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(54) **Clamp device for use in welding sheet metal elements**

Einspannvorrichtung zum Schweissen von Blechelementen

Dispositif de serrage pour le soudage de tôles

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(73) Proprietor: **COMAU S.p.A.**

10095 Grugliasco (Torino) (IT)

(72) Inventor: **Chiorino, Luigi**

10100 Torino (IT)

(74) Representative: **Notaro, Giancarlo et al**

c/o Buzzi, Notaro & Antonielli d'Oulx

Via Maria Vittoria 18

10123 Torino (IT)

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- **PATENT ABSTRACTS OF JAPAN** vol. 018, no. 219 (C-1192), 20 April 1994 & JP 06 015094 A (TOKYO SENSEN KIKAI SEISAKUSHO:KK), 25 January 1994
- **Brochure of the Destaco company "MP10"** bearing a reference 12/95
- **"Arbeitsblatt"** of the Destaco company "KSZB 82-2" and "KSZB 82-3" bearing a reference 10/95
- **Brochure of the Destaco company "Konsolen für Automationskraftspanner"** bearing a reference 05/96

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Description

[0001] The present invention relates to devices for locating and locking in position components of pressed sheet metal which are to be subjected to a welding operation. In particular, the invention relates to clamp devices of the type indicated in the preamble of claim 1. A clamp device of this type is known from DE-U-296 22 739.

[0002] The clamp devices of the above indicated type have been known and used for a long time, for instance in assembling operations by means of welding of units constituted by elements of pressed sheet metal, such as motor-vehicle bodies or subassemblies thereof.

[0003] For a prompt reference, figure 1 shows one embodiment of a clamp device according to the prior art. Typically, with reference to this drawing, a structure 1 of pressed sheet metal is constituted by two sheet metal elements 2, 3 which must be welded by means of electric spot welding at two juxtaposed flanges 2a, 3a thereof. Elements 2, 3 are clamped in the proper welding position by means of a clamp device 4 comprising a fixed supporting element 5 and a movable clamp element 6 adapted to be closed over supporting element 5 to clamp the two juxtaposed flanges 2a, 3a in the proper welding position, so that these flanges can then be welded to each other by applying electric welding spots at areas not covered by the two elements 5, 6 of the clamp device 4. The fixed supporting element 5 is connected by screws to a fixed supporting structure 7 by means of an angled member 8. Registering plates 9, 10 are interposed between the angled member 8 and the fixed structure 7 and the supporting element 5, respectively. The movable clamp element 6 is pivotally supported around an axis 11 by a supporting body 12 which on its turn is secured by screws to the structure 7 with the interposition of a registering plate 13. A registering plate 14 is also interposed between the movable clamp element 6 and a lever 15 which is directly pivotally mounted around axis 11 on the body 12 and whose rotation is driven by a fluid cylinder 16 which is also carried by body 12. In the known device, the use of registering plates 9, 10, 13, 14 is due to the need of assuring that elements 5, 6 of the clamp device 4 are in the required proper position relative to the position of the structure to be welded 1. Typically, the structure 1 is brought to a welding station and located in position therein by means independent from the clamp device 4. Therefore, the position of the structure 1 to be welded is to be considered as predetermined and is then necessary that elements 5, 6 are at a proper position relative thereto. When the structure 1 reaches the welding station, it is arranged on the supporting element 5, in the condition shown in figure 1, but, obviously, with the movable clamp element 6 in an upwardly rotated condition with respect to that shown in figure 1. Once the structure 1 has been positioned on the supporting element 5, the cylinder 16 may then be activated to drive a closing movement of the movable clamp element 6 over the two juxtaposed flanges 2a, 3a of the two components of sheet metal 2,

3, so as to obtain precise location and clamping of these flanges between the two elements 5, 6.

[0004] As it is clearly apparent, in the known solution, if it is necessary to register the position of the supporting element 5, the plates 9, 10 must be replaced with plates having different thickness, so as to adjust the position of element 5 along the two orthogonal axes (vertically and horizontally) lying in the plane of figure 1. Similarly, a registration of element 6 along the horizontal and vertical direction implies replacement of plates 13, 14. As indicated above, a clamp device according to the preamble of claim 1 is known from DE-U-296 22 739. However, in this known device the holes of enlarged diameter provide the first supporting element to be registered in position relative to the fixed support structure only along a single vertical direction.

[0005] Therefore, the adjustment operations on clamp devices according to the prior art are troublesome and time consuming and imply a loss in the projectivity of the plant where these devices are used.

[0006] The object of the present invention is that of overcoming this drawback.

[0007] In view of achieving this object, the invention provides a clamp device of the type indicated at the beginning of the present description, characterized in that it further includes the features of claim 1.

[0008] Due to these feature, the time consuming and troublesome adjustment operations which are necessary in the known devices have been eliminated, since said first supporting element and said second clamp element are not carried by the fixed supporting structure independently from each other. On the contrary, the body carrying the movable clamp element is directly connected to the first supporting element, so that the position of the first supporting element relative to the second clamp element is univocally determined and defined once for all. Therefore, no operation for registering this position is necessary. At most, only a registration of the whole unit formed by the first supporting element and the second movable clamp element relative to the fixed supporting structure may only be necessary, due to possible wear or deformations which originate with time.

[0009] Moreover, the fixed supporting structure preferably comprises an angled supporting member which is in contact with two orthogonal surfaces of the first supporting element to provide a reference of the proper assembling position of the supporting element relative to the fixed supporting structure, for the case the supporting element has to be disassembled temporarily. Between the above mentioned angled supporting member and the two above mentioned orthogonal surfaces of the supporting element two plates are interposed by which the assembling position of the supporting element can be adjusted.

[0010] The invention will be now described with reference to the annexed drawings, given purely by way of non limiting example, in which:

figure 1 is a diagrammatic side view of a device according to the prior art,

figure 2 is a perspective diagrammatic view of a first embodiment of the device according to the invention,

figure 3 is a side diagrammatic view of the device of figure 2, shown in the operative condition,

figure 4 shows the device of figures 2, 3 in a side view similar to that of figure 3, but in the inoperative condition, and

figure 5 shows a variant of figure 2.

[0011] In figures 2-5, parts which are in common to those shown in figure 1 are designated by the same reference numerals.

[0012] The main difference of the device according to the invention with respect to the known device shown in figure 1 lies in that in the case of the device according to the invention the body 12 carrying the movable clamp element 6 is not secured directly to the fixed supporting structure 7, but rather is carried by the latter by means of the first supporting element 5. As a matter of fact, the body 12 is secured by screws 17 to a bracket 18 which on its turn is directly secured to the fixed supporting element 5. There are no other direct connection between body 12 and the fixed structure 7. Therefore, contrary to the known device, in which the elements 5, 6 are carried independently by the fixed structure 7, the relative position of these elements is univocally determined and defined once for all and therefore has not to be registered. At most, a registering operation of the whole unit formed by the two elements 5, 6 may still be necessary, due to wears or deformations which can be originated with the time. This operation can be made simply by adjusting the position of the supporting element 5 relative to the fixed structure 7. In order to simplify this last remaining registering operation, the fixed supporting element 5, having an upper edge 5a shaped to define a reference for the structure to be clamped, is constituted by a vertical plate secured to a vertical wall 7a of the fixed supporting structure 7 by means of a pair of screws 19 which engage holes of corresponding diameter formed in wall 7a and holes of enlarged diameter formed in plate 5. By loosening the screws 19, is therefore possible to register simultaneously the position of plate 5 relative to the structure 7 along two directions orthogonal to each other, i.e. along the horizontal direction and the vertical direction in the plane of figures 3, 4.

[0013] As already indicated above, according to a further feature of the present invention, in order to provide an immediate reference of the proper position for the assembling of plate 5, on the fixed structure 7 there is mounted an angled supporting member 20 against which orthogonal edges 5b, 5c of plate 5 are supported, with the interposition of plates 21, 22. When first using the device, the angled member 20 is not yet mounted on the fixed structure 7. The plate 5 is adjusted in the proper position and then fixed by means of screws 19 to the structure 7. At this time, the angle member 20 is brought

in contact with the two edges 5b, 5c of the plate 5, with the interposition of plates 21, 22. Screws 23 lock the angled member 20 on the plate 5 and hold the plates 21, 22. The seats of screws 23 on the angled member 20 are provided to allow an orthogonal movement of the plate in case of a variation of plates 21, 22. The angled member 20, once assembled on plate 5 with plates 21, 22 is there welded or otherwise secured to structure 7. In this manner, if plate 5 has to be disassembled, it can be immediately mounted again and positioned in the proper position, due to the reference provided by the angled member 20.

[0014] In the use of the device, similarly to known devices, the structure to be welded is clamped between the fixed element 5 and the movable element 6, which is closed over the fixed element 5. The closed and opened positions of element 6 are shown respectively in figures 3, 4 and also in figure 2 respectively with undotted lines and dotted lines. As already indicated, the device according to the invention has the advantage that it never requires an operation for registering the relative position of the two elements 5, 6, since the body 12 carrying the element 6 is directly mounted on the element 5. At most an operation for registering the whole unit of the two elements 5, 6 may be necessary, which can be made by loosening screws 19, removing the plates 21, 22, and then tightening again the screws 19 after that the new required position of plate 5 has been reached and two new plates 21, 22 of suitable size have been inserted, so as to provide again an immediate reference for the proper assembly position of plate 5.

[0015] Figure 5 shows a variant in which the angled member 20 has been replaced by two separate beams 20a, 20b welded to the structure 7, whereas the two orthogonal screws 23 have been replaced by a single screw 230 arranged at 45° at the corner between edges 5b, 5c of element 5.

[0016] As it is clearly apparent from the foregoing description, the device according to the invention avoids the time consuming and troublesome registering operations which are instead necessary with the known devices.

[0017] Naturally, while the principle of the invention remains the same, the details of construction and the embodiments may widely vary with respect to what has been described and illustrated purely by way of example, without departing from the scope of the present invention as defined by the claims.

Claims

1. Device for locating and locking in position components of pressed sheet metal (2, 3) to be subjected to a welding operation, comprising:

- a first element (5) for supporting the sheet metal elements (2, 3) in the proper welding position,

said first element (5) being rigidly connected to a fixed support structure (7), and

- a second element (6) for clamping the sheet metal elements to be welded (2, 3), said second element (6) being rotatably mounted on a body (12) carried by said fixed supporting structure (7) for rotation between an inoperative position, spaced from the first supporting element (5), and an operative position, in which it is adjacent to the first supporting element (5) and cooperates therewith so that said sheet metal components (2, 3) are clamped in the proper welding position between said first and second elements (5, 6),

- a cylinder (16) carried by said body (12) for rotating said second movable clamp element (6),

- wherein said body (12) carrying the movable clamp element (6) is supported by said fixed supporting structure (7) by means of said first supporting element (5), to which said body (12) carrying the movable clamp element (6) is directly connected by screws (17), and

- wherein said first supporting element comprises a plate (5) connected to a wall (7a) of the fixed supporting structure (7) by screws (19) engaged within holes of said plate having enlarged diameters,

characterized in that

- said plate (5) is a vertical plate arranged with its plane orthogonal relative to the axis of rotation (11) of said second element (6) and has an upper edge (5a) having, when viewed in the direction of the rotational axis (11) of the second element (6), a shaped profile including a cavity with a bottom and two sides for shaped contact with a correspondingly shaped sheet metal element (3) of the structure to be clamped, so as to define a reference for the position of the structure to be clamped, along a horizontal direction orthogonal to said rotational axis (11),

- said wall (7a) of the fixed support structure (7) to which said vertical plate (5) is secured is a vertical wall which is also arranged with its plane orthogonal to the axis of rotation (11) of said second element (6),

- said screws (19) which connect said plate (5) to the wall (7a) of the fixed supporting structure (7) are arranged parallel to the axis of rotation (11) of said second element (6),

so that said vertical plate (5) can be registered in position over said vertical wall (7a) of the fixed supporting structure (7) simultaneously along two mutually orthogonal directions, in a plane orthogonal to the axis of rotation (11) of said second element (6) and orthogonally to said screws (19) which engage

the holes of enlarged diameters, upon loosening of these screws (19).

2. Clamp device according to claim 1, **characterized in that** said wall (7a) is provided with an angled supporting member (20) in contact with two orthogonal edges (5b, 5c) of the plate (5) to provide a reference of the proper assembling position of the plate (5).

3. Clamp device according to claim 2, **characterized in that** registering plates (21, 22) are interposed between said angled member (20) and said plate (5).

Patentansprüche

1. Vorrichtung zum örtlich Festlegen und Klemmen in Position von Pressblech-Komponenten (2, 3), die einem Schweißvorgang unterzogen werden sollen, umfassend:

- ein erstes Element (5) zum Stützen der Blechelemente (2, 3) in der richtigen Schweißposition, wobei das erste Element (5) starr mit einer fixen Stützstruktur (7) verbunden ist, und

- ein zweites Element (6) zum Einspannen der zu verschweißenden Blechelemente (2, 3), wobei das zweite Element (6) drehbar an einem Körper (12) montiert ist, der von der fixen Stützstruktur (7) getragen wird, und zwar zur Rotation zwischen einer Ruheposition in einem Abstand vom ersten Stützelement (5) und einer Betriebsposition, in der es dem ersten Stützelement (5) benachbart ist und mit ihm zusammenwirkt, so dass die Blechkomponenten (2, 3) in der richtigen Schweißposition zwischen dem ersten und dem zweiten Element (5, 6) eingespannt sind,

- einen vom Körper (12) getragenen Zylinder (16) zum Drehen des zweiten beweglichen Einspannelements (6),

wobei der das bewegliche Einspannelement (6) tragende Körper (12) durch die fixe Stützstruktur (7) gestützt ist, und zwar mittels des ersten Stützelements (5), womit der das bewegliche Einspannelement (6) tragende Körper (12) direkt durch Schrauben (19) verbunden ist,

wobei das erste Stützelement eine Platte (5) umfasst, die mit einer Wand (7a) der fixen Stützstruktur (7) mittels Schrauben (19) verbunden ist, die in Löcher der Platte eingreifen, die vergrößerte Durchmesser haben,

dadurch gekennzeichnet, dass

die Platte (5) eine vertikale Platte ist, die mit ihrer Ebene orthogonal relativ zu der Drehachse (11) des zweiten Elementes (6) angeordnet ist und eine obere Kante (5a) hat, die, in der Richtung der Drehachse (11) des zweiten Elementes (6) gesehen, ein ge-

formtes Profil aufweist, das einen Hohlraum mit einem Boden und zwei Seiten zum Formkontakt mit einem entsprechend geformten Blechelement (3) der einzuspannenden Struktur enthält, um einen Bezug für die Position der einzuspannenden Struktur entlang einer horizontalen Richtung orthogonal zu der Drehachse (11) zu bilden, die Wand (7a) der fixen Stützstruktur, an der die vertikale Platte (5) befestigt ist, eine vertikale Wand ist, die mit ihrer Ebene ebenfalls orthogonal zu der Drehachse (11) des zweiten Elementes (6) angeordnet ist, die Schrauben (19), die die Platte (5) mit der Wand (7a) der fixen Stützstruktur (7) verbinden, parallel zu der Drehachse (11) des zweiten Elementes (6) angeordnet sind, so dass die vertikale Platte (5) bezüglich ihrer Position über der vertikalen Wand (7a) der fixen Stützstruktur (7) gleichzeitig in zwei zueinander orthogonalen Richtungen in einer Ebene orthogonal zu der Drehachse (11) des zweiten Elementes (6) und orthogonal zu den Schrauben (19), die in die Löcher mit vergrößertem Durchmesser eingreifen, beim Lösen dieser Schrauben (15) ausgerichtet werden kann.

2. Einspannvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Wand (7a) ein Winkelstützglied (20) aufweist, das mit zwei orthogonalen Kanten (5b, 5c) der Platte (5) in Kontakt steht, um einen Hinweis auf die richtige Montageposition der Platte (5) zu geben.
3. Einspannvorrichtung nach Anspruch 2, **dadurch gekennzeichnet, dass** Passplatten (21, 22) zwischen dem Winkelglied (20) und der Platte (5) angeordnet sind.

Revendications

1. Dispositif permettant de positionner et de verrouiller en position des composants en tôle emboutie (2, 3) devant être soumis à une opération de soudage, le dispositif comprenant :
 - un premier élément (5) destiné à soutenir les composants en tôle (2, 3) dans la position de soudage voulue, ledit premier élément (5) étant relié rigidement à une structure de support fixe (7), et
 - un deuxième élément (6) servant à serrer les composants en tôle devant être soudés (2, 3), ledit deuxième élément (6) étant monté rotatif sur un corps (12) porté par ladite structure de support fixe (7) de façon à pouvoir tourner entre une position inactive, qui est écartée du premier élément de support (5), et une position active,

dans laquelle il est adjacent au premier élément de support (5) et coopère avec celui-ci si bien que lesdits composants en tôle (2, 3) sont serrés dans la position de soudage voulue entre les premier et deuxième éléments (5, 6),
 - un cylindre (16) porté par ledit corps (12) servant à faire tourner ledit deuxième élément de serrage mobile (6),

où ledit corps (12) portant l'élément de serrage mobile (6) est soutenu par ladite structure de support fixe (16) par l'intermédiaire dudit premier élément de support (5), auquel ledit corps (12) portant l'élément de serrage mobile (6) est relié directement par des vis (17), et
 où ledit premier élément de support comprend une plaque (5) reliée à une paroi (7a) de la structure de support fixe (7) par des vis (19) vissées dans des trous de ladite plaque possédant des diamètres agrandis,

caractérisé en ce que :

ladite plaque (5) est une plaque verticale disposée de façon que son plan soit orthogonal par rapport à l'axe de rotation (11) dudit deuxième élément (6) et possède un bord supérieur (5a) ayant, quand on regarde dans la direction de l'axe de rotation (11) du deuxième élément (6), un profil conformé comportant une cavité équipée d'un fond et de deux côtés permettant un contact conformé avec un composant en tôle (3) conformé de façon correspondante de la structure à serrer, de manière à ainsi définir une référence pour la position de la structure à serrer, suivant une direction horizontale qui est perpendiculaire audit axe de rotation (11),
 ladite paroi (7a) de la structure de support fixe (7) à laquelle ladite plaque verticale (5) est fixée est une paroi verticale qui est également disposée de façon que son plan soit perpendiculaire à l'axe de rotation (11) dudit deuxième élément (6),
 lesdites vis (19) qui relient ladite plaque (5) à la paroi (7a) de la structure de support fixe (7) sont disposées parallèlement à l'axe de rotation (11) dudit deuxième élément (6),
 de sorte que ladite plaque verticale (5) peut être ajustée en position par dessus ladite paroi verticale (7a) de la structure de support fixe (7) simultanément suivant deux directions mutuellement perpendiculaires, dans un plan qui est perpendiculaire à l'axe de rotation (11) dudit deuxième élément (6) et perpendiculairement auxdites vis (19) qui sont vissées dans les trous de diamètres agrandis, lors du desserrage de ces vis (19).

2. Dispositif de serrage selon la revendication 1, **ca-**

ractérisé en ce que ladite paroi (7a) est dotée d'un élément de support (20) formant un angle, qui est en contact avec les deux bords perpendiculaires (5a, 5c) de la plaque (5) de façon à produire une référence pour la position d'assemblage correcte de la plaque (5). 5

3. Dispositif de serrage selon la revendication 2, **caractérisé en ce que** des plaques d'ajustement (21, 22) s'interposent entre ledit élément (20) formant un angle et ladite plaque (5). 10

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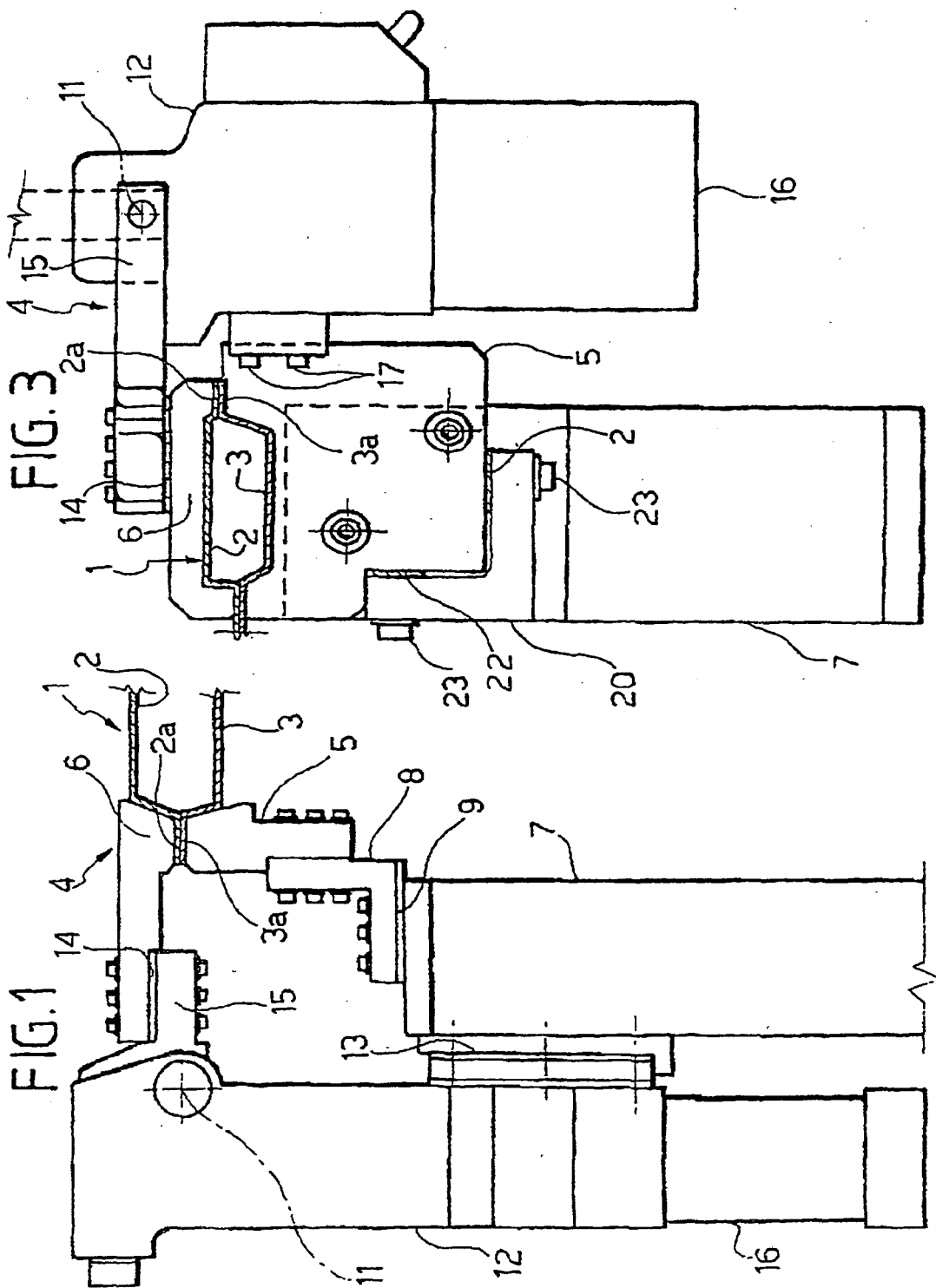


FIG. 4

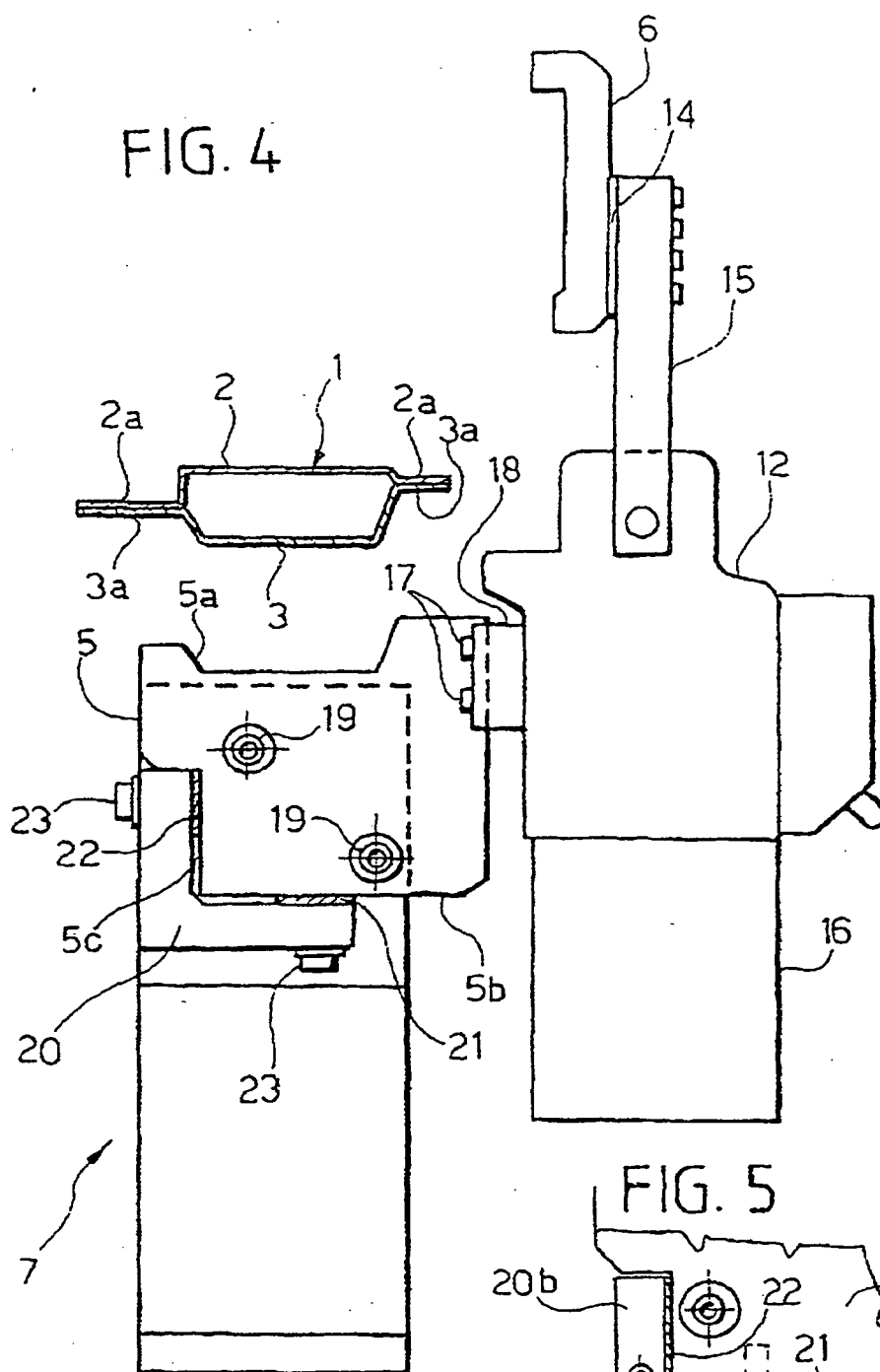


FIG. 5

