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(54) **STRAPPING HEAD FOR PACKAGE/PALLET STRAPPING ALONG TWO ORTHOGONAL PLANES**

(57) A strapping head (100) for strapping a package/pallet with a first strap (91) and a second strap (92) that are wrapped around the package/pallet (P) along two orthogonal planes; the strapping head (100) comprises: a platform (1) to support the package/pallet (P), guide means (2) to guide the platform (1), blocking means

(4) to block a first blocking portion (91c, 92c) of each strap (91, 92), blocking means (4) to block a second blocking portion (91e, 92e) of each strap (91, 92); welding means (Q) to weld two welding portions (91c, 92c, 91d, 92d) of the same strap (91, 92); and cutting means (T) to cut said strap.

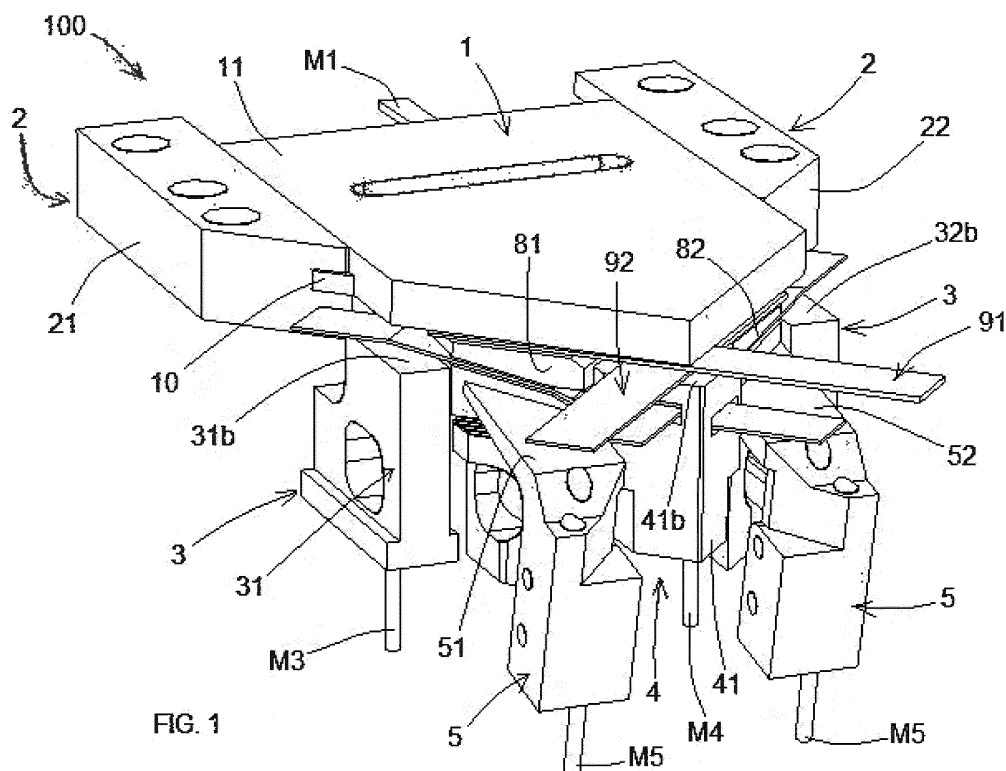


FIG. 1

Description

[0001] The present patent application for industrial invention relates to a strapping head for the strapping of packages/pallets or boxes.

[0002] In particular, the field of reference is the packaging sector wherein packages/pallets or boxes are tied with straps (plastic or metal straps) in order to seal a package/pallet or box for transportation purposes.

[0003] As it is known, packages and cardboard boxes are tied and sealed using strapping heads that wrap the package or cardboard box with flexible straps made of metal or plastics. The ends of the straps are welded in such a way that the straps can be untied only by using a sharp tool capable of cutting the straps off.

[0004] Normally, the straps are tied along orthogonal planes in order to tie the package or box firmly.

[0005] The strapping heads of the prior art are configured in such a way to tie the straps along one plane only. Therefore, in order to tie the straps along two orthogonal planes, two strapping heads must be provided and disposed in a sequence in order to tie the straps along two orthogonal planes. In view of the above, the package needs to be transported from one strapping head to the next strapping head using transporting means, such as rollers or conveyor belts. Evidently, such a system is an expensive system because two strapping heads are required and because time is wasted to transport the package.

[0006] When only one strapping head is provided, a first strap is tied on the package; then the package is rotated by 90° on the strapping head and a second strap is tied along an orthogonal plane relative to the first strap. Evidently, such a system results in a waste of time and requires the use of a rotation system to rotate the package on the platform.

[0007] US4578933A discloses a strapping apparatus according to the preamble of claim 1.

[0008] The purpose of the present invention is to overcome the drawbacks of the prior art by disclosing a strapping head that is capable of strapping a package/pallet or box along two orthogonal planes, without having to rotate the package during the strapping process.

[0009] An additional purpose of the present invention is to disclose a strapping head that is efficient, rapid and easy to make.

[0010] These purposes are achieved according to the invention with the characteristics of the appended independent claim 1.

[0011] Advantageous embodiments appear from the dependent claims.

[0012] The strapping head of the invention is defined by claim 1.

[0013] For the sake of clarity, the description of the strapping head according to the invention continues with reference to the appended drawings, which have a merely illustrative, not limiting value, wherein:

Fig. 1 is an axonometric view of the strapping head according to the invention, wherein various moving means are diagrammatically illustrated;

Fig. 2 is a view of the strapping head of Fig. 1 from a different angle;

Fig. 3 is a top view of the strapping head according to the invention, wherein the platform is in advanced position;

Fig. 3A is a top view of the strapping head according to the invention, wherein the platform is in retracted position;

Fig. 3B is a top view of the strapping head of Fig. 3, wherein a package/pallet is disposed on the platform;

Fig. 4 is a perspective front view of the strapping head according to the invention;

Fig. 5 is a view of the strapping head of Fig. 4, wherein the heating means are not shown;

Fig. 6 is an exploded perspective view of the strapping head according to the invention;

Fig. 7 is a perspective front view of the strapping head, which diagrammatically illustrates the launching means of the straps disposed in front of the strapping head;

Figs. 8 to 17 are diagrammatic perspective views of the strapping head in different operating steps during the strapping process of a package/pallet.

[0014] With reference to Figs. 1 to 7, a strapping head according to the invention is disclosed, which is generally indicated with reference numeral (100).

[0015] The strapping head (100) is devised for strapping a package/pallet (P) or a box with a first strap (91) and a second strap (92) that are wrapped around the package/pallet (P) along two orthogonal planes.

[0016] The strapping head (100) comprises a platform (1) suitable for supporting the package/pallet (P).

[0017] The platform (1) is a plate comprising an upper surface (11) whereon the package/pallet (P) is disposed, and a lower surface (12) directed in an opposite direction with respect to the upper surface (11).

[0018] With reference to Figs. 3 and 3A, the platform (1) has a polygonal shape with two parallel sides (15a, 15b) and two converging sides (16a, 16b) that define a point (17), preferably provided with an angle of 90°. The straps (91, 92) are crossed under the point (17).

[0019] With reference to Fig. 3B, the package/pallet (P) is usually provided with a rectangular parallelepiped shape. The package/pallet (P) is disposed on the platform (1) in such a way that two adjacent sides (P1, P2) of the package/pallet are parallel to the two converging sides (16a, 16b) of the platform.

[0020] Although Fig. 3B illustrates a parallelepiped package, the package may have a different shape.

[0021] With reference to Fig. 2, the strapping head (100) of the invention comprises guide means (2) to guide a sliding movement of the platform (1) along a horizontal axis between an advanced position and a retracted po-

sition.

[0022] The guide means (2) comprise two supporting elements (21, 22) that are disposed laterally relative to the platform (1). The two supporting elements (21, 22) comprise grooves (20) wherein flanges (10) obtained on the parallel sides (15a, 15b) of the platform (1) are slidably inserted.

[0023] The strapping head (100) comprises first moving means (M1) connected to the platform (1) in order to move the platform from the retracted position to the advanced position, and vice versa.

[0024] As shown in Fig. 7, the two straps (91, 92) are fed to the strapping head (100) by launching means (L1, L2) disposed upstream the strapping head (100),

[0025] Each launching means (L1, L2) comprises a pulley or a reel whereon the strap (91, 92) used for wrapping the package/pallet is wound.

[0026] With reference to Fig. 4 and 6, the strapping head (100) comprises tensioning means (3) disposed under the platform (1) in the point where the parallel sides (15a, 15b) are joined with the converging sides (16a, 16b) of the platform (1), when the platform is in advanced position.

[0027] The tensioning means (3) cooperate with the platform (1) in order to block a first blocking portion (91c, 92c) of each strap (91, 92).

[0028] The tensioning means (3) comprise a first mobile element (31) disposed in the point where a first parallel side (15a) and a first converging side (16a) are joined, and a second mobile element (32) disposed in the point where a second parallel side (15b) and a second converging side (16b) of the platform (1) are joined. Each mobile element (31, 32) is a parallelepiped block with a head surface (31b, 32b) directed towards the platform (1).

[0029] Each mobile element (31, 32) can be in an idle position, wherein the head surface (31b, 32b) is distal from the lower surface (12) of the platform (1), and an operating position, wherein the head surface (31b, 32b) compresses and blocks the blocking portion (91c, 92c) of the strap (91, 92) against the lower surface (12) of the platform (1).

[0030] The strapping head (100) comprises second moving means (M3) connected to the tensioning means (3) in order to move the tensioning means.

[0031] With reference to Figs. 4, 5 and 6, the strapping head (100) comprises blocking means (4) that are disposed under the platform (1) in correspondence of the point (17) of the platform (1) when said platform (1) is in advanced position. The blocking means (4) cooperate with the platform (1) to block a second blocking portion (91e, 92e) of each strap (91, 92).

[0032] The blocking means (4) comprise a body (41) with a parallelepiped cross-section with rounded corners, and provided with an upper side (41b) directed towards the platform (1), where the second blocking portion (91e) of the first strap (91) and the second blocking portion (92e) of the second strap (92) are to be disposed and

crossed. In particular, the body (41) has a quadrangular section.

[0033] The body (41) of the blocking means can be in a first position, wherein the upper side (41b) is distal from the lower surface (12) of the platform (1), and in a second position, wherein said upper side (41b) compresses and simultaneously blocks the second blocking portions (91e, 92e) of the first strap (91) and of the second strap (92), in such a way to be blocked against the lower surface of the platform.

[0034] With reference to Fig. 6, the body (41) of the blocking means has two through openings (42, 43) that extend along two orthogonal directions and lie on two superimposed horizontal planes. Each through opening (42, 43) comprises an inlet and an outlet that are obtained on opposite lateral sides of the body. One of said straps (91, 92) slides in each through opening (42, 43). After wrapping the package/pallet (P), an initial portion of the straps (91, 92) is suitable for being disposed in each through opening (42, 43).

[0035] The strapping head (100) comprises third moving means (M4) connected to the blocking means (4) in order to move the blocking means.

[0036] With reference to Figs. 5 and 6, the strapping head (100) comprises guides (8) to guide each strap under the platform (1), going from the blocking means (4) towards the tensioning means (3), along a parallel direction with respect to the converging side (16a, 16b) of the platform (1).

[0037] The guides (8) for said straps (91, 92) comprise a first block (81) to guide the first strap (91), and a second block (82) to guide the second strap (92).

[0038] Each block (81, 82) comprises an empty space (81a, 82a) suitable for housing a first welding portion (91b, 92b). Each block (81, 82) also comprises a crossing surface (81b, 82b) directed towards the platform (1). A second welding portion (91f, 92f) of the straps (91, 92) is suitable for being disposed on the crossing surface (81b, 82b) of the block.

[0039] The blocks (81, 82) are configured in such a way to translate along a horizontal axis that is parallel to the sliding axis of the platform (1), between an advanced position, wherein the first welding portion (91b, 92b) is inserted in the empty space (81a, 82a) and the second welding portion (91f, 92f) is disposed on the crossing surface (81b, 82b), and a retracted position, wherein the two welding portions (91b, 92b, 91f, 92f) are uncovered under the platform (1).

[0040] The strapping head (100) comprises fourth moving means (M8) in order to move the guides (8) between said retracted position and said extracted position.

[0041] Advantageously, the two blocks (81, 82) are connected by means of a material bridge, in such a way that they are integral and can be simultaneously moved by the moving means (M8).

[0042] With reference to Fig. 2, the strapping head (100) comprises welding means (Q) disposed under said platform (1) between the blocking means (4) and the ten-

sioning means (3). The welding means (Q) are configured in such a way to weld the two welding portions (91c, 92c, 91f, 92f) of the same strap (91, 92).

[0043] According to the embodiment shown in the appended figures, the welding means (Q) comprise heating means (5) and pressing means (6).

[0044] The heating means (5) are configured in such a way to be in operating position, wherein said heating means (5) heat the welding portions (91b, 92b, 91f, 92f) of the strap (91, 92), and in a non-operating position, wherein said heating means (5) do not heat said welding portions (91b, 92b, 91f, 92f).

[0045] The pressing means (6) are configured in such a way to cooperate with the platform (1) in order to press and weld the two welding portions (91b, 92b, 91f, 92f) of the same strap (91, 92), after the first welding portion (91b, 92b) is heated by the heating means (5).

[0046] In particular, the heating means (5) comprise a first heating plate (51) to heat the welding portions (91b, 91f) of the first strap (91), and a second heating plate (52) to heat the welding portions (92b, 92f) of the second strap (92).

[0047] According to said embodiment of the heating means (5), said operating position corresponds to a position wherein the heating plate (51, 52) is proximal to the welding portions (91b, 91f, 92b, 92f), in such a way to heat and soften the welding portions (91b, 91f, 92b, 92f) of the strap (91, 92), whereas the non-operating position corresponds to a position wherein the heating plate (91, 92) is not in contact with the first welding portion (91b, 92b) of the strap (91, 92).

[0048] The strapping head (100) comprises fifth moving means (M5) in order to move the heating plates (51, 52) between the operating position and the non-operating position.

[0049] With reference to Figs. 5 and 6, the pressing means (6) comprise a first presser (61) for the first strap (91), and a second presser (62) for the second strap (92). Each presser (61, 62) comprises a contact head (61b, 62b) directed towards the platform (1) and configured in such a way to provide a resistant heat-sealing. The pressers (61, 62) are configured in such a way to be in a first position, wherein said contact head (61b, 62b) is distal from said lower surface (12) of the platform (1), and in a second position, wherein said contact head (61b, 62b) presses the two welding portions (91b, 92b, 91f, 92f) against the lower surface (12), in such a way to join and weld the two welding portions (91b, 92b, 91f, 92f) after the heating means (5) heat the welding portions (91b, 92b, 91f, 92f).

[0050] The strapping head (100) comprises sixth moving means (M6) in order to move the pressers (61, 62) between said first position and said second position.

[0051] Although in the appended figures the pressers (61, 62) are separated, they can be joined by a material bridge in such a way that they can be simultaneously moved by the same moving means (M6).

[0052] For illustrative purposes, instead of comprising

heating means (5) and pressing means (6), the welding means (Q) can comprise means that are suitably configured to heat and simultaneously press said welding portions of the straps, such as ultrasound heads.

[0053] With reference to Fig. 6, the strapping head (100) also comprises cutting means (T) disposed between the blocking means (4) and the tensioning means (3). The cutting means (T) are suitably configured to cut the straps (91, 92) off.

[0054] With reference to Fig. 6, the cutting means (T) comprise a first blade (71) integrally connected with the first presser (61), and a second blade (72) integrally connected with the second presser (62). Being the blades (71, 72) integrally connected with the pressers (61, 62), the welding and the cutting of the straps (91, 92) are performed simultaneously.

[0055] In particular, the blades (71, 72) cut the straps (91, 92) in a position between the initial portion and the first welding portion (91b, 92b) of the strap (91, 92).

[0056] More precisely, the blades (71, 72) cut the portion of the strap that comes out of the outlet of the through openings (42, 43) of the body (41).

[0057] The figures diagrammatically illustrate the moving means (M1, M3, M4, M5, M6, M8). Said moving means can comprise one or more linear actuators, such as a screw-female screw system, a gear-rack system moved by an electric motor, or an assembly made of a cylinder and a piston of hydraulic, pneumatic or electromagnetic type. Additionally, said moving means (M1, M3, M4, M5, M6, M8) can comprise a cam-rocker arm system or a flat cam system.

[0058] It must be noted that the contact head (61b, 62b) of the pressers (61, 62), the head surface (31b, 32b) of the mobile elements (31, 32) of the tensioning means (3), and the upper side (41b) of the body (41) of the blocking means (4) comprise knurled portions or ribs and grooves to retain, block and seal the straps (91, 92) firmly.

[0059] Preferably, also the lower surface (12) of the platform (1) has knurled portions or portions with ribs and grooves. Said portions are obtained in the place where the contact heads (61b, 62b) of the pressers (61, 62), the head surfaces (31b, 32b) of the mobile elements (31, 32) of the tensioning means (3), and the upper side (41b) of the body (41) of the blocking means (4) press the straps (91, 92) against the platform (1), in such a way to additionally improve the retention and blocking or the welding of the straps (91, 92).

[0060] Fig. 8 to 17 illustrate a strapping process of a package/pallet (P) by means of the strapping head (100) of the invention.

[0061] Firstly, the process provides for a step of positioning, wherein the package/pallet (P) is disposed on the platform (1) in such a way that two adjacent sides (P1, P2) of the package/pallet lie on planes that are parallel to the two converging sides (16a, 16b) of the platform (1), as shown in Fig. 8.

[0062] With reference to Fig. 9, when the package/pallet is positioned on the platform (1), a step of pre-wrap-

ping is performed, wherein the straps (91, 92) are fed by the launching means (L1, L2), sliding under the platform (1) until one end (91v, 92v) of each strap (91, 92) is disposed on the tensioning means (3). More precisely, each strap (91, 92) is passed inside the through openings (42, 43) of the body, in the empty space (81a, 82a) of the blocks (81, 82) of the guide means (8) until the end (91v, 92v) of the straps is positioned on the head surface (31b, 32b) of the mobile elements (31, 32) of the tensioning means (3).

[0063] Then, a step of wrapping is performed, wherein each strap (91, 92) is passed on the platform (1) in order to wrap the package/pallet (P) on the sides and on top. Each strap (91, 92) is passed again under the platform (1), re-positioning the end (91v, 92v) of each strap on the tensioning means (3). During said step of wrapping, the two straps (91, 92) are crossed on the package/pallet (P) and under the platform (1) in correspondence of the point (17) of the platform (1).

[0064] Said step of wrapping can be performed manually or with suitable wrapping devices. Preferably, wrapping is performed with wrapping devices that are technically known as "arch strap guides".

[0065] When the step of wrapping is completed, each strap (91, 92) is positioned and ready to strap the package (P).

[0066] Each strap (91, 92) is provided with multiple portions (as shown in Fig. 10 and 18), namely:

- an initial portion that is inserted in the through opening (42, 43) of the body of the blocking means;
- a first welding portion (91b, 92b) that is inserted in the empty space (81a, 81b) of the block (81, 82) of the guides (8);
- a first blocking portion (91c, 92c) disposed between the platform (1) and the mobile element (31, 32) of the tensioning means (3);
- a central portion (91d, 92d) that surrounds and wraps the package/pallet (P) on the sides and on top;
- a second blocking portion (91e, 92e) disposed between the platform (1) and the body of the blocking means (4); and
- a second welding portion (91f, 92f) disposed on the transit surface (81a, 82b) of the block (81, 82) of the guides (8).

[0067] As shown in Fig. 11, after the step of wrapping, a first step of blocking is performed, wherein the blocking means (4) block the second blocking portion (91e, 92e) of the straps. In particular, the body (41) of the blocking means (4) is moved from the first position to the second position in such a way that the upper side (41b) of the body firmly presses and blocks said second blocking portion (91e, 92e) against the lower surface (12) of the platform (1).

[0068] Being the body (41) of the blocking means disposed under the point (17) where the two straps (91, 92) are crossed, the body (41) simultaneously blocks the sec-

ond blocking portion (91e) of the first strap (91) and the second blocking portion (92e) of the second strap (92).

[0069] After said second blocking portions (91f, 92f) of the straps are blocked firmly, a step of tensioning is performed, wherein each strap (91, 92) is pulled in the opposite direction with respect to the wrapping direction.

[0070] Such a tensioning can be performed by rotating the pulley of the launching means (L1, L2) in the opposite direction with respect to the launching direction of the straps (91, 92).

[0071] After the straps (91, 92) are suitably tensioned, a second step of blocking is performed, as shown in Fig. 12, wherein the mobile elements (31, 32) of the tensioning means (3) are moved from the idle position to the operating position in order to firmly block the first blocking portion (91c, 92c).

[0072] The step of welding and the second step of blocking can be performed simultaneously for the two straps (91, 92) or in a sequence: firstly, tensioning and second blocking of the first strap (91) and then tensioning and second blocking of the second strap (92).

[0073] With reference to Figs. 13, 14 and 15, successively, a step of welding is performed, wherein the first welding portion (91b, 92b) and the second welding portion (91f, 92f) of the same strap (91, 92) are welded.

[0074] In particular, said step of welding provides for a step of heating and a step of pressing.

[0075] With reference to Fig. 13 and 14, the step of heating is performed by activating the heating means (5). Namely, the fifth moving means (M5) that move the heating plates (51, 52) are activated in such a way that said heating plates (51, 52) are proximal to said welding portions (91b, 92b, 91f, 92f) in order to soften said welding portions (91b, 92b, 91f, 92f).

[0076] As shown in Fig. 15, the step of pressing provides for pressing the two welding portions (91b, 92b, 91f, 92f) of the straps (91b, 92b). The first welding portion (91b, 92b) was previously heated and softened during the step of heating. The two welding portions (91b, 92b, 91f, 92f) are pressed by the presser (61, 62) against the platform (1) and the two welding portions (91b, 92b, 91f, 92f) are welded.

[0077] Simultaneously with the step of pressing, a step of cutting is performed by means of the blades (71, 72), wherein the straps (91, 92) are cut in a position between the initial portion and the first welding portion (91b, 92b).

[0078] The step of pressing and the step of cutting can be performed simultaneously for the two straps (91, 92) if the pressers (61, 62) are separated, by synchronizing the moving means (M6), and also if the pressers (61, 62) are joined by the material bridge that allows for moving the pressers (61, 62) with the same moving means (M6).

[0079] If the strapping head (100) is provided with guide means (8), before the step of welding, the guide means (8) are moved from the advanced position to the retracted position, in such a way that the first welding portion (91b, 92b) and the second welding portion (91f, 92f) are moved closer and uncovered under the platform

(1).

[0080] After the step of welding and the step of cutting are completed, as shown in Figs. 16 and 17, a step of releasing is performed, wherein:

- the body (41) of the blocking means (4) is disposed in the first position;
- the mobile elements (31, 32) of the tensioning means (3) are returned to the idle position;
- the pressers (61, 62) are returned to the first position; and
- the platform (1) is moved from the advanced position to the retracted position (Fig. 16), in such a way that the platform (1) is no longer disposed between the portions of straps (91, 92) under the package/pallet (P), and therefore the package/pallet (P) is completely wrapped by the welded straps (91, 92), thus providing a firm packaging of the package/pallet (P), as shown in Fig. 17.

[0081] The advantages of the strapping head (100) according to the invention are manifest.

[0082] Because of the special configuration of the strapping head (100), a package/pallet can be simultaneously strapped along two orthogonal planes, without having to rotate the package by 90° and without having to transport the package/pallet to another strapping head with transportation means, as it occurred in the prior art. In view of the above, the use of the strapping head (100) can save time during the packaging process of packages or pallets.

[0083] Numerous equivalent variations and modifications, which are within the reach of an expert of the field and fall in any case within the scope of the invention as disclosed by the appended claims, can be made to the present embodiment of the invention.

Claims

1. Strapping head (100) for strapping a package/pallet with a first strap (91) and a second strap (92) that wrap the package/pallet (P) along two orthogonal planes; said strapping head (100) comprising:
 - a platform (1) suitable for supporting said package/pallet (P); said platform (1) comprising an upper surface (11), wherein said package/pallet is disposed (P), and a lower surface (12) directed in opposite direction with respect to said upper surface (11); said platform (1) having a polygonal shape with two parallel sides (15a, 15b) and two converging sides (16a, 16b) that define a point (17) under which said straps (91, 92) are crossed;
 - tensioning means (3) disposed under said platform (1); said tensioning means (3) cooperating with the platform (1) to block a first blocking por-

tion (91c, 92c) of each strap (91, 92);

characterized in that it comprises

- guide means (2) to guide said platform (1) along a horizontal axis between an advanced position and a retracted position;
 - blocking means (4) disposed under said platform (1) in correspondence of said point (17) of the platform (1), when said platform (1) is in advanced position; said blocking means (4) cooperating with the platform (1) to block a second blocking portion (91e, 92e) of each strap (91, 92);
 - welding means (Q) disposed under said platform (1) between said tensioning means (3) and said blocking means (4); said welding means (Q) being configured in such a way to weld two welding portions (91c, 92c, 91d, 92d) of the same strap (91, 92); and
 - cutting means (T) disposed between said blocking means (4) and said tensioning means (3); said cutting means (T) being suitable for cutting said strap.
2. The strapping head (100) of claim 1, comprising guides (8) to guide each strap under the platform, going from the blocking means (4) towards the tensioning means (3), along a parallel direction with respect to the converging sides (16a, 16b) of the platform (1).
3. The strapping head (100) of any one of the preceding claims, wherein said welding means (Q) comprise heating means (5) and pressing means (6); said heating means (5) being configured in such a way to be in an operating position, wherein said heating means (5) heat at least one of said welding portions (91b, 92b, 91f, 92f) of the strap (91, 92), and a non-operating position, wherein said heating means (5) do not heat said welding portions (91b, 92b, 91f, 92f); said pressing means (6) being suitable to cooperate with the platform (1) in order to press and weld the two welding portions (91b, 92b, 91f, 92f) of the same strap (91, 92) when at least one welding portion is heated with said heating means (5).
4. The strapping head (100) of any one of the preceding claims, wherein said tensioning means (3) comprise a first mobile element (31) and a second mobile element (32), each of them comprising a head surface (31b, 32b); said mobile elements (31, 32) being configured in such a way to be in an idle position, wherein said head surface (31b, 32b) is distal from said lower surface (12) of the platform (1), and in an operating position, wherein said head surface (31b, 32b) presses the first blocking portion (91c, 92c) of each strap (91, 92) against said lower surface (12) of the

platform (1).

5. The strapping head (100) of any one of the preceding claims, wherein said blocking means (4) comprise a body (41) with a parallelepiped cross-section with rounded angles; said body (41) comprising an upper side (41b) wherein the second blocking portion (91e) of the first strap (91) and the second blocking portion (92e) of the second strap (92) are disposed and crossed; said body (41) being configured in such a way to be in a first position, wherein said upper side (41b) is distal from said lower surface (12) of the platform (1), and a second position, wherein said upper side (41b) presses and simultaneously blocks the second blocking portions (91e, 92e) of the first strap (91) and of the second strap (92) against said lower surface (12) of the platform (1).
6. The strapping head (100) of claim 5, wherein said body (41) of the blocking means comprises two through openings (42, 43) that extend along two orthogonal directions and lie on two superposed horizontal planes, in such a way that said straps (91, 92) can slide in said through openings of the body of the blocking means.
7. The strapping head (100) of any one of claims 3 to 6, wherein said heating means (5) comprise a first heating plate (51) to heat at least one welding portion (91b, 91f) of the first strap (91), and a second heating plate (52) to heat at least one welding portion (92b, 92f) of the second strap (92); each heating plate (51, 52) being in contact with said at least one welding portion (91b, 92b, 91f, 92f) of the strap (91, 92) when said heating means (5) are in operating position.
8. The strapping head (100) of any one of claims 3 to 7, wherein said pressing means (6) comprise a first presser (61) for the first strap (91), and a second presser (62) for the second strap (92); each presser (61, 62) comprising a contact head (61b, 62b); said pressers (61, 62) being configured in such a way to be in a first position, wherein said contact head (61b, 62b) is distal from said lower surface (12) of the platform (1), and in a second position, wherein said contact head (61b, 62b) pushes and presses the two welding portions (91b, 92b, 91f, 92f) against the lower surface (12) of the platform (1).
9. The strapping head (100) of claim 8, wherein said cutting means (T) comprise a first blade (71) that is integral with the first presser (61), and a second blade (72) that is integral with the second presser (62).
10. The strapping head (100) of any one of the preceding claims, wherein said guide means (2) for said platform (1) comprise two supporting elements (21, 22)

disposed in lateral position relative to said platform (1) whereon grooves (20) are provided: said platform (1) comprising two flanges (10) obtained on said parallel sides (15a, 15b) and slidably inserted in said grooves (20) of said supporting elements (21, 22).

11. The strapping head (100) of any one of claims 2 to 10, wherein said guides (8) for said straps (91, 92) comprise a first block (81) to guide the first strap (91) and a second block (82) to guide the second strap (92); each block (81, 82) comprising an empty space (81a, 82a) suitable for housing a first welding portion (91b, 92b) of the strap (91, 92), and a crossing surface (81b, 82b) directed towards the platform (1) and whereon a second welding portion (91f, 92f) of the straps (91, 92) is disposed; said blocks (81, 82) being configured in such a way to be in an advanced position and in a retracted position, wherein the two welding portions (91b, 92b, 91f, 92f) of the straps (91, 92) are uncovered under the platform (1).
12. Strapping process of a package/pallet (P) with the strapping head (100) according to any one of the preceding claims; said process comprising the following steps:
 - step of positioning, wherein the package/pallet (P) is positioned on the platform (1);
 - step of pre-wrapping, wherein two straps (91, 92) are provided, sliding under the platform (1) until an end (91v, 92v) of each strap (91, 92) is on said blocking means (4);
 - step of wrapping, wherein each strap (91, 92) is passed on the platform (1) in order to wrap the package/pallet (P) on the sides and on the top along two orthogonal planes, until the end (91v, 92v) of the strap (91, 92) is disposed again on the blocking means (4);
 - first blocking, wherein a second blocking portion (91e, 92e) of the straps (91, 92) is locked by means of the blocking means (4);
 - tensioning, wherein each strap (91, 92) is pulled in opposite direction relative to the wrapping direction of the strap (91, 92) around the package/pallet (P).
 - second blocking, wherein a first blocking portion (91c, 92c) of the straps (91, 92) is blocked by means of said tensioning means (3);
 - welding, wherein two welding portions (91e, 92e) of the straps (91, 92) are welded with said welding means (Q);
 - cutting, wherein the straps (91, 92) are cut near the welding point.
13. The process of claim 12, wherein a step of heating is performed before said step of welding, wherein at least one welding portion (91b, 92b) of each strap (91, 92) is heated, and then a step of pressing is

performed, wherein the welding portions (91e, 92e) of each strap (91, 92) are pressed in such a way to be welded.

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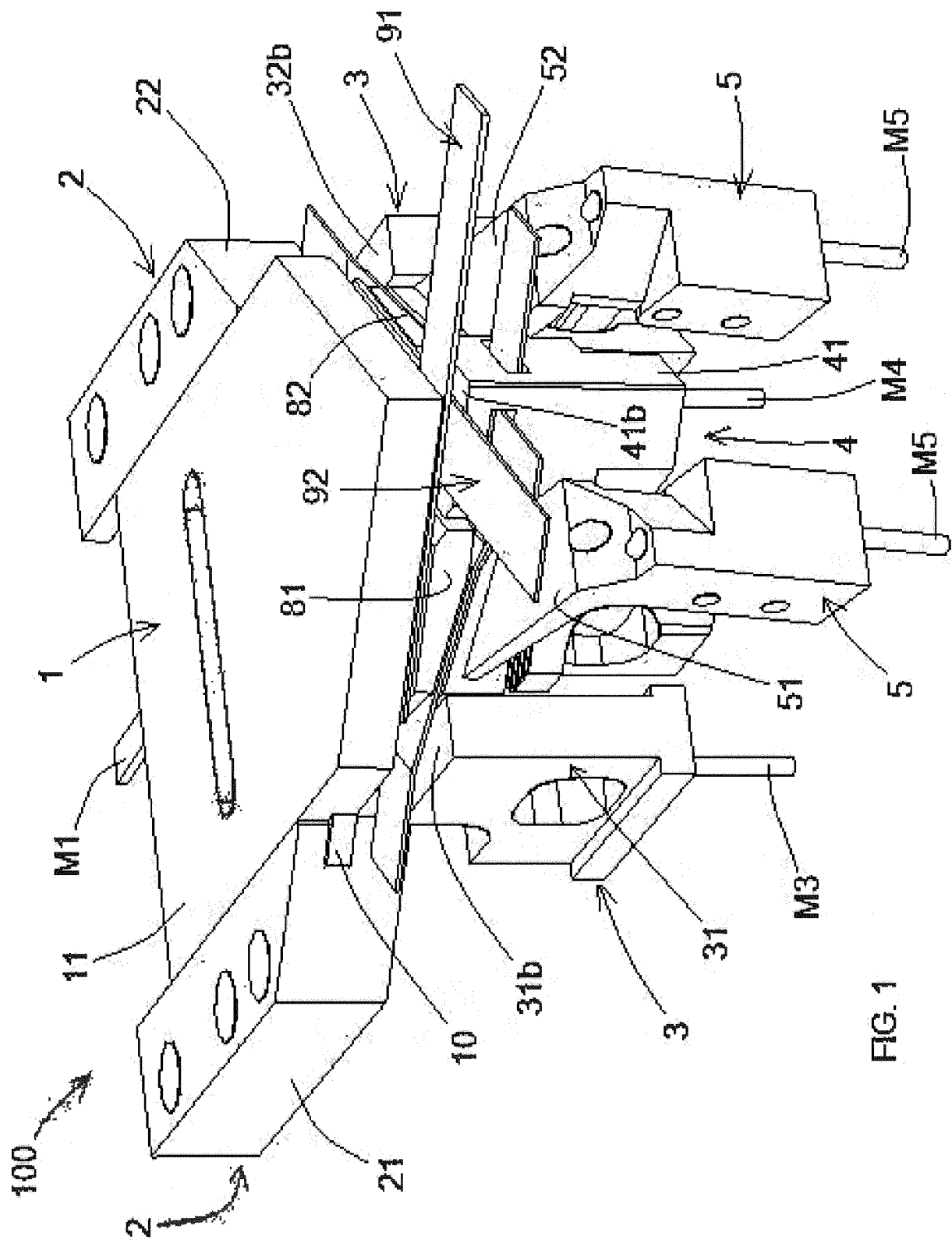


FIG. 1

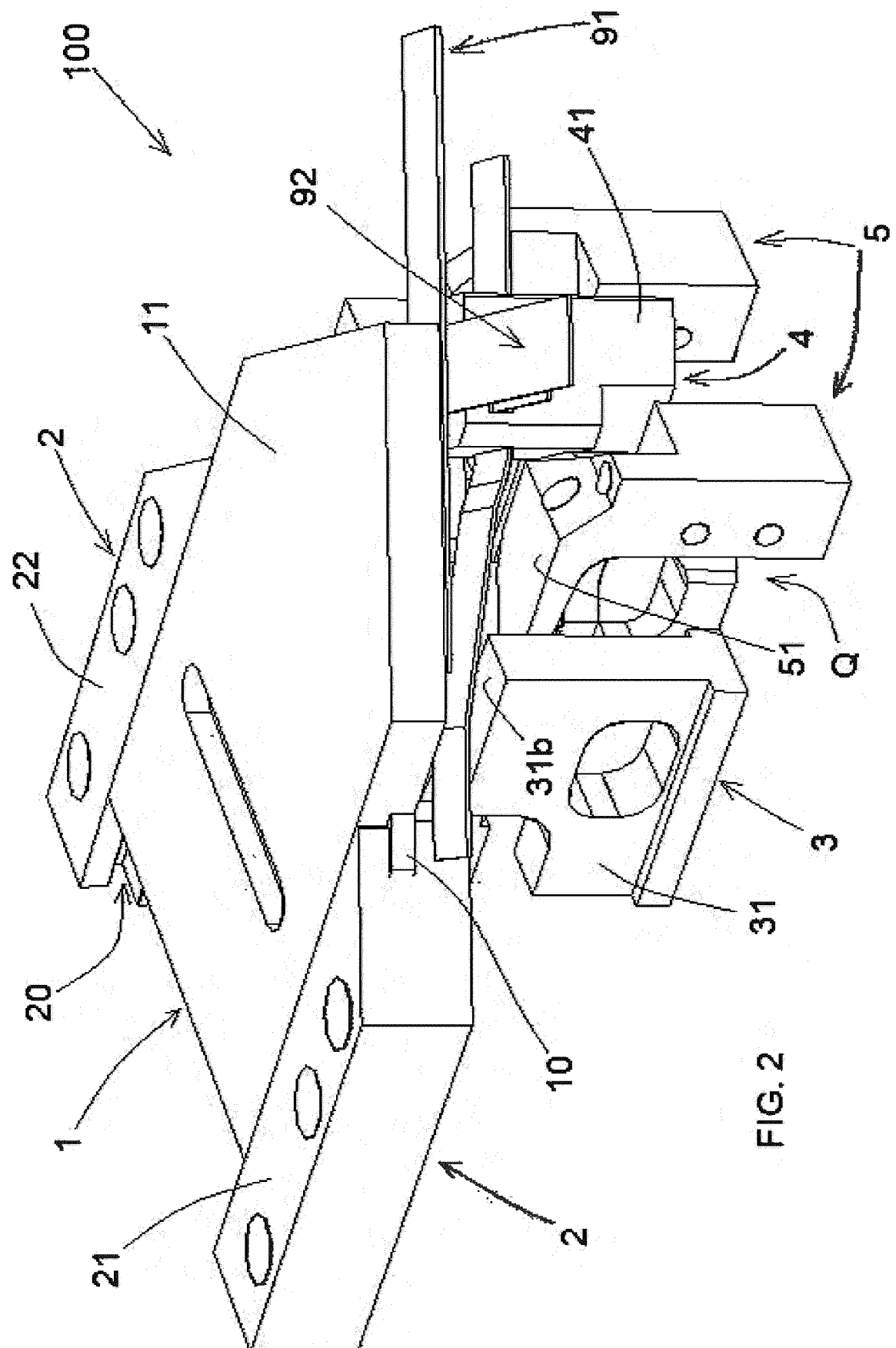
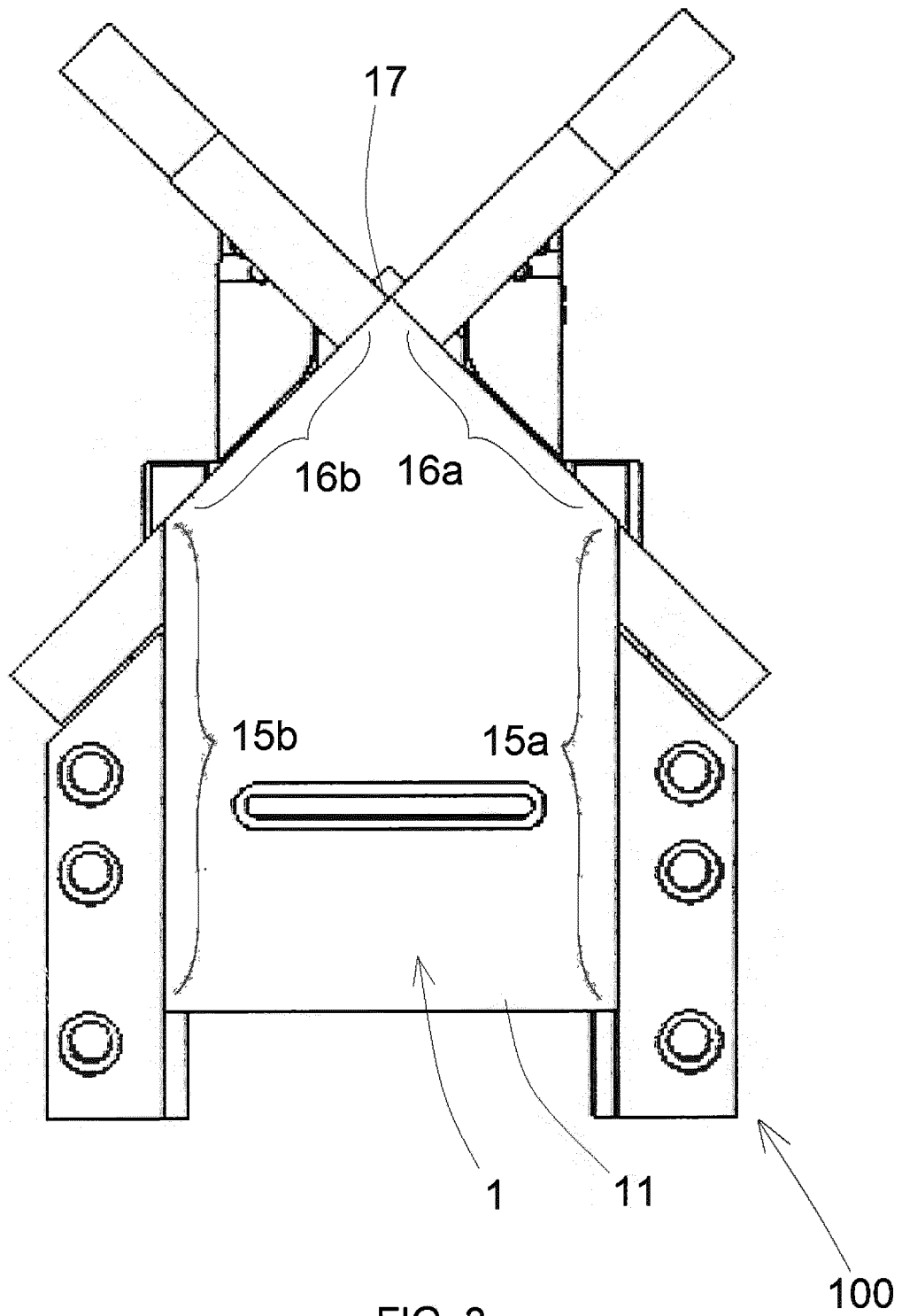


FIG. 2



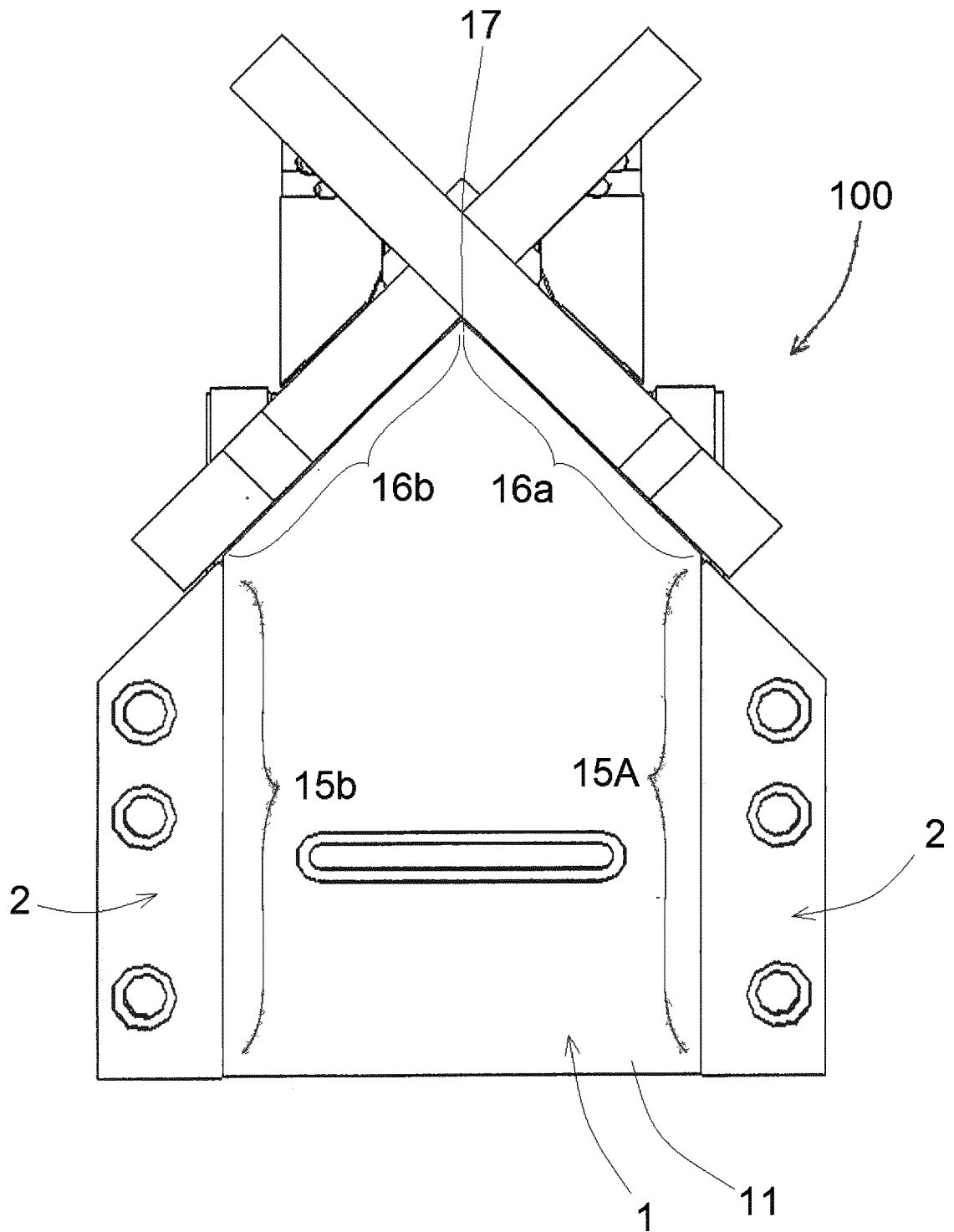


FIG. 3A

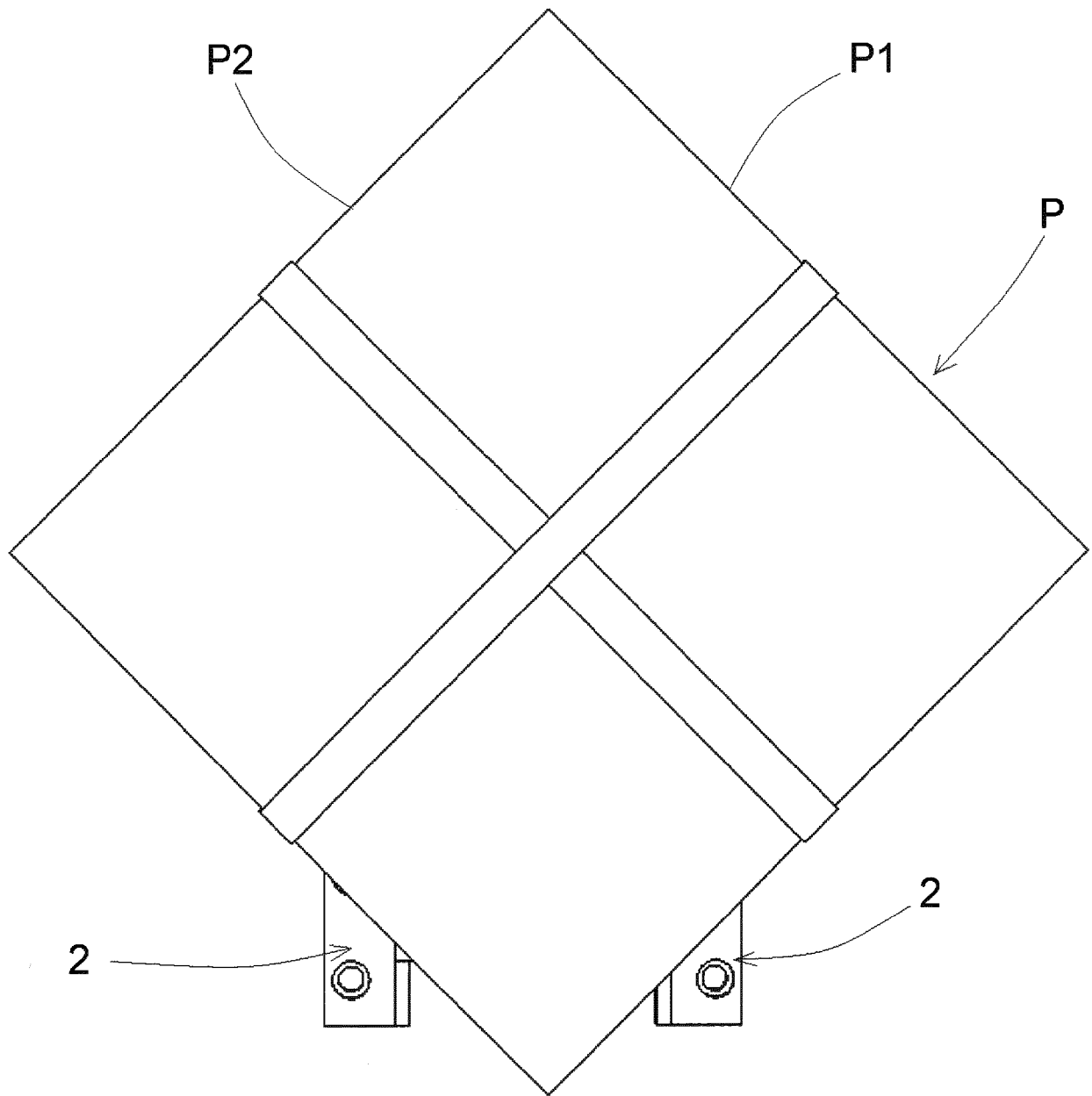
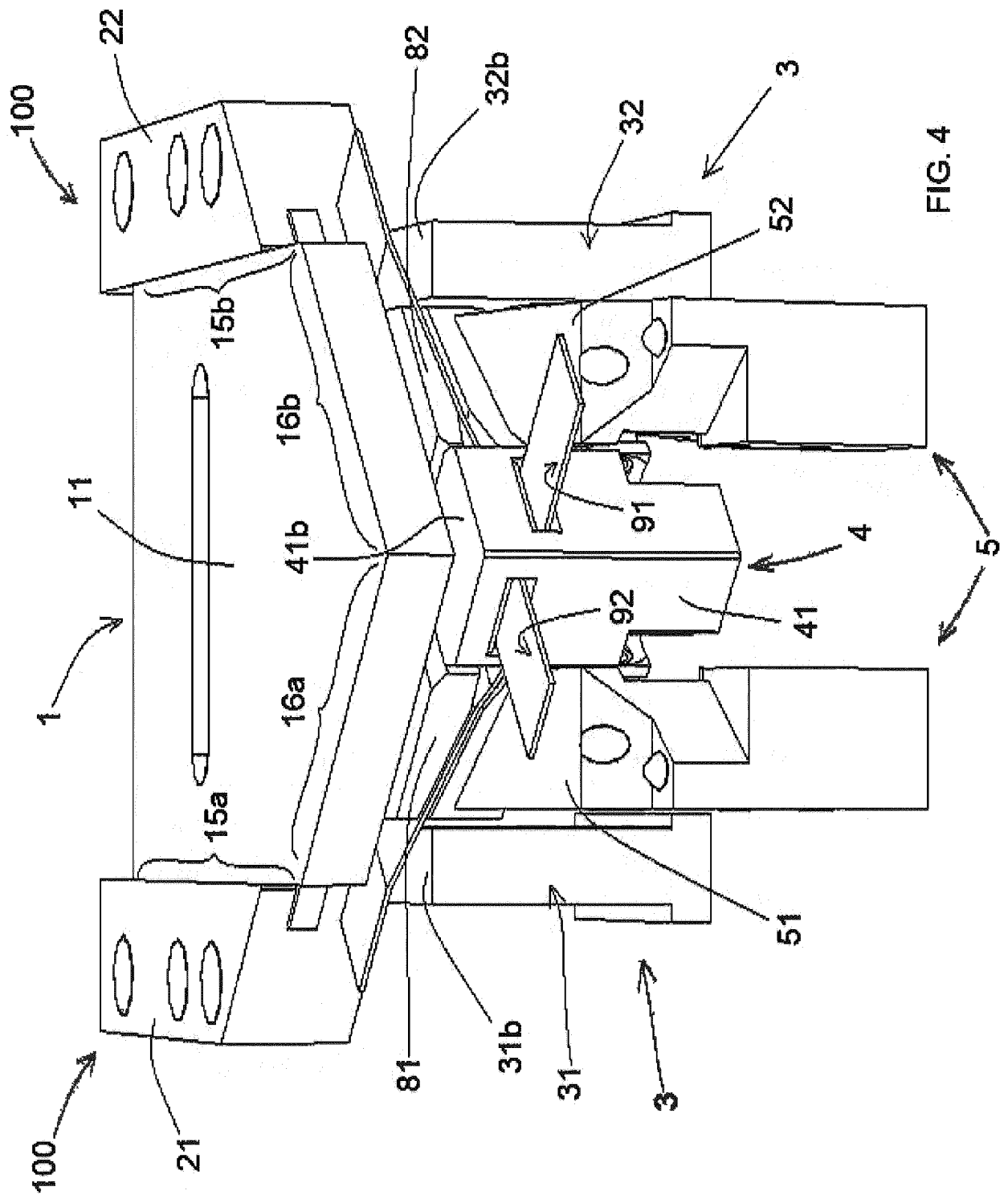
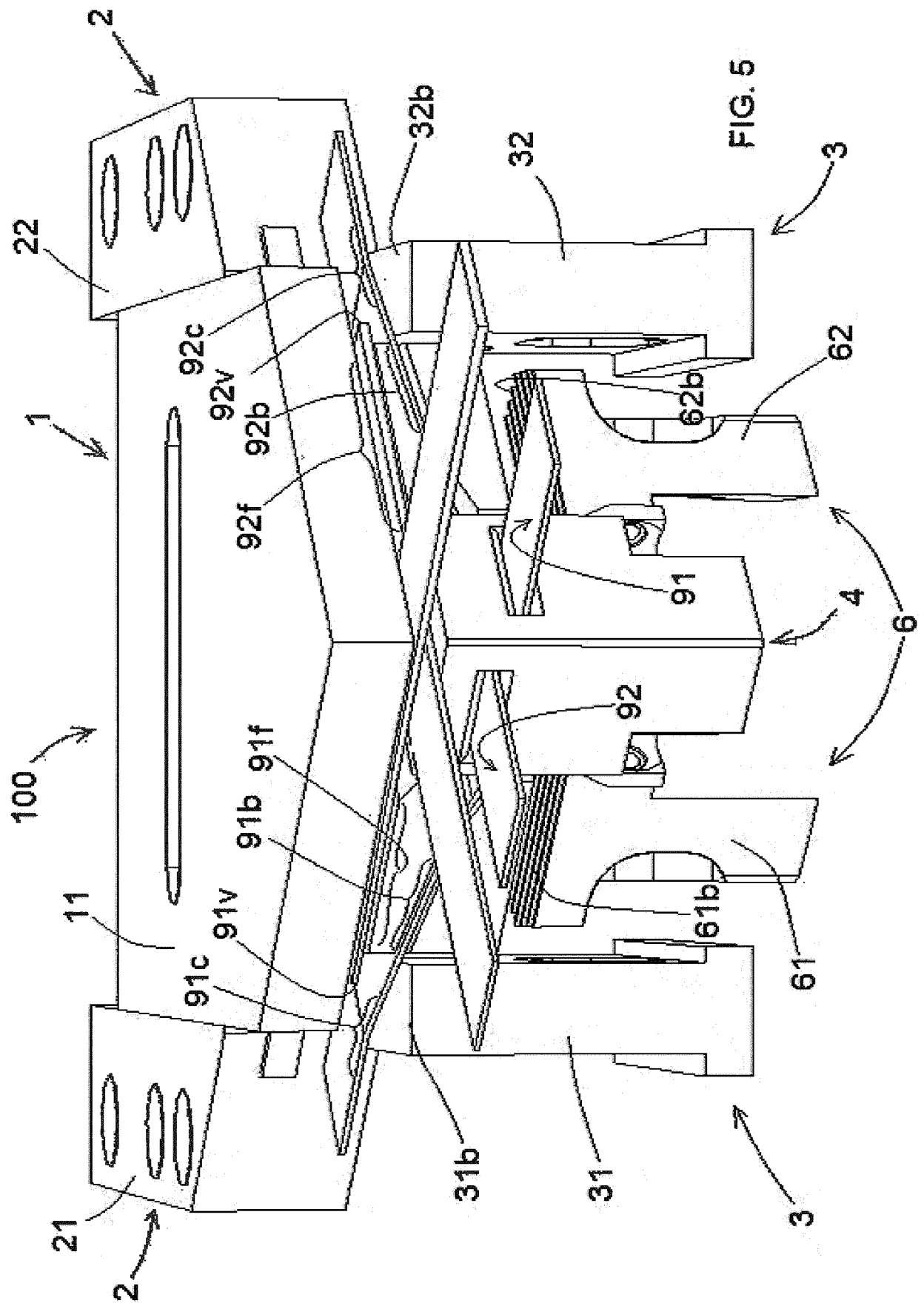


FIG. 3B





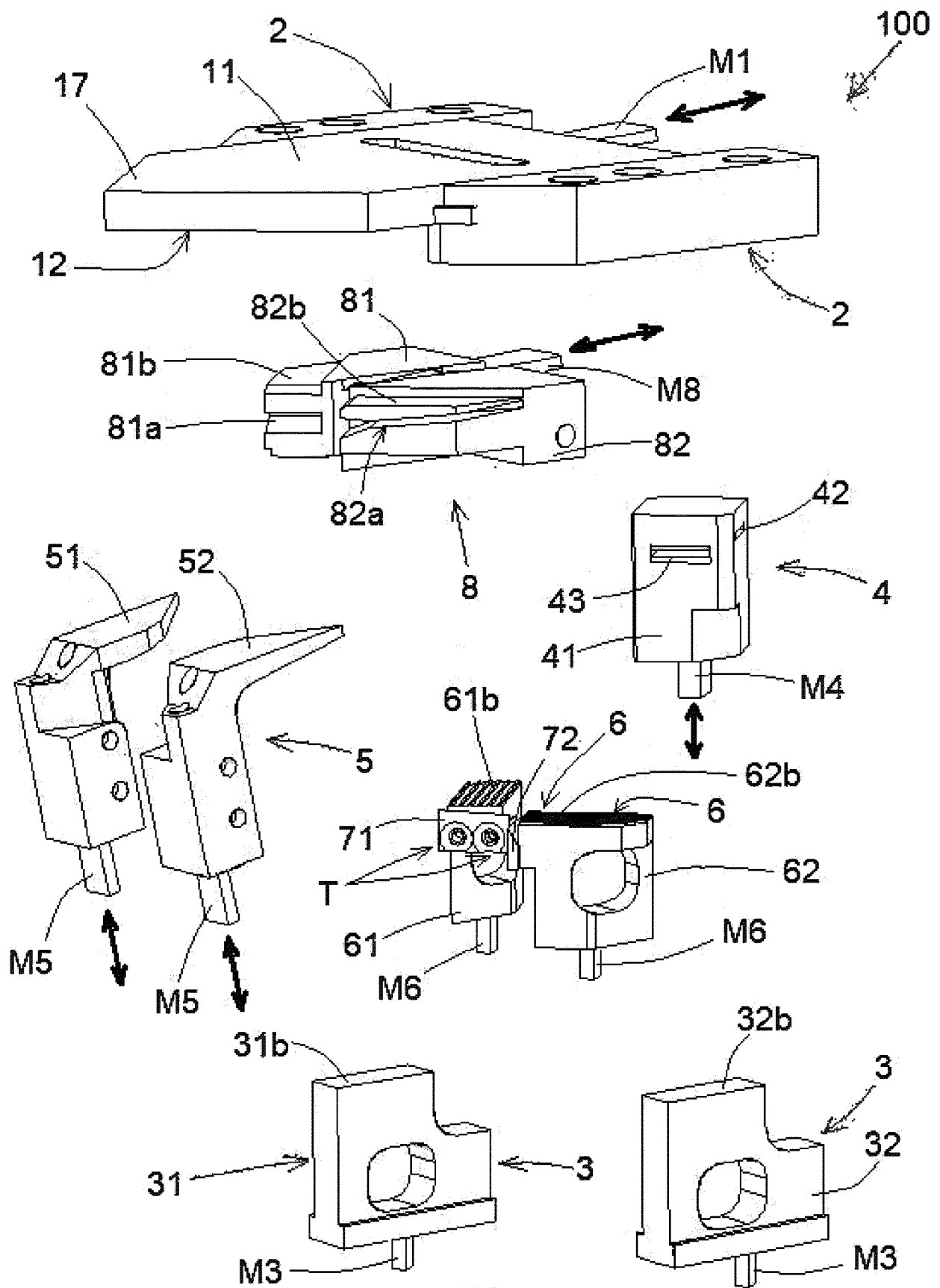


FIG. 6

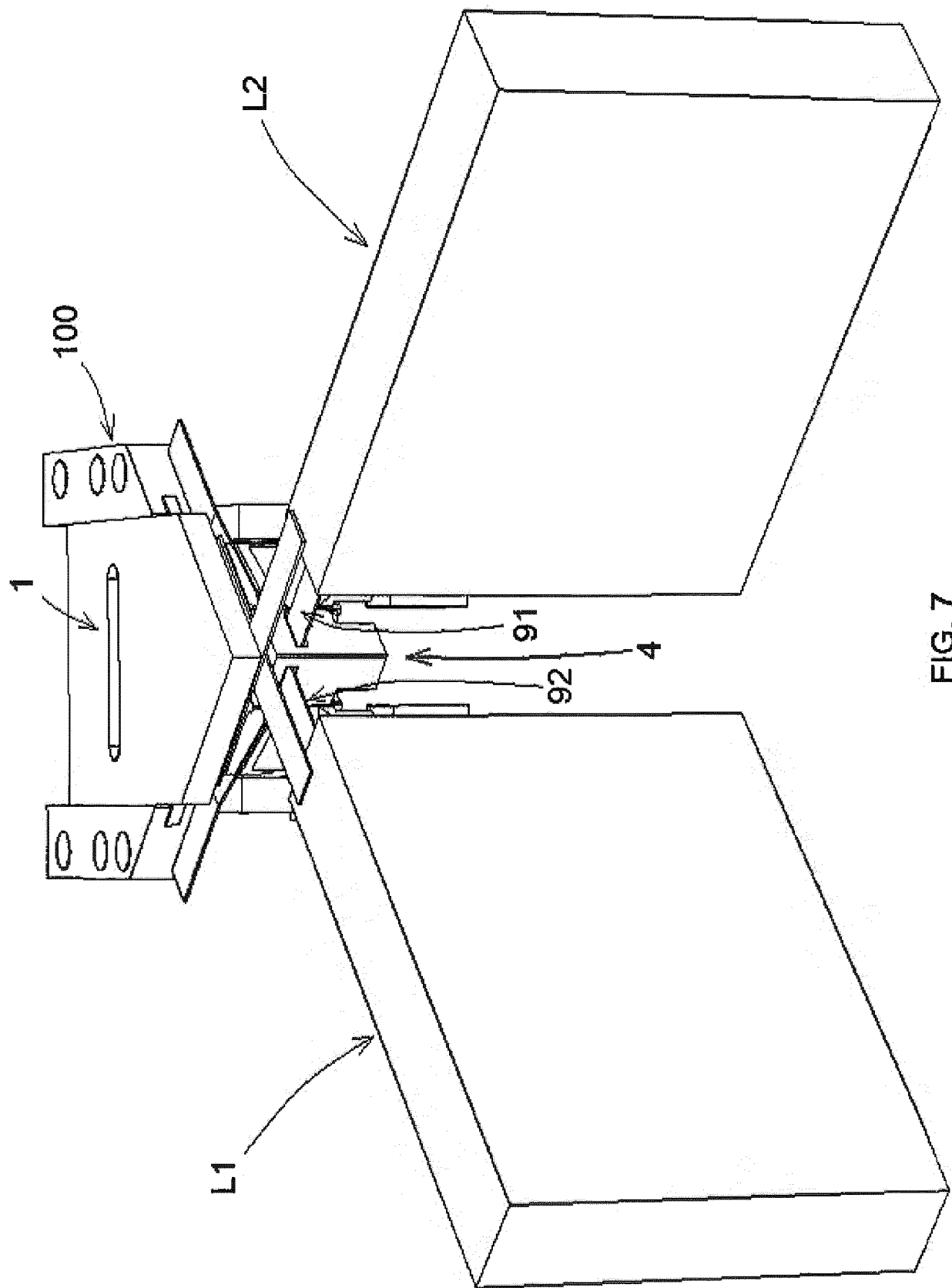


FIG. 7

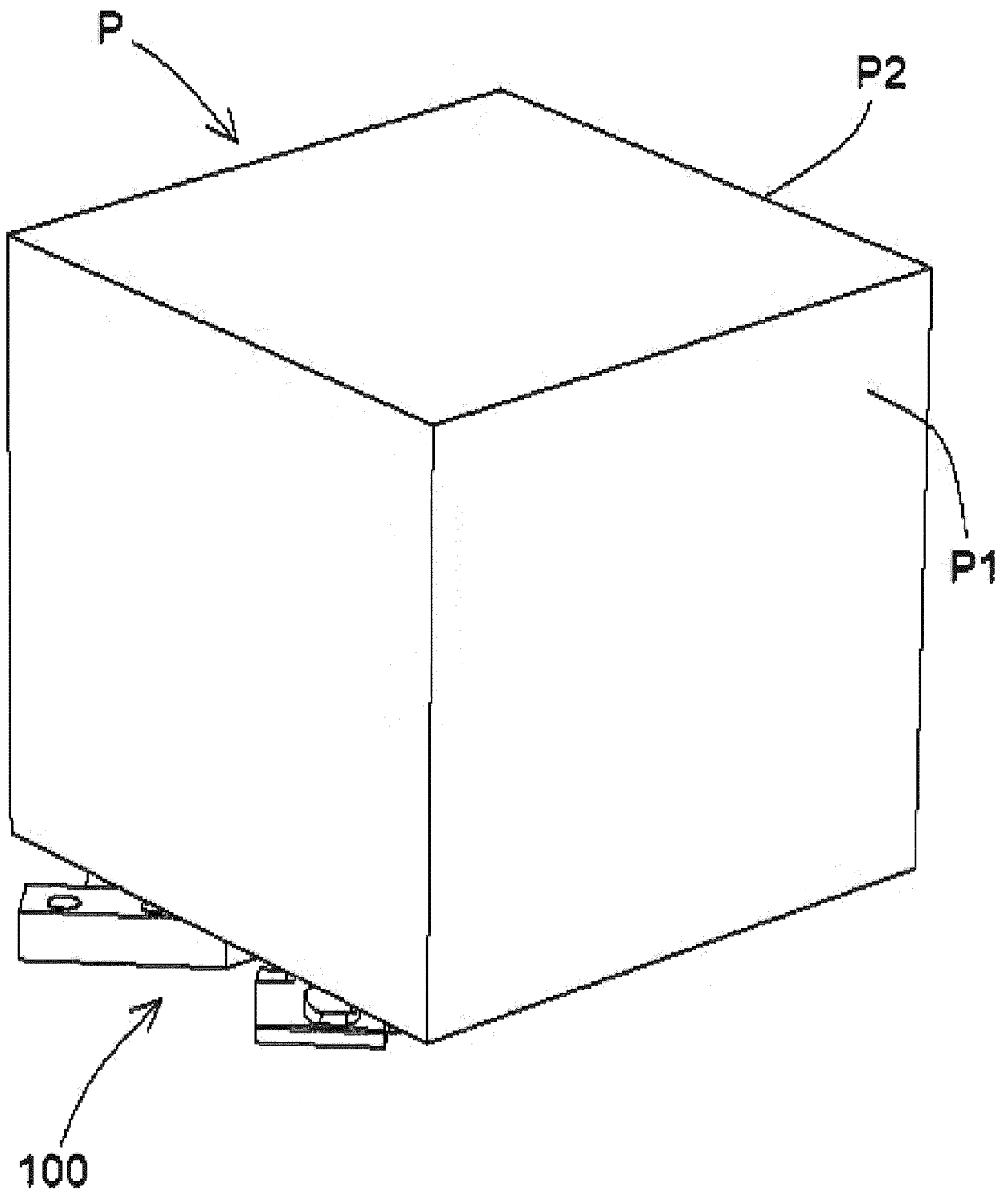


FIG. 8

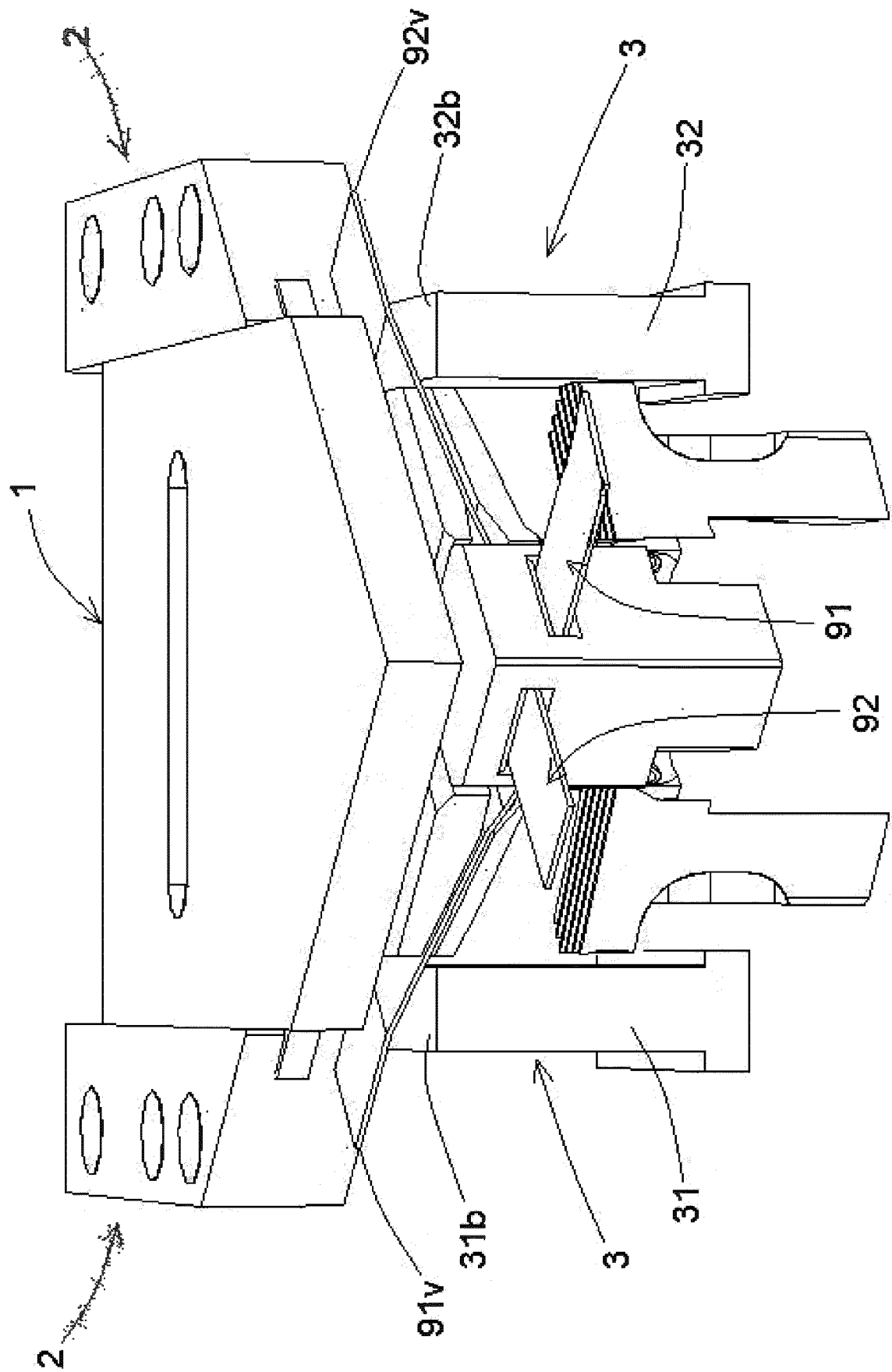


FIG. 9

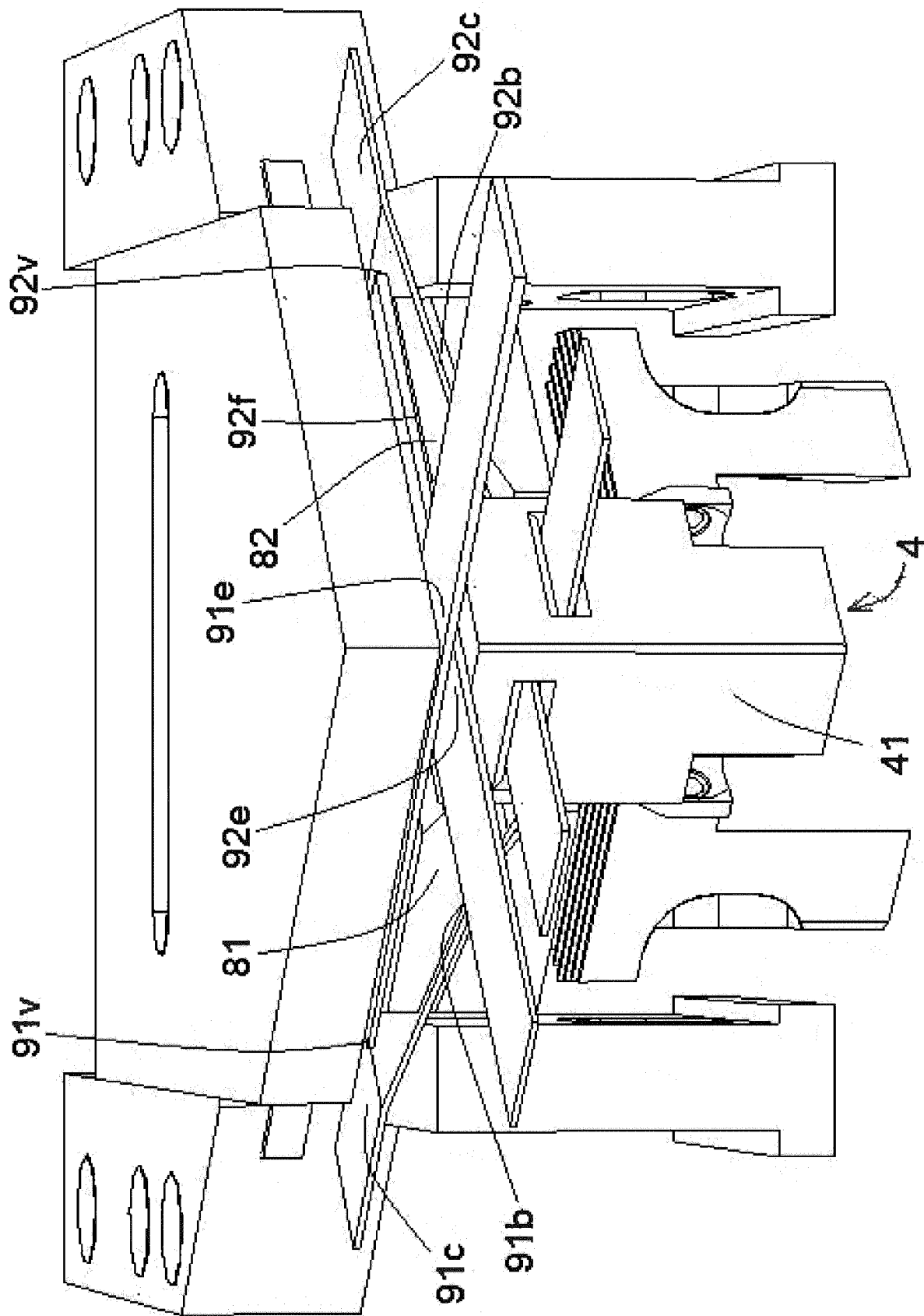


FIG. 10

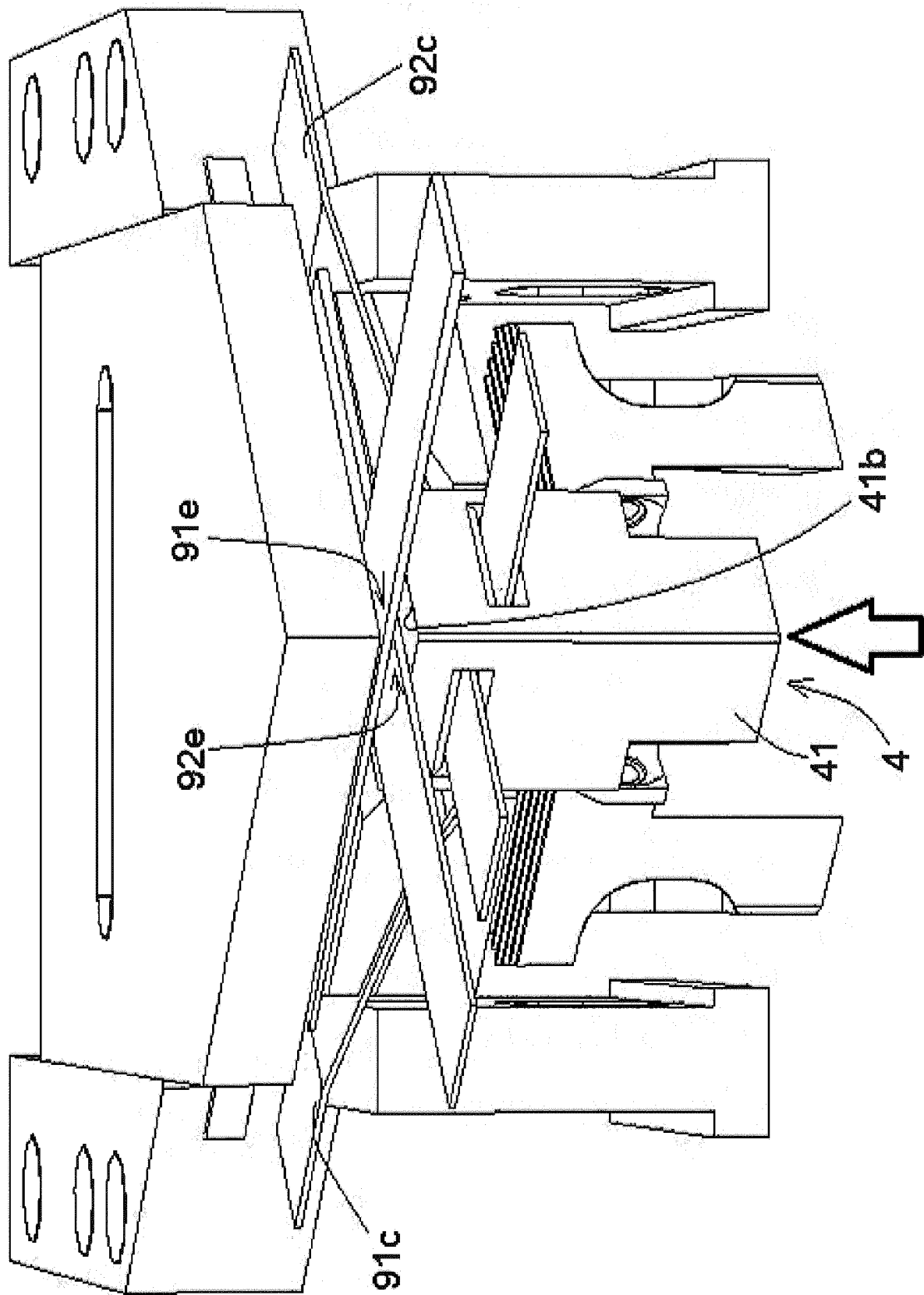
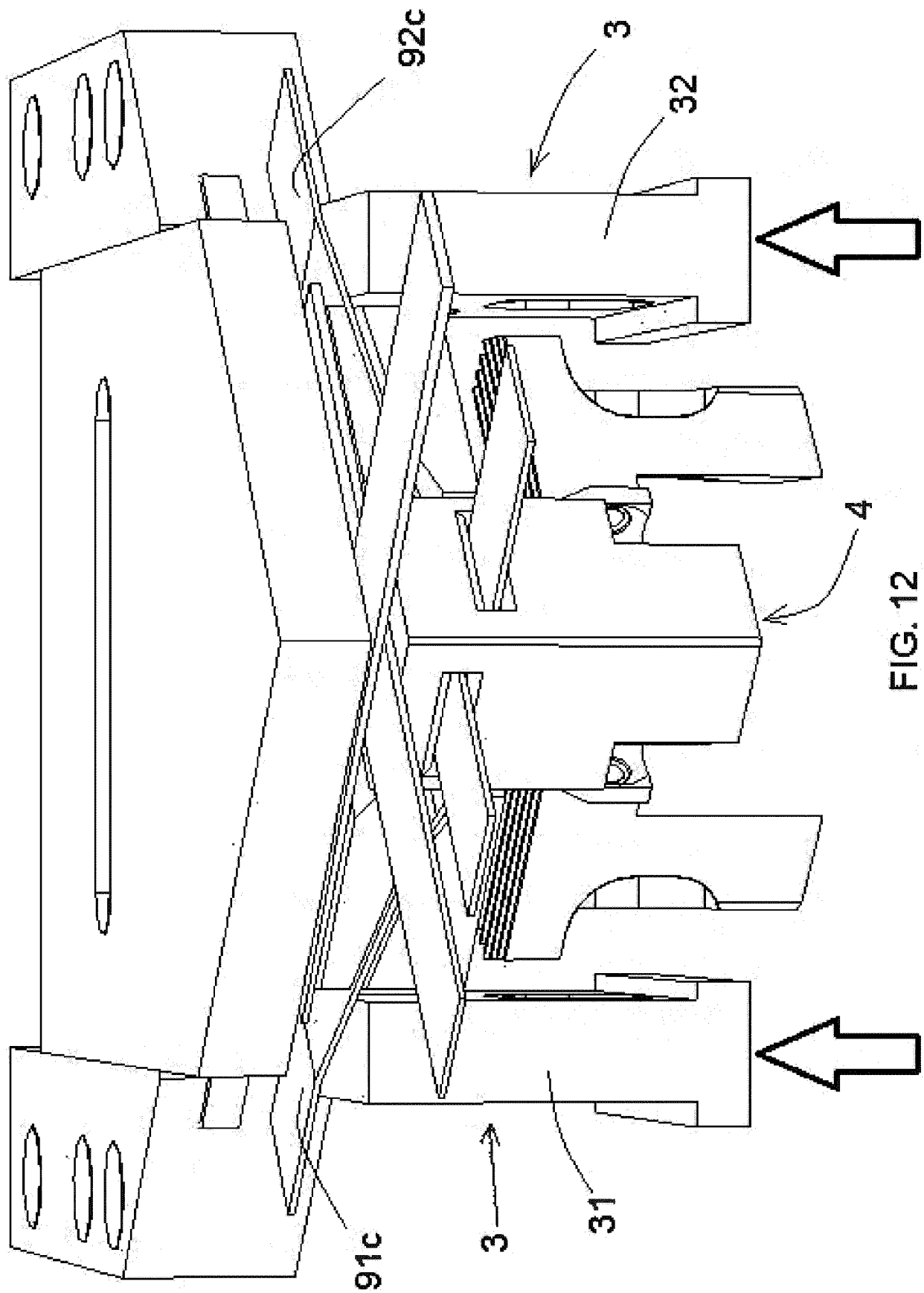
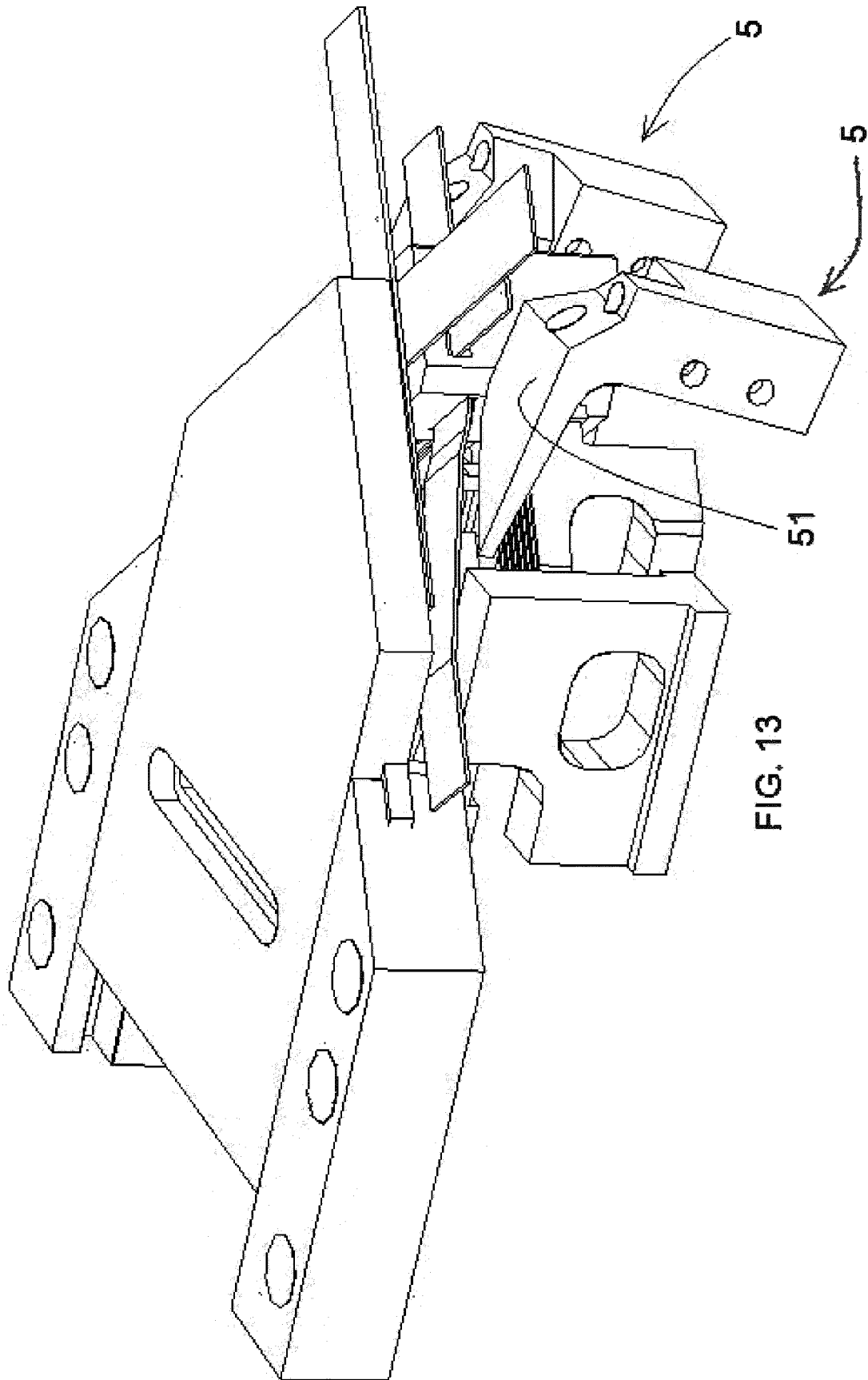
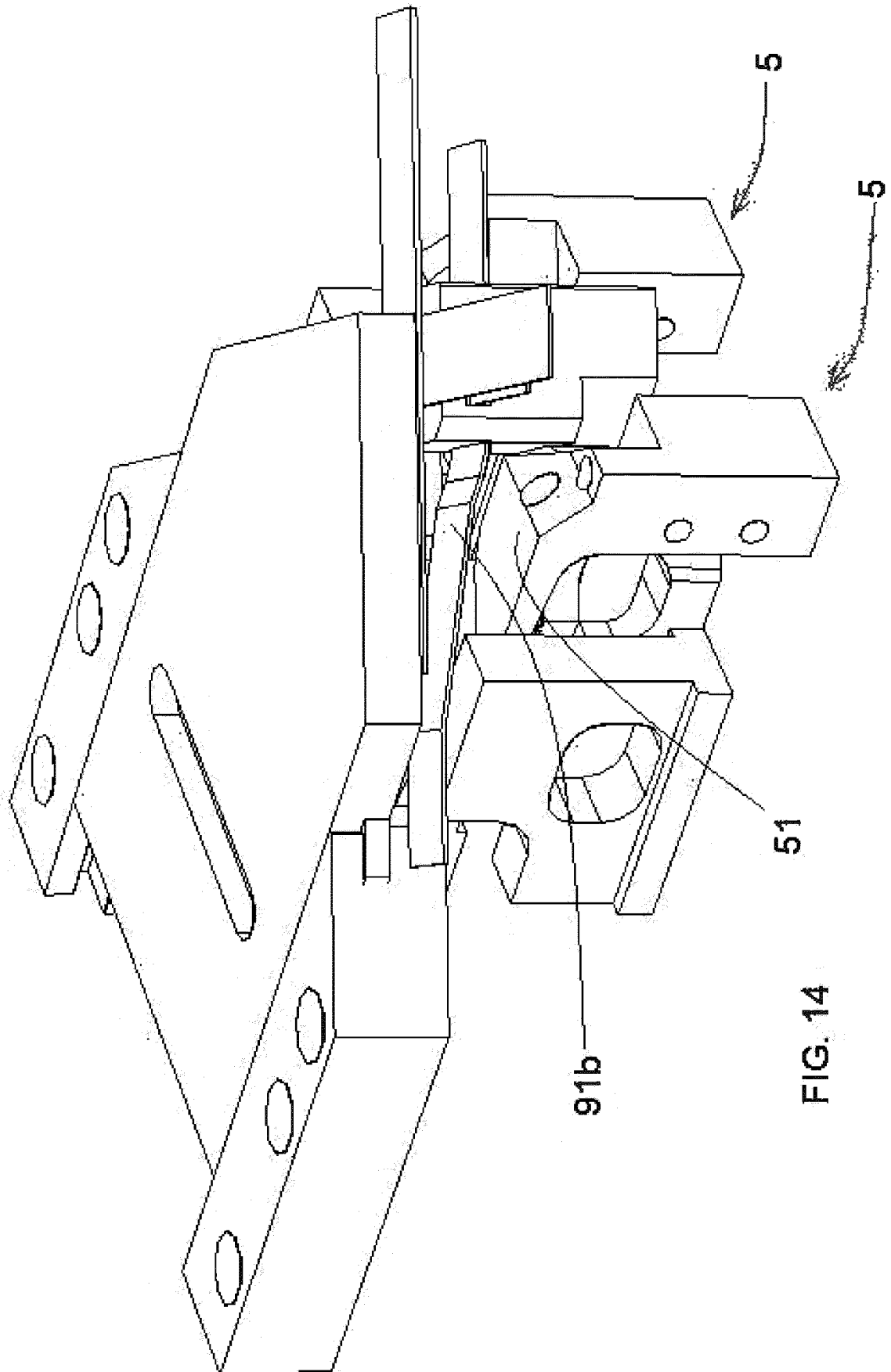
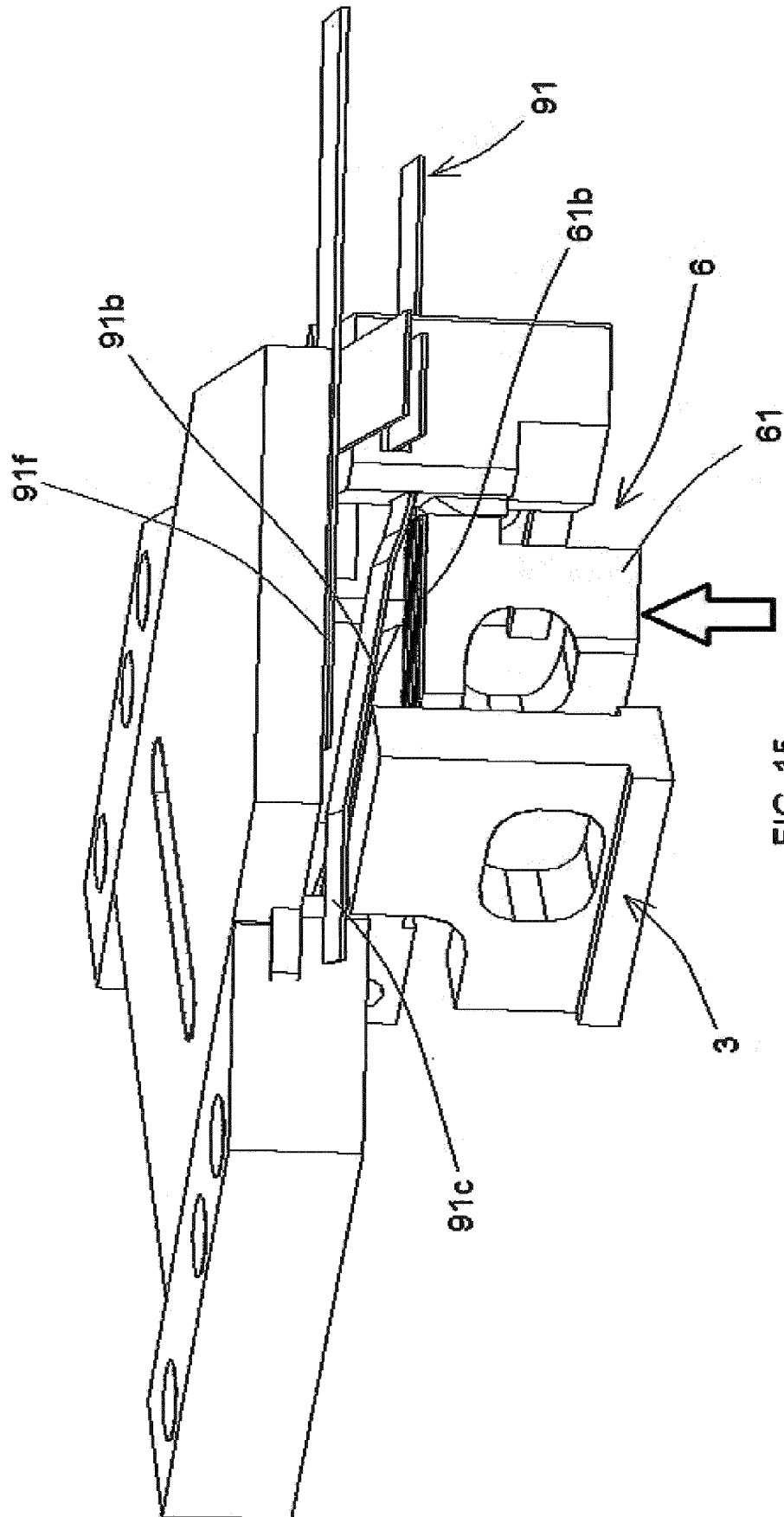


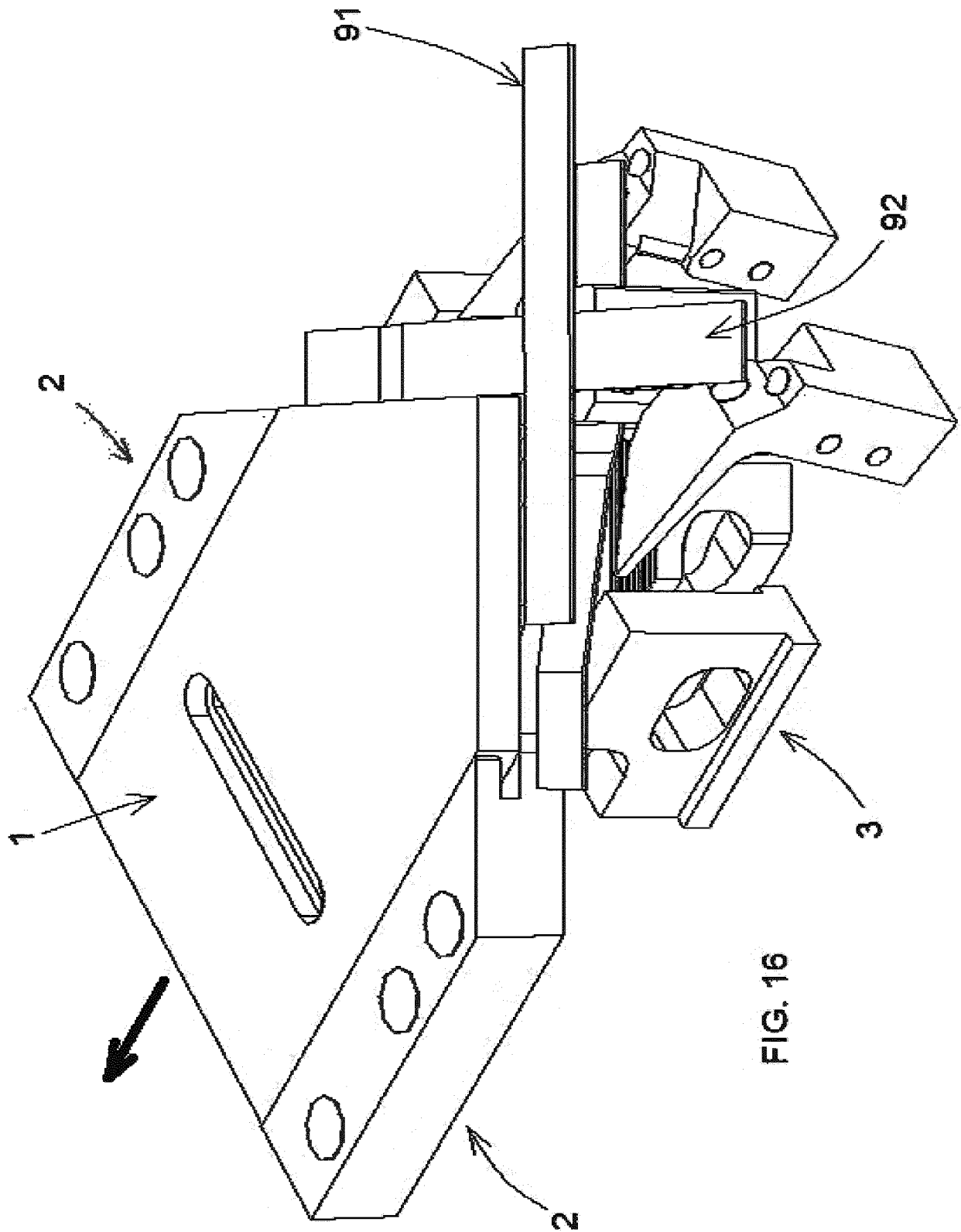
FIG. 11











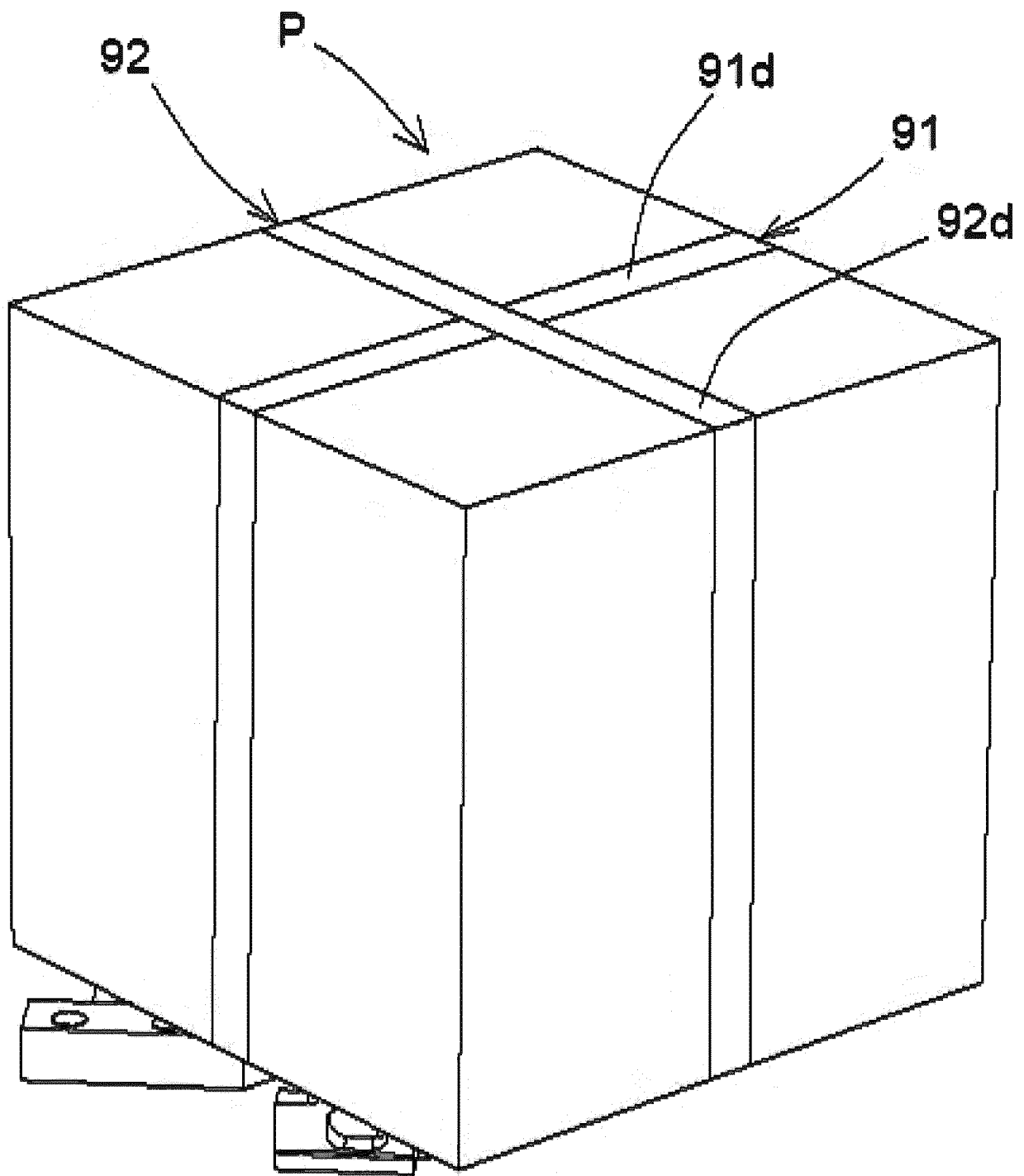


FIG. 17



EUROPEAN SEARCH REPORT

 Application Number
 EP 20 17 6177

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			B65B B29C
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 16 October 2020	Examiner Dick, Birgit
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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