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(54) Push head for a cardboard box forming machine

(57) The invention relates to a push head for a cardboard box forming machine, comprising a support structure (1) with first and second opposite, longitudinal side plates (6a, 6b), mutually joined by a transverse bridge (8) and several transverse bars (7) having adjustable length. The transverse bridge (8) supports a fixing base (2) for being joined to a moving member (3) that is able to transmit an up-down movement, and is assembled in an adjustable manner in the vertical direction. Hooks (15)

fixed to the transverse bridge (8) project above of the fixing base (2) to engage in a coupling member (16) joined to said moving member (3) for the purpose of supporting the push head during an installation or removal operation. Four swiveling thrusters (4) projecting from four corners of the support structure are individually assembled in respective supports (9) fixed to the first and second side plates (6a, 6b) in an adjustable manner in the longitudinal direction.

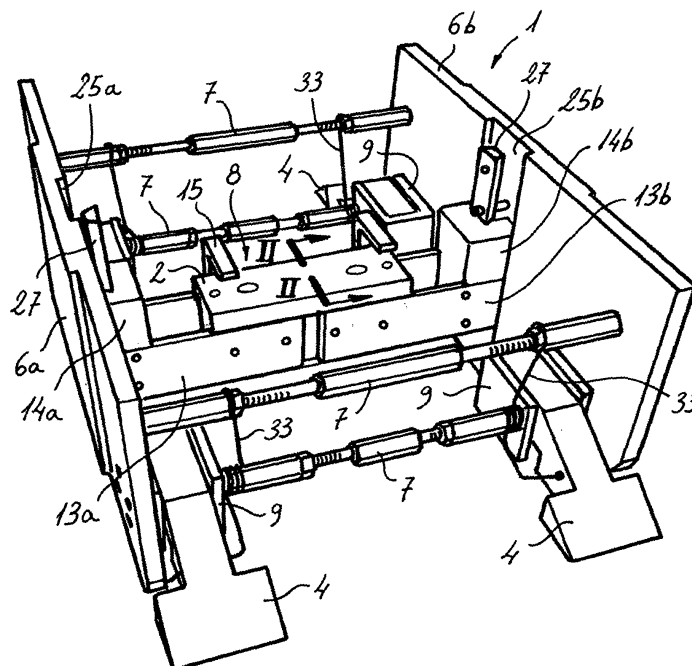


FIG. 1

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Description

Field of the Art

[0001] The present invention relates to a push head for a cardboard box forming machine starting from flat, die-cut cardboard templates.

Background of the Invention

[0002] Patent documents US-A-2798416, ES-A-0442914, ES-A-0550143, ES-A-235835-U and ES-A-255122-U disclose automatic open cardboard box assembling machines starting from flat templates, generally comprising four corner forming units arranged as vertical columns defining a molding cavity on which a flat die-cut cardboard template supplied sequentially by a feed device is horizontally introduced. The flat die-cut cardboard template is then pushed downwards by a push head joined to a moving arm of the machine, each of said corner units cooperating in the formation of the box by folding several parts of the flat cardboard template.

[0003] Spanish addition patent application N° 200402985 relating to Spanish patent application N° 200302184 describes a push head for a cardboard box forming machine comprising a support structure formed from two longitudinal side plates joined by three transverse bridges, one of which is a central bridge defining a fixing base adapted to be joined to a moving member of the machine that is able to transmit an up-down reciprocating movement to said support structure. Assembled at the ends of the side plates there are corner posts and a swiveling thruster is assembled at each of the two end bridges. The push head includes several adjustable fixing devices to adjust the relative positions of the side plates, bridges, corner posts and swiveling thrusters for the purpose of adapting the push head to different box formats and allowing operation adjustments.

Description of the Invention

[0004] The present invention provides a push head for a cardboard box forming machine comprising a support structure provided with a fixing base adapted to be joined to a moving member of said machine that is able to transmit an up-down movement to said support structure, four swiveling thrusters projecting from four corresponding corners of said support structure, two on one side and two others on the other opposite side in a longitudinal direction. Each swiveling thruster is individually assembled to rotate about a horizontal shaft and in cooperation with a rotation limiter which keeps it stiff so as to press against a cardboard box template during a downward movement and which allows it to pivot so as to overcome a flap of the cardboard box during an upward movement. Adjustment means allow adjusting the distances between the swiveling thrusters in the longitudinal and transverse directions of the support structure. The sup-

port structure comprises first and second side plates arranged longitudinally on opposite sides and joined to one another by means of a transverse bridge having adjustable length and several transverse bars also having adjustable length. The mentioned transverse bridge supports the fixing base, and is assembled such that its position can be adjusted in the vertical direction in relation to the first and second side plates. The swiveling thrusters are assembled in respective supports fixed to the first and second side plates such that their position can be individually adjusted in the longitudinal direction.

[0005] This construction is simplified in relation to the push heads of the state of the art and allows precise adjustments in the longitudinal, transverse and vertical directions in a fast and practical manner.

[0006] The transverse bridge further has fixed thereto several hooks projecting above the fixing base. These hooks are adapted to engage a coupling member joined to said moving member for the purpose of temporarily supporting the push head during a push head installation or removal operation. With the push heads of the state of the art, in order to carry out, for example, a push head installation operation in the machine, one person had to support the push head with the fixing base opposite to the moving member of the machine while another person installed and tightened corresponding locking screws. With the push head of the present invention, a single operator can "hang" the push head from the moving member by means of the mentioned hooks and can then install and tighten the locking screws.

Brief Description of the Drawings

[0007] The foregoing and other features and advantages will be better understood using the following detailed description of an embodiment in reference to the attached drawings, in which:

Figure 1 is a perspective view of an embodiment of the push head of the present invention;

Figure 2 is a partial front elevational view of a transverse bridge of the push head of Figure 1 just about to be coupled to a moving member of the cardboard box assembling machine;

Figure 3 is a cross-sectional view according to the plane indicated as III-III in Figure 2;

Figure 4 is a partial plan view showing an adjustment device for adjusting the vertical position of the transverse bridge of the push head of Figure 1;

Figure 5 is a perspective view of one of the swiveling thrusters assembled in its support;

Figure 6 is a partial side elevational view showing an adjustment device for adjusting the longitudinal position of the support and swiveling thruster of Figure 5 in relation to one of the side plates;

Figure 7 is a partially sectioned side elevational view of a push head for a cardboard box forming machine according to another embodiment of the present in-

vention;

Figure 8 is a partially sectioned plan view of the push head of Figure 7;

Figure 9 is a side view of a transverse bridge forming part of a support structure of the push head of Figures 7 and 8;

Figure 10 is a cross-sectional view according to the plane indicated as X-X in Figure 8; and

Figure 11 is a partially sectioned partial plan view showing an adjustment device for adjusting the vertical position of the transverse bridge of the push head of Figures 7 and 8.

Detailed Description of an Embodiment

[0008] Figure 1 shows a push head for a cardboard box forming machine according to an embodiment of the present invention. The push head comprises a support structure 1 formed from first and second side plates 6a, 6b arranged longitudinally on opposite sides of the structure. The mentioned first and second side plates 6a, 6b are joined to one another by a transverse bridge 8 having adjustable length and several transverse bars 7 also having adjustable length. Arranged in the transverse bridge 8 there is a fixing base 2 adapted to be joined to a moving member 3 (shown in Figures 2 and 3) of said machine. The mentioned moving member is actuated to transmit an up-down reciprocating movement to the support structure 1. The support structure 1 has a general rectangular shape with a longitudinal dimension and a transverse dimension, and is substantially symmetrical both in relation to a longitudinal vertical midplane and in relation to a transverse vertical midplane. Projecting from the four corners of the support structure 1 there are four corresponding swiveling thrusters 4, two on one side and two others on the other opposite side in the longitudinal direction.

[0009] In relation to Figures 2 and 3, the construction of the transverse bridge 8 is described below, which bridge comprises a central body 10 with an upper part in which the fixing base 2 is defined and opposite side faces 12 in which guide grooves 11 are defined. Coupled in each of such guide grooves in a sliding manner there is a first guide member 13a projecting on one side and a second guide member 13b projecting on the other opposite side. Therefore projecting from one side of the central body there are two first guide members 13a joined to the first side plate 6a in an adjustable manner in the vertical direction, and projecting from the other opposite side there are two second guide members 13b joined to the second side plate 6b in an adjustable manner in the vertical direction. The transverse bridge includes fixing means for fixing the first and second guide members 13a, 13b to the central body 10 in an adjustable manner in the transverse direction comprising round holes 22 formed in the guide members 13a, 13b opposite to elongated holes 23 formed in the central body 10, or vice versa, said round holes 22 and corresponding elongated holes

23 are traversed by locking screws 24 screwed into screw threads formed in the round holes 22 of some of said guide members. Alternatively, the locking screws could be tightened by respective nuts. By virtue of the elongated holes 23, by loosening the mentioned locking screws 24 the first and second guide members 13a, 13b can slide along the guide grooves 11 of the central body 10 to reduce or increase the length of the transverse bridge 8 or to simply shift the central body 10 without changing the length of the transverse bridge 8.

[0010] The mentioned moving member 3 of the machine ends in a coupling member 16 adapted to be joined to the fixing base 2 of the push head. Formed in the fixing base 2 there are centering holes 18 adapted to receive corresponding centering lugs 17 projecting from the lower part of the coupling member 16, or vice versa. Formed in the fixing base 2 there are also holes 20 opposite to corresponding holes 19 existing in the coupling member 16. These holes 19, 20 are adapted for installing vertical locking screws (not shown) for joining the push head to the moving member 3.

[0011] The central body 10 has fixed thereto, for example by means of some of the same locking screws 24 joining the first and second guide members 13a, 13b to the central body 10, hooks 15 projecting above the fixing base 2. The mentioned hooks 15 are adapted to engage in the coupling member 16 joined to said moving member 3 for the purpose of temporarily supporting the push head during a push head installation or removal operation. When the push head is supported by the hooks 15 in the coupling member 16, the mentioned centering lugs 17 remain opposite to said centering holes 18, though outside of them, and the holes 19 of the coupling member 16 remain opposite to the holes 20 of the fixing base 2, as shown in Figure 2. The mentioned vertical locking screws have a suitable length to project from the lower end of the holes 20 of the fixing base 2 and to couple, for example, to corresponding nuts when the push head is supported by the hooks 15 in the coupling member 16. In this position, slowly tightening the vertical locking screws allows bringing the coupling member 16 closer to the fixing base 2 with the insertion of the centering lugs 17 in the centering holes 18 until fixedly joining the push head to the moving member 3 during a push head installation operation. Inversely, during a push head removal operation, slowly loosening the vertical locking screws allows gradually separating the coupling member 16 from the fixing base 2 with the extraction of the centering lugs 17 from the centering holes 18 until the hooks 15 rest on the coupling member 16. Therefore, by virtue of the hooks 15, a single operator can install and remove the push head easily and without making any unnecessary efforts.

[0012] In relation to Figure 4, a description is provided below of a device for joining the first and second guide members 13a, 13b to the first and second side plates 6a, 6b which allows adjusting the position of the transverse bridge 8 in the vertical direction in relation to said first and second side plates 6a, 6b. To that end, the two first

guide members 13a are fixed to a first block 14a, which is assembled such that it can be shifted along a first vertical guide 25a formed or arranged in the first side plate 6a, whereas the two second guide members 13b are fixed to a second block 14b assembled such that it can be shifted along a second vertical guide 25b formed or arranged in the second side plate 6b (also see Figure 1). The first and second guide members 13a, 13b are fixed to the corresponding first and second blocks by means of screws 34. To fix the first and second blocks 14a, 14b to the first and second side plates 6a, 6b, respectively, in an adjustable manner in the vertical direction fixing means are provided comprising a trapezium-shaped groove 26 formed in each first and second block 14a, 14b in the vertical direction, each trapezium-shaped groove 26 being opposite to its corresponding first and second side plate 6a, 6b. A trapezium-shaped bar 27 is inserted in a sliding manner in each trapezium-shaped groove 26, and locking screws 28 traverse opposite holes of the corresponding trapezium-shaped bar 27 and of the first or second side plate 6a, 6b. Tightening said locking screws 28 brings each trapezium-shaped bar 27 towards the corresponding first or second side plate 6a, 6b and presses it against the vertical guide 25a, 25b, thus locking the corresponding first or second block 14a, 14b.

[0013] Each of the mentioned transverse bars 7 having adjustable length (Fig. 1) is formed by a tightener type that is well known in the state of the art, comprising two mutually aligned rods externally threaded in reverse helical directions, which are coupled by threading with corresponding screw threads formed internally in reverse helical directions in opposite portions of a through hole existing in an adjustment member adapted to be rotated manually or by means of a tool.

[0014] Now in reference to Figures 5 and 6, said figures show one of the four swiveling thrusters 4, and the description thereof can also be used for the three other swiveling thrusters 4, which are equal and/or symmetrical to the one shown in Figures 5 and 6. Each of the swiveling thrusters 4 is assembled in a respective support 9 fixed to the first or second side plate 6a, 6b such that its position can be adjusted individually in the longitudinal direction. The mentioned support 9 has an overturned U shape and comprises two opposite parallel plates between which a rear portion of the swiveling thruster 4 is arranged. A horizontal shaft 5 traversing the swiveling thruster 4 and a pin 29 adjacent thereto extend from one of the side plates of the support 9 to the other. The swiveling thruster 4 can rotate about the horizontal shaft 5 and the pin 29 acts as a rotation limiter. The longitudinal shafts 5 of two of the swiveling thrusters 4 located at the same longitudinal end of the support structure 1 can optionally be aligned and connected with the two rods forming part of one of the transverse bars 7 having adjustable length (Fig. 1).

[0015] When the push head carries out a downward movement, the rotation limiter keeps the swiveling thruster 4 stiff (as it is shown by means of continuous lines in

Figure 6) to press the cardboard box template towards the inside of the molding cavity of the machine forcing the folding of the flaps for forming the open cardboard box. Then when the push head carries out an upward movement, the swiveling thruster 4 can pivot (towards the position shown by means of dotted lines in Figure 6) in order to overcome a flap of the formed cardboard box. Each swiveling thruster 4 is associated to a corresponding elastic element 33 (Fig. 1) arranged to push the swiveling thruster 4 towards the mentioned stiff position in contact with the rotation limiter pin 29.

[0016] The push head includes adjustment means to adjust the distances between the swiveling thrusters 4 in the longitudinal direction of the support structure 1. To that end, one of the two opposite parallel plates of each support 9 has threaded holes 30, which are opposite to elongated holes 31 formed in the corresponding first or second side plate 6a, 6b (Fig. 6). Locking screws 32 traverse said elongated holes 31 and are screwed in said threaded holes 30 to lock the support 9 in relation to the side plate 6a, 6b. Preferably, around the elongated holes there is a perimetral step 35 in which plates 36 provided with holes are arranged for the locking screws 32, and the locking screws 32 have heads which press against said plates 36. By virtue of the elongated holes 31 of the first and second plates 6a, 6b, loosening the locking screws 32 allows independently changing the position of each support 9 in the longitudinal direction in relation to the corresponding first and second side plates 6a, 6b, and tightening the locking screws 32 allows locking each support 9 in relation to the first or second side plates 6a, 6b.

[0017] Now in reference to Figures 7 to 11, another alternative embodiment of the push head of the present invention is described below, and the same reference numbers are used to designate equal or equivalent features as those in the embodiment described above in relation to Figures 1 to 6. The principal difference of the push head shown in Figures 7 to 11 is that the first and second longitudinal side plates 6a, 6b of the support structure 1 therein are formed by respective first and second central portions 61a, 61b and respective first and second end portions 62a, 62b. The mentioned first and second central portions 61a, 61b are joined to opposite ends of said transverse bridge 8, and said first and second end portions 62a, 62b are joined to opposite sides of their corresponding central portion 61a, 61b by connecting members 63a, 63b having adjustable length. Given that in this embodiment, the supports 9 in which the swiveling thrusters 4 are assembled are fixed to the first and second end portions 62a, 62b, an adjustment of the length of the mentioned connecting members 63a, 63b allows adjusting the length of the push head determined by the positions of the swiveling thrusters 4. Furthermore, each of the supports 9 of the swiveling thrusters 4 is fixed to its corresponding end portion 62a, 62b by means including screws traversing elongated holes 31 (Fig. 7) similar to those described above in relation to Figure 6,

such that the position of each of the swiveling thrusters 4 can be additionally adjusted in the longitudinal direction in relation to its corresponding end portion 62a, 62b.

[0018] In this embodiment, the first and second central portions 61a, 61b of the side plates 6a, 6b are metallic, for example steel or aluminum, and each of the mentioned connecting members 63a, 63b comprises a slider rail 64a, 64b rigidly fixed at one of its ends, preferably by welding, to the corresponding central portion 61a, 61b of the side plate 6a, 6b. Each slider rail 64a, 64b is inserted in a sliding manner in a groove defined in a guide part 65a, 65b, which in turn is fixed to its corresponding first or second end portion 62a, 62b of the side plate 6a, 6b. Each guide part 65a, 65b has holes 66 adapted for installing locking screws cooperating with elongated holes 67 formed in said slider rail 64a, 64b for fixing the slider rail 64a, 64b to the sliding guide part 65a, 65b in a selected position when said screws are tightened. Therefore, by sliding the slider rails 64a, 64b more or less in relation to the guide parts 65a, 65b and fixing their relative position by means of the mentioned screws, it is possible to adjust the longitudinal dimension of the push head.

[0019] In this embodiment, the first and second end portions 62a, 62b of the side plates 6a, 6b are made of a plastic material, and each guide part 65a, 65b is coupled in a sliding manner in a recessed area 70 of the corresponding first or second end portion 62a, 62b (Fig. 7). For the fixing thereof, the guide part 65a, 65b has holes 68 adapted for installing locking screws cooperating with elongated holes 69 formed in the first or second end portion 62a, 62b for fixing the guide part 65a, 65b to the first or second end portion 62a, 62b in a selected position, which provides the possibility of an additional adjustment of the dimension of the push head in the longitudinal direction.

[0020] Here the transverse bars 7 having adjustable length are connected at their ends to the first and second end portions 62a, 62b. Preferably, and in a manner that is similar to that of the first embodiment, two of these transverse bars 7 having adjustable length, namely those which are located at a lower level, are connected at their ends to the supports 9, which in turn are fixed to the corresponding first and second end portions 62a, 62b as described above.

[0021] The transverse bridge 8 is formed by a central body 10 and first and second guide members 13a, 13b. However, as is best shown in Figure 10, another difference of this embodiment shown in Figures 7 to 11 in relation to the first embodiment shown in Figures 1 to 6 is that here each of the mentioned guide grooves 11 of the central body 10 has sufficient depth so as to house, mutually overlapped, the mentioned first and second guide members 13a, 13b, such that the first and second guide members 13a, 13b can slide in their guide groove with respect to one another and in turn with respect to the central body 10. As shown in Figure 9, the first guide members 13a have elongated holes 71a and the second guide members 13b also have elongated holes 71b,

which, in an operative position, partially overlap the mentioned elongated holes 71a of first guide members 13a. The overlapping area of the elongated holes 71a, 71b of the first and second guide members 13a, 13b is opposite to a transverse hole 72 formed in the central body 10. Therefore, a locking screw installed through said transverse hole 72 and said elongated holes 71a, 71b can be tightened to fix the first and second guide members 13a, 13b to the central body 10 in selected positions. The overlapping arrangement of the first and second guide members 13a, 13b and of the elongated holes 71a, 72a provides this second embodiment with greater adjustment capacity of the transverse dimension of the push head in comparison with the first embodiment.

[0022] As shown in Figure 8, the first and second guide members 13a, 13b are fixed at their ends farthest from the central body 10 to respective first and second blocks 14a, 14b, which are assembled such that they can be shifted along corresponding first and second vertical guides 25a, 25b formed in the first and second central portions 61a, 61b. Fixing means are arranged for fixing the positions of the first and second blocks 14a, 14b in relation to the first and second central portions 61a, 61b, respectively, whereby providing a possibility of adjusting the vertical position of the push head in relation to the moving member 3 of the cardboard box assembling machine.

[0023] As is best shown in Figure 11, the mentioned fixing means comprise, for each side plate 6a, 6b, a trapezium-shaped bar 27 inserted in a sliding manner in a corresponding trapezium-shaped groove 26 formed in the corresponding first or second block 14a. A series of threaded holes are formed along said trapezium-shaped bar 27, which holes are opposite to a series of holes formed in the corresponding first or second central portion 61a, 61b of the first or second side plate 6a, 6b. Locking screws 28 are inserted through said opposite holes, which locking screws, when tightened, bring the trapezium-shaped bar 27 towards the corresponding first or second central portion 61a, 61b and press it against the vertical guide 25a, 25b, thus locking the corresponding first or second block 14a, 14b. Figure 11 only shows the fixing means on one side of the push head, given that the fixing means on the opposite side are identical.

[0024] A person skilled in the art may devise variations and modifications to the embodiment that has been shown and described without departing from the scope of the present invention as it is defined in the attached claims.

Claims

1. A push head for a cardboard box forming machine, of the type comprising a support structure (1) provided with a fixing base (2) adapted to be joined to a moving member (3) of said machine that is able to transmit an up-down movement to said support

- structure (1), four swiveling thrusters (4) projecting from four corresponding corners of said support structure (1), two on one side and two others on the other opposite side in a longitudinal direction, each swiveling thruster (4) being individually assembled to rotate about a horizontal shaft (5) and in cooperation with a rotation limiter which keeps it stiff to press against a cardboard box template during a downward movement and which allows it to pivot to overcome a flap of the cardboard box during an upward movement, and adjustment means to adjust the distances between the swiveling thrusters (4) in the longitudinal and transverse directions of the support structure (1), **characterized in that** the support structure (1) comprises first and second longitudinal side plates (6a, 6b) on opposite sides in the transverse direction joined to one another by a transverse bridge (8) having adjustable length and several transverse bars (7) having adjustable length, in which said transverse bridge (8) supports said fixing base (2) and is assembled such that its position can be adjusted in the vertical direction in relation to said first and second side plates (6a, 6b), and in which the swiveling thrusters (4) are assembled in respective supports (9) fixed to the first and second side plates (6a, 6b) such that their position can be individually adjusted in the longitudinal direction.
2. A push head according to claim 1, **characterized in that** the transverse bridge (8) has fixed thereto hooks (15) projecting above the fixing base (2), said hooks (15) being adapted to engage in a coupling member (16) joined to said moving member (3) for the purpose of temporarily supporting the push head during a push head installation or removal operation.
 3. A push head according to claim 1, **characterized in that** said transverse bridge (8) comprises a central body (10) defining the fixing base (2) in an upper part and at least one guide groove (11) adapted to receive in one side at least one first guide member (13a) joined to the first side plate (6a) in an adjustable manner in the vertical direction, and on an opposite side at least one second guide member (13b) joined to the second side plate (6b) in an adjustable manner in the vertical direction, fixing means being provided for fixing the first and second guide members (13a, 13b) to the central body (10) in an adjustable manner in the transverse direction.
 4. A push head according to claim 3, **characterized in that** the central body (10) has fixed thereto hooks (15) projecting above the fixing base (2), said hooks (15) being adapted to engage a coupling member (16) joined to said moving member (3) for the purpose of temporarily supporting the push head during a push head installation or removal operation.
 5. A push head according to claim 4, **characterized in that** said coupling member (16) comprises centering lugs (17) adapted to fit in centering holes (18) formed in the fixing base (2), or vice versa, said centering lugs (17) being opposite to said centering holes (18) outside of them when the push head is supported by the hooks (15) in the coupling member (16).
 6. A push head according to claim 5, **characterized in that** the coupling member (16) comprises holes (19) opposite to corresponding holes (20) formed in the fixing base (2), said holes (19, 20) being adapted for installing vertical locking screws of a suitable length to allow bringing the coupling member (16) closer to the fixing base (2) with the insertion of the centering lugs (17) in the centering holes (18) until fixedly joining them when said vertical locking screws are tightened during a push head installation operation and to allow separating the coupling member (16) from the fixing base (2) with the extraction of the centering lugs (17) from the centering holes (18) until the hooks (15) rest on the coupling member (16) when said vertical locking screws are loosened during a push head removal operation.
 7. A push head according to claim 3, **characterized in that** the central body (10) comprises two of said guide grooves (11) formed in opposite side faces (12) thereof, two of said first guide members (13a) fixed to a first block (14a) assembled such that it can be shifted along a first vertical guide (25a) arranged in the first side plate (6a), two of said second guide members (13b) fixed to a second block (14b) assembled such that it can be shifted along a second vertical guide (25b) arranged in the second side plate (6b), and fixing means for fixing the first and second blocks (14a, 14b) to the first and second side plates (6a, 6b), respectively, in an adjustable manner in the vertical direction.
 8. A push head according to claim 7, **characterized in that** said fixing means for fixing the first and second guide members (13a, 13b) to the central body (10) comprise round holes (22) formed in the guide members (13a, 13b) opposite to elongated holes (23) formed in the central body (10), or vice versa, and locking screws (24) traversing said round holes (22) and corresponding elongated holes (23) and adapted to be tightened by a nut or screwed into screw threads formed in some of said round holes (22).
 9. A push head according to claim 7, **characterized in that** said fixing means for fixing the first and second blocks (14a, 14b) to the first and second side plates (6a, 6b), respectively, comprise a trapezium-shaped groove (26) formed in each first and second block (14a, 14b) in the vertical direction and opposite to the corresponding first and second side plate (6a,

6b), a trapezium-shaped bar (27) inserted in a sliding manner in each trapezium-shaped groove (26), and locking screws (28) traversing opposite holes of the corresponding trapezium-shaped bar (27) and first or second side plate (6a, 6b) to press each trapezium-shaped bar (27) towards the corresponding first or second side plate (6a, 6b), locking the corresponding first or second block (14a, 14b).

10. A push head according to claim 1 or 2, **characterized in that** said support (9) of each thrusting element (4) has an overturned U shape and comprises two opposite parallel plates between which said horizontal shaft (5) and a pin (29) acting as said rotation limiter extend.

11. A push head according to claim 10, **characterized in that** one of said opposite parallel plates of each support (9) has formed threaded holes (30) opposite to elongated holes (31) formed in the corresponding first or second side plate (6a, 6b), locking screws (32) being installed, traversing said elongated holes (31) and screwed in said threaded holes (30) to lock the support (9) in relation to the side plate (6a, 6b).

12. A push head according to claim 10, **characterized in that** each swiveling thruster (4) is associated to a corresponding elastic element (33) arranged to push the swiveling thruster (4) to said rigid position determined by contact of the swiveling thruster (4) against said rotation limiter pin (29).

13. A push head according to claim 1 or 2, **characterized in that** each of said transverse bars (7) having adjustable length comprises two rods externally threaded in reverse helical directions, mutually aligned and coupled by threading in corresponding screw threads formed internally in reverse helical directions in opposite portions of a through hole existing in an adjustment member adapted to be rotated manually or by means of a tool.

14. A push head according to any one of claims 1 to 13, **characterized in that** said first and second longitudinal side plates (6a, 6b) of the support structure (1) comprise respective first and second central portions (61a, 61b) and respective first and second end portions (62a, 62b), in which:

said first and second central portions (61a, 61b) are joined to opposite ends of said transverse bridge (8);

said first and second end portions (62a, 62b) are joined to opposite sides of their corresponding central portion (61a, 61b) by connecting members (63a, 63b) having adjustable length; said supports (9), in which the swiveling thrusters (4) are assembled, are fixed to the first and

second end portions (62a, 62b); and said transverse bars (7) having adjustable length are connected at their ends to the first and second end portions (62a, 62b).

15. A push head according to claim 14, **characterized in that** at least two of the transverse bars (7) having adjustable length are connected at their ends to the supports (9), which in turn are fixed to the corresponding first and second end portions (62a, 62b).

16. A push head according to claim 14, **characterized in that** each of said connecting members (63a, 63b) having adjustable length comprises a slider rail (64a, 64b) fixed at one of its ends to the corresponding central portion (61a, 61b) and inserted in a sliding manner in a guide part (65a, 65b) fixed to its corresponding first or second end portion (62a, 62b), said guide part (65a, 65b) having holes (66) adapted for installing locking screws cooperating with elongated holes (67) formed in said slider rail (64a, 64b) for fixing the slider rail (64a, 64b) to the sliding guide part (65a, 65b) in a selected position.

17. A push head according to claim 16, **characterized in that** each guide part (65a, 65b) is coupled in a sliding manner in a recessed area (70) of the corresponding first or second end portion (62a, 62b), and the guide part (65a, 65b) has holes (68) adapted for installing locking screws cooperating with elongated holes (69) formed in the first or second end portion (62a, 62b) for fixing the guide part (65a, 65b) to the first or second end portion (62a, 62b) in a selected position.

18. A push head according to claim 14, **characterized in that** each of said guide grooves (11) of the central body (10) has sufficient depth so as to house, mutually overlapped, the first and second guide members (13a, 13b), such that the first and second guide members (13a, 13b) can slide with respect to one another and with respect to the central body (10), and the first and second guide members (13a, 13b) have respective elongated holes (71a, 71b) partially overlapping and opposite to a transverse hole (72) formed in the central body (10), a locking screw being installed through said transverse hole (72) and said elongated holes (71a, 71b) for fixing the first and second guide members (13a, 13b) to the central body (10) in selected positions.

19. A push head according to claim 18, **characterized in that** the first and second guide members (13a, 13b) are fixed to respective first and second blocks (14a, 14b) assembled such that they can be shifted along corresponding first and second vertical guides (25a, 25b) formed in the first and second central portions (61a, 61b), and fixing means are arranged for

fixing the positions of the first and second blocks (14a, 14b) in relation to the first and second central portions (61a, 61b), respectively, in an adjustable manner in the vertical direction.

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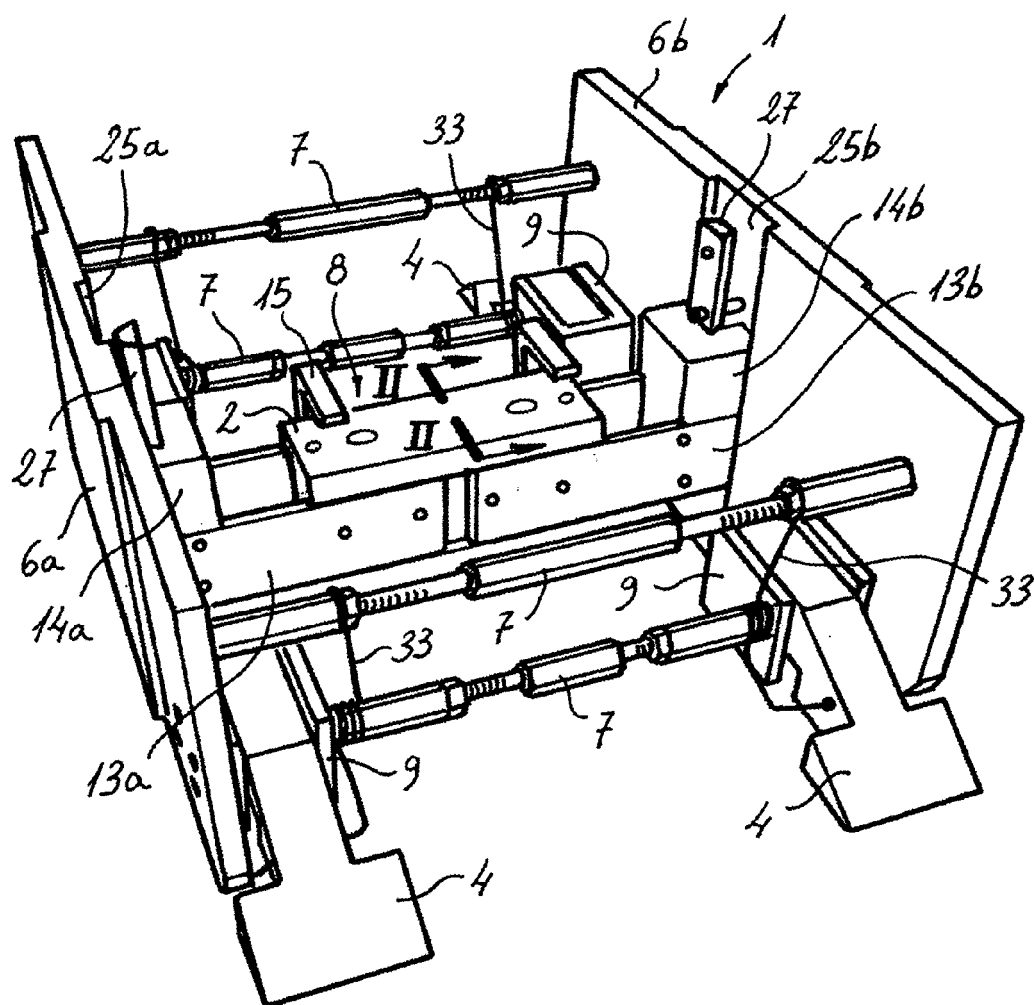
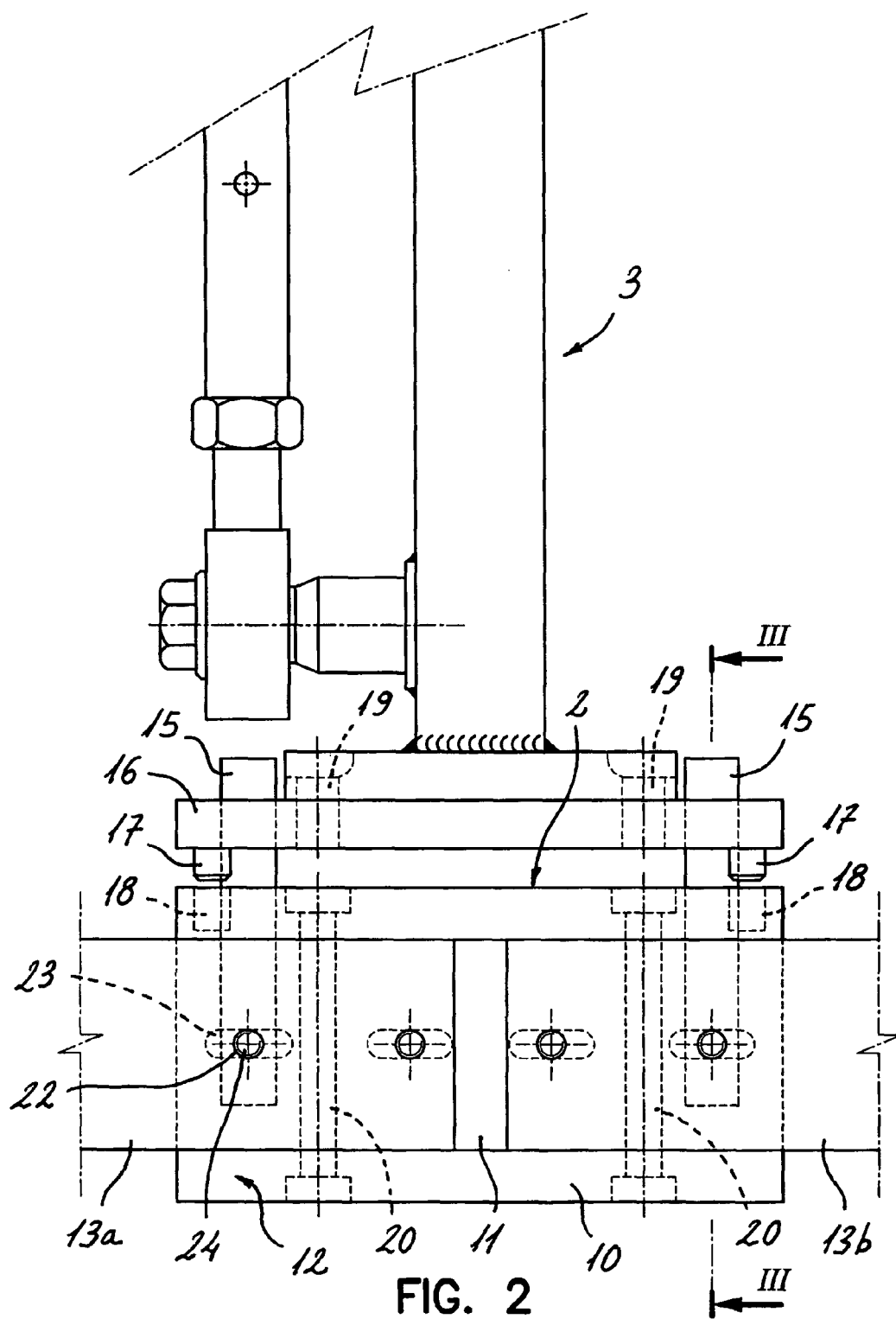
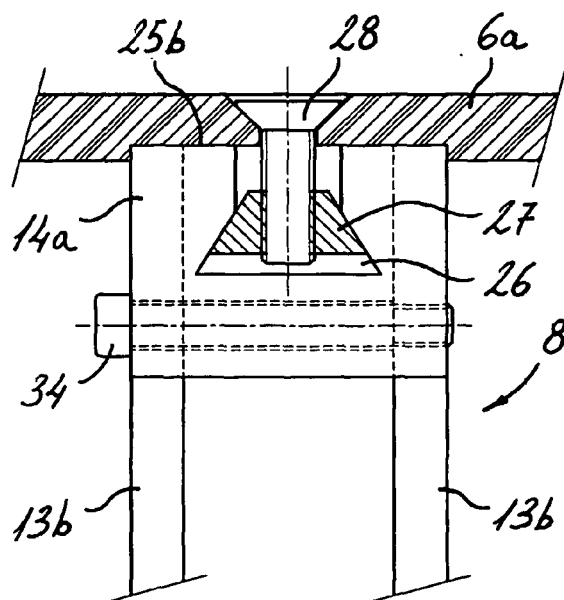
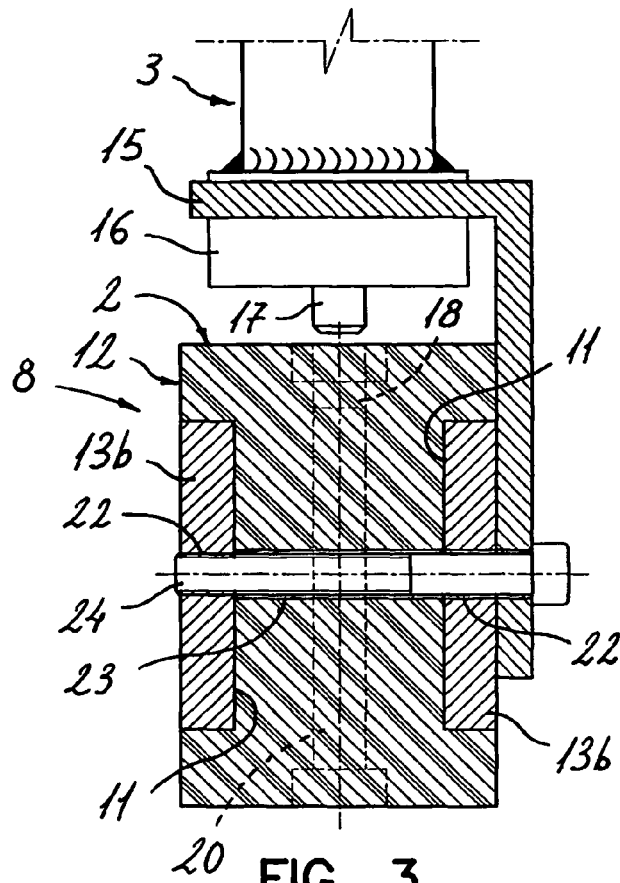
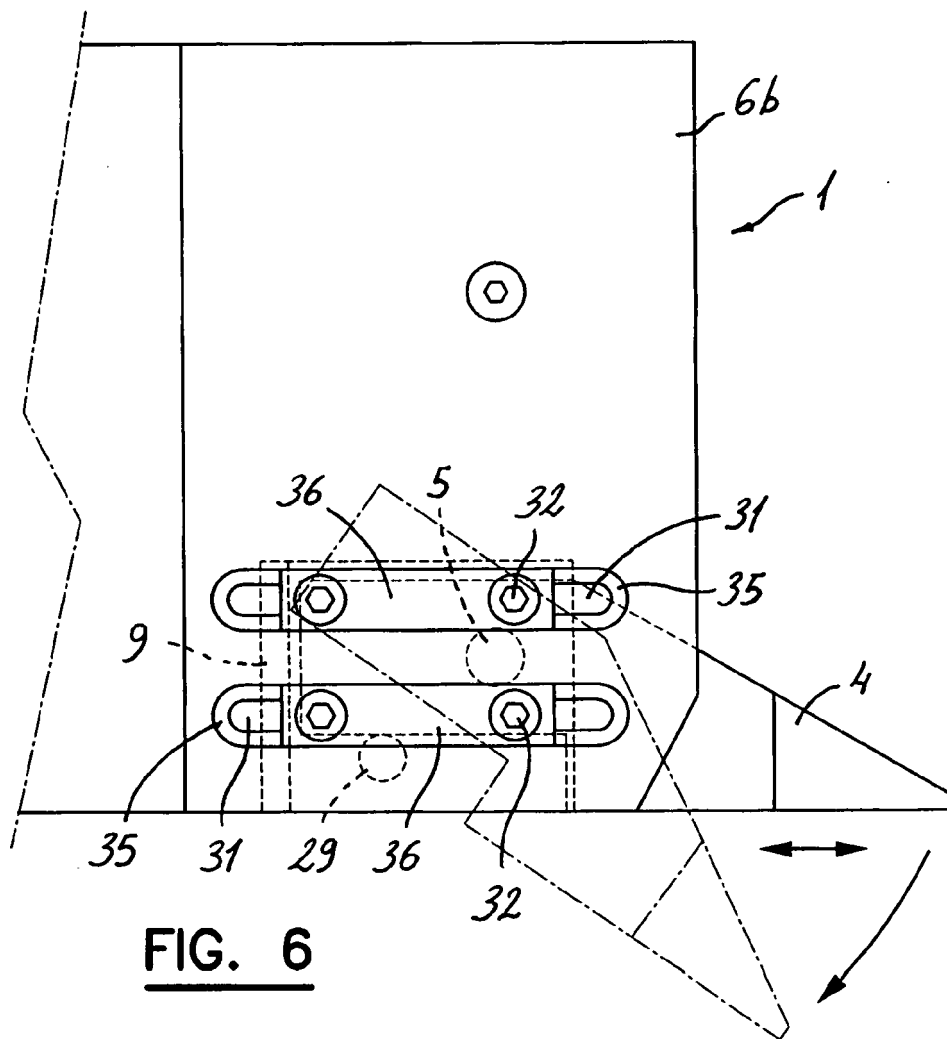
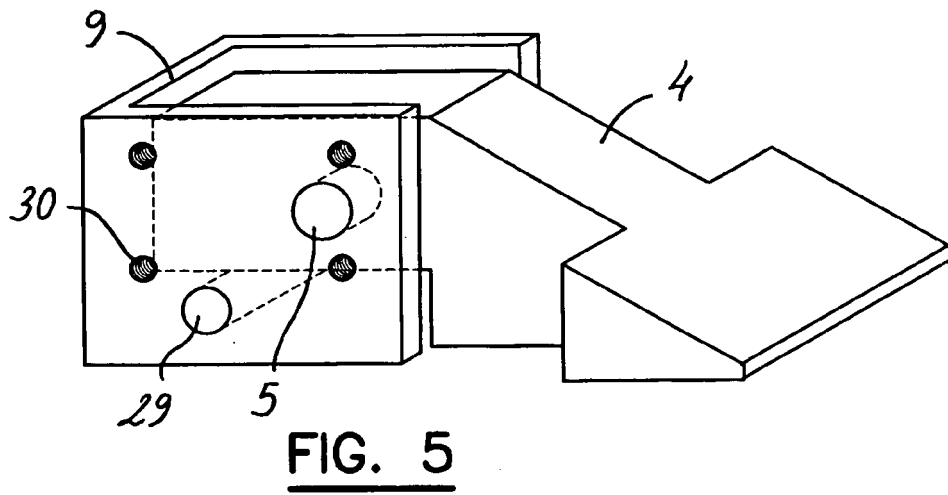


FIG. 1







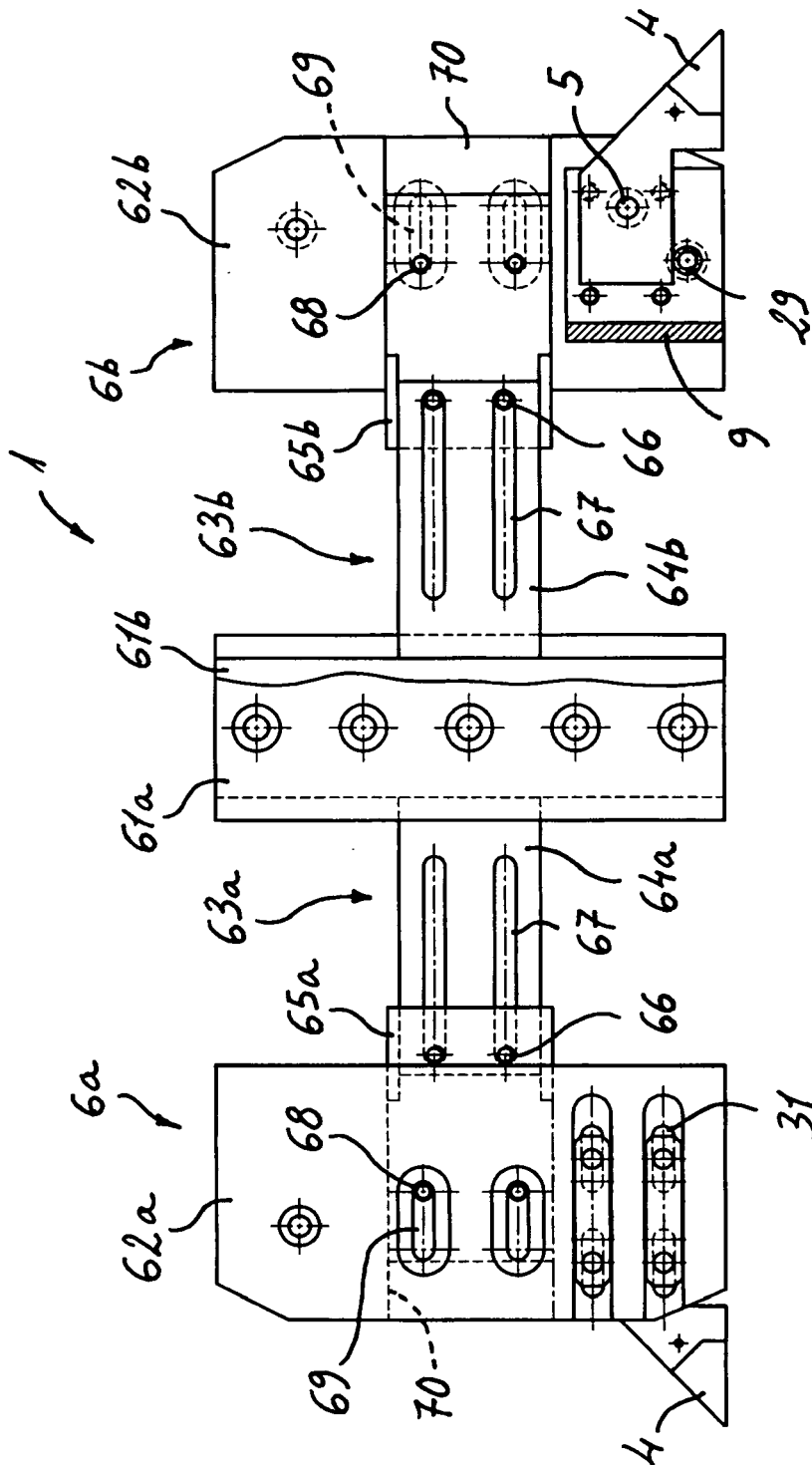


FIG. 7

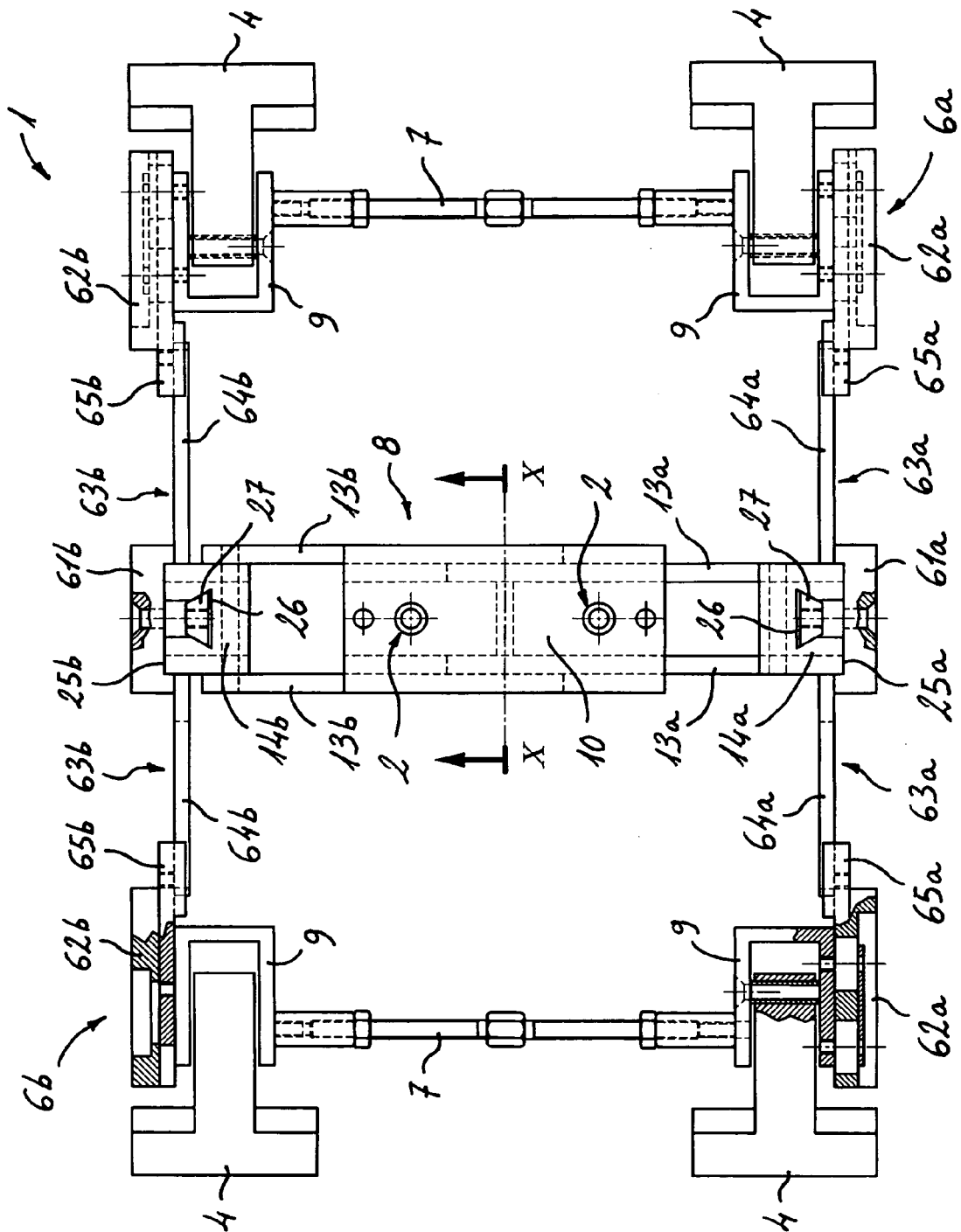


FIG. 8

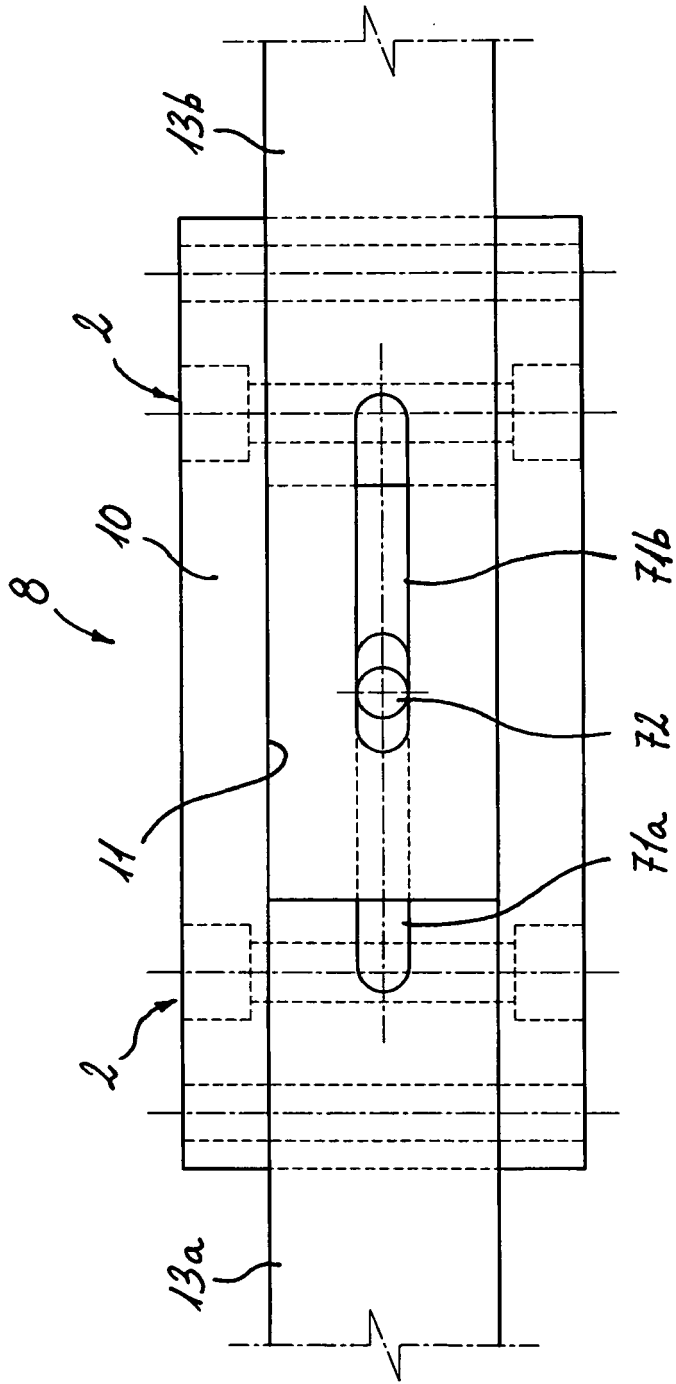


FIG. 9

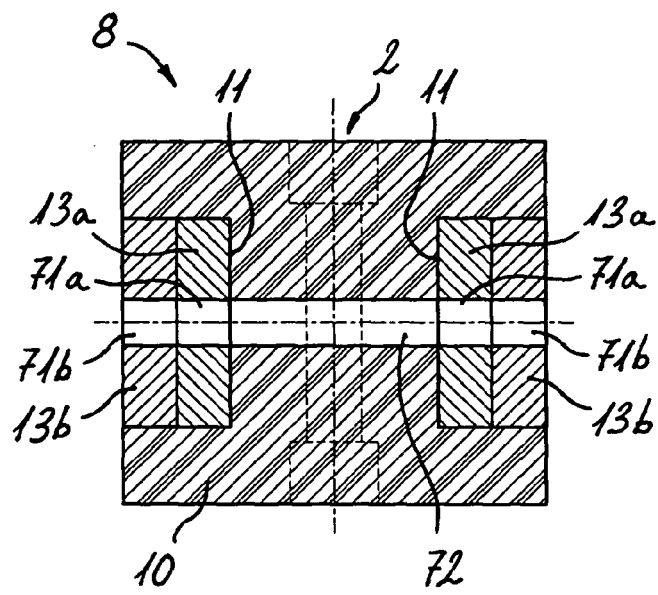


FIG. 10

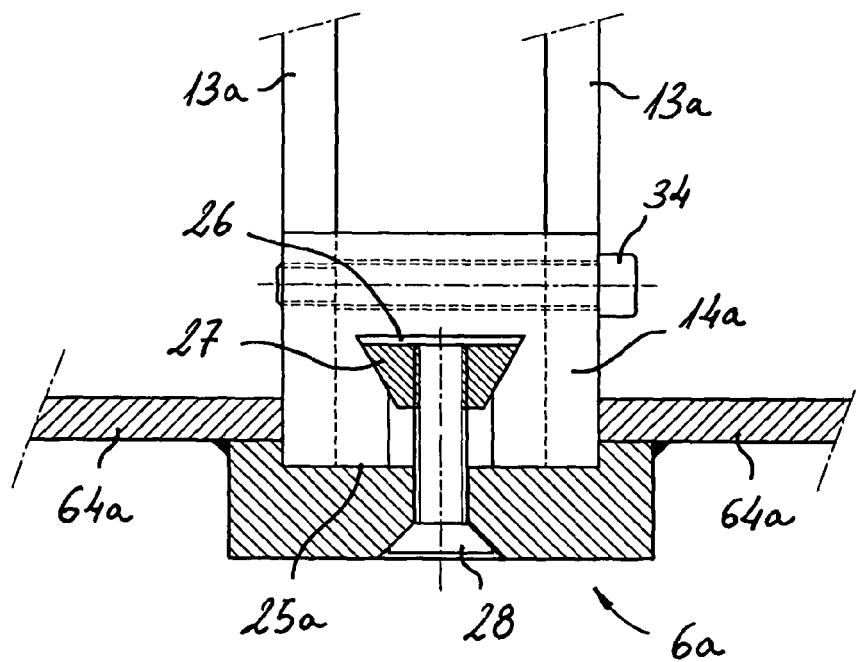


FIG. 11



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EUROPEAN SEARCH REPORT

Application Number
EP 07 38 0181

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	DE 42 22 461 A1 (BOIX MAQUINARIA SA [ES] LOS PINOS FINCA AGRICOLA SL [ES]) 29 July 1993 (1993-07-29) * column 2, line 39 - column 3, line 47; figures 1-6 *	1-19	INV. B31B3/44 B31B3/46
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			B31B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 26 September 2007	Examiner Johne, Olaf
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