(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 808 102 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
12.02.2020 Bulletin 2020/07

(51) Int Cl.:
B21D 28/06 *(2006.01)* ***B21D 43/02*** *(2006.01)*

(21) Application number: **13169938.1**

(22) Date of filing: **30.05.2013**

(54) **Two parallel staggered rows die forming system for approximately circular shape parts, in order to limit sheet scraps in productions by coil fed transfer presses**

Stempelprägesystem mit zwei parallel gestaffelten Reihen für ungefähr kreisförmige Teile zur Einschränkung von Blechschrott bei der Herstellung durch spulenbeschickte Transferpressen

Système de formation de matrice à deux rangées étagées parallèles pour pièces de forme approximativement circulaire, en vue de limiter les déchets de feuille de productions dans des presses de transfert alimentées par bobine

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(43) Date of publication of application:
03.12.2014 Bulletin 2014/49

(73) Proprietor: **Bora Poland Sp. z o.o.**
97-500 Radomsko (PL)

(72) Inventor: **Bora, ELIO**
60035 Jesi (AN) (IT)

(74) Representative: **Baldi, Claudio et al**
Viale Cavallotti, 13
60035 Jesi (AN) (IT)

(56) References cited:
FR-A1- 2 237 698
FR-A1- 2 350 900
JP-A- S5 750 225
JP-A- S5 947 099
JP-A- S55 165 234
JP-A- 2012 152 813
US-A- 3 589 221

EP 2 808 102 B1

Description

[0001] **The technical field:** sheet metal moulding by transfer presses fed by coil: reduction in costs of raw materials of items obtained by moulding.

[0002] **Background art:** the cost of the raw material also affects the cost of the moulded pieces to a very high percentage that can vary between 50% and 75% of the total cost of production. You can obtain a considerable saving in terms of material costs, optimizing the use of the sheet, so as to minimize the amount of scraps. If it is necessary to manufacture approximately circular parts , if the starting material consists of a strip of metal sheet unwinded from a coil, the proper use of the metal sheet suggests to cut the shape of departure on the strip, not on a single row, but on rows staggered between them (Fig.1)

[0003] The transfer press normally allows you to obtain the moulded piece , with a series of dies. Dies are mounted on the press aligned with the axis of the press itself. Dies are equidistant between them and the distance is called "pitch". Pieces to be worked are transferred from one die to another, at the same time, after each stroke of the press, by means of an "iron hand " mounted on two longitudinal bars, a bar at each side of the machine.

[0004] The iron hands, during each stroke of the press ram, advance simultaneously one step the parts to be worked on the series of dies . The first die separates the blank from the strip.The blank generally consists of a flat shaped element. This element is transferred to the second die and so on. You typically use four or five dies aligned among them.

[0005] When the blank detached from the strip with the first die, after having been worked on intermediate dies, abandons the last die, it has been transformed into a part obtained by moulding.

[0006] In the dieing on staggered parallel rows with a transfer press , it is found that:

- at least one row of the figures detached from the sheet metal is misaligned with respect to the row of the dies;
- one of the two figures punched with the first die is spaced from the second mould a different value of the pitch between the subsequent moulds; the first die produces twice the subsequent moulds;
- Various systems have been used for dieing on staggered rows, with problems of space or costs.
- A first system consists in doubling the number of dies: this solution requires a more powerful press, and greater cost of equipments. Not always the demand of moulded pieces justifies the greater production.
- A second system consists in bringing out of the transfer press the first operation, feed the transfer press with a robotic system on a station aligned with the subsequent operations. This system requires the introduction of other elements of the dieing line, with dimensions and costs that not always justify some of its advantages
- It also uses a system that, by moving across the sheet metal strip, between a stroke of the press and the other, varying at the same time, the length of the stroke of the sheet metal strip itself, feeds the first cutting die to obtain the desired effect of form on the strip two rows of punched staggered shapes . In this case also, there is a complication on all the moulding system, because to move across the sheet metal strip, it is necessary to move laterally the unwinding reel of the coil, and the feeder. This system involves greater need for space and greater cost.

[0007] US3,589,221 discloses a system for cutting strips of scrap metal removing circular sections in a pattern of staggered longitudinal rows.

[0008] For this reason it has been studied the system which is the object of the request of the patent TWO PARALLEL STAGGERED ROWS DIE FORMING SYSTEM FOR APPROXIMATELY CIRCULAR SHAPE PARTS , IN ORDER TO LIMIT SHEET SCRAPS IN PRODUCTIONS BY COIL FED TRANSFER PRESSES

[0009] The purpose of this system is to eliminate the disadvantages of the systems described above, achieving the aim of a substantial reduction in the weight of the sheet scraps .

[0010] The complete system is defined according to claim 1. The system comprises:

- unwinding reel of the sheet metal coil, straightener press;
- feeder of the sheet metal strip to the first mould.
  This is a normal feeder used to feed sheet metal strip to the presses. In this system the use of the feeder is characterized by the fact that it advances the strip one step every two shots of the press. The feeder stroke is equal to the pitch between the dies in the transfer press ;
- Transfer press equipped with a line of dies.
  This line of dies is characterized by the fact that the first cutting die, which is used to detach from the sheet metal strip the material then will be worked on the series of dies in order to obtain the final moulded piece , is double, with the two punches that can be excluded: the punches will be excluded in correspondence of alternate strokes of the press so as to balance the production of the first blanking operation to following operations. The two punches and the two matrices, in this first cutting die, are positioned between them so as to cut out on the strip two figures that are staggered and almost tangent;
- Transfer system of the piece from one die to another.
  This system transfers a single piece at a time, for each stroke of the press, from the first blanking station to the second station. It is consisting of two bars that move longitudinally with respect to the press, with the stroke equal to the pitch between the

moulds. These two bars have an operation equal to that of a normal transfer system on a transfer press .

- Clamping systems of the piece: the clamping systems of the piece, which transfer the pieces that were cut on the first die, are mounted on the bars of transfer in such a way as to permit longitudinal movement and transverse movements of clamping systems themselves, in relation to the transfer bars. The transverse movement allows you to retrieve the offset of the punched piece with respect to the position of the second mould; the longitudinal movement allows you to retrieve the different length of the displacement of the figure from the first mould to the second mould, with respect to the length of the pitch.
- With the moulding system, innovative, which is the object of the present patent application, as described above, you solve the problems of moulding with rows offset:

  - The cross offset of the punched shapes with respect to the axis of the moulds, is recovered with an additional stroke of the clamping systems of the piece, with relative movement respect to the transfer bar;
  - the distance greater than the pitch of one of the two cut blanks with respect to the second mould, is recovered with a relative movement of the clamping system with respect to the transfer bar;
  - there is not an overproduction in the first mould, since at each stroke of the press only one piece is transferred.
  - Further characteristics of the invention will appear clearly from the detailed description below, which refers to a merely illustrative, not limiting embodiment, illustrated in the attached drawings, wherein:

    - Figure 1 shows the component to be produced (1) and the discs that will serve to produce it (1);
    - Figure 2A shows the side view of the transfer system;
    - Figure 2B shows a plan view of the transfer system;
    - Figure 2C represents the side view of the transfer system, perpendicular to the view of Figure 2A,
    - Figure 3 represents the mould of the first punching operation;
    - Figure 4 is the release system of punches;
    - Figure 5 is a side sectional view of the cutting die;
    - Figure 6 shows the transfer system on the transfer press.
    - Part (1) is the part to manufacture by dieing.
    - this particular to realize has a sheet blank represented by details (3) or (4). The details (3) and (4) are characterized by having a slightly different shape each other, but this diversity does not affect the final form of (1): the dieing operations later, not shown, forecast, once the drawing operation is carried out, a trimming operation which makes circular the outer edge (1). The slight differences between (3) and (4) allow to have the punches with a simple shape and the two figures can be almost tangent.
    - Figure 1A represents (3) and (4) punched simultaneously from the strip (2). During the press cycle that realizes this blanking, the part (3) is transferred onto the die of the second operation, as shown in Fig.1B . The part (4) remains on the first cutting die. During the next cycle of the press, the strip (2) does not move forward, the punches are excluded and therefore there is no cutting of sheet metal. The part (4) is transferred onto the die of the second operation as shown in Fig. 1C.
    - In Figure 2A is a side view of the die forming system where are represented the various components: (5) the unwinding reel of the coils of sheet metal, (6) the rectifier, (7) the power supply (8) the press transfer, (9) The transfer bars.
    - The feeder is adjusted in a characteristic way and feeds the sheet, toward the first die, a step every two stokes of the press ram. The length of a forward step corresponds to the distance between two machining stations, i.e. the distance between two successive dies, mounted on the table of the press. The bars (9) have a longitudinal movement, a transverse movement toward the center of the machine, a vertical movement. Of course, these movements of bars are the same for all the parts being moulded to be transferred. To transfer parts (3) and (4) cut at the first station, these movements are not sufficient and for this, as is shown in Fig.6, the grip systems , clamps, are mounted on the bar by means of slides that characterize the system and that allow further longitudinal and transverse movements
    - The clamp (26) which transfers the part (3), while closing grasps the particular (3). (26) is mounted on a cross-slide (24) and on a longitudinal slide (22). The slide (24) allows to retrieve the offset of the position of (3) from the central axis of the press, the slide (22) allows to retrieve the extra distance of (3) from the following work station. The extra distance of (3) from the next station depends on the offset of the two rows of blanking: this offset allows the maximum saving

of raw material.

- The clamp (27) is mounted on two cross slides: the slide (24a) and slide (25). The slide (24a) has the same stroke of the slide (24) and is used to return the particular (4) to the center. The slide (25) allows the clamp (27) a further stroke. In the cycle in which the part (3) is transferred to the next station, the clamp (27) must be raised by the transfer bar without moving (4). The slide (25) allows to place back (27) so as not to crush (4) during the vertical movements due to the movement of the bar ,during the idle stroke of the same clamp (27) .
- The Figs. 6B and 6C show the movements respectively of the clamps (27) and (26) during the transfer of the part (3): the clamps are advancing toward
- the center together with bars (9), stroke represented by the vector (23). The clamp (26) grabs the component (3)
- the clamps rise together with the bars (9),
- the clamps move longitudinally one step, this stroke is represented by the vector (21),
- The clamp (26) continues its longitudinal stroke, represented by the vector (22a), to retrieve the pitch difference,
- - the clamp (26) advances toward the center, vector (-24a),
- the clamps are lowered together with bars (9),
- the clamp (26) opens and deposits (3) on the second station.
- The bars are widening, vectors (23) and (-23),
- the clamp (26) goes back to its initial position with the stroke represented by the vector (24a),
- the bars(9) return to the starting point with the movement indicated by the vector (-21).
- The Figs. 6A and 6D show the movements respectively of the clamps (27) and (26) during the transfer of the part (4):
    - the clamps are advancing toward the center together with bars (9), stroke represented by the vector (23),
    - the clamp (27) further advances as indicated with the vector (25a) and closes by grasping the component (4)
    - the clamps rise together with the bars (9),
    - the clamps move longitudinally one step, stroke represented by the vector (21)
    - The clamp (27) advances toward the center, vector (24a),
- the clamps are lowered together with bars (9),
- the clamp (27) opens and deposits (4) on the second station.
- The bars are widening, vectors (23) and (-23),
- the clamp (27) goes back to its initial position, with respect to its bar, with the stokes represented by vectors (-24a) and (-25a),
- the bars(9) return to the starting point with the movement indicated by the vector (-21).
- The die of the first operation, blanking, must have the two punches that can be excluded. Figg.3 and 4 represent the design of a die which punches can be excluded, suitable for the functioning of this system which is the object of this patent application.
- Figure 3A shows the lower part of the die,
- (11) lower blank holder,
- (10) matrix,
- figure 3B represents the top of the die.
- (12)upper intermediate plate,
- (13) upper blank holder,
- (14) punches,
- (15) upper base.
- Figures 4a and 4B represent the upper part of the open die.
- (16) sliding plate
- (17) pneumatic cylinders driving slide plate
- (18) cylindrical pressure blocks fixed on the sliding plate
- (19) hollow for blocks (18), to disengage the punches
- (20) cylindrical inserts of reaction attached to the top base
- Figure 5 shows a section of the die of the first cutting operation. In detail B you can see the positioning of the blocks (18) resting on blocks (20) at the moment in which the punches are inserted. In detail C can be seen that the punches are fixed on the movable plate (12) and that therefore if the sliding plate (16) is positioned in such a way that blocks (18) are in the region of the cavity (19), the mobile plate (12) is pushed upward by the sheet metal holder (11) and the blanking does not take place.
- The sliding plate (16) is controlled by the two pneumatic cylinders (17).

Claims

1. System for forming approximately circular shape parts in two parallel staggered rows, the system comprising:

- an unwinding reel (5) of coils of sheet metal (2), a rectifier (6), a feeder (7), a transfer press (8) and a gripping system comprising two transfer bars (9) that are able to move longitudinally, transversally and vertically with respect to the press, with the stroke equal to the pitch between the moulds;
the transfer press (8) comprising: a first die, a ram and a table;
the first die comprising: a lower blank holder (11), a matrix (10), an upper intermediate movable plate (12), an upper blank holder (13), punches (14), an upper base (15), a sliding plate (16), pneumatic cylinders (17) driving the sliding plate (16), blocks (18) fixed on the sliding plate (16), cavities (19) on the upper base (5) and suitable for housing of the blocks (18), inserts (20) attached to the upper base (15), **characterised in that** the feeder (7) is adjusted for feeding the sheet metal (2) toward a first die of the transfer press (8), a step every two strokes of the press ram; the length of a forward step corresponds to the distance between two successive dies mounted on the table of the press;
the punches (14) of the first die are able to be excluded, in correspondence of alternate strokes of the press ram,
whereby the sliding plate (16) is controlled by the pneumatic cylinders (17) in such a way that the blocks (18) are positioned in the region of the inserts (20) of the upper base (15) which allow the punches (14) to be inserted, allowing the first die to cut two disks (3, 4) on the sheet metal strip, at the same time, in a staggered manner, and
when the pneumatic cylinders (17) position the sliding plate (169 in such a way that the blocks (18) are positioned in the region of the cavities (1) of the upper base (15), the mobile plate (12) is able to be pushed upward by the blank holder (11) so that blanking of the sheet metal does not take place, allowing that the punches can be excluded in correspondence of alternative strokes of the press;
the gripping system further comprises clamps (26, 27) mounted on the transfer bars (9) by means of slides (23, 24, 24a, 25) allowing further longitudinal and transversal movements,
at each stroke of the press, a part (3, 4) is fed from the first blanking station to the second station of the transfer press (8) by a first clamp (26) which transfers a first part (3), when grasping the first part (3); the first clamp (26) is mounted on a cross-slide (24) and on a longitudinal slide (22); the cross-slide (24) allows to retrieve the offset of the position of the first part (3) from the central axis of the press, the longitudinal slide (22) allows to retrieve the extra distance of the first part (3) from the following work station, the extra distance of the first part (3) from the next station depends on the offset of the two rows of blanking; and
a second clamp (27) which transfers a second part (4) when grasping the second part (4), said clamp (27) (27) is mounted on two cross slides: a first cross-slide (24a) and a second cross-slide (25); the first cross-slide (24a) has the same stroke of the cross-slide (24) of the first clamp (26) and the first cross-slide (24a) is used to return a second part (4) to the center; the second cross-slide (25) allows the second clamp (27) a further stroke; in the cycle in which the first part (3) is transferred to the next station, the second clamp (27) must be raised by the transfer bar (9) without moving the second part (4); the second cross-slide (25) allows to place back the second clamp (27) so as not to crush the second part (4) during the vertical movements due to the movement of the transfer bar (9), during the idle stroke of the second clamp (27);
the clamps (27) and (26) and the transfer bars (9) during the transfer of the first part (3) are configured to perform the following movements:

the clamps (26, 27) advance toward the center together with the transfer bars (9),
the first clamp (26) grabs the first part (3),
the clamps (26, 27) rise together with the transfer bars (9),
the clamps (26, 27) move longitudinally of one step,
the first clamp (26) continues its longitudinal stroke to retrieve the pitch difference,
the first clamp (26) advances toward the center,
the clamps (26, 27) are lowered together with the transfer bars (9),
the first clamp (26) opens and deposits the first part (3) on the second station of the transfer press,
the transfer bars (9) are widening,
the first clamp (26) goes back to its initial position,
the transfer bars (9) return to the starting point,
the clamps (27, 26) and the transfer bars (9) during the transfer of the second part (4) are configured to perform the following movements:

the clamps (26, 27) advance toward the center together with the transfer bars (9),
the second clamp (27) further advances and the second clamp (27) closes by grasping the second part (4),
the clamps (26, 27) rise together with the transfer bars (9),
the clamps (26, 27) move longitudinally for one step,
the second clamp (27) advances toward the center,
the clamps (26, 27) are lowered together with the transfer bars (9),
the second clamp (27) opens and deposits the second part (4) on the second station of the transfer press,
the transfer bars (9) are widening,
the second clamp (27) goes back to its initial position, with respect to its transfer bar,
the transfer bars (9) return to the starting point.

Patentansprüche

1. System zur Bildung von ungefähr kreisförmig geformten Teilen in zwei parallel versetzten Reihen, wobei das System umfasst:

- eine Haspel (5) von Blechspulen (2), einen Gleichrichter (6), eine Zuführungsvorrichtung (7), eine Transferpresse (8) und ein Greifsystem, umfassend zwei Transferstäbe (9), die in der Lage sind, sich längs, quer und vertikal in Bezug auf die Presse mit einem Hub gleich dem Abstand zwischen den Formen zu bewegen;
wobei die Transferpresse (8) umfasst: eine erste Matrize, einen Stößel und einen Tisch;
wobei die erste Matrize umfasst: einen unteren Stanzhalter (11), eine Matrix (10), eine obere bewegliche Zwischenplatte (12), einen oberen Stanzhalter (13), Stempel (14), eine obere Basis (15), eine Gleitplatte (16), pneumatische Zylinder (17), die die Gleitplatte (16) antreiben, Blöcke (18), die an der Gleitplatte (16) befestigt sind, Kavitäten (19) auf der oberen Basis (5), die zur Aufnahme der Blöcke (18) geeignet sind, Einsätze (20), die an der oberen Basis (15) angebracht sind,
dadurch gekennzeichnet, dass
die Zuführungsvorrichtung (7) eingestellt ist zum Zuführen des Bleches (2) zu einer ersten Matrize der Transferpresse (8) um einen Schritt pro zwei Hübe des Pressenstößels; die Länge eines Vorschubschrittes dem Abstand zwischen zwei aufeinanderfolgenden, auf dem Pressentisch montierten Matrizen entspricht;
die Stempel (14) der ersten Matrize in der Lage sind, bei alternierenden Hüben des Pressenstößels ausgeschlossen zu werden,
wobei die Gleitplatte (16) durch die pneumatischen Zylinder (17) angesteuert wird, derart, dass die Blöcke (8) im Bereich der Einsätze (20) der oberen Basis (15) positioniert werden, die das Einsetzen der Stempel (14) erlauben, wobei es der ersten Matrize erlaubt ist, zwei Scheiben (3, 4) gleichzeitig auf versetzte Weise aus dem Blechstreifen zu schneiden und
wenn die pneumatischen Zylinder (17) die Gleitplatte (169) derart positionieren, dass die Blöcke (18) im Bereich der Kavitäten (1) der oberen Basis (5) positioniert sind, ist die bewegliche Platte (12) in der Lage, durch den Stanzhalter (11) nach oben gedrückt zu werden, so dass das Ausstanzen des Bleches nicht stattfindet, wodurch es ermöglicht wird, die Stempel bei alternierenden Hüben der Presse auszuschließen;
das Greifsystem umfasst ferner Klemmen (26, 27), die auf den Transferstäben (9) mittels Schlitten (23, 24, 24a, 25) montiert sind, die weitere Längs- und Querbewegungen erlauben,
bei jedem Hub der Presse wird ein Teil (3, 4) von der ersten Stanzstation zu der zweiten Station (3, 4) der Transferpresse (8) durch eine erste Klemme (26) zugeführt, die ein erstes Teil (3) überträgt, wenn sie das erste Teil (3) ergreift; die erste Klemme (26) ist auf einem Kreuzschlitten (24) und auf einem Längsschlitten (22) montiert; wobei der Kreuzschlitten (24) es erlaubt, den Versatz der Position des ersten Teils (3) von der mittleren Achse der Presse zu erfassen, der Längsschlitten (22) es erlaubt, den zusätzlichen Abstand des ersten Teils (3) von der darauffolgenden Arbeitsstation zu erfassen, wobei der zusätzliche Abstand des ersten Teils (3) von der darauffolgenden Station vom Versatz der beiden Stanzreihen abhängt; und
eine zweite Klemme (27), die ein zweites Teil (4) überträgt, wenn sie das zweite Teil (4) ergreift, wobei die Klemme (27) (27) auf zwei Kreuzschlitten montiert ist: ein erster Kreuzschlitten (24a) und ein zweiter Kreuzschlitten (25); der erste Kreuzschlitten (24a) weist denselben Hub wie der Kreuzschlitten (24) der ersten Klemme (26) auf und der erste Kreuzschlitten (24a) wird verwendet, um ein zweites Teil (4) zur Mitte zurückzubringen; der zweite Kreuzschlitten (25) erlaubt der zweiten Klemme (27) einen weiteren Hub; in dem Zyklus, in dem das erste Teil (3) zu der darauffolgenden Station übertragen wird, muss die zweite Klemme (27) von dem Transferstab (9) angehoben werden, ohne das zweite Teil (4) zu bewegen; der zweite Kreuzschlitten (25) erlaubt es, die zweite Klem-

me (27) zurückzustellen, um das zweite Teil (4) während der vertikalen Bewegungen infolge der Bewegung des Transferstabes (9) während des Leerhubes der zweiten Klemme (27) nicht zu zerdrücken;
die Klemmen (27) und (26) und die Transferstäbe (9) werden während des Transfers des ersten Teils (3) konfiguriert, um die folgenden Bewegungen auszuführen:

die Klemmen (26, 27) werden zusammen mit den Transferstäben (9) zur Mitte vorgeschoben,
die erste Klemme (26) ergreift das erste Teil (3),
die Klemmen (26, 27) werden zusammen mit den Transferstäben (9) angehoben,
die Klemmen (26, 27) bewegen sich in Längsrichtung um einen Schritt,
die erste Klemme (26) setzt ihren Längshub fort, um die Abstandsdifferenz zu erfassen,
die erste Klemme (26) wird zur Mitte vorgeschoben,
die Klemmen (26, 27) werden zusammen mit den Transferstäben (9) abgesenkt,
die erste Klemme (26) öffnet sich und legt das erste Teil (3) an der zweiten Station der Transferpresse ab,
die Transferstäbe (9) werden geweitet,
die erste Klemme (26) kehrt zu ihrer Anfangsposition zurück,
die Transferstäbe (9) kehren zu ihrem Startpunkt zurück
die Klemmen (27, 26) und die Transferstäbe (9) werden während des Transfers des zweiten Teils (4) konfiguriert, um die folgenden Bewegungen auszuführen:

die Klemmen (26, 27) werden zusammen mit den Transferstäben (9) zur Mitte vorgeschoben,
die zweite Klemme (27) wird weiter vorgeschoben und die zweite Klemme (27) schließt sich durch Ergreifen des zweiten Teils (4),
die Klemmen (26, 27) werden zusammen mit den Transferstäben (9) angehoben,
die Klemmen (26, 27) bewegen sich in Längsrichtung um einen Schritt,
die zweite Klemme (27) wird zur Mitte vorgeschoben,
die Klemmen (26, 27) werden zusammen mit den Transferstäben (9) abgesenkt, die zweite Klemme (27) öffnet sich und legt das zweite Teil (4) an der zweiten Station der Transferpresse ab,
die Transferstäbe (9) werden geweitet,
die zweite Klemme (27) kehrt zu ihrer Anfangsposition in Bezug auf ihren Transferstab zurück,
die Transferstäbe (9) kehren zu dem Startpunkt zurück.

Revendications

1. Système pour former des pièces de forme essentiellement circulaire en quinconce, le système comprenant:

dispositif de détourage (5) de bobines de plaques de métal (2), un redresseur (6), un convoyeur (7), une presse de transfert (8) et un système de préhension comprenant deux barres de transfert (9) aptes à se déplacer longitudinalement, transversalement et verticalement par rapport à la presse, avec une course égale à la hauteur entre les moules;
la presse de transfert (8) comprenant : un premier moule, un coulisseau et une table;
le premier moule comprenant : un serre-flan inférieur (11), une matrice (10), une plaque intermédiaire supérieure mobile (12), un serre-flan supérieur (13), des poinçons (14), une base supérieure (15), une plaque coulissante (16), des vérins pneumatiques (17) qui entrainent la plaque coulissante (16), des blocs (18) fixés sur la plaque coulissante (16), des cavités (19) sur la base supérieure (5) aptes à loger les blocs (18), des inserts (20) fixés sur la base supérieure (15),
caractérisé en ce que
le convoyeur (7) est réglé pour alimenter la plaque de métal (2) vers un premier moule de la presse de transfert (8), une position d'avancement chaque deux courses du coulisseau de presse; la longueur d'une position en avant correspond à la distance entre deux moules suivants installés sur la table de la presse;
les poinçons (14) du premier moule pouvant être exclus en correspondance de courses alternées du coulisseau de presse,
où la plaque coulissante (16) est commandée par les vérins pneumatiques (17) de manière que les blocs (18) soient positionnés dans la zone des inserts (20) de la base supérieure (15) dans laquelle les poinçons (14) peuvent s'insérer, permettant au premier moule de découper deux disques (3, 4) dans la bande de la plaque de métal, en même temps, de manière décalée et lorsque les vérins pneumatiques (17) positionnent la plaque coulissante (16) de façon à ce que les blocs (18) se positionnent dans la zone des cavités (1) de la base supérieure (15), la plaque mobile (12) peut être poussée vers le haut par le serre-flan de sorte qu'il n'y a pas de

vides de la plaque métallique, en excluant les poinçons en correspondance de courses alternées de la presse;
le système de préhension comprenant également des pinces (26, 27) montées sur les barres de transfert (9) au moyen de lames (23, 24, 24a, 25) permettant également les mouvements longitudinal et transversal,
à chaque course de la presse, une pièce (3, 4) est alimentée par le premier poste de détourage au deuxième poste de la presse de transfert (8) par une première pince (26) qui transfère une première pièce (3), quand elle saisit la première pièce (3) ; la première pince (26) est montée sur une lame transversale (24) et sur une lame longitudinale (22) ; la lame transversale (24) permettant de retrouver le décalage de la position de la première pièce (3) de l'axe central de la presse, la lame longitudinale (22) permettant de retrouver la distance supplémentaire de la première pièce (3) par rapport au poste d'usinage suivant, la distance supplémentaire de la première pièce (3) par rapport au poste suivant dépendant du décalage de deux tours de détourage ; et
une seconde pince (27) qui transfère une deuxième pièce (4) quand elle saisit la seconde pièce (4), ladite pince (27) étant montée sur deux lames transversales : une première lame transversale (24a) et une seconde lame transversale (25) ; la première lame transversale (24a) a la même course de la lame transversale (24) de la première pince (26) et la première lame transversale (24a) est utilisée pour retourner une seconde pièce (4) au centre ; la seconde lame transversale (25) permet une course supplémentaire de la seconde pince (27) ; dans le cycle où la première pièce (3) est transférée au poste suivant, la seconde pince (27) doit être relevée par la barre de transfert (9) sans déplacer la seconde pièce (4) ; la seconde lame transversale (25) permet de remettre en position la seconde pince (27) de façon à ce qu'elle ne heurte pas la seconde pièce (4) pendant les déplacements verticaux à cause du mouvement de la barre de transfert (9) pendant la course à vide de la seconde pince (27) ;
les pinces (27) et (26), ainsi que les barres de transfert (9), sont configurées, pendant le transfert de la première pièce (3), pour effectuer les déplacements suivants :

les pinces (26, 27) avancent vers le centre à l'unisson avec les barres de transfert (9),
la première pince (26) saisit la première pièce (3),
les pinces (26, 27) se soulèvent à l'unisson avec les barres de transfert (9),
les pinces (26, 27) se déplacent longitudinalement d'une position,
la première pince (26) continue sa course longitudinale pour retrouver la différence de hauteur,
la première pince (26) avance vers le centre,
les pinces (26, 27) sont abaissées à l'unisson avec les barres de transfert (9),
la première pince (26) s'ouvre et dépose la première pièce (3) sur le second poste de la presse de transfert,
les barres de transfert (9) sont écartées,
la première pince (26) retourne sur sa position initiale,
les barres de transfert (9) retournent au point de départ,
les pinces (26, 27) et les barres de transfert (9) sont configurées, pendant le transfert de la seconde pièce (4), pour effectuer les déplacements suivants :

les pinces (26, 27) avancent vers le centre à l'unisson avec les barres de transfert (9)
la seconde pince (27) avance ultérieurement et la seconde pince (27) se referme en saisissant la seconde pièce (4),
les pinces (26, 27) se soulèvent à l'unisson avec les barres de transfert (9),
les pinces (26, 27) se déplacent longitudinalement d'une position,
la seconde pince (27) avance vers le centre,
les pinces (26, 27) sont abaissées à l'unisson avec les barres de transfert (9),
la seconde pince (27) s'ouvre et dépose la seconde pièce (4) sur le second poste de la presse de transfert,
les barres de transfert (9) sont écartées,
la seconde pince (27) retourne sur sa position initiale par rapport à sa barre de transfert,
les barres de transfert (9) retournent au point de départ.

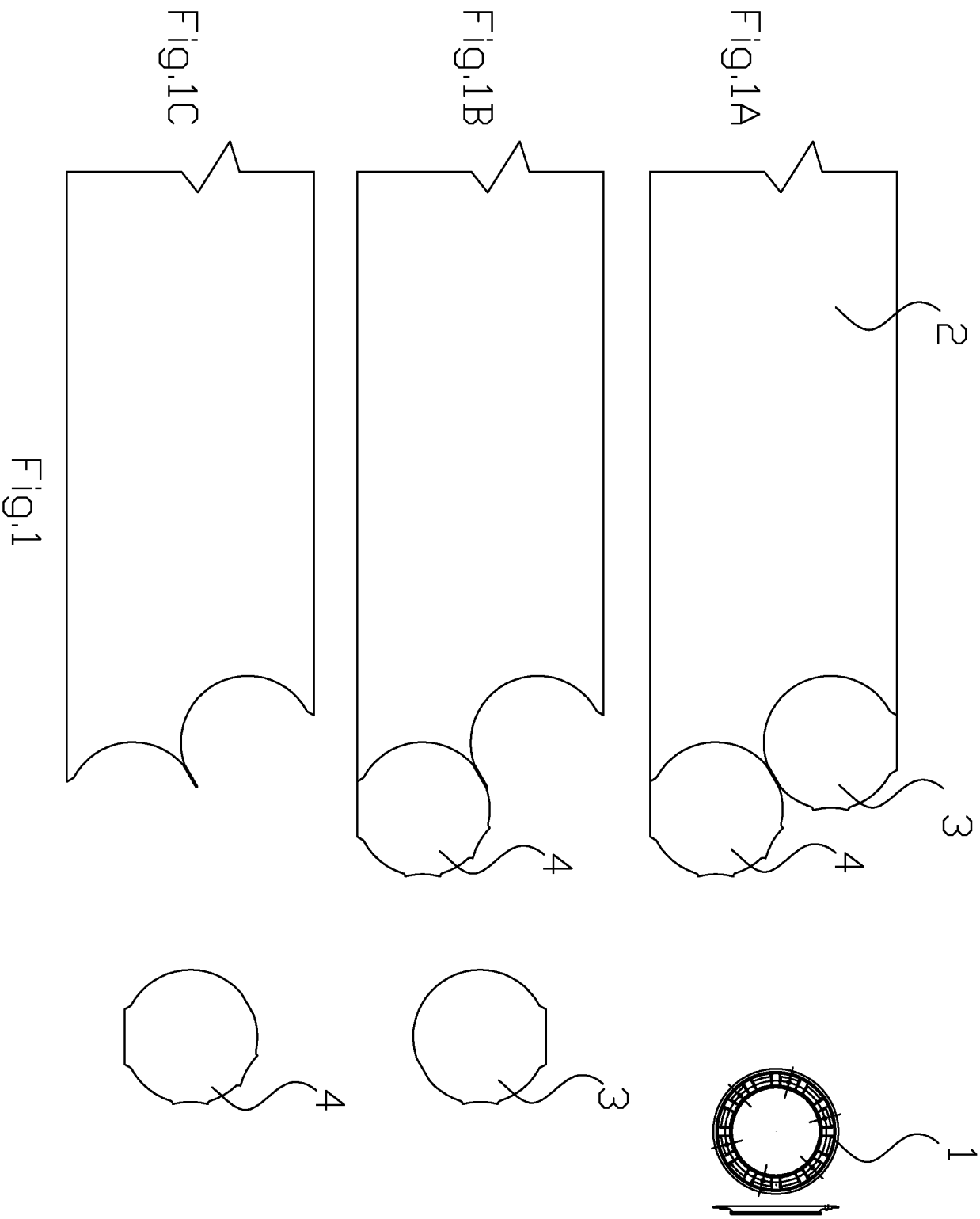
Fig.1
Fig.1A
Fig.1B
Fig.1C
1
2
3
4
4
3
4

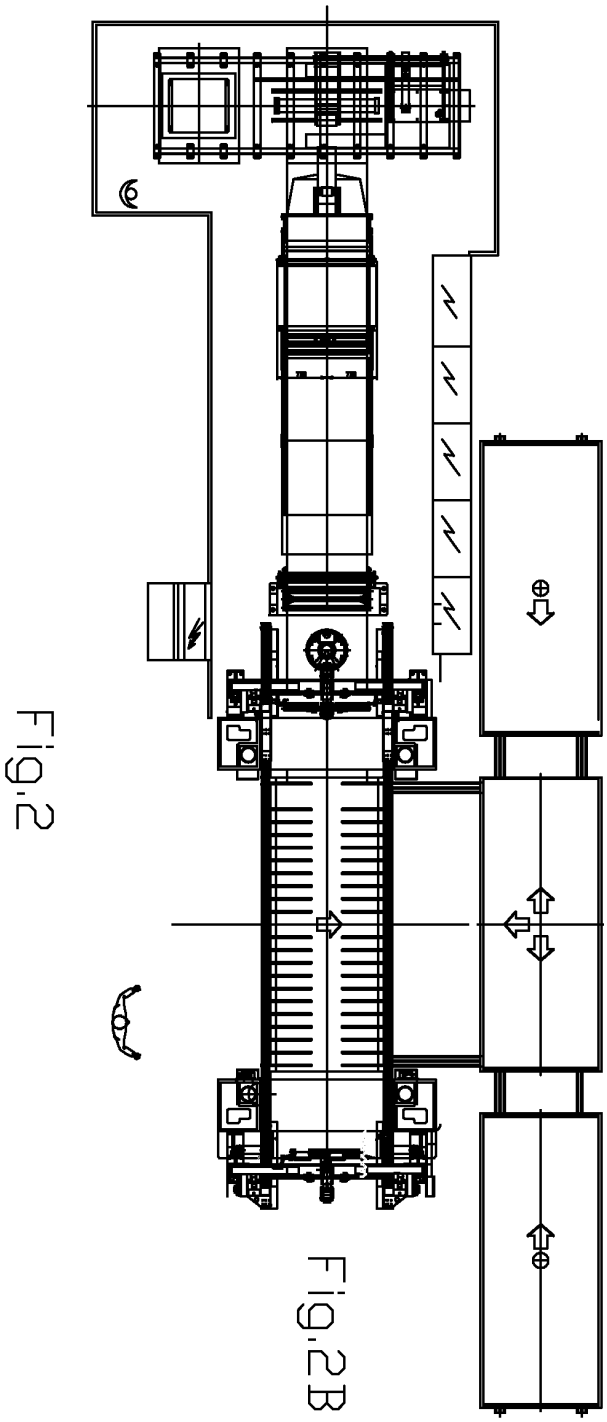

Fig.2

Fig.2B

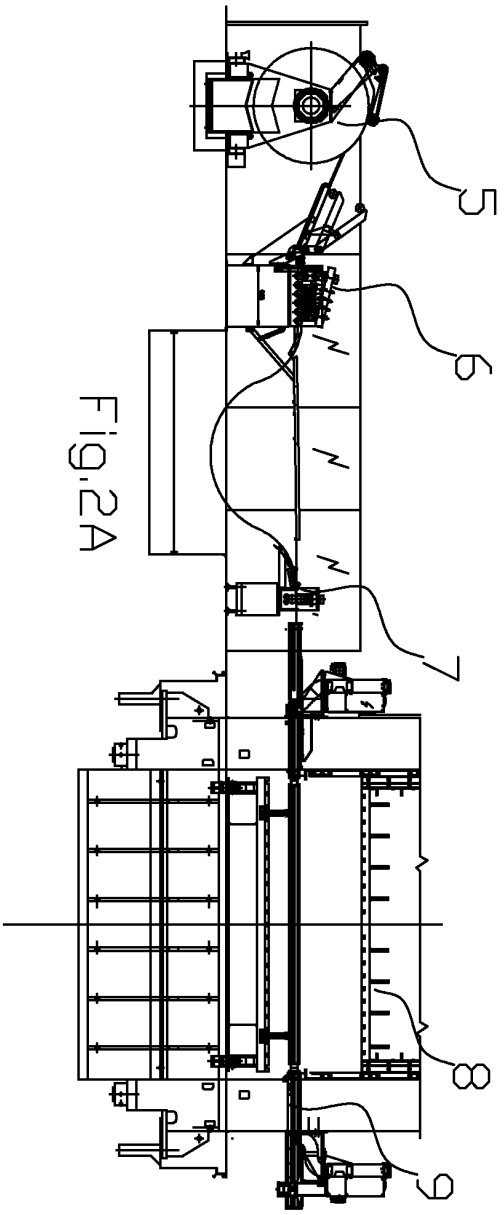

Fig.2A

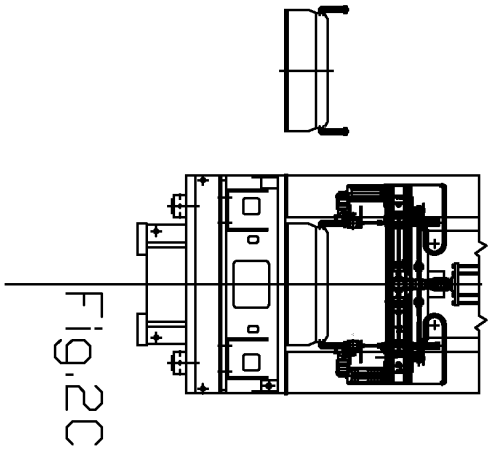

Fig.2C

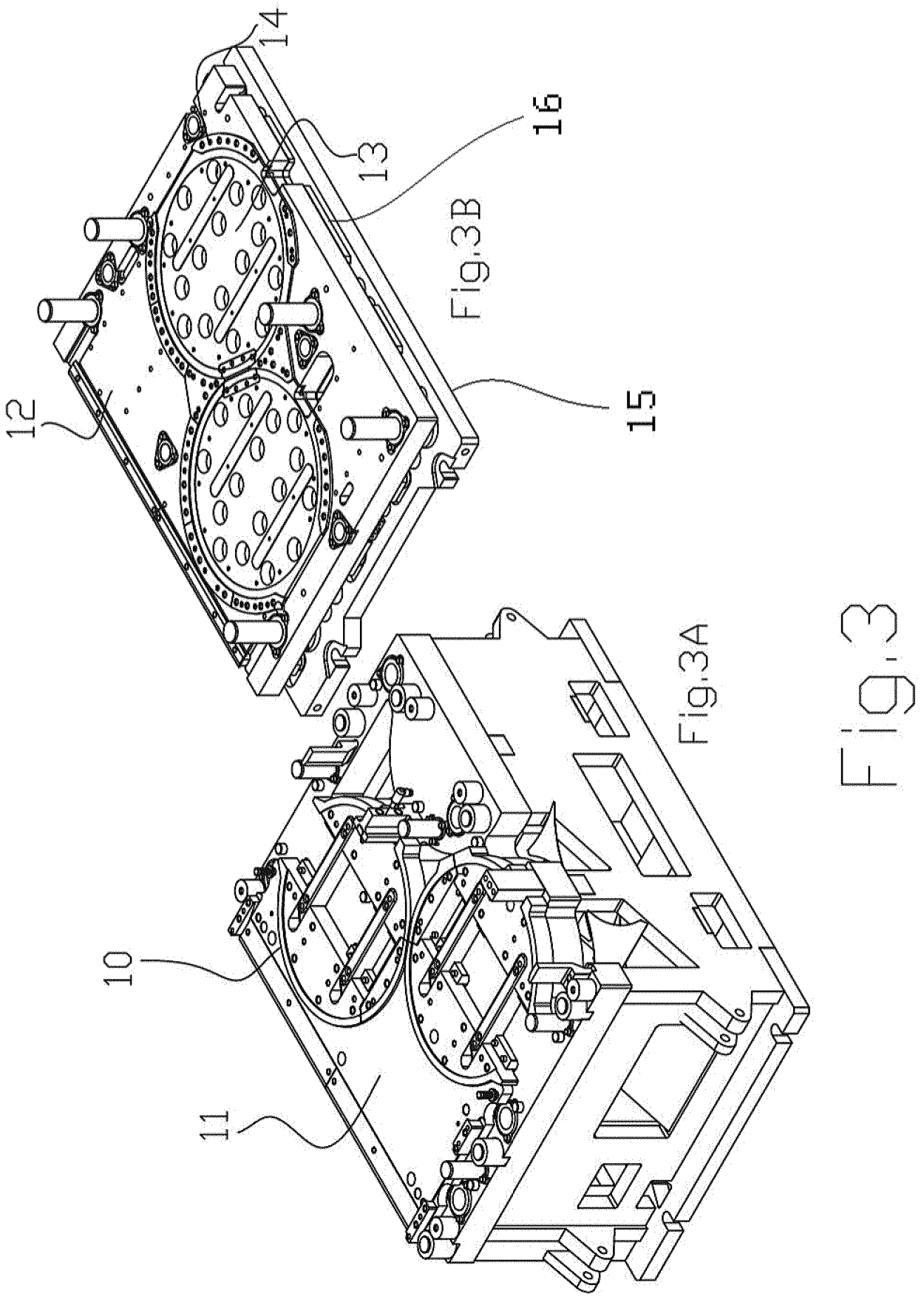

Fig.3

Fig.3B

Fig.3A

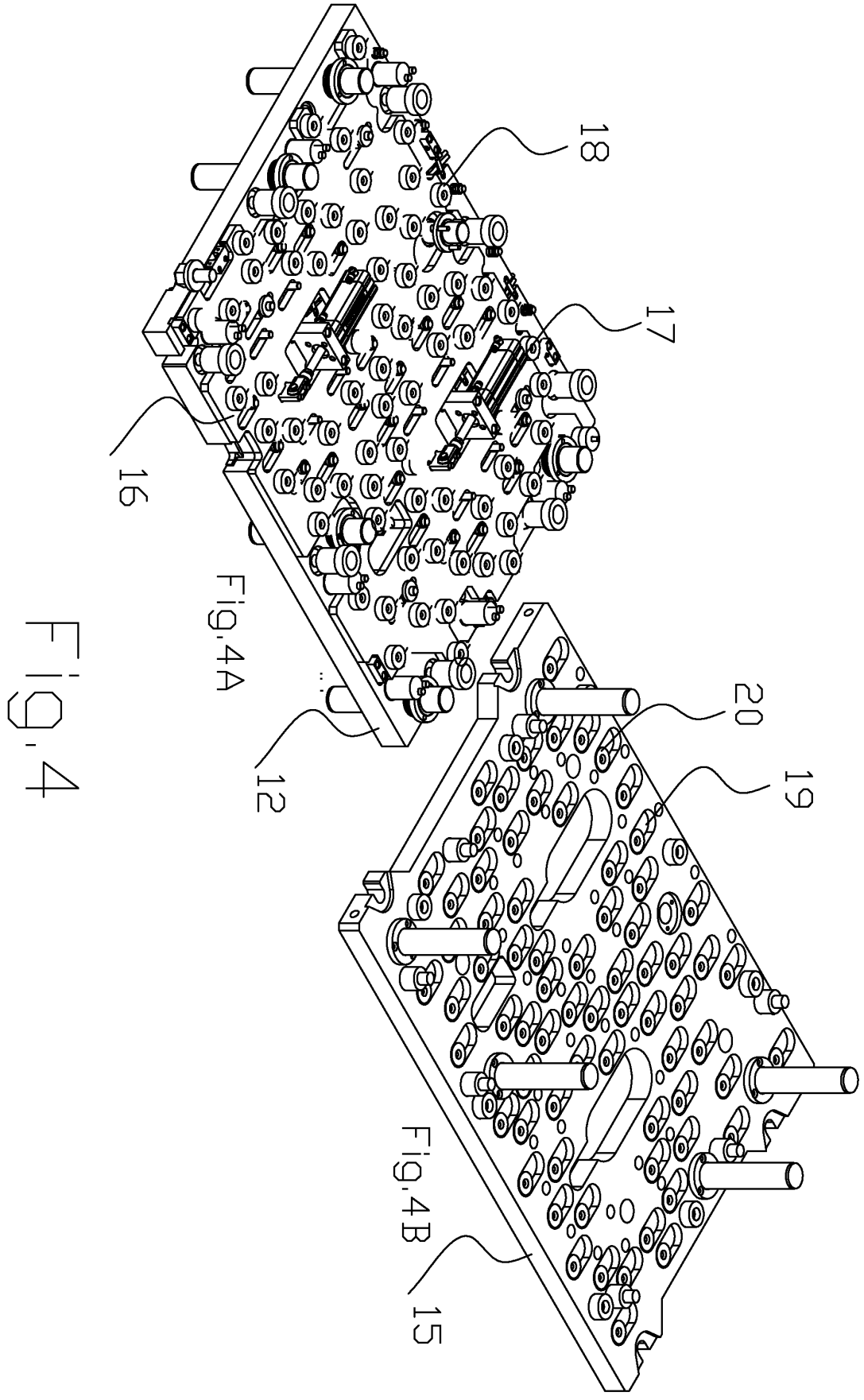

Fig. 4

Fig. 4A

Fig. 4B

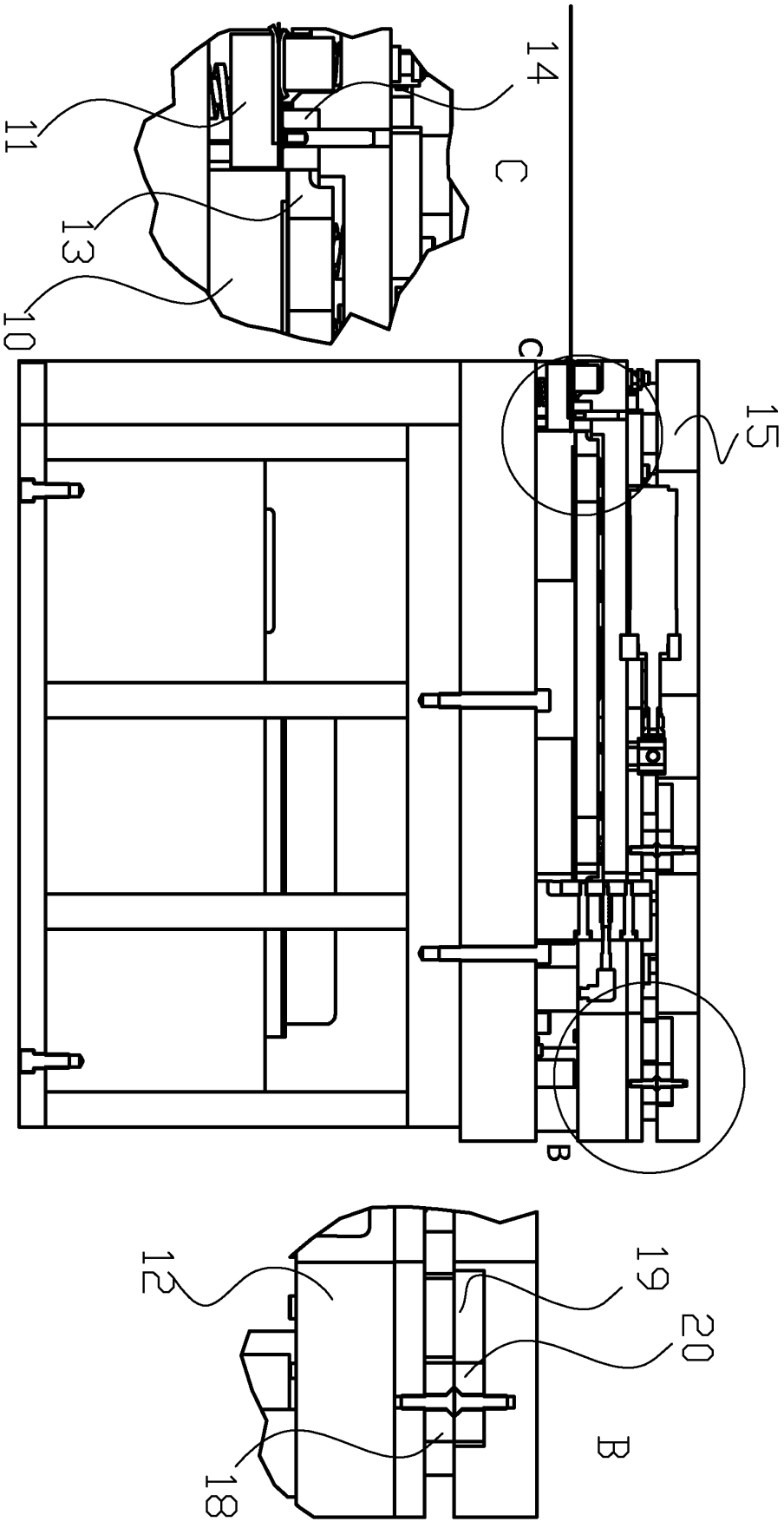

FIG. 5

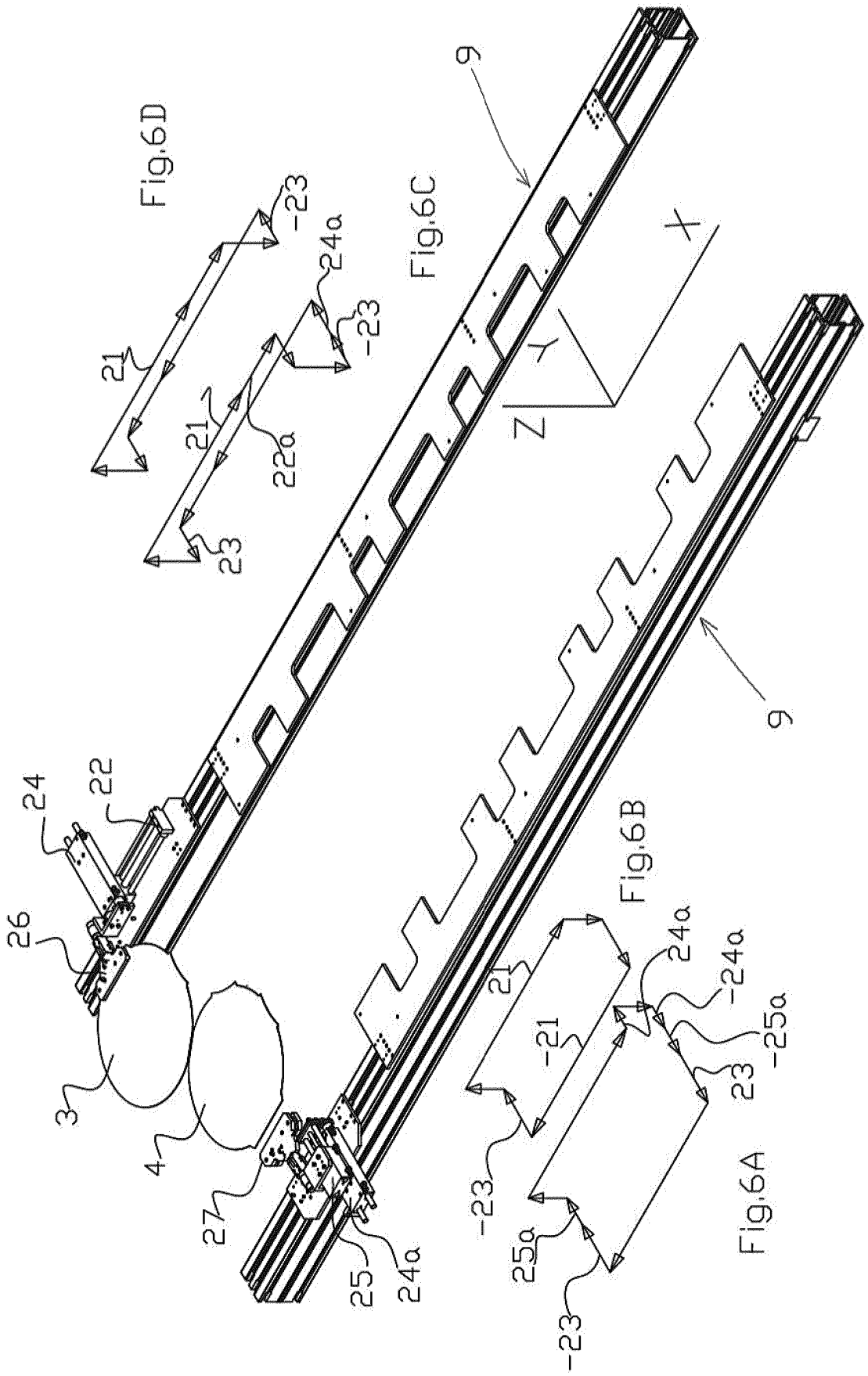
Fig.6D
21
-23
24a
-23
21
22a
23
Fig.6C
9
X
Y
Z
Fig.6B
21
24a
-24a
-21
-25a
23
-23
25a
-23
Fig.6A
24
22
26
3
4
27
25
24a
9

Fig.6

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 3589221 A **[0007]**