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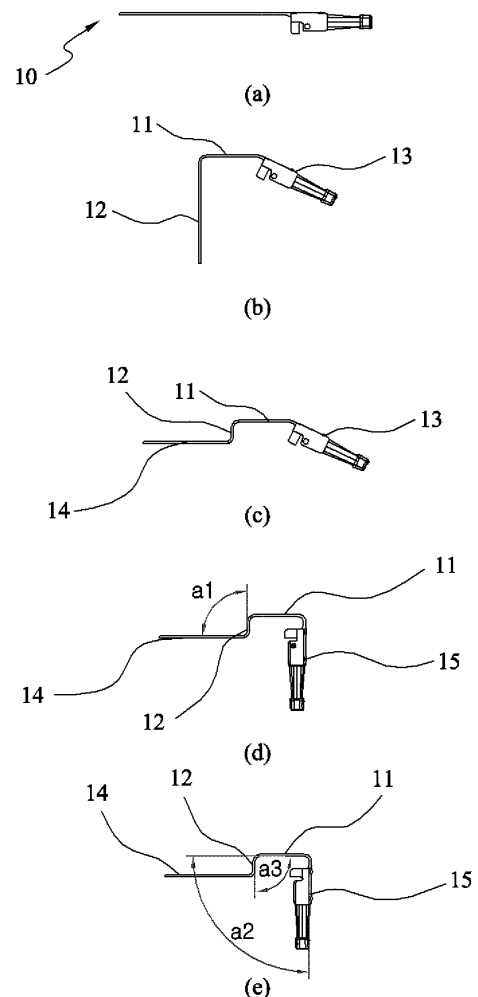
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(54) **TERMINAL BENDING EQUIPMENT**

(57) Terminal bending equipment further includes a structure capable of correcting a bending angle even if components for bending a terminal are deteriorated, thus always maintaining the quality and reliability of a product, reducing the overall size of the equipment to a compact size, and thereby eliminating the restriction of space.

FIG. 12



DescriptionTechnical Field

5 **[0001]** The present disclosure relates to terminal bending equipment, and in particular, to terminal bending equipment which is capable of correcting a bending angle even if components configured to bend a terminal are deteriorated.

Background Art

10 **[0002]** Generally, as a method of producing a press-processed product is gradually automated and propels mass production, measures to improve the productivity and rationalization of press work are important, research and development are strongly promoted, and the method is remarkably advancing through design or improvement.

15 **[0003]** A progressive processing (continuous processing) mold is spotlighted instead of a conventional single processing mold, so the use of the progressive processing mold is rapidly increasing. Simultaneously, the use range thereof is gradually expanding in various fields.

20 **[0004]** Furthermore, in the sense that a material is transferred according to a process sequence, this is usually referred to as a sequential transfer type progressive die or a flow die. In the sense that multiple processes are included and a continuous combination process is possible, this is also referred to as a multi-stage transfer type or gang die.

25 **[0005]** Meanwhile, during work through a press process, a desired terminal is made by sequentially performing a process while continuously transferring the terminal in a strip-shaped material having a length longer than a width. In other words, each process is sequentially performed by a die and a punch installed to correspond to each other at respective positions of mold equipment, thus making a product.

30 **[0006]** As equipment for forming a terminal, "Terminal bending device (Korean Patent Laid-Open Publication No. 10-1092937)" has been disclosed in the following patent document 1.

35 **[0007]** The "terminal bending device" of patent document 1 includes a guide rail 10 which is installed in a front-rear direction, a vertical mount 20 which is slidably coupled to the guide rail 10 to be horizontally moved by the operation of a servomotor 21, a fixed support body 30 which is installed in front of the vertical mount 20 and presses a connector case 2 supplied through a transfer line 5 to stop the movement of the connector case, a movable installed support portion 40 including a horizontal cylinder 41 which is coupled to a rear portion of an upper side of the vertical mount 20, a horizontal moving body 42 which is coupled to the horizontal cylinder 41 to horizontally move, and a prop 44 which is coupled to the horizontal moving body 42 to support the rear surface of the connector case 2 fixedly supported on the fixed support body 30 and has an insert groove 43 to prevent the terminal 1 from being caught, a pressure adjusting portion 50 which is installed on the horizontal moving body 42 of the movable installed support portion 40 to press the fixed support body 30 and thereby press and fix the connector case 2, a fixed installation portion 60 which is vertically installed in front of the guide rail 10 to be spaced apart therefrom, a vertical operating portion 70 including a guider 72 which constitutes a rotating shaft 71 vertically installed on the fixed installation portion 60, and an operating motor 73 which is coupled to the guider 72 to rotate the rotating shaft 71, an installation frame 80 including a vertical frame 81 which is coupled to the rotating shaft 71 formed on the vertical operating portion 70 to vertically move, and a pair of horizontal frames 82 which are provided on both sides of the vertical frame 81, and a rotary operation bending portion 90 including a rotation motor 92 which is installed on the installation frame 80 through a bracket 91, a bending actuator 94 which constitutes a hinge shaft 93 to be coupled to a pair of horizontal frames 82 provided on the installation frame 80 via a bearing, an insert body 95 which is coupled to the rear surface of the bending actuator 94 to insert the terminal 1 according to the operation of the servomotor 21, and a power transmission means 96 which connects the rotation motor 92 and the bending actuator 94 to transmit the power of the rotation motor 92 to the bending actuator 94. Thus, through the repeated operation of the rotary operation bending portion, the bending process may be rapidly performed regardless of the thickness of the terminal, thus leading to an increase in productivity as well as a reduction in manufacturing cost. Further, maintenance may be easily performed due to the configuration of a micrometer configured to move the insert body.

45 **[0008]** However, the "terminal bending device" of patent document 1 is problematic in that, when components configured to bend the terminal are worn, deformed, or deteriorated through repeated production, the angle of a bent portion is changed, so the quality and reliability of a product are degraded.

50 **[0009]** Furthermore, the conventional bending device is problematic in that its size is large, so the bending device has many space restrictions.

55 **[0010]** (Patent document 1) Korean Patent Laid-Open Publication No. 10-1092937

SUMMARY

Technical Problem

5 [0011] An aspect of the present disclosure provides terminal bending equipment, which further includes a structure capable of correcting a bending angle even if components for bending a terminal are deteriorated, thus always maintaining the quality and reliability of a product, reducing the overall size of the equipment to a compact size, and thereby eliminating the restriction of space.

10 Technical Solution

[0012] According to various embodiments of the present disclosure, a terminal bending equipment 1 may include a body housing 100 having a terminal input portion 110 formed on a side thereof, and a terminal moving rail 120 formed therein to guide a movement of a terminal 10 introduced from the terminal input portion 110; a first bending block 200 provided above the body housing 100, and forming a first horizontal portion 11 on a center of the terminal 10 introduced from the terminal input portion 110, a front-end vertical portion 12 made by bending a front end of the terminal 10 at right angles, and an inclination portion 13 made by bending a rear end of the terminal 10 at a predetermined angle; a first press bar 300 provided on a rear surface of the body housing 100, and horizontally unbending a portion of the front-end vertical portion 12 to form a second horizontal portion 14; a first angle adjuster 400 provided on a front surface of the body housing 100, and moving up and down by a worker's manipulation to adjust an angle α_1 between the front-end vertical portion 12 and the second horizontal portion 14 and to support the second horizontal portion 14; and a second bending block 500 provided above the body housing 100, and forming the second horizontal portion 14 at an angle α_1 , and forming a rear-end vertical portion 15 by bending the rear end of the terminal 10 at right angles.

[0013] The terminal bending equipment may further include a second angle adjuster 600 provided on the front surface of the body housing 100, and moving forwards or backwards by a worker's manipulation to adjust an angle α_2 between the first horizontal portion 11 and the rear-end vertical portion 15 and to support the rear-end vertical portion 15; and a second press bar 700 provided on the rear surface of the body housing 100, and pressing the rear-end vertical portion 15 to have the angle α_2 .

[0014] The terminal bending equipment may further include a press block 800 provided above the body housing 100 to press the first horizontal portion 11; a third press bar 900 inserted into the press block 800 to be moved forwards or backwards; and a press hook pin 1000 rotatably formed on a front surface of the press block 800, and pressing the front-end vertical portion 12 by pressing the third press bar 900 and thereby having an angle α_3 between the first horizontal portion 11 and the front-end vertical portion 12.

[0015] The first angle adjuster 400 may include a first adjusting screw 410 formed on the front surface of the body housing 100 to be moved forwards or backwards; a moving block 420 provided in the body housing 100 to be moved forwards or backwards by manipulating the first adjusting screw 410; and a lifting block 430 provided on a front surface of the terminal moving rail 120 to be moved up and down as the moving block 420 moves, in a state where the lifting block comes into contact with the second horizontal portion 14.

[0016] An upper surface of the moving block 420 may be formed to be inclined at a predetermined angle, and a lower surface of the lifting block 430 may be formed to be inclined at an angle corresponding to the upper surface of the moving block 420.

[0017] The terminal bending equipment may further include a third angle adjuster 1100 provided on the front surface of the body housing 100 and moved forwards and backwards by a worker's manipulation to adjust an angle of the press hook pin 1000.

[0018] The third angle adjuster 1100 may include a third adjusting screw 1110 formed on the front surface of the body housing 100 to move forwards or backwards, and having a curved surface on a portion coming into contact with the press hook pin 1000; and an elastic member 1120 provided on a lower portion of the third adjusting screw 1110 to provide an elastic force to the press hook pin 1000.

[0019] The press hook pin 1000 may include a hinge portion 1010 hinged to the press block 800 to be elastically supported by the elastic member 1120; a circular head 1020 formed above the hinge portion 1010 to be positioned between the third adjusting screw 1110 and the third press bar 900; and a ring-shaped press protrusion 1030 formed under the hinge portion 1010 to protrude inwards from the body housing 100.

[0020] Further, cutting pins 130 may be formed above the body housing 100 to cut the terminals 10 which are continuously introduced from the terminal input portion 110.

ADVANTAGEOUS EFFECTS

[0021] As described above, the terminal bending equipment according to the present disclosure may further include

a structure capable of correcting a bending angle even if components for bending a terminal are deteriorated, thus always maintaining the quality and reliability of a product, reducing the overall size of the equipment to a compact size, and thereby eliminating the restriction of space.

BRIEF DESCRIPTION OF THE DRAWINGS

[0022]

FIG. 1 is a perspective view illustrating a terminal before forming.

FIG. 2 illustrates the appearance of a terminal formed through terminal bending equipment according to a preferred embodiment of the present disclosure in a perspective view and a side view.

FIG. 3 is a perspective view illustrating the entire appearance of the terminal bending equipment according to the preferred embodiment of the present disclosure.

FIG. 4 is an exploded perspective view illustrating the terminal bending equipment according to the preferred embodiment of the present disclosure.

FIG. 5 is a front perspective view illustrating the terminal bending equipment according to the preferred embodiment of the present disclosure.

FIG. 6 is a rear view illustrating the terminal bending equipment according to the preferred embodiment of the present disclosure.

FIGS. 7 to 11 are exemplary diagrams illustrating a process of forming a terminal through terminal bending equipment according to a preferred embodiment of the present disclosure.

FIG. 12 is an exemplary diagram illustrating the shape of the terminal in each step, which is formed through the terminal bending equipment according to the preferred embodiment of the present disclosure.

DESCRIPTION OF EXEMPLARY EMBODIMENTS

[0023] Hereinafter, terminal bending equipment 1 according to an embodiment of the present disclosure will be described in detail with reference to the accompanying drawings. First, it should be noted that the same components or parts are denoted by the same reference numerals. In the following description, when a detailed description of the relevant known functions or configurations is determined to unnecessarily obscure the gist of the present disclosure, the detailed description will be omitted.

[0024] Referring to FIGS. 3 and 4, the terminal bending equipment 1 according to an embodiment of the present disclosure may mainly include a body housing 100, a first bending block 200, a first press bar 300, a first angle adjuster 400, a second bending block 500, a second angle adjuster 600, a second press bar 700, a press block 800, a third press bar 900, a press hook pin 1000, and a third angle adjuster 1100.

[0025] The terminal bending equipment 1 according to an embodiment of the present disclosure may mainly include a cylinder, a sensor, a controller, a power applying device, which are connected to the first, second, and third press bars 300, 700, and 900, and driving elements operated in conjunction with them to allow the equipment to be smoothly operated. Since the principle of forming and operating the driving elements is widely known to those skilled in the art to which the present disclosure pertains, a detailed description thereof will be omitted.

[0026] First, the body housing 100 will be described. As shown in FIG. 3 or 4, the body housing 100 is a component into which a terminal 10 is movably put and which accommodates components for bending the terminal for each step. A terminal input portion 110 is formed on a side of the body housing in the shape of a hole to allow the external terminal 10 to be put into the body housing 100.

[0027] Furthermore, a terminal moving rail 120 is formed inside the body housing 100 to allow the terminal 10 introduced from the terminal input portion 110 to be seated therein, thus guiding the movement of the terminal and supporting the terminal 10 during a bending operation.

[0028] Meanwhile, cutting pins 130 are formed above the body housing 100 to cut the terminals 10 at regular intervals, as shown in FIG. 7, which are continuously introduced from the terminal input portion 110.

[0029] Next, the first bending block 200 will be described. As shown in FIG. 4, 6, or 8, the first bending block 200 is a component provided above the body housing 100 to primarily bend the terminal 10 which is first introduced from the terminal input portion 110 and then is seated in the terminal moving rail 120. As shown in FIG. 12B, a first horizontal portion 11 is formed on the center of the terminal 10 through a first forming portion 210 formed on a lower portion of the first bending block 200, a front end of the terminal 10 is bent at right angles to form a front-end vertical portion 12, and a rear end of the terminal 10 is bent at a predetermined angle to form an inclination portion 13.

[0030] Next, the first press bar 300 will be described. As shown in FIG. 4, 6 or 9, the first press bar 300 is a secondary bending component provided on a rear surface of the body housing 100, i.e., the rear surface of the body housing 100 corresponding to a position of the first bending block 200 to be movable forwards or backwards by the cylinder or the

like, thus horizontally unbending a portion of the front-end vertical portion 12. Thereby, as shown in FIG. 12C, a second horizontal portion 14 is formed.

[0031] Next, the first angle adjuster 400 will be described. As shown in FIG. 4, 5 or 10, the first angle adjuster 400 is a component provided on a front surface of the body housing 100 to move up and down by a worker's manipulation, thereby adjusting an angle α_1 between the front-end vertical portion 12 and the second horizontal portion 14 and supporting the second horizontal portion 14. The first angle adjuster is composed of a first adjusting screw 410, a moving block 420, and a lifting block 430.

[0032] The first adjusting screw 410 is a component formed on the front surface of the body housing 100 to be connected to the moving block 420 which will be described later, and is moved forwards or backwards depending on a rotating direction to move the moving block 420 forwards or backwards.

[0033] The moving block 420 is connected to the first adjusting screw 410 while being provided in the body housing 100, so the moving block is moved forwards or backwards by the first adjusting screw 410.

[0034] Furthermore, the lifting block 430 is seated on an upper portion of the moving block 420, and an upper surface of the moving block 420 is formed to be inclined downwards at a predetermined angle to move the lifting block 430 up or down using the forward or backward movement through the first adjusting screw 410, thus allowing the lifting block 430 to move up and down along an inclined surface.

[0035] The lifting block 430 is connected to the moving block 420 while being positioned on the front surface of the terminal moving rail 120, so the lifting block is moved up or down by the moving block 420. This applies an upwardly pushing force while being in contact with the lower portion of the second horizontal portion 14, thus guiding the formation of the angle α_1 between the front-end vertical portion 12 and the second horizontal portion 14. Here, the angle α_1 refers to a correction angle.

[0036] Furthermore, a lower surface of the lifting block 430 is preferably formed to be inclined at an angle corresponding to the upper surface of the moving block 420.

[0037] Next, the second bending block 500 will be described. As shown in FIG. 4 or 10, the second bending block 500 is a component which is provided above the body housing 100 to perform a bending operation while securing the angle α_1 by the first angle adjuster 400. Through the lifting block 430 and the second forming portion 510 formed on a lower portion of the second bending block 500, as shown in FIG. 12D, the terminal is bent at the corrected angle α_1 between the front-end vertical portion 12 and the second horizontal portion 14. Furthermore, the inclination portion 13 formed at a predetermined angle is further bent to form a rear-end vertical portion 15 having a right angle at the rear end of the terminal 10.

[0038] Next, the second angle adjuster 600 will be described. As shown in FIG. 4, the second angle adjuster 600 is provided on the front surface of the body housing 100 to be moved forwards or backwards by a worker's manipulation. The second angle adjuster is a component which pushes the rear-end vertical portion 15 to the rear surface during the forward movement, thus serving as a stopper which adjusts an angle α_2 between the first horizontal portion 11 and the rear-end vertical portion 15 and supports the rear-end vertical portion 15. Here, the angle α_2 refers to a correction angle.

[0039] Next, the second press bar 700 will be described. As shown in FIG. 4 or 6, the second press bar 700 may be provided on the rear surface of the body housing 100 to be movable forwards or backwards by the cylinder or the like, thus pressing the rear-end vertical portion 15 supported by the second angle adjuster 600 and thereby forming the corrected angle α_2 between the first horizontal portion 11 and the rear-end vertical portion 15, as shown in FIG. 12E.

[0040] Next, the press block 800 will be described. As shown in FIG. 4 or 5, the press block 800 is provided above the body housing 100 to press the first horizontal portion 11 and thereby fix the terminal 10.

[0041] Next, the third press bar 900 will be described. As shown in FIG. 4, the third press bar 900 is a component which is inserted into the press block 800 to be moved forwards or backwards by the cylinder or the like, thus pressing the press hook pin 1000 which will be described later, and causing the press hook pin 100 to press the front-end vertical portion 12.

[0042] Next, the press hook pin 1000 will be described. As shown in FIG. 4 or 11, the press hook pin 1000 is a component which is rotatably formed on a front surface of the press block 800 to press the front-end vertical portion 12 by pressing the third press bar 900 and thereby have an angle α_3 between the first horizontal portion 11 and the front-end vertical portion 12, and is composed of a hinge portion 1010, a circular head 1020, and a press protrusion 1030. Here, the angle α_3 refers to a correction angle.

[0043] The hinge portion 1010 is a component which is hinged to the press block 800 to allow the press hook pin 1000 to be rotatably connected to the press block 800.

[0044] The circular head 1020 is a circular component which is formed above the hinge portion 1010 to be positioned between the third adjusting screw 1110 and the third press bar 900, and guides the press hook pin 1000 to smoothly lie forwards or backwards about the hinge portion 1010 by manipulating the third angle adjuster 1100 which will be described later.

[0045] The press protrusion 1030 is a ring-shaped component which is formed under the hinge portion 1010 to protrude inwards from the body housing 100, and may directly strike the front-end vertical portion 12 by pressing the third press

bar 900 to form the correction angle α_3 as shown in FIG. 12E.

[0046] Next, the third angle adjuster 1100 will be described. As shown in FIG. 4 or 11, the third angle adjuster 1100 is a component which is provided on the front surface of the body housing 100 to be moved forwards and backwards by a worker's manipulation and thereby adjust the angle of the press hook pin 1000, and is composed of a third adjusting screw 1110 and an elastic member 1120.

[0047] The third adjusting screw 1110 is a component which is formed on the front surface of the body housing 100 to move forwards or backwards depending on the rotating direction, and has a curved surface on a portion coming into contact with the press hook pin 1000. As the third adjusting screw is moved forwards or backwards by the elastic member 1120 which will be described later, the press hook pin 1000 may lie forwards or backwards or may be kept vertical.

[0048] The elastic member 1120 is a component which is provided between the lower portion of the third adjusting screw 1110 and the press hook pin 1000 to provide an elastic force to the press hook pin 1000. When the third adjusting screw 1110 moves backwards, the elastic member becomes in a tension state, thus maintaining a state in which the press hook pin 1000 lies backwards. When the third adjusting screw 1110 moves forwards, the elastic member becomes in a compressed state, thus maintaining a state in which the press hook pin 1000 lies forwards.

[0049] Preferred embodiments have been shown and described in the accompanying drawings and the specification. Although the present invention has been described in terms of specific items such as detailed elements as well as the limited embodiments and the drawings, they are only provided to help more general understanding of the invention, and the present invention is not limited to the above embodiments. It will be appreciated by those skilled in the art to which the present invention pertains that various modifications and changes may be made from the above description. Therefore, the spirit of the present invention shall not be limited to the above-described embodiments, and the entire scope of the appended claims and their equivalents will fall within the scope and spirit of the invention.

[Description of Reference Numerals]

1: terminal bending equipment	
10: terminal	11: first horizontal portion
12: front-end vertical portion	13: inclination portion
14: second horizontal portion	15: rear-end vertical portion
100: body housing	110: terminal input portion
120: terminal moving rail	130: cutting pin
200: first bending block	210: first forming portion
300: first press bar	
400: first angle adjuster	410: first adjusting screw
420: moving block	430: lifting block
500: second bending block	510: second forming portion
600: second angle adjuster	
700: second press bar	
800: press block	
900: third press bar	
1000: press hook pin	1010: hinge portion
1020: circular head	1030: press protrusion
1100: third angle adjuster	1110: third adjusting screw
1120: elastic member	

Claims

1. Terminal bending equipment 1 comprising:

a body housing 100 comprising a terminal input portion 110 formed on a side thereof, and a terminal moving rail 120 formed therein to guide a movement of a terminal 10 introduced from the terminal input portion 110;
a first bending block 200 provided above the body housing 100, and forming a first horizontal portion 11 on a center of the terminal 10 introduced from the terminal input portion 110, a front-end vertical portion 12 made by bending a front end of the terminal 10 at right angles, and an inclination portion 13 made by bending a rear end of the terminal 10 at a predetermined angle;
a first press bar 300 provided on a rear surface of the body housing 100, and horizontally unbending a portion of the front-end vertical portion 12 to form a second horizontal portion 14;

a first angle adjuster 400 provided on a front surface of the body housing 100, and moving up and down by a worker's manipulation to adjust an angle α_1 between the front-end vertical portion 12 and the second horizontal portion 14 and to support the second horizontal portion 14; and
a second bending block 500 provided above the body housing 100, and forming the second horizontal portion 14 at an angle α_1 , and forming a rear-end vertical portion 15 by bending the rear end of the terminal 10 at right angles.

2. The terminal bending equipment 1 of claim 1, further comprising:

a second angle adjuster 600 provided on the front surface of the body housing 100, and moving forwards or backwards by a worker's manipulation to adjust an angle α_2 between the first horizontal portion 11 and the rear-end vertical portion 15 and to support the rear-end vertical portion 15; and
a second press bar 700 provided on the rear surface of the body housing 100, and pressing the rear-end vertical portion 15 to have the angle α_2 .

3. The terminal bending equipment 1 of claim 1, further comprising:

a press block 800 provided above the body housing 100 to press the first horizontal portion 11;
a third press bar 900 inserted into the press block 800 to be moved forwards or backwards; and
a press hook pin 1000 rotatably formed on a front surface of the press block 800, and pressing the front-end vertical portion 12 by pressing the third press bar 900 and thereby having an angle α_3 between the first horizontal portion 11 and the front-end vertical portion 12.

4. The terminal bending equipment 1 of claim 1,
wherein the first angle adjuster 400 comprises:

a first adjusting screw 410 formed on the front surface of the body housing 100 to be moved forwards or backwards;
a moving block 420 provided in the body housing 100 to be moved forwards or backwards by manipulating the first adjusting screw 410; and
a lifting block 430 provided on a front surface of the terminal moving rail 120 to be moved up and down as the moving block 420 moves, in a state where the lifting block comes into contact with the second horizontal portion 14.

5. The terminal bending equipment 1 of claim 4,

wherein an upper surface of the moving block 420 is formed to be inclined at a predetermined angle, and
a lower surface of the lifting block 430 is formed to be inclined at an angle corresponding to the upper surface of the moving block 420.

6. The terminal bending equipment 1 of claim 3, further comprising:

a third angle adjuster 1100 provided on the front surface of the body housing 100, and moved forwards and backwards by a worker's manipulation to adjust an angle of the press hook pin 1000.

7. The terminal bending equipment 1 of claim 6,
wherein the third angle adjuster 1100 comprises:

a third adjusting screw 1110 formed on the front surface of the body housing 100 to move forwards or backwards, and having a curved surface on a portion coming into contact with the press hook pin 1000; and
an elastic member 1120 provided on a lower portion of the third adjusting screw 1110 to provide an elastic force to the press hook pin 1000.

8. The terminal bending equipment 1 of claim 7,
wherein the press hook pin 1000 comprises:

a hinge portion 1010 hinged to the press block 800 to be elastically supported by the elastic member 1120;
a circular head 1020 formed above the hinge portion 1010 to be positioned between the third adjusting screw 1110 and the third press bar 900; and

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a ring-shaped press protrusion 1030 formed under the hinge portion 1010 to protrude inwards from the body housing 100.

9. The terminal bending equipment 1 of claim 1,

5 wherein cutting pins 130 are formed above the body housing 100 to cut the terminals 10 which are continuously introduced from the terminal input portion 110.

10. A terminal 10 produced through the terminal bending equipment 1 described in claim 1.

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FIG. 1

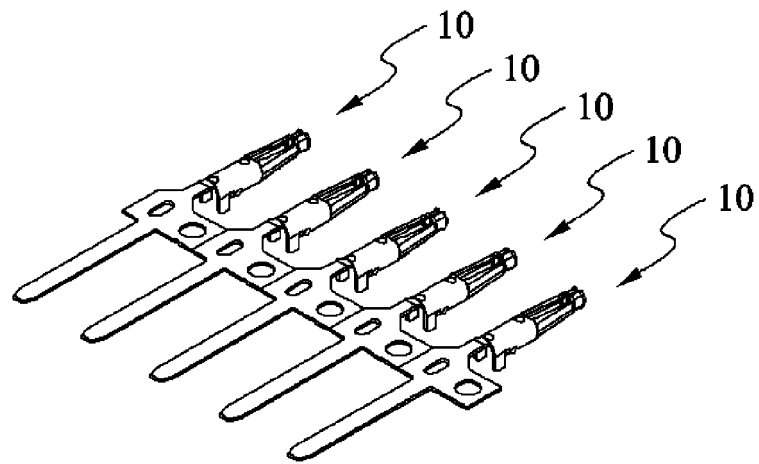


Fig. 3

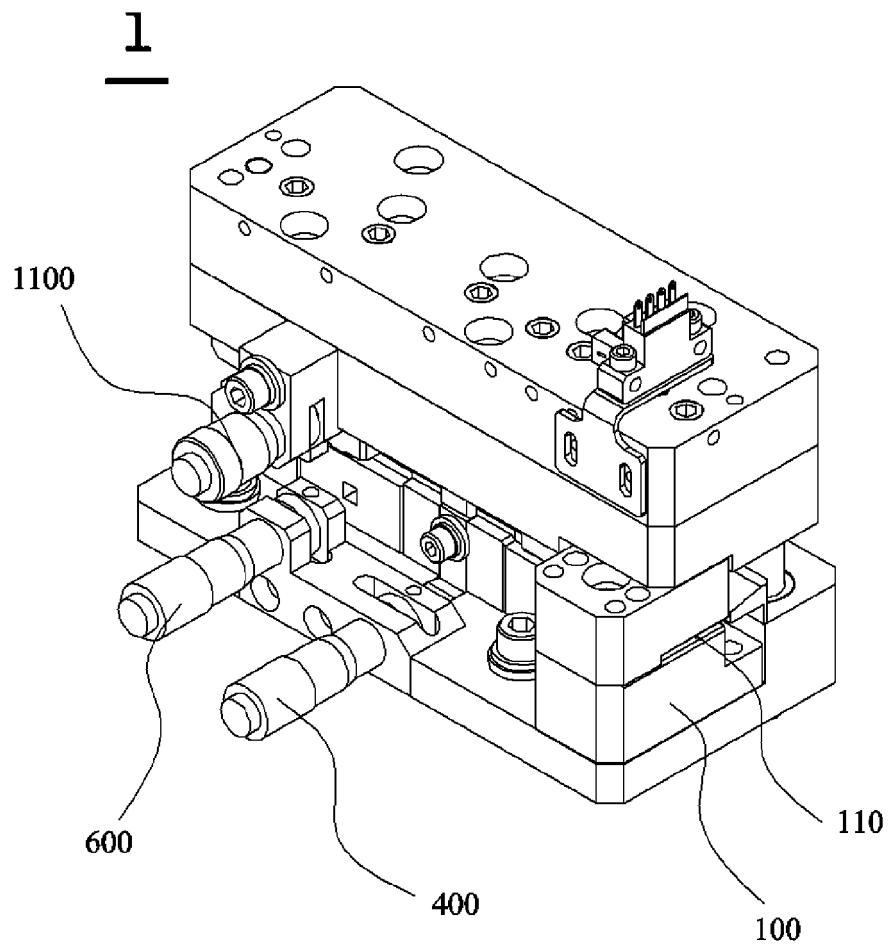


FIG. 2

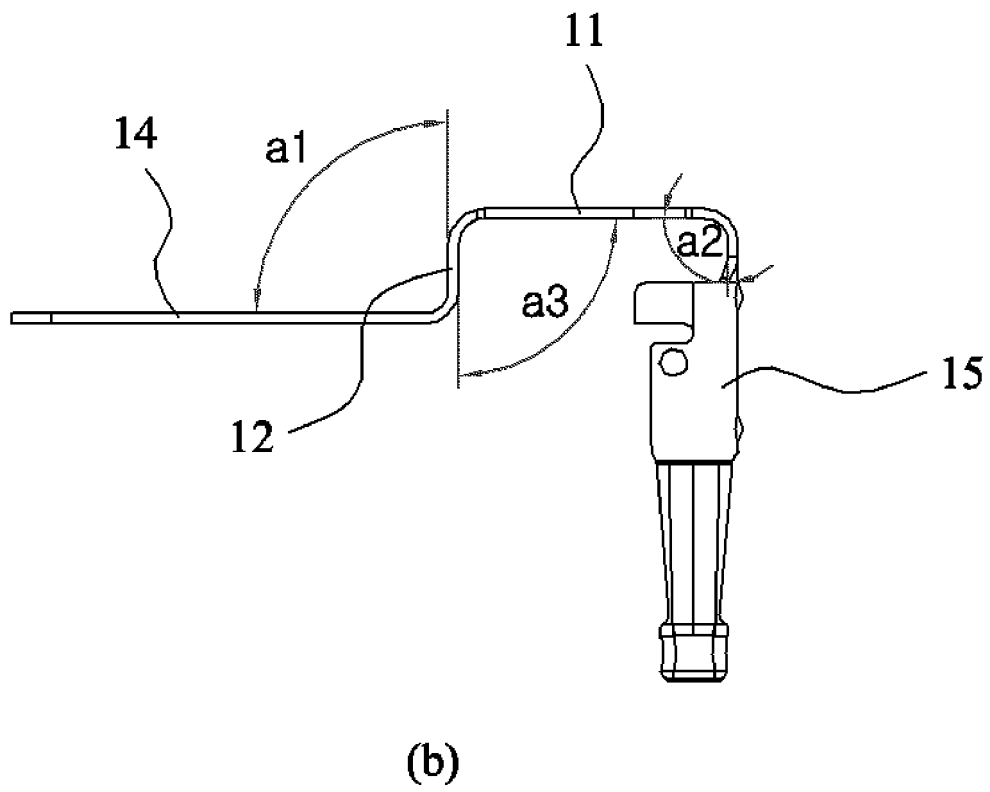
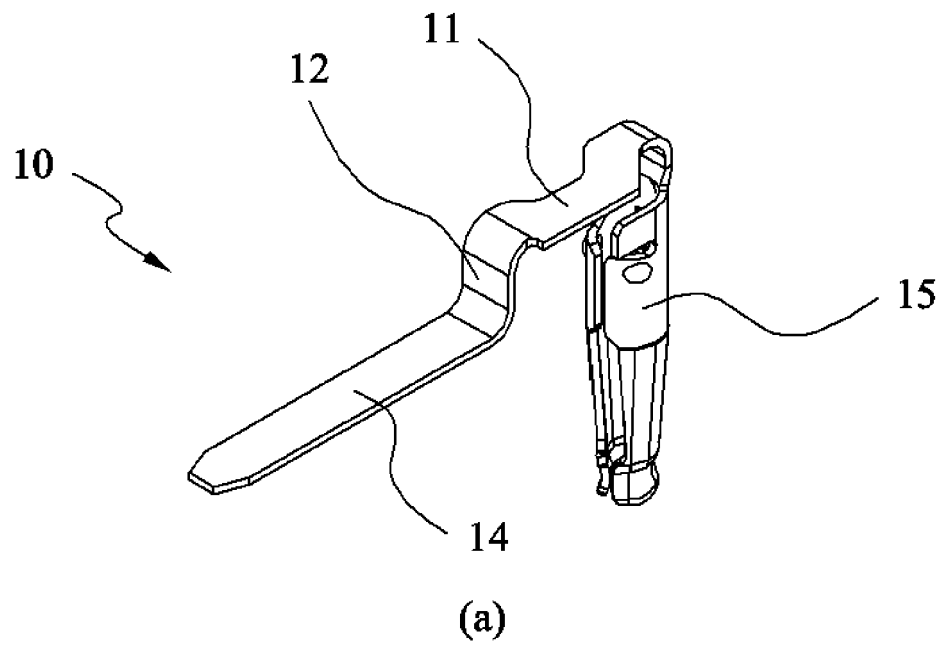


FIG. 4

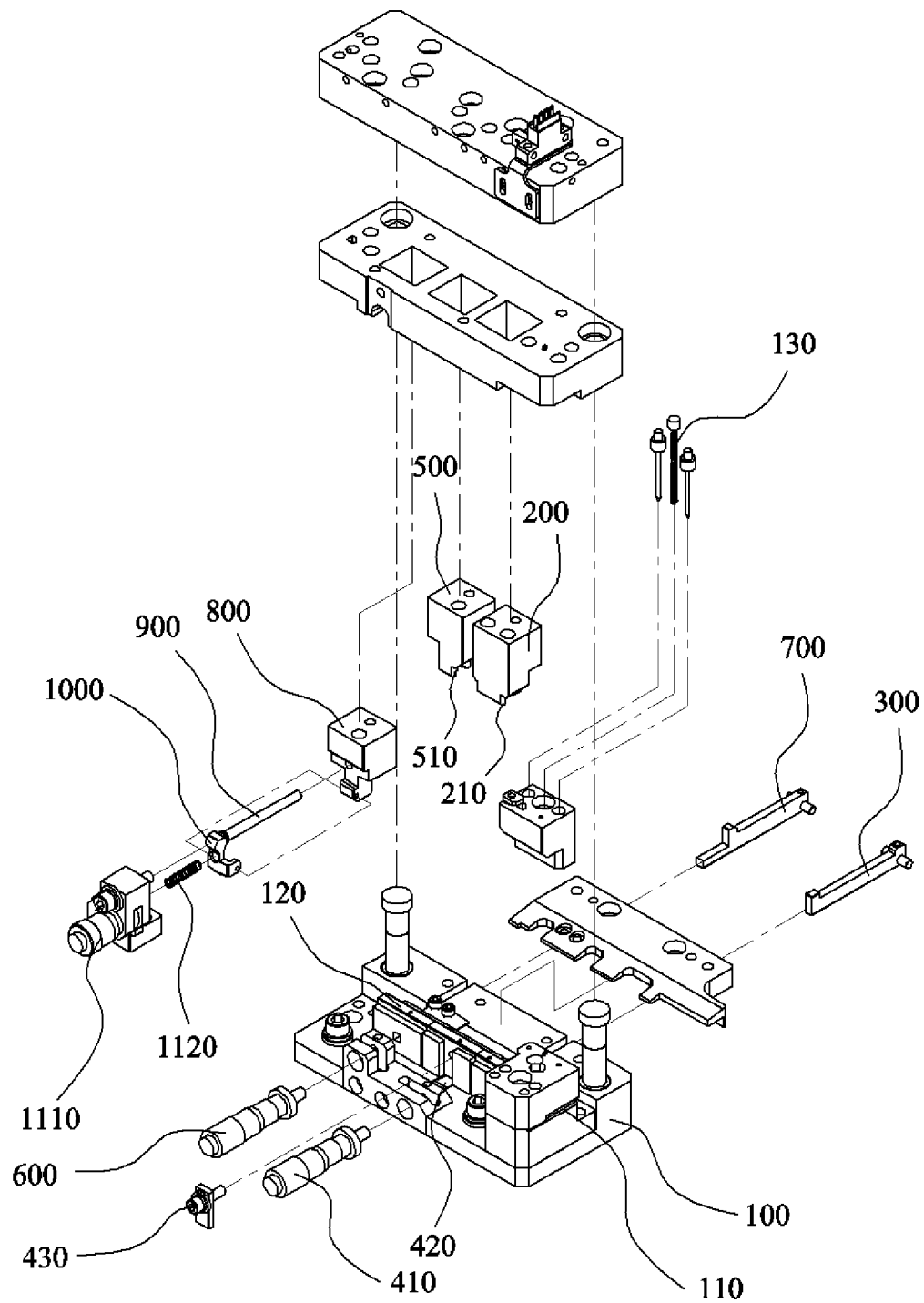


FIG. 5

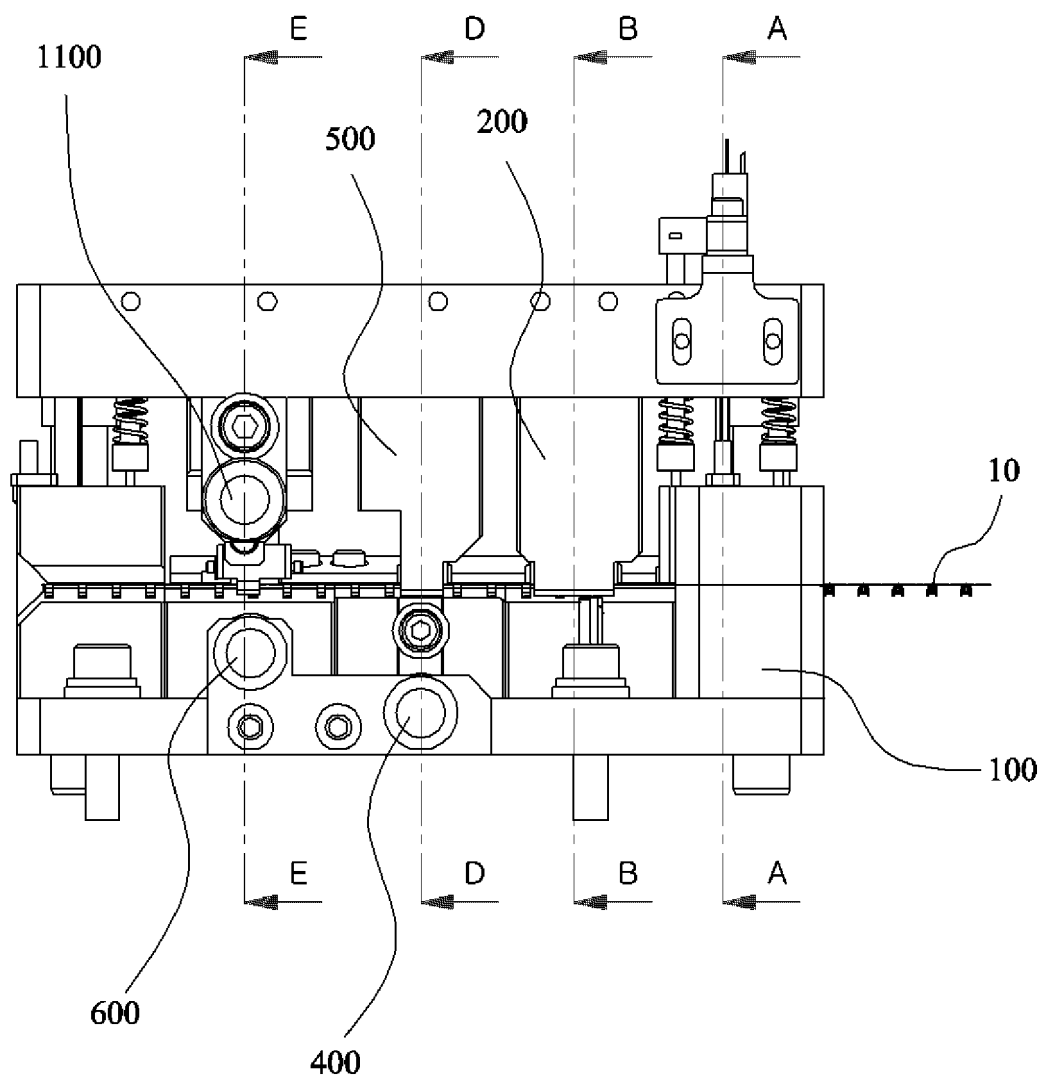


FIG. 6

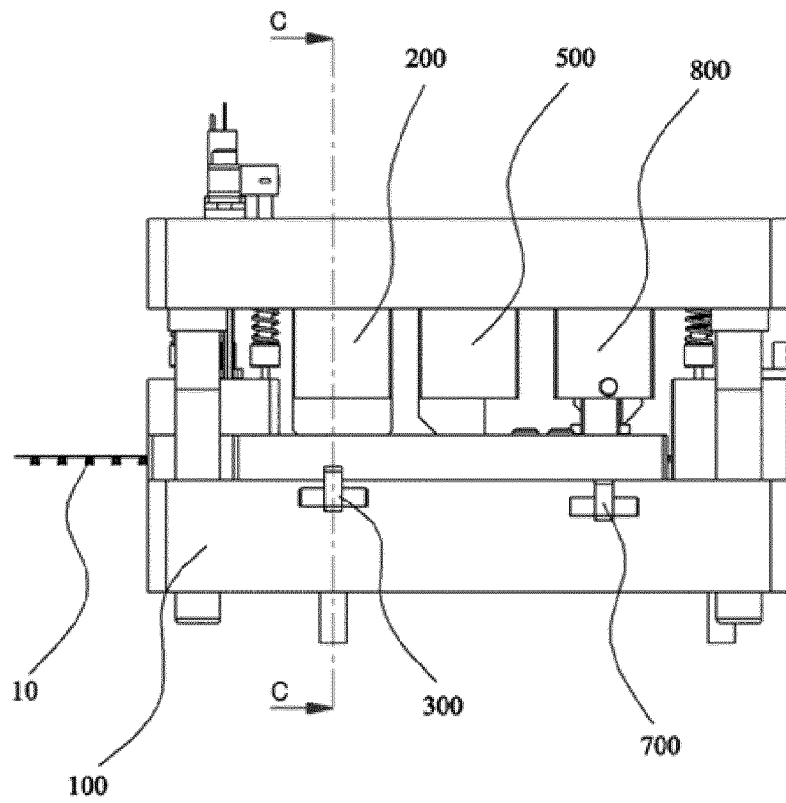


FIG. 7

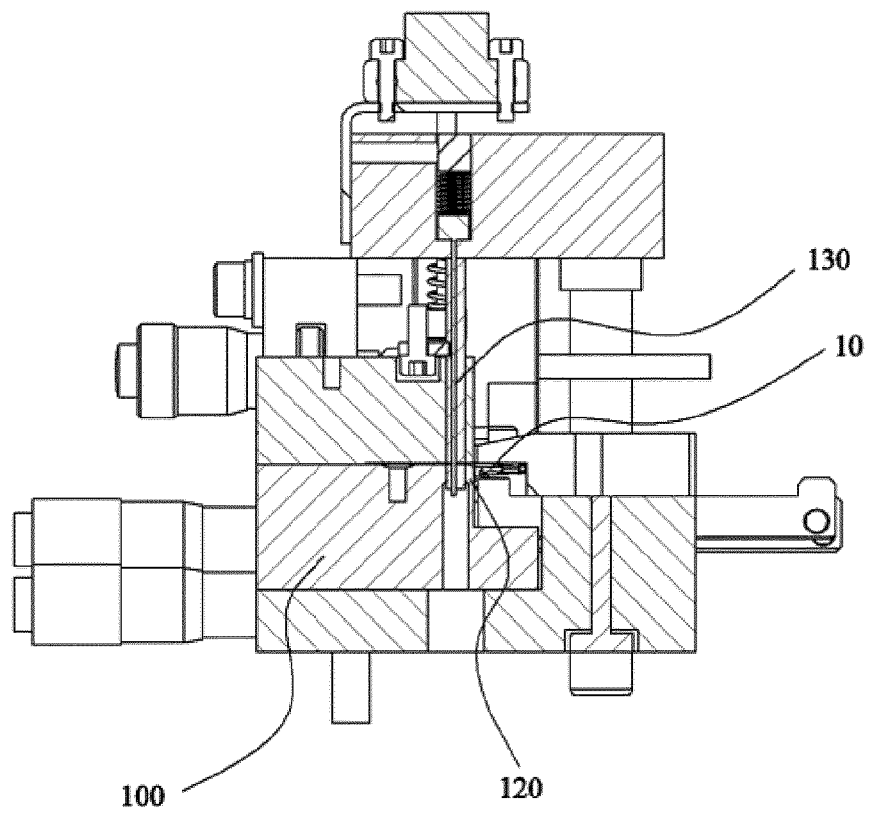


FIG. 8

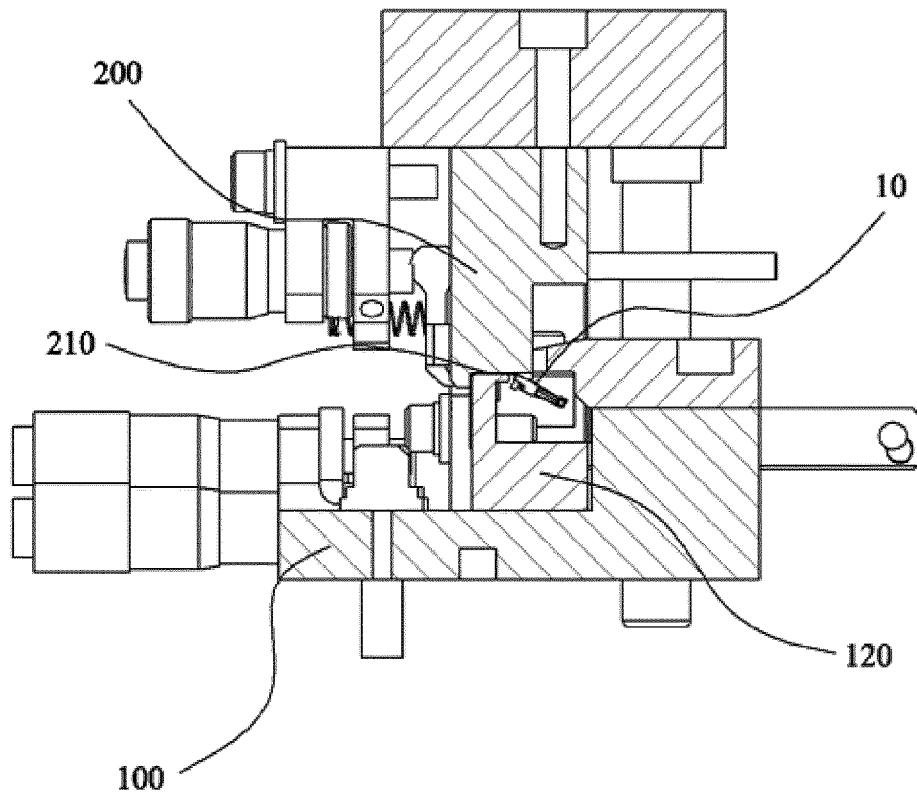


FIG. 9

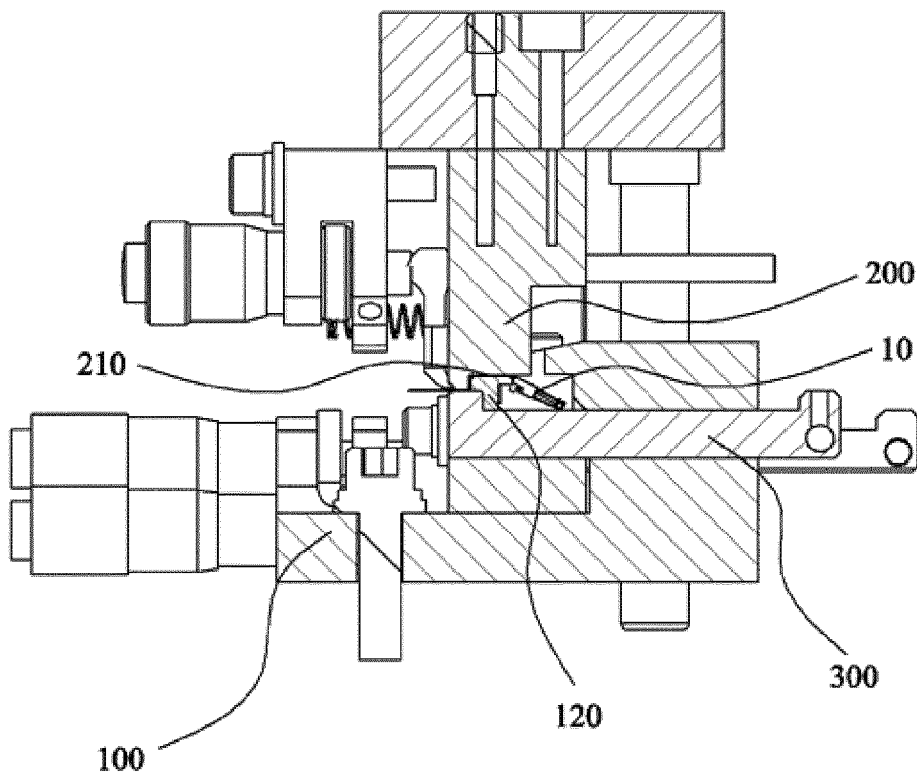


FIG. 10

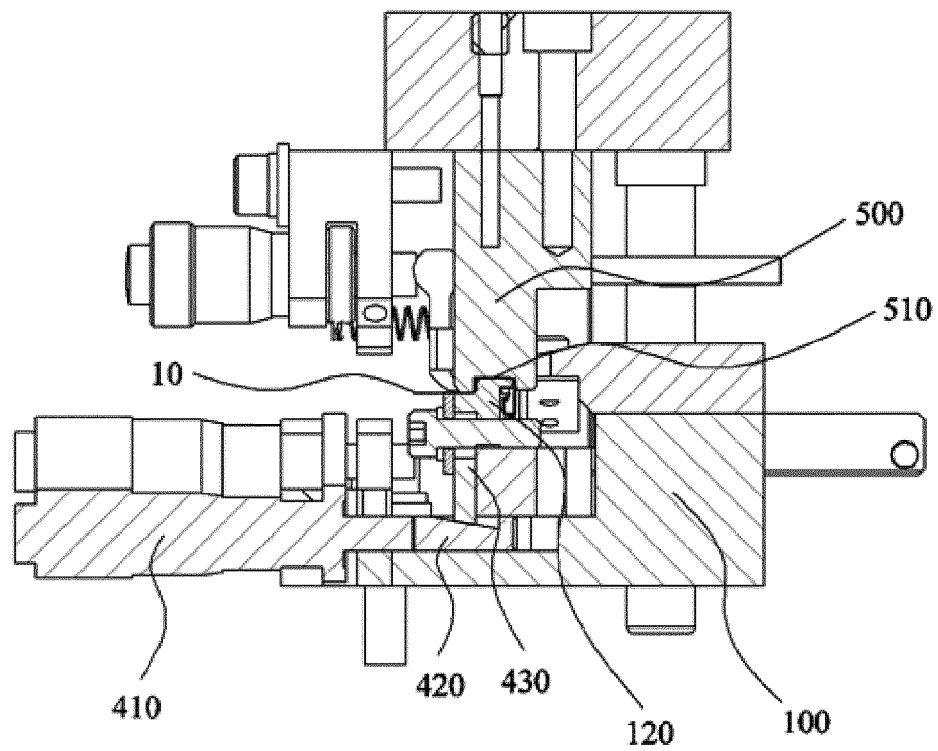


FIG. 11

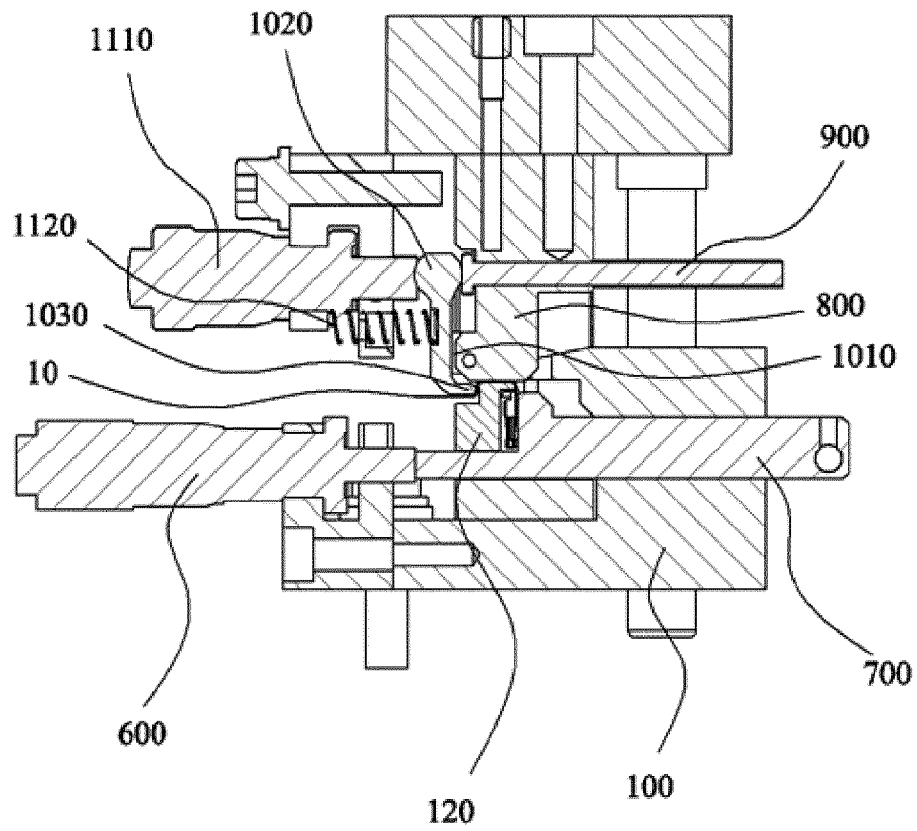
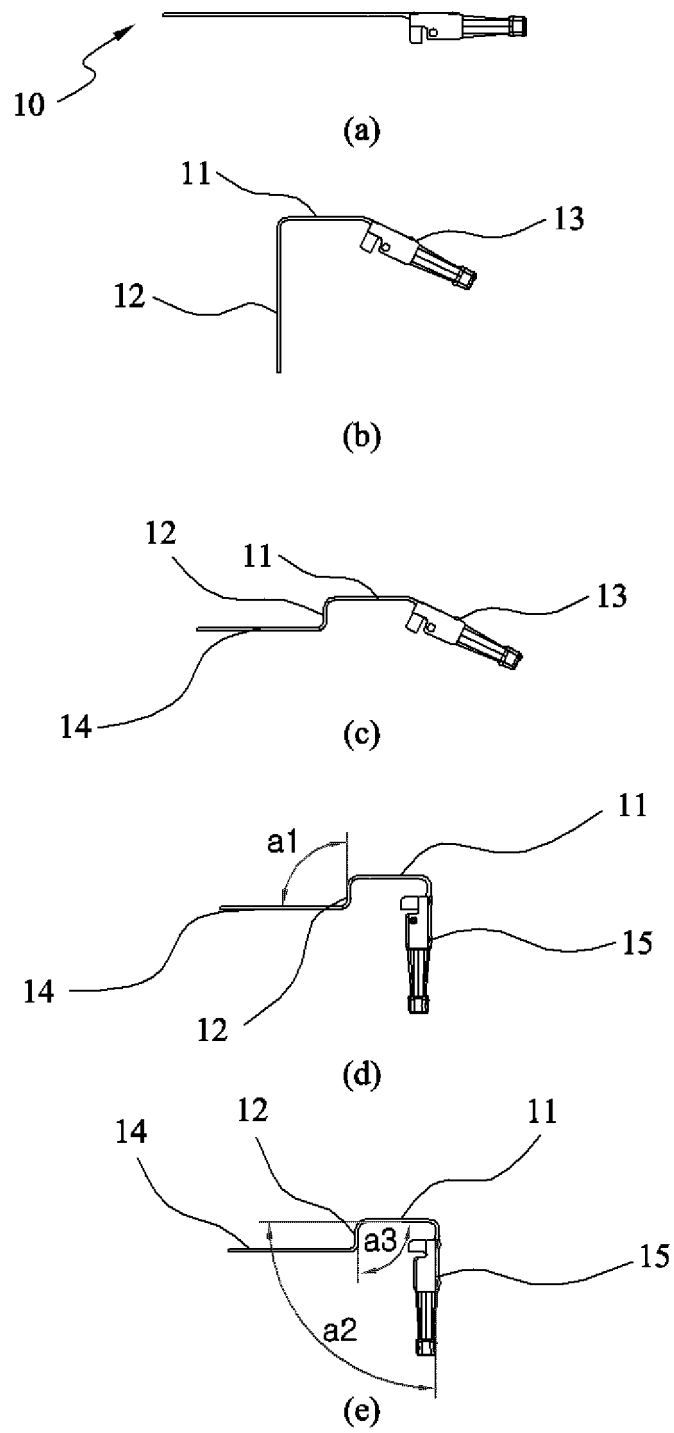


FIG. 12





EUROPEAN SEARCH REPORT

Application Number

EP 21 18 6892

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DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	KR 101 062 047 B1 (LEE GEE BONG [KR]) 2 September 2011 (2011-09-02) * abstract * * figures 1-10 * -----	1-10	INV. B21D5/14 B21D11/10 H01R43/16
A	JP 2008 166014 A (OPTREX KK; NIPPON SEIKI CO LTD) 17 July 2008 (2008-07-17) * abstract * * figures 1-9 * -----	1-10	ADD. H01R12/72
X	US 6 045 402 A (EMBO GEORGES [BE] ET AL) 4 April 2000 (2000-04-04) * figure 5 * -----	10	TECHNICAL FIELDS SEARCHED (IPC) H01R B21D B21F
X	US 2013/017728 A1 (MIYAWAKI KOJI [JP]) 17 January 2013 (2013-01-17) * figure 2 * -----	10	
1 The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 December 2021	Examiner Pugliese, Sandro
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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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