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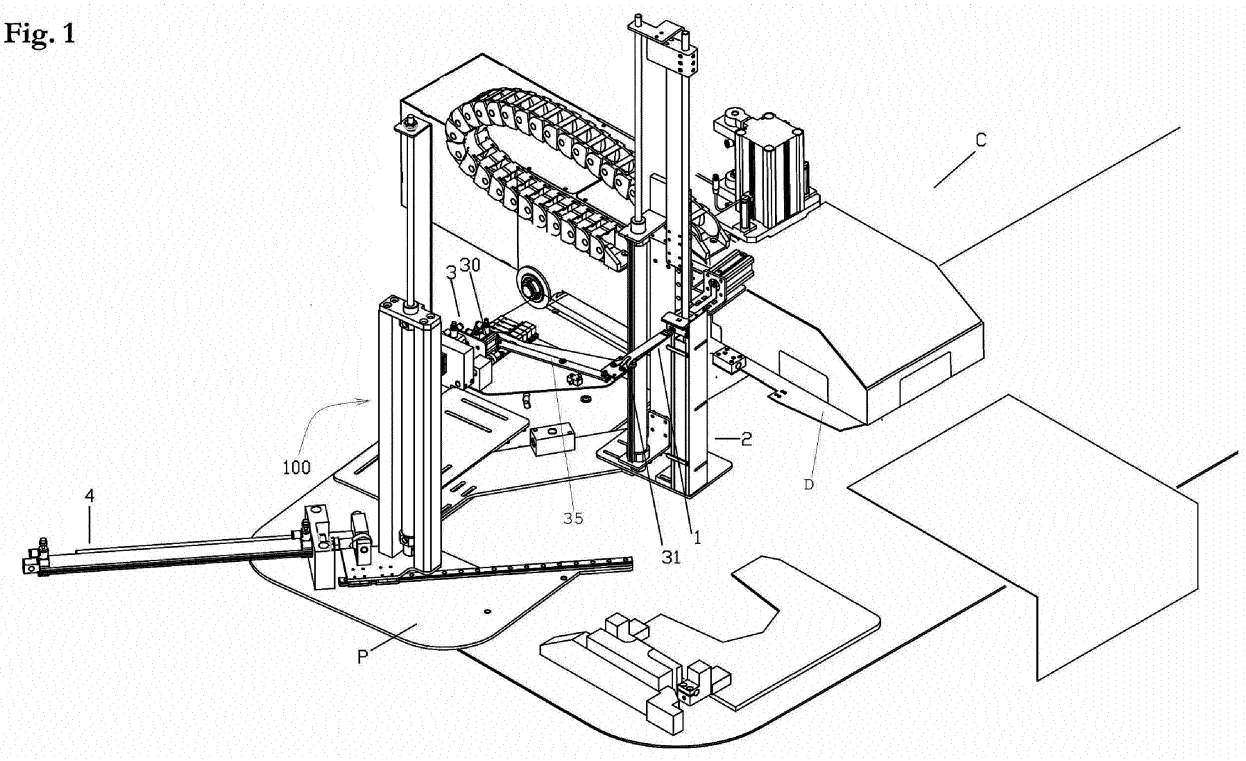
(54) FOLDING APPARATUS COMPRISING A FOLDER AND A LABELING MACHINE

(57) A folding apparatus (C) comprises: a folder (200), a plate for applying a pocket or a patch on a piece of fabric, a labeling machine (100) for picking and moving labels (E); said labeling machine (100) comprises a storage device (2) for storing labels (E), a clamp (1) for picking a label (E) from the storage device (2); opening/closing means (3) for opening and closing the clamp (10), moving means (4) for moving the clamp (1) between a position that is close to the storage device (2) and a position that is remote from the storage device (2).

Fig. 1



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Description

[0001] The present patent application for industrial invention relates to a folding apparatus comprising a folder and a labeling machine.

[0002] In this patent a labeling machine is a machine that is capable of moving a label and placing it from a first position, preferably in a storage, to a second position, where a folder of the folding apparatus is suitable for folding a patch or a pocket and for successively positioning the patch or the pocket on the piece of fabric with the interposition of the label applied by the labeling machine.

[0003] Although the description and the claims refer to a label, the labeling machine of the invention can be also used to move and support protective films, fringes or inserts of any type, which are suitable for being positioned under the folder.

[0004] The machine according to the invention may comprise a sewing apparatus downstream the folding apparatus, said sewing apparatus being suitable for sewing the pocket and the label on the piece of fabric where the folder and the labeling machine have positioned the pocket and the label.

[0005] Garments are known, which are provided with a label that is sewn in a lateral edge of a pocket.

[0006] In order to sew the label on the lateral edge of the pocket, the operator must manually pick the label from an area where the labels are stored, separating said label from the other labels.

[0007] Then, the operator must position the label between the piece of fabric, where the pocket is to be folded and sewn, and the lateral edge of the pocket, which is not folded on the piece of fabric, in such a way that the label partially protrudes from the lateral edge of the pocket. It must be noted that in some cases the label is already folded.

[0008] Moreover, it must be noted that the label is currently inserted as follows: when the folder has moved backwards, after folding the pocket, the pocket is folded on the plate onto the piece of fabric where it is to be applied, without adhering completely, and then the label is inserted with a clamp. This fact makes the insertion difficult, with the risk of creating problems on the folded edges of the pocket. In fact, in case of contact, the folded edges of the pocket tend to move, consequently losing the correct position of the folded pocket.

[0009] In addition to impairing the correct positioning of the pocket, this method requires a long time for the correct application of the pocket.

[0010] Finally, when sewing the pocket on the piece of fabric, the machine also sews the label on the piece of fabric.

[0011] It must be noted that, in some cases, before being applied on the piece of fabric, the label is folded in two parts, in such a way that a slot is formed after applying and sewing the label. These labels can be stored in folded or in unfolded condition. In the latter case, the labels need to be manually folded immediately before they are sewn on the pocket.

[0012] This process used for picking and positioning the labels is impaired by severe drawbacks.

[0013] A first drawback consists in the fact that the operations that are made to pick and position the label on the piece of fabric require a high level of precision of the operator. As already mentioned, from time to time, the operator must place the label always in the same position relative to the pocket in such a way that the garments are identical. Evidently, the operator must be skillful and trained in order to correctly place the label between the piece of fabric and the pocket.

[0014] A second drawback consists in the fact that, when the labels are not stored in folded condition, they must be folded by the operator manually before being disposed between the piece of fabric and the pocket. Evidently, such a folding operation is long, difficlt and requires a high level of attention and precision.

[0015] WO2017194714 discloses a sewing machine that comprises a bearing frame whereon a sewing head, a loading clamp, a work surface and a support arm are mounted.

[0016] US5133271 discloses a workpiece fabric folding device having a clamping mechanism of the label, which is sewn on fabric.

[0017] EP1231312 discloses a fast label inserting device for a sewing machine, especially for a bar tack sewing machine.

[0018] The purpose of the present invention is to overcome the drawbacks of the prior art by disclosing a folding apparatus comprising a labeling machine that is suitable for picking a label from a storage area and correctly position the label on a piece of fabric.

[0019] Another purpose is to disclose a folding apparatus that comprises a labeling machine that, in addition to satisfying the aforementioned purpose, is compact and capable of working rapidly, efficiently and precisely.

[0020] Another purpose is to disclose a folding apparatus that comprises a labeling machine that is suitable for folding and eventually cutting the labels in extended condition, before they are positioned on the piece of fabric.

[0021] The folding apparatus of the invention comprises a folder that is suitable for folding a pocket or a patch, and a plate for applying the pocket or the patch on the piece of fabric.

[0022] The folding apparatus of the invention comprises a labeling machine used for picking and moving the labels. The labeling machine comprises a storage device for storing the labels and a clamp suitable for grabbing a label from the storage device. The clamp comprises two opposite arms.

[0023] The labeling machine comprises opening/closing means connected to the clamp in such a way that the clamp can be in open position and in closed position.

[0024] The labeling machine comprises moving means to move the clamp between a position that is close to the storage device and a position that is remote from the

storage device, wherein the clamp is under the folder and the label is partially under the pocket or the patch.

[0025] For the sake of clarity, the description of the folding apparatus 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 folding apparatus with the labeling machine and the folder in idle position;

Fig. 1A shows the labeling machine of Fig. 1, cut along a vertical plane passing through the longitudinal axis of the clamp;

Fig. 1B is the same as Fig. 1A, except for it shows the labeling machine in diverged position because of the air that is delivered from a nozzle;

Fig. 2 is the same as Fig. 1, except for the fact that it shows the labeling machine in a first operating step;

Fig. 2A is a view of the labeling machine of Fig. 2, wherein the lateral walls of the storage device are omitted;

Fig. 2B is a view of the labeling machine of Fig. 2, cut along a vertical plane passing through the longitudinal axis of the clamp;

Fig. 3 is the same as Fig. 2, except for the fact that it shows the labeling machine in a second operating step;

Fig. 4 is the same as Fig. 3, except for the fact that it shows the labeling machine in a third operating step;

Fig. 4A shows the labeling machine of Fig. 4, wherein the lateral walls of the storage device are omitted;

Fig. 5 is the same as Fig. 4, except for the fact that it shows the labeling machine in a fourth operating step;

Fig. 5A shows the labeling machine of Fig. 5, wherein the lateral walls of the storage device are omitted;

Fig. 6 is the same as Fig. 5, except for the fact that it shows the labeling machine in a fifth operating step;

Fig. 7 is the same as Fig. 6, except for the fact that it shows the labeling machine in a sixth operating step;

Fig. 8 is the same as Fig. 7, except for the fact that it shows the labeling machine in a seventh operating step;

Fig. 9 shows the clamp and the spreading means of Fig. 2A cut along the plane IX-IX;

Fig. 10 shows the clamp and the spreading means of Fig. 5A cut along the plane X-X;

Fig. 11 is an axonometric view of a first variant of the labeling machine according to the invention, comprising a folding device;

Figs. 12-20 are the same as Fig. 11, except for the fact that they show the folding and picking steps of a label.

Figs. 21-31 are axonometric views of a second variant of the labeling machine of the invention, which is provided with two clamps in order to grab two labels.

[0026] With reference to Figs. 1 to 8, a folding apparatus according to the invention is disclosed, which is generally indicated with reference letter (C).

[0027] The folding apparatus (C) comprises a folder (200) for folding and applying a pocket or a patch on a piece of fabric. The folding apparatus (C) comprises a plate (D), which is shown in Figs. 1 and 6, in order to support the pocket or the patch.

[0028] The folding apparatus (C) comprises a labeling machine (100) used for picking a label (E) and moving the label (E) until the label (E) is partially disposed under the pocket or the patch.

[0029] With reference to Fig. 1, 1A, 1B, 2, 2A, and 2B, the labeling machine (100) comprises a storage device (2) with a compartment (21) where the labels (E) are stored, and an outlet (22) for ejecting the labels (E) out of the compartment (21).

[0030] More precisely, the storage device (2) extends vertically in such a way that the labels (E) are stacked one on top of the other. The outlet (22) is obtained in upper position relative to the compartment (21).

[0031] Each label (E), which is stacked in the compartment (21), is folded in such a way to have two edges (E1, E2).

[0032] The storage device (2) comprises an extraction column (26) disposed in upper position relative to said compartment (21), which comprises an extraction mouth (26a); the extraction column (26) also comprises moving means and extraction means (not shown in the figures). It must be noted that the picking means could be different, such as for example needles.

[0033] The moving means are configured in such a way that the extraction column (26) can go from a first position, wherein it is disposed above the compartment (21), with the extraction mouth (26a) proximal to the outlet (22), to a second position, wherein the extraction column (26) is partially contained in the compartment (21), with the extraction mouth in a remote position relative to the outlet (22).

[0034] The extraction means are suitable for extracting air from the extraction mouth (26a) to retain the label (E) in the extraction mouth (26a).

[0035] More precisely, the extraction column (26) is moved by the moving means until said extraction mouth (26a) is brought in contact above the label (E) to be picked; successively the extraction means are actuated in such a way that the label (E) is held and lifted by said extraction column (26), when the extraction column (26) goes from the second position to the first position (Figs. 1A, 1B).

[0036] With reference to Figs. 1A and 1B, the storage device (2) comprises two metal plates (Y) provided with two free edges that define the outlet (22) where the label (E) is to be inserted.

[0037] The storage device (2) also comprises a slider (20) aligned with said outlet (22) of the storage device

and configured in such a way to move the label (E) that is positioned on the extraction mouth (26a) outside the storage device (2) through the outlet (22).

[0038] As shown in Fig. 1A, said slider (20) is disposed in the proximity of the outlet (22) and, when the extraction column (26) is in its second position, said extraction mouth (26a) of the extraction column (26) is disposed in intermediate position between said slider (20) and said outlet (2).

[0039] The storage device (2) comprises moving means (MM) that permit the slider (20) to be in a first position (Fig. 1A) wherein it is in remote position relative to the two metal plates (Y), and in a second position (Fig. 2B) wherein said slider (20) has a front end inserted between said two metal plates (Y) in order to push the label (E) out of the outlet (22) towards the clamp (1).

[0040] With reference to Fig. 1B, said storage device (2) also comprises a nozzle (29) that is disposed near the slider, which is disposed in proximal position relative to said slider (20) and said extraction column (26).

[0041] The nozzle (29) is configured in such a way to blow air along a direction that intercepts the label (E) when said label is held by the extraction column (26) in front of the outlet (22) in such a way to spread out the two edges (E1, E2) and permit the insertion of the front end of the slider between said two edges (E1, E2) in such a way to push the label (E) towards the outlet (22).

[0042] With reference to Figs. 1 to 8, the labeling machine (100) comprises a clamp (1) suitable for grabbing the label (E) moved by the slider (20).

[0043] The labeling machine (100) comprises opening/closing means (3) connected to the clamp (1) in such a way that the clamp (1) can be in an open position and in a closed position. The opening/closing means (3) are disposed on a support surface (P) and support the clamp (1). Moreover, the labeling machine (100) comprises moving means (4) that move the clamp (1) between a position that is close to the storage device (2) and a position that is remote from the storage device (2). More precisely, the moving means (4) move the support surface (P) where the opening/closing means (3) that support the clamp (1) are disposed. When the clamp (1) is in remote position relative to the storage device (2), the clamp (1) is under the folder (200) and the label (E) is partially disposed between the piece of fabric and the pocket or the patch.

[0044] With reference to Figs. 9 and 10, the clamp (1) comprises two opposite arms (10a, 10b). More precisely, the clamp (1) comprises an upper arm (10a) and a lower arm (10b) disposed under the upper arm (10a). Every arm (10a, 10b) comprises:

- an upper surface (13a, 13b);
- a lower surface (14a, 14b);
- a front portion (15a, 15b) suitable for picking the label;
- a rear portion (16a, 16b).

[0045] The lower arm (10b) comprises a stop tooth (11) against which the label (E) is suitable for being engaged. The stop tooth (11) is disposed on the front portion (15b) of the lower arm (10b). The upper arm (10a) of the clamp (1) comprises a window (12) that is obtained on the front portion (15a) of the upper arm (10a) and wherein the stop tooth (11) of the lower arm (10b) is disposed when the clamp (1) is in closed position.

[0046] The opening/closing means (3) comprise a linear actuator (30), which is shown in Figs. 1 to 8, and spreading means (31), which are shown in Figs. 9 and 10 and are suitable for being disposed between the two arms (10a, 10b) of the clamp (1).

[0047] The linear actuator (30) is a cylinder-piston assembly comprising a cylinder fixed to the support surface (P) and a piston that is slidingly mounted in the cylinder. The piston is connected to a stem (36) that protrudes from the cylinder. A transmission lever (35) is hinged to the support surface (P) and is provided with a first end connected to the stem (36) and a second end connected to the spreading means (31), in such a way that when the stem is in an extracted position relative to the cylinder, as shown in Fig. 2A, the spreading means (31) are in a first retracted position, and when the stem (36) is in a retracted position relative to the cylinder, as shown in Fig. 4A, the spreading means (31) are in a second forward position.

[0048] With reference to Figs. 9 and 10, when the spreading means (31) are in the first retracted position, the spreading means (31) open the arms (10a, 10b) of the clamp (1) (Fig. 9), and when the spreading means (31) are in the second forward position, the spreading means (31) close the arms (10a, 10b) of the clamp (1) (Fig. 10).

[0049] More precisely, the upper arm (10a) of the clamp (1) comprises a slot (17) that is obtained in the rear portion (16a) of the upper arm (10a).

[0050] The spreading means (31) comprise a wedge provided with an oblique section (31c) that protrudes from the space between the two arms (10a, 10b) of the clamp (10) passing through the slot (17) of the upper arm (10a) of the clamp (1).

[0051] The oblique section (31c) of the wedge comprises an upper surface (31a) that is in contact with the lower surface (14a) of the upper arm (10a) when the spreading means (31) are in the first backward position, in such a way as to push said upper arm (10a) of the clamp (1) upwards, as shown in Fig. 9, and a lower surface (31b) that is in contact with the upper surface (13a) of the upper arm (10a) when the spreading means (31) are in the second position, in such a way as to push said upper arm (10a) downwards, as shown in Fig. 10.

[0052] Advantageously, in correspondence of the rear edge of the slot (17) of the upper arm (10a), the lower surface (14a) of the upper arm (10a) is provided with an inclined section (14c) that acts as a reference surface for the oblique section (31c) of the wedge, when the spreading means (31) are in the first retracted position. Advan-

tageously, the upper surface (13a) of the upper arm (10a) has an upward-inclined section (14d) that is disposed in front position relative to the slot (17) and is suitable for acting as reference surface for the wedge, when the spreading means (31) are in the second forward position.

[0053] Fig. 1 shows the labeling machine (100) in an idle position, in which the slider (20) is in the first retracted position, the clamp (1) is closed and is disposed in remote position relative to the storage device (2). The piece of fabric is disposed under the folder (200) and the pocket or the patch, which is supported by the plate (D), is disposed above the piece of fabric, ready to be applied on the piece of fabric.

[0054] With reference to Figs. 2 and 2A, the linear actuator (30) of the opening/closing means (3) moves the spreading means (31) to the first retracted position, in such a way to open the arms (10a, 10b) of the clamp (1). The moving means (4) move the clamp (1) towards the storage device (2).

[0055] With reference to Figs. 3 and 3A, the slider (20) is disposed in the second forward position in such a way to move forward the label (E) disposed on the reference surface (20c) of the slider (20). The open clamp (1) is disposed in such a way that the label (E) that protrudes from the storage device (2) is inserted between the two arms (10a, 10b) and stopped against the stop tooth (11) of the lower arm (10b) of the clamp (1).

[0056] With reference to Figs. 4 and 4A, the linear actuator (30) of the opening/closing means (3) moves the spreading means (31) to the second forward position, in such a way to close the arms (10a, 10b) of the clamp (1). In view of the above, the label (E) is firmly grabbed by the front portion (15a, 15b) of the arms (10a, 10b) of the clamp (1).

[0057] With reference to Figs. 5 and 5A, the slider (20) is disposed in its first retracted position and the moving means (4) move the clamp (1), which supports the label (E), in such a way that the clamp is moved away from the storage device (2).

[0058] As shown in Figs. 6 to 8, the moving means (4) move the clamp (1) to a remote position relative to the storage device (2), i.e. move the clamp (1) under the folder (200), disposing the label (E) between the upper surface of the piece of fabric and the lateral edge of the pocket, in such a way that the label (E) partially protrudes from the lateral edge of the pocket.

[0059] Alternatively, the label can be inserted when the folder has completed its folding step and has moved backwards.

[0060] The folder (200) is disposed on the piece of fabric, in such a way to apply the pocket or the patch on the piece of fabric, while the labeling machine (100) places the label (E) on the piece of fabric under the pocket or the patch.

[0061] The clamp (1) does not move, supporting the label (E) during the positioning of the pocket or of the patch on the piece of fabric.

[0062] Successively, the opening/closing means (3) open the arms (10a, 10b) of the clamp (1) and the labeling machine (100) returns to its idle position (Fig. 1).

[0063] It must be noted that the labels (E) stored in the storage device (2) shown in Figs. 1 to 8 are pre-folded labels (E), i.e. said labels (E) are disposed in the compartment (21) of the storage device (2) in pre-folded condition.

[0064] Figs. 11 to 20 show a first embodiment of the labeling machine of the folding apparatus (C) according to the invention, which, in addition to moving the labels (E), pre-folds said labels (E), which are disposed in the storage device (2) in extended condition, i.e. without being folded.

[0065] In the following description the parts that are identical or that correspond to the aforementioned parts are identified with the same numerals, omitting their detailed description.

[0066] The labeling machine (100) comprises a folding device (5) comprising two fingers (50) suitable for picking a label (E) in extended position from the outlet mouth (22) of the storage device (2), and for folding said label (E) in extended position.

[0067] The folding device (5) comprises an opening/closing device (not shown in the figures) connected to the fingers (50) in order to move said fingers (50) closer/farther. More precisely, the fingers (50) can be in a proximal position, wherein the fingers (50) are in contact to support the label, as shown in Fig. 15, and a distal position, wherein the fingers are apart to permit the insertion of the label (E) between the fingers (50), as shown in Fig. 11.

[0068] The folding device (5) comprises a rotation device (52) (not shown in the Figures) that is connected to said fingers (50) in order to rotate said fingers (50) by 180° around a horizontal axis in central position relative to the two fingers (50), when said fingers (50) are in horizontal position.

[0069] Advantageously, the folding device (5) comprises translation means (not shown in the Figures) to move the fingers (50) closer/farther from the outlet (22) of the storage device (2).

[0070] The folding device (5) comprises fastening means (53) that are suitable for supporting and fastening the label when the label (E) is folded. With reference to Figs. 11 and 12, the clamp (1) picks the label (E) and moves the label (E) out of the storage device (2).

[0071] With reference to Fig. 13, when the label (E) passes under the rotary bar of the fastening means (53), said rotary bar rotates in such a way to block the label (E). The clamp (1) opens to release the label (E).

[0072] With reference to Fig. 14, the fingers (50) in open position are moved closer to the label (E) and are disposed in such a way that one finger is above the label (E) and one finger is under the label (E).

[0073] With reference to Figs. 15 to 17, the fingers (50) are closed in order to pick the label (E) and rotate around their axis of rotation by 180°, in such a way to fold the label (E).

[0074] With reference to Figs. 18 to 20, the clamp (1) is moved closer to the label (E) and grabs the label (E) near its folding edge. The rotary bar of the fastening means (53) is lifted and the fingers (50) are opened, in such a way to release teh label (E).

[0075] Figs. 21 to 31 show a second embodiment of the labeling machine (100) according to the invention, which is provided with two clamps (1) that are shown diagrammatically. Said clamps (1) are identical to the aforementioned clamps (1).

[0076] In the following description the parts that are identical or that correspond to the aforementioned parts are identified with the same numerals, omitting their detailed description.

[0077] The clamps (1) are mutually joined and fixed to a support (6) in order to support the clamps. The support (6) is connected to the moving means (4) in such a way to move both clamps (1) simultaneously.

[0078] More precisely, the clamps (1) are in adjacent, parallel position.

[0079] With reference to Figs. 21 to 24, the moving means (4) move the support (6) in such a way to move a first clamp (1) closer to the storage device (2) in order to pick a first label.

[0080] Successively, as shown in Figs. 25 to 27, the moving means (4) move the support (6) in such a way to move a second clamp (1) closer to the storage device (2) in order to pick a second label.

[0081] With reference to Figs. 28 to 31, the moving means (4) move the support (6) until the labels are partially disposed under the angles formed by the upper edge of the pocket and the lateral edges of the pocket or patch. The clamps (1) support the labels until the pocket or the patch is positioned by the folder (200) on the piece of fabric where it is to be sewn.

[0082] It must be noted that the distance between the two clamps (1) coincides with the distance between the lateral edges of the folded pocket.

[0083] Although not shown in the appended figures, the storage device (2) can comprise a roller whereon a label roll is wound. A breaking line, which consists for instance in a pre-cut line, is disposed between two successive labels (E). When the clamp (1) pulls a label (E), the breaking line is broken, separating said label (E) from the other labels. Alternatively, the labeling machine (100) may comprise a blade that separates the label (E) from the other labels (E), when coming out from the storage device.

[0084] Finally, it must be noted that the labels can be portions of a textile or non-textile material with stiffening or stabilization properties, especially in order to sew pockets, patches or elasticized fabric, which would get damaged if washed or otherwise treated.

[0085] In view of the above, the stiffening or stabilization labels may be successively removed after said treatments, since they have a technical function, and not an aesthetical function, being intended not to break the pieces of fabric or the seams that fix the patch or the pocket to the garment.

Claims

1. Folding apparatus (C) comprising:

- a folder (200) suitable for folding a pocket or a patch to be applied on a piece of fabric;
- a template (D) to support the pocket or the patch;

characterized in that it comprises

- a labeling machine (100) for picking and moving labels (E); said labeling machine (100) comprising:
- a storage device (2) for storing labels (E);
- a clamp (1) suitable for picking a label (E) from the storage device (2); said clamp (1) comprising two opposite arms (10a, 10b);
- opening/closing means (3) connected to the clamp (1) in such a way that said clamp (10) can be in an open position and in a closed position;
- moving means (4) that move the clamp (1) between a position that is close to the storage device (2) and a position that is remote from the storage device (2),

in such a way that the clamp (1) is disposed under the folder (200) and the label (E) is partially disposed under the pocket or the patch,

wherein said opening/closing means (3) of the label machine (100) comprise a linear actuator (30) and spreading means (31) connected to the linear actuator (30) in such a way as to be in a first position, wherein the spreading means (31) open the arms (10a, 10b) of the clamp (1), and in a second position, wherein the spreading means (31) close the arms (10a, 10b) of the clamp (1).

wherein said clamp (1) of the labeling machine (100) comprises an upper arm (10a) and a lower arm (10b), disposed under the upper arm (10a); each arm (10a, 10b) comprising:

- an upper surface (13a, 13b);
- a lower surface (14a, 14b);
- a front portion (15a, 15b) suitable for picking the label (E); and
- a rear portion (16a, 16b);

said upper arm (10a) comprises a slot (17) crossed by the spreading means (31) of the opening/closing means (3); said spreading means (31) comprising a wedge provided with:

- an upper surface (31a) that is in contact with the lower surface (14a) of the upper arm (10a) when the spreading means (31) are in the first position, in such a way to push said upper arm (10a) upwards;
- a lower surface (31b) that is in contact with the upper surface (13a) of the upper arm (10a) when

the spreading means (31) are in the second position, in such a way to push said upper arm (10a) downwards.

2. The folding apparatus (C) of claim 1, wherein said lower arm (10b) of the clamp (1) of the labeling machine (100) comprises a stop tooth (11) against which the label (E) is stopped; said stop tooth (11) being disposed in upper position on said front portion (15b) of the lower arm (10b).

3. The folding apparatus (C) of claim 1 or 2, wherein the upper arm (10a) of the clamp (1) of the labeling machine (100) comprises a window (12) wherein the stop tooth (11) of the lower arm (10b) of the clamp (1) of the label machine (100) is disposed, when the clamp (1) is in closed position.

4. The folding apparatus (C) of any one of the preceding claims, wherein said storage device (2) of the label machine (100) comprises a compartment (21) for storing the labels (E), and an outlet (22) for ejecting the labels (E) out of the compartment (21); said storage device (2) comprises a cursor (20) configured in such a way to move a label (E) out of the storage device (2) through the outlet (22).

5. The folding apparatus (C) of claim 4, wherein said storage device (2) comprises two plates (Y); said two plates (Y) being provided with two free edges that define the outlet (22); said two plates (Y) being configured in such a way to hold the label (E) firmly on the outlet (22).

6. The folding apparatus (C) of claim 4 or 5, wherein the storage device (2) of the label machine (100) comprises an extraction column (26); said extraction column (26) comprising an extraction mouth (26a), extraction means and moving means; said moving means being configured in such a way to move the extraction column (26) from a first position, wherein it is disposed above the compartment (21), to a second position, wherein is partially contained in the compartment (21); said extraction means being suitable for extracting air from the extraction mouth (26a).

7. The folding apparatus (C) of claim 6, wherein said storage device (2) comprises a nozzle (29) disposed near said extraction column (26); said nozzle (29) blowing air along a direction that intercepts the extraction mouth (26a) of the extraction column (26) when the extraction column (26) is in its first position, with the extraction mouth (26a) opposite to the outlet mouth (22).

8. The folding apparatus (S) of any one of the preceding claims, wherein said label machine (100) comprises a folding device (5) comprising:

- two fingers (50) suitable for picking a label in extended position from the outlet mouth (22) of the storage device (2) and for folding said label;
- an opening/closing device (51) connected to said fingers to move said fingers (50) closer or farther;
- a rotation device (52) connected to said fingers (50) in order to rotate said fingers by 180° (50) around a horizontal axis in central position relative to the two fingers (50), when said fingers (50) are in horizontal position;
- locking means (53) suitable for locking the label (E) during the folding of the label (E).

9. The folding apparatus (C) of any one of the preceding claims, wherein said label machine (100) comprises:

- two clamps (1) in adjacent, parallel position; each clamp (1) being suitable for picking a label (E) from the storage device (2);
- a support (6) to support the clamps (1); said support (6) being connected to the moving means (4), in such a way to move the clamps (1).

Amended claims in accordance with Rule 137(2) EPC.

1. Folding apparatus (C) comprising:

- a folder (200) suitable for folding a pocket or a patch to be applied on a piece of fabric;
- a t plate (D) to support the pocket or the patch;
- a labeling machine (100) for picking and moving labels (E); said labeling machine (100) comprising:
  - a storage device (2) for storing labels (E);
  - a clamp (1) suitable for picking a label (E) from the storage device (2); said clamp (1) comprising two opposite arms (10a, 10b);
  - opening/closing means (3) connected to the clamp (1) in such a way that said clamp (10) can be in an open position and in a closed position;
  - moving means (4) that move the clamp (1) between a position that is close to the storage device (2) and a position that is remote from the storage device (2), where the clamp (1) is disposed under the folder (200) and the label (E) is partially disposed under the pocket or the patch, wherein said opening/closing means (3) of the labeling machine (100) comprise a linear actuator (30) and spreading means (31) connected to the linear actuator (30) in such a way as to be

in a first position, wherein the spreading means (31) open the arms (10a, 10b) of the clamp (1), and in a second position, wherein the spreading means (31) close the arms (10a, 10b) of the clamp (1), wherein said clamp (1) of the labeling machine (100) comprises an upper arm (10a) and a lower arm (10b), disposed under the upper arm (10a); each arm (10a, 10b) comprising:
- an upper surface (13a, 13b);
- a lower surface (14a, 14b);
- a front portion (15a, 15b) suitable for picking the label (E); and
- a rear portion (16a, 16b);

characterized in that said upper arm (10a) comprises a slot (17) crossed by the spreading means (31) of the opening/closing means (3); said spreading means (31) comprising a wedge provided with:

- an upper surface (31a) that is in contact with the lower surface (14a) of the upper arm (10a) when the spreading means (31) are in the first position, in such a way to push said upper arm (10a) upwards;
- a lower surface (31 b) that is in contact with the upper surface (13a) of the upper arm (10a) when the spreading means (31) are in the second position, in such a way to push said upper arm (10a) downwards.

2. The folding apparatus (C) of claim 1, wherein said lower arm (10b) of the clamp (1) of the labeling machine (100) comprises a stop tooth (11) against which the label (E) is stopped; said stop tooth (11) being disposed in upper position on said front portion (15b) of the lower arm (10b).

3. The folding apparatus (C) of claim 1 or 2, wherein the upper arm (10a) of the clamp (1) of the labeling machine (100) comprises a window (12) wherein the stop tooth (11) of the lower arm (10b) of the clamp (1) of the label machine (100) is disposed, when the clamp (1) is in closed position.

4. The folding apparatus (C) of any one of the preceding claims, wherein said storage device (2) of the label machine (100) comprises a compartment (21) for storing the labels (E), and an outlet (22) for ejecting the labels (E) out of the compartment (21); said storage device (2) comprises a cursor (20) configured in such a way to move a label (E) out of the storage device (2) through the outlet (22).

5. The folding apparatus (C) of claim 4, wherein said storage device (2) comprises two plates (Y); said two plates (Y) being provided with two free edges that define the outlet (22); said two plates (Y) being configured in such a way to hold the label (E) firmly on the outlet (22).

6. The folding apparatus (C) of claim 4 or 5, wherein the storage device (2) of the label machine (100) comprises an extraction column (26); said extraction column (26) comprising an extraction mouth (26a), extraction means and moving means; said moving means being configured in such a way to move the extraction column (26) from a first position, wherein it is disposed above the compartment (21), to a second position, wherein is partially contained in the compartment (21); said extraction means being suitable for extracting air from the extraction mouth (26a).

7. The folding apparatus (C) of claim 6, wherein said storage device (2) comprises a nozzle (29) disposed near said extraction column (26); said nozzle (29) blowing air along a direction that intercepts the extraction mouth (26a) of the extraction column (26) when the extraction column (26) is in its first position, with the extraction mouth (26a) opposite to the outlet mouth (22).

8. The folding apparatus (S) of any one of the preceding claims, wherein said label machine (100) comprises a folding device (5) comprising:

- two fingers (50) suitable for picking a label in extended position from the outlet mouth (22) of the storage device (2) and for folding said label;
- an opening/closing device (51) connected to said fingers to move said fingers (50) closer or farther;
- a rotation device (52) connected to said fingers (50) in order to rotate said fingers by 180° (50) around a horizontal axis in central position relative to the two fingers (50), when said fingers (50) are in horizontal position;
- locking means (53) suitable for locking the label (E) during the folding of the label (E).

9. The folding apparatus (C) of any one of the preceding claims, wherein said label machine (100) comprises:

- two clamps (1) in adjacent, parallel position; each clamp (1) being suitable for picking a label (E) from the storage device (2);
- a support (6) to support the clamps (1); said support (6) being connected to the moving means (4), in such a way to move the clamps (1).

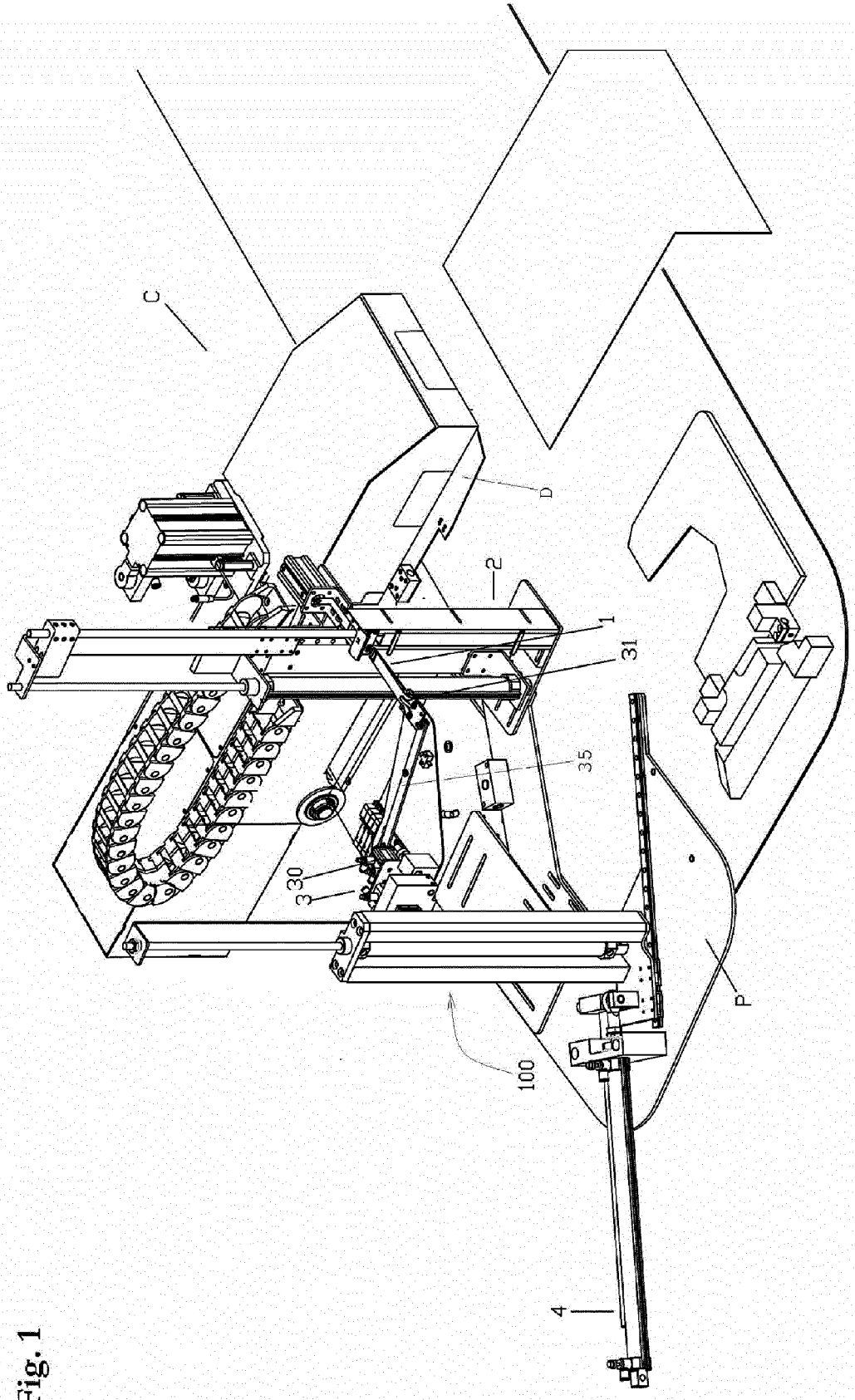


Fig. 1

Fig. 1A

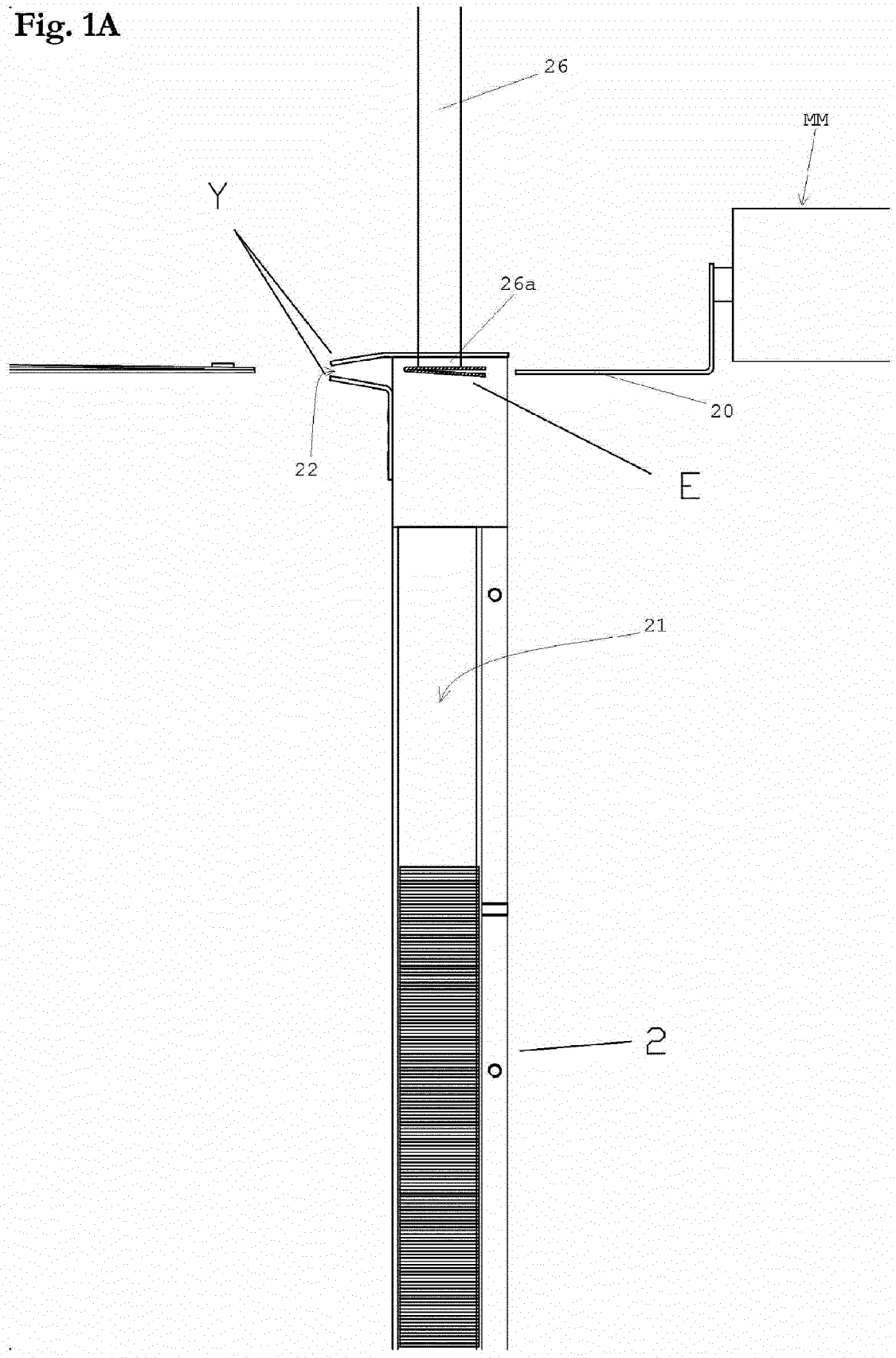
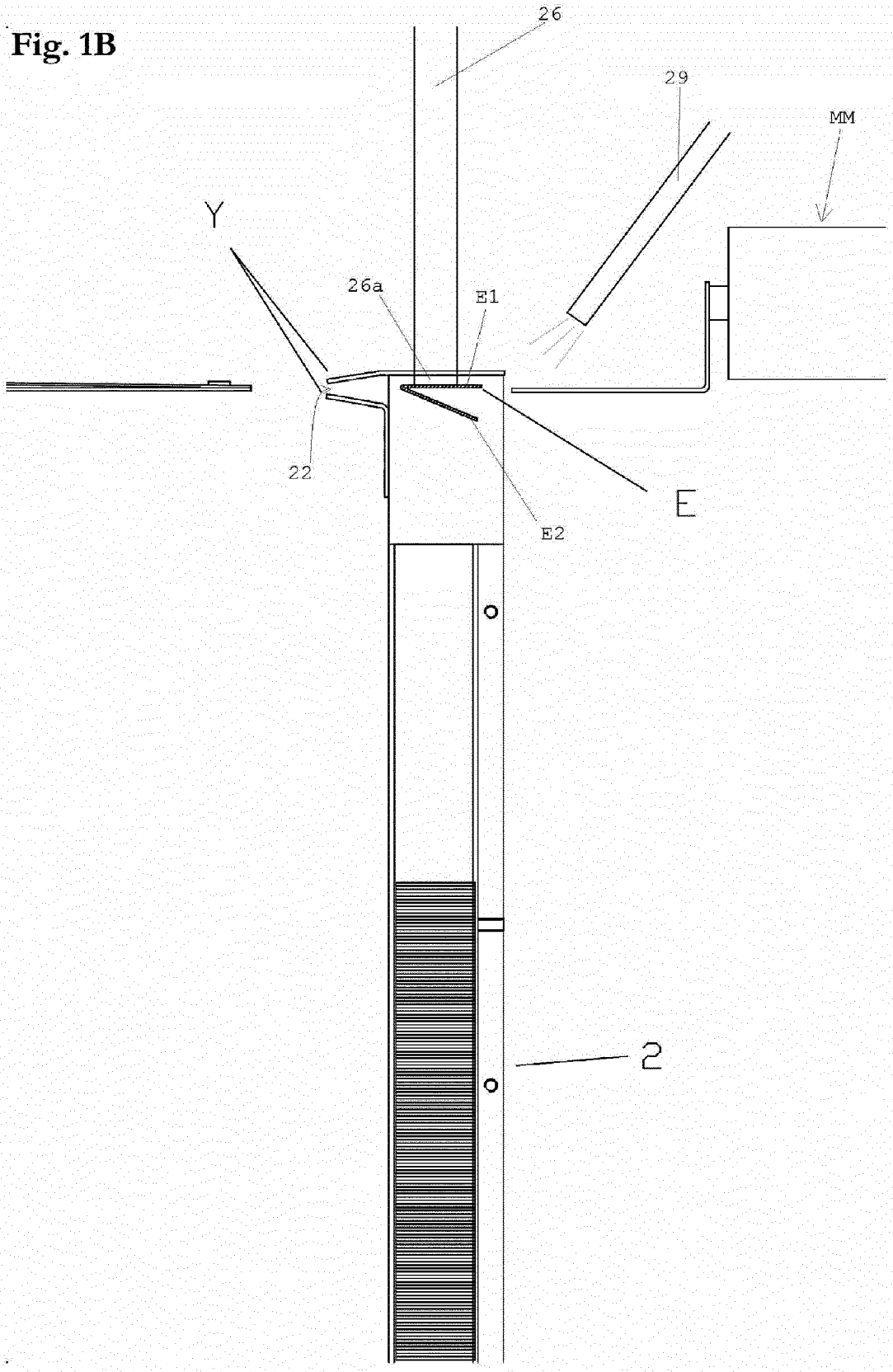


Fig. 1B



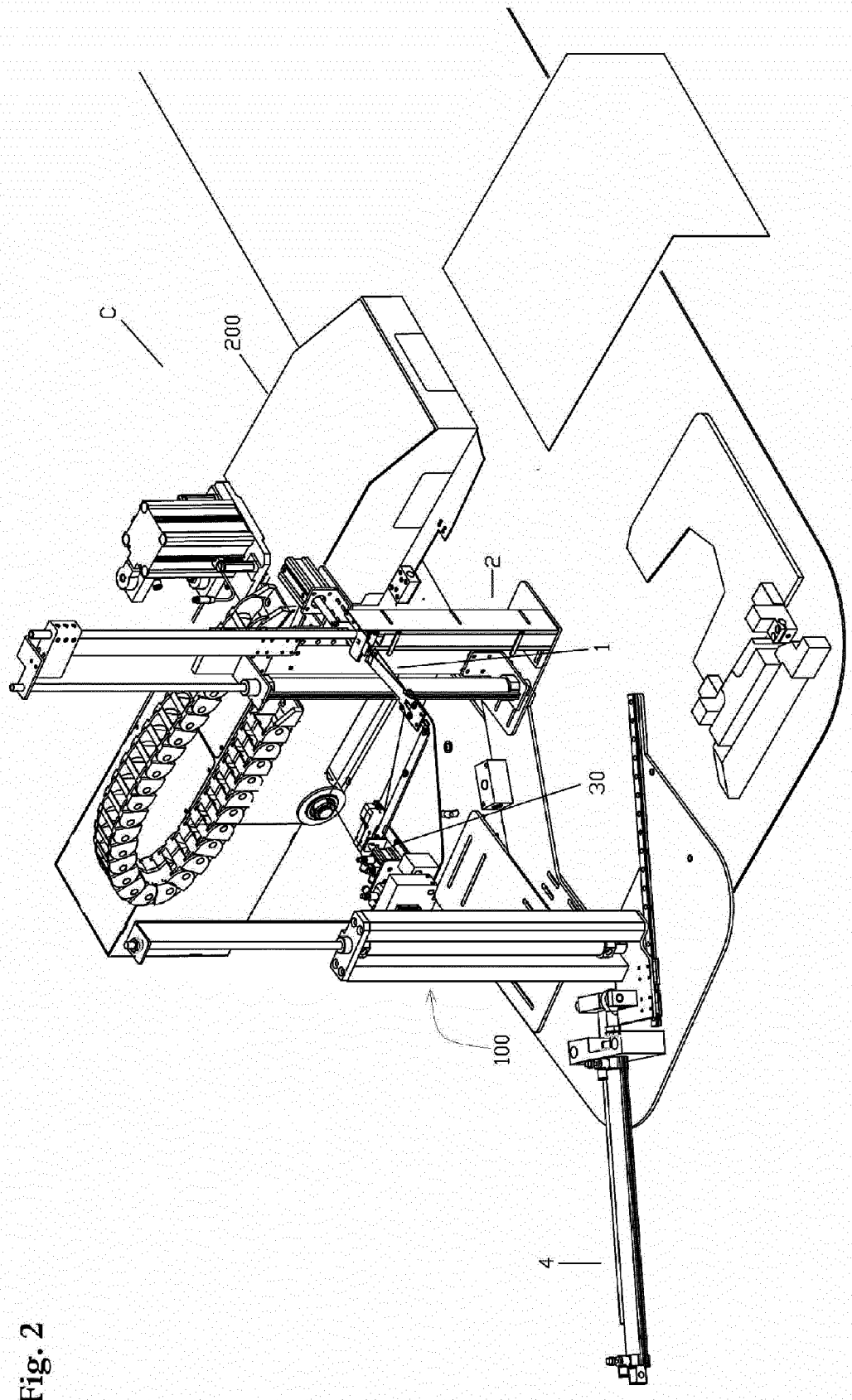


Fig. 2

Fig. 2A

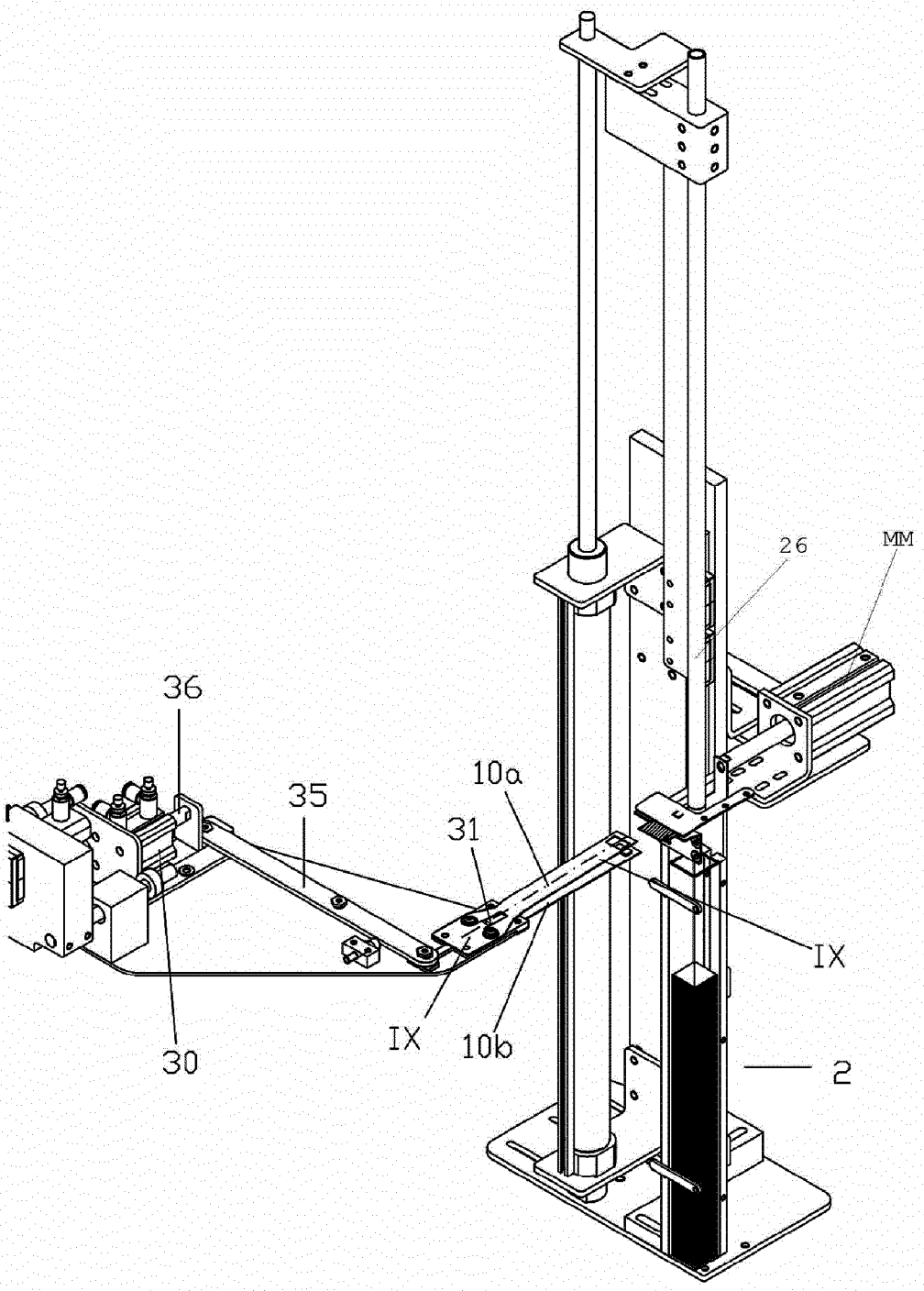
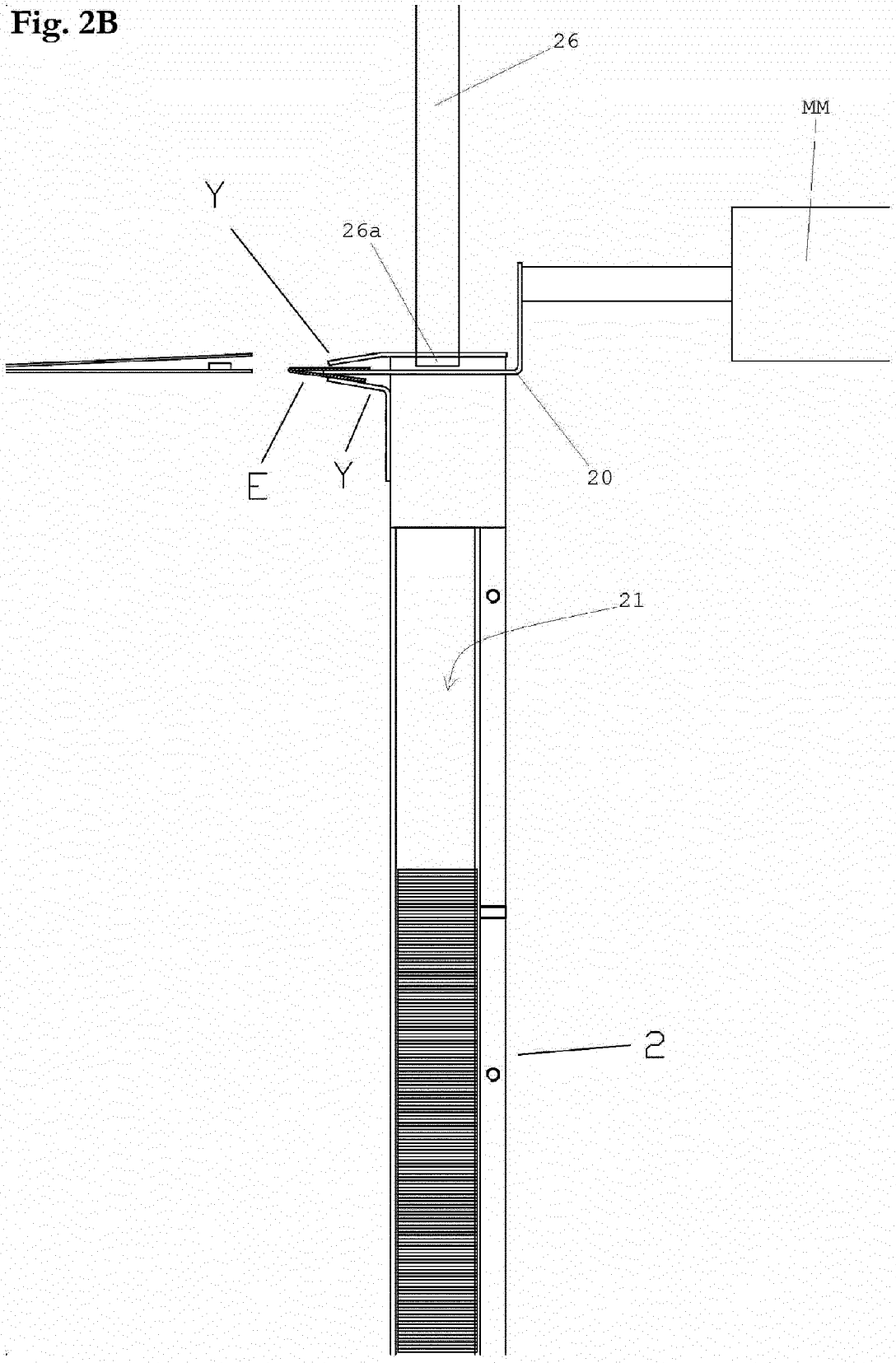


Fig. 2B



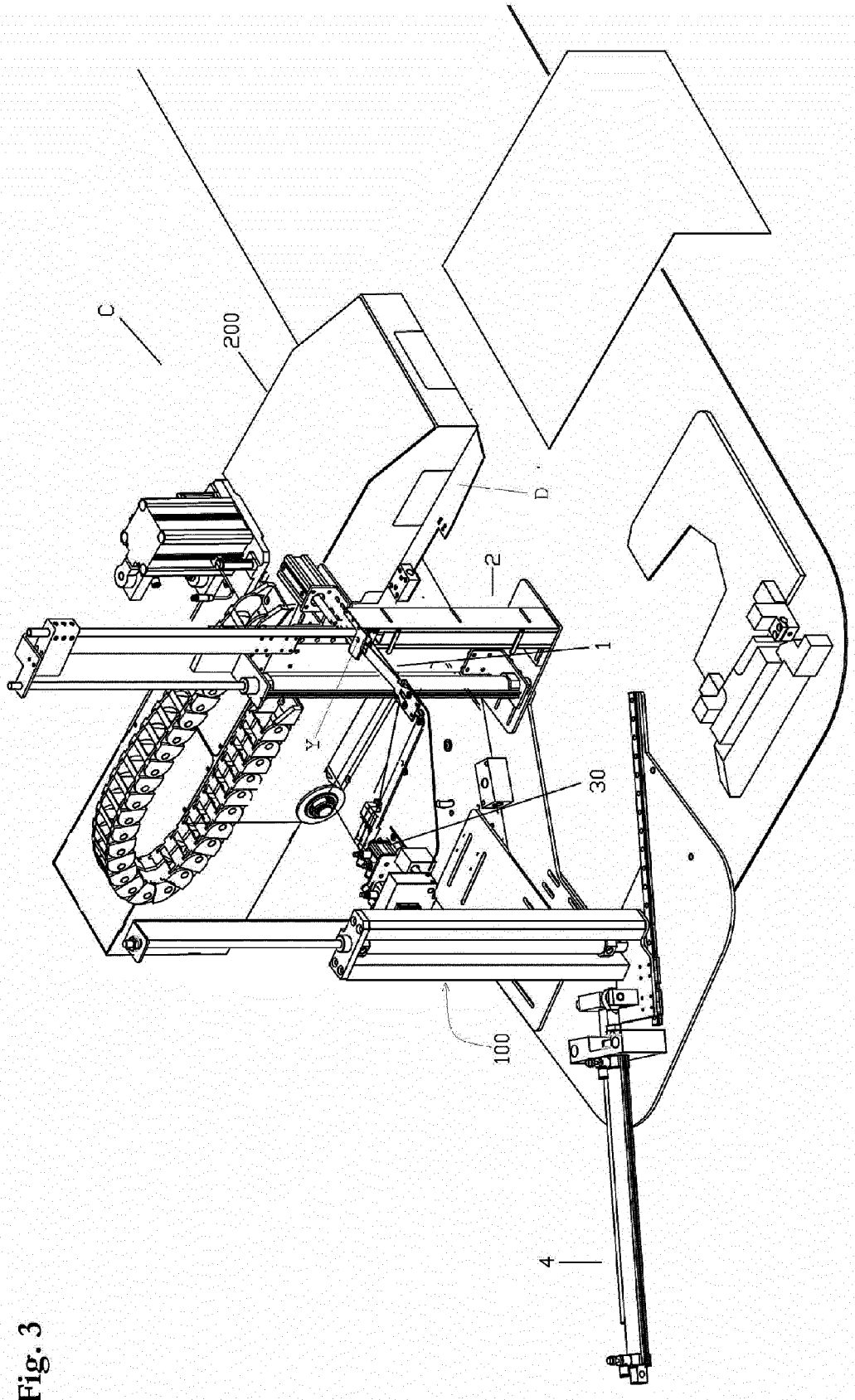


Fig. 3

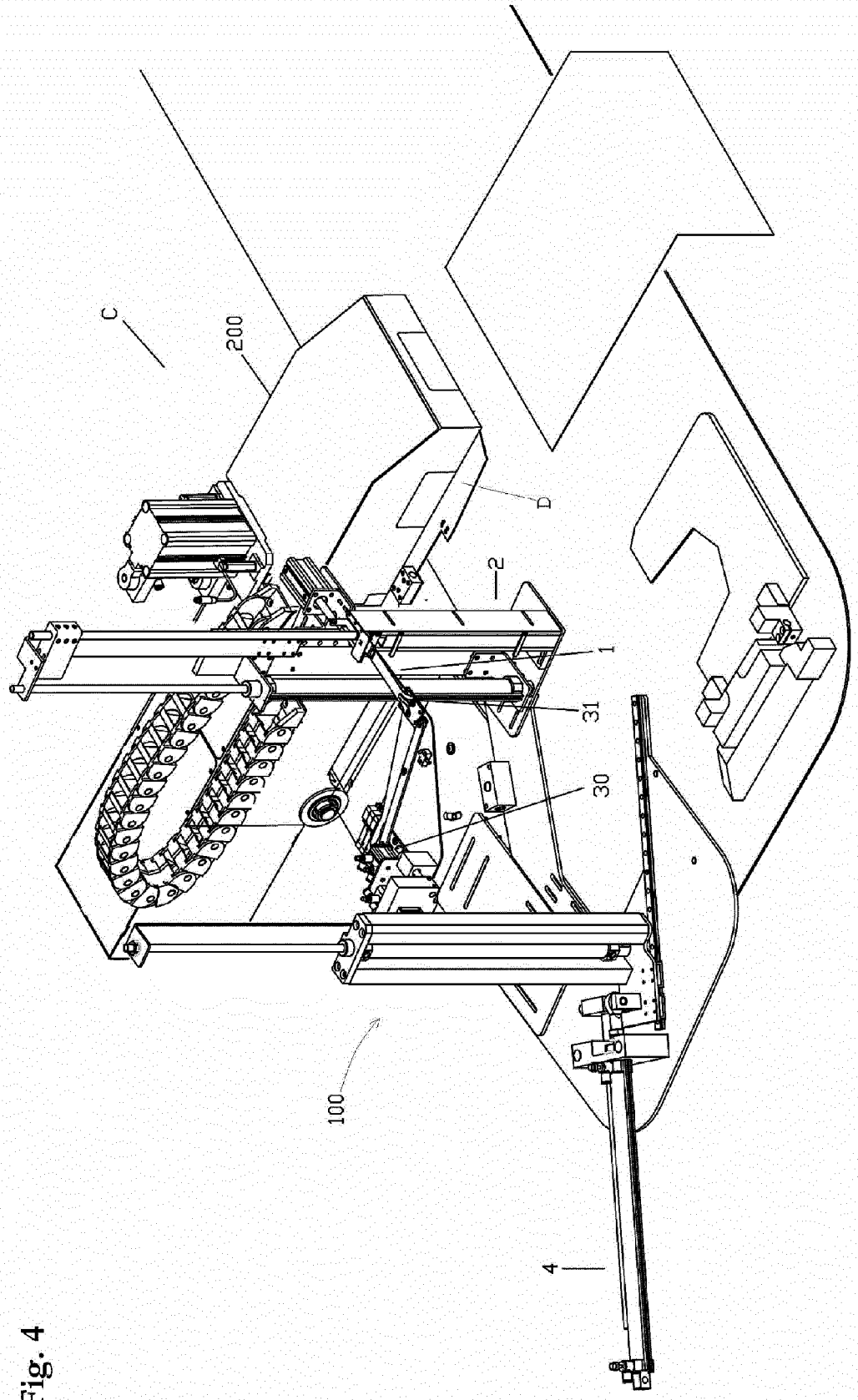
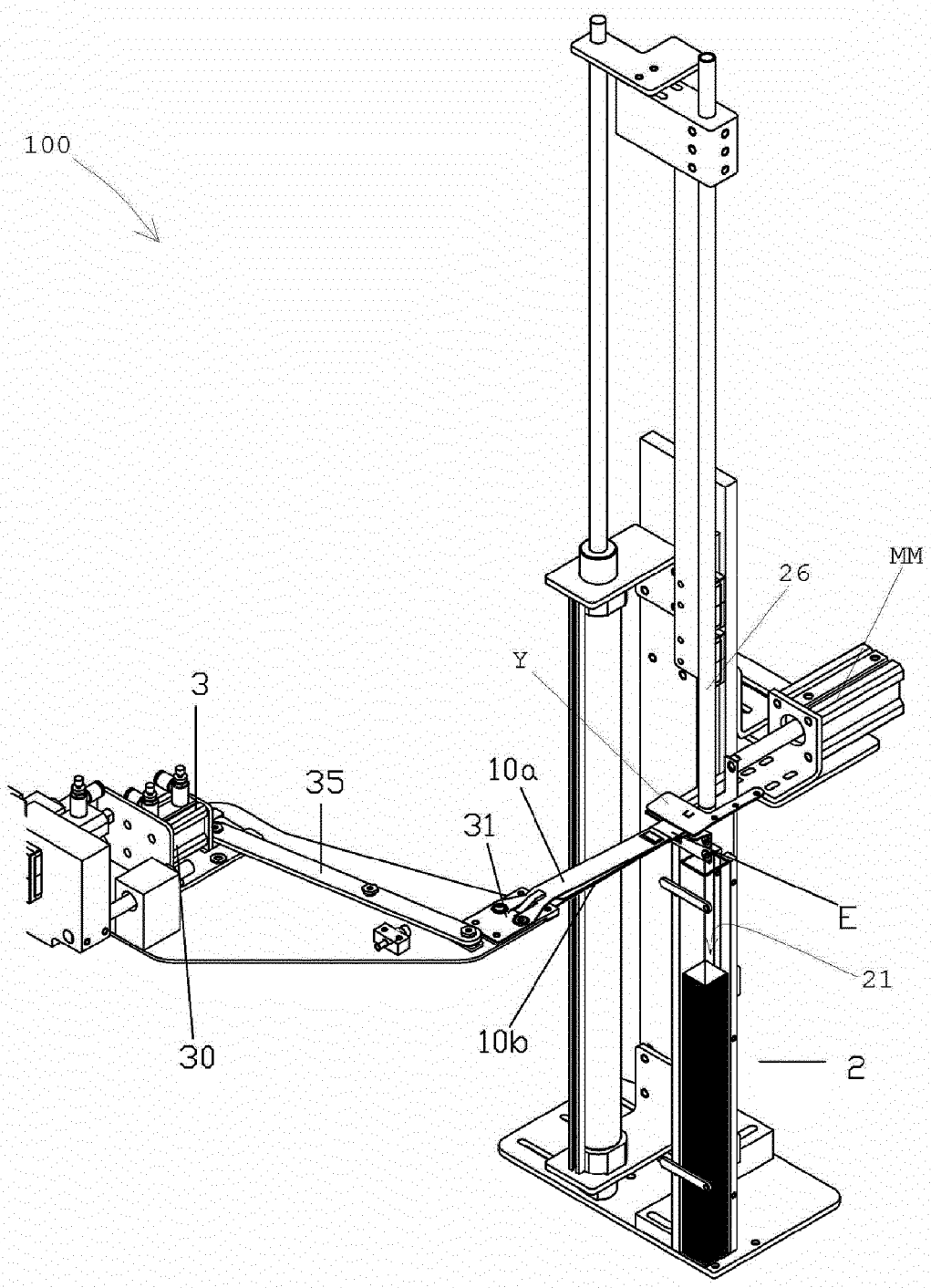


Fig. 4

Fig. 4A



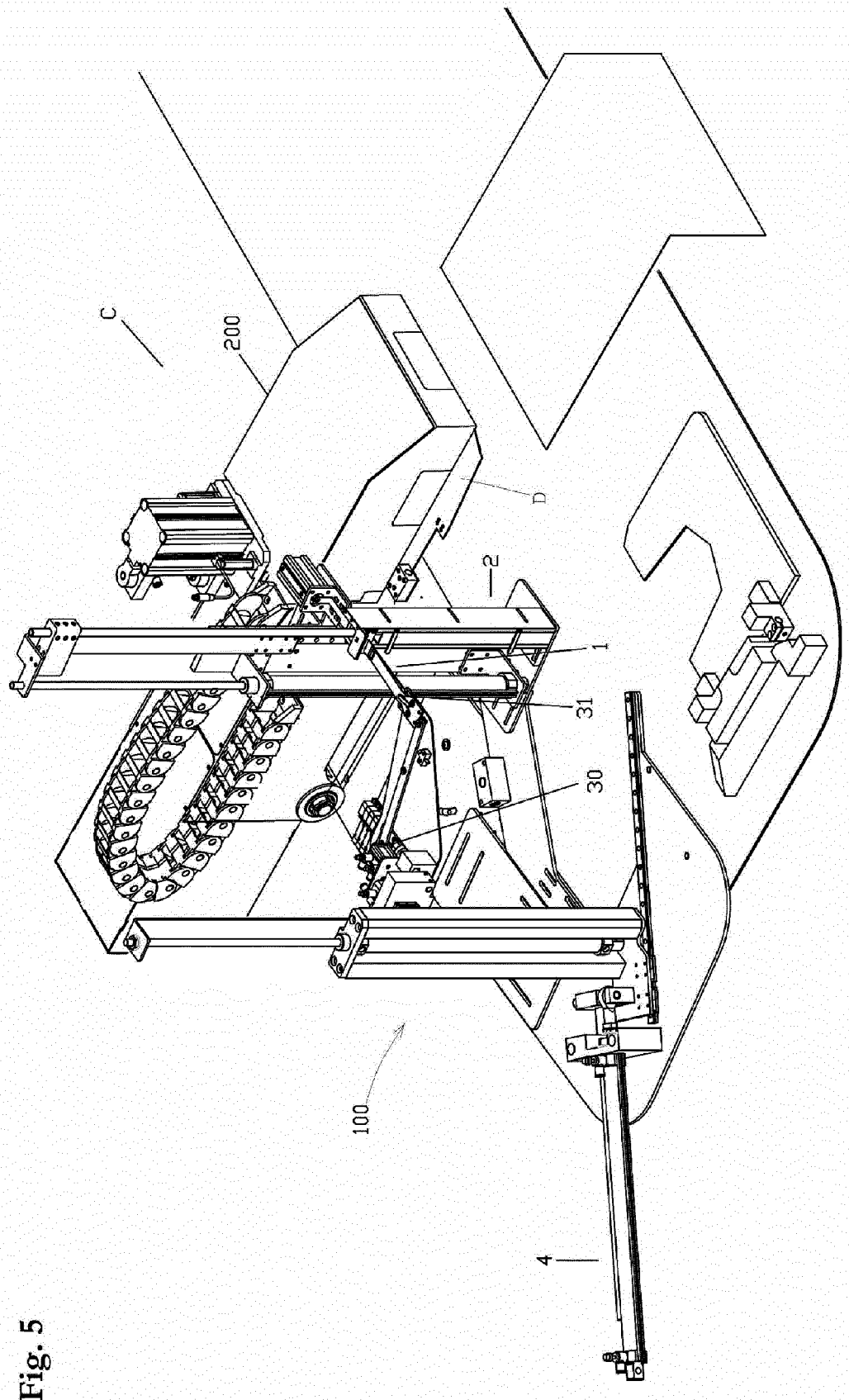
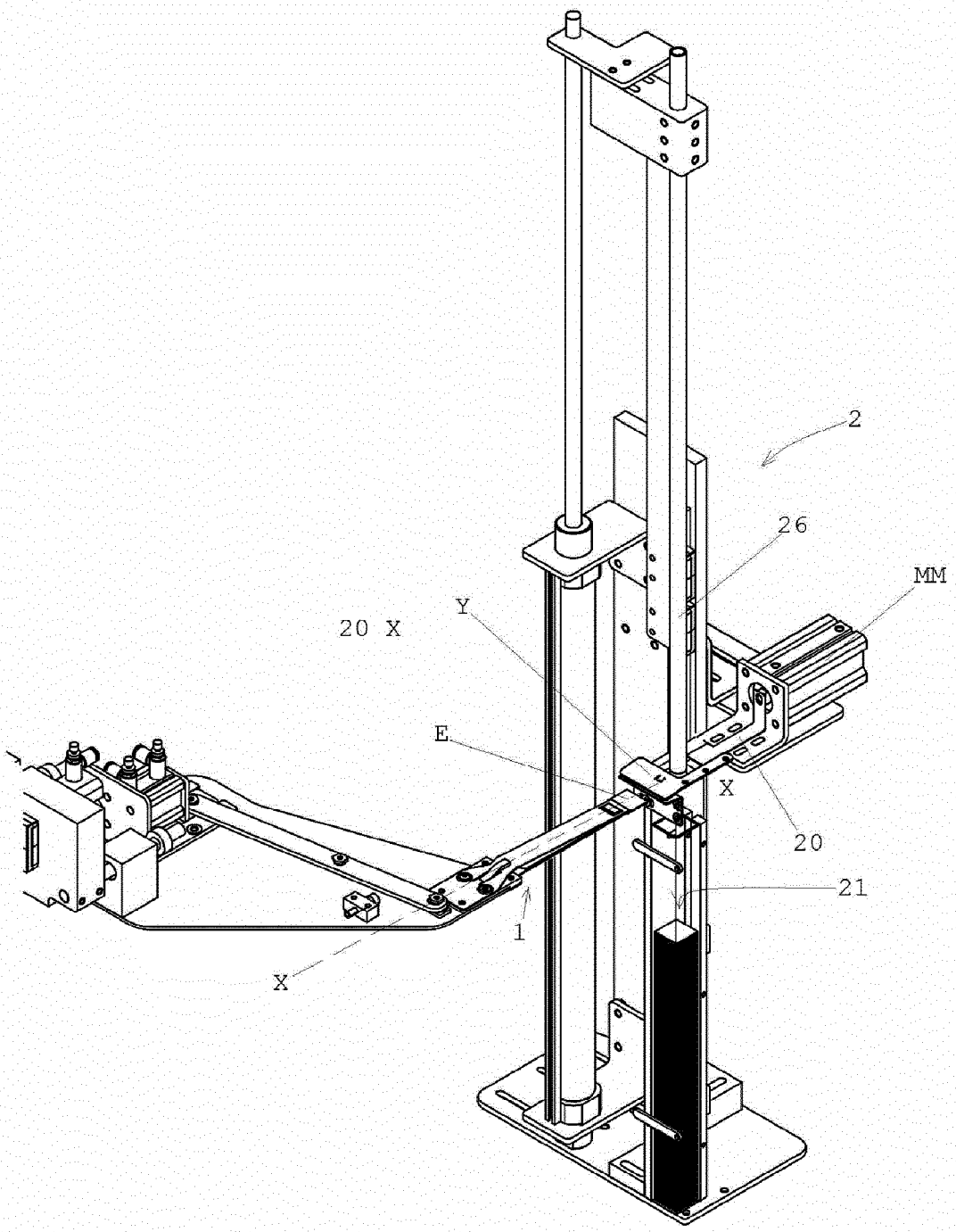


Fig. 5

Fig. 5A



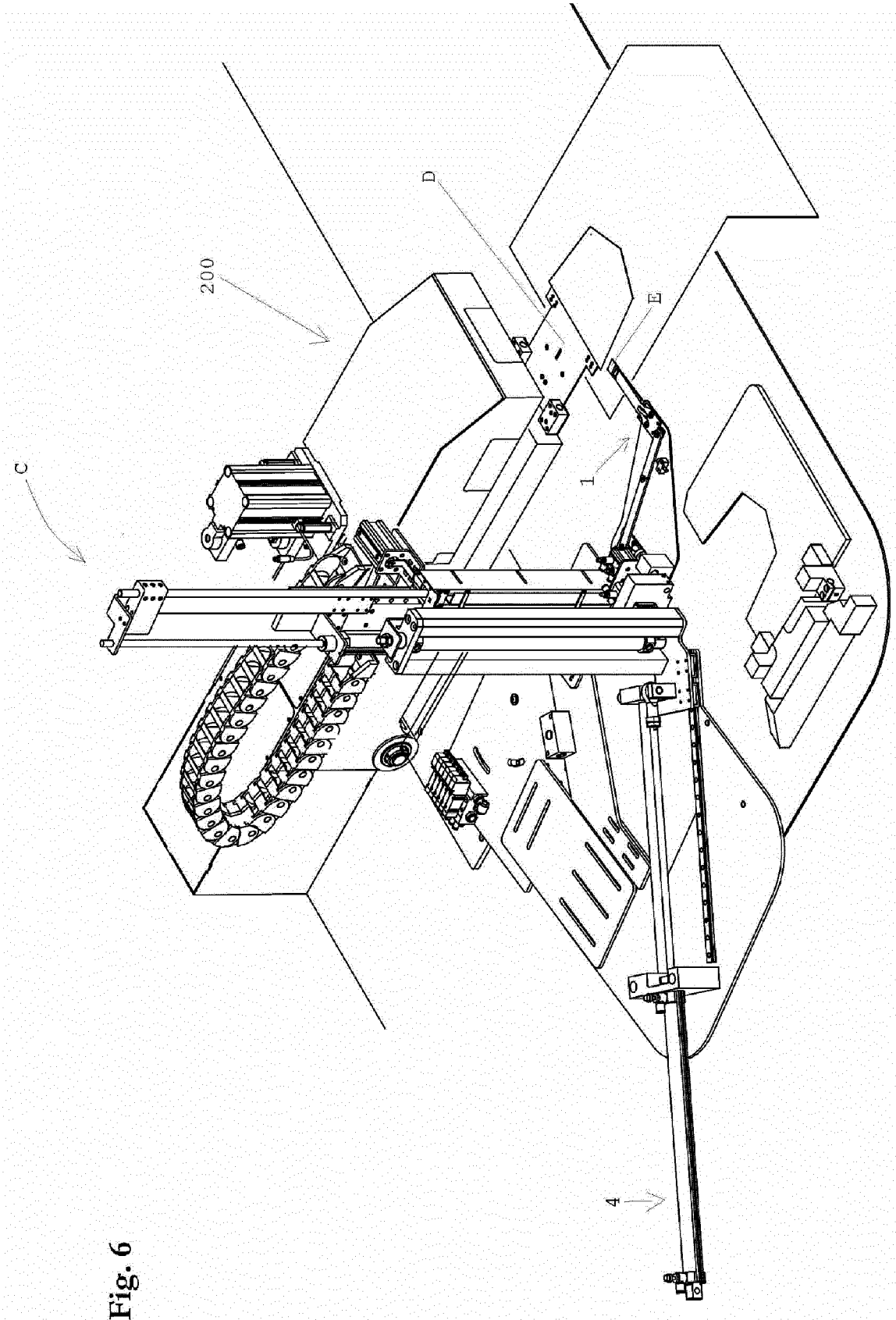


Fig. 6

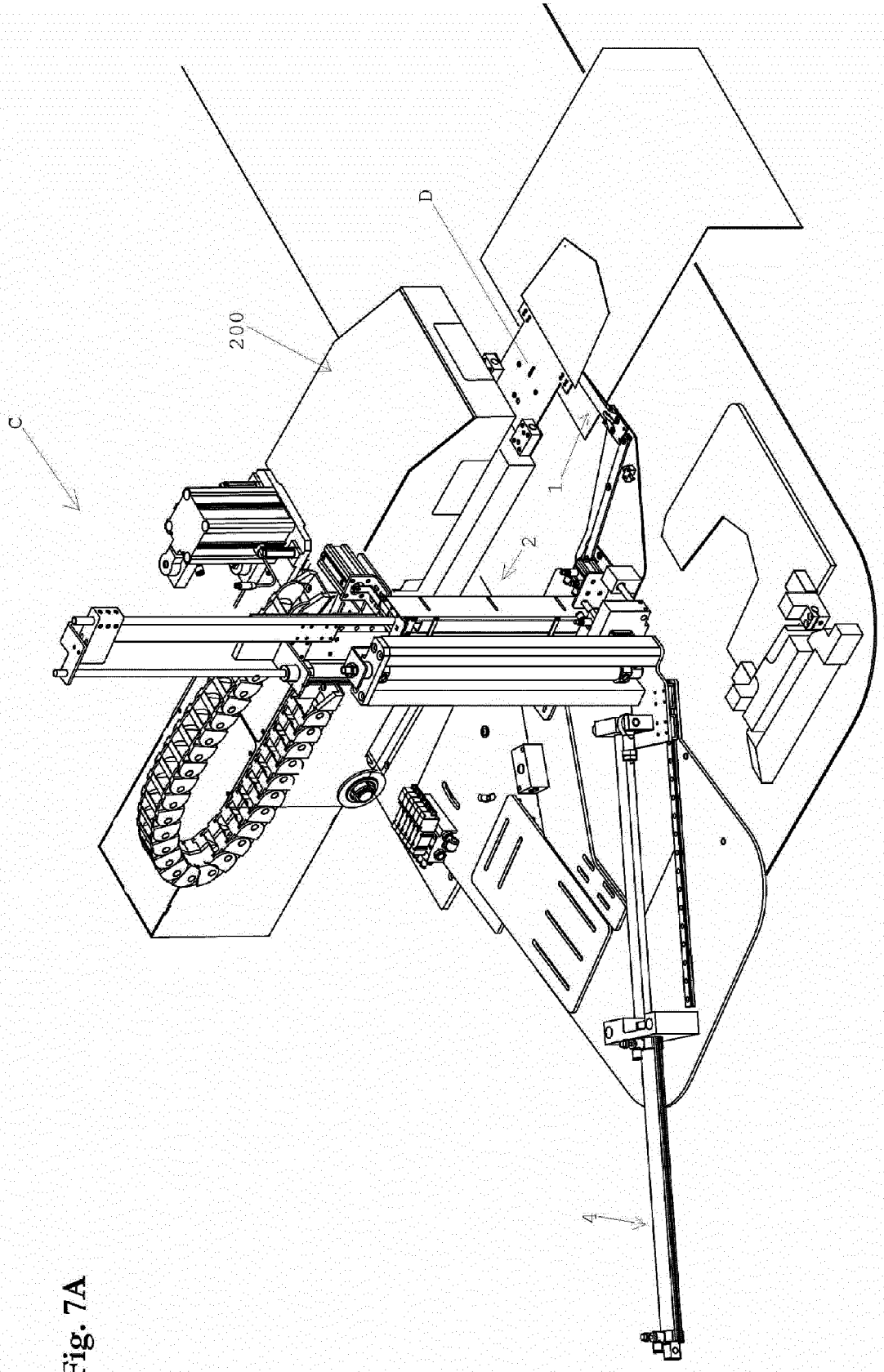


Fig. 7A

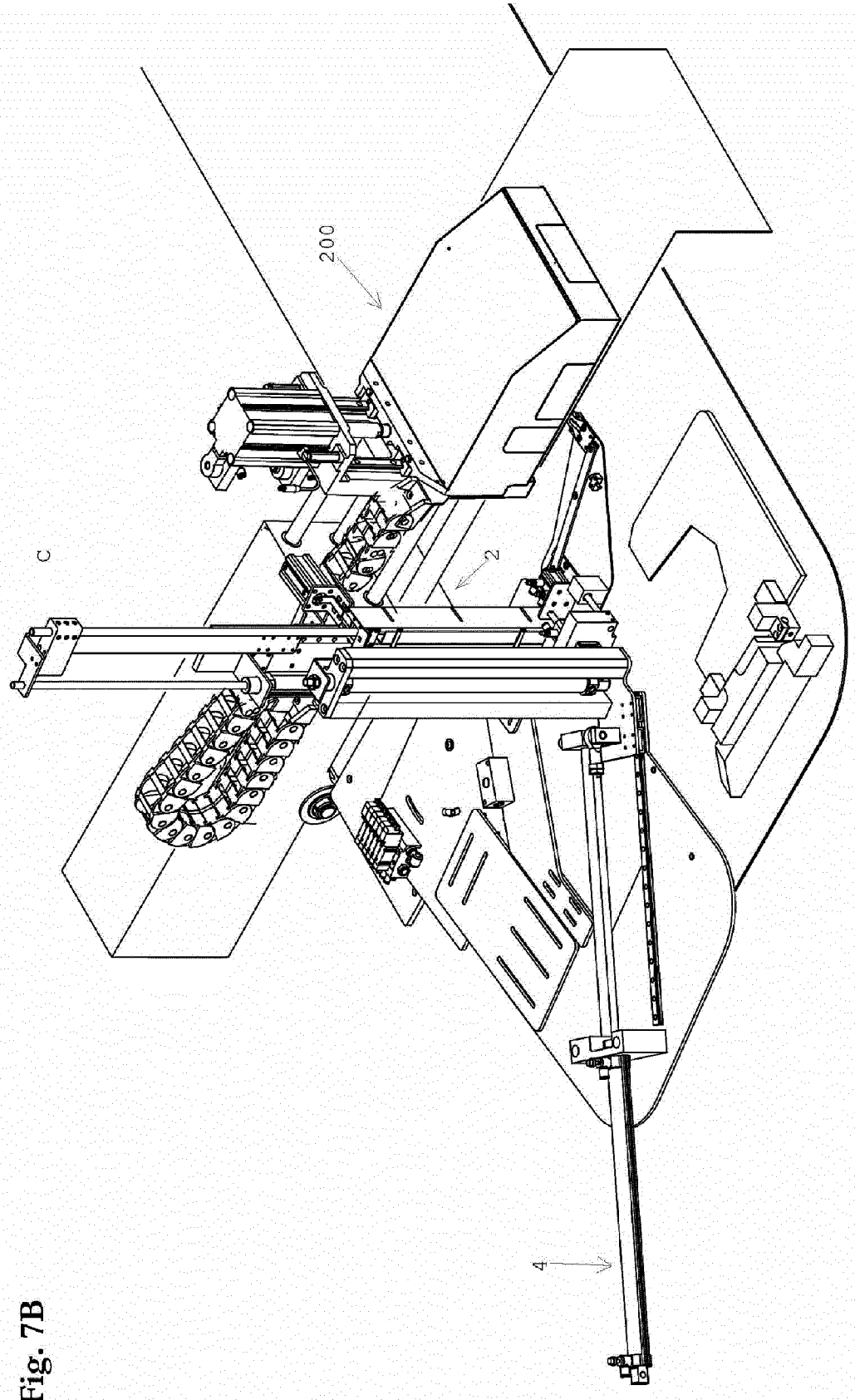


Fig. 7B

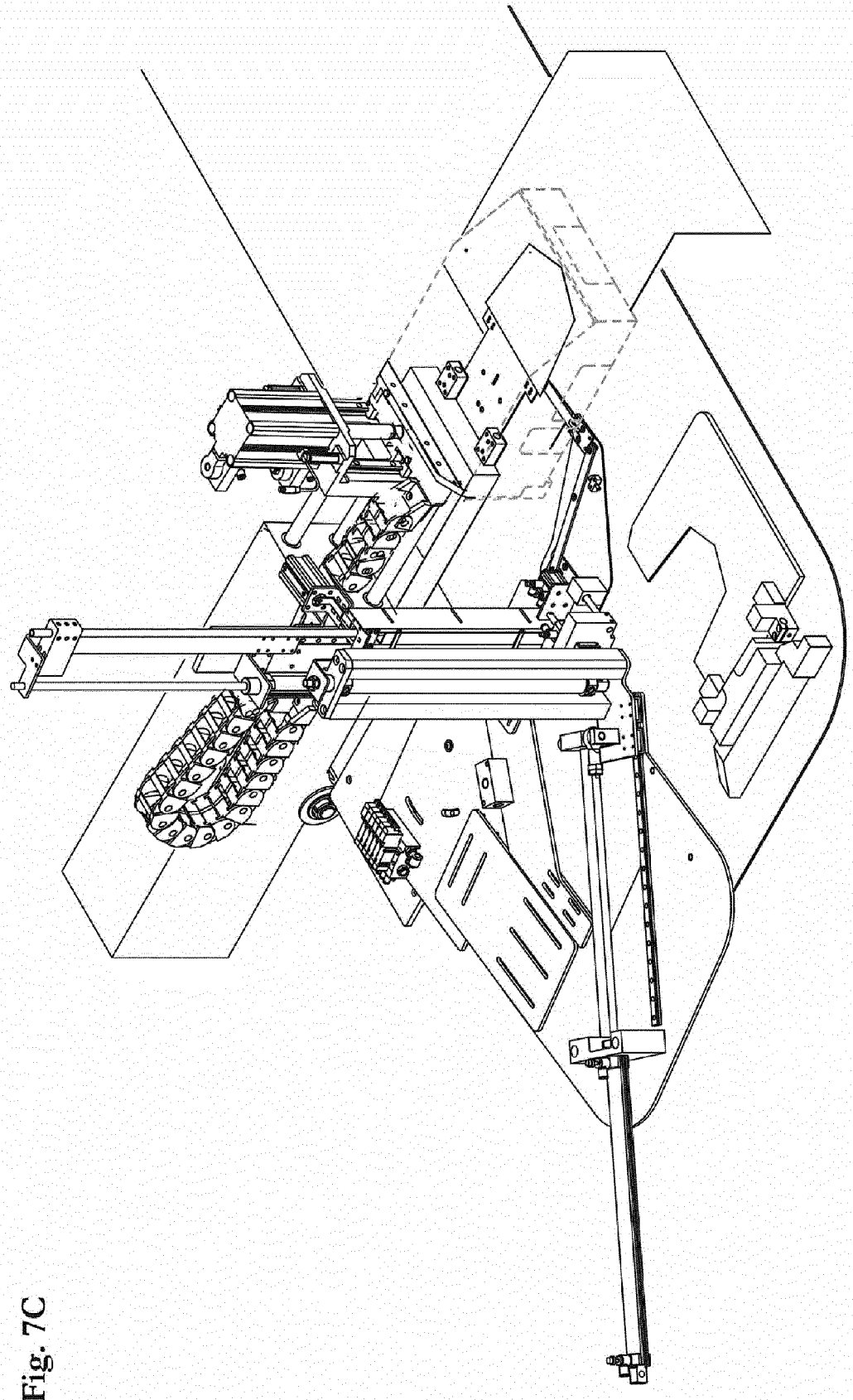


Fig. 7C

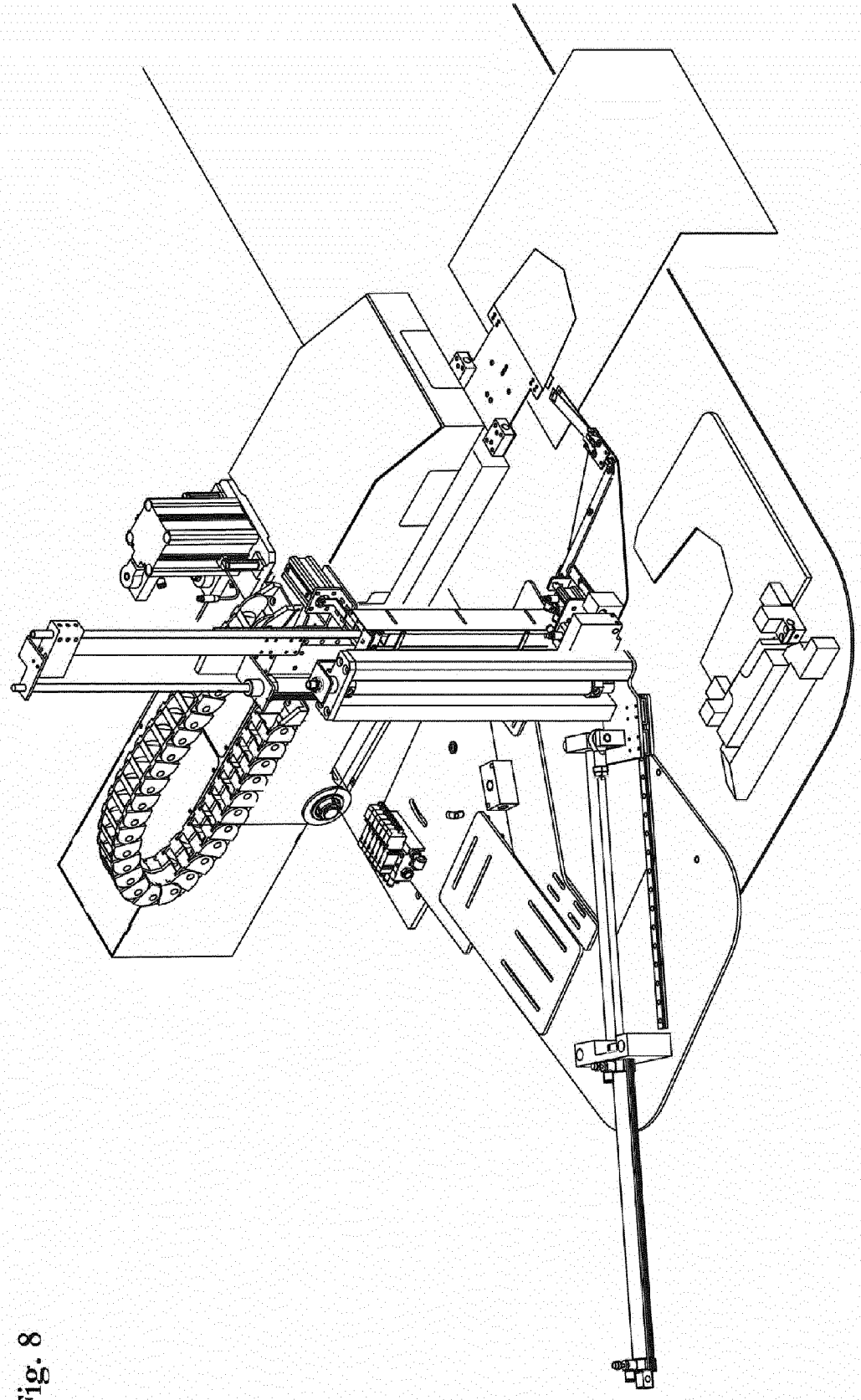


Fig. 8

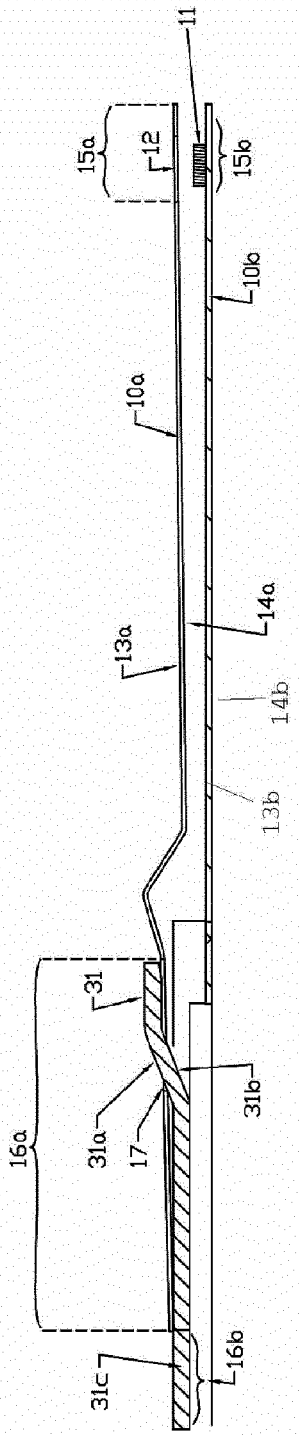
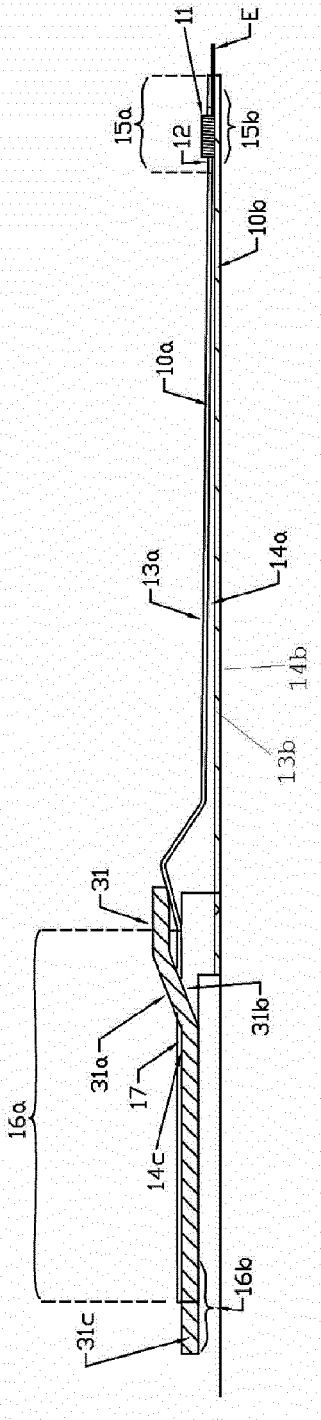

11
15a
12
15b
10b
10a
14a
13a
14b
13b
31
31b
31a
17
16a
16b
31c

Fig. 9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15b
10b
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31a
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16a
14c
16b
31c

Fig. 10

Fig. 11

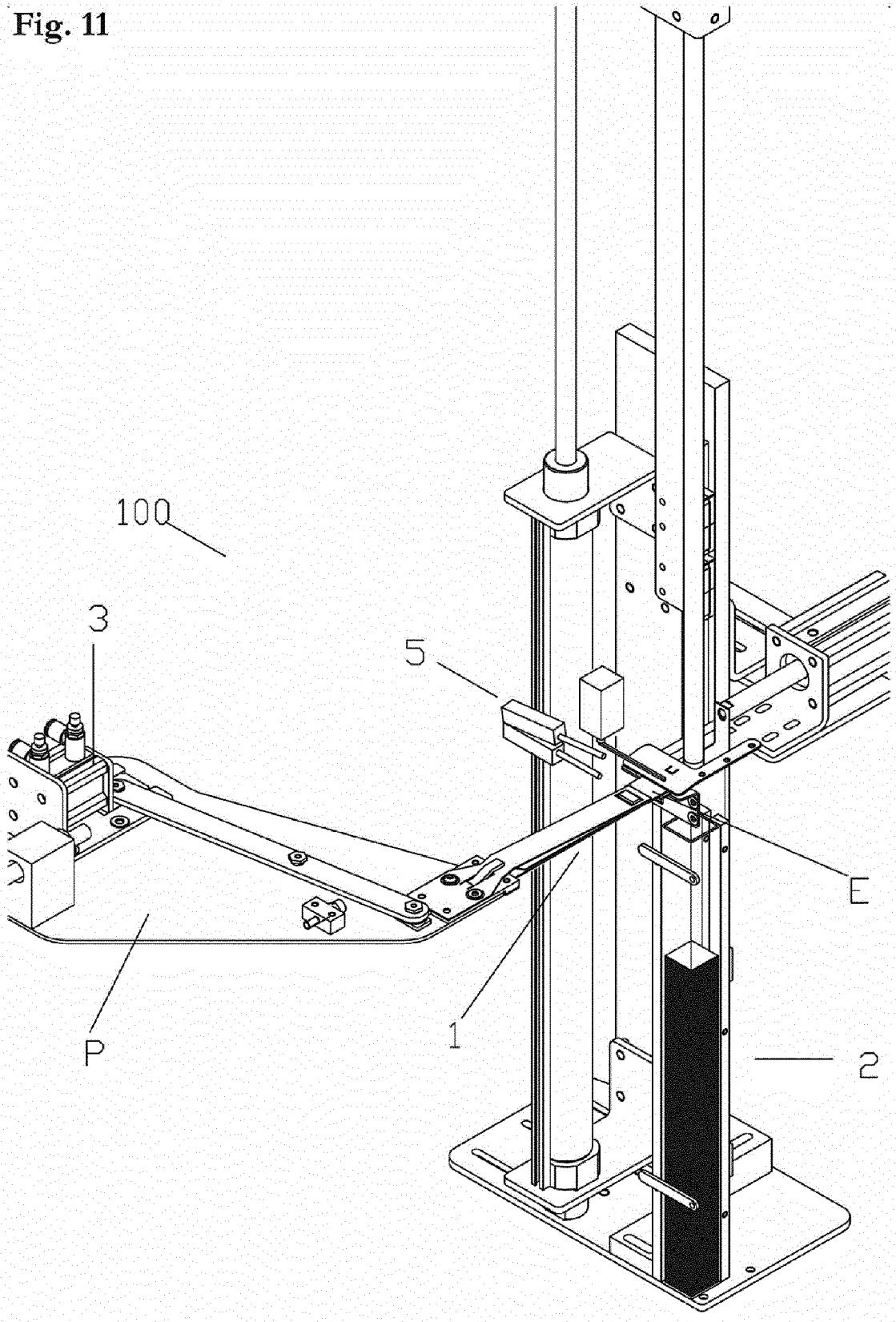


Fig. 12

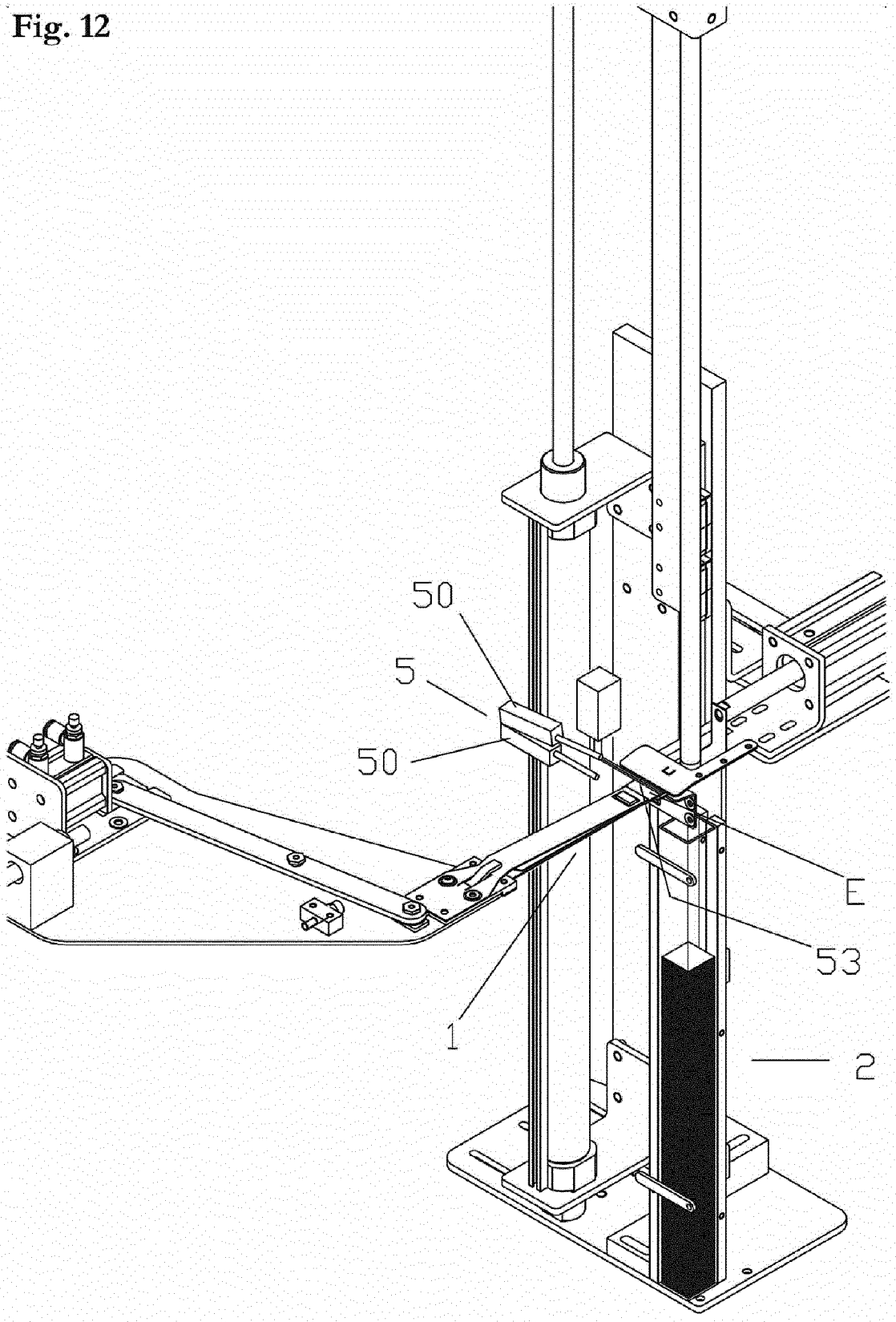


Fig. 13

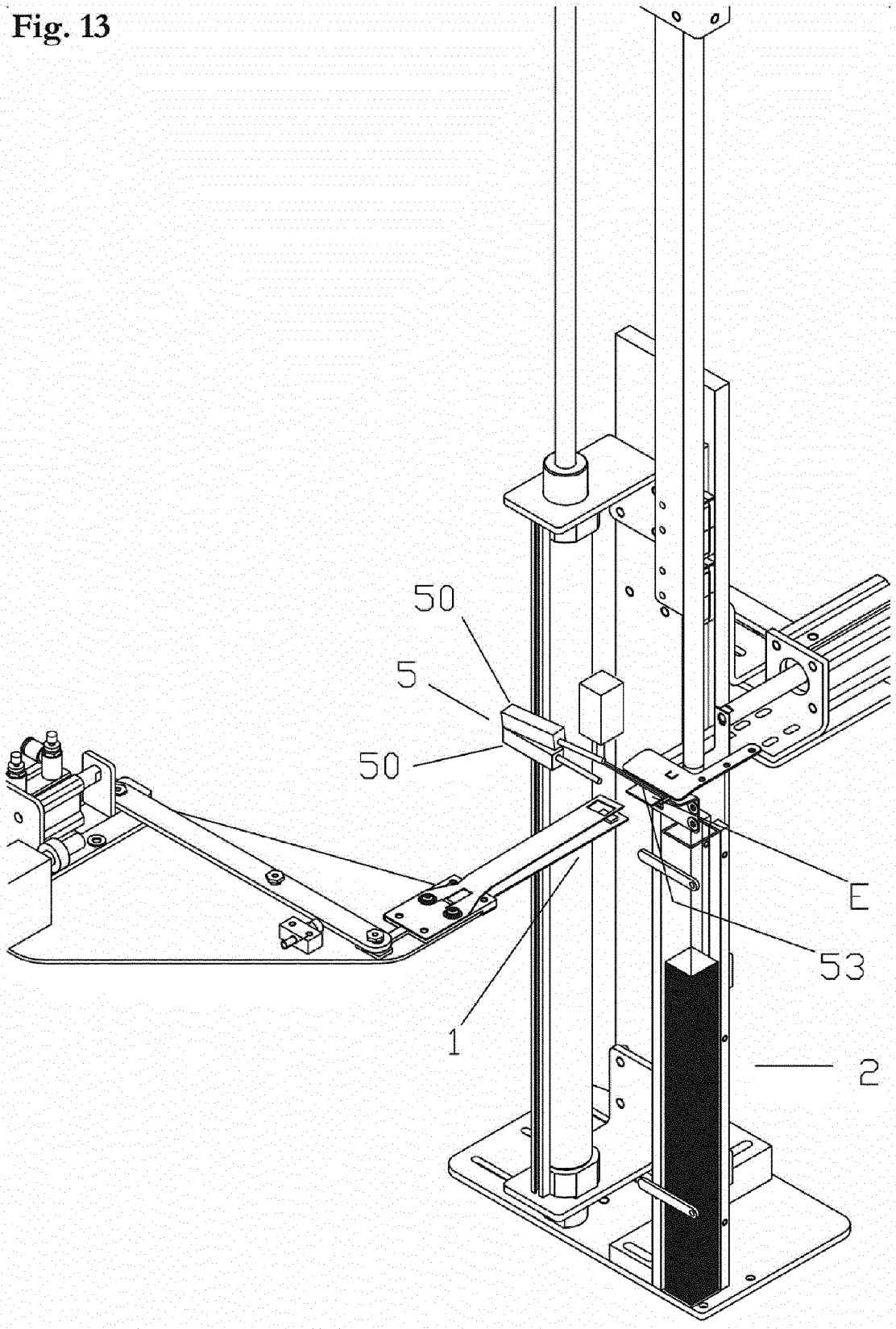


Fig. 14

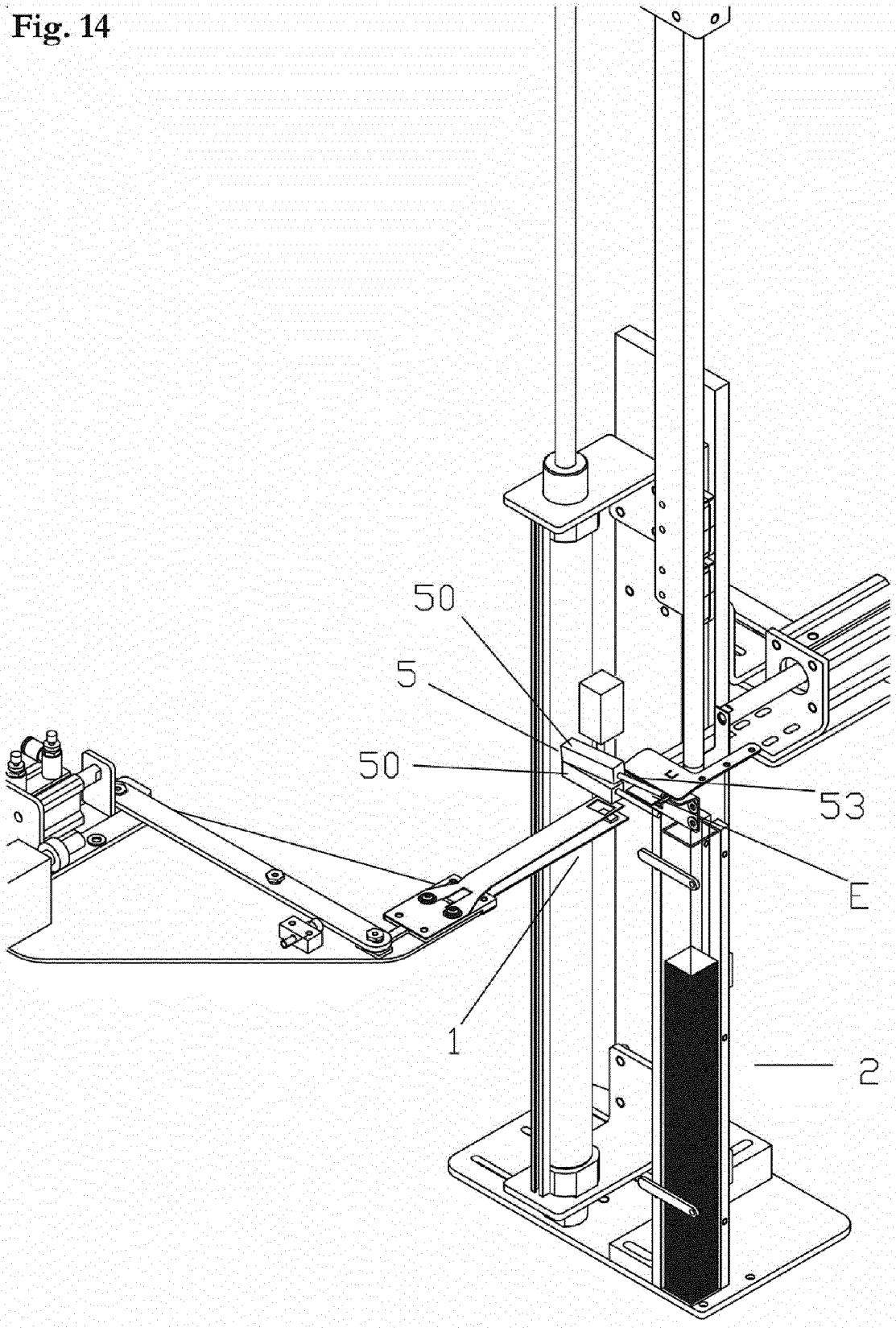


Fig. 15

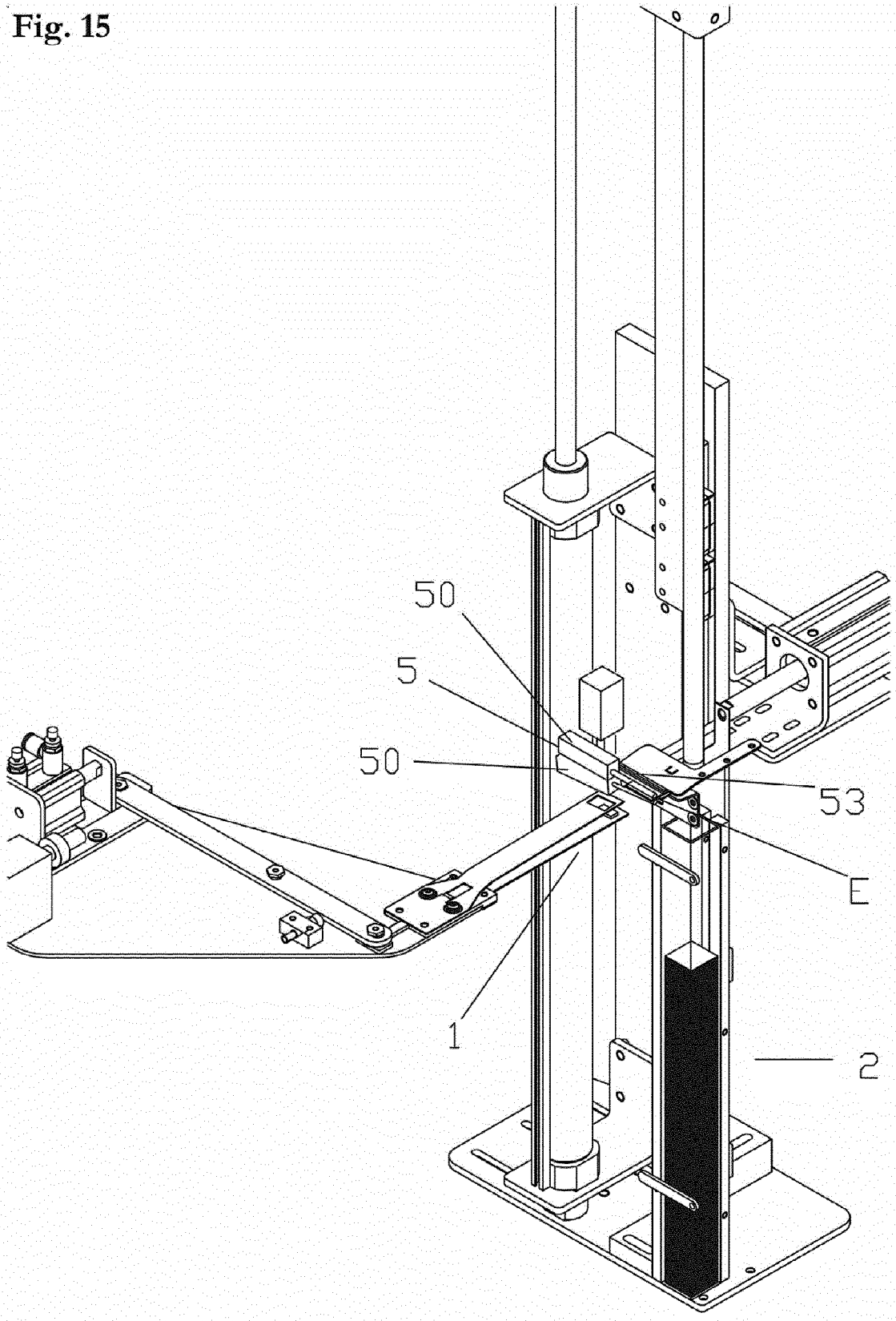


Fig. 16

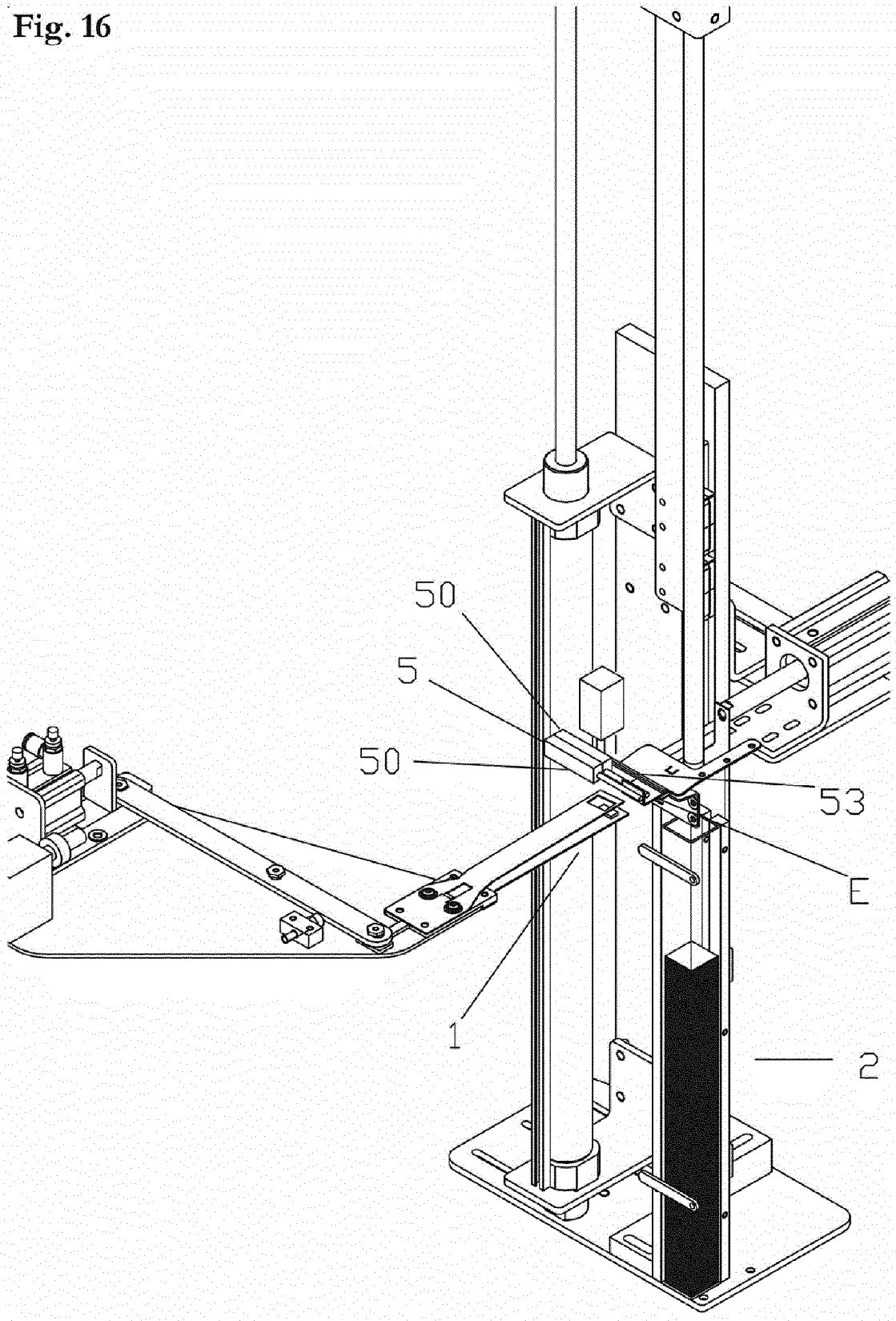


Fig. 17

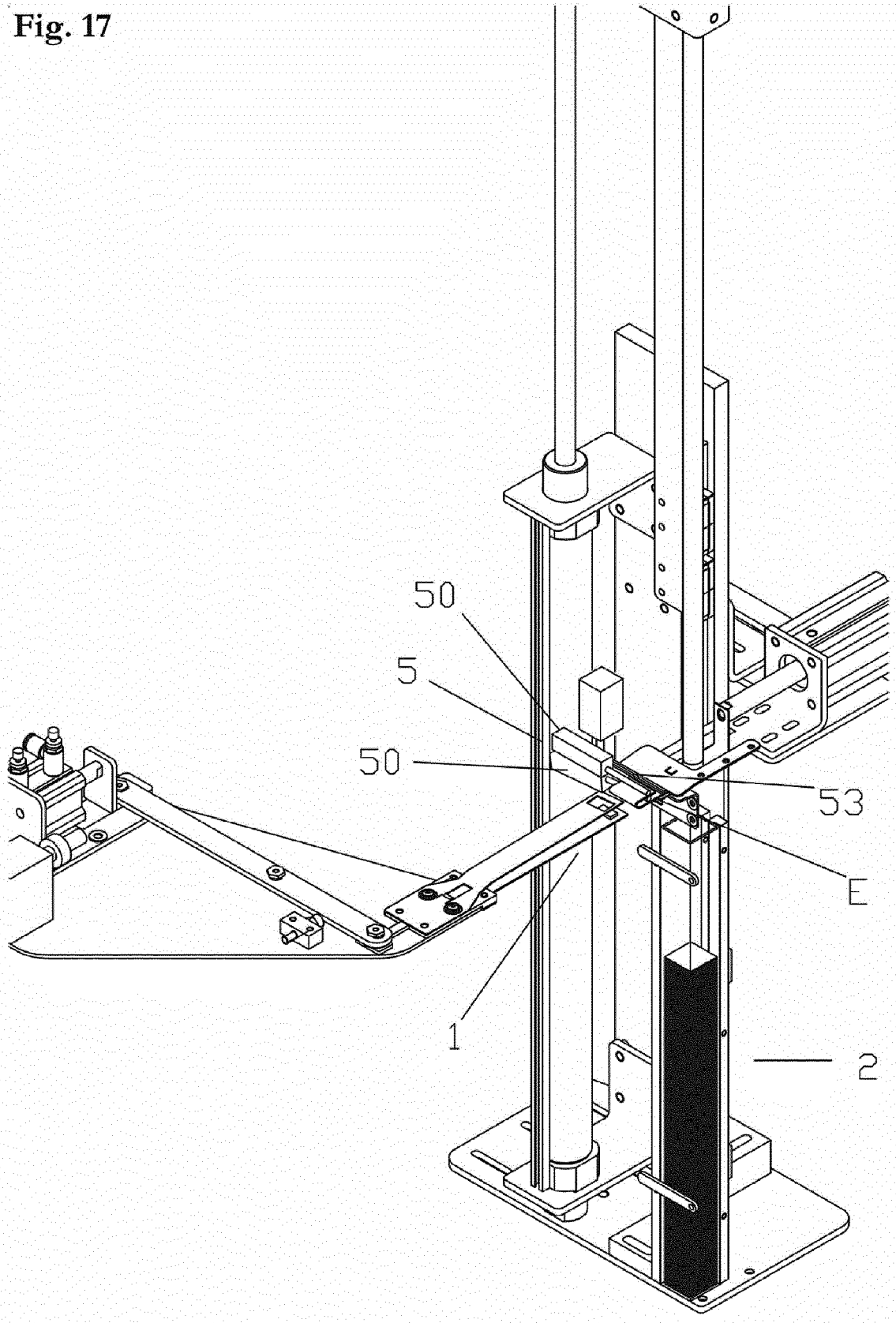


Fig. 18

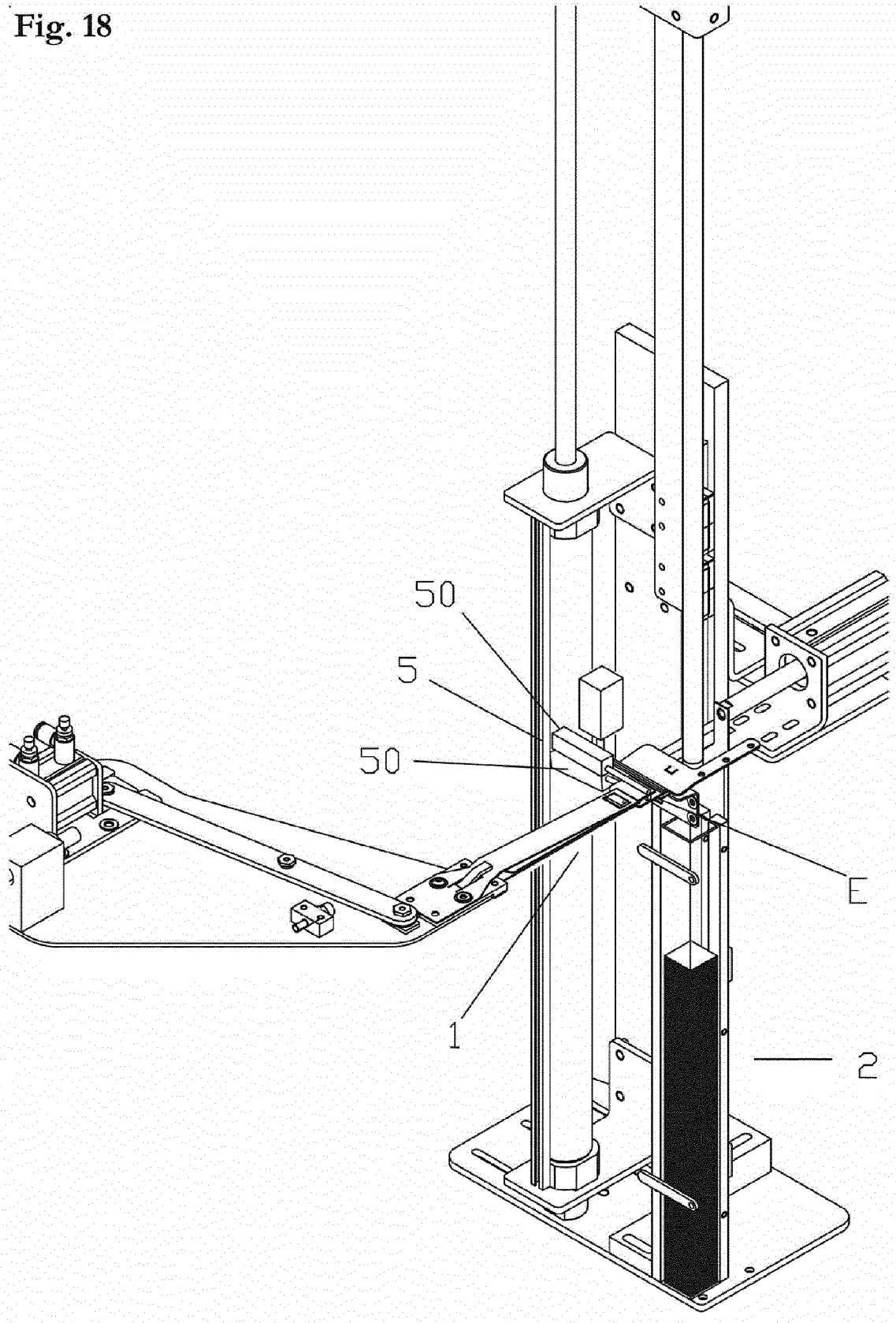


Fig. 19

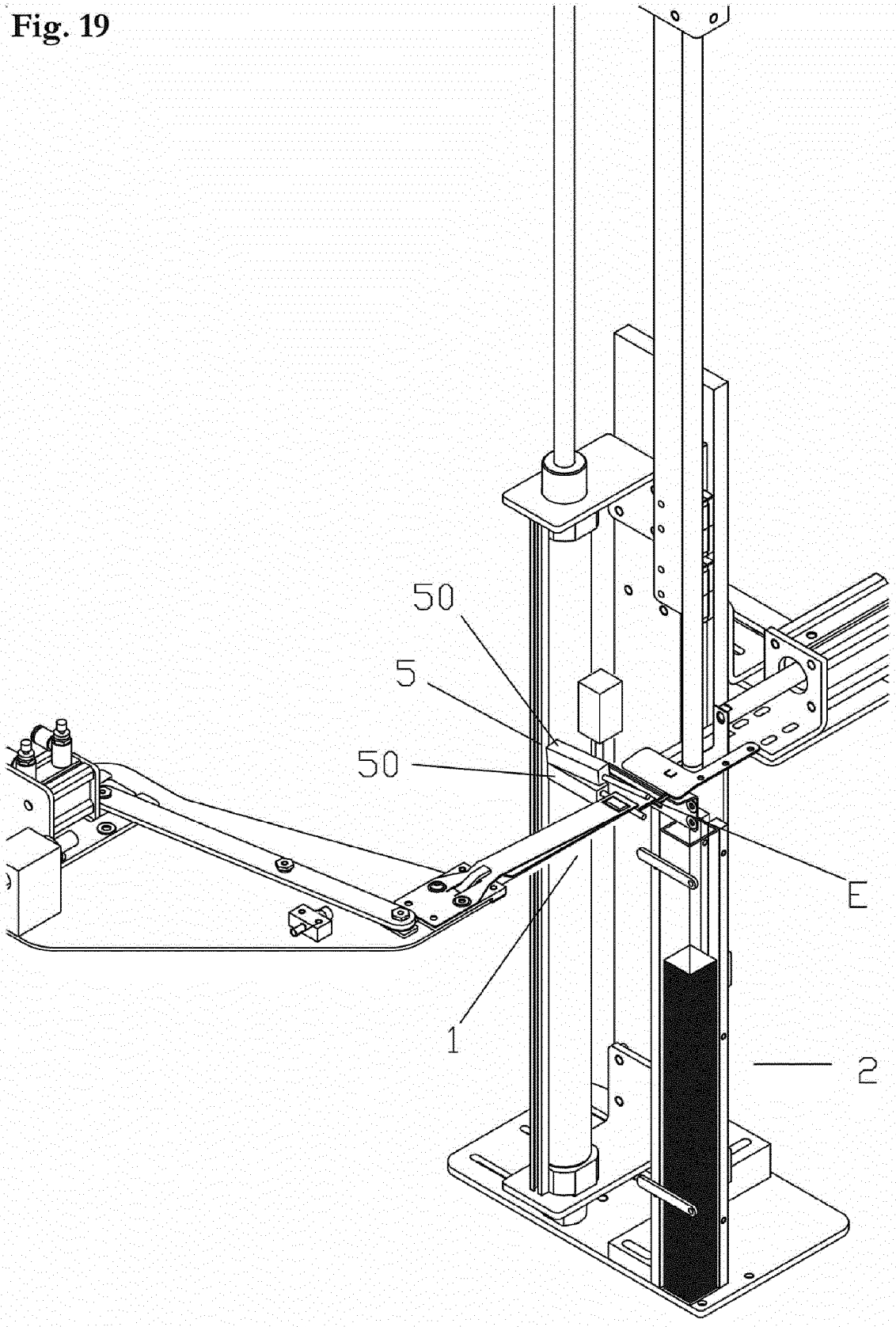
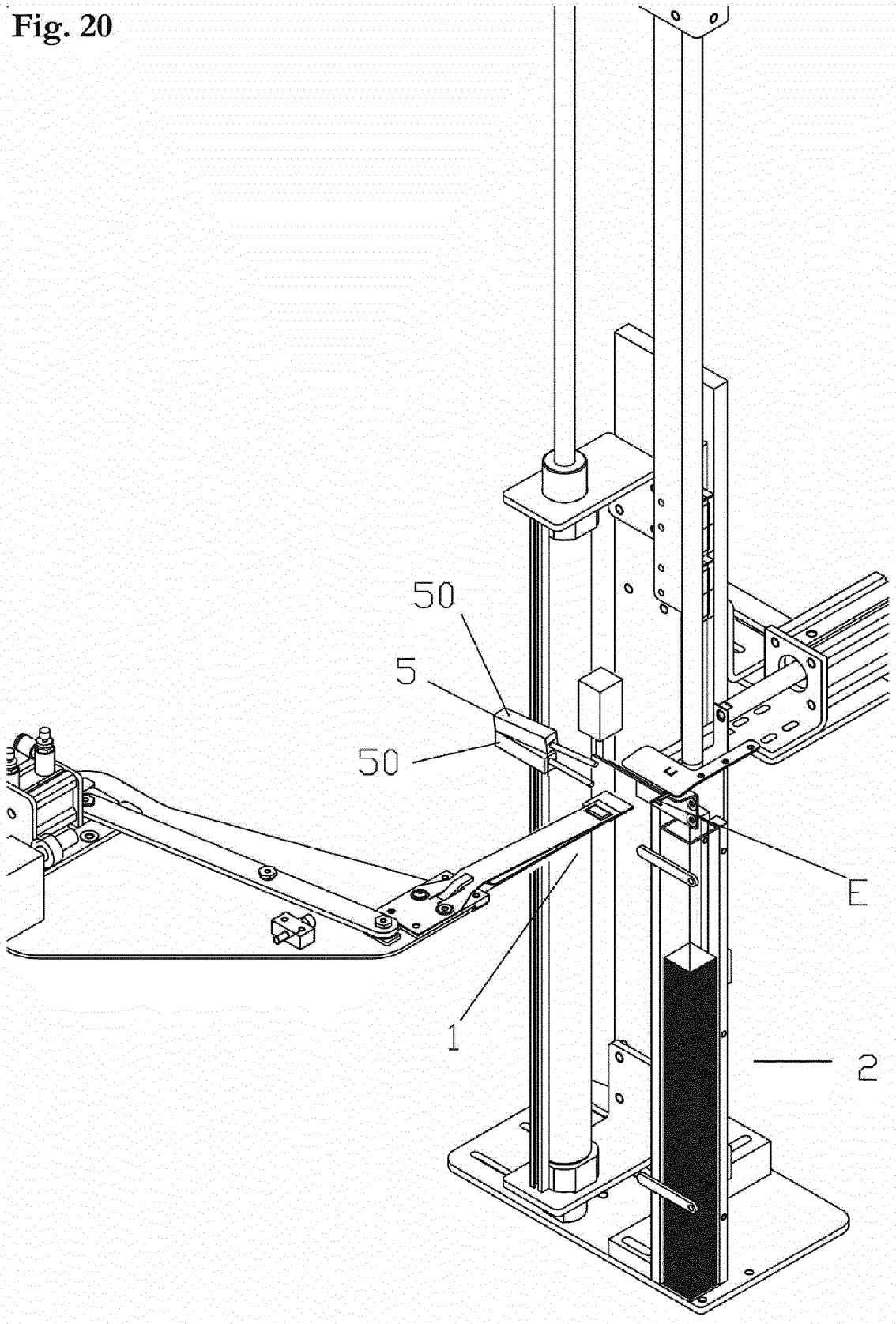


Fig. 20



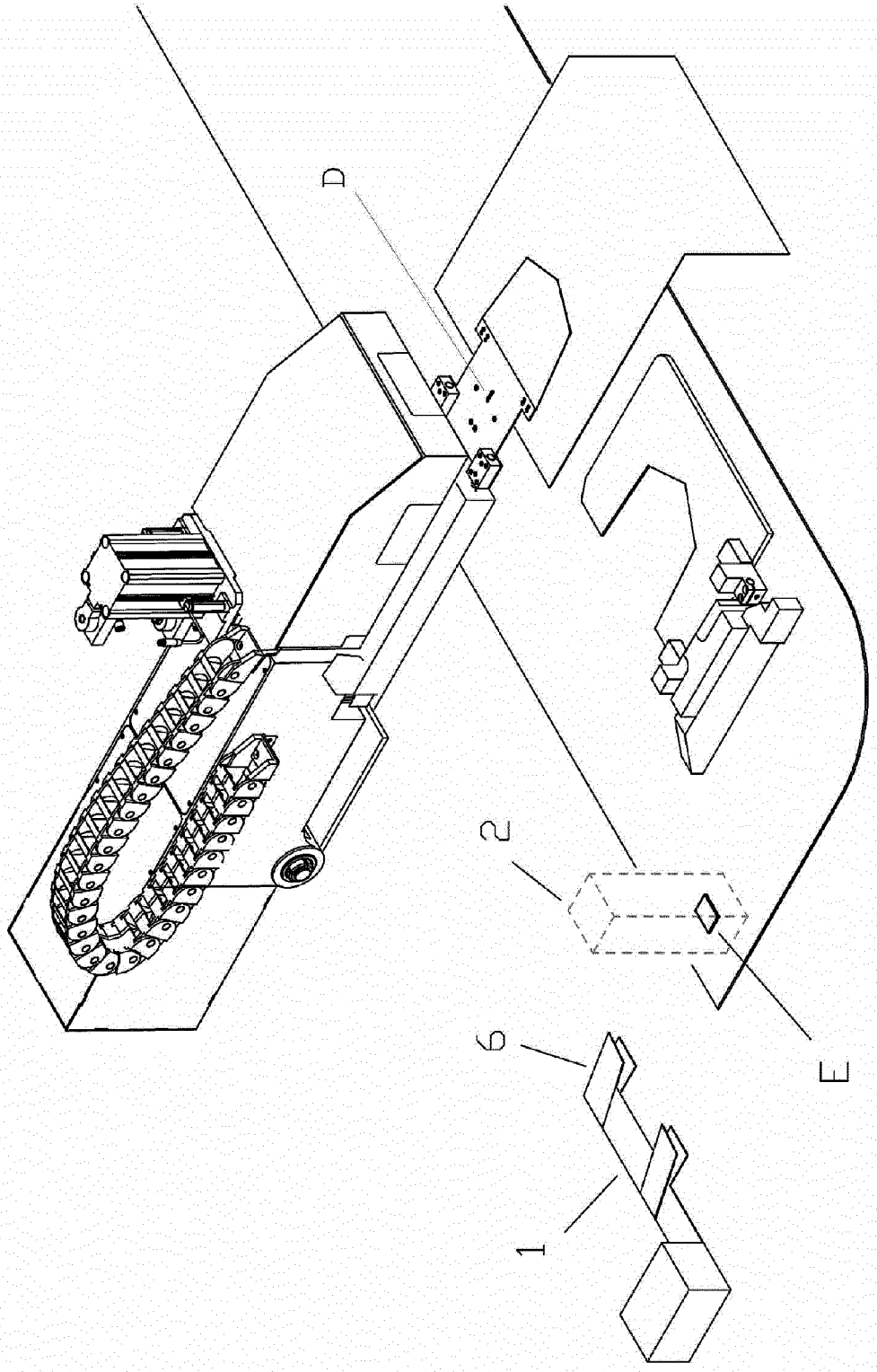


Fig. 21

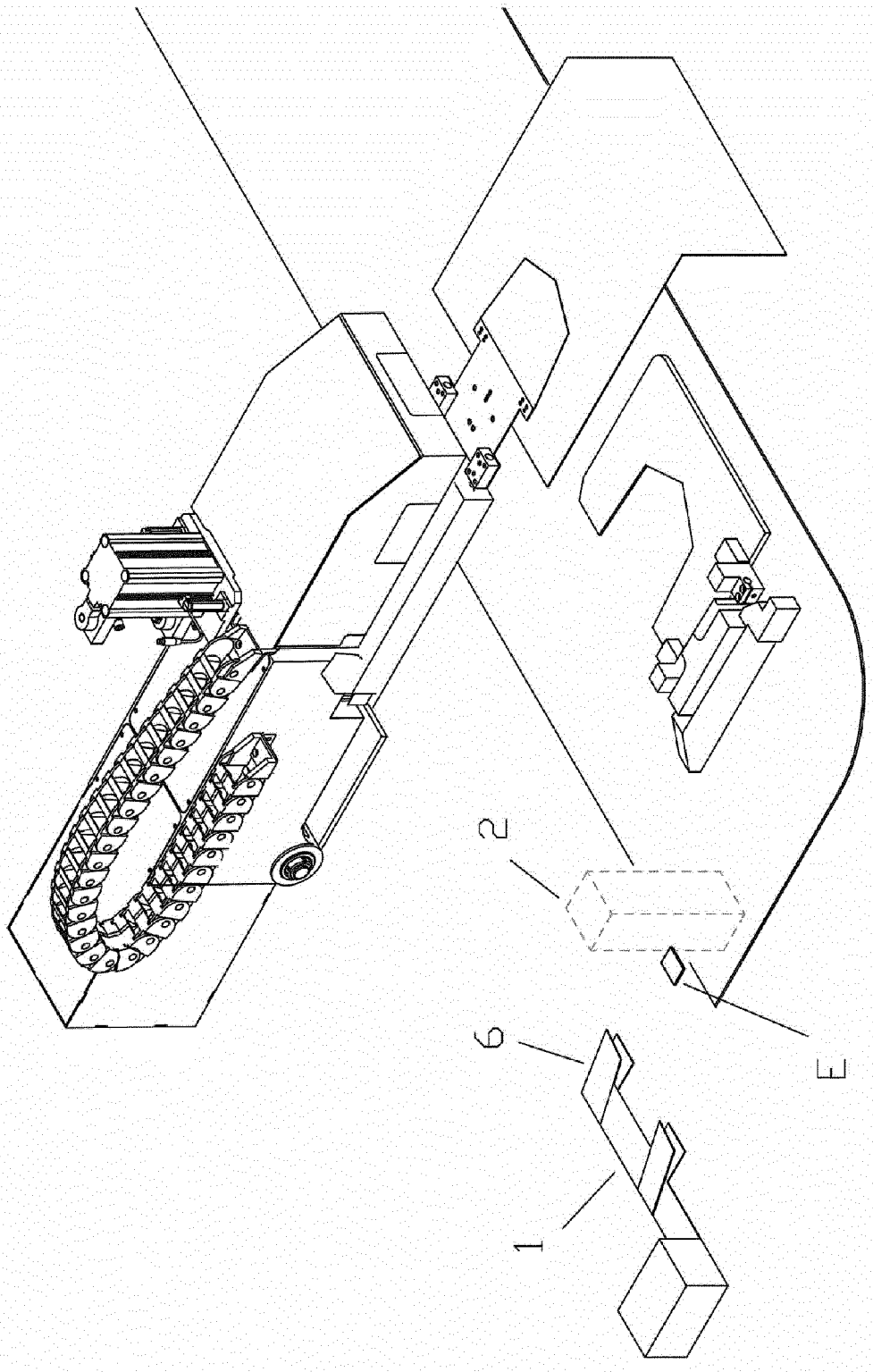


Fig. 22

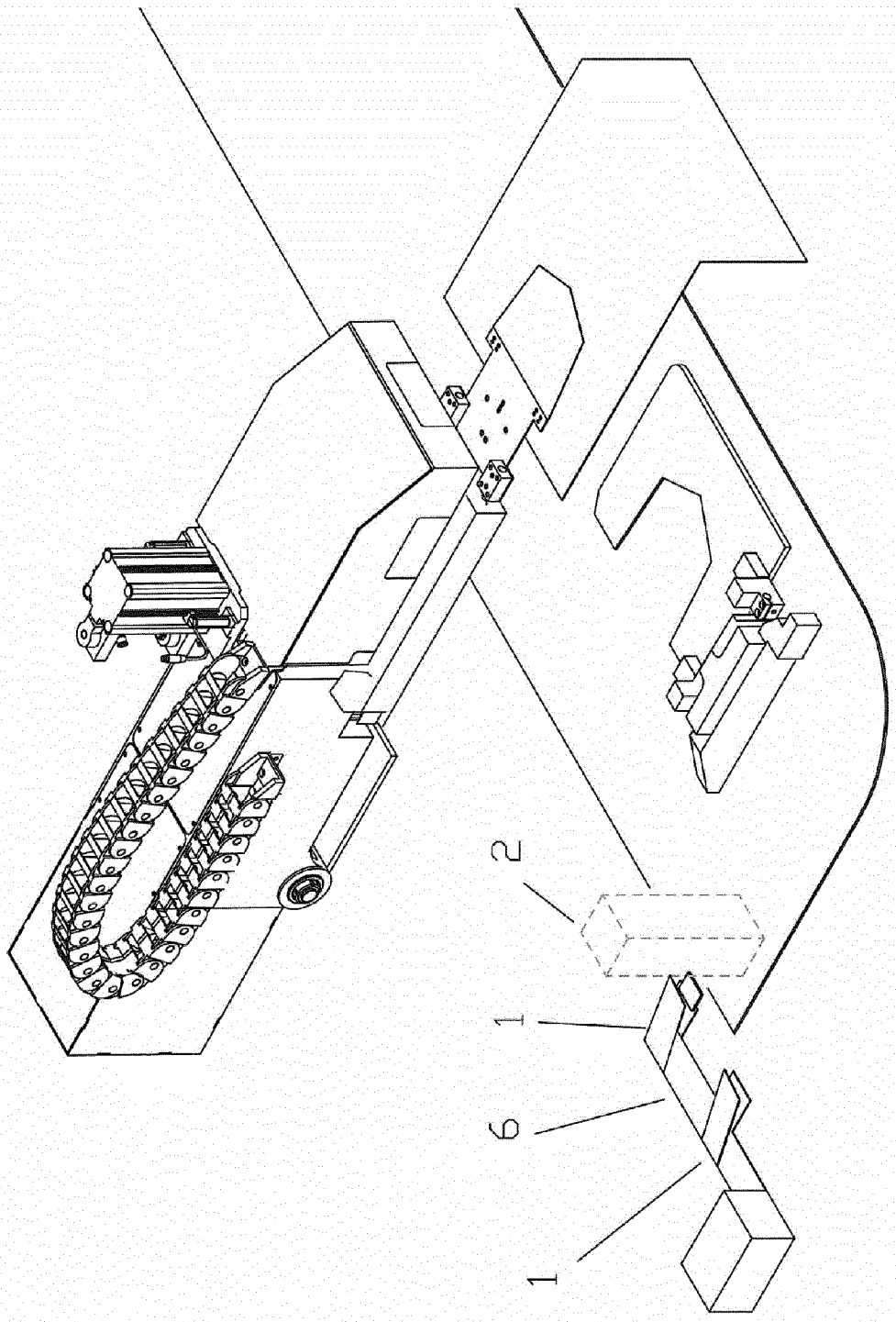


Fig. 23

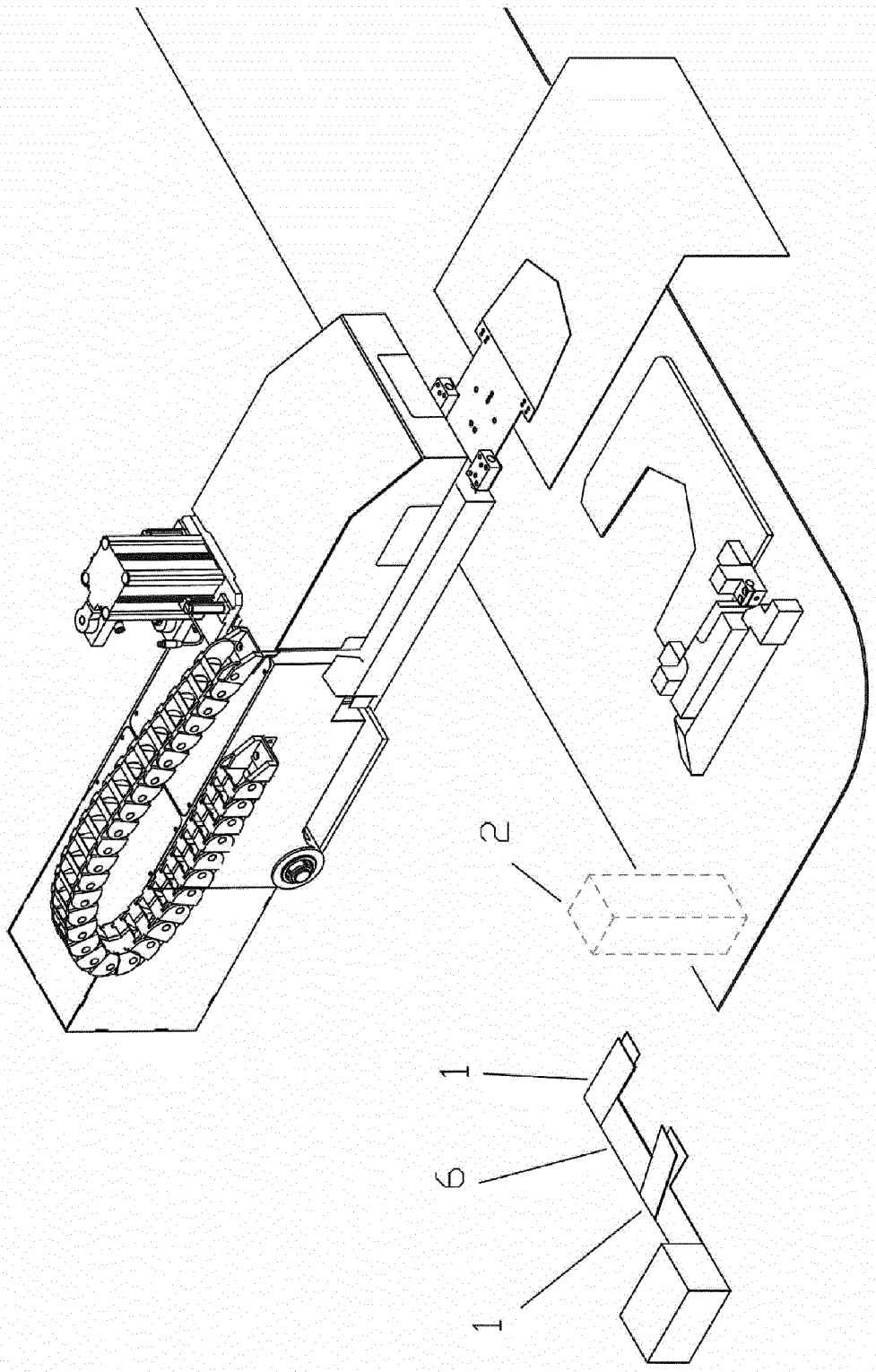


Fig. 24

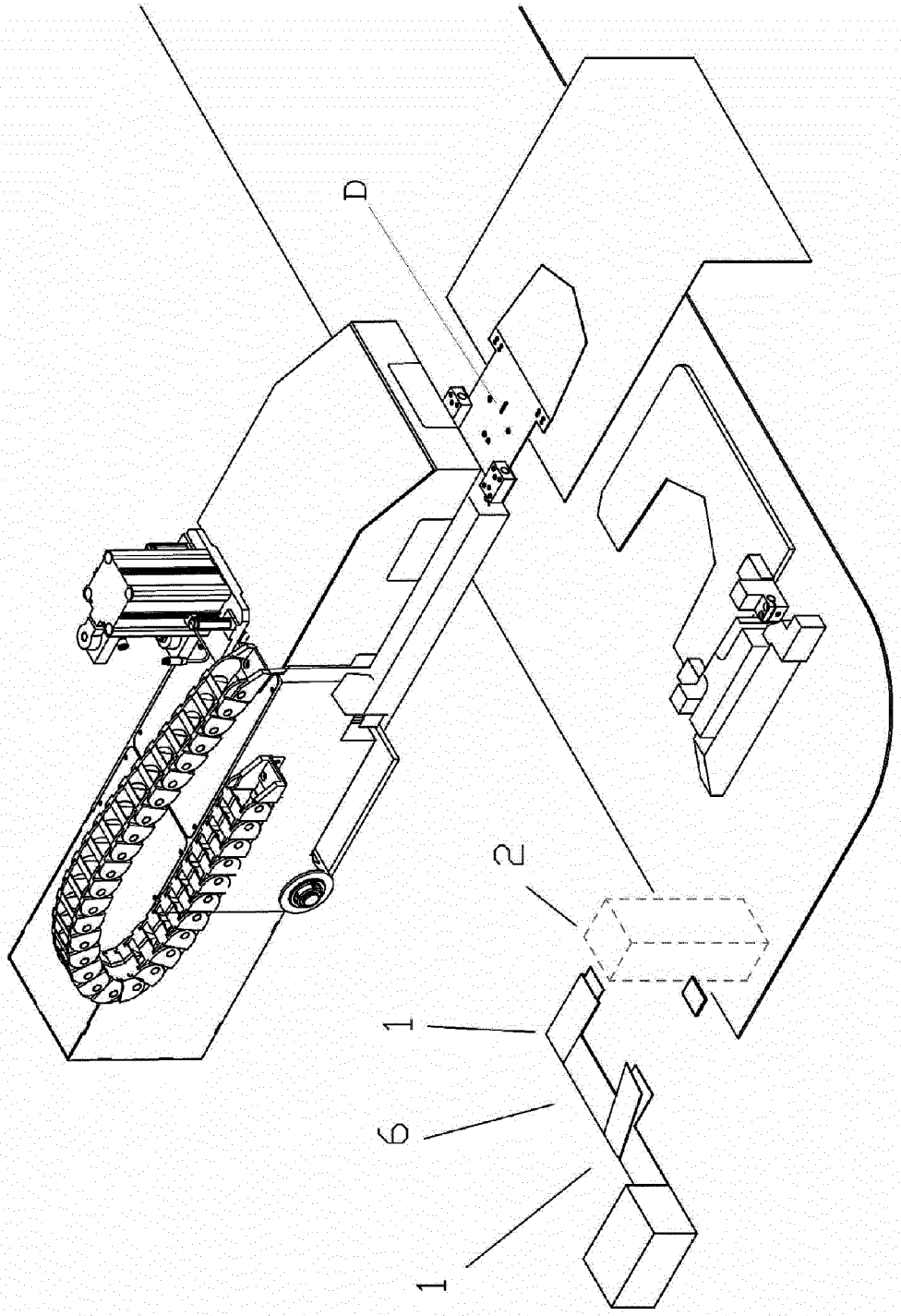


Fig. 25

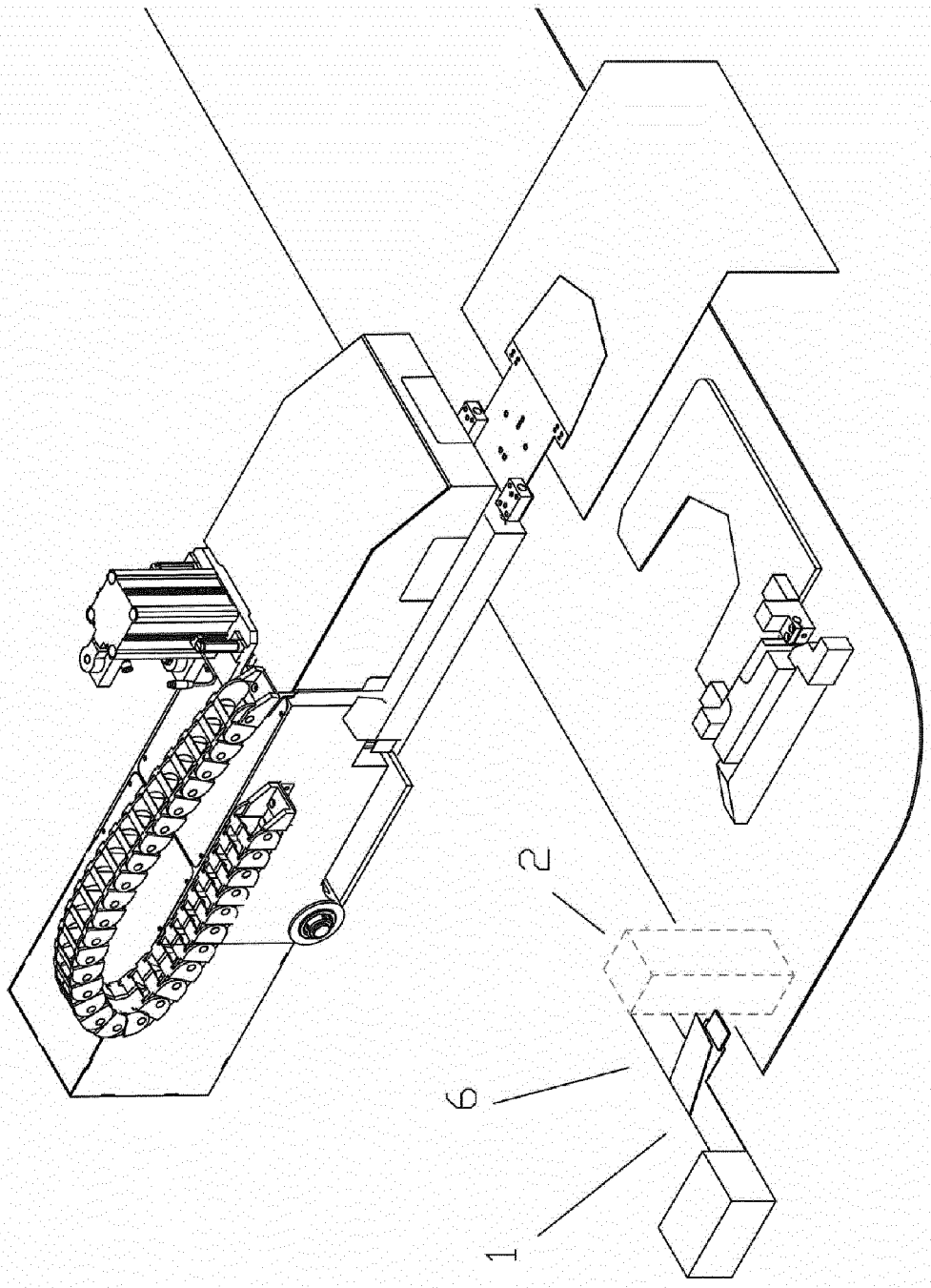


Fig. 26

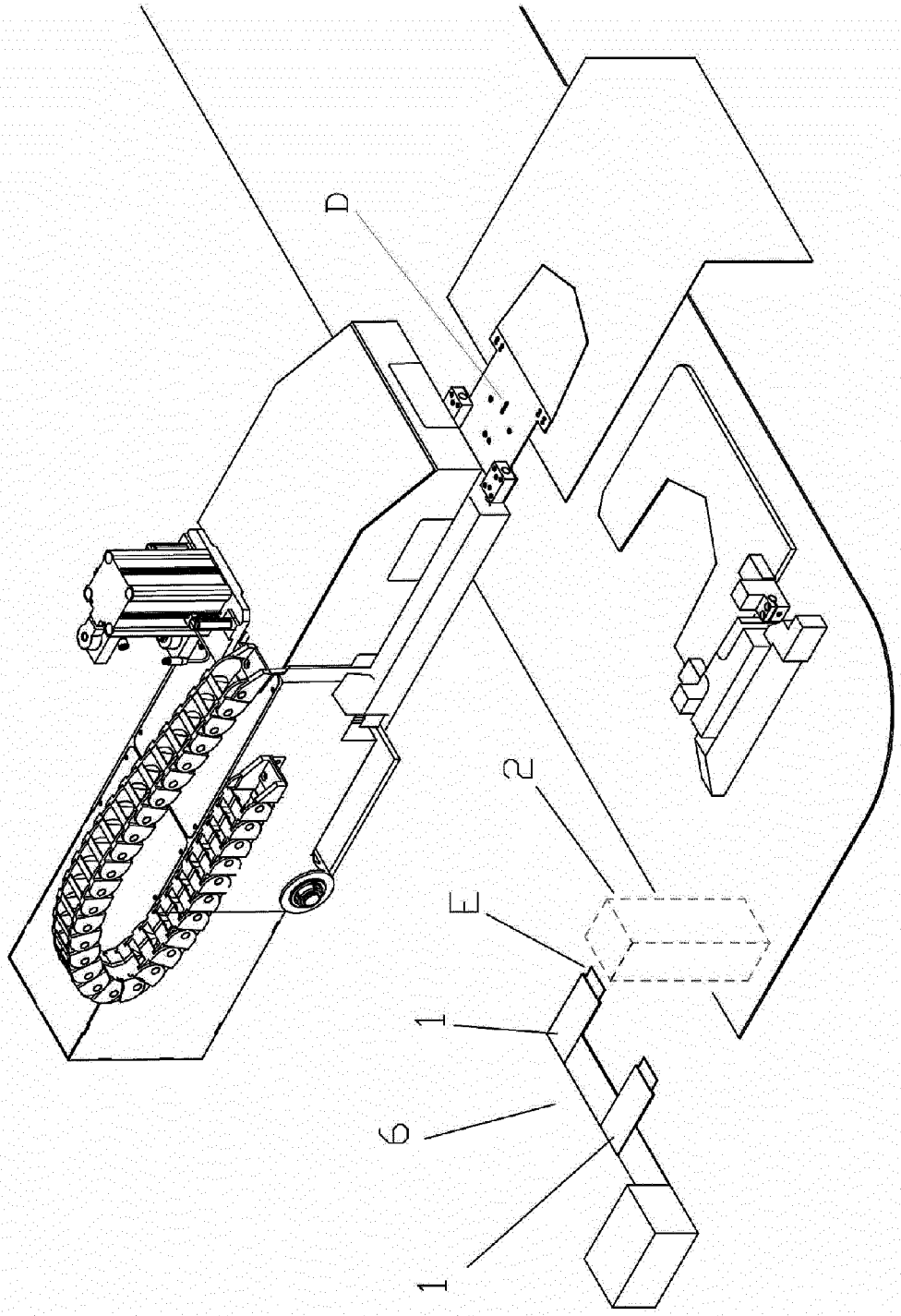


Fig. 27

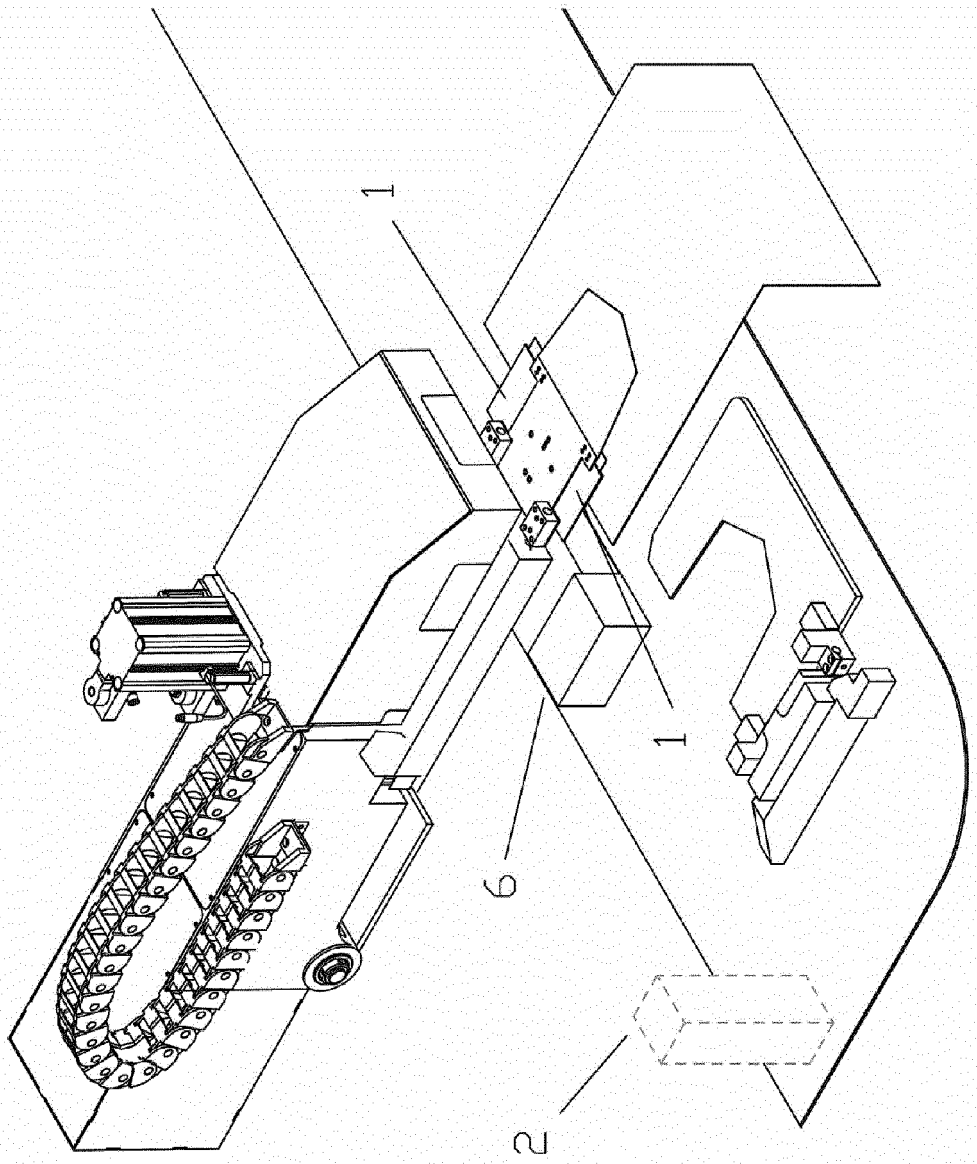


Fig. 28

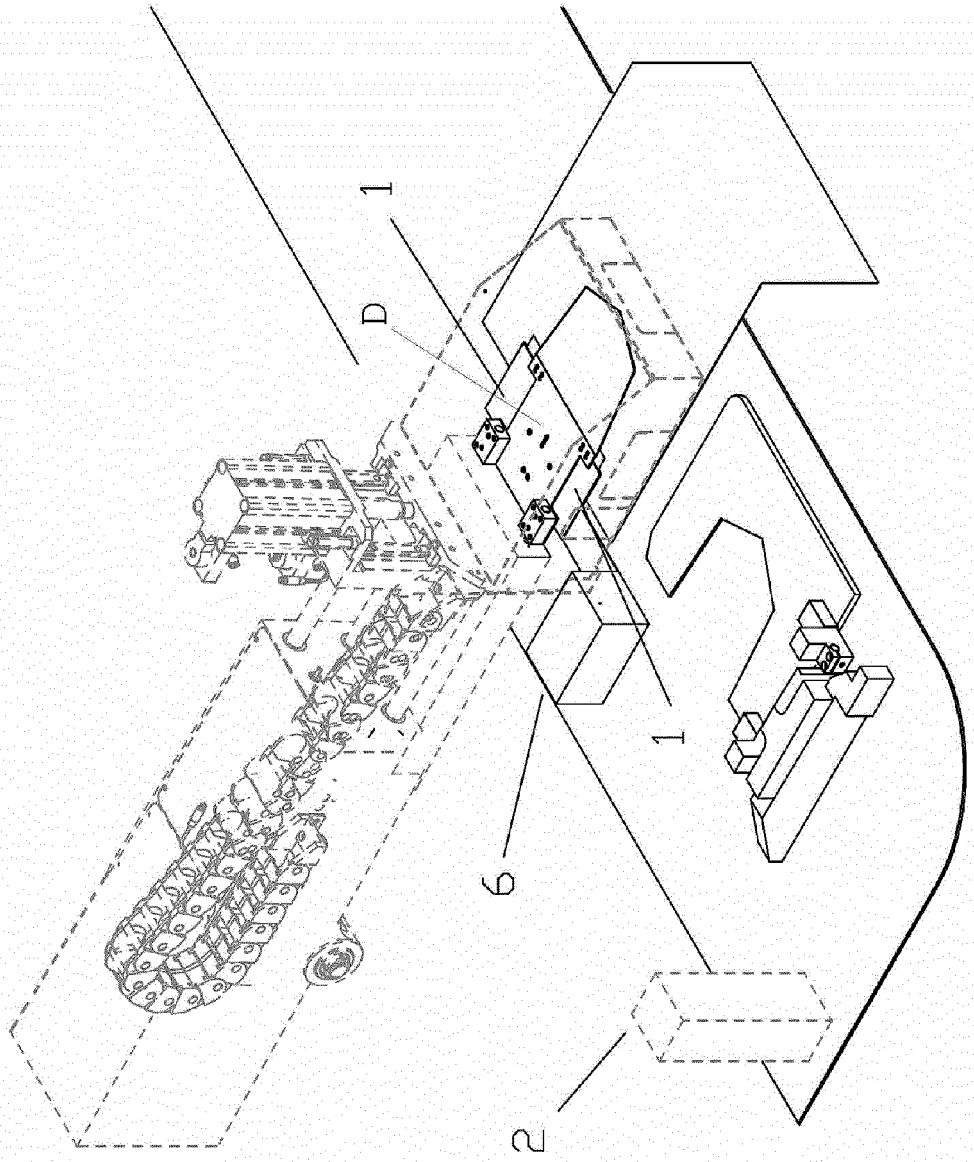


Fig. 29

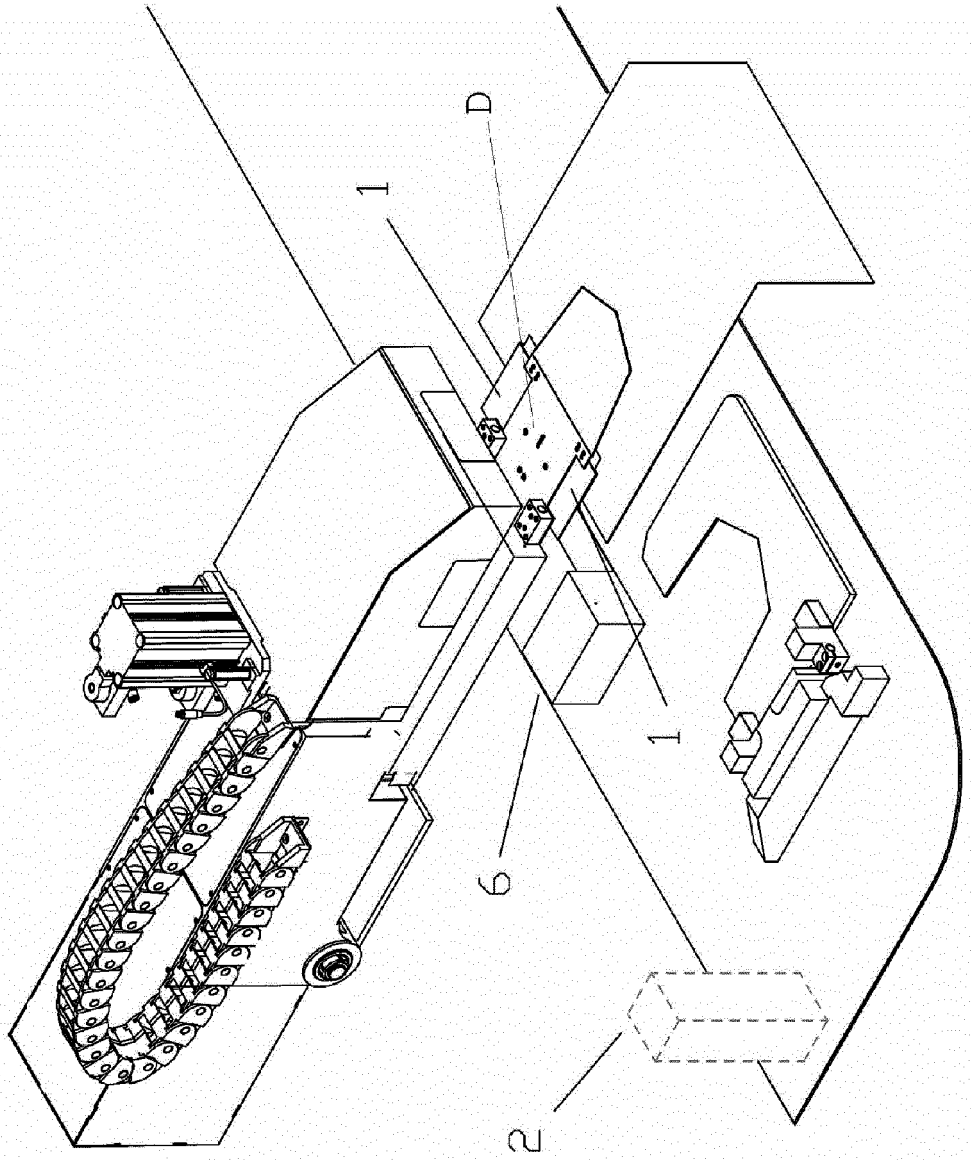


Fig. 30

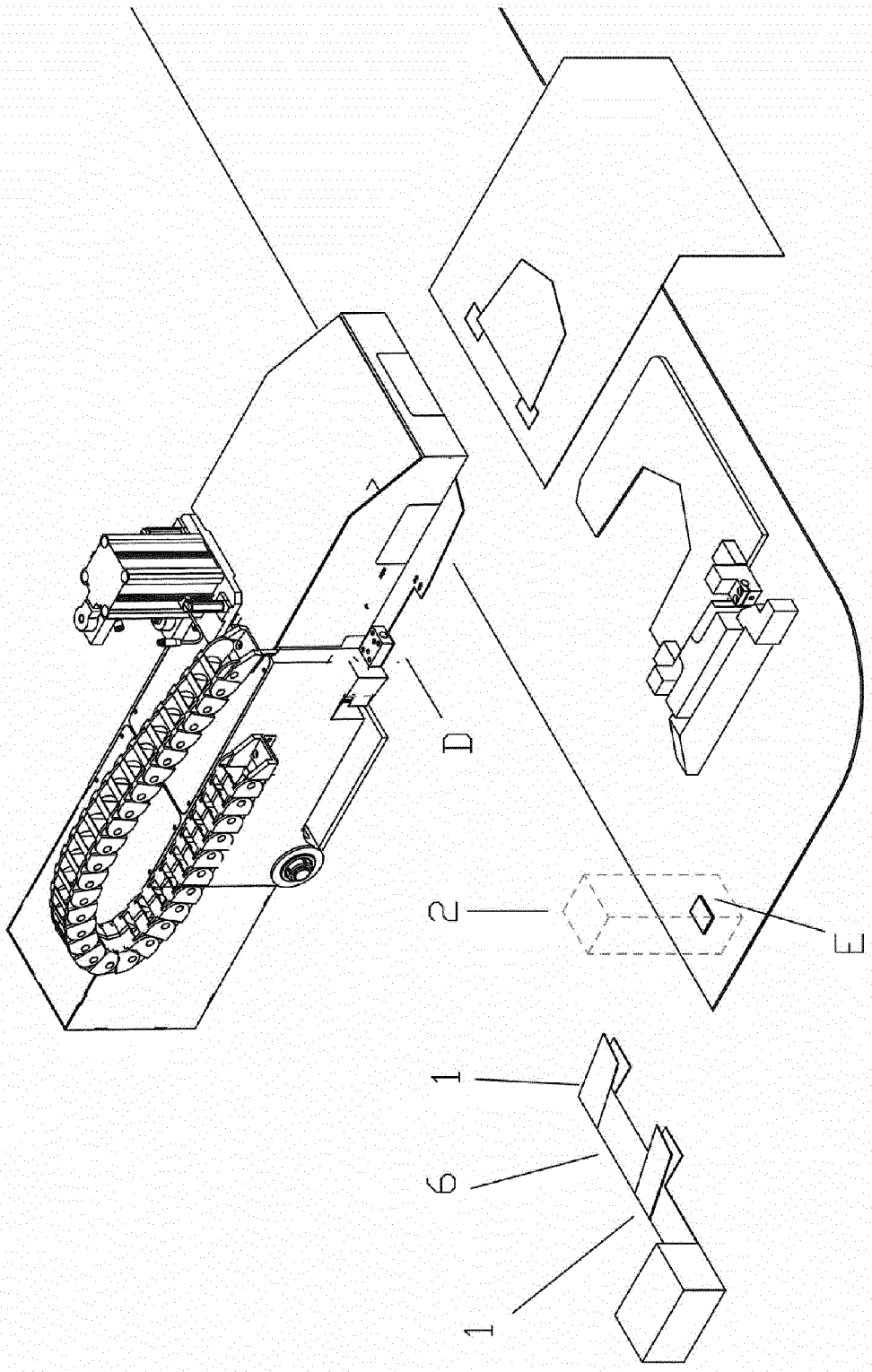


Fig. 31

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 19 18 1761

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 133 271 A (IWASAKI TOSHIAKI [JP] ET AL) 28 July 1992 (1992-07-28) * column 3, line 62 - column 9, line 41; figures 1-9 *	1-9	INV. D05B35/06
A	EP 1 231 312 A2 (SCHIPS AG [CH]) 14 August 2002 (2002-08-14) * paragraph [0032] - paragraph [0074]; figures 1-7 *	1-9	

TECHNICAL FIELDS SEARCHED (IPC)

D05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	31 July 2019	Braun, Stefanie

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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A : technological background
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E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 19 18 1761

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31-07-2019

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US 5133271 A	28-07-1992	DE 4138058 A1	17-06-1992
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REFERENCES CITED IN THE DESCRIPTION

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