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(54) **FORMING DEVICE**

(57) The present invention relates to a forming device, configured to be coupled to a container forming machine, said forming device comprising forming means and displacement means, coupled to each other by connecting means. Likewise, the present invention relates to a container forming machine, comprising such a forming device.

Thus, the present invention relates to the connecting means between the very elements of a forming device, which is configured to form containers, as well as a container forming machine, preferably forming cardboard containers, which forming device is configured like that of the present invention.

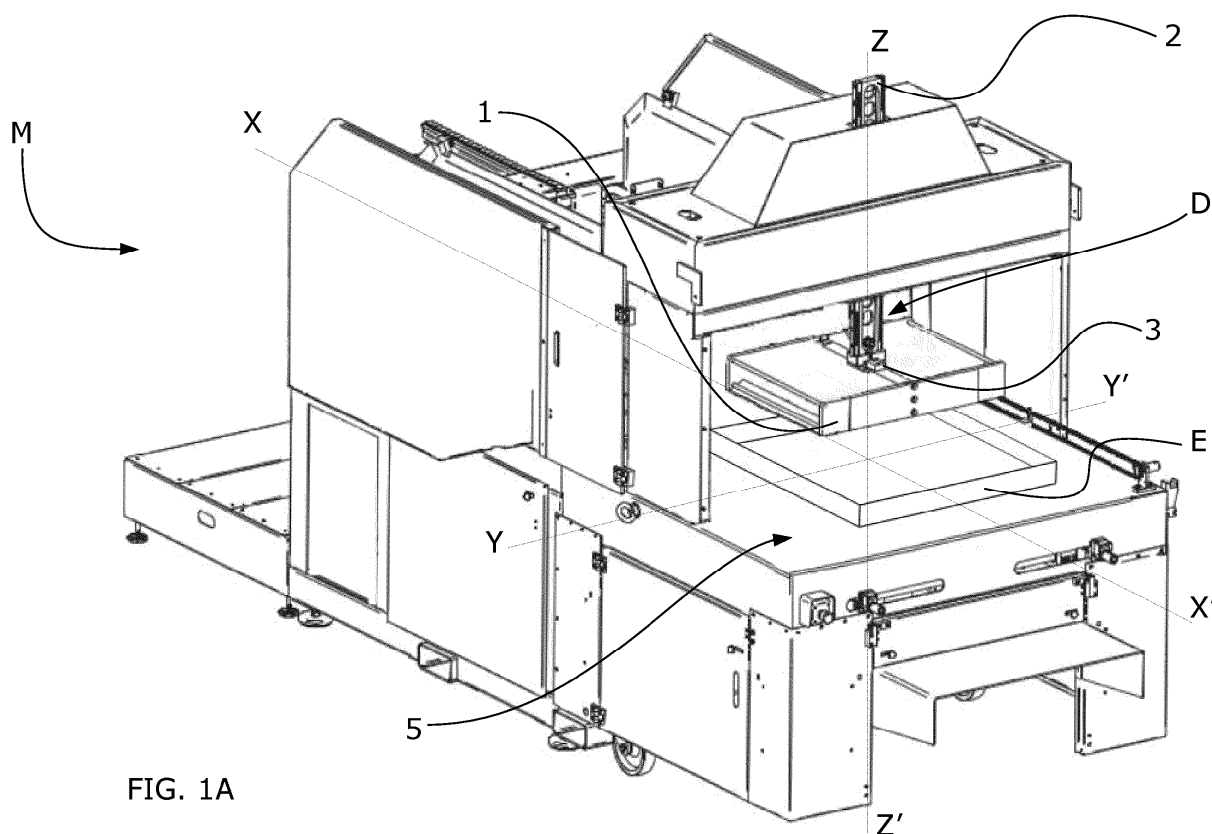


FIG. 1A

Description

OBJECT OF THE INVENTION

[0001] The present invention relates to a forming device, configured to be coupled to a container forming machine, said forming device comprising forming means and displacement means, coupled to each other by connecting means. Likewise, the present invention relates to a container forming machine, comprising such a forming device.

[0002] Thus, the present invention relates to the connecting means between the very elements of a forming device, which is configured to form containers, as well as a container forming machine, preferably forming cardboard containers, which forming device is configured like that of the present invention.

BACKGROUND OF THE INVENTION

[0003] In the technical field of forming containers, in particular containers formed from extended flat sheets, solutions involving forming devices as well as container forming machines comprising forming devices are currently known, which make it possible to obtain containers with different characteristics based on the forming device with which the forming operations are carried out.

[0004] In this way, each container requires a forming device with particular characteristics in its configuration that allow it to be formed, so that a plurality of forming devices can be coupled to the same forming machine based on the container production to be carried out.

[0005] Forming devices usually vary in terms of their dimensions, which are conditioned by the size of the container to be formed, as well as in terms of their geometric configuration, which is conditioned by the shape of the container to be obtained.

[0006] Thus, the configuration and dimensions of the forming device in the forming machine to which it is coupled make it possible to determine the interaction on the extended flat sheet until the corresponding formed container is obtained.

[0007] Therefore, said forming devices, in addition to said forming machines, are configured from several solutions, in other words, in each case it is necessary that the suitable forming device can be coupled to a forming machine, in order to be able to manufacture the required corresponding container.

[0008] One known solution is that described in document ES 2683004 A1, which discloses a container forming machine, in this case for forming cardboard containers, and a forming device in which the various elements composing it, in particular the forming means and the displacement means, are coupled by means of known fastening means, such as bolted joints, clamps or anchoring elements, which allow fixed joining of said elements. Therefore, any modification and/or change or replacement of the forming device for its interaction with

an extended flat sheet so as to obtain containers with different characteristics requires a very long time, thus slowing down the manufacturing process of said containers and reducing the range of alternative containers to be formed, in addition to involving a significant effort made by the operators in any handling of the forming device.

[0009] Likewise, the replacement or change of a forming device with different characteristics for the manufacture of alternative containers, where the forming device has fastening means of the type described, may result in both the loosening of the elements of the male former, thereby reducing the accuracy of the set position, and a risk of failure of the fastening means, the elements of the forming device becoming detached with consequent damage and deterioration of the latter or making it difficult to couple the corresponding forming device to the forming machine.

[0010] The current state of the art also has known solutions for the modification, change or replacement of the corresponding forming device in a forming machine, in relation to both the extended flat sheet on which it interacts and the container to be obtained after its handling, said solutions being complex and highly costly, which reduces the efficiency of the corresponding forming device, as well as that of the forming machine to which it is coupled and, therefore, slowing down the manufacturing and production process of containers of various characteristics, configurations and sizes.

[0011] The present invention makes it possible to solve the aforementioned problems, which are not solved in the current state of the art, by means of a forming device, which comprises connecting means between its forming means and its displacement means, as well as a forming machine comprising such a forming device, which will be described below.

DESCRIPTION OF THE INVENTION

[0012] In order to obtain a forming system suitable for forming various types of containers, and which in turn avoids the aforementioned drawbacks, the present invention relates to a forming device and a forming machine comprising such a forming device.

[0013] Thus, the first inventive aspect relates to a forming device, configured to be coupled to a container forming machine, wherein the forming device comprises:

- forming means, which extend along a longitudinal direction X-X' and a first transverse direction Y-Y', transverse to the longitudinal direction X-X', and configured to form at least one container, wherein the forming means comprise at least one structural element,
- displacement means, which extend along a second transverse direction Z-Z', transverse to the longitudinal direction X-X' and to the first transverse direction Y-Y', and configured to move the forming means along said second transverse direction Z-Z', and

- connecting means, configured to connect the forming means and the displacement means to each other, wherein said connecting means comprise:

- a first main part comprising a first face, configured to connect to the displacement means, and a second face, parallel and opposite to the first face, wherein the first main part further comprises:

- o a first housing, located on the second face of the first main part, and
- o fastening means, located in a position adjacent to the first housing, which in turn comprise at least two projections extending mainly along the first transverse direction Y-Y' and facing each other on two opposite sides of the first housing, and at least one stop, which extends mainly along the first transverse direction Y-Y' on a third side of the first housing,

- a second main part comprising a first face and a second face, parallel and opposite to the first face and configured to connect to the at least one structural element of the forming means, wherein the second main part further comprises a second housing, located along the first face of said second main part,
- coupling means, configured to couple the first main part and the second main part, wherein said coupling means are partially housed in the second housing of the second main part, and are slidable along the first transverse direction Y-Y', and wherein the coupling means comprise at least two protrusions extending along the first transverse direction Y-Y' and facing each other on opposite sides of the coupling means, and
- locking means, configured to join the first main part to the second main part and/or the coupling means,

wherein the forming device comprises:

- a first connected position, wherein the locking means join the first main part, the second main part and the coupling means to each other, and wherein:

- o the second face of the second main part is in contact with and coupled to the second face of the first main part, and
- o the at least two projections of the first main part are in contact with the coupling means, so as to retain the position of said coupling means,

- a second partially disconnected position, wherein the locking means join the first main part and the coupling means together, and wherein the at least

two protrusions of the coupling means are in contact with the at least one stop of the first main part, so as to retain the position of said coupling means, and

- a third fully disconnected position, wherein the first main part is disconnected from the coupling means and the second main part.

[0014] In this way, the forming device according to the first inventive aspect makes it possible to couple the forming means and the displacement means to each other, by means of the connecting means, in such a way that said forming means are easily replaceable based on the specific characteristics of the container to be formed, the forming device being interchangeable according to the required configuration, which makes it possible to obtain a plurality of alternative containers.

[0015] Any of the containers to be formed is obtained from an extended flat sheet, which extends along a plane formed by a longitudinal direction X-X' and a first transverse direction Y-Y', transverse to said longitudinal direction X-X'.

[0016] In a particular embodiment, the extended flat sheet is made of cardboard.

[0017] The forming device comprises forming means, configured to form at least one container from an extended flat sheet, so that its configuration is that which allows a particular container to be formed with its corresponding characteristics.

[0018] In other words, the forming means act as a male element on an extended flat sheet, which is supported on a female element, or die, located in a forming machine.

[0019] In this way, the forming means of the forming device act on the extended flat sheet, so that its geometry allows the different sections of the extended flat sheet to be adapted until a container of a particular configuration, geometry and structure is obtained.

[0020] Said forming means extend along the longitudinal direction X-X' and the first transverse direction Y-Y', in a manner analogous to the extended flat sheet with which they interact, and they comprise at least one structural element which establishes the configuration of said forming means, stiffening the configuration thereof.

[0021] In a particular embodiment, the forming means comprise a plurality of structural elements, connected to each other and configured according to a particular geometry, which advantageously allows the formation of rigid and stable forming means, which maintain their shape during the forming of the respective container.

[0022] In a particular embodiment, the at least one structural element of the forming means is a central structure, which advantageously allows for a more rigid and stable configuration of the forming means.

[0023] The forming device also comprises displacement means, which extend in a transverse direction to the plane on which the forming means extend and, therefore, the plane on which an extended flat sheet also extends. In other words, the displacement means extend along a

second transverse direction Z-Z', transverse to the longitudinal direction X-X' and the first transverse direction Y-Y', and allow a displacement along said direction of the forming means, through a linear movement along said second transverse direction Z-Z'.

[0024] Likewise, the forming device comprises driving means, configured to drive the displacement means along the second transverse direction Z-Z', so as to produce said linear movement that allows the displacement of the forming means.

[0025] In a particular embodiment, the drive means are, for example, an electric motor, a pneumatic cylinder or a linear actuator, configured to act on the displacement means in such a way that they transmit a movement on said displacement means and, therefore, on the forming means.

[0026] In addition, the forming device also comprises connecting means, which connect the forming means to the displacement means, so that the forming means can be connected and disconnected based on the container to be formed by said forming means.

[0027] In this way, the forming means are configured to perform a movement along the second transverse direction Z-Z', so that they can move towards or away from the extended flat sheet and/or the partially formed container and thus interact with it by contact, configuring at least one section of said extended flat sheet and/or said partially formed container based on the configuration thereof.

[0028] This movement of the forming means is produced by the displacement means, which allow the movement of the forming means due to their indirect coupling to said displacement means via the connecting means.

[0029] In this way, the forming means and the displacement means are coupled together by means of the connecting means, thus forming a joint assembly that moves by means of a movement along the second transverse direction Z-Z', thus applying a force on an extended flat sheet along the plane formed by the longitudinal direction X-X' and the first transverse direction Y-Y'.

[0030] In particular, said connecting means comprise a first main part, which comprises a first face and a second face, opposite and essentially parallel to the first face, said first main part therefore having an essentially flat configuration.

[0031] In this way, the connecting means allow, via the first face of the first main part, its connection with the displacement means and, therefore, the fixed joining of said elements.

[0032] In a particular embodiment, the first main part further comprises first joining means, configured to integrally connect the first face of said first main part and the displacement means.

[0033] Advantageously, this makes it possible to connect the first main part of the connecting means, via its first face, to the displacement means by means of the first

joining means.

[0034] In a particular embodiment, the first joining means comprise a groove, machined in the first face of the first main part, which advantageously allows the partial housing of the displacement means, with an interference-fit joint between said first face of the first main part and the displacement means, which advantageously allows fixed and integral joining, which in turn allows easy assembly and disassembly.

[0035] Additionally, the first main part of the connecting means in turn comprises a first housing, located on the second face of said first main part.

[0036] In a particular embodiment, the first housing extends, along the longitudinal direction X-X', a length equivalent to the full extension of the second face of the first main part along said direction. In this way, the first housing defines a perimeter extending along the longitudinal direction X-X' and along the first transverse direction Y-Y'.

[0037] In a particular embodiment, the first housing has a prismatic configuration, its perimeter being rectangular or squared.

[0038] On the other hand, the first main part of the connecting means further comprises fastening means, located close to the first housing, and on opposite sides of said first housing, or its perimeter, and therefore on opposite sides of the second face of the first main part.

[0039] In a particular embodiment, the fastening means are an integral part of the first main part, which advantageously allows a more stable configuration and the fastening means and the first main part behave as one.

[0040] In a particular embodiment, the fastening means are at least two parts symmetrically positioned along the longitudinal direction X-X' on either side of the first main part, which advantageously allows said fastening means to be interchanged based on the container to be formed. In other words, the at least two parts forming the fastening means are dimensioned and positioned on the first main part based on the dimensions of the forming means, which in turn are dimensioned based on the container to be formed.

[0041] In a particular embodiment, said at least two parts forming the fastening means are coupled, by means of fixing means, to the first main part.

[0042] In a particular embodiment, the fixing means are bolted joints.

[0043] Additionally, said fastening means comprise at least two projections, wherein each of said projections is oriented and, in turn, extends along the first transverse direction Y-Y', so as to project along said direction.

[0044] The at least two projections are in a position opposite each other, with reference to the longitudinal direction X-X', on two opposite sides of the first housing and, therefore, of the second face of the first main part.

[0045] Additionally, the fastening means also comprise at least one stop, configuring a surface extending mainly along the first transverse direction Y-Y', said at least one

stop being located on a third side of the first housing and, therefore, of the second face of the first main part with respect to the at least two projections.

[0046] In a particular embodiment, the at least one stop is located on a side of the first housing perpendicular to the sides of said first housing on which the at least two projections extend.

[0047] On the other hand, the connecting means also comprise a second main part, which extends mainly along the longitudinal direction X-X', and which in turn comprises a first face, and a second face, opposite and essentially parallel to the first face, said second main part therefore having an essentially flat configuration.

[0048] The second main part is configured to be coupled, via its second face, to the at least one structural element of the forming means, which advantageously allows rigid coupling between the connecting means and the forming means and, therefore, indirect rigid coupling between the displacement means and the forming means through the interaction of the first main part and the second main part.

[0049] In a particular embodiment, the second main part further comprises second joining means configured to solidly connect the first face of said second main part and the at least one structural element of the forming means, which advantageously allows the correct coupling of said elements.

[0050] In a particular embodiment, the second joining means are bolted joints.

[0051] Likewise, the second main part comprises a second housing, located on the first face of said second main part.

[0052] In a particular embodiment, the second housing extends, along the first transverse direction Y-Y', a length equivalent to the full extension of the first face of the second main part along said direction. In this way, the second housing defines a perimeter extending along the longitudinal direction X-X' and along the first transverse direction Y-Y'.

[0053] In a particular embodiment, the second housing has a prismatic configuration, its perimeter being rectangular or squared.

[0054] Additionally, the connecting means comprise coupling means, configured to allow the first main part and the second main part to be joined together.

[0055] Said coupling means are partially housed in the second housing of the second main part, thus occupying part or all of the surface of said second housing, extending along the longitudinal direction X-X' and along the first transverse direction Y-Y'.

[0056] In a particular embodiment, the coupling means comprise a configuration complementary to the configuration of the first housing of the first main part, which advantageously allows its partial housing in said first housing at the same time as its partial housing in the second housing. In this way, the coupling means allow indirect joining between the first main part and the second main part.

[0057] Additionally, the coupling means are slidable on the second housing along the first transverse direction Y-Y', which advantageously allows the position of said coupling means to be adjusted in relation to the second housing of the second main part.

[0058] Likewise, the coupling means comprise at least two protrusions, wherein each of said protrusions is oriented and, in turn, extends along the first transverse direction Y-Y', so as to project along said direction.

[0059] The at least two protrusions are located in a position opposite each other, with reference to the longitudinal direction X-X', on two opposite sides of the coupling means.

[0060] In a particular embodiment, the coupling means are symmetrical along the longitudinal direction X-X'.

[0061] In a particular embodiment, the coupling means further comprise third joining means configured to couple said coupling means and the second main part, which advantageously allows fixing the position of the coupling means in the second housing of the second main part.

[0062] In a particular embodiment, the second main part comprises through holes to house the third joining means.

[0063] In a particular embodiment, the third joining means are bolted joints.

[0064] On the other hand, the connecting means further comprise locking means, which advantageously allow detachable but efficient joining between the first main part and the second main part and/or the coupling means.

[0065] In a particular embodiment, the locking means are threaded elements.

[0066] In this way, the forming device comprises three possible positions, which are distinguished by the type of joint established between the forming means and the displacement means.

[0067] In other words, this forming device allows, by means of the connecting means, different positions of the forming means in relation to the displacement means, which in turn also allows the assembly and disassembly of said forming means on the displacement means, via the connecting means.

[0068] Therefore, the forming device comprises a first connected position, in which the forming means are fully coupled to the displacement means.

[0069] Said first connected position is obtained by joining the first main part, the second main part and the coupling means to each other via the locking means, so that said fixed joining between the aforementioned elements establishes the forming of the coupled forming device for its interaction with an extended flat sheet and, therefore, for the formation of a corresponding container.

[0070] In this first connected position, both the first face of the second main part is in contact with and coupled to the second face of the first main part, and the at least two projections of the first main part are in contact with the coupling means, so as to retain the position of said coupling means.

[0071] Likewise, the forming device comprises a second partially disconnected position, in which the forming means are partially coupled to the displacement means.

[0072] Advantageously, this second disconnected position is an intermediate position between complete coupling and complete decoupling between the forming means and the displacement means, which allows an operator to disassemble the forming means more easily while, at the same time, said forming means are not completely decoupled from the displacement means.

[0073] In this way, the operator has an intermediate anchoring position for the forming means, which prevents them from bearing the heavy weight of said forming means during assembly and/or disassembly thereof.

[0074] In said second partially disconnected position, the locking means allow the joining of the first main part and the coupling means together, while the at least two protrusions of the coupling means are in contact with the at least one stop of the first main part, so as to retain the position of said coupling means.

[0075] Advantageously, the contact of the at least two protrusions of the coupling means with the at least one stop of the first main part makes it possible to support the forming means on the displacement means by means of coupling established only between the aforementioned elements and not by means of the locking means, additionally allowing a tilting movement of said forming means with respect to the displacement means.

[0076] Lastly, the forming device comprises a third fully disconnected position, in which the forming means are completely decoupled from the displacement means, which advantageously allows the separation of said forming means either for their replacement or for the performance of maintenance tasks on said forming means or on said displacement means.

[0077] In this third fully disconnected position, the first main part is disconnected from the coupling means and the second main part, so that the forming means are separate and independent of the displacement means.

[0078] Therefore, this forming device allows an easier interchange, assembly and disassembly of the forming means on the displacement means and with less effort for the operator who performs this action. Likewise, it also provides greater security of assembly for said forming means based on the intermediate position established by means of the second partially disconnected position.

[0079] On the other hand, the second inventive aspect relates to a *container forming machine, comprising:*

- *at least one forming device according to the first inventive aspect, and*
- *a die, configured to receive an extended flat sheet,*

wherein the forming device is configured to form a container from said extended flat sheet placed on the die.

[0080] Advantageously, the forming machine allows the formation of different types of containers from an easily adjustable and interchangeable forming device,

being adapted to the forming of containers of different characteristics and properties, which in turn advantageously allows greater adaptability of the forming machine to the corresponding container and less effort for the operator who assembles said forming means on the forming machine.

[0081] In a particular embodiment, the forming means of the forming device are square or rectangular, which advantageously allows the formation of containers of this configuration, such as boxes and trays, which are widely used in the food industry.

[0082] In a particular embodiment, the forming machine is configured to form boxes, preferably cardboard boxes, from an extended, die-cut flat sheet.

BRIEF DESCRIPTION OF THE FIGURES

[0083] To complete the description of the invention, and for the purpose of helping to make the features thereof more readily understandable, according to preferred exemplary embodiments thereof, a set of drawings is included wherein, by way of illustration and not limitation, the following figures have been represented:

- Figure 1A represents a perspective view of an embodiment of a forming machine, while figure 1B represents a detailed perspective view of the forming device of the forming machine of figure 1A.
- Figure 2 shows a perspective view of an embodiment of a forming device.
- Figures 3A - 3C show perspective views, from different points, of the embodiment of a forming device of figure 2 in its first connected position in the case of figure 3A and in its third disconnected position in the case of figures 3B and 3C.
- Figures 4A - 4B show complete and incomplete bottom plan views, respectively, of the embodiment of a forming device of figure 2 in its first connected position.
- Figures 5A - 5B show perspective views of the embodiment of a forming device of figure 2 in its second partially disconnected position, showing a detail of the connecting means without the mounted forming means in the case of figure 5B.

DESCRIPTION OF A PREFERRED EMBODIMENT OF THE INVENTION

[0084] Figure 1A shows a perspective view of an embodiment of a forming machine (M), which allows containers (E) to be obtained, in particular square or rectangular cardboard boxes and/or trays.

[0085] Said forming machine (M) comprises a forming device (D) and a die (5), positioned opposite each other.

[0086] The die (5) extends along a longitudinal direction X-X' and a first transverse direction Y-Y', transverse to the longitudinal direction X-X', thus forming a horizontal plane as shown in Figure 1A, so that said die (5) is

configured to house an extended flat sheet from which, after forming by means of the forming device (D), a container (E) of the required characteristics is obtained.

[0087] On the other hand, the forming device (D) comprises forming means (1), coupled to displacement means (2) by means of connecting means (3), the displacement means (2) extending along a second transverse direction Z-Z', transverse to the longitudinal direction X-X' and to the first transverse direction Y-Y', or vertical direction as shown in Figure 1A.

[0088] In this way, the forming means (1) are located on the die (5) and, in turn, on the extended flat sheet by means of which the corresponding container (E) is formed, in a higher position along the second transverse direction Z-Z', in other words, the forming means (1) are located above the extended flat sheet and move vertically along the second transverse direction Z-Z' by means of the displacement means (2), downwards towards the die (5) in order to come into contact with said extended flat sheet and form the corresponding container (E).

[0089] After the container (E) has been formed, the displacement means (2), and therefore the forming means (1), perform an analogous vertical movement along the second transverse direction Z-Z' in the opposite direction, i.e., upwards, thus moving the forming means (1) away from the already formed container (E), as shown in Figure 1A.

[0090] The joint movement of the forming means (1) and the displacement means (2) is produced by the coupling of these elements by means of the connecting means (3), as can be seen in Figure 1A.

[0091] On the other hand, Figure 1B shows a detailed perspective view of an embodiment of a forming device (D) which, as in the case of Figure 1A, comprises forming means (1) coupled on displacement means (2) by means of connecting means (3).

[0092] The forming means (1) comprise a structural element (1.1) located in the centre of the forming means (1), which makes it possible to stiffen the configuration of said forming means (1) and provide a balanced joining point between said forming means (1) and the displacement means (2).

[0093] In turn, the displacement means (2) are also coupled to driving means (4).

[0094] As shown in Figure 1B, the displacement means (2) extend along the second transverse direction Z-Z', transverse to the longitudinal direction X-X' and to the first transverse direction Y-Y', or vertical direction according to this figure.

[0095] Figure 2 shows a perspective view of an embodiment of a forming device (D), comprising forming means (1) configured by means of straight side walls as well as by means of a central structural element (1.1), which connects said straight side walls through the intermediate section of the forming means (1).

[0096] The forming means (1), through the central structural element (1.1), are connected to the displacement means (2) by means of the connecting means (3),

configured from a first main part (3.1), which extends mainly along the first transverse direction Y-Y', and a second main part (3.2), which extends mainly along the longitudinal direction X-X', therefore being coupled together in a perpendicular position with respect to each other.

[0097] Likewise, Figure 2 shows the connection of the driving means (4), in particular a motor (4), with the displacement means (2).

[0098] Figures 3A - 3C show perspective views, from different points, of the embodiment of the forming device (D) of Figure 2.

[0099] In particular, Figure 3A shows the forming device (D) in its first connected position, so that a first main part (3.1) of the connecting means (3) is coupled to a second main part (3.2) of said connecting means (3) via coupling means (3.3) of said connecting means (3).

[0100] As shown in Figure 3A, the first face (3.1.1) of the first main part (3.1) comprises first joining means (3.1.5), in particular a groove (3.1.5) that crosses the length of said first face (3.1.1) of the first main part (3.1) along the first transverse direction Y-Y', the displacement means (2) being partially housed in said groove (3.1.5) so that said displacement means (2) are joined to the forming means (1), not shown in this figure, by means of their coupling to the first main part (3.1) of the connecting means (3).

[0101] On the other hand, the second face (3.1.2) of the first main part (3.1) comprises a first housing (3.1.3) wherein the second main part (3.2) of the connecting means (3) is partially housed, so that the first face (3.2.1) of the second main part (3.2) is in contact with the second face (3.1.2) of the first main part (3.1).

[0102] Additionally, the coupling means (3.3) are simultaneously partially housed in a second housing (3.2.3) of the second main part (3.2), not visible in this figure, and in the first housing (3.1.3) of the first main part (3.1), as shown in Figure 3A.

[0103] The first main part (3.1), the second main part (3.2) and the coupling means (3.3) are fixed together by means of the locking means (3.4), in this case a screw (3.4).

[0104] This Figure 3A also shows fastening means (3.1.4) coupled to the second face (3.1.2) of the first main part (3.1), which embrace the second main part (3.2) and partially support the coupling means (3.3).

[0105] Figure 3B shows the same configuration of the forming device (D) of Figure 3A, this time in its third fully disconnected position, the first main part (3.1) and the second main part (3.2) being separated.

[0106] In particular, as shown in Figure 3B, the screw (3.4) of the locking means (3.4) in Figure 3A is not shown, noting the configuration of the fastening means (3.1.4), configured as two symmetrical parts (3.1.4), located in a symmetrical position with respect to the longitudinal direction X-X' on the second face (3.1.2) of the first main part (3.1) of the connecting means (3).

[0107] Additionally, Figure 3B shows the second main

part (3.2), which on its first face (3.2.1) comprises a second housing (3.2.3) in which the coupling means (3.3) are partially housed, comprising two protrusions (3.3.1) projected along the first transverse direction Y-Y' and symmetrically located along the longitudinal direction X-X', as well as third joining means (3.3.2), in the form of bolted joints (3.3.2), which allow said coupling means (3.3) to be fixed to the second main part (3.2).

[0108] Based on the perspective view shown in this Figure 3B, also shown is the first housing (3.1.3) of the first main part (3.1), wherein the second main part (3.2) is partially housed in the previous Figure 3A, as well as a stop (3.1.4.2) on each of the symmetrical parts (3.1.4) forming the fastening means (3.1.4) which, in the second partially disconnected position (not shown), interact with the protrusions (3.3.1) of the connecting means (3).

[0109] Finally, this Figure 3B shows, on the second face (3.2.2) of the second main part (3.2), second joining means (3.2.5) in the form of pins (3.2.5), which are housed in corresponding holes (not shown) in the central structural element (1.1) of the forming means (1).

[0110] Figure 3C shows the same configuration of the forming device (D) in Figure 3B, also in its third fully disconnected position, this time using a bottom view that allows the elements not visible in said Figure 3B to be seen.

[0111] In this way, it shows the first main part (3.1), which partially houses the displacement means (2) on its first face (3.1.1).

[0112] Likewise, the second face (3.1.2) of said first main part (3.1) is shown in detail, comprising a first housing (3.1.3) which, as already indicated, is where the second main part (3.2) is partially housed in previous Figure 3A.

[0113] The two symmetrical parts (3.1.4) forming the fastening means (3.1.4) are shown adjacent to two opposite sides of said first housing (3.1.3), wherein each part (3.1.4) comprises, integrally, a projection (3.1.4.1) extending along the first transverse direction Y-Y', one projection (3.1.4.1) therefore being positioned opposite the other projection (3.1.4.1) with respect to the longitudinal direction X-X'.

[0114] Each of the two symmetrical parts (3.1.4) of the fastening means (3.1.4) are fixed, by means of bolted joints, to the second face (3.1.2) of the first main part (3.1).

[0115] As in Figure 3B, a stop (3.1.4.2) is shown on each of the symmetrical parts (3.1.4) forming the fastening means (3.1.4) which, in the second partially disconnected position (not shown), interact with the protrusions (3.3.1) of the connecting means (3). The surface of each of said stops (3.1.4.2) extends along the first transverse direction Y-Y'.

[0116] On the other hand, Figure 3C also shows the configuration, from a bottom plan view, of the second main part (3.2) of Figure 3B.

[0117] Thus, said Figure 3C shows the second main part (3.2), which on its first face (3.2.1) comprises the

second housing (3.2.3) in which the coupling means (3.3) are partially housed, and one of the two protrusions (3.3.1) of said coupling means (3.3), projected along the first transverse direction Y-Y', as well as the third joining means (3.3.2), in the form of bolted joints (3.3.2), which allow said coupling means (3.3) to be fixed to the second main part (3.2).

[0118] Also shown, located on the second face (3.2.2) of the second main part (3.2), are second joining means (3.2.5) in the form of pins (3.2.5) as well as in the form of holes (3.2.5), which are respectively housed in corresponding holes and cylindrical elements (not shown) of the central structural element (1.1) of the forming means (1), thus carrying out interference-fit coupling between the second main part (3.2) and the forming means (1).

[0119] Lastly, Figures 4A and 4B show, respectively, a complete bottom plan view of the forming device (D) of Figure 2, and an incomplete plan view, removing parts of said forming device (D) in Figure 4A.

[0120] In particular, Figure 4A shows the forming device (D) in its first connected position, whereby the two parts (3.1.4) forming the fastening means (3.1.4) of the first main part (3.1) are shown located symmetrically with respect to the longitudinal direction X-X', in contact with and embracing the second main part (3.2), partially housed in the first housing (3.1.3) of the first main part (3.1), by means of the projections (3.1.4.1) of said fastening means (3.1.4).

[0121] In this way, as shown in Figure 4A, the projections (3.1.4.1) of the fastening means (3.1.4) are located on each side of the second main part (3.2), maintaining their fixed position.

[0122] In turn, each part (3.1.4) forming the fastening means (3.4.1) is fixed to the first main part (3.1) by means of fixing means (3.4.1.3), in this case bolted joints (3.1.4.3), which form a solid joining of said parts (3.1.4) forming the fastening means (3.4.1) with the first main part (3.1).

[0123] The coupling means (3.3), housed in the second housing (3.2.3) of the second main part (3.2) and which can slide through said second housing (3.2.3) to adjust their relative position, are also shown. The two protrusions (3.3.1), opposite and symmetrical with respect to the longitudinal direction X-X', of said coupling means (3.3), in relation to the first (3.1) and second (3.2) main part, are also shown.

[0124] Additionally, this Figure 4A shows the position of the stops (3.1.4.2) of each part (3.1.4) forming the fastening means (3.4.1), away from the protrusions (3.3.1) of the coupling means (3.3) in this first connected position.

[0125] Also shown are the third joining means (3.3.2), in the form of bolted joints (3.3.2), which allow said coupling means (3.3) to be fixed to the second main part (3.2), and the second joining means (3.2.5) in the form of pins (3.2.5) and holes (3.2.5), which are respectively housed in corresponding holes and cylindrical elements (not shown) of the central structural element (1.1) of the

forming means (1).

[0126] On the other hand, Figure 4B shows the forming device (D) of Figure 4A, wherein one of the parts (3.1.4) forming the fastening means (3.4.1) has been removed to show a detailed view of the position of the coupling means (3.3), housed in the second housing (3.2.3) of the second main part (3.2), as well as in the first housing (3.1.3) of the first main part (3.1).

[0127] In this way, Figure 4B shows the same situation of the forming device (D) in the first connected position as shown in Figure 4A, with a greater level of detail that the latter does not provide, by removing one of the parts (3.1.4) forming the fastening means (3.4.1) from its real position.

[0128] Lastly, Figures 5A - 5B show the same forming device (D) in the second partially disconnected position.

[0129] In particular, Figure 5A shows said forming device (D), wherein the forming means (1) are partially coupled to the displacement means (2), said forming device (D) therefore being located in a second partially disconnected position.

[0130] Figure 5A also shows the configuration of the coupling means (3.3), housed in the second main part (3.2), and their position with respect to both the fastening means (3.1.4) and the first main part (3.1). Said fastening means (3.1.4) interact with the coupling means (3.3) to keep the forming means (1) partially coupled and fastened to the displacement means (2), so that said forming means (1) perform a tilting movement in relation to the first main part (3.1), which advantageously allows an external operator not to bear the weight of the forming means (1) while performing an operation aimed at establishing the first connected position or the third fully disconnected position of the forming device (D).

[0131] In more detail, Figure 5B shows the particular configuration of the elements in the second partially disconnected position of the forming device (D).

[0132] In particular, said Figure 5B shows how the at least two protrusions (3.3.1) of the coupling means (3.3) are in contact with the at least one stop (3.1.4.2), so as to retain the position of said coupling means (3.3).

[0133] In turn, although Figure 5B does not show it, the locking means (3.4) join the first main part (3.1) and the coupling means (3.3) to each other, so that the coupling of this second partially connected position is maintained.

[0134] Lastly, it must be taken into account that the present invention must not be limited by the embodiment described herein. Other configurations may be carried out by those skilled in the art based on the present description. Accordingly, the scope of the invention is defined by the following claims.

Claims

1. A forming device (D), configured to be coupled to a container (E) forming machine (M), wherein the forming device (D) comprises:

- forming means (1), which extend along a longitudinal direction X-X' and a first transverse direction Y-Y', transverse to the longitudinal direction X-X', and configured to form at least one container (E), wherein the forming means (1) comprise at least one structural element (1.1),
 - displacement means (2), which extend along a second transverse direction Z-Z', transverse to the longitudinal direction X-X' and to the first transverse direction Y-Y', and configured to move the forming means (1) along said second transverse direction Z-Z', and
 - connecting means (3), configured to connect the forming means (1) and the displacement means (2) to each other, wherein said connecting means (3) comprise:

- a first main part (3.1) comprising a first face (3.1.1), configured to connect to the displacement means (2), and a second face (3.1.2), parallel and opposite to the first face (3.1.1), wherein the first main part (3.1) further comprises:

- o a first housing (3.1.3), located on the second face (3.1.2) of the first main part (3.1), and
- o fastening means (3.1.4), located in a position adjacent to the first housing (3.1.3), which in turn comprise at least two projections (3.1.4.1) extending mainly along the first transverse direction Y-Y' and facing each other on two opposite sides of the first housing (3.1.3), and at least one stop (3.1.4.2), which extends mainly along the first transverse direction Y-Y' on a third side of the first housing (3.1.3),

- a second main part (3.2) comprising a first face (3.2.1) and a second face (3.2.2), parallel and opposite to the first face (3.2.1) and configured to connect to the at least one structural element (1.1) of the forming means (1),

wherein the second main part (3.2) further comprises a second housing (3.2.3), located along the first face (3.2.1) of the second main part (3.2),

- coupling means (3.3), configured to couple the first main part (3.1) and the second main part (3.2), wherein said coupling means (3.3) are partially housed in the second housing (3.2.3) of the second main part (3.2), and are slidable along the first transverse direction Y-Y', and wherein the cou-

pling means (3.3) comprise at least two protrusions (3.3.1) extending along the first transverse direction Y-Y' and facing each other on opposite sides of said coupling means (3.3), and

• locking means (3.4), configured to join the first main part (3.1) to the second main part (3.2) and/or the coupling means (3.3),

wherein the forming device (D) comprises:

- a first connected position, wherein the locking means (3.4) join the first main part (3.1), the second main part (3.2) and the coupling means (3.3) to each other, and wherein:

o the first face (3.2.1) of the second main part (3.2) is in contact with and coupled to the second face (3.1.2) of the first main part (3.1), and

o the at least two projections (3.1.4.1) of the first main part (3.1) are in contact with the coupling means (3.3), so as to retain the position of said coupling means (3.3),

- a second partially disconnected position, wherein the locking means (3.4) join the first main part (3.1) and the coupling means (3.3) together, and wherein the at least two protrusions (3.3.1) of the coupling means (3.3) are in contact with the at least one stop (3.1.4.2) of the first main part (3.1), so as to retain the position of said coupling means (3.3), and

- a third fully disconnected position, wherein the first main part (3.1) is disconnected from the coupling means (3.3) and the second main part (3.2).

2. The forming device (D) according to claim 1, wherein the first main part (3.1) further comprises first joining means (3.1.5) configured to solidly connect the first face (3.1.1) of said first main part (3.1) and the displacement means (2).

3. The forming device (D) according to claim 2, wherein the first joining means (3.1.5) comprise a groove, located on the first face (3.1.1) of the first main part (3.1), and configured to partially house the displacement means (2).

4. The forming device (D) according to any of the preceding claims, wherein the second main part (3.2) further comprises second joining means (3.2.5) configured to solidly connect the first face (3.2.1) of said second main part (3.2) and the at least one structural element (1.1).

5. The forming device (D) according to any of the pre-

ceding claims, wherein the coupling means (3.3) further comprise third joining means (3.3.2) configured to couple said coupling means (3.3) and the second main part (3.2).

6. The forming device (D) according to any of the preceding claims, wherein the second joining means (3.2.5) and/or the third joining means (3.3.2) are bolted joints.

7. The forming device (D) according to any of the preceding claims, wherein the at least one structural element (1.1) of the forming means (1) is a central structure.

8. The forming device (D) according to any of the preceding claims, wherein the fastening means (3.1.4) are an integral part of the first main part (3.1).

9. The forming device (D) according to any of claims 1 to 7, wherein the fastening means (3.1.4) are at least two symmetrical parts along the longitudinal direction X-X'.

10. The forming device (D) according to any of the preceding claims, wherein the coupling means (3.3) comprise a configuration complementary to the configuration of the first housing (3.1.3) of the first main part (3.1).

11. The forming device (D) according to any of the preceding claims, wherein the locking means (3.4) are threaded elements.

12. The forming device (D) according to any of the preceding claims, wherein the coupling means (3.3) are symmetrical along the longitudinal direction X-X'.

13. The forming device (D) according to any of the preceding claims, **characterised in that** it further comprises driving means (4), configured to drive the displacement means (2) along the second transverse direction Z-Z'.

14. A container (E) forming machine (M), comprising:

- at least one forming device (D) according to any of claims 1 to 13, and
- a die (5), configured to receive an extended flat sheet,

wherein the forming device (D) is configured to form a container (E) from said extended flat sheet placed on the die (5).

15. The forming machine (M) according to claim 14, **characterised in that** the forming means (1) of the forming device (D) are square or rectangular.

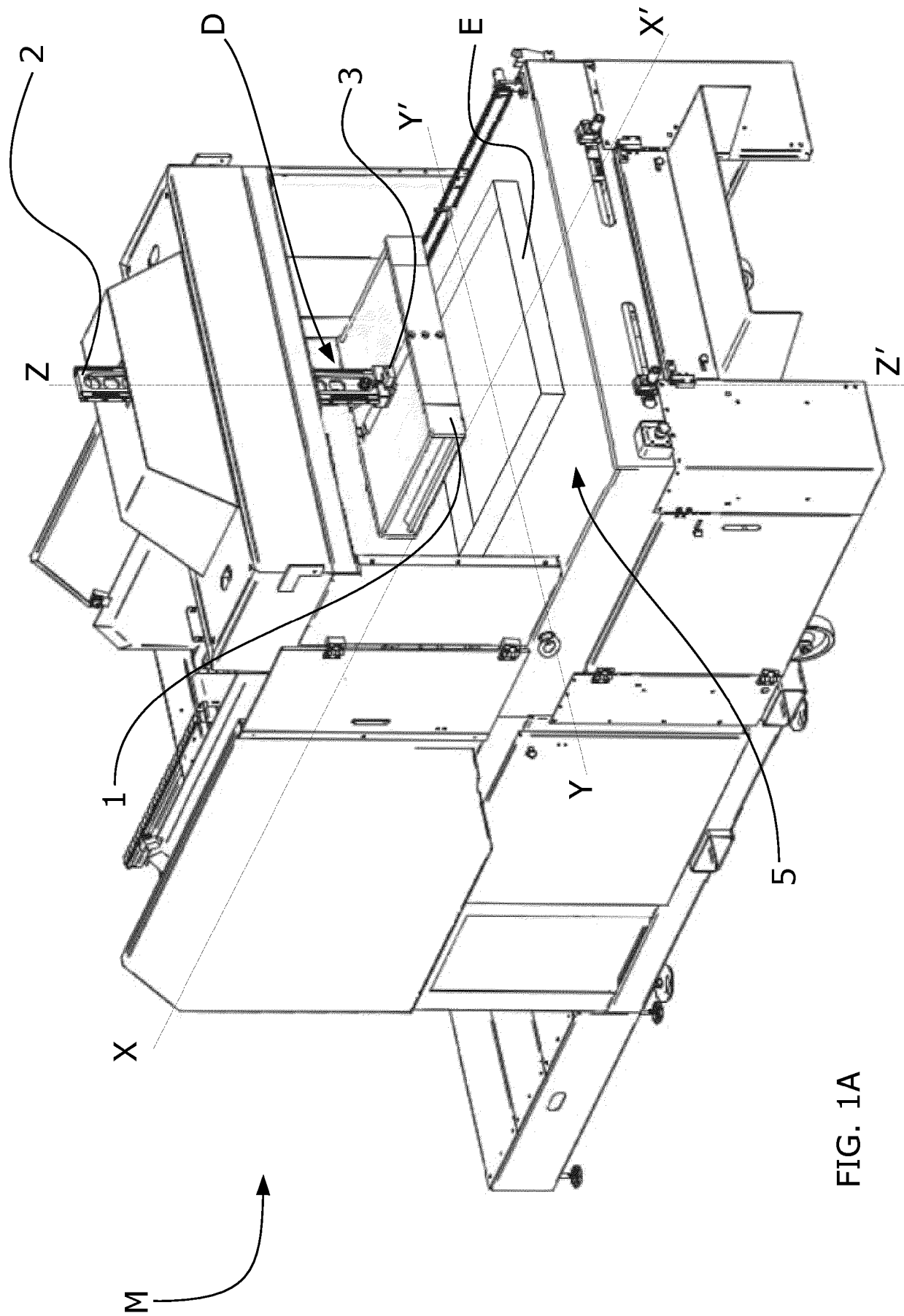


FIG. 1A

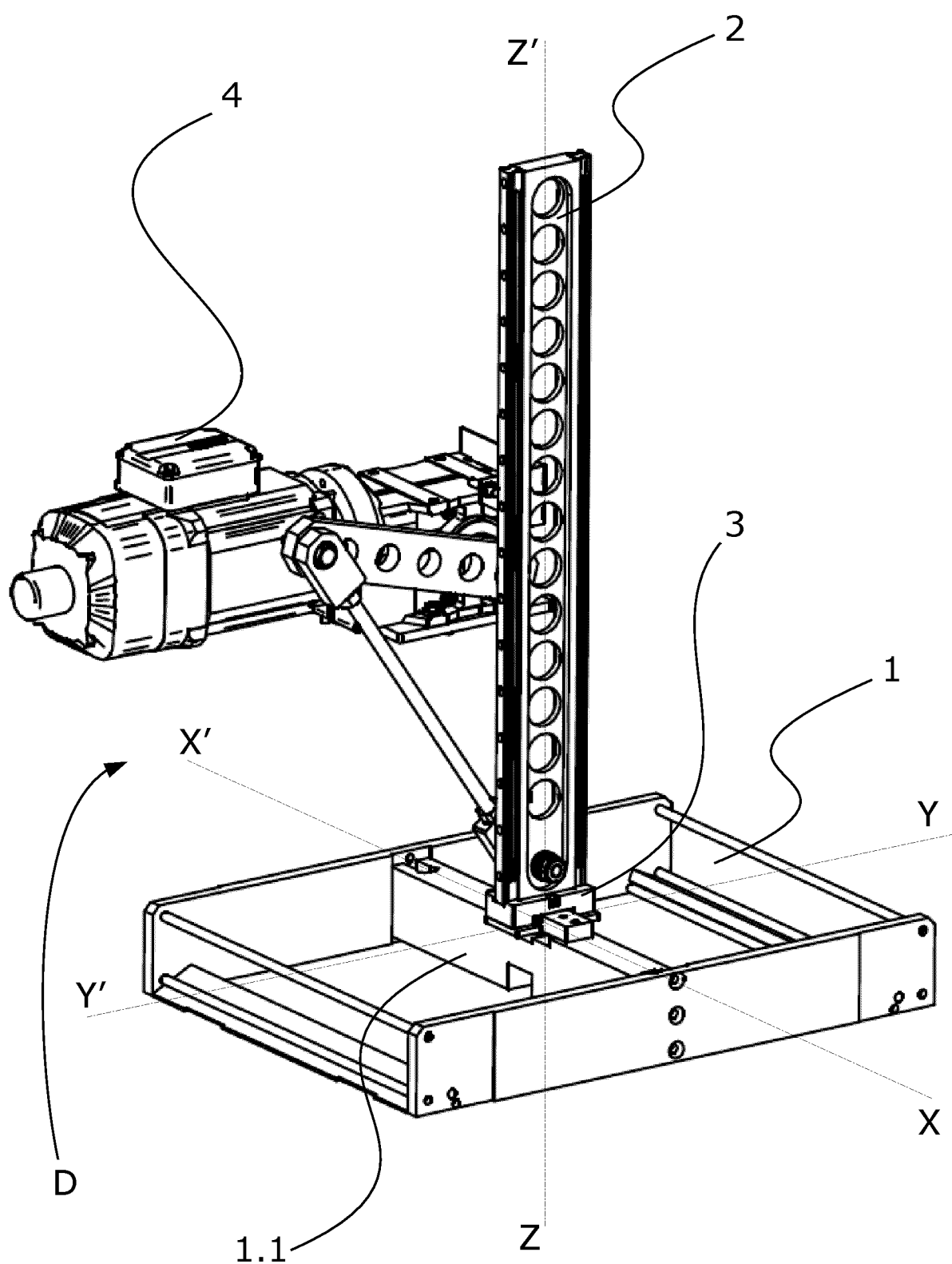


FIG. 1B

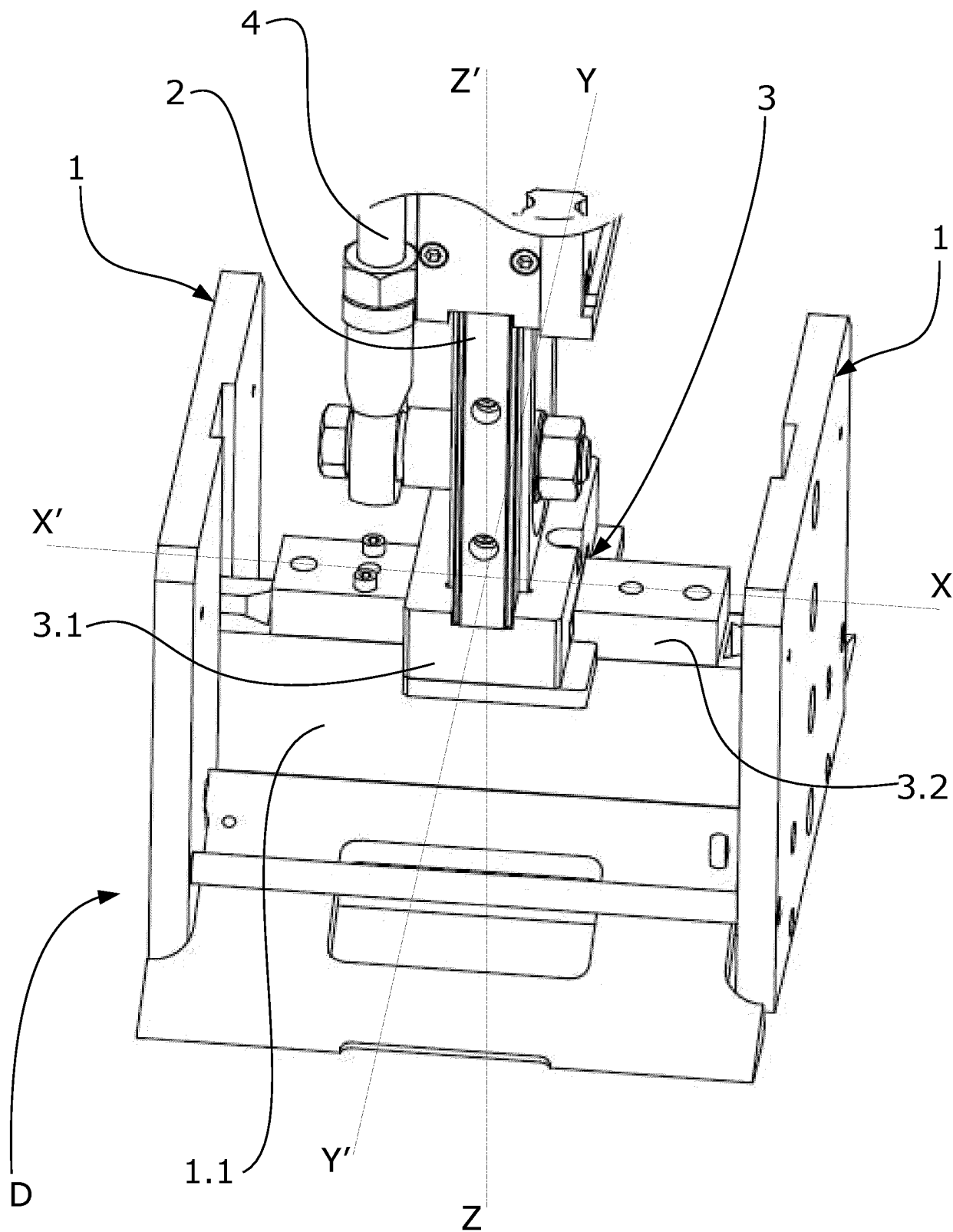


FIG. 2

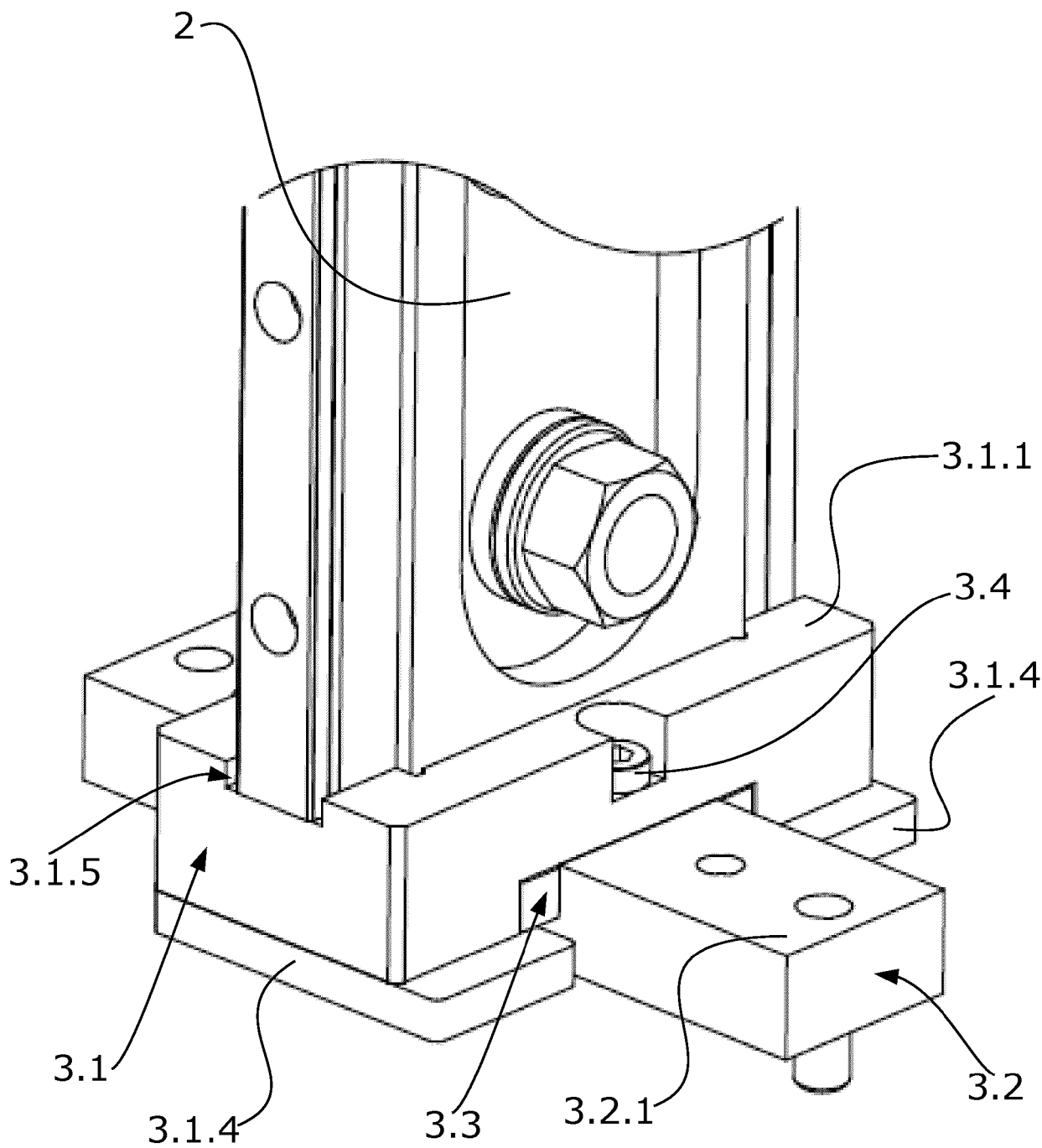
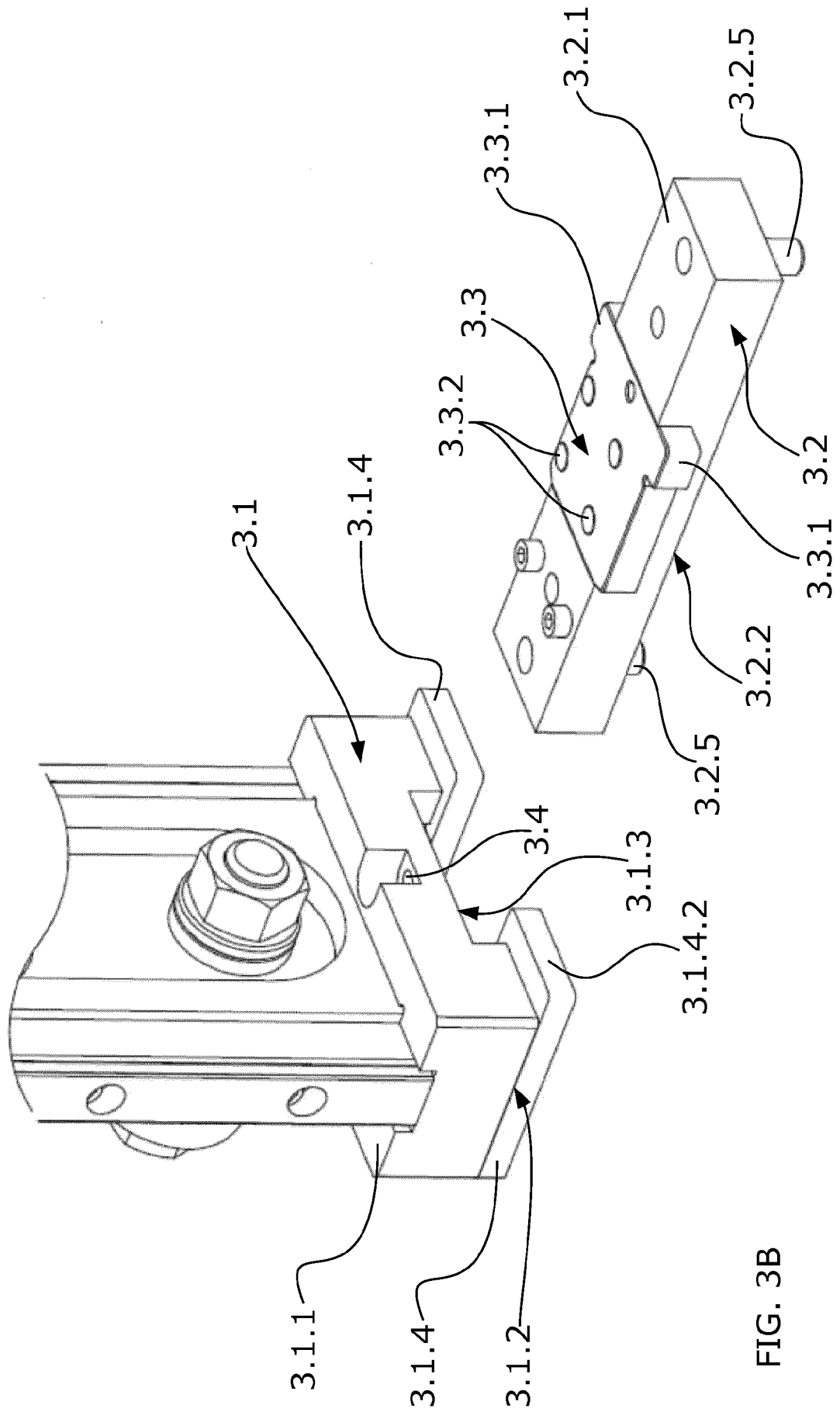
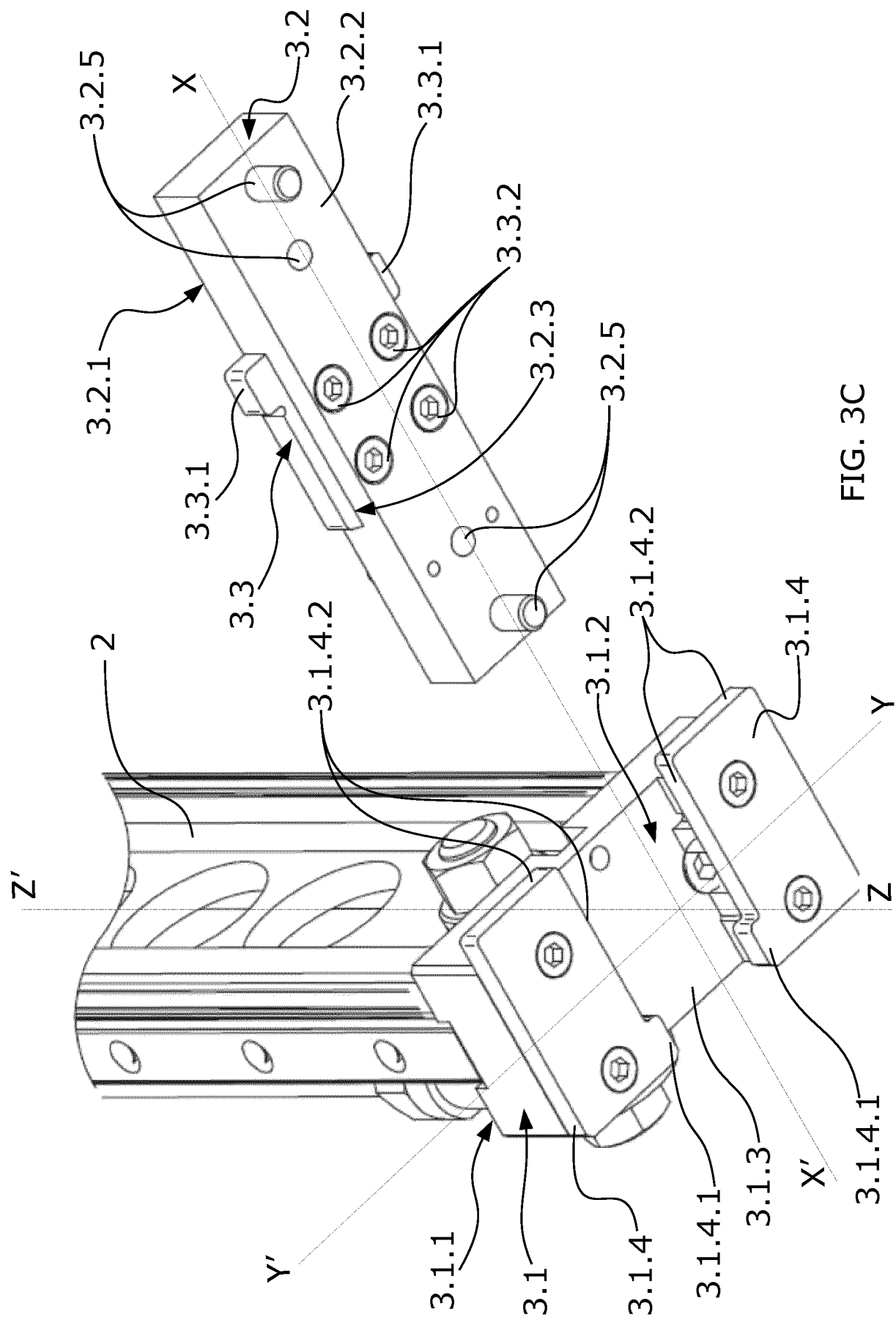


FIG. 3A





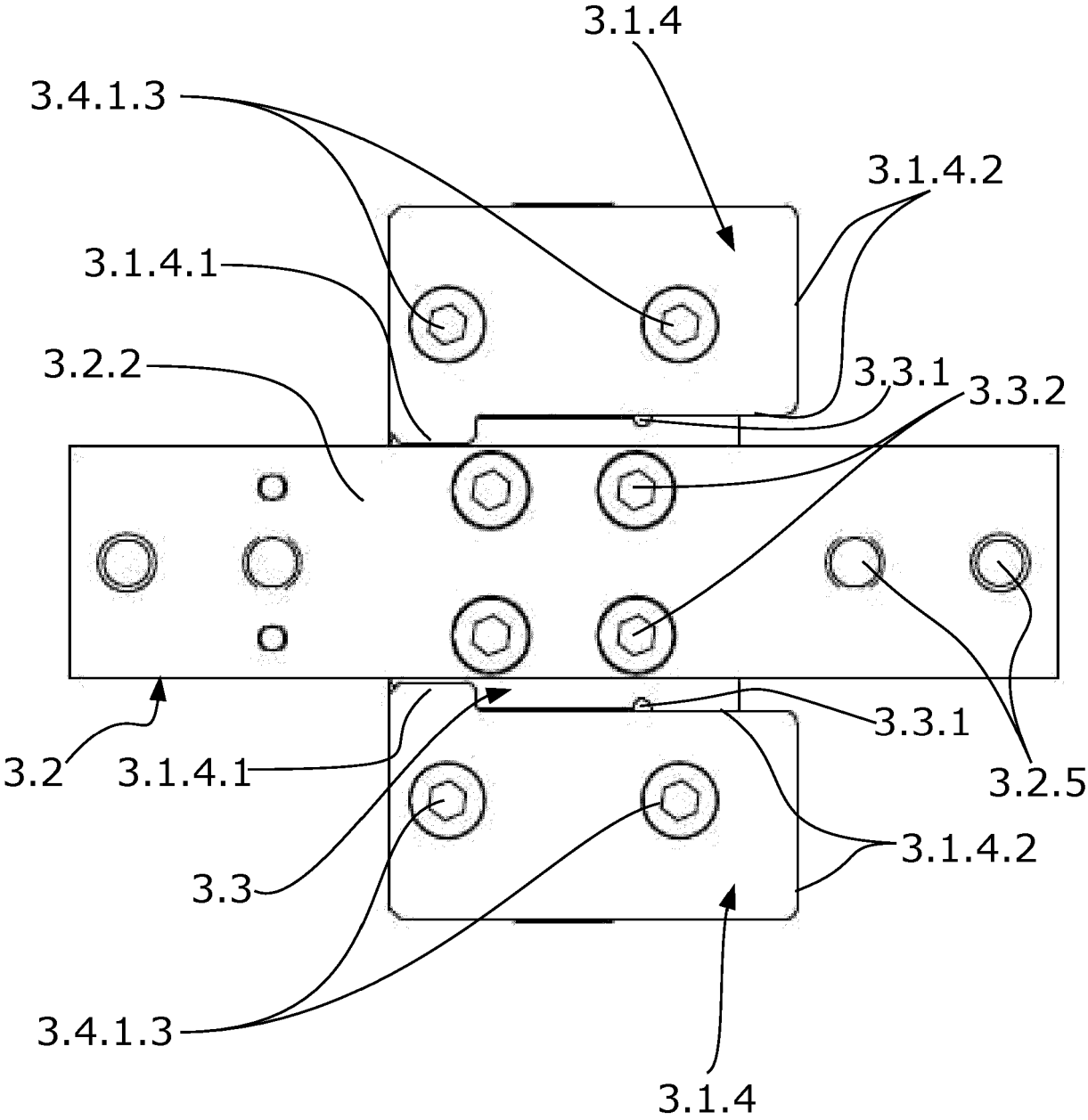


FIG. 4A

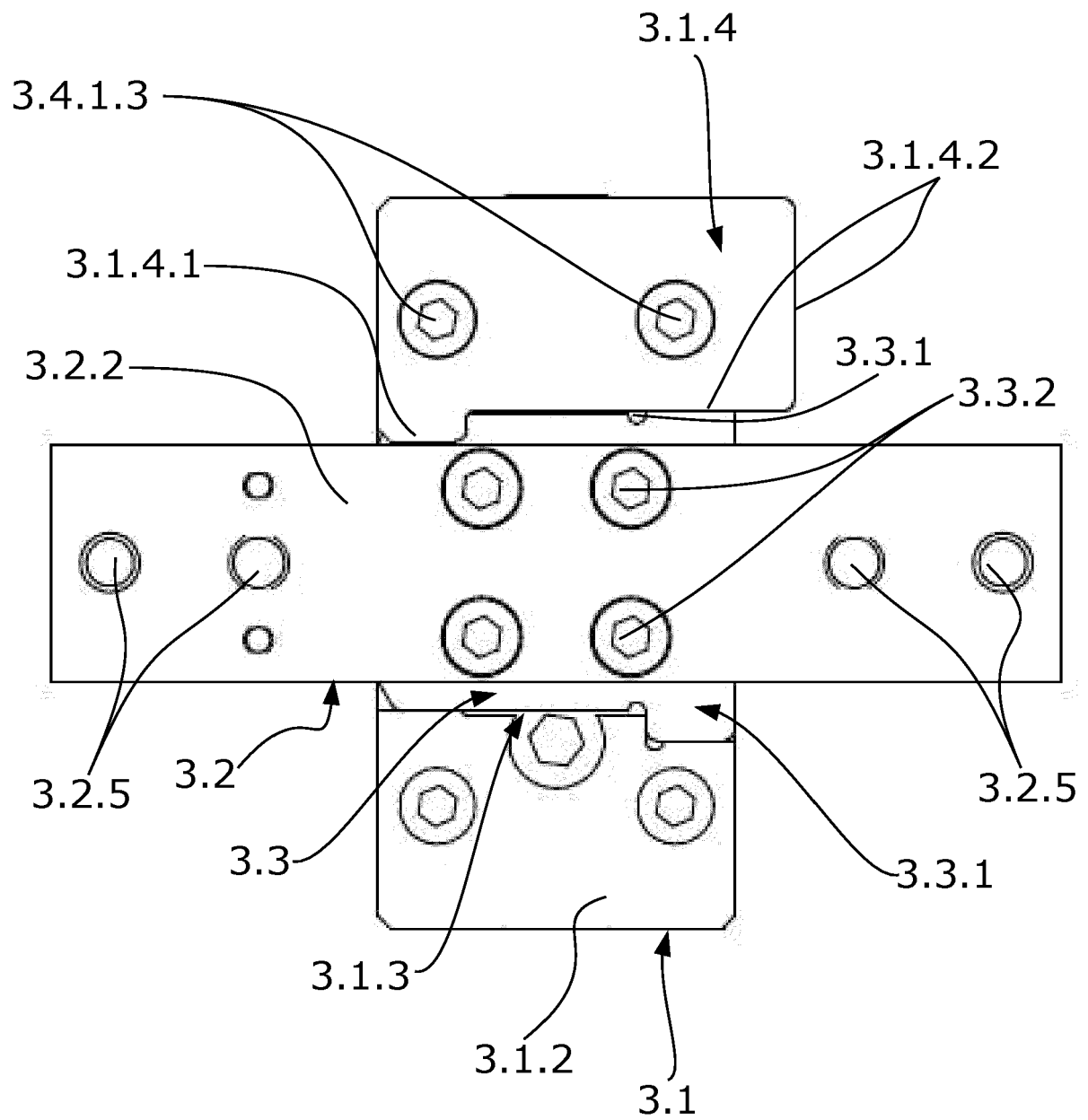


FIG. 4B

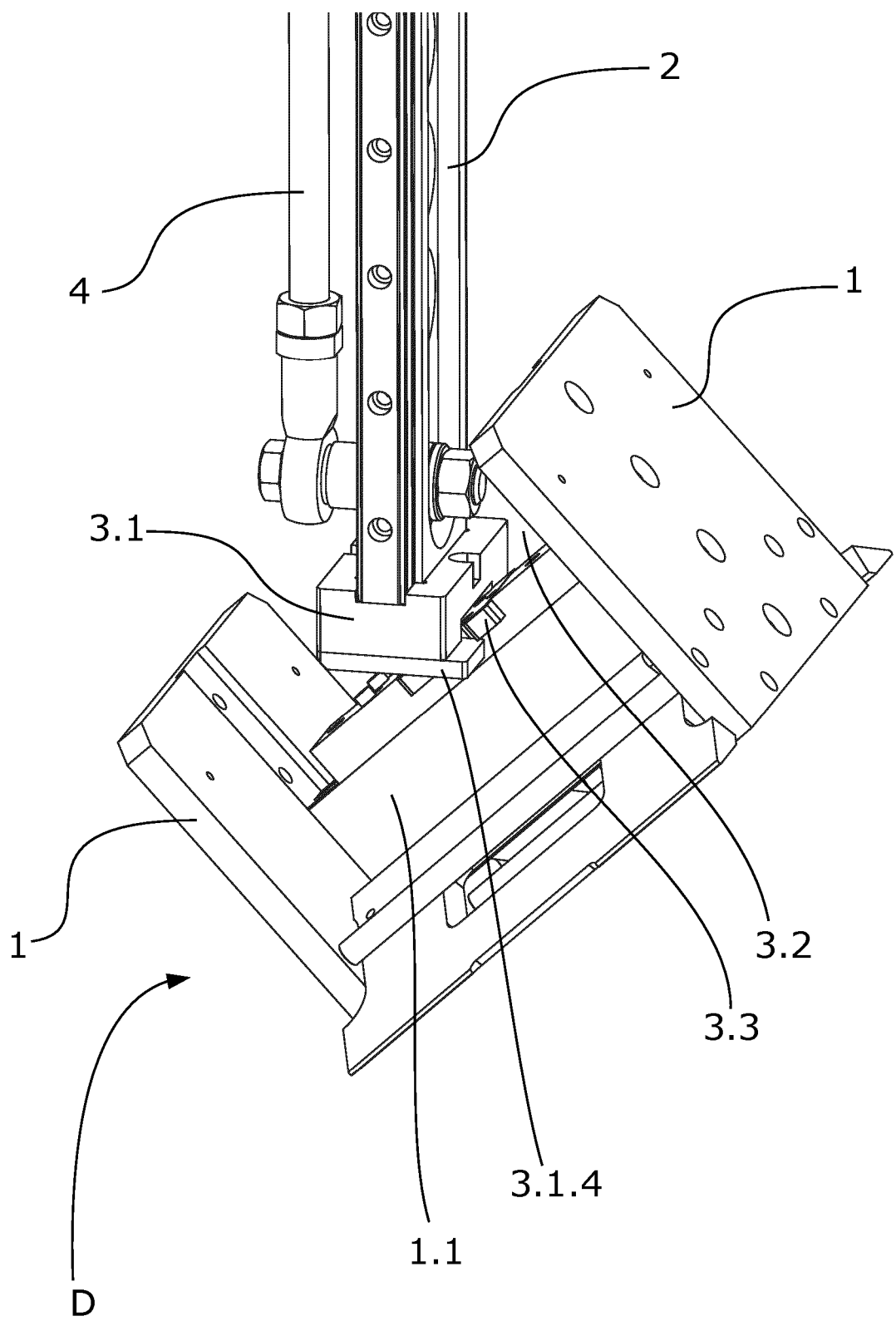


FIG. 5A

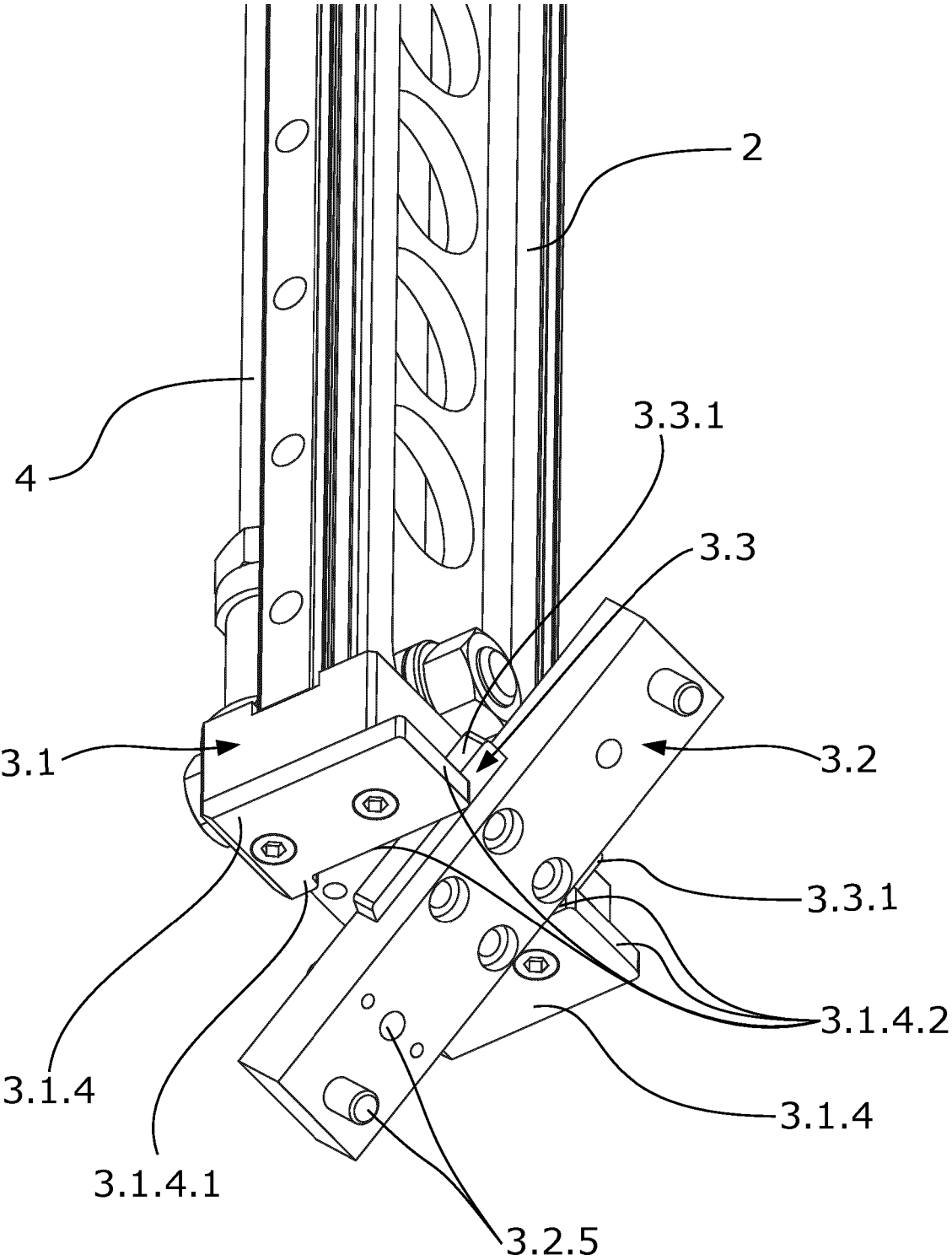


FIG. 5B



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