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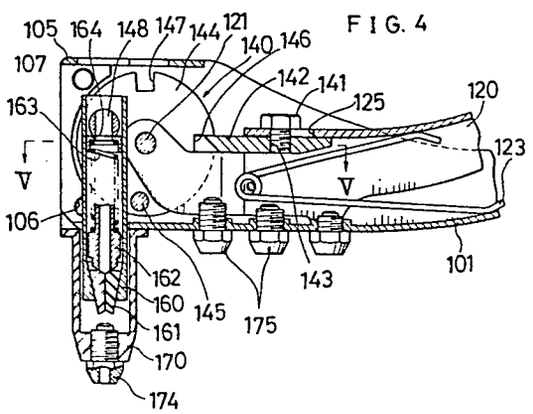
(54) **Riveter.**

(57) A riveter comprises a turnable jaw case actuating support member (140) disposed in a forward end portion of a frame main body (101,) and mounted on a pivot for supporting a lever (120,) on the frame main body (101), coupling means capable of locking the actuating support member (140), in a plurality of positions relative to the lever (120), and displaced from each other through a predetermined angle, a jaw case (160), turnably supported by the actuating support member (140), eccentrically of the pivot and reciprocally movable straight by reciprocal turn of the lever (120), through reciprocal turn of the actuating support member (140), connected thereto, and a jaw case tubular housing (170), turnably supported by the forward end portion of the frame main body (101), and lockable in a plurality of positions angularly spaced from each other by the same angle as the angle of displacement. The orientation of the jaw case housing a jaw assembly and attached to the main body is easily changeable in accordance with the shape of the work to be riveted or with other conditions, so that rivets are settable very efficiently with only one riveter for any work irrespective of its shape.

FIG. 4



EP 0 036 210 A1

Riveter

The present invention relates to a riveter comprising a lever pivoted to a frame main body and reciprocally turnable relative to the frame to reciprocate a jaw case.

Conventional riveters comprise a frame main body, a lever pivoted to the main body, a jaw case housing a jaw assembly and pivoted to the forward end of the lever, and a jaw case housing having the jaw case fitted therein and attached, either in a forward position or in a downward position, to the forward end of the frame main body. The lever, when turned, reciprocates the jaw case within the housing for setting rivets. Such riveters are disclosed in U.S. Patents No. 3,280,615 and No. 3,328,985, and Japanese Patent Publication No. 30166/1973.

With riveters of the construction described, the jaw assembly is fixedly directed either forward or downward, so that when the forward-type riveter is not usable for the work to be riveted owing to its shape or other conditions involved, the downward-type riveter is used. Since one of the different types of riveters must be employed alternatively, the conventional riveters have the drawback of being very inefficient to use. Moreover, the two types of riveters need to be prepared

at all times, hence uneconomical.

The present invention, which has been accomplished to overcome the foregoing drawbacks, provides a riveter comprising a turnable jaw case actuating support member disposed within a forward end portion of a frame main body and mounted on a pivot for supporting a lever on the frame main body, coupling means capable of locking the actuating support member in a plurality of positions relative to the lever and displaced from each other through a predetermined angle θ, a jaw case turnably supported by the actuating support member eccentrically of the pivot and reciprocally movable straight by reciprocal turn of the lever through reciprocal turn of the actuating support member connected to the lever, and a jaw case tubular housing turnably supported by the forward end portion of the frame main body and lockable thereto in a plurality of positions angularly spaced from each other by the same angle as the angle of displacement θ.

With the riveter of the present invention, the orientation of the jaw case enclosing a jaw assembly is easily changeable as desired in accordance with the shape of the work to be riveted or with other conditions involved. Rivets can therefore be set in place with a greatly improved efficiency using only one riveter for

any work irrespective of its shape.

Embodiments of the present invention will be described below in detail with reference to the accompanying drawings, in which:

Fig. 1 is an exploded perspective view partly broken away and showing an embodiment of the present invention;

Fig. 2 is a front view showing the same embodiment;

Fig. 3 is a fragmentary plan view;

Fig. 4 is a view in vertical section taken along the line IV-IV in Fig. 3;

Fig. 5 is a plan view in section taken along the line V-V in Fig. 4;

Fig. 6 is a fragmentary view in vertical section showing the embodiment with a lever in its opened position;

Fig. 7 is a fragmentary view in cross section taken along the line VII-VII in Fig. 6;

Figs. 8 to 10 are fragmentary front views partly broken away and showing a rivet setting process, Fig. 8 being a view showing a mandrel gripped by jaws; Fig. 9 being a view showing the mandrel pulled up with the lever in a half-closed position, Fig. 10 being a view showing the rivet completely set in place;

Fig. 11 is a fragmentary view showing the jaw assembly changed-over to its forward position;

Fig. 12 is a fragmentary view in vertical section showing the jaw assembly during change-over;

Fig. 13 is a fragmentary view in vertical section showing the jaw assembly in its forward position;

Fig. 14 is a fragmentary exploded perspective view showing another embodiment of the invention;

Fig. 15 is a front view partly broken away and showing the same embodiment;

Fig. 16 is a plan view of the same;

Fig. 17 is a left side view of the same;

Fig. 18 is a view in cross section taken along the line A-A in Fig. 15;

Fig. 19 is a view in vertical section taken along the line B-B in Fig. 17;

Fig. 20 is a view in vertical section taken along the line C-C in Fig. 17;

Fig. 21 is a view in vertical section taken along the line D-D in Fig. 17;

Fig. 22 is a fragmentary view in vertical section showing the same with a jaw case tubular housing turned to a horizontal position;

Fig. 23 is a fragmentary view in vertical section showing the jaw case housing while being turned

toward the horizontal position;

Fig. 24 is a perspective view showing modified coupling means;

Fig. 25 is a perspective view partly broken away and showing another modified coupling means; and

Fig. 26 is a perspective view showing a modification of the means for supporting a jaw case on an actuating support member.

With reference to Figs. 1 to 13, a first embodiment of the invention will be described first. The illustrated hand riveter has a frame main body 101 including a handle portion 102 at its rear end and a head frame 105 at its forward end. The head frame 105 is in the form of a case having a small width and opened on the front and under sides. The head frame has one side wall formed with an upper threaded bore 107 and a lower threaded bore 106 at the front end for positioning the jaw case tubular housing to be described later.

A lever 120 is supported by a pivot 121 on the frame main body 101. The pivot 121 extends through holes 108, 108 formed in the opposite side walls of the head frame 105 and through holes 122, 122 formed in the forward end of the lever 120. The lever 120 is biased upward by a spring 123 at all times and has a handle portion 124 at its rear end. The lever 120 has a slot

125 extending longitudinally thereof and formed in an upper wall front end portion thereof. A bolt 141 inserted through the slot 125 is screwed in a threaded bore 143 in an engaging pawl 142, whereby the engaging pawl 142 is attached to the lever 120 movably longitudinally of the lever.

An actuating support member 140 for a jaw assembly is disposed within the head frame 105 and turnably mounted on the pivot 121 for supporting the lever 120 on the frame main body 101. The actuating support member 140 comprises a pair of turnable disks 144, 144 connected together by a bar 145 as opposed to each other and spaced apart by a predetermined distance. Each of the disks 144 is formed in its peripheral edge with two cutouts 146, 147 angularly spaced apart from each other by about 90°. The cutouts 146, 147 of one of the disks 144 are in register with the corresponding cutouts 146, 147 of the other disk 144. A support pin 148 extends between and is supported by the disks 144, 144 which are disposed within the head frame 105 and turnably mounted on the pivot 121 as already described. The support pin 148 is positioned on one side of the disk 144 opposite to the center of the cutout 146 (preferably as displaced from the cutout 146 angularly through about 180°). A jaw case 160 is pivotably supported by the

pin 148. The pin 148 has a groove 149 in one end.

The jaw case 160 houses jaws 161, a jaw pusher 162, a jaw pusher pressing spring 163, and a spring seat 164 which is fitted in a recess 151 formed in the pin 148.

A tubular housing 170 for inserting the jaw case 160 therein has bifurcated attaching pieces 171, 171 upwardly extending from its upper end. The head frame 105 is disposed between the attaching pieces 171, 171. A slot 172 extending axially of the housing 170 is formed in the upper end of each attaching piece 171. A retaining ring 173 is engaged with each end of the pivot 121 extending through the slot 172 and turnably supporting the tubular housing 170 on the head frame 105 of the frame main body 101. The jaw case 160 is fitted in the housing 170, which has a nose piece 174 screwed in its lower end. Interchangeable nose pieces 175 of different sizes are screwed in the under wall of the frame main body 101.

With the riveter of the foregoing construction, the jaw assembly is set in its downward position shown in Fig. 4 in the following manner. The bolt 141 is loosened, and the engaging pawl 142 is slidingly advanced to engage its front end in the cutouts 146 of the disks 144. The pawl 142 is then fastened to the lever 120 by tightening up the bolt 141. The housing 170 having the

jaw case 160 therein is retained in a vertical position and then fastened to the head frame 105 by screwing a bolt 176 in the threaded bore 106 of the frame.

The riveter is used for riveting in the following manner. The mandrel M of a blind rivet L is inserted through a sleeve S, then inserted through the nose piece 174 and gripped at its forward end by the jaws 161 in the jaw case 160 as seen in Fig. 8. At this time, the lever 120 is held away from the frame main body 101 by the force of the spring 123. With the sleeve S of the rivet L then inserted through a bore formed in the workpieces W, W to be fastened together, the handle portions 102, 124 of the frame main body 101 and the lever 120 are gripped by hand to turn the lever 120 toward the frame main body 101 as shown in Fig. 9. Since the lever 120 is coupled to the actuating support member 140 for the jaw assembly by the engaging pawl 142, the member 140 rotates about the pivot 121 with the turn of the lever 120. The rotation of the member 140 to which the jaw case 160 is pivoted by the pin 148 pulls the jaw case 160 upward. Thus the turn of the lever 120 pulls up the mandrel M. Since the nose piece 174 bears against a flange F at the base end of the sleeve S and restrains the sleeve S from moving, the head H of the mandrel M is forced into the sleeve S to deform the sleeve S.

Consequently the sleeve S is fully deformed as shown in Fig. 10 to firmly fasten the workpieces W, W together, while the mandrel M is snapped at a constricted portion K. The rivet is now completely set in the workpieces.

To set the jaw assembly alternatively in its forward position, the bolt 141 is loosened first, the engaging pawl 142 is then retracted to release the actuating support member 140 from the lever 120, and the bolt 176 is loosened to release the tubular housing 170. The housing 170 is pulled down along the slots 172 to the broken-line position shown in Fig. 11, then turned forward and thereafter horizontally retracted along the slots 172 to the solid-line position in Fig. 11. The housing 170 is fixed to the head frame 105 again by screwing the bolt 176 in the other threaded bore 107. When the housing 170 turns forward, the jaw case 160 housed therein is also turned as seen in Fig. 12, with upper opposite side portions 165 of the case 160 in bearing contact with front end portions 126 of the lever 120, the contact portions therefore serving as support points for causing the jaw assembly actuating support member 140 to rotate about the pivot 121 with the turn of the housing 170. Subsequently the engaging pawl 142 is slidingly moved forward into engagement with the other cutout portions 147, 147 of the disks

144, 144. The bolt 141 is tightened up to couple the lever 120 to the actuating support member 140. The jaw case 160 and the lever 120 can be so dimensioned that the upper side portions 165 of the former will not contact the front end portions 126 of the latter when the housing 170 is turned. In this case, the actuating support member 140 may be made rotatable by suitable means.

According to the present invention, therefore, the jaw assembly of the riveter is easily shiftable from forward position to downward position, and vice versa.

Although not shown, the engaging pawl 142 on the lever 120 can be made movable forward or backward with use of a spring.

Another embodiment of the present invention will be described below with reference to Figs. 14 to 23.

A frame main body 201 includes at its front end a head frame 205 opened at the upper, lower and front sides thereof and having opposite side walls 203, 204. The side walls opposed to each other are formed with holes 208, 208 for inserting the pivot 221 to be described later, and with circular arc apertures 209, 209 centered about the holes 208, 208 for removably accommodating the

locking pin 250 to be described later. One side wall 203 is provided at its forward end with an upper threaded bore 207 and a lower threaded bore 206 and also with a hole 210 for inserting a pin 248 for pivotably supporting the jaw case to be described later. The other side wall 204 has a hole 211 opposed to the hole 210.

A lever 220 has a bifurcated side walls 227, 227 at its head portion formed by removing the upper, lower and front walls of the head portion. The side walls 227 are formed with holes 222, 222 opposed to each other for inserting the pivot 221 and with slots 228, 228 for turning the jaw case actuating support member 240 to be described later. The slots 228 are positioned on the same circumference as the hole 210 of the frame main body 201 to communicate with the hole 210, the circumference being centered about the pivot 221. The walls 227 also have holes 229, 229 for passing the locking pin 250 which are positioned on the same circumference, centered about the pivot 221, as the apertures 209 in the frame main body 201 to communicate with the apertures 209.

The actuating support member 240 for the jaw assembly comprises a pair of side disks 244, 244 opposed to each other at the desired spacing and partly connected together by a plate 245. The side disks 244, 244 are formed with holes 253, 253 for inserting the pivot 221

and also with holes 254, 254 for inserting the support pin 248 for the jaw case. The holes 254 are positioned on the same circumference, centered about the pivot 221, as the hole 210 of the frame main body 201 and the slots 228 of the lever 220 to communicate with the hole 210 and the slots 228. Each of the disks 244 has two holes 255 and 256 angularly displaced from each other through 90° for passing the locking pin 250. These holes 255 and 256 are arranged on the same circumference, centered about the pivot 221, as the aperture 209 of the main body 201 and the hole 229 of the lever 220 to communicate with the aperture 209 and the hole 229. The disks 244, 244 have knob portions 257, 257 for turning the actuating support member 240.

As in the first embodiment, the jaw case 260 has accommodated therein a jaw assembly comprising jaws 261, a jaw pusher 262, a jaw pusher pressing spring 263 and a spring seat 264. The support pin 248 is inserted through an upper portion of the case 260 and has a recess 251 in which the spring seat 264 is press-fitted, whereby the jaw assembly is held in position.

As is the case with the first embodiment, a tubular housing 270 for the jaw case has bifurcated opposite attaching pieces 271, 271 extending from its base end. The pieces 271 have at their upper ends slots

272, 272 extending axially of the housing 270. A hole 277 is formed in one of the attaching piece 272 at a front lower portion thereof.

A nose piece 274 is attached to the forward end of the housing 270. Interchangeable nose pieces 275a, 275b and 275c have bores of different sizes. Indicated at 278 is a tool for mounting or demounting the nose pieces, pins, bolts and nuts, and at 223 is a spring for returning the lever.

The main components described above are assembled in the following manner.

The actuating support member 240 is placed between the bifurcated side walls 227, 227 of the lever 220, and a short tube 258 is inserted through the holes 222, 222 and 253, 253, whereby the support member 240 is turnably attached to the head of the lever.

Subsequently the jaw case 260 is pivoted to the support member 240 by inserting the pin 248 through the holes 254, 254 of the member 240. Since the project-ends of the pin 248 are engaged in the slots 228, 228 of the lever 220 at this time, the pin 248 is turnable with the actuating support member 240 within the range defined by the slots 228.

The lever 220 having the jaw case 260 and the jaw assembly actuating support member 240 thus incorpo-

rated therein is placed at its head portion between the side walls 203, 204 of the head frame 205 of the main body 201, and the pivot 221 in the form of a bolt is inserted through the holes 208, 208 of the side walls and through the short tube 258, whereby the lever 220 is turnably attached to the frame main body 201. The actuating support member 240 is then suitably turned to bring either pair of holes 255, 256, for example the holes 256, into communication with the apertures 209 of the frame main body 201 and with the holes 229 of the lever 220, and the locking pin 250 is inserted through these openings, whereby the actuating support member 240 is locked in position relative to the lever 220. In this state, the support pin 248 for the jaw case 260 is positioned at one end of each of the slots 228 (i.e. at the left end of the slot 228 in Fig. 19) of the lever 220 to hold the jaw case 260 in a vertical position.

In the state described above, the ends of the pivot 221 projecting from the opposite sides of the frame main body 201 are engaged in the slots 272, 272 of the attaching pieces 271, 271 on the jaw case housing 270, with the result that the housing 270 is disposed in a vertical position with the jaw case 260 inserted therein. With the housing 270 raised by being guided by the engagement of the pivot 221 in the slots 272, a

nut 279 is screwed on the pivot 221. A bolt 276 is further inserted through the hole 277 of the attaching piece 271 and screwed in the threaded bore 206 at a lower portion of the side wall 203 of the main body 201, whereby the housing 270 is properly attached in its vertical position to the main body as seen in Figs. 15 to 21. In this state, the attaching pieces 271, 271 of the housing 270 close the apertures 209, 209 of the frame main body 201, thereby preventing the locking pin 250 from slipping off.

With the riveter thus assembled, the jaw case housing 270 is turnable from the vertical position to a horizontal position in the manner to be described below.

Following the foregoing procedure reversely, the bolt 276 is removed from the bore 206 of the frame main body 201 and the hole 277 of the housing attaching piece 271, and the housing 270 is pulled down as allowed by the slots 272 in the direction of an arrow in Fig. 22 with the nut 279 loosened to open the apertures 209 of the frame main body 201 which have been covered with the attaching pieces 271, 271. The locking pin 250 is then removed. The actuating support member 240 for the jaw assembly is turned clockwise as shown in Fig. 23 to bring the other pair of holes 255 in the member 240 into

communication with the apertures 209 of the frame main body 201 and with the holes 229 of the lever 220, and the locking pin 250 is thereafter inserted through these openings, whereby the support member 240 is locked to the lever 220, positioning the support pin 248 of the jaw case 260 at the other end of each slot 228 (i.e. the right end of the slot 228 in Fig. 19) of the lever 220 to hold the jaw case 260 and the housing 270 in a horizontal position. Subsequently the housing 270 is retracted toward the pivot 221, and the nut 279 on one end of the pivot 221 is tightened. The bolt 276 is passed through the hole 277 of the attaching piece 271 and screwed in the upper threaded bore 207 in the side wall 203 of the frame main body 201. Consequently the housing 270 can be properly set in its horizontal position as shown in Fig. 22.

In the above embodiment, the apertures 209 formed in the frame main body 201 for the locking pin 250 may be circular holes which are dimensioned to permit the insertion of the locking pin 25. Further only one aperture 209 can be provided in either one of the side walls 203 and 204. However, it is desirable that the apertures 209 be in the form of elongated openings to render the pin 250 easily insertable or removable and to make the lever 220 smoothly turnable

despite the projection of the ends of the locking pin 250.

According to the first embodiment, the means for coupling the lever to the actuating support member for a jaw assembly to rotate the member by the turn of the lever comprises an enagaging pawl 142 provided on a forward end upper portion of the lever and movable forward and backward, and cutout portions 146, 147 formed in the outer peripheral edge of the actuating support member 140. Further according to the second embodiment, the coupling means comprises holes 229 formed in the lever 220 at a peripheral portion thereof around its pivot, holes 255 and 256 formed in the actuating support member 240 at peripheral portions thereof around its pivot, and a locking pin 250 insertable in these holes. The coupling means nevertheless is not limited to these arrangements but can be modified variously as will be described below.

Although unillustrated, the actuating support member of the first embodiment, for example, may be provided with an engaging pawl which is engageable in cutouts formed in the lever. With the second embodiment, the actuating support member may be formed with a hole in combination with a plurality of holes formed in the lever for inserting the locking pin through these holes.

Although not shown, the invention includes a gear-and-rack arrangement for coupling the lever to the actuating support member, a screw-thread arrangement for coupling these members, etc.

With reference to Fig. 24, an actuating support member 340 comprises a pair of side disks 344, 344 interconnected by pins 381. A hook 342 movably mounted on a lever 320 is engageable with either one of the pins 381 to couple the lever 320 to the support member 340. The actuating support member 440 shown in Fig. 25 comprises a pair of side disks 444, 444 connected together by a plate 445 which is formed with holes 455 and 456. An engaging bar 442 movably mounted on a lever 420 is engageable in the hole 455 or 456 to couple the lever to the support member 440.

While the support pin 148 or 248 is used for pivotably supporting the jaw case on the actuating support member, an actuating support member 540 and a jaw case 560 are similarly useful as seen in Fig. 26. The actuating support member 540 comprises a pair of side plates 544, 544 connected together by a plate 545. Each of the side plates 544 has a constricted midportion and resembles a cocoon. The side plate 544 has a hole 553 at the midportion for inserting a pivot therethrough and is formed at one side thereof with two holes 555 and

556 angularly displaced from each other about the hole 553 through 90° for passing a locking pin therethrough. The other side of the plate 544 opposite to the holes 555, 556 serves as a support portion 559 having a circular arc periphery. Parallel cutout portions 565, 565 are formed in an upper portion of the jaw case 560 on the opposite sides thereof. The support portions 559 of the actuating member 540 are engageable with the cutout portions 565, 565 in sliding contact therewith to turnably support the jaw case 560 on the member 540.

With the riveter of this invention which has the foregoing construction, the jaw assembly is easily shiftable either to a forward position or to a downward position as desired. The riveter therefore has the distinct advantage that rivets can be set in an optimum condition in accordance with the shape of the work to be riveted and with other requirements concerned, thus assuring rivet setting with a greatly improved efficiency without necessitating different kinds of riveters.

CLAIMS

1. A riveter having a lever (120, 220, 320, 420) pivoted to a frame main body (101, 201) and reciprocally turnable relative to the frame to reciprocate a jaw case (160, 260, 560), the riveter comprising a turnable jaw case actuating support member (140, 240, 340, 440, 540) disposed within a forward end portion of the frame main body (101, 201) and mounted on a pivot for supporting the lever (120, 220, 320, 420) on the frame main body (101, 201), coupling means capable of locking the actuating support member (140, 240, 340, 440, 540) in a plurality of positions relative to the lever (120, 220, 320, 420) and displaced from each other through a predetermined angle (θ), the jaw case (160, 260, 560) being turnably supported by the actuating support member (140, 240, 340, 440, 540) eccentrically of the pivot and reciprocally movable straight by reciprocal turn of the lever (120, 220, 320, 420) through reciprocal turn of the actuating support member (140, 240, 340, 440, 540) connected thereto, and a jaw case tubular housing (170, 270) turnably supported by the forward end portion of the frame main body (101, 201) and lockable in a plurality of positions angularly spaced from each other by the same angle as the angle of displacement (θ).

2. A riveter as defined in claim 1 wherein the coupling means comprises an engaging pawl (142) provided on a forward end upper portion of the lever (120) and movable forward and backward, and a plurality of cutout portions (146, 147) formed in the outer peripheral edge of the actuating support member (140) and angularly spaced apart by the angle (θ).

3. A riveter as defined in claim 1 wherein the coupling means comprises holes (229) formed in the lever (220) at a peripheral portion thereof around the pivot, a plurality of holes (255, 256) formed in the actuating support member (240) at peripheral portions thereof around the pivot and angularly spaced apart by the angle (θ), and a locking pin (250) insertable in these holes.

4. A riveter as defined in any one of claims 1 to 3 wherein the predetermined angle (θ) is 90 degrees, and the jaw case (160, 260) is lockable in each of downward position and forward position relative to the frame main body (101, 201).

FIG. 1

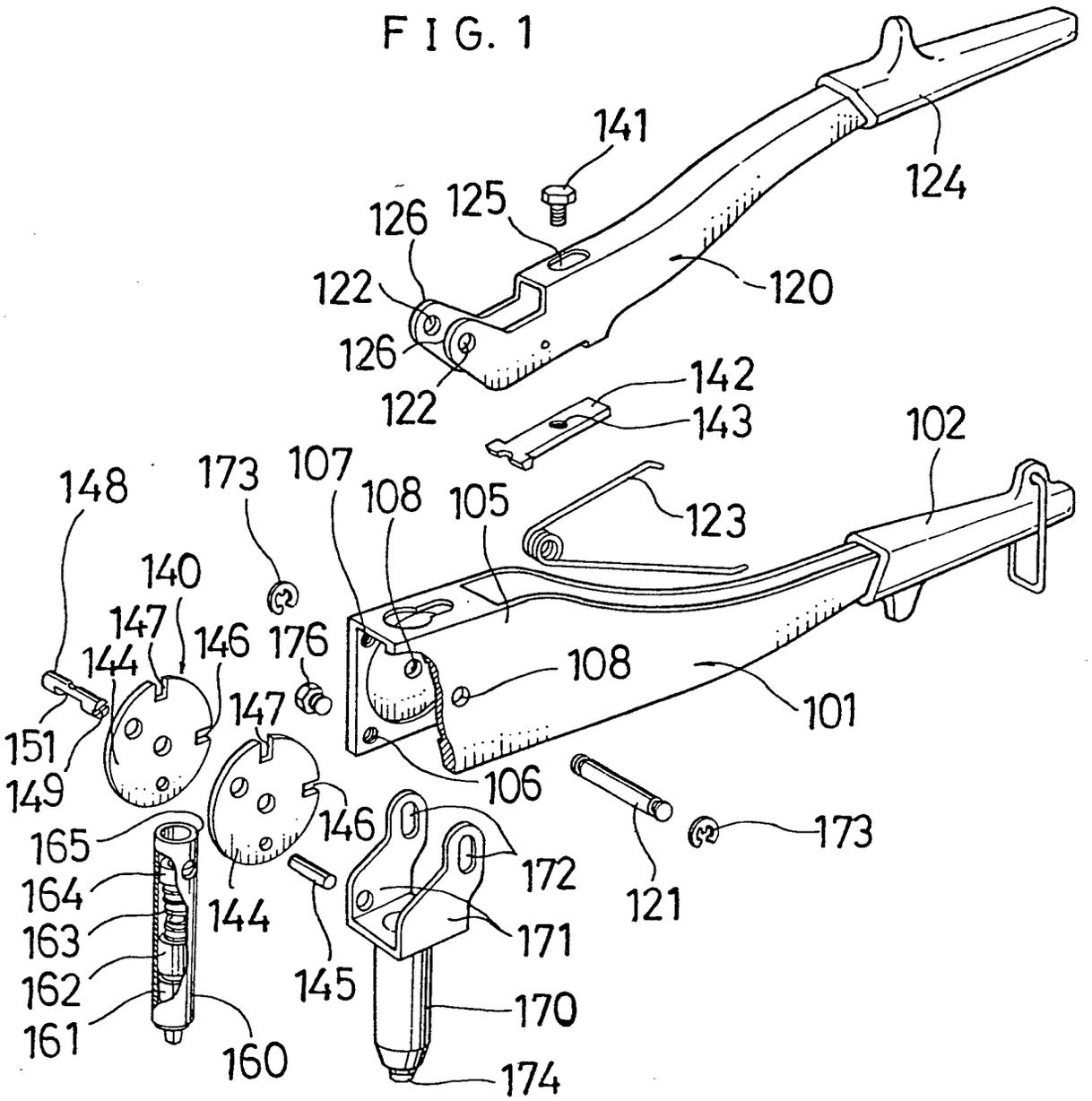

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FIG. 2

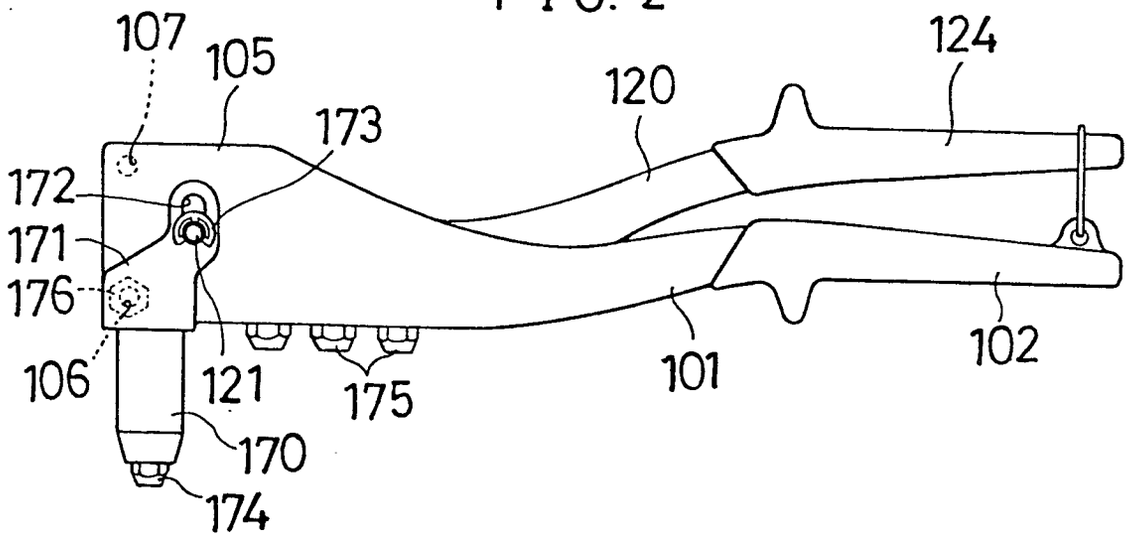
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FIG. 3

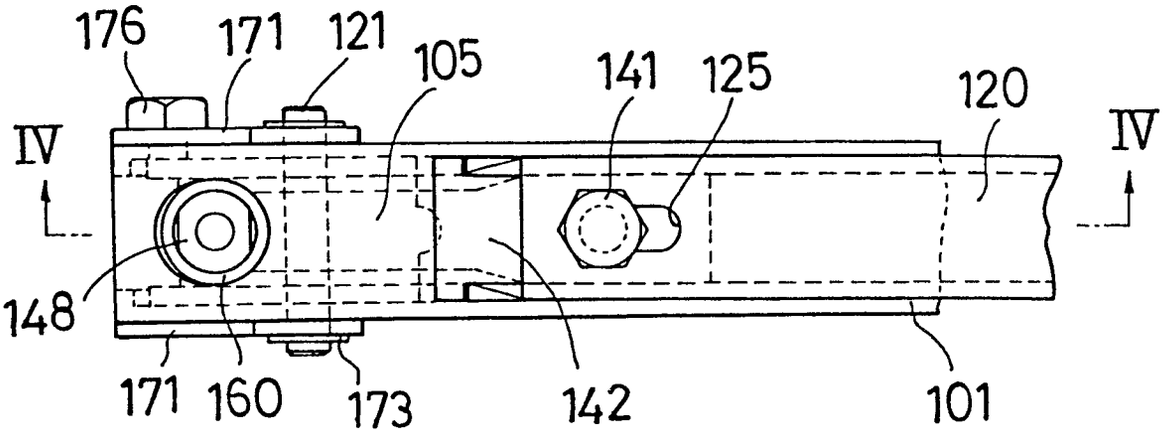
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FIG. 4

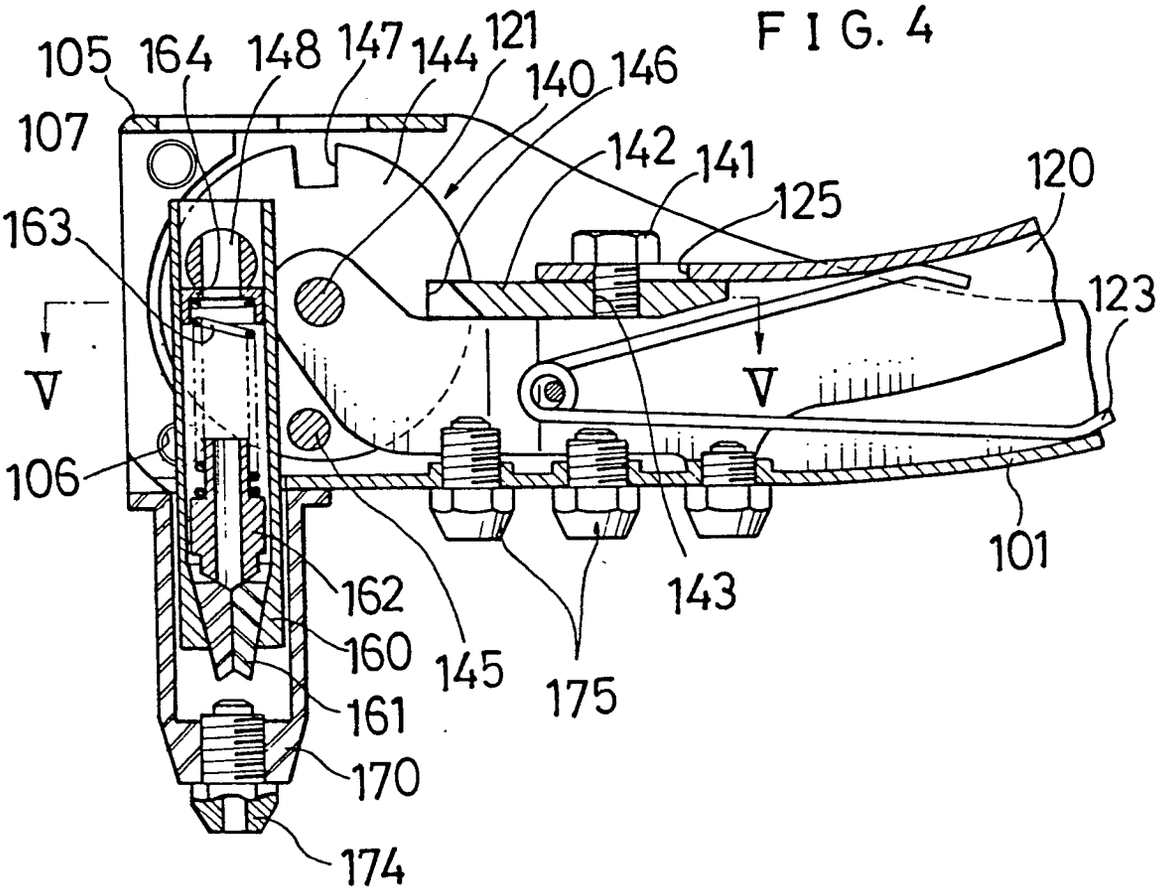
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FIG. 5

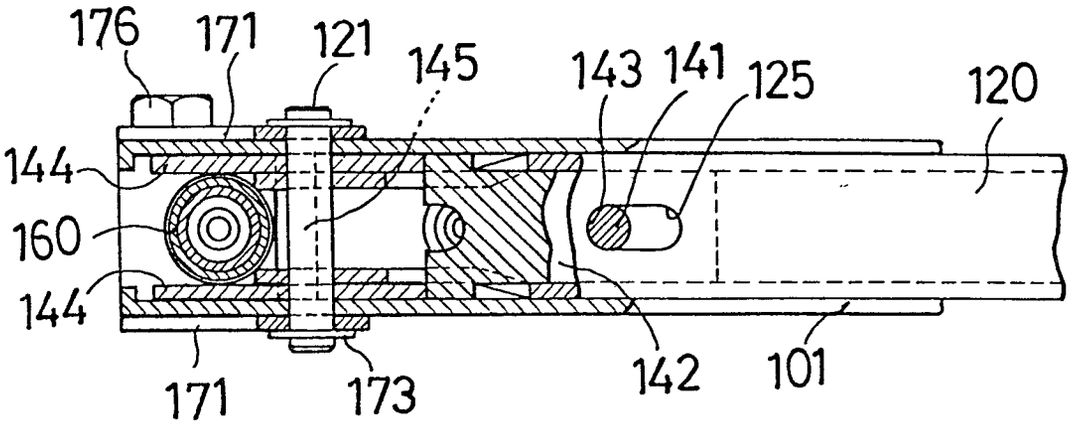

FIG. 6

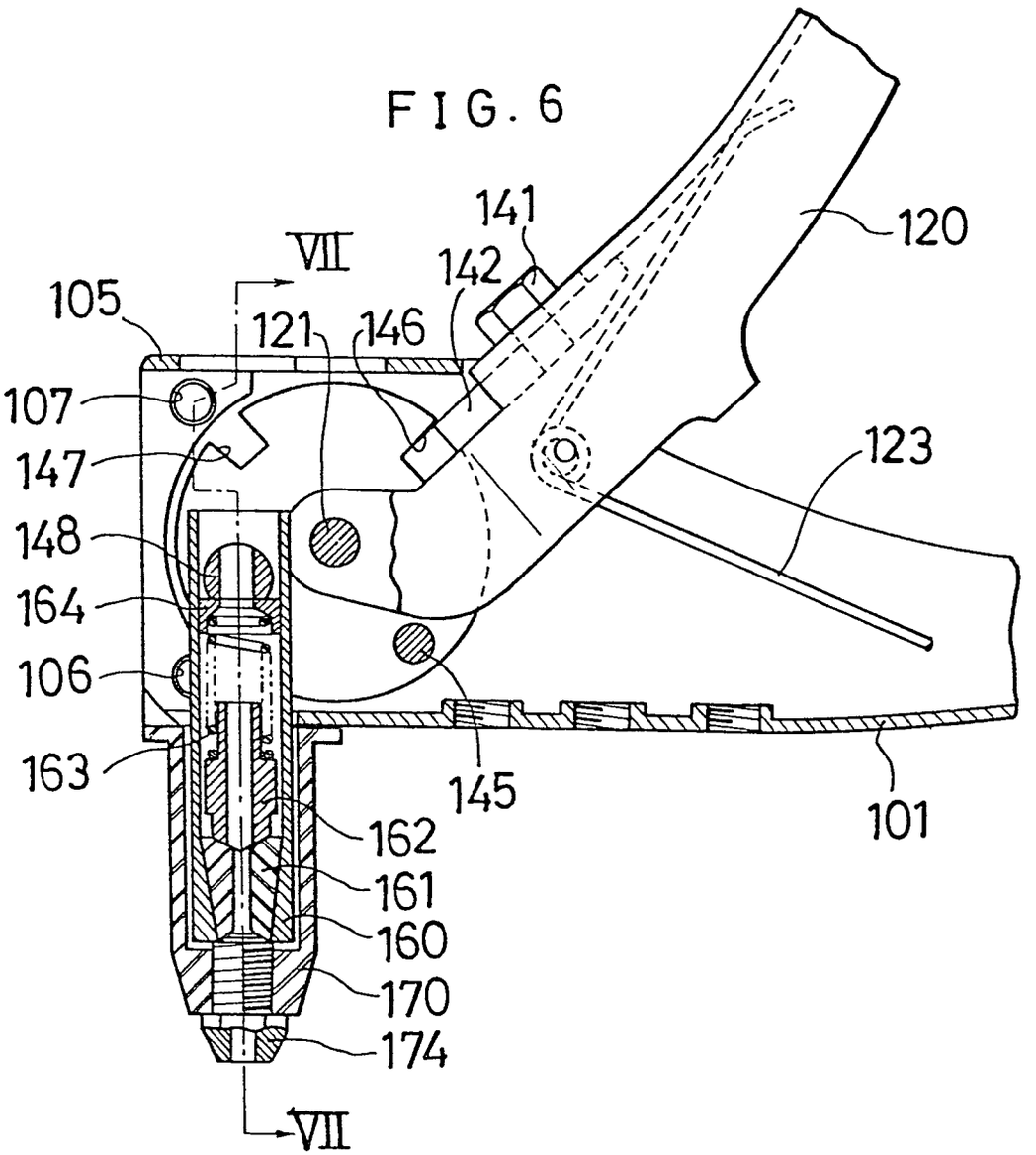

FIG.7

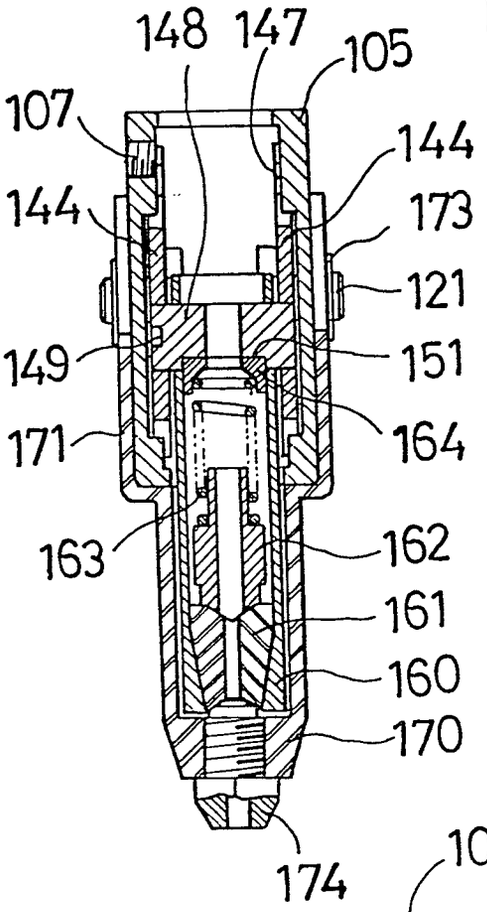
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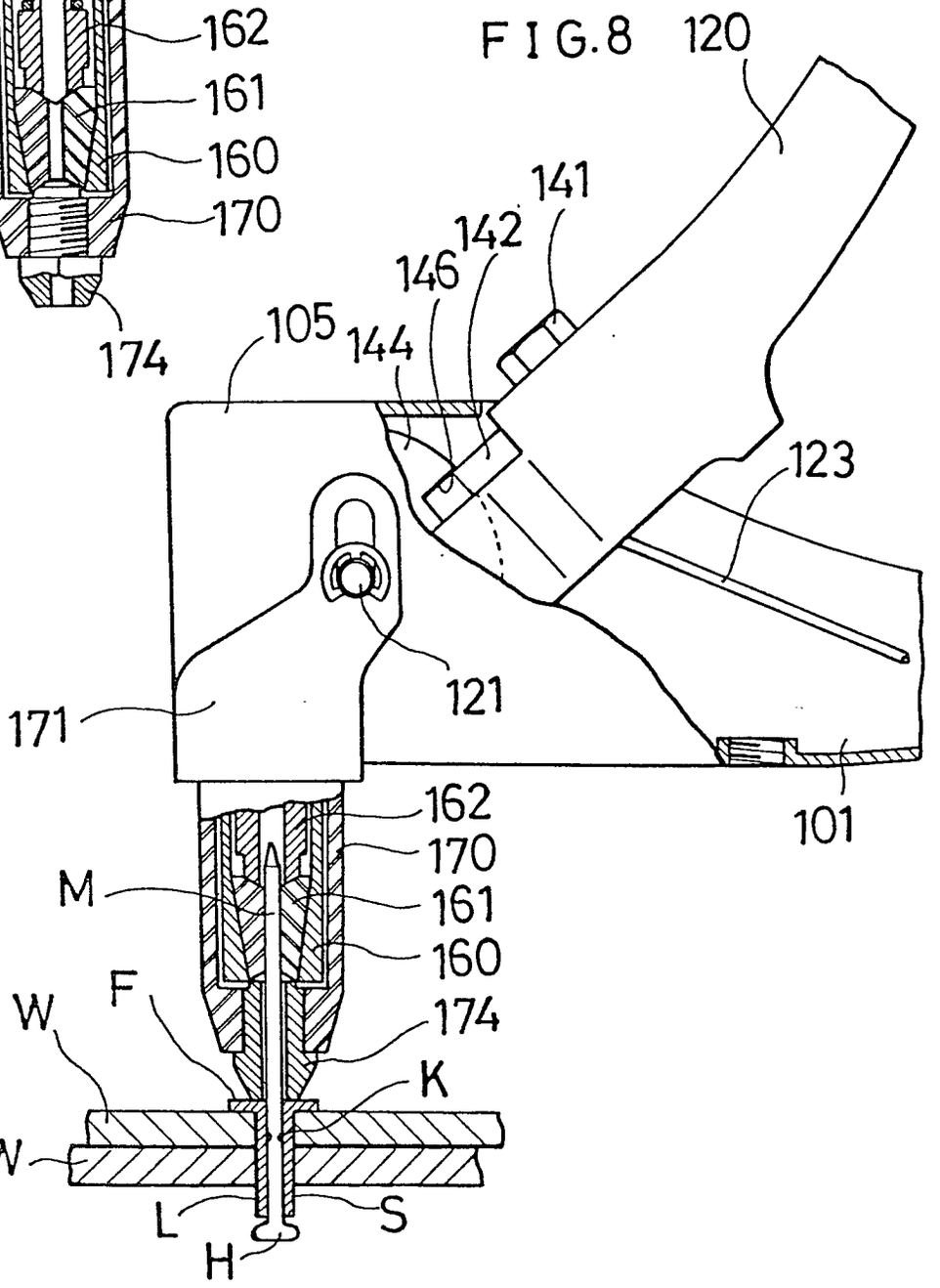
FIG.8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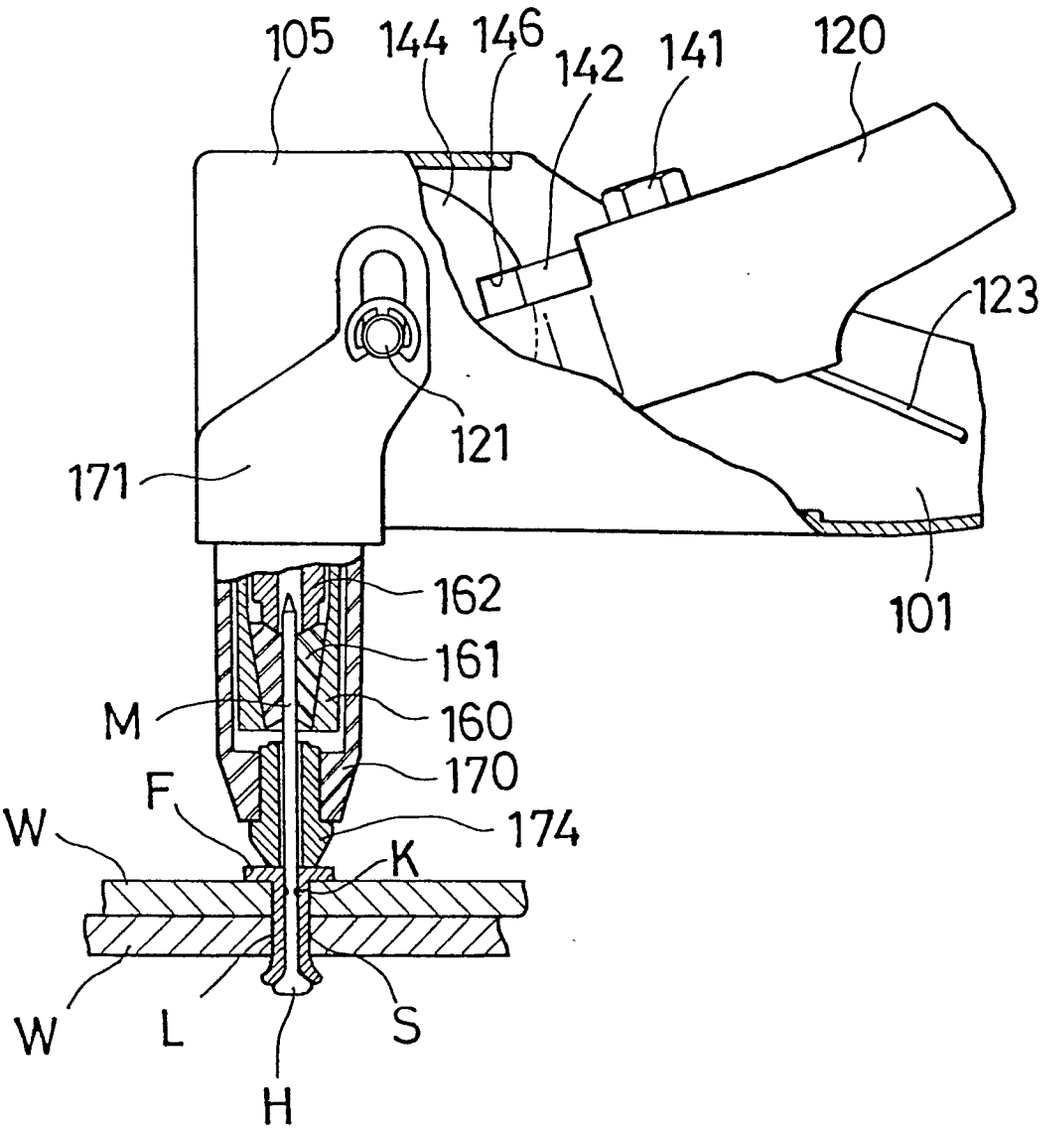
H

FIG. 9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101

FIG. 10

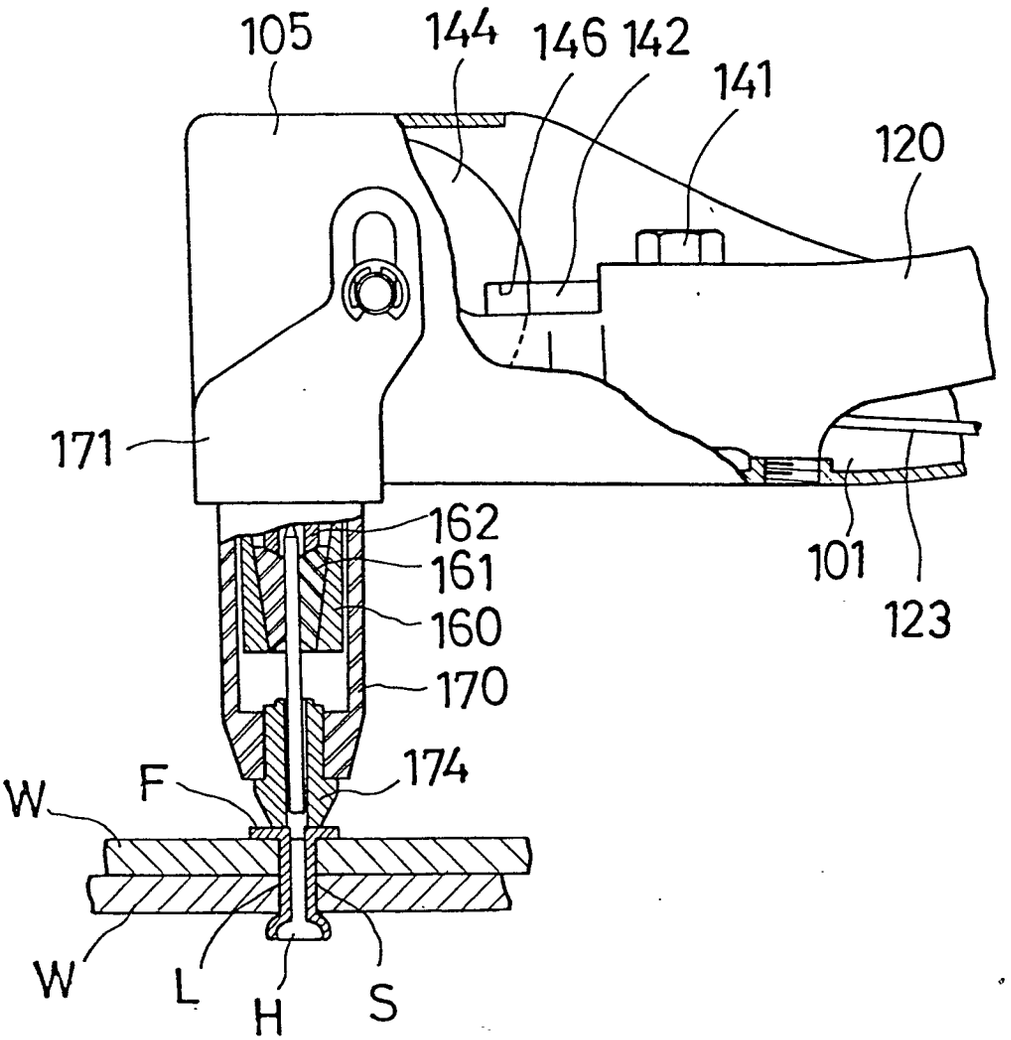

FIG. 11

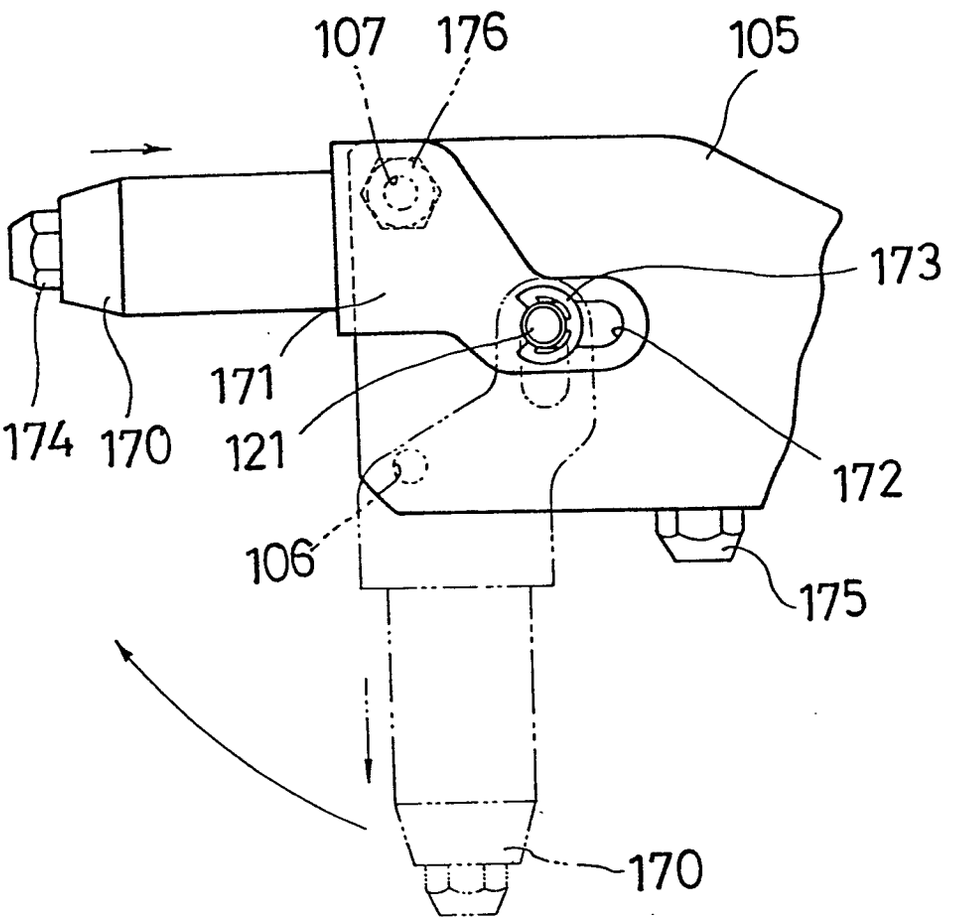

FIG. 12

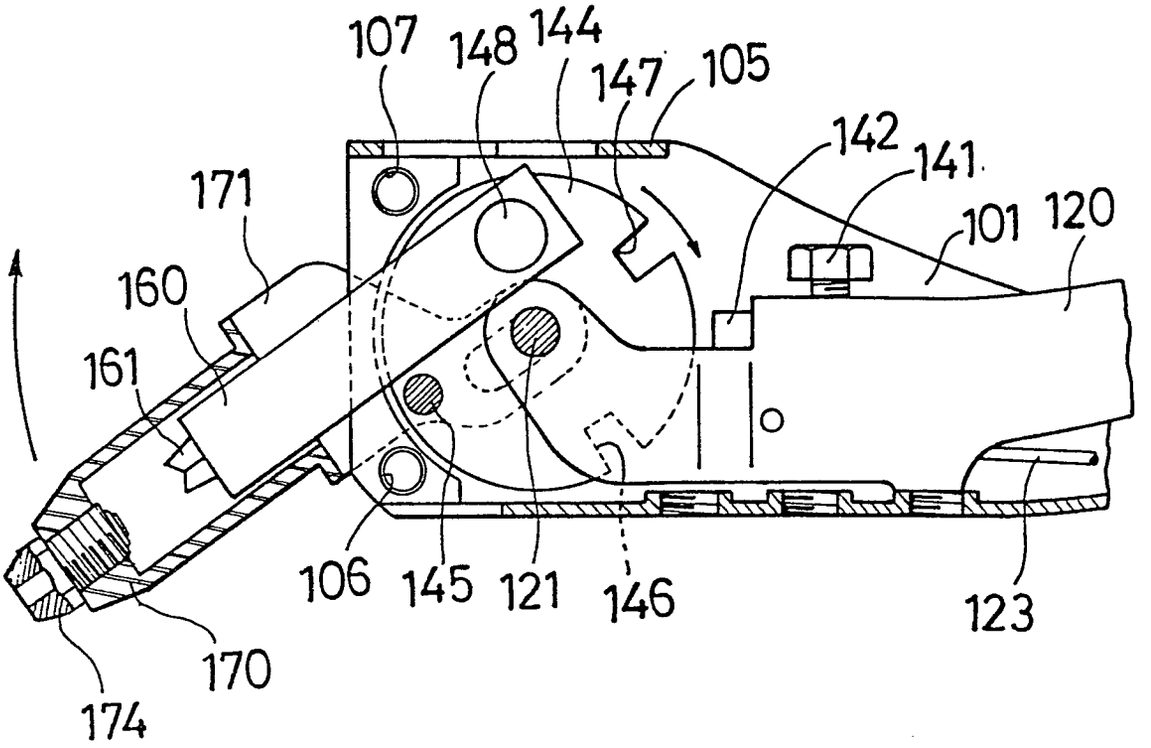
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FIG. 13

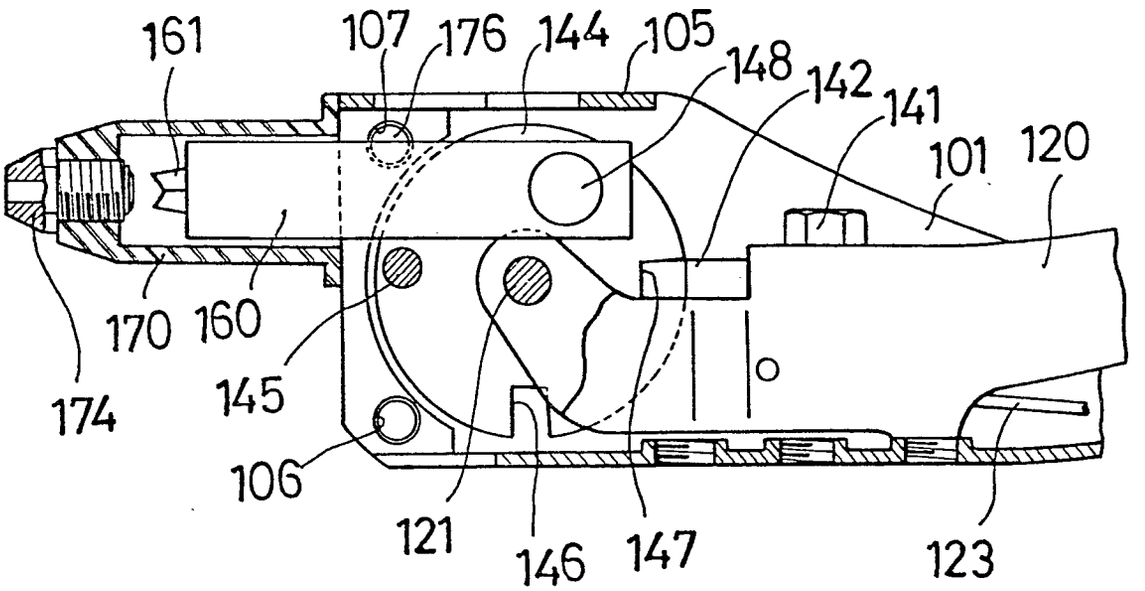
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FIG. 14

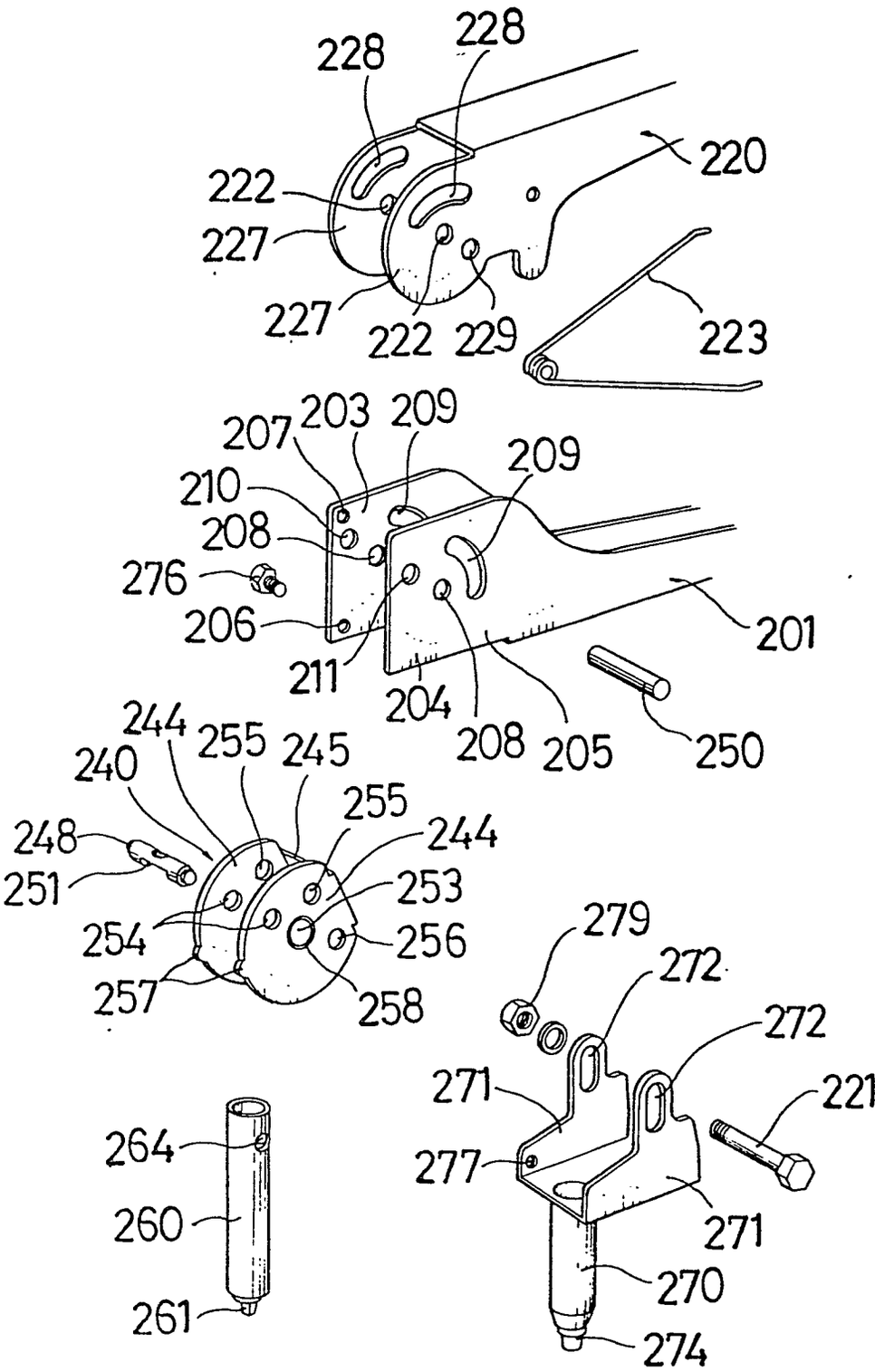
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FIG. 15

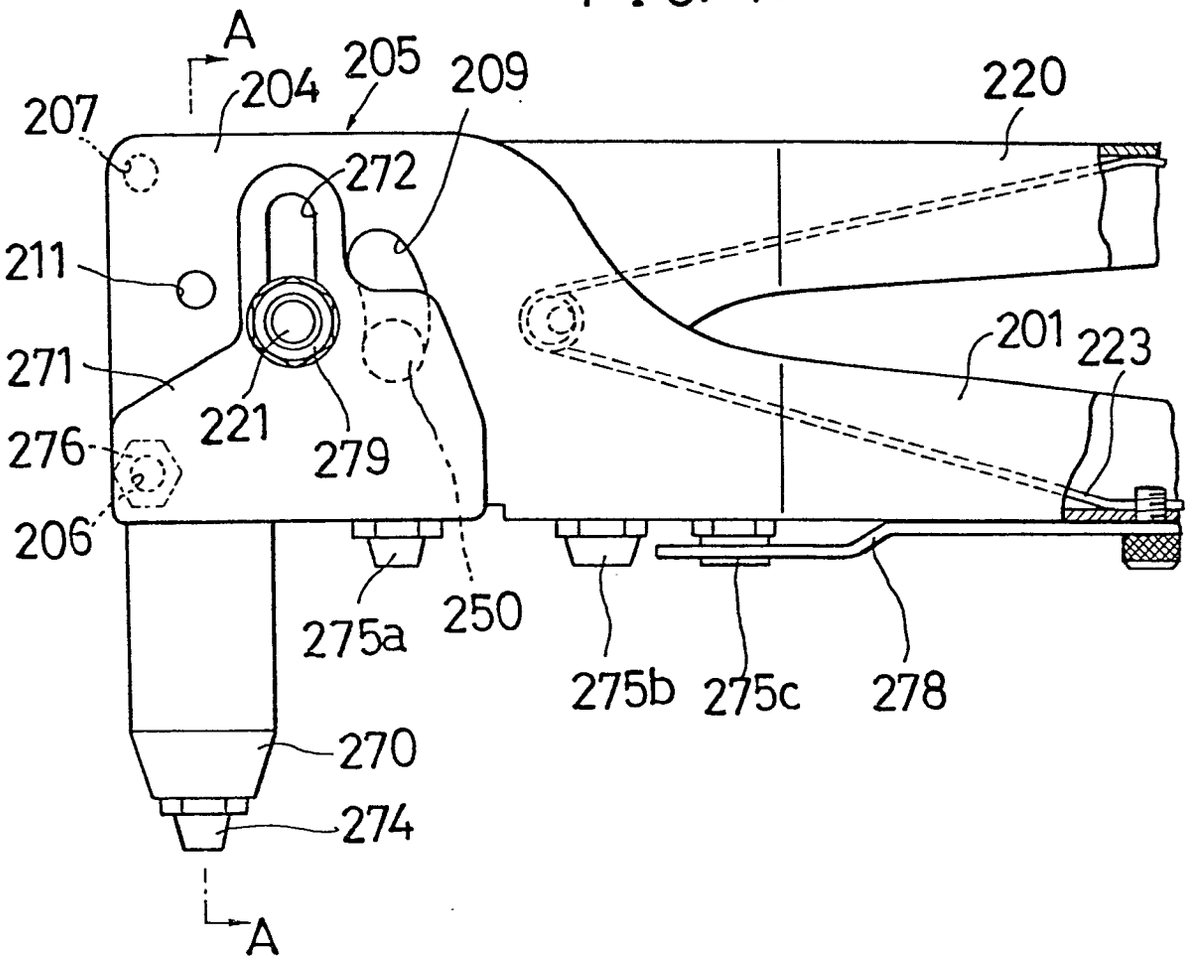
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FIG. 16

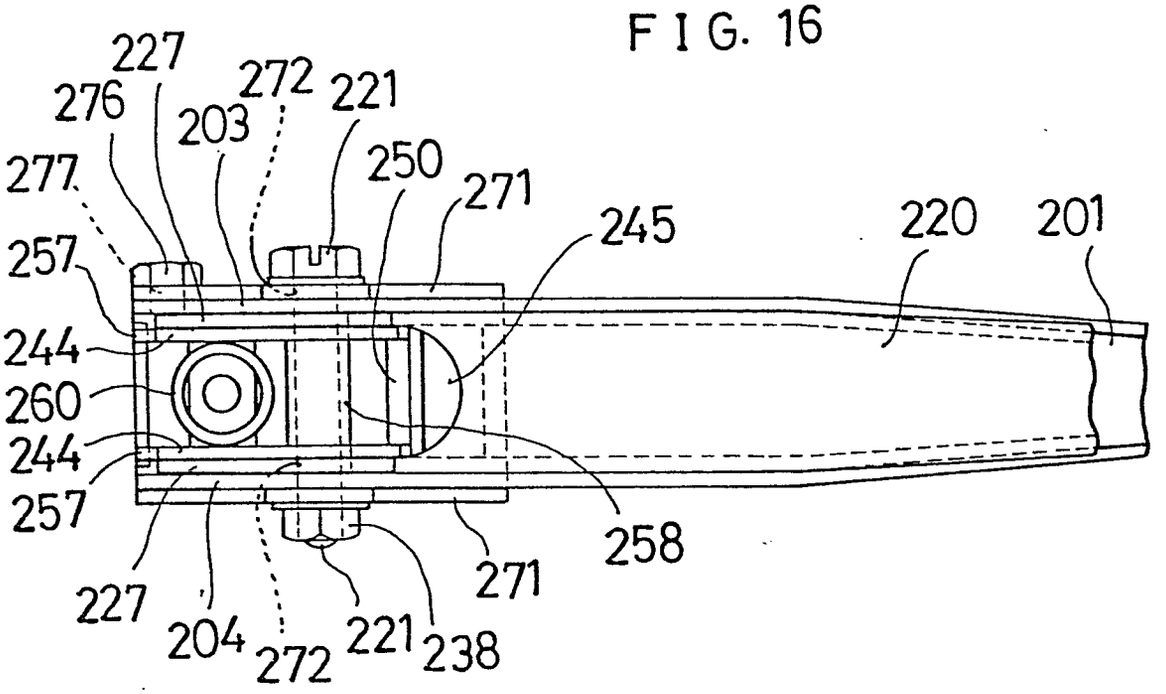
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FIG. 17

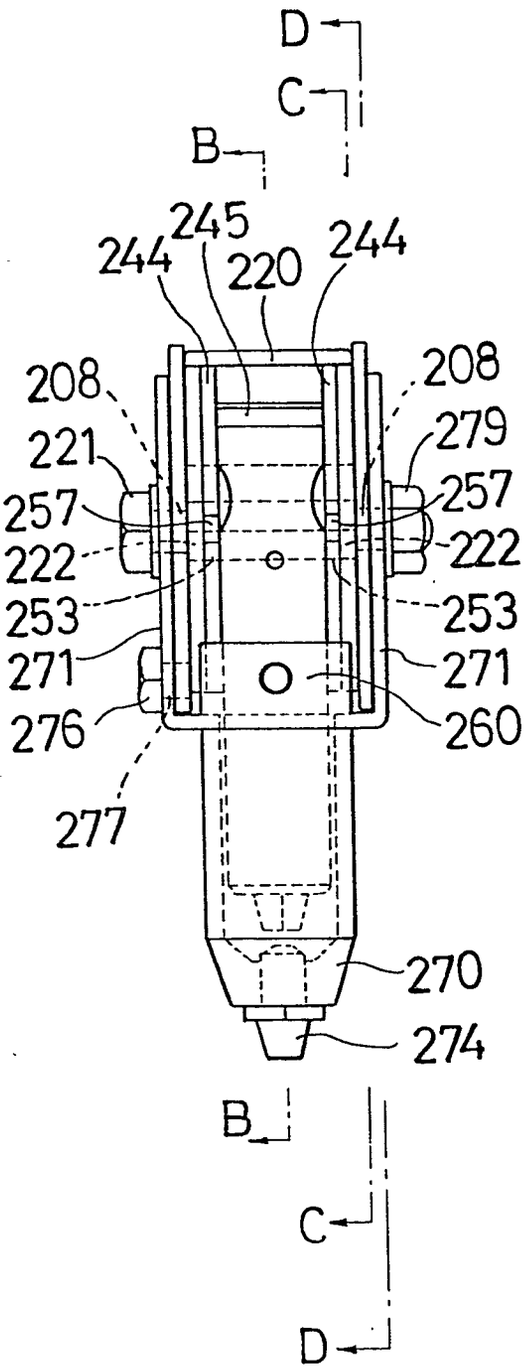
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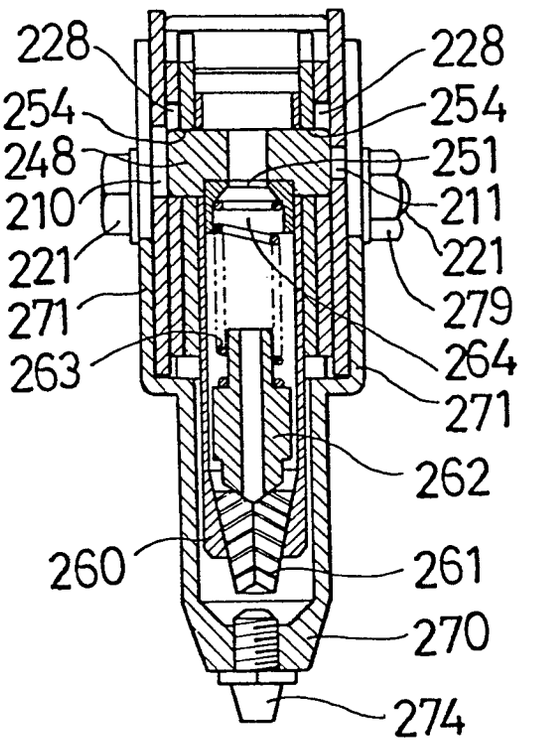
FIG. 18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12/15 FIG. 19

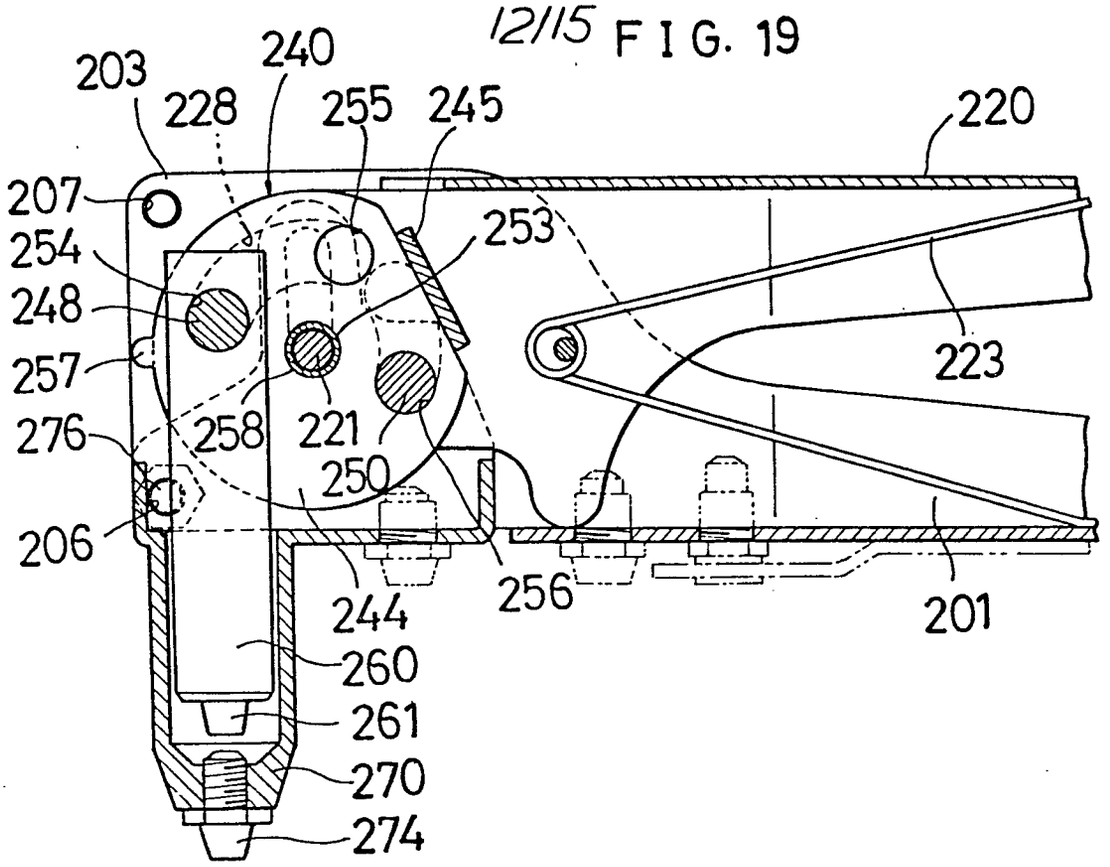
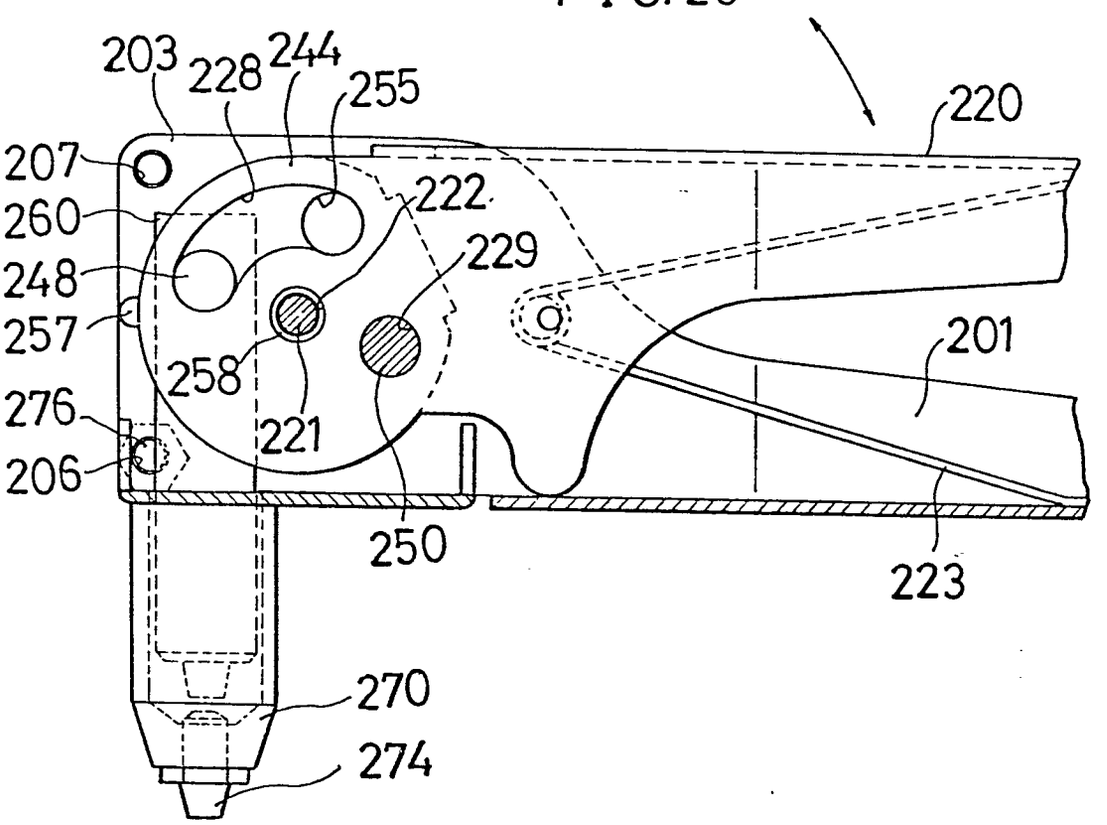


FIG. 20



13/15

FIG. 21

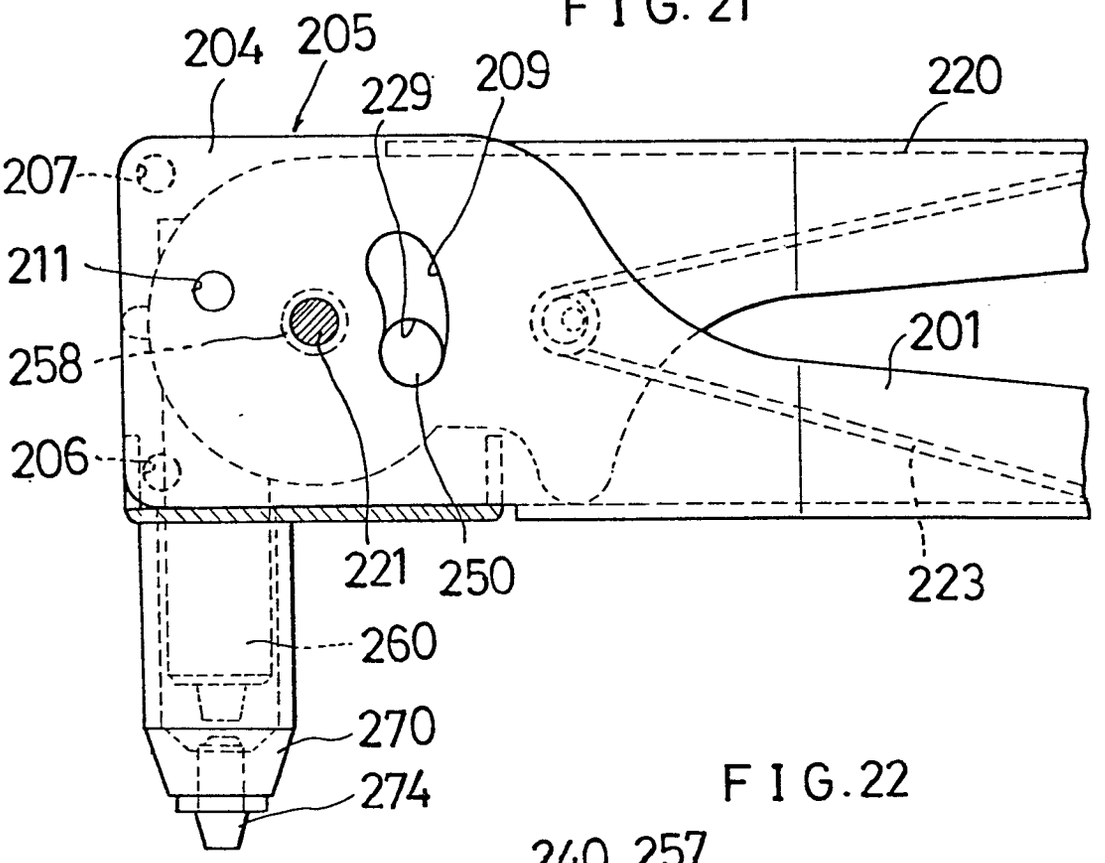


FIG. 22

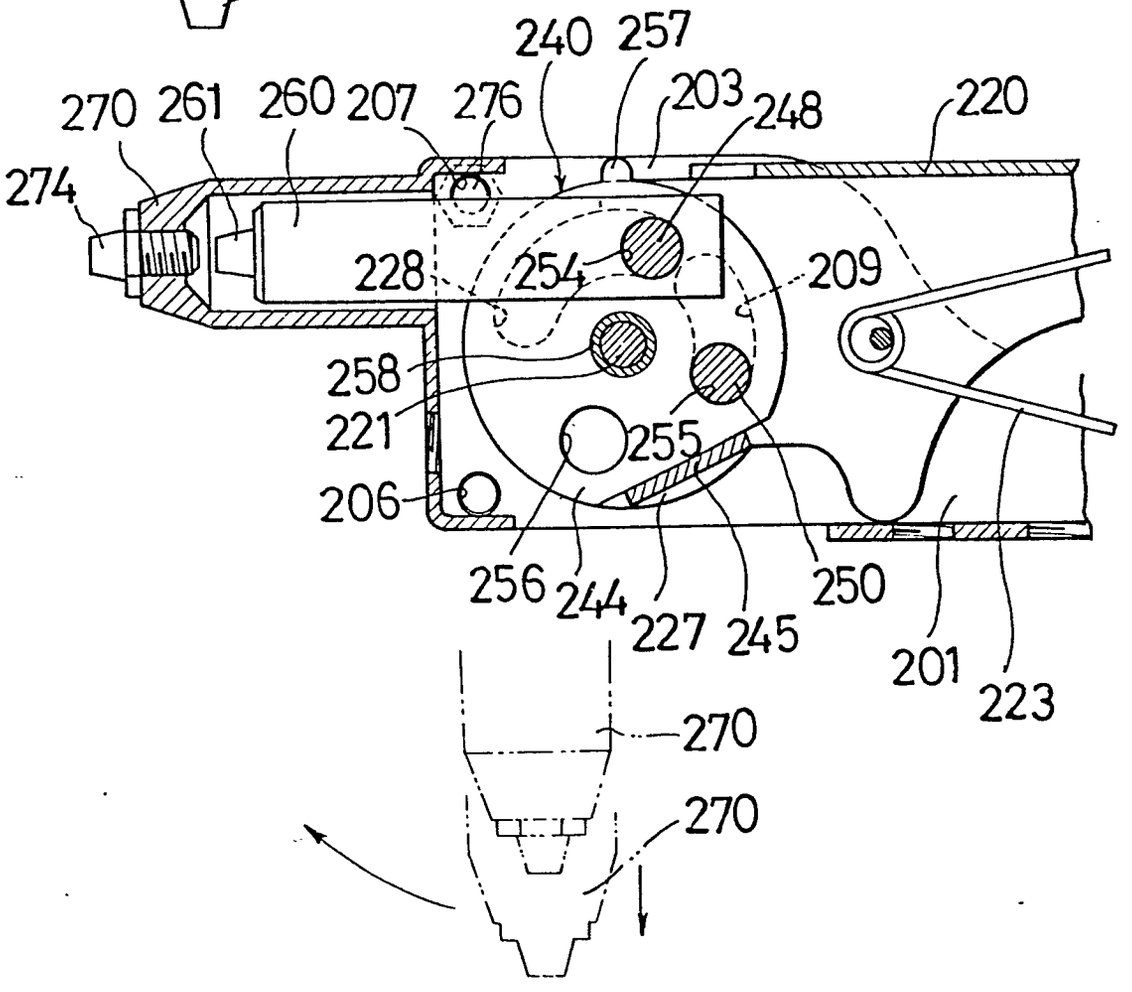


FIG. 23

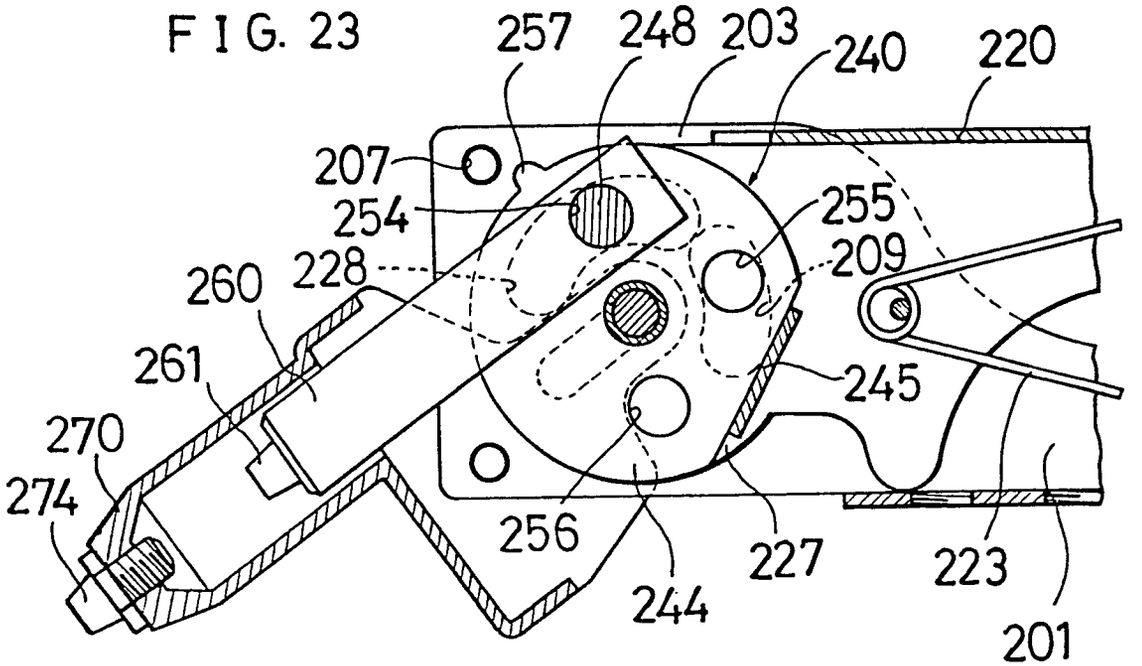

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FIG. 24

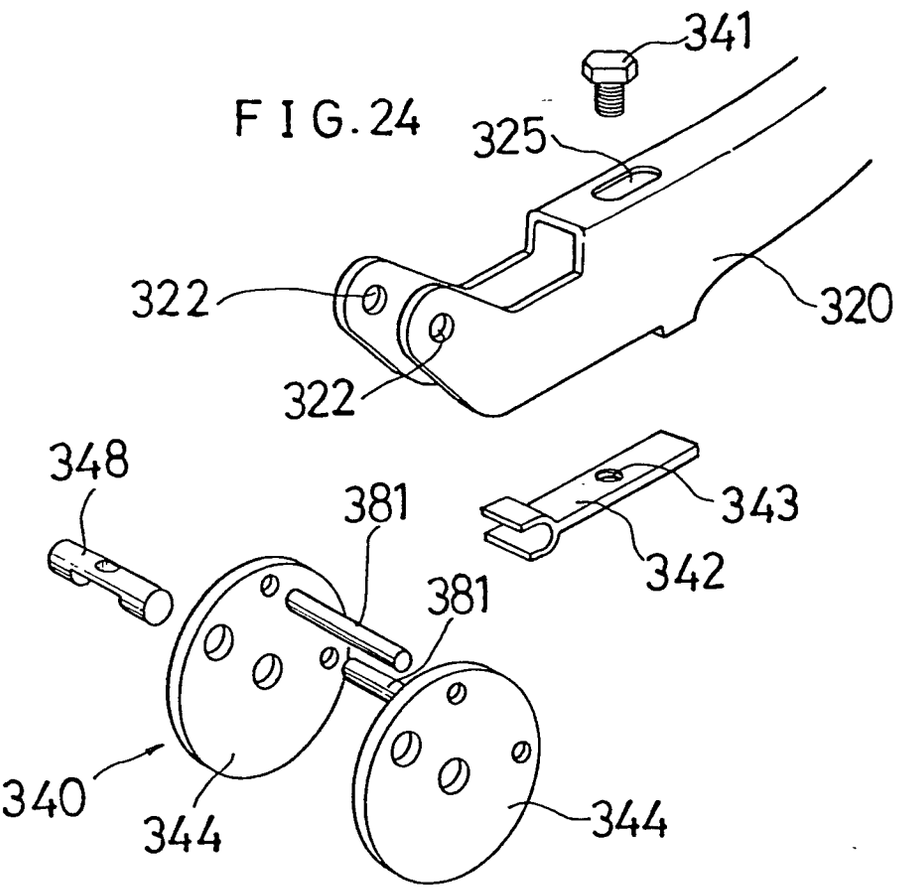
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FIG. 25

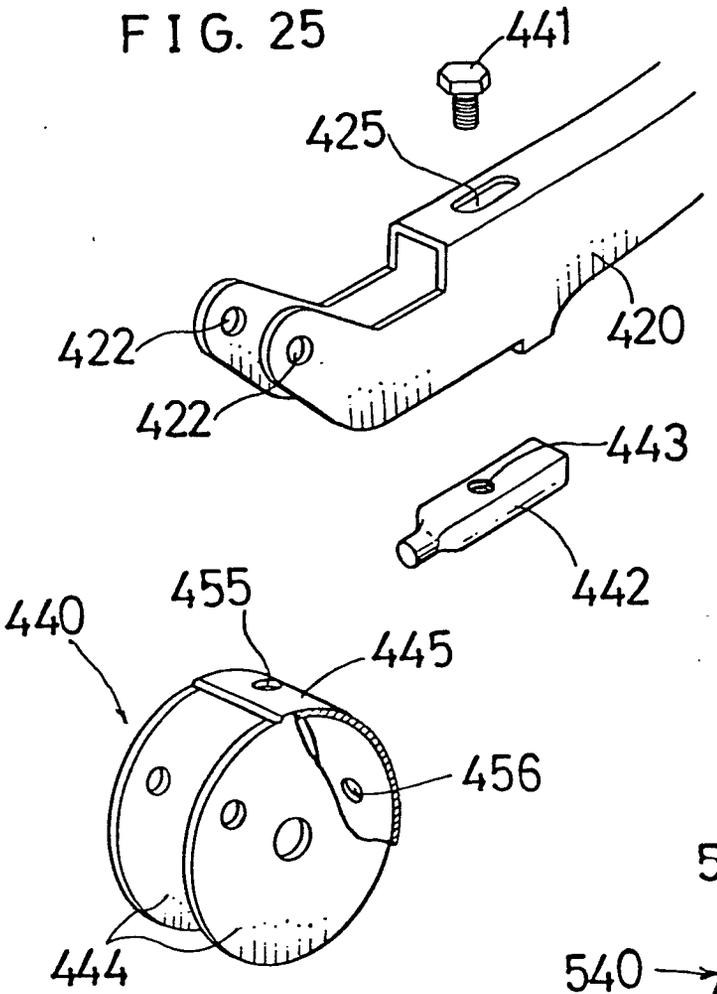
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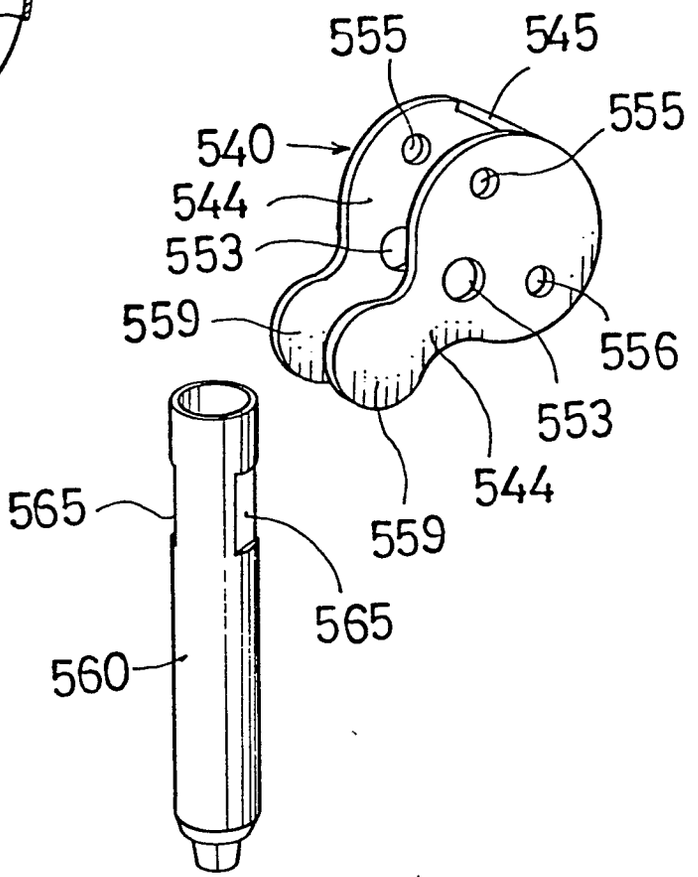
FIG. 26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0036210

European Patent Office

Application number

EP 81 10 1957.9

EUROPEAN SEARCH REPORT

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim
D	US - A - 3 328 985 (KEYMER)	
D	US - A - 3 280 615 (MOLITOR et al.)	
	DE - C - 711 057 (SIEBEL-FLUGZEUG-WERKE) * page 2, lines 72 to 80; fig. 3 *	1
A	DE - A - 2 805 909 (VEB WERKZEUGKOMBINAT SCHMALKALDEN)	

CLASSIFICATION OF THE APPLICATION (Int. Cl.³)

B 21 J 15/04
B 25 B 27/00

TECHNICAL FIELDS SEARCHED (Int. Cl.³)

B 21 J 15/00
B 25 B 27/00
B 25 B 33/00

CATEGORY OF CITED DOCUMENTS

X: particularly relevant
A: technological background
O: non-written disclosure
P: intermediate document
T: theory or principle underlying the invention
E: conflicting application
D: document cited in the application
L: citation for other reasons

&: member of the same patent family, corresponding document

X The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Berlin	09-06-1981	SCHLAITZ