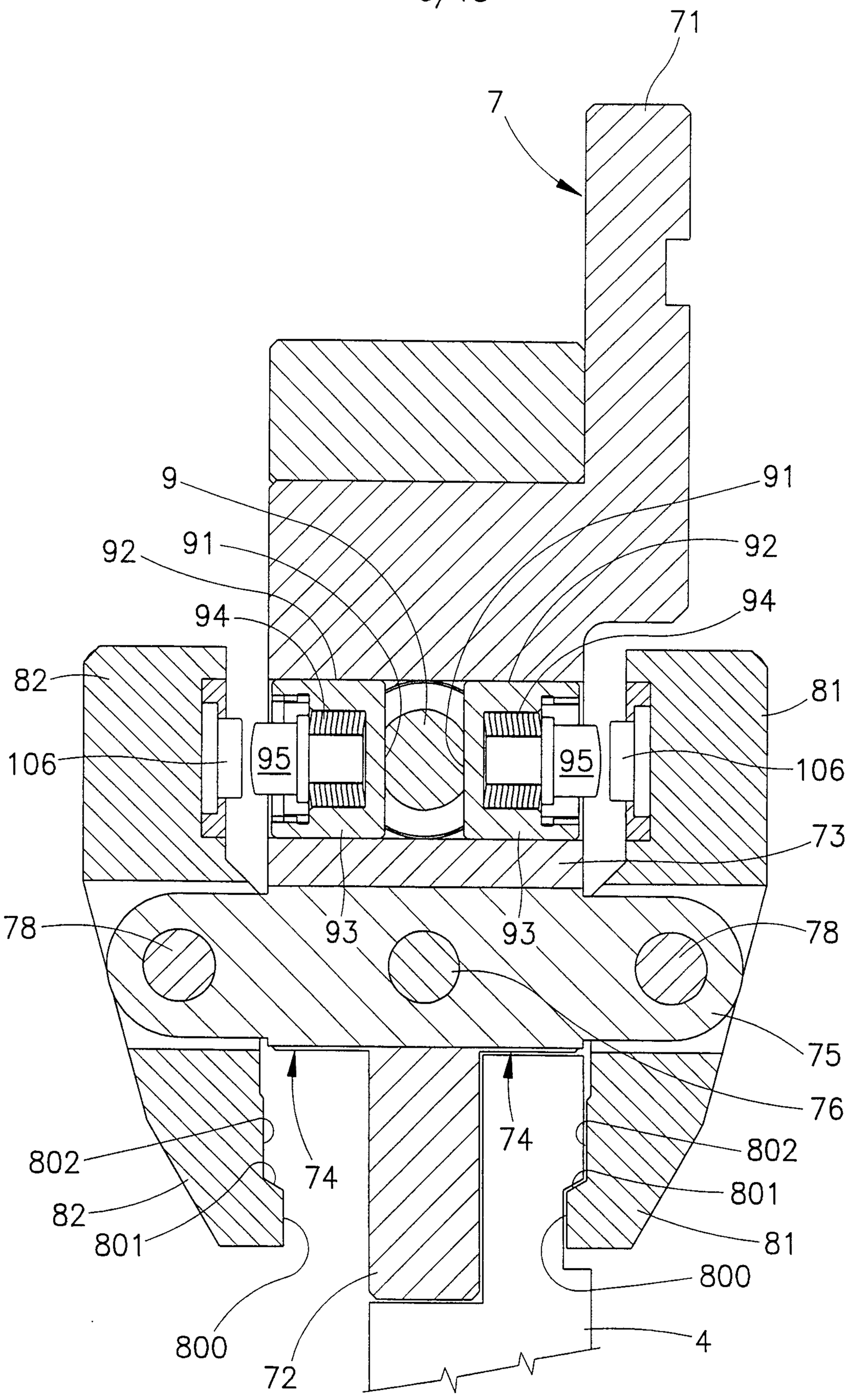
800
72
4

FIG.4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802
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801
82
801
81
800
800
4
72

FIG.5

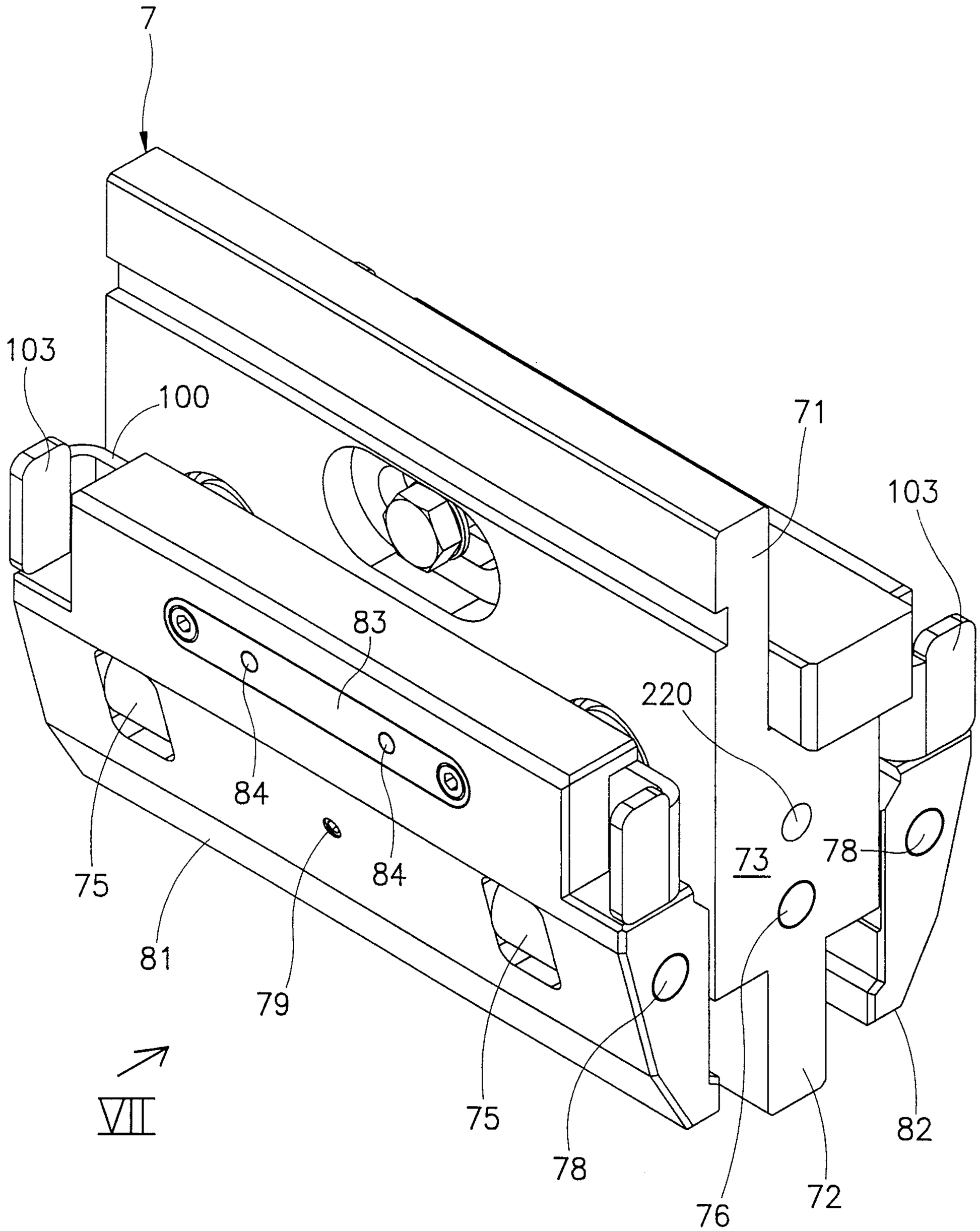


FIG.6

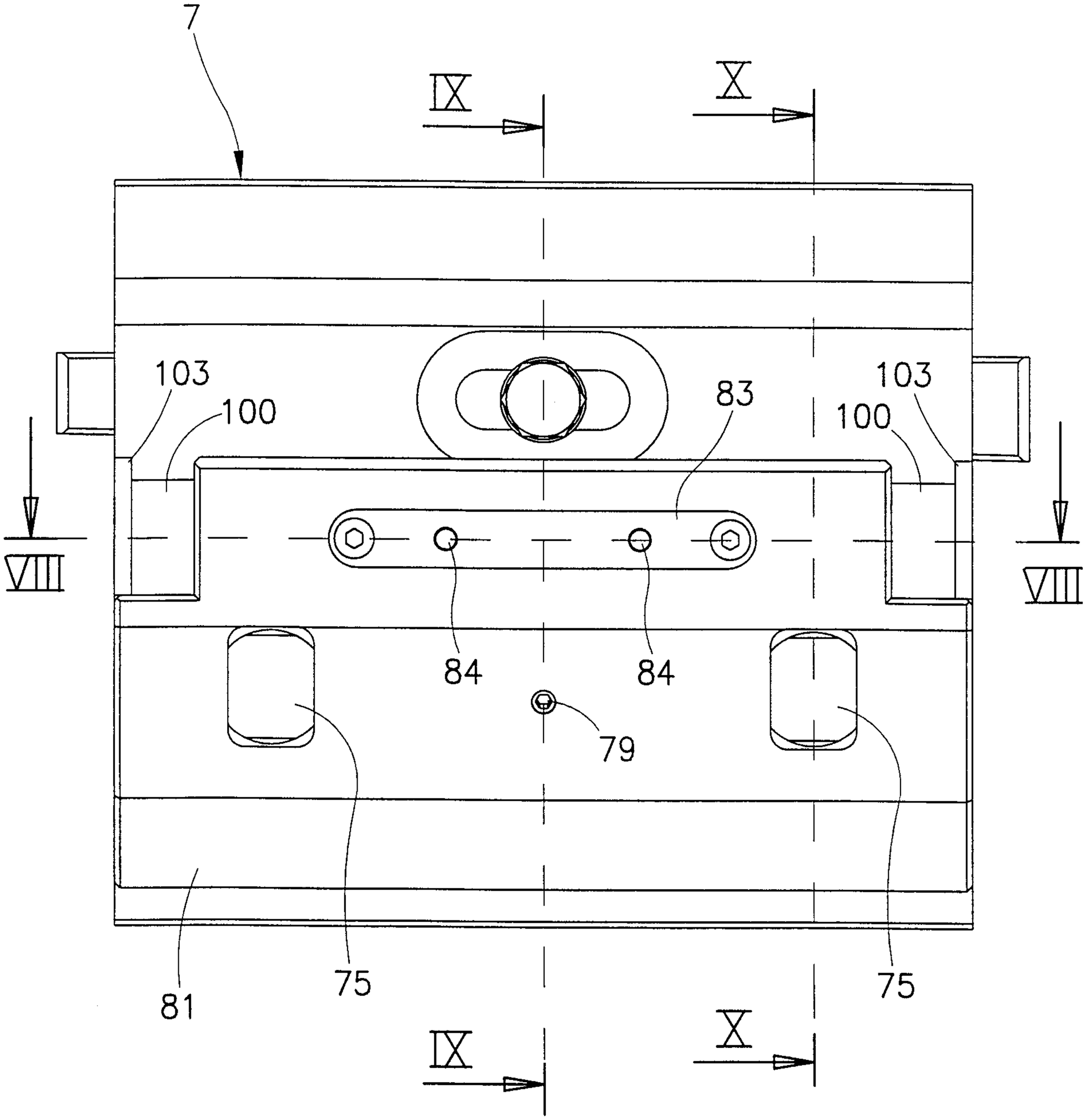
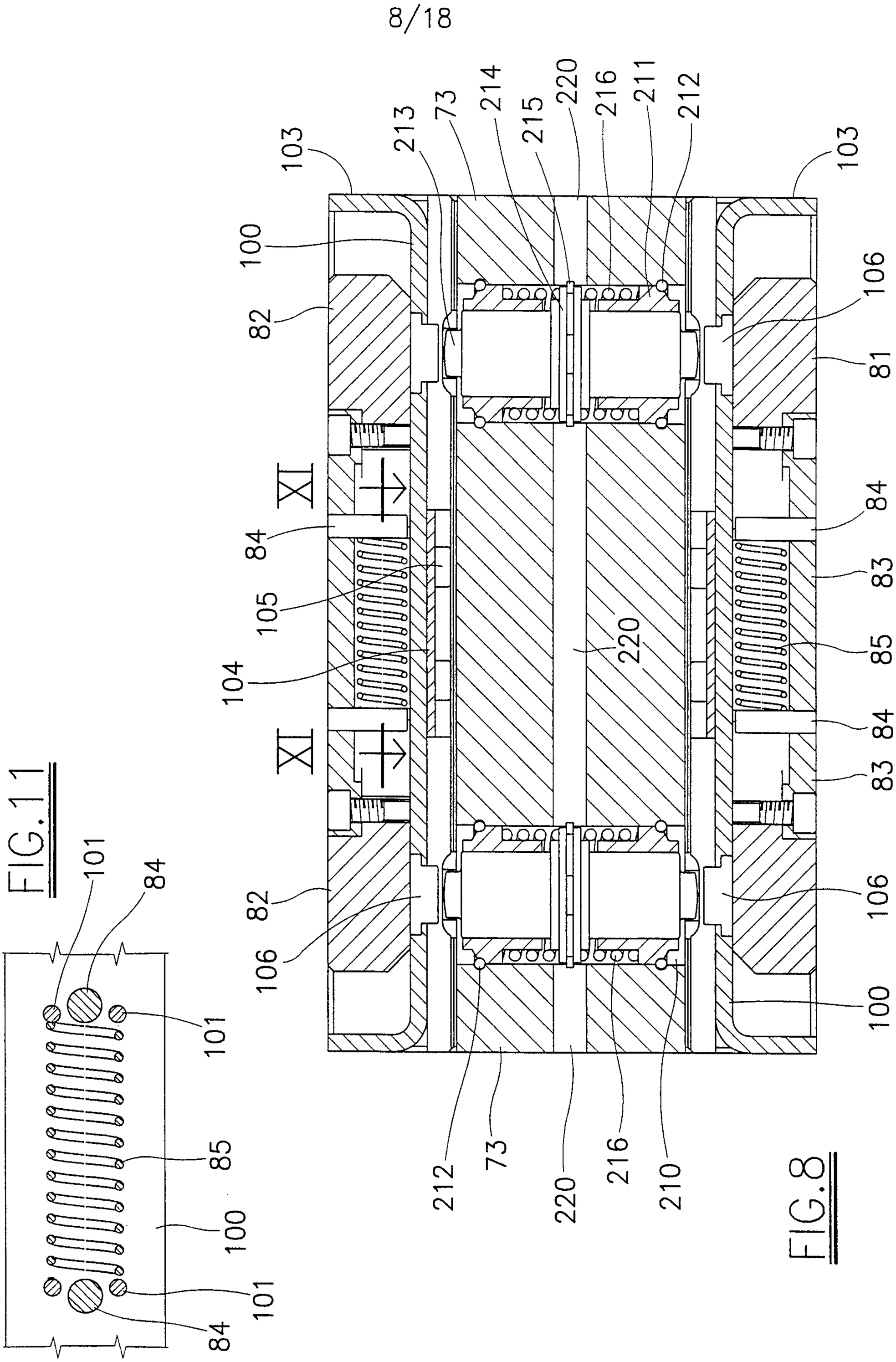


FIG.7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220
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82
81
XI
84
84
105
83
104
220
85
XI
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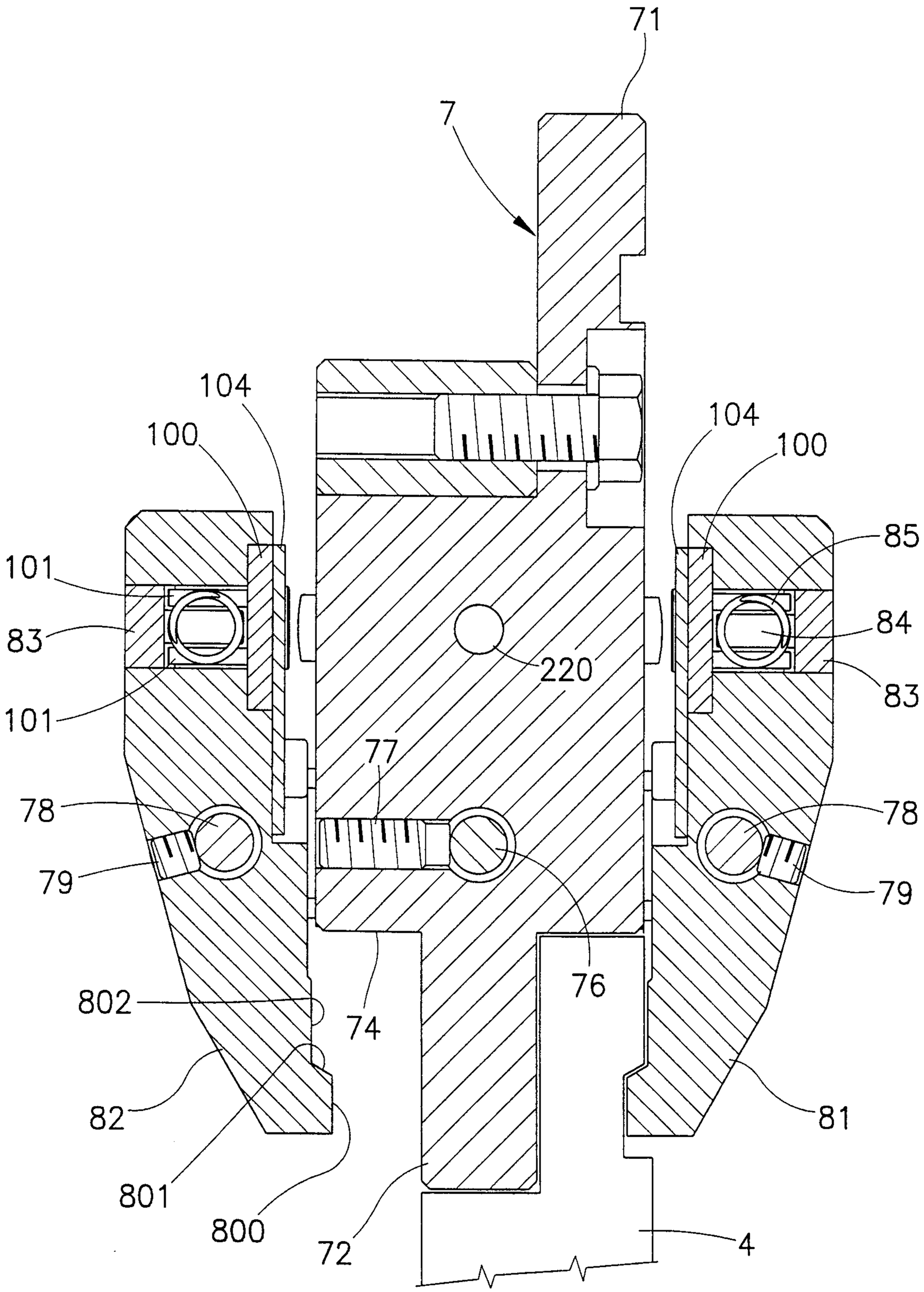
106
100
212
73
220
216
210

FIG.8

101
84
85
100
101
84

FIG.11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800
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FIG.9

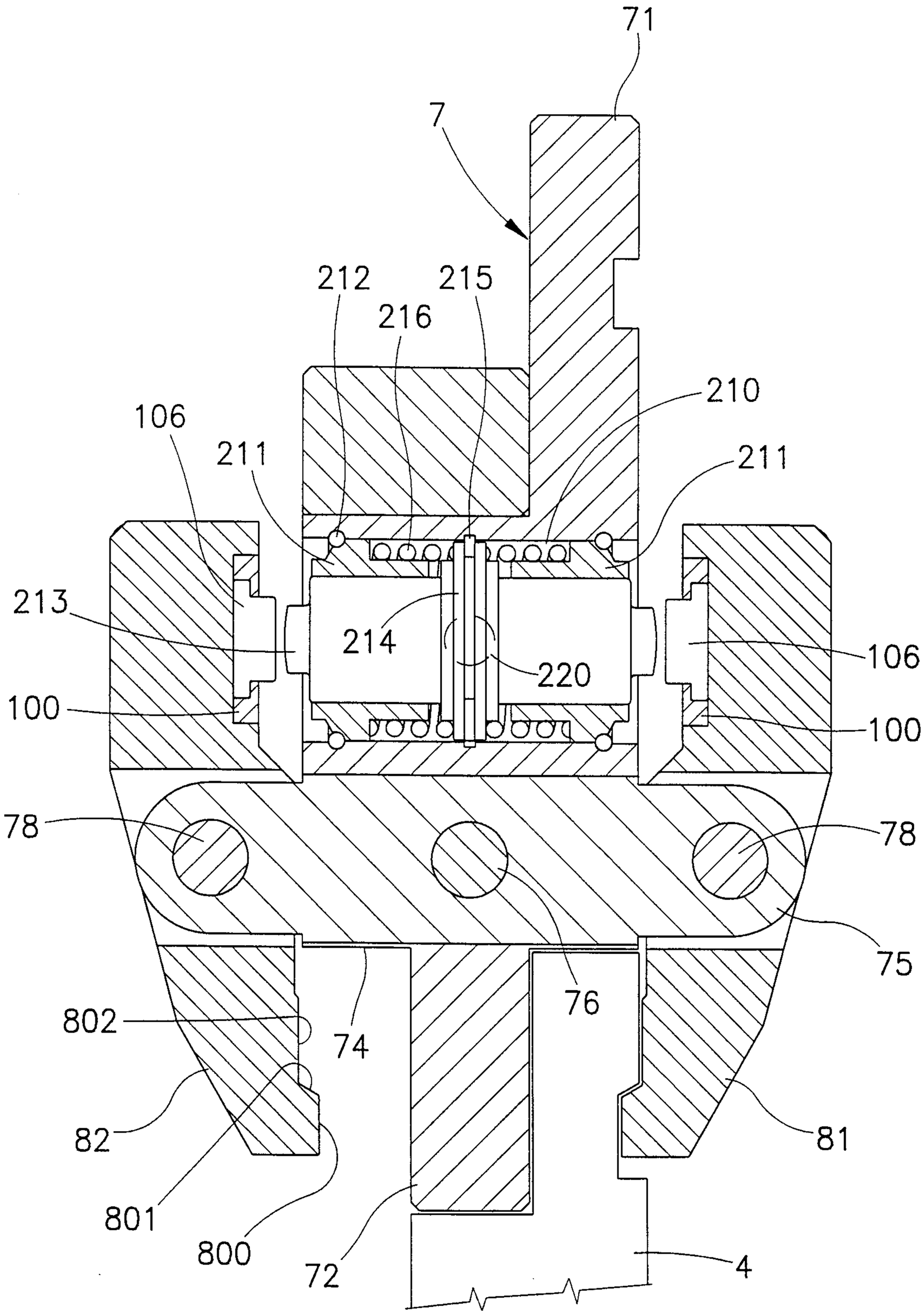
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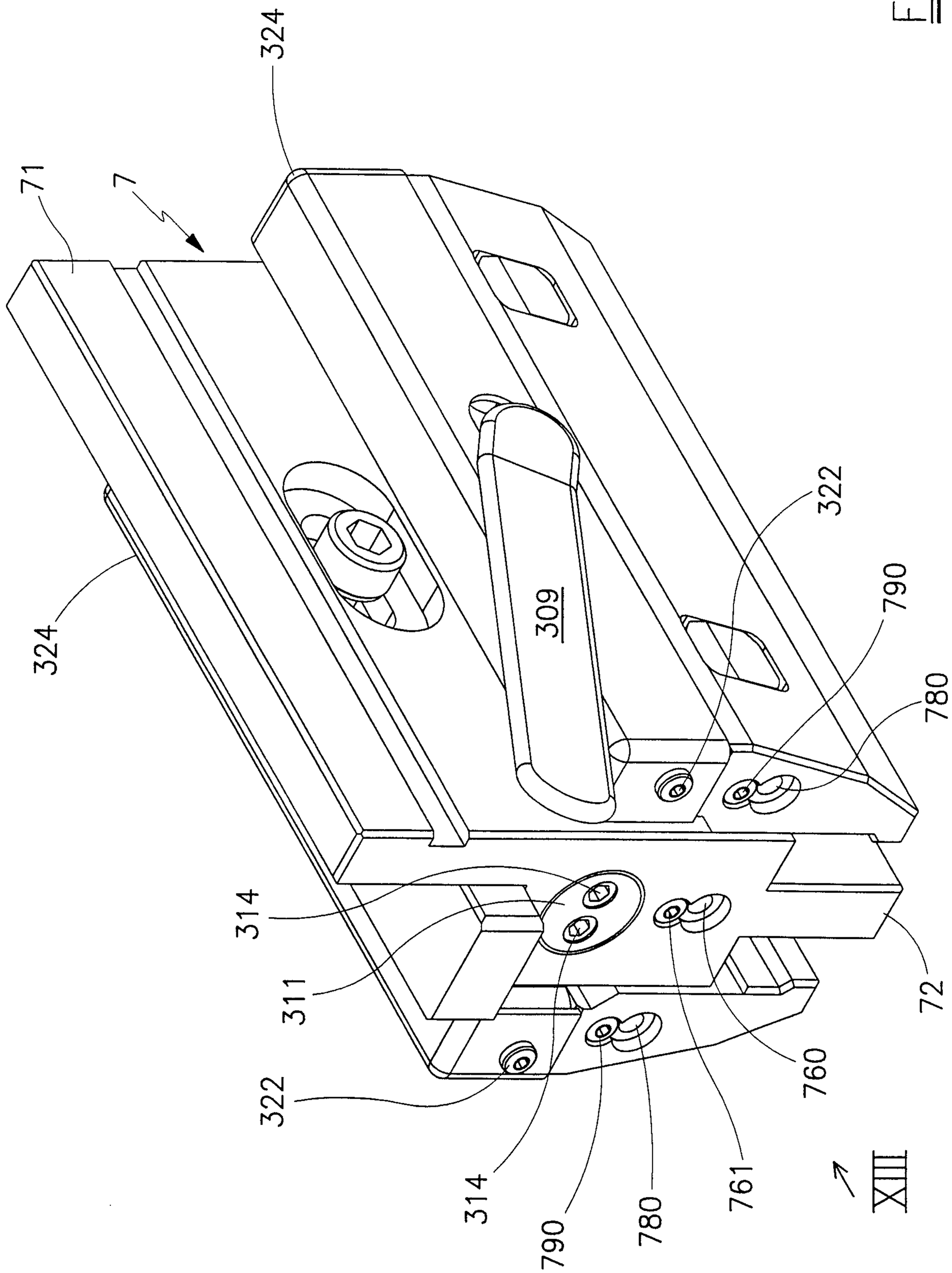
FIG.10

FIG.12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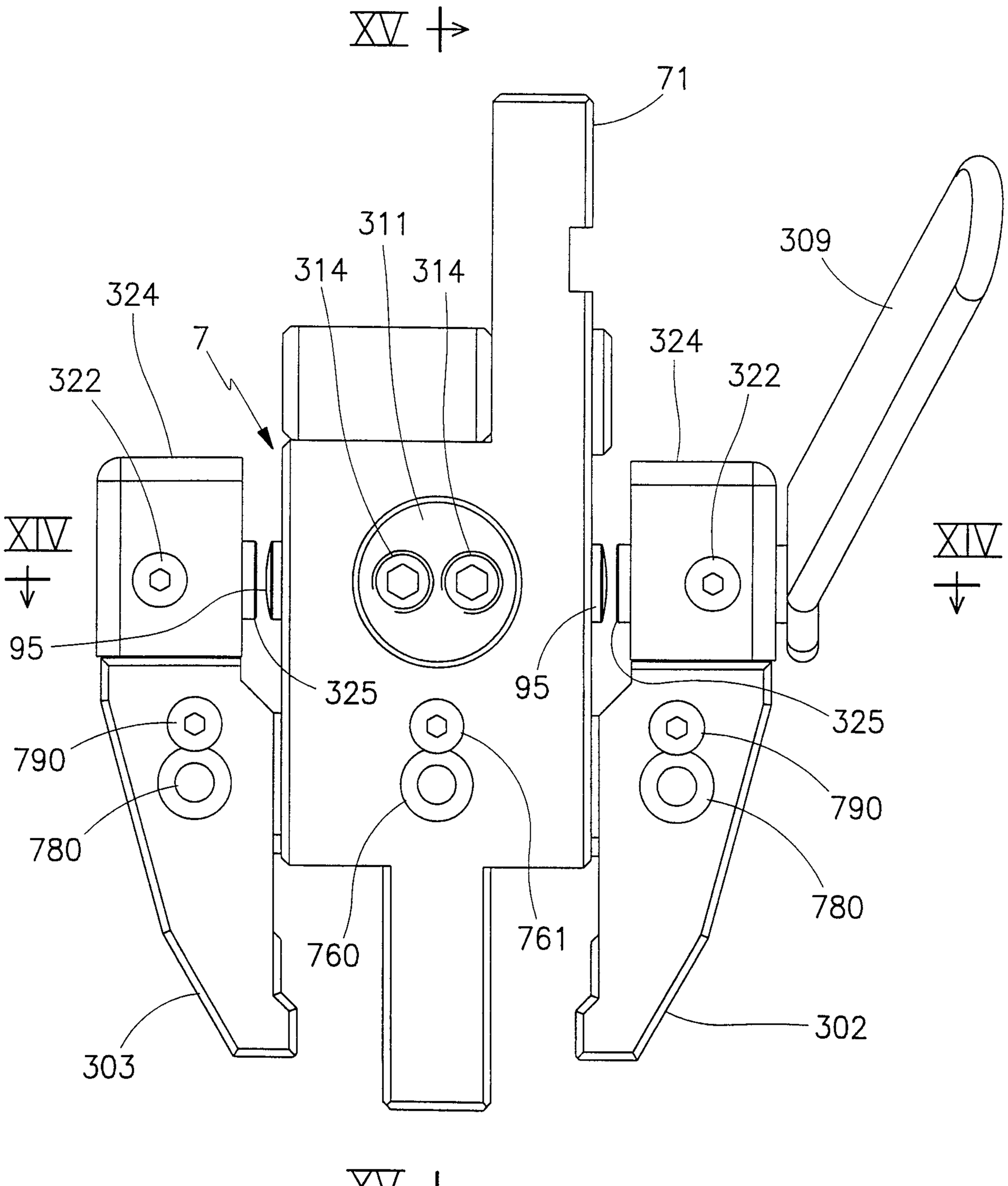
7
324
309
322
790
780
314
311
760
72
322
314
790
780
761
XIII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311
314
314
309
324
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324
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322
XIV
XIV
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325
95
325
790
790
780
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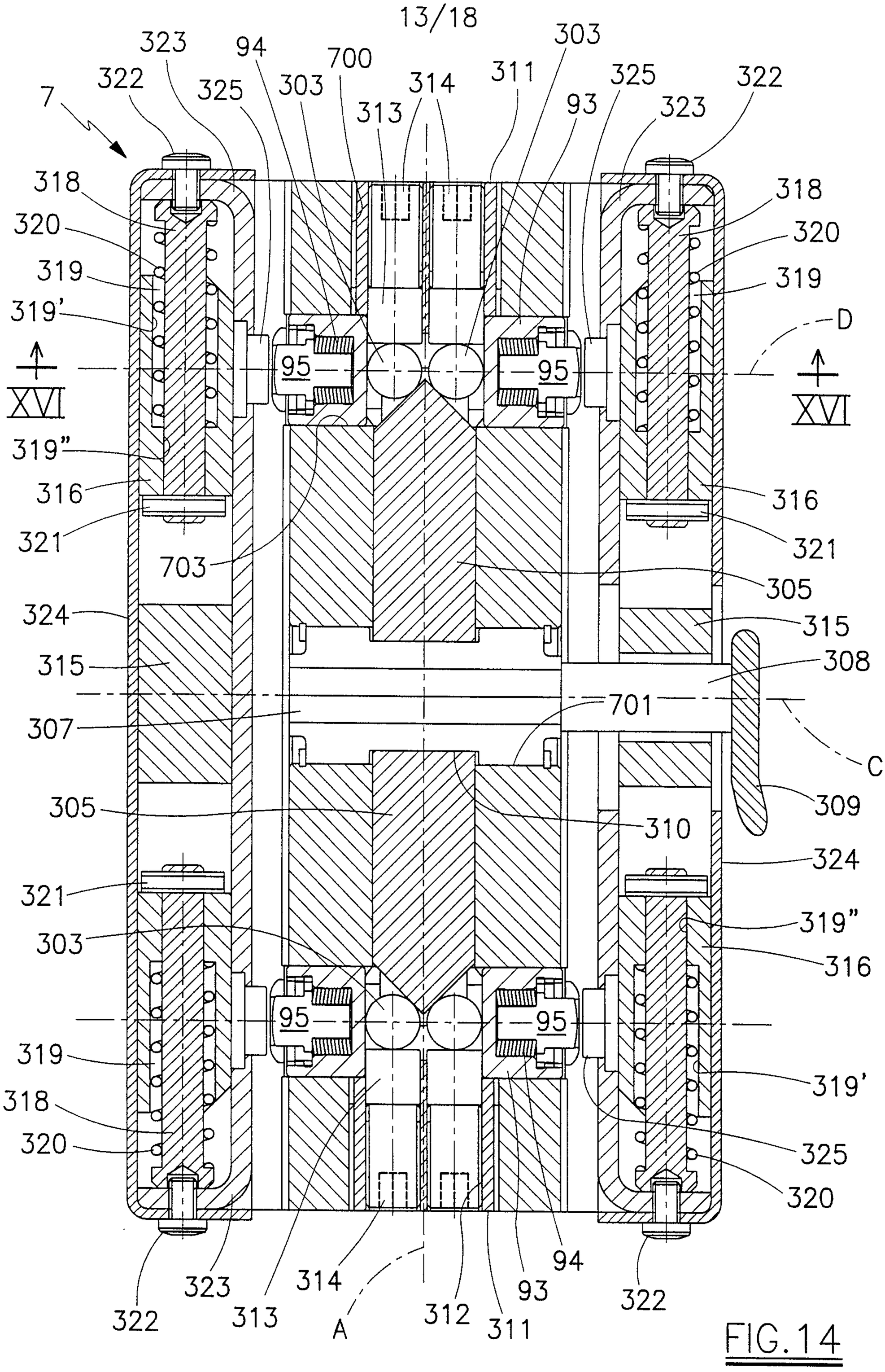
761
303
302
XV

FIG.13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320
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319'
XVI
319"
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318
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322
323
313
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311
93
94
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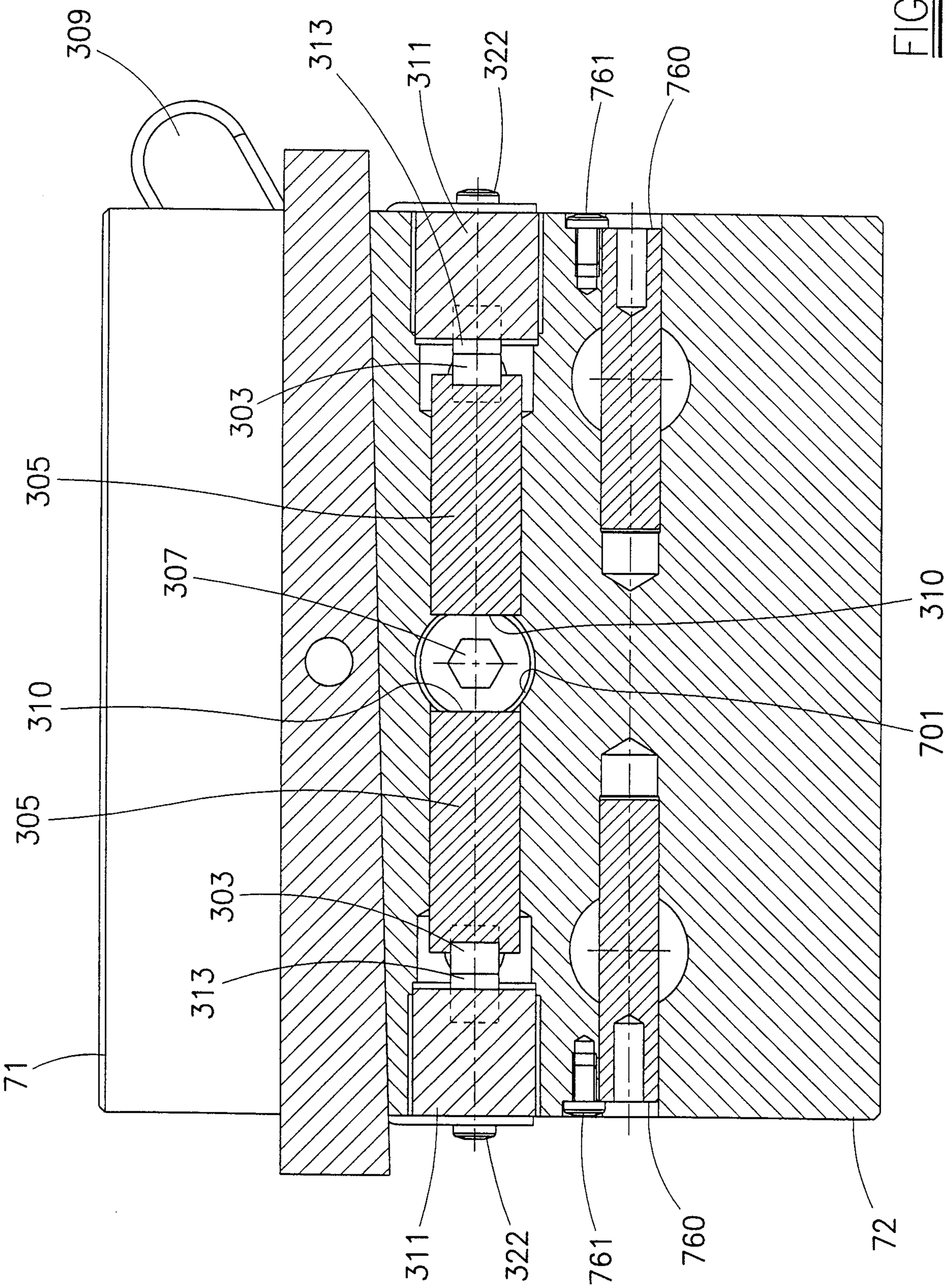
700
325
95
701
310
308
309
C
D

FIG.14

FIG.15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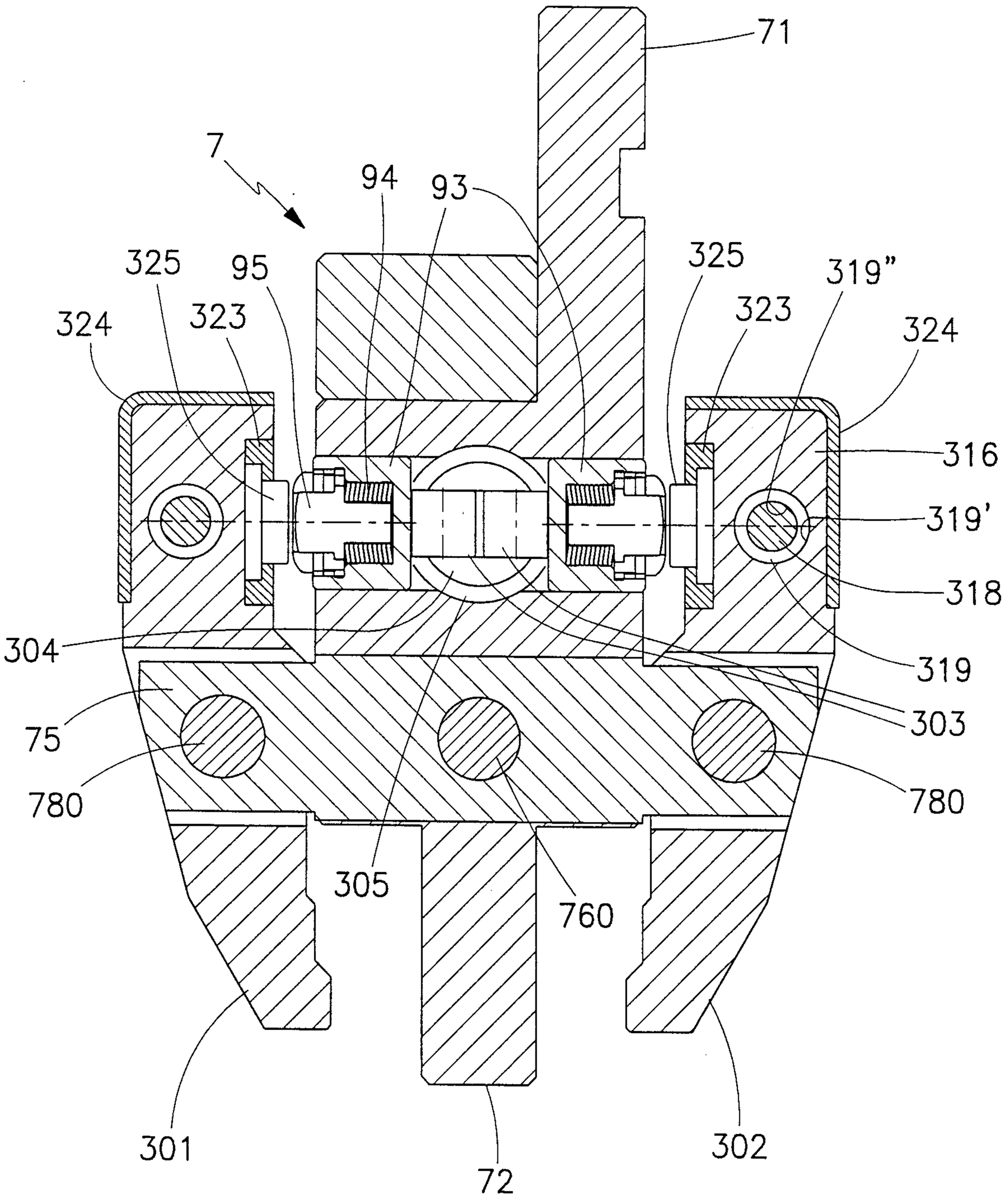
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305
760
301
72
302

FIG.16

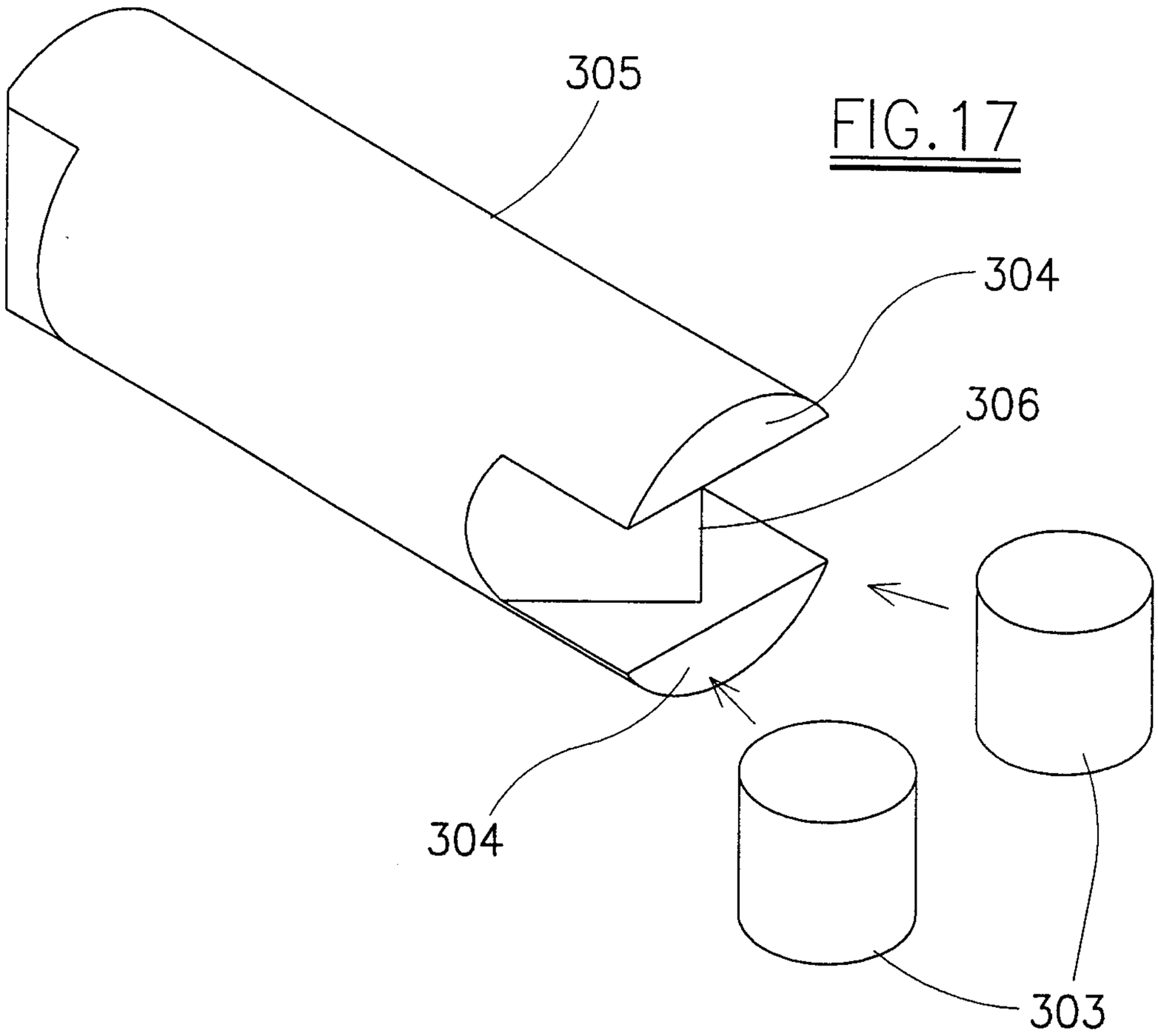


FIG.17

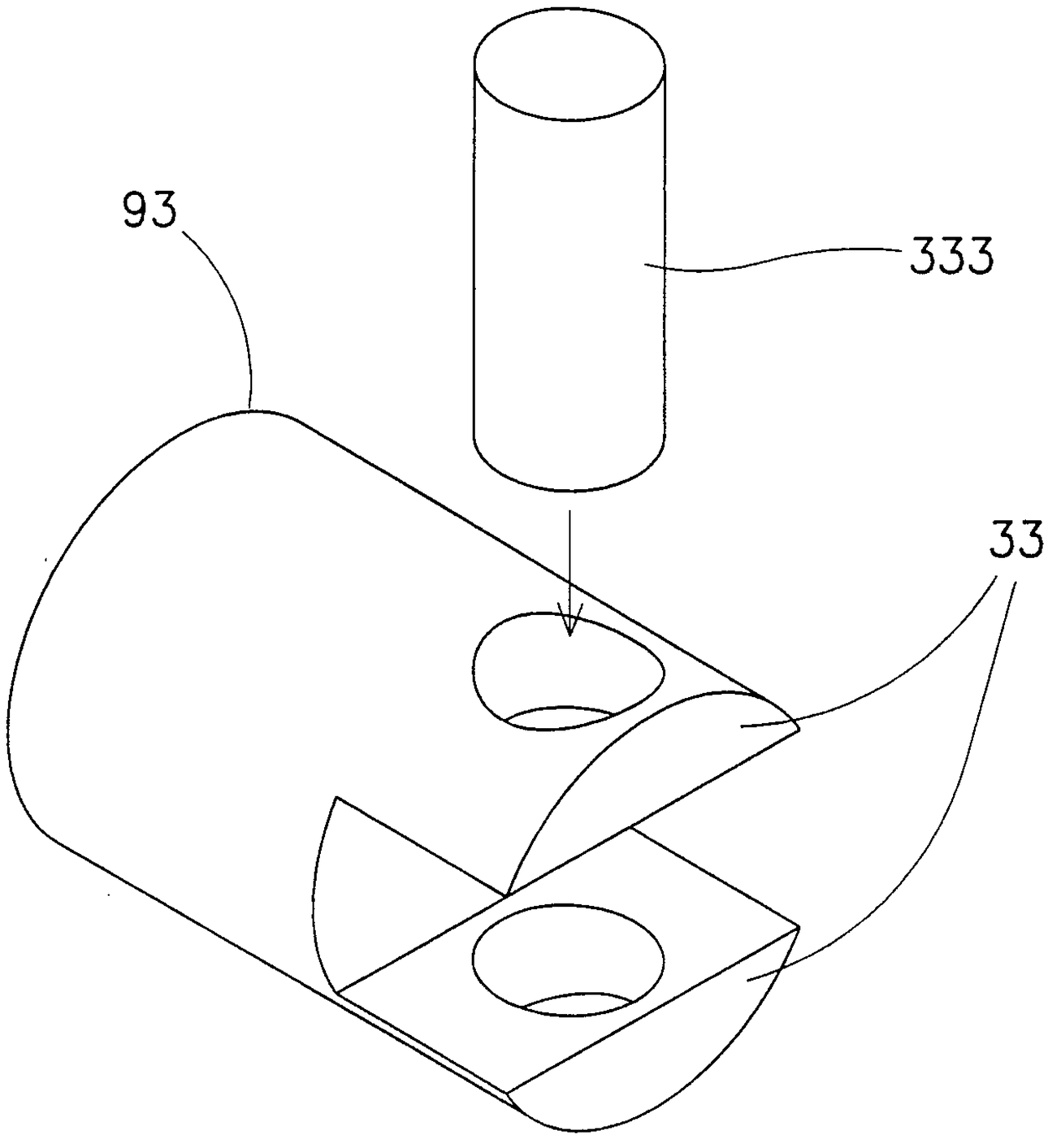
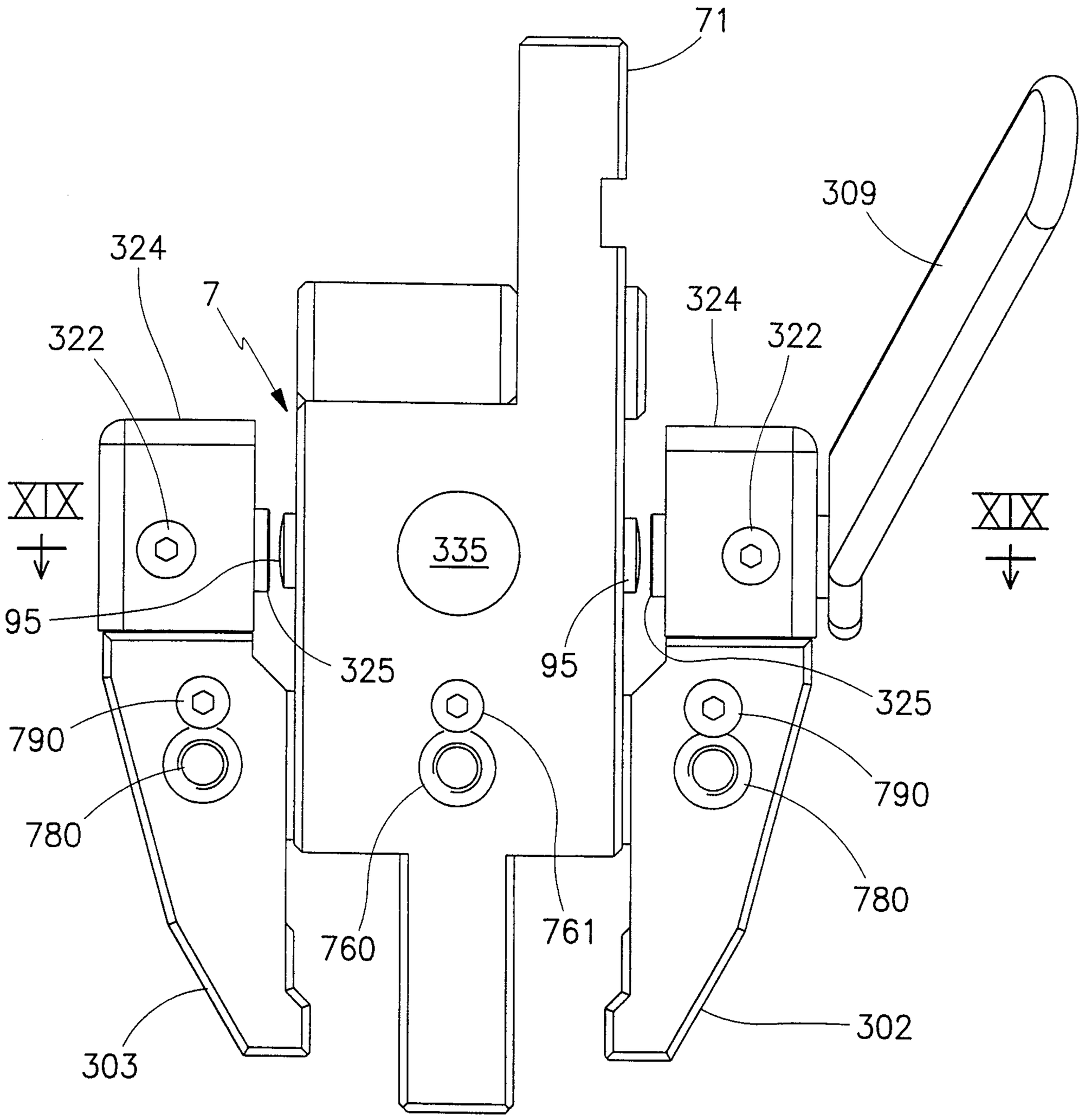


FIG.20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761
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302

FIG.18

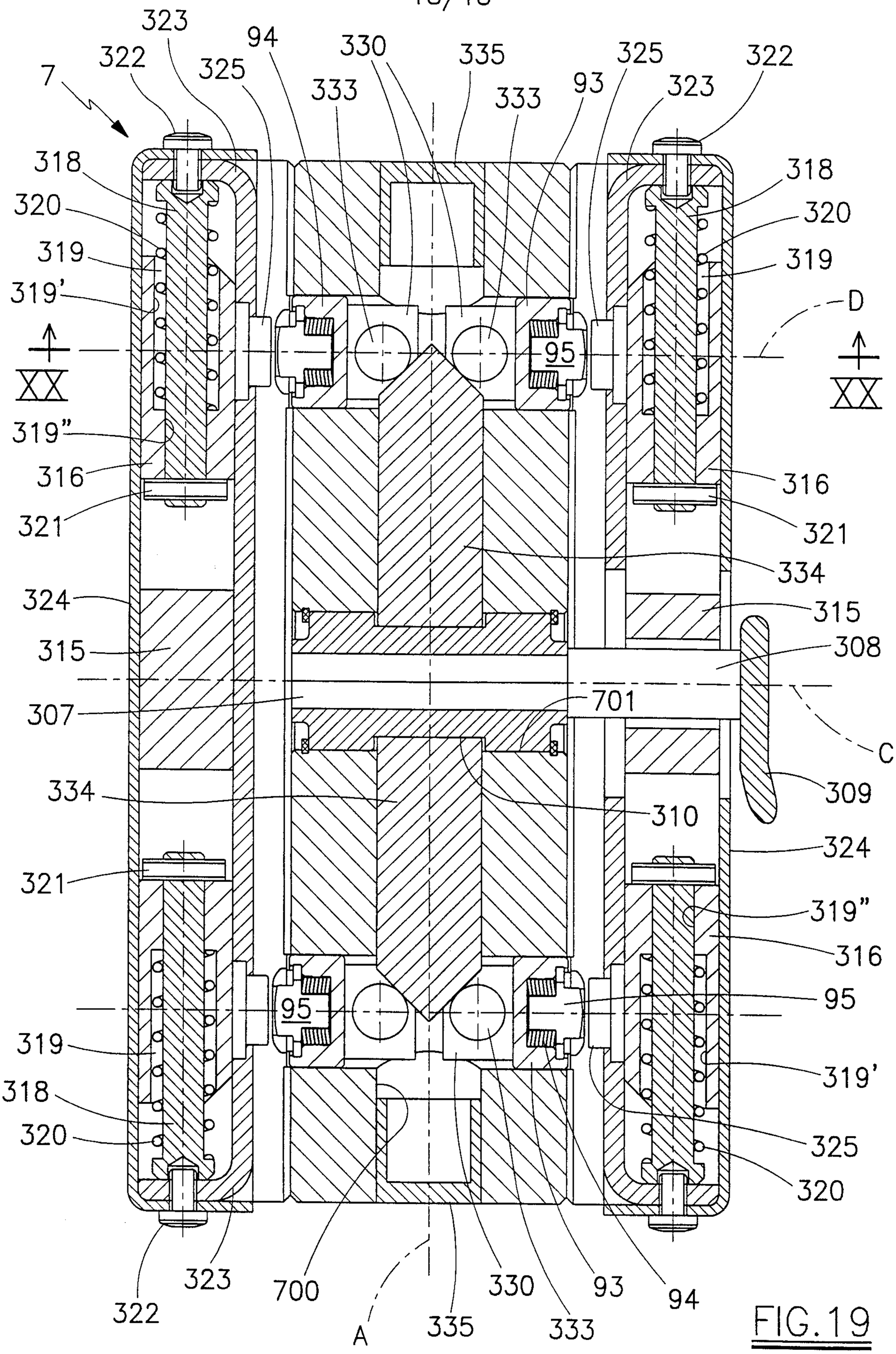
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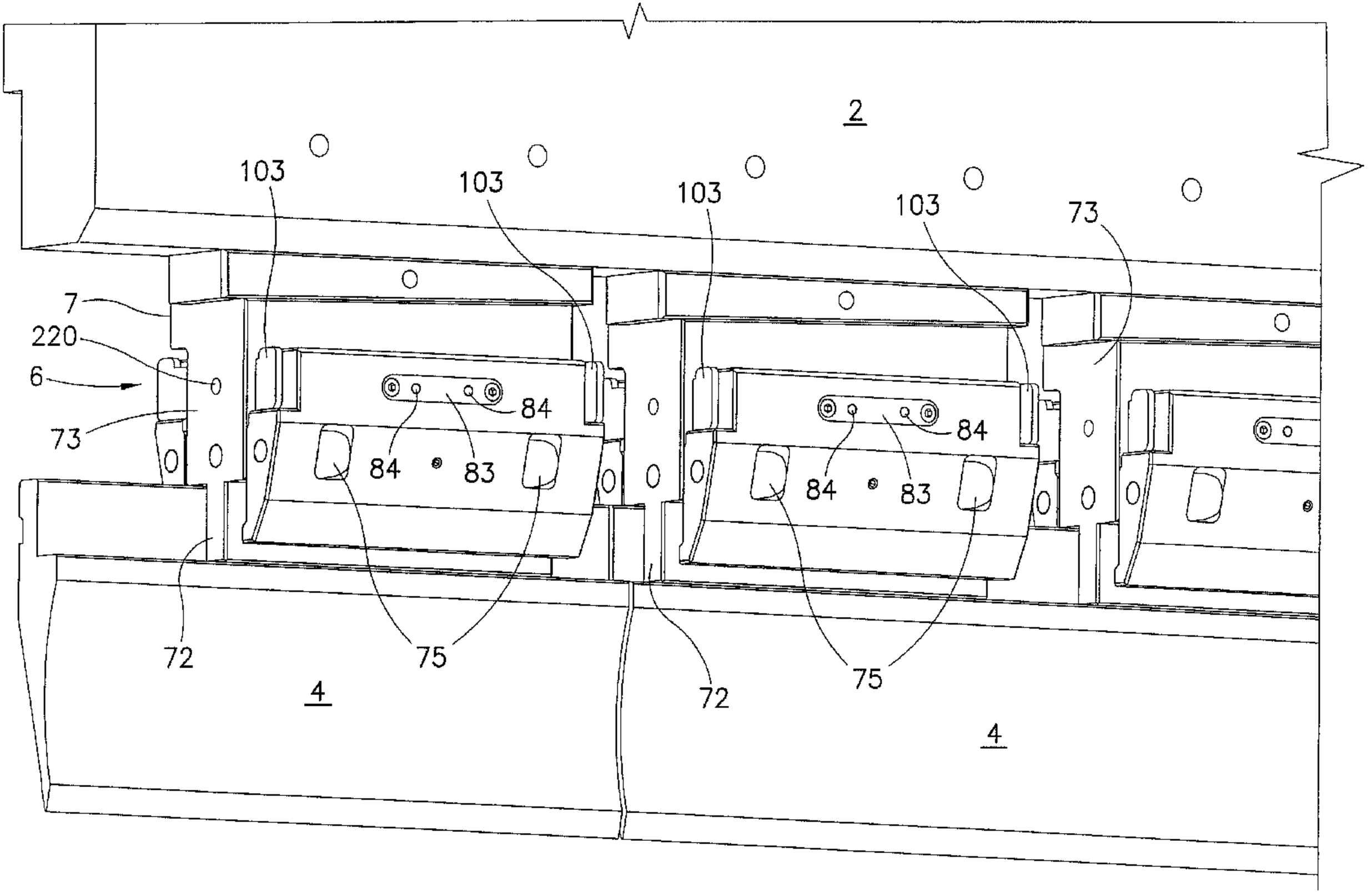
FIG.19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