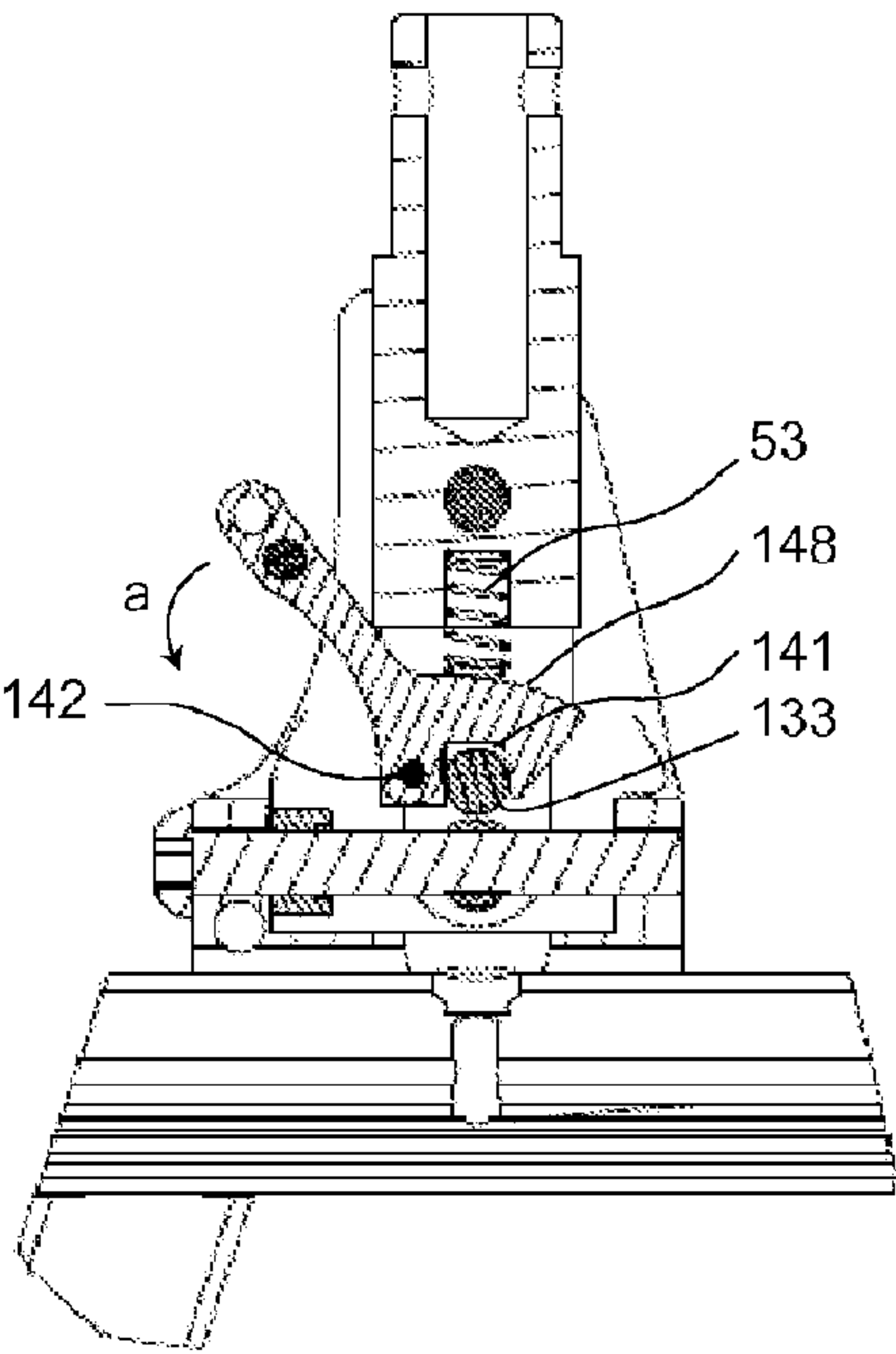




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(54) Titre : CHAISE ROULANTE COMPRENANT UN CHASSIS DE DOSSIER ESCAMOTABLE ET/OU A ANGLE AJUSTABLE
(54) Title: WHEELCHAIR INCLUDING A COLLAPSIBLE AND/OR ANGLE ADJUSTABLE BACKREST FRAME



(57) **Abrégé/Abstract:**
A wheelchair has a wheelchair frame resting on wheels and supporting a seat, and a backrest frame supporting a backrest. The backrest frame is pivotally connected to the wheelchair frame and has two lateral tubular elements, each tubular element having an upper end portion provided with a handle and a lower end portion pivotally mounted on an axis supported on a support fixedly connected to the wheelchair frame. Locking/unlocking means are provided for preventing the lower end portion of at least one of the tubular elements, and preferably of each one of the tubular elements, to pivot relative to the corresponding support in a locked inclined position of the backrest frame. The locking/unlocking means configured to permit a stepless adjustment of the angle between a plane defined by the backrest and a plane defined by the seat in the locked inclined position.

Abstract

A wheelchair has a wheelchair frame resting on wheels and supporting a seat, and a backrest frame supporting a backrest. The backrest frame is pivotally connected to the wheelchair frame and has two lateral tubular elements, each tubular element having an upper end portion provided with a handle and a lower end portion pivotally mounted on an axis supported on a support fixedly connected to the wheelchair frame. Locking/unlocking means are provided for preventing the lower end portion of at least one of the tubular elements, and preferably of each one of the tubular elements, to pivot relative to the corresponding support in a locked inclined position of the backrest frame. The locking/unlocking means configured to permit a stepless adjustment of the angle between a plane defined by the backrest and a plane defined by the seat in the locked inclined position.

Wheelchair including a collapsible and/or angle adjustable backrest frame**Technical Field**

- 5 The present invention relates in general to a wheelchair including a collapsible and/or angle adjustable backrest frame.

Prior Art and the Problem Underlying the Invention

- 10 Foldable wheelchairs have been known for some time, and the advantages are numerous with respect to managing the wheelchair when it is not in use, or for transportation of the wheelchair.

In general, foldable wheelchairs include collapsible backrest frames which can be pivotally folded down from a generally vertical position to a generally horizontal position parallel to
15 and atop the seat. This operation provides partial collapsibility of the wheelchair which reduces the overall dimensions. The backrest frame can advantageously be locked in its operating vertical position via locking/unlocking means.

Occasionally, such foldable wheelchairs may also comprise angle adjustable backrest frame. Thus, the backrest frame can be locked in an operating inclined position wherein the angle of
20 the plane defined by the backrest is slightly inclined relative to the vertical.

However, the problem with such foldable wheelchairs provided with a collapsible and angle adjustable backrest frame is often the necessity for the user to use specific tools for actuating the locking/unlocking means when he wants to move the backrest frame from its operating inclined position to its fully folded position in which the wheelchair can be easily transported
25 and to dismantle and reassembly several components of the backrest frame when he wants to modify the inclination of the backrest in its operating inclined position.

Thus, a first objective of the present invention is to provide a wheelchair in which the backrest can be folded and/or adjusted without requiring any specific tools to actuate the locking/unlocking means and any dismantling of certain parts of the backrest frame.

- 30 A second objective of the present invention is to provide a wheelchair including a backrest frame that can be easily and quickly folded and/or angle adjusted.

A third objective of the present invention is to provide a wheelchair including a backrest frame that can be stepless angle adjusted.

A fourth objective of the present invention is to provide a wheelchair including a backrest frame that can be locked in an inclined position in which the backrest frame is prevented to pivot relative to the wheelchair frame.

A fifth objective of the present invention is to provide a wheelchair including a backrest frame
5 that can be locked both in a folded position and in an erected position.

Summary of Invention

In an aspect, the present invention provides a wheelchair comprising a wheelchair frame resting on wheels and supporting a seat, and a backrest frame supporting a backrest, said backrest frame being pivotally connected to said wheelchair frame and comprising two lateral tubular elements,
10 wherein each tubular element comprises an upper end portion provided with a handle and a lower end portion pivotally mounted on an axis supported on a support fixedly connected to the wheelchair frame, characterized in that locking/unlocking means are provided for preventing the lower end portion of each one of said tubular elements to pivot relative to the corresponding support in a locked inclined position of the backrest frame, said locking/unlocking means being
15 configured so as to permit a stepless adjustment of the angle between a plane defined by the backrest and a plane defined by the seat in said locked inclined position.

According to one aspect of the present invention, there is provided a wheelchair comprising a wheelchair frame resting on wheels and supporting a seat, and a backrest frame supporting a backrest, said backrest frame being pivotally connected to said wheelchair frame and comprising
20 two lateral tubular elements, wherein each tubular element comprises an upper end portion provided with a handle and a lower end portion pivotally mounted on an axis supported on a support fixedly connected to the wheelchair frame, characterized in that locking/unlocking means are provided for preventing the lower end portion of each one of said tubular elements to pivot relative to the corresponding support in a locked inclined position of the backrest frame,
25 said locking/unlocking means being configured so as to permit a stepless adjustment of the angle (α_0) between a plane (P1) defined by the backrest and a plane (P2) defined by the seat in said locked inclined position, wherein the locking/unlocking means comprise at least one abutment element against which abuts a locking/unlocking element connected to the lower end portion of one of said tubular elements of the backrest frame in the locked inclined position, said abutment

element being steplessly movable in a longitudinal direction relative to the support supporting the pivot axis of said lower end portion under the action of driving means supported by said support, and wherein said driving means comprise a threaded rod to which is threadedly connected the abutment element, the position of said abutment element being adjusted along a longitudinal direction by screwing or unscrewing said threaded rod via a control member, said threaded rod being secured on the support through a self-locking type nut, thus prohibiting any loosening of said threaded rod.

According to another aspect of the present invention, there is provided a wheelchair comprising a wheelchair frame resting on wheels and supporting a seat, and a backrest frame supporting a backrest, said backrest frame being pivotally connected to said wheelchair frame and comprising two lateral tubular elements, wherein each tubular element comprises an upper end portion provided with a handle and a lower end portion pivotally mounted on an axis supported on a support fixedly connected to the wheelchair frame, wherein locking/unlocking means are provided for preventing the lower end portion of each one of said tubular elements to pivot relative to the corresponding support in a locked inclined position of the backrest frame, said locking/unlocking means being configured so as to permit a stepless adjustment of the angle (α_0) between a plane (P1) defined by the backrest and a plane (P2) defined by the seat in said locked inclined position, wherein the locking/unlocking means comprise at least one abutment element against which abuts a locking/unlocking element connected to the lower end portion of one of said tubular elements of the backrest frame in the locked inclined position, said abutment element being steplessly movable in a longitudinal direction relative to the support supporting the pivot axis of said lower end portion under the action of driving means supported by said support, wherein the abutment element is configured to be at least partially received inside a laterally oriented groove of the locking/unlocking element in the locked inclined position of the backrest frame so as to prevent the locking/unlocking element together with the tubular element to pivot relative to the corresponding support, wherein the locking/unlocking element is pivotally connected to the tubular element between at least one first position, in which the abutment element is at least partially received inside the groove of the locking/unlocking element, thus maintaining the backrest frame in its locked inclined position, and at least one second position, in which the abutment element is out of engagement with said groove, thus moving the backrest

frame from its locked inclined position to a released position, in which the tubular element can freely pivot relative to the corresponding support, wherein the locking/unlocking element is urged into the first position by biasing means, and wherein the biasing means comprise a compression spring whose upper end is received inside an axially oriented recessed hole
5 provided at the lower end of the tubular element and abuts against the bottom of said recessed hole and whose lower end abuts against an upper side of the locking/unlocking element, the groove of said locking/unlocking element being provided at a lower side of the locking/unlocking element and the pivot axis between the locking/unlocking element and the tubular element being positioned so that the spring is compressed when the locking/unlocking
10 element moves from the first position to the second position.

Further aspects and preferred embodiments are provided in the appended claims.

Brief Description of the Drawings

The wheelchair of the present invention will be described in further detail further below, when
15 useful with reference to the attached drawings, which show an exemplary wheelchair frame according to the invention.

Figure 1 is a side view of a wheelchair according to the present invention, said wheelchair being in its position of use.

Figure 2a is a perspective view of one of the tubular elements of the backrest frame of the
20 wheelchair of Figure 1 when connected to its corresponding support, the backrest frame being in its locked inclined position.

Figure 2b is a view similar to Figure 2a, but on an enlarged scale.

Figure 2c is a view similar to Figure 2a, but the backrest frame being in its locked folded
5 position.

Figure 2d is a view similar to Figure 2c, but on an enlarged scale.

Figure 3a is the side view corresponding to the perspective view of Figure 2a.
10

Figure 3b is a view similar to Figure 3a, but with a different inclination of the backrest relative to the seat.

Figure 3c is a view similar to Figure 3a, but with a different inclination of the backrest
15 relative to the seat.

Figure 4a is the side view corresponding to the perspective view of Figure 2a.

Figure 4b is a view similar to Figure 4a, but the backrest frame being in its released position
20 and the backrest abutting against the seat.

Figure 4c is a view similar to Figure 4a, but the backrest frame being its locked folded position.

Figure 5a is a perspective partially exploded view of a first embodiment of locking/unlocking
25 means used in the wheelchair of Figure 1 to lock one tubular element of the backrest frame to the corresponding support of the wheelchair frame.

Figure 5b is a perspective exploded view of the abutment element shown in Figure 5a.
30

Figure 5c is a perspective exploded view of the lower end portion of the tubular element shown in Figure 5a.

Figure 6 is a perspective partially exploded view of a second embodiment of locking/unlocking means used in the wheelchair of Figure 1 to lock one tubular element of the backrest frame to the corresponding support of the wheelchair frame.

- 5 **Figure 7a** is a sectional view on an enlarged scale of the lower end portion of one tubular element and of the corresponding support as shown in Figure 2a.

Figure 7b is a view similar to Figure 7a, apart that the pivoting locking/unlocking element has been replaced by a fixed locking/unlocking element.

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Figure 8a is a perspective view on an enlarged scale of the lower end portion of one tubular element and of the corresponding support as shown in Figure 2a, in a first embodiment of the driving means used for moving the abutment element.

- 15 **Figure 8b** is a view similar to Figure 8a, but in a second embodiment of the driving means used for moving the abutment element.

Figure 9 is a side view on an enlarged scale of the support shown in Figure 2a.

- 20 **Figure 10a** is a sectional view on an enlarged scale of the lower end portion of one tubular element and of the corresponding support as shown in Figure 2a, in the locked inclined position of the backrest frame.

- Figure 10b** is a view similar to Figure 10a, but in a second position of the locking/unlocking element, the backrest frame being in its released position.
- 25

Figure 10c is a view similar to Figure 10a, but the backrest frame being in an intermediate position between its folded position and its erected position.

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Detailed Description of the Preferred Embodiments

For the purpose of the present specification, situations and directions of elements of the wheelchair of the present invention are determined by the perspective of a user seated in the wheelchair. Accordingly, the rear side of the wheelchair corresponds to the left side of Figure 1. The situations or directions "up" or "top" and "down" or "bottom", "rear" or "back" and "front", "behind" and "in front", "upper" and "lower", "lateral" and "central" follow the same rule. A longitudinal direction corresponds to a back-to-front direction and a lateral direction corresponds to a left-to-right direction. The horizontal corresponds to the plane tangential to the rear and front wheels and positioned under said wheels when the wheelchair is its normal position of use. A horizontal plane corresponds to a plane parallel to the horizontal. The vertical, or a vertical plane, corresponds to a plane perpendicular to the horizontal.

Figure 1 shows a wheelchair according to the present invention. The wheelchair 10 of Figure 1 includes a frame 1 with rear and front wheels 2 and 3, respectively, extending downwardly therefrom for engaging the ground. The frame 1 includes a left side component and a right side component connected together via lateral struts, the left side component and the right side component being substantially identical. Therefore, to simplify our explanations, we will only describe in the following paragraphs the left side component. The wheelchair frame 1 supports a seat 4 and a backrest frame 5 supporting a backrest 6. The backrest frame 5 comprises two lateral tubular elements, respectively left and right lateral tubular elements, connected at their lower end to the wheelchair frame 1. In the erected position of the backrest frame illustrated in Figure 1, the backrest 6 defines a plane P1 and the seat 4 defines a plane P2, said plane P1 being substantially perpendicular to said plane P2. As explained in greater detail in the following description, the wheelchair 10 of the present invention is configured so that the angle between said plane P1 and said plane P2 may be stepless adjusted.

With reference to Figure 2a, the left side component 1a of the wheelchair frame 1 comprises an upright 1b, an L-shaped bar 1c and a horizontal profile 1d extending therebetween. The profile 1d may advantageously be configured as a rail along which may be fixedly connected a support 11 to which is connected the lower portion 5c of the left lateral tubular element 5a of the backrest frame 5, said tubular element comprising an upper portion 5b provided with a

handle 5d. As shown in detail in Figure 2b, the support 11 comprises a left part 111 and a right part 112 integral therewith, said left part and said right part being laterally spaced-apart so that the lower portion 5c of the tubular element 5a can be at least partially positioned inside the free space separating said left and right parts 111 and 112. Said lower portion 5c may
5 advantageously comprise two parallel flat surfaces 8 on its left and right sides, said flat surfaces 8 being parallel and slightly spaced-apart from the internally oriented surfaces 9 of the left and right parts 111 and 112. The lower portion 5c of the tubular element 5a is pivotally mounted on an axis 7 laterally extending between the left and right parts 111 and 112 of the support 11. As explained in greater detail in the following description,
10 locking/unlocking means 12 are provided in the support 11 and at the lower end of the tubular element 5a so as to permit a stepless adjustment of the angle α_0 between the plane P1 and the plane P2 in the erected position of the backrest frame 5 illustrated in Figure 1. In particular, the angle α_0 may be adjusted via said locking/unlocking means 12 so as to be substantially equal to 90°, as illustrated in Figure 3a, to 105°, as illustrated in Figure 3b, or to 75°, as
15 illustrated in Figure 3c. Therefore, any angle α_0 between 75° and 105° can be adjusted through said locking/unlocking means 12. Of course, said locking/unlocking means 12 may be configured so as to enlarge or reduce this angular range. Furthermore, as explained in greater detail in the following description, said locking/unlocking means 12 may also be configured so as to unlock the backrest frame 5 from its locked inclined position as illustrated
20 in Figure 4a, thus permitting the positioning of said backrest frame 5 into a completely folded position as illustrated in Figure 4b, in which the tubular element 5a or the backrest 6 abuts against the seat 4. Said locking/unlocking means 12 may also be configured so as to lock the backrest frame 5 into a locked folded position as illustrated in Figures 2c and 4c, in which the plane P1 is substantially parallel to the plane P2.

25

A first embodiment of the locking/unlocking means 12 is shown in Figures 5a and 7a. This locking means 12 comprises one abutment element 13 connected to the support 11 and one locking/unlocking element 14 pivotally connected to the lower end portion 5c of a tubular element 5a.

30

As shown in Figure 5b, the abutment element 13 comprises an upper part 133 and a lower part 134, said upper and lower parts having a substantially cylindrical form and extending in a lateral direction. The left, respectively the right, end of said upper part 133 is fixedly

connected to a left plate 131, respectively a right plate 132, extending in a vertical direction and the left, respectively the right, end of said lower part 134 is rotatably connected to said left plate 131, respectively said right plate 132. Furthermore, said left, respectively said right, end of said lower part 134 is slidably received in an oblong through-hole 138, respectively 139, of said left plate 131, respectively said right plate 132, so that the distance between the lower part 134 and the pivot axis 7 may vary according to the angle α_0 , thus permitting the longitudinal movement of the abutment element 13 along the threaded rod 151. The upper end of said left plate 131, respectively of said right plate 132, is pivotally connected to the left part 111, respectively the right part 112, of the support 11 via a screw 71 and a nut 72, said screw being received inside corresponding through-holes 136 of the left plate 131, respectively 137 of the right plate 132, and 116 of the left part 111, respectively 117 of the right part 112. Advantageously, said screw 71 is also received inside a through-hole 55 provided in the lower end portion 5c of the tubular element 5a, thus defining the pivot axis 7 between the tubular element 5a and the support 11. The lower part 134 is provided with a longitudinal threaded through-hole 135 adapted to receive a threaded rod 151 fixedly connected to the support 11. Thus, as explained in greater detail in the following description, the abutment element 13 may be stepless movable in a longitudinal direction relative to the support 11 under the action of said threaded rod 151. During the displacement of the abutment element 13 along the threaded rod 151, the inclination of the left and right plates 131, 132 and, thus, of the upper and lower parts 111, 112 of the abutment element 13, is progressively modified due to the fact that said left and right plates 131, 132 pivot relative to the axis 7.

In a second embodiment of the locking/unlocking means 12, illustrated in Figure 6, the abutment element 13' comprises an upper part 133' and a lower part 134', said parts being integral into one single piece and said lower part 134' being provided with a longitudinal threaded through-hole 135' adapted to receive a threaded rod 151 fixedly connected to the support 11. Thus, in this embodiment, the inclination of the upper and lower parts 133', 134' is not modified during the displacement of the abutment element 13' along the threaded rod 151.

30

In the embodiments shown in Figures 5a, 6 and 7a, the threaded rod 151 is defined by the shank of a screw 15 which is received inside corresponding threaded through-holes 115 provided in the central rear and front portions 113 and 114 of the support 11, which link the left part 111 to the right part 112. Said screw 15 is advantageously secured on the support 11

through a Nylstop® type nut 153 abutting against an internally oriented surface of the central rear portion 113. Said Nylstop® type nut 153 prohibits any loosening of the screw 15 when the user screws or unscrews said screw 15 so as to adjust the position of the abutment element 13 along a longitudinal direction. As shown in Figure 8a, this operation can be done via a tool
 5 T, such as a screwdriver, a cruciform key or an Allen key, adapted to the head 152 of the screw 15.

In a further embodiment shown in Figure 8b, the threaded rod 151 may also be fixedly connected at its rear end to a knob 152', said knob being configured so as to permit the user to
 10 screw or unscrew the threaded rod 151 by hand and without using a tool.

As shown in Figure 9, the left part 111 of the support 11 may advantageously be provided with a longitudinal slot 118, said slot being aligned with the threaded rod 151 so that the position of the abutment element 13 or 13' relative to said threaded rod 151 can be seen by
 15 the user. Furthermore, the left oriented face 111a of said left part 111 may advantageously be provided with a scale 119 and the lower part 134, respectively 134', of said abutment element 13, respectively 13', may advantageously comprise a reference mark 140 on its left side face, said reference mark 140 indicating the position of the abutment element 13 or 13' along the threaded rod 151. Thus, by reading the graduation of the scale 119 which is aligned with the
 20 reference mark 140 of the abutment element 13 or 13', one can evaluate the angle between the plane P1 defined by the backrest 6 and the plane P2 defined by the seat 4.

In the embodiments shown in Figures 5a, 6 and 7a, the locking/unlocking element 14 comprises an upper part 14a and a lower part 14b integral therewith, said locking/unlocking
 25 element having a substantially L-shape form. As shown in Figure 5c, the lower part 14b is defined by a curved shape upper side 148 linked to the lower side 149 thereof by an obliquely extended surface 143, defining a bevelled cam surface as explained in greater detail in the following description. The lower side 149 is provided with a laterally oriented groove 141 adapted to receive the upper part 133 of the abutment element 13 in the locked inclined
 30 position of the backrest frame 5, as illustrated in Figure 7a. The lower part 14b is at least partially received inside a longitudinal housing 56 provided in the tubular element 5a, said housing 56 being defined by left and right parallel flanges 57 and 58 protruding in a vertical direction from a bottom surface 51 defining the lower end of the tubular element 5a. So as to pivotally connect the locking/unlocking element 14 to the lower end portion 5c of the tubular

element 5a, the lower part 14b of the locking/unlocking element 14 is provided with a laterally oriented through-hole 147 adapted to receive a pin 142 received inside and fixedly connected to laterally oriented through-holes provided in the left and right flanges 57 and 58 respectively. The upper part 14a extends at least partially outside of the support 11 so that the user can handle it. In particular, said upper part 14a defines a lever arm adapted to be actuated by a user so as to pivot the locking/unlocking element 14 relative to the tubular element 5a between a first position in which the upper part 14a abuts against the lower end 51 of the tubular element 5a, as illustrated in Figure 10a, and a second position in which the lower part 14b abuts against said lower end 51, as illustrated in Figure 10b. The locking/unlocking element 14 is advantageously urged into its first position by biasing means 53. In the embodiment shown, said biasing means consists in a compression spring 53, whose the upper end is received inside an axially oriented recessed hole 52 emerging from the lower end 51 of the tubular element 5a and abuts against the bottom 54 of said recessed hole 52 and whose the lower end abuts against the upper side 148 of the lower part 14b of the locking/unlocking element 14. Thus, when the locking/unlocking element 14 moves from its first position to its second position, the spring 53 is compressed inside the recessed hole 52. The locking/unlocking element 14 comprises also one pin 144 laterally protruding from both side faces of the upper part 14a. Accordingly, a laterally oriented through-hole 145 is advantageously provided in said upper part 14a so as to receive said pin 144. As shown in Figure 2d, the left end 144a, respectively the right end 144b, of said pin 144 is adapted to be received inside a cavity or trough 111i, respectively 112i, provided in the upper portion of the left part 111, respectively the right part 112, of the support 11 when the backrest frame 5 in its folded position shown in Figure 2c and when the locking/unlocking element 14 is in its first position. In this locked folded position, the tubular element 5a is prevented to pivot relative to the support 11 in the clockwise direction but may slightly pivot relative to the support 11 in the anticlockwise direction until the pin 144 abuts against a vertical portion 111j, respectively 112j, of the cavity or trough 111i, respectively 112i. Thus, to unlock the backrest frame 5 from this locked folded position, the user may move the locking/unlocking element 14 from its first position to its second position when the pin 144 does not abut against the vertical portions 111j and 112j. Such a movement may advantageously be done by pulling a cord or a string that is fixedly connected at one end to the locking/unlocking element 14 pivotally connected to the tubular element 5a that is pivotally connected to the left side component 1a of the wheelchair frame 1 and at the other end to the locking/unlocking element 14 pivotally connected to the tubular element 5a that is pivotally connected to the right side component 1b

of the wheelchair frame 1. A laterally oriented through-hole 146 may advantageously be provided in the upper part 14a of the locking/unlocking element 14 so as to receive said cord or string.

5 In a further embodiment of the locking/unlocking means 12, illustrated in Figure 7b, the pivoting locking/unlocking element 14 of Figure 7a is replaced by a locking/unlocking element 14' fixedly connected to the lower end portion 5c of the tubular element 5a. Accordingly, the compression spring 53 is removed from the recessed hole 52 provided at the lower end 51 of the tubular element 5a. The locking/unlocking element 14' is advantageously
10 configured as a substantially parallelepiped piece which is completely received inside the housing 56 of the tubular element 5a and abuts against the lower end 51 thereof. The lower side of said parallelepiped piece 14' is provided with a groove 141' adapted to receive the upper part 133 of the abutment element 13 in the locked inclined position of the backrest frame 5. Thus, a stepless adjustment of the angle between the backrest and the seat of the
15 wheelchair can be done by simply moving the abutment element 13 in the longitudinal direction along the threaded rod 151, as already explained in the preceding paragraphs with respect to the locking/unlocking element 14. However, in this embodiment, the backrest frame 5 may only be released from said locked inclined position by dismantling said locking/unlocking element 14' from the lower end portion 5c of the tubular element 5.

20

Figures 10b illustrates an intermediate position of the locking/unlocking element 14 and of the tubular element 5a during the movement of the backrest frame from its locked inclined position, illustrated in Figure 10a, to its locked folded position.

25 The intermediate position illustrated in Figure 10b results of the pivoting movement of the locking/unlocking element 14 in the anticlockwise direction around the pivot axis 142 from its first position, as indicated in (a) in Figure 10a. During this movement, the locking/unlocking element 14 compresses the spring 53 inside the recessed hole 52. This movement permits to at least partially position the upper part 133 of the abutment element 13
30 outside of the groove 141 of the locking/unlocking element 14, thus unlocking the backrest frame from its locked inclined position. Thereafter, so as to position the backrest frame in its locked folded position, the tubular element 5a will be pivotally moved in the clockwise direction around the pivot axis 7, as indicated in (b) in Figure 10b, till the plane P1 and the

plane P2 be substantially parallel and the locking/unlocking element 14 will return to its first position, as indicated in (c) in Figure 10b.

Figure 10c illustrates an intermediate position of the locking/unlocking element 14 and of the tubular element 5a during the movement of the backrest frame from to its locked folded position to its locked inclined position.

In this intermediate position, the locking/unlocking element 14 is in its first position and the tubular element 5a is in a partially locked inclined position in which it can pivot in the clockwise direction but not in the anticlockwise direction due to the fact that the bevelled cam surface 143 of the locking/unlocking element 14 abuts against the upper part 133 of the abutment element 13. To move the backrest frame from said partially locked inclined position to its locked inclined position, the user must pivot the tubular element 5a under constraint in the anticlockwise direction, as indicated in (d1) in Figure 10c. During this operation, the bevelled cam surface 143 interacts with the upper part 133 so as to produce a pivoting movement of the locking/unlocking element 14 around the pivot axis 142 in the anticlockwise direction, as indicated in (d2) in Figure 10c, and a compression of the spring 53 inside the recessed hole 52, as indicated in (d3) in Figure 10c. Thus, the tubular element 5a can pivot in the anticlockwise direction till the contact between the bevelled cam surface 143 and the upper part 133 ceases. This happens when the groove 141 is substantially aligned with the upper part 133. Thereafter, the spring 53 forces the locking/unlocking element 14, as indicated in (e1) in Figure 10c, to pivot in the clockwise direction till it abuts against the lower end of the tubular element 5a, as indicated in (e2) in Figure 10c, thus positioning the upper part 133 inside the groove 141.

25

The above detailed description with reference to the drawings illustrates rather than limit the invention. There are numerous alternatives, which fall within the scope of the appended claims.

Claims

1. A wheelchair comprising a wheelchair frame resting on wheels and supporting a seat, and a backrest frame supporting a backrest, said backrest frame being pivotally connected to said
5 wheelchair frame and comprising two lateral tubular elements, wherein each tubular element comprises an upper end portion provided with a handle and a lower end portion pivotally mounted on an axis supported on a support fixedly connected to the wheelchair frame, characterized in that locking/unlocking means are provided for preventing the lower end portion of each one of said tubular elements to pivot relative to the corresponding support in a locked
10 inclined position of the backrest frame, said locking/unlocking means being configured so as to permit a stepless adjustment of the angle (α_0) between a plane (P1) defined by the backrest and a plane (P2) defined by the seat in said locked inclined position,
wherein the locking/unlocking means comprise at least one abutment element against which abuts a locking/unlocking element connected to the lower end portion of one of said
15 tubular elements of the backrest frame in the locked inclined position, said abutment element being steplessly movable in a longitudinal direction relative to the support supporting the pivot axis of said lower end portion under the action of driving means supported by said support,
and wherein said driving means comprise a threaded rod to which is threadedly connected the abutment element, the position of said abutment element being adjusted along a longitudinal
20 direction by screwing or unscrewing said threaded rod via a control member, said threaded rod being secured on the support through a self-locking type nut, thus prohibiting any loosening of said threaded rod.
2. The wheelchair of claim 1, wherein the control member is the head of a screw, the
25 threaded rod corresponding to the shank of said screw.
3. The wheelchair of claim 1, wherein the control member is a knob fixedly connected at one end of said threaded rod.
- 30 4. The wheelchair of any one of claims 1 to 3, wherein the abutment element is configured to be at least partially received inside a laterally oriented groove of the locking/unlocking

element in the locked inclined position of the backrest frame so as to prevent the locking/unlocking element together with the tubular element to pivot relative to the corresponding support.

5 5. The wheelchair of claim 4, wherein the locking/unlocking element is fixedly connected to the tubular element.

6. The wheelchair of claim 4, wherein the locking/unlocking element is pivotally connected to the tubular element between at least one first position, in which the abutment element is at least partially received inside the groove of the locking/unlocking element, thus maintaining the backrest frame in its locked inclined position, and at least one second position, in which the abutment element is out of engagement with said groove, thus moving the backrest frame from its locked inclined position to a released position, in which the tubular element can freely pivot relative to the corresponding support.

15

7. The wheelchair of claim 6, wherein the locking/unlocking element is urged into the first position by biasing means.

8. The wheelchair of claim 7, wherein the biasing means comprise a compression spring whose upper end is received inside an axially oriented recessed hole provided at the lower end of the tubular element and abuts against the bottom of said recessed hole and whose lower end abuts against an upper side of the locking/unlocking element, the groove of said locking/unlocking element being provided at a lower side of the locking/unlocking element and the pivot axis between the locking/unlocking element and the tubular element being positioned so that the spring is compressed when the locking/unlocking element moves from the first position to the second position.

9. The wheelchair of claim 8, wherein the locking/unlocking element comprises a bevelled cam surface obliquely extended between the upper side and the lower side thereof, said cam surface being configured to interact with the abutment element when the backrest frame is moved under constraint from the released position to the locked inclined position so that the

spring is compressed by said locking/unlocking element, thus facilitating the movement of the backrest frame from the released position to the locked inclined position.

10. The wheelchair of any one of claims 6 to 9, wherein the locking/unlocking element
5 comprises an upper part and a lower part, said upper part defining a lever arm adapted to be actuated by a user so as to pivot the locking/unlocking element relative to the tubular element and said lower part supporting the pivot axis between said locking/unlocking element and said tubular element and defining the groove inside which is at least partially received the abutment element in the first position of the locking/unlocking element.

10

11. The wheelchair of claim 10, wherein the locking/unlocking element comprises at least one pin laterally protruding from at least one side face of the upper part of said locking/unlocking element, said pin being adapted to be received inside at least one cavity or trough provided in the support to which is pivotally connected the tubular element when the
15 backrest frame is in a locked folded position, in which the plane (P1) defined by the backrest is substantially parallel to the plane (P2) defined by the seat and in which said tubular element is prevented to pivot relative to said support.

12. The wheelchair of any one of claims 9 to 11, wherein the abutment element comprises a
20 lower part and an upper part, said lower part being provided with a longitudinal threaded through-hole adapted to receive the threaded rod and said upper part having a substantially cylindrical form and extending in a lateral direction so that the cam surface interact with said upper part so that the spring is compressed by the locking/unlocking element when the backrest frame moves under constraint from its released position to its locked inclined position.

25

13. The wheelchair of claim 12, wherein the lower part and the upper part of the abutment element are integral in one single piece.

14. The wheelchair of claim 12, wherein the lower part and the upper part of the abutment
30 element are connected to two parallel plates, an upper end of each of said plates being pivotally connected to the support to which is pivotally connected the tubular element.

15. The wheelchair of claim 14, wherein the pivot axis between the plates and the support corresponds to the pivot axis between the tubular element and the support.

5 16. The wheelchair of any one of claims 1 to 15, wherein a longitudinal slot is provided in a lateral face of the support to which is pivotally connected the tubular element, said slot being substantially aligned with the threaded rod so that the position of the abutment element along said threaded rod can be seen.

10 17. The wheelchair of claim 16, wherein said lateral face is provided with a scale so that the angle (α_0) between the plane (P1) defined by the backrest and the plane (P2) defined by the seat in the locked inclined position of the backrest frame can be evaluated by reading the graduation of the scale which is aligned with the position of the abutment element.

15 18. A wheelchair comprising a wheelchair frame resting on wheels and supporting a seat, and a backrest frame supporting a backrest, said backrest frame being pivotally connected to said wheelchair frame and comprising two lateral tubular elements, wherein each tubular element comprises an upper end portion provided with a handle and a lower end portion pivotally mounted on an axis supported on a support fixedly connected to the wheelchair frame, wherein
20 locking/unlocking means are provided for preventing the lower end portion of each one of said tubular elements to pivot relative to the corresponding support in a locked inclined position of the backrest frame, said locking/unlocking means being configured so as to permit a stepless adjustment of the angle (α_0) between a plane (P1) defined by the backrest and a plane (P2) defined by the seat in said locked inclined position,

25 wherein the locking/unlocking means comprise at least one abutment element against which abuts a locking/unlocking element connected to the lower end portion of one of said tubular elements of the backrest frame in the locked inclined position, said abutment element being steplessly movable in a longitudinal direction relative to the support supporting the pivot axis of said lower end portion under the action of driving means supported by said support,

30 wherein the abutment element is configured to be at least partially received inside a laterally oriented groove of the locking/unlocking element in the locked inclined position of the

backrest frame so as to prevent the locking/unlocking element together with the tubular element to pivot relative to the corresponding support,

wherein the locking/unlocking element is pivotally connected to the tubular element between at least one first position, in which the abutment element is at least partially received inside the groove of the locking/unlocking element, thus maintaining the backrest frame in its locked inclined position, and at least one second position, in which the abutment element is out of engagement with said groove, thus moving the backrest frame from its locked inclined position to a released position, in which the tubular element can freely pivot relative to the corresponding support,

wherein the locking/unlocking element is urged into the first position by biasing means, and wherein the biasing means comprise a compression spring whose upper end is received inside an axially oriented recessed hole provided at the lower end of the tubular element and abuts against the bottom of said recessed hole and whose lower end abuts against an upper side of the locking/unlocking element, the groove of said locking/unlocking element being provided at a lower side of the locking/unlocking element and the pivot axis between the locking/unlocking element and the tubular element being positioned so that the spring is compressed when the locking/unlocking element moves from the first position to the second position.

19. The wheelchair of claim 18, wherein the locking/unlocking element comprises a bevelled cam surface obliquely extended between the upper side and the lower side thereof, said cam surface being configured to interact with the abutment element when the backrest frame is moved under constraint from the released position to the locked inclined position so that the spring is compressed by said locking/unlocking element, thus facilitating the movement of the backrest frame from the released position to the locked inclined position.

20. The wheelchair of claim 18 or 19, wherein the locking/unlocking element comprises an upper part and a lower part, said upper part defining a lever arm adapted to be actuated by a user so as to pivot the locking/unlocking element relative to the tubular element and said lower part supporting the pivot axis between said locking/unlocking element and said tubular element and

defining the groove inside which is at least partially received the abutment element in the first position of the locking/unlocking element.

21. The wheelchair of claim 20, wherein the locking/unlocking element comprises at least
5 one pin laterally protruding from at least one side face of the upper part of said
locking/unlocking element, said pin being adapted to be received inside at least one cavity or
trough provided in the support to which is pivotally connected the tubular element when the
backrest frame is in a locked folded position, in which the plane (P1) defined by the backrest is
substantially parallel to the plane (P2) defined by the seat and in which said tubular element is
10 prevented to pivot relative to said support.

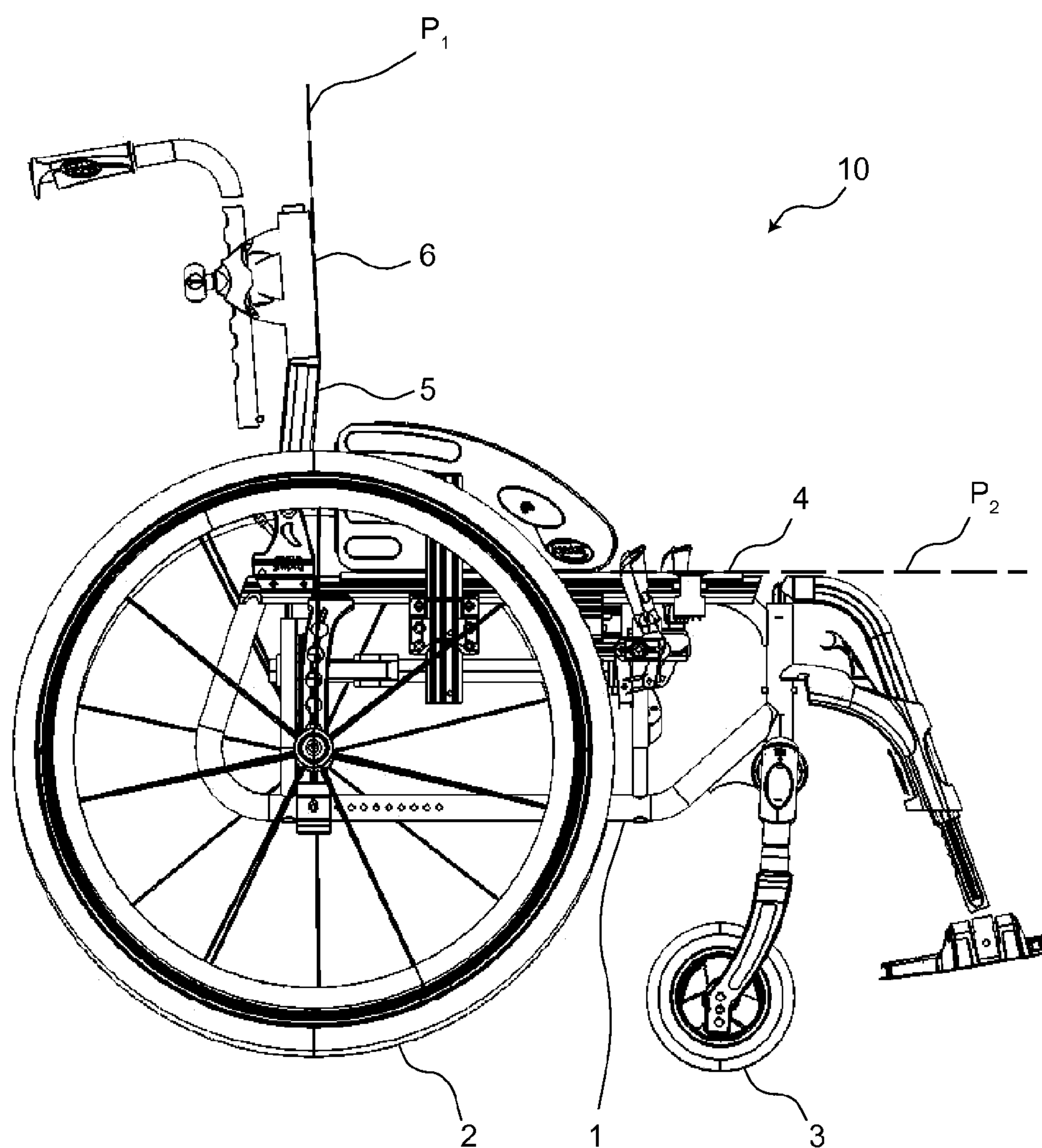


Fig. 1

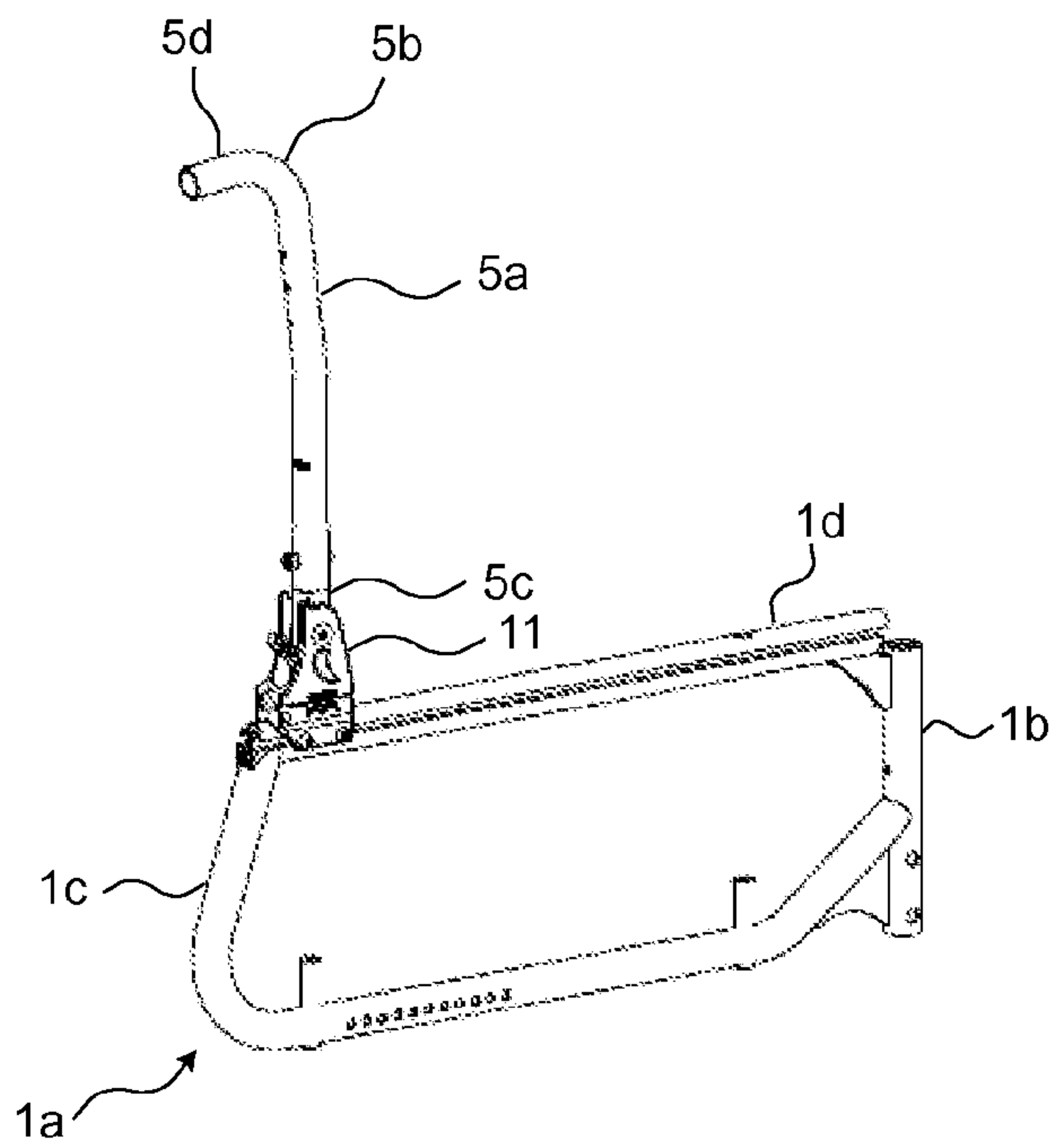


Fig. 2a

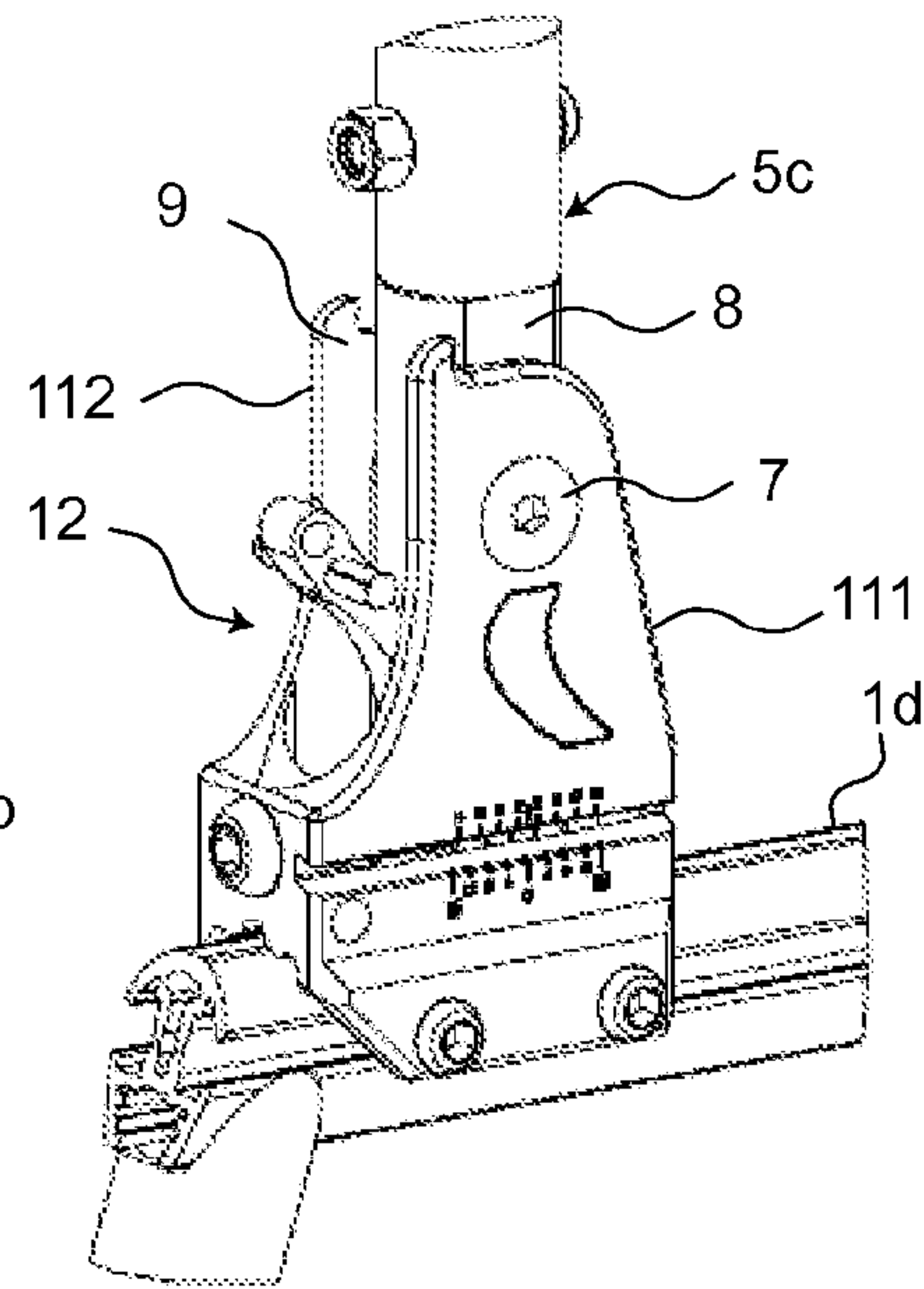


Fig. 2b

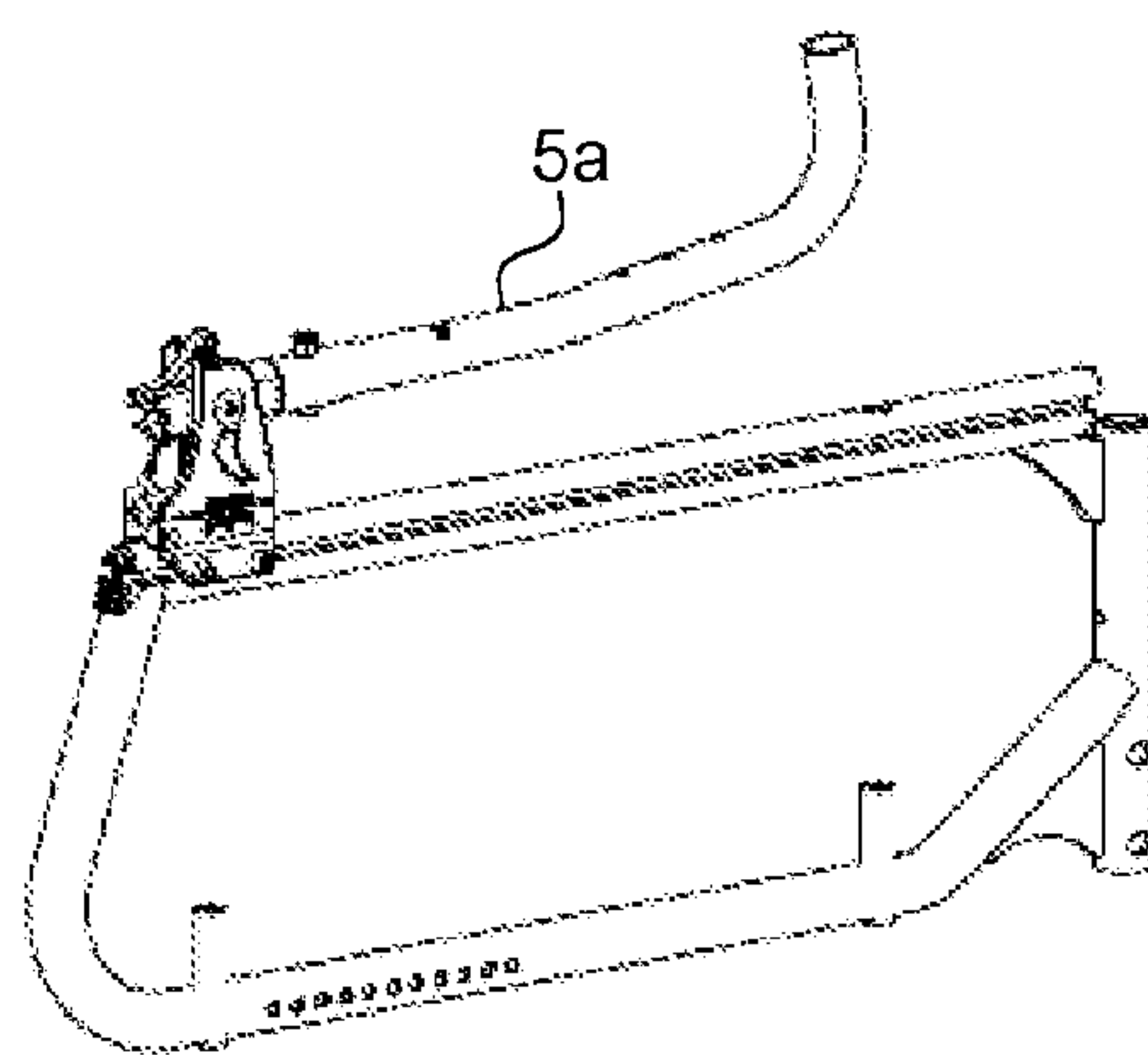


Fig. 2c

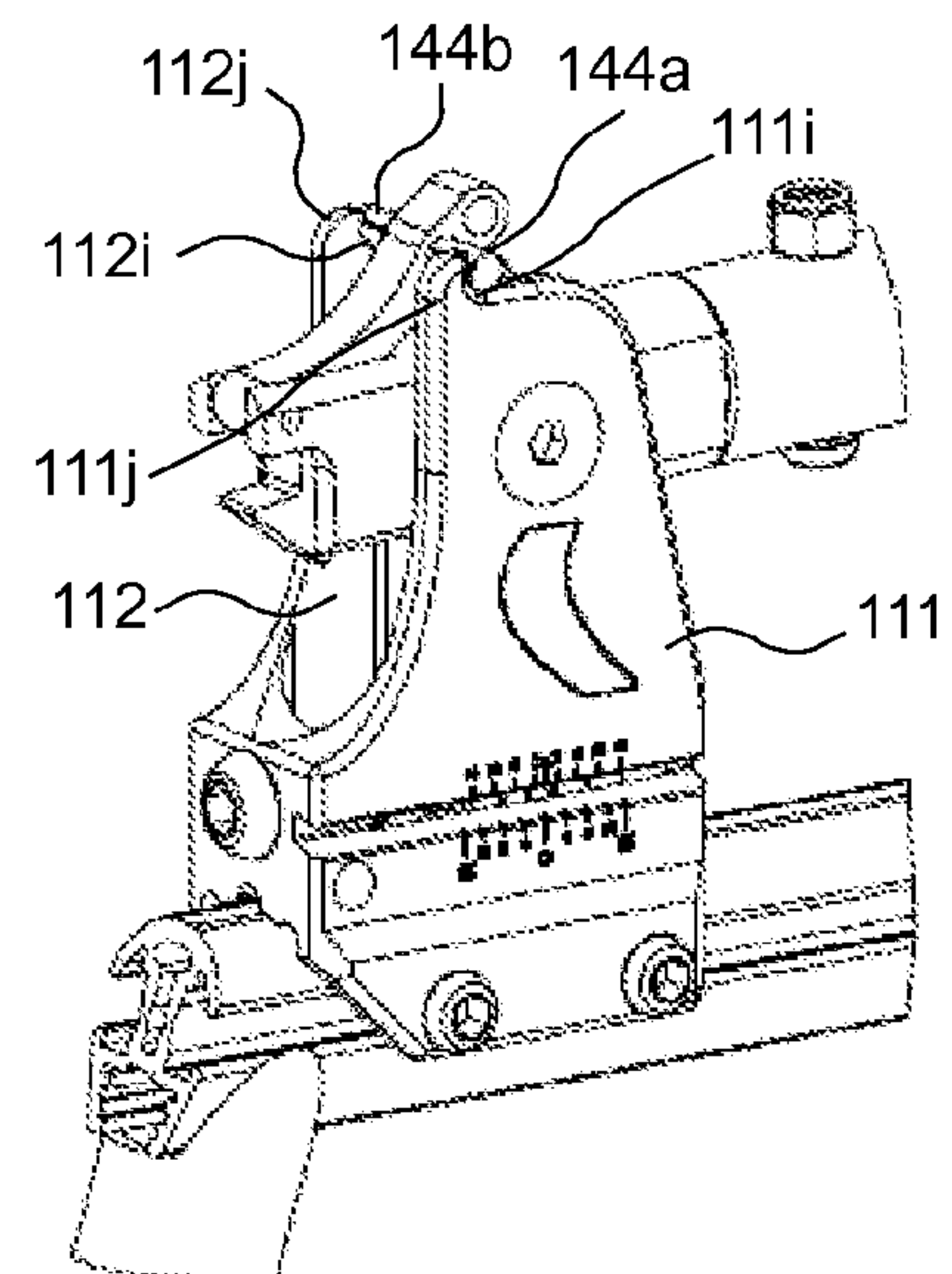


Fig. 2d

3/10

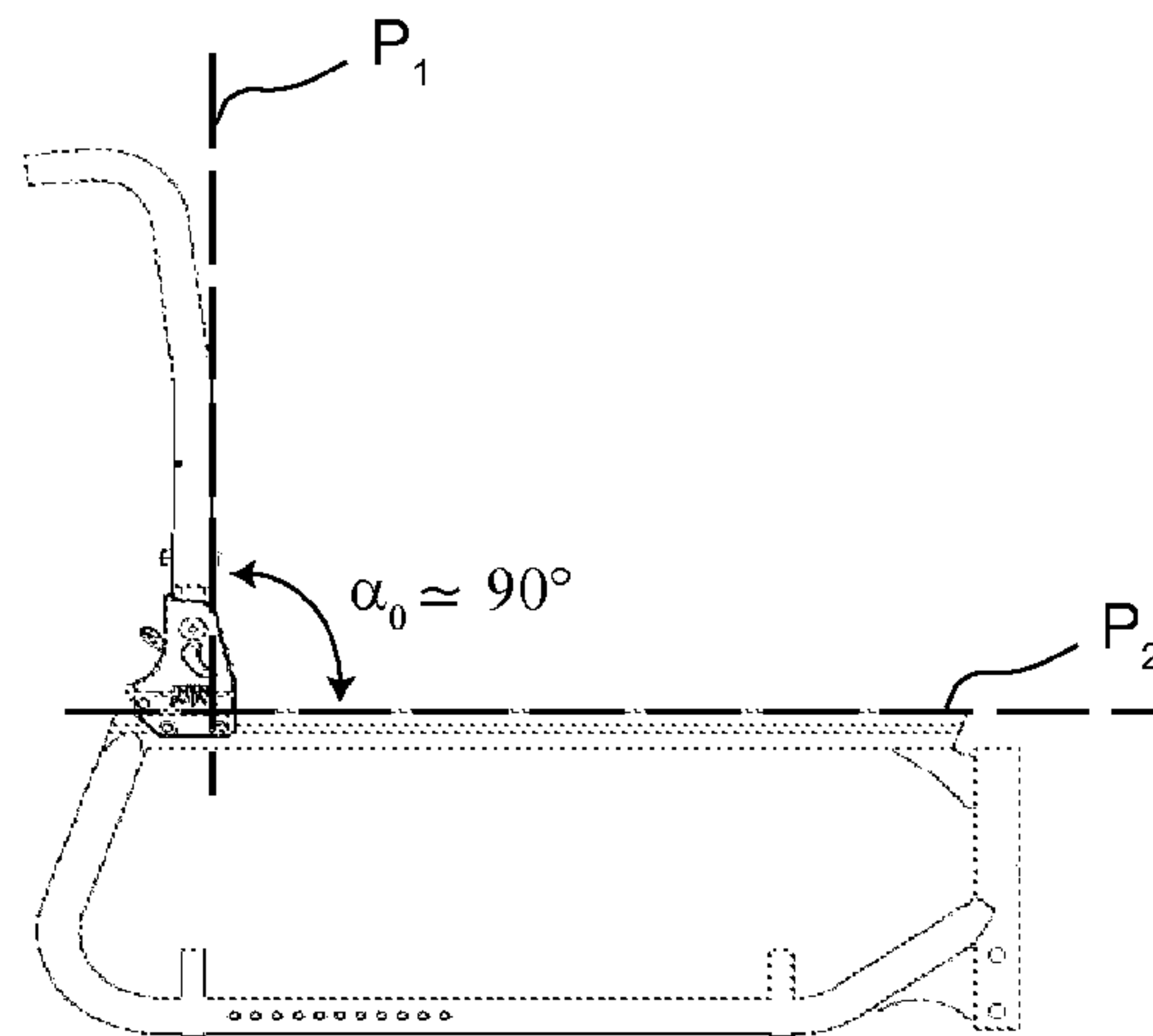


Fig. 3a

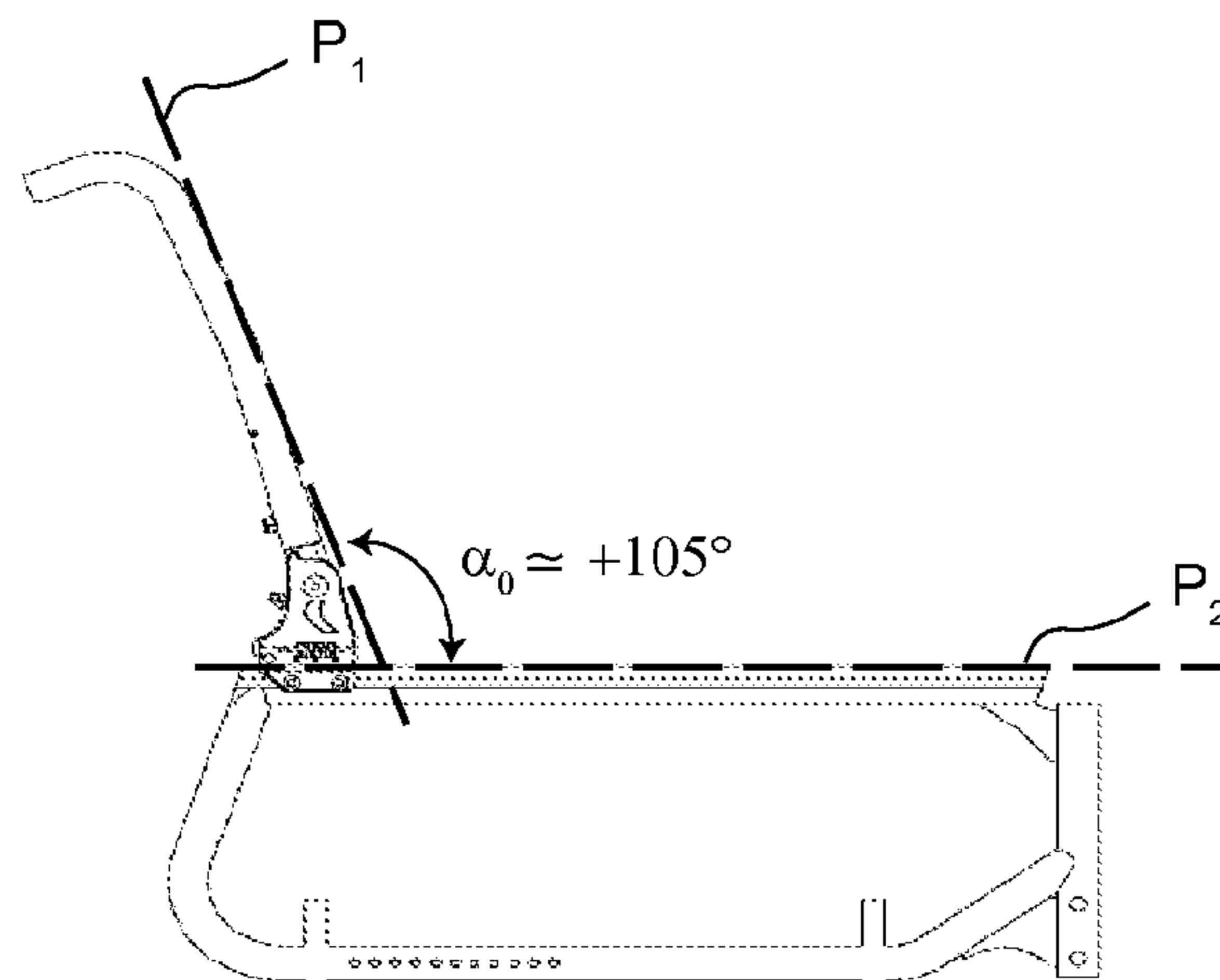


Fig. 3b

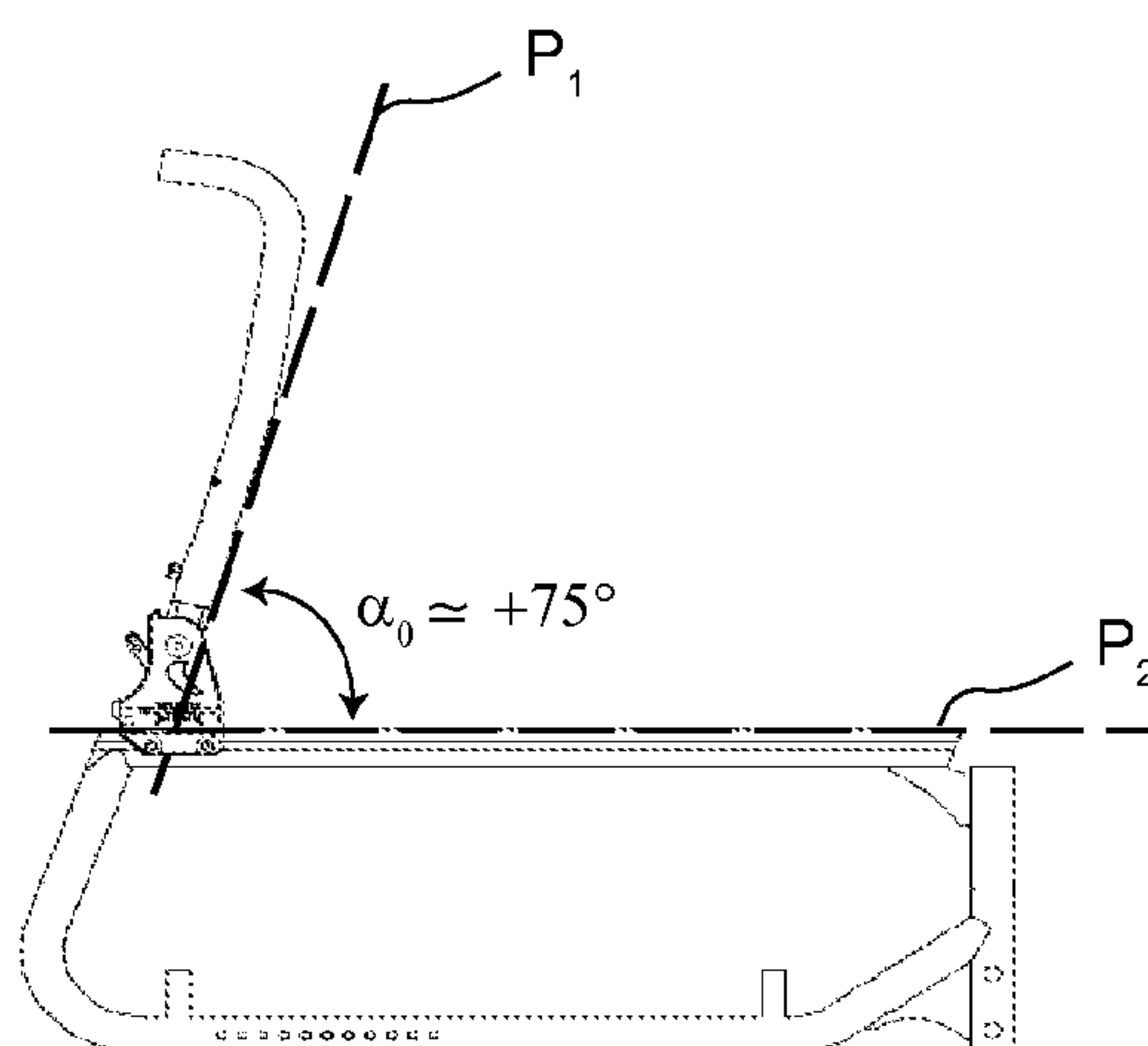


Fig. 3c

4/10

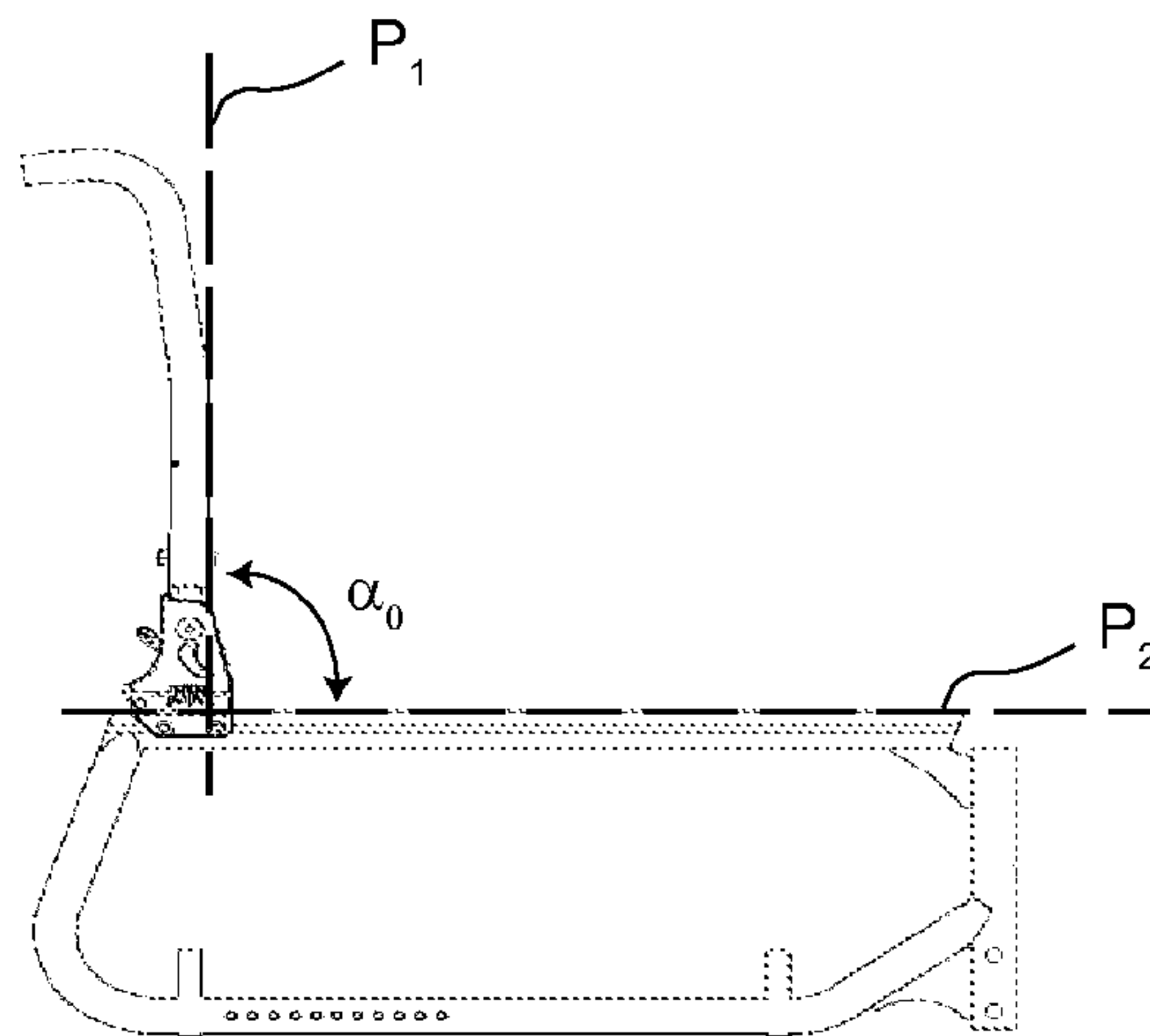


Fig. 4a

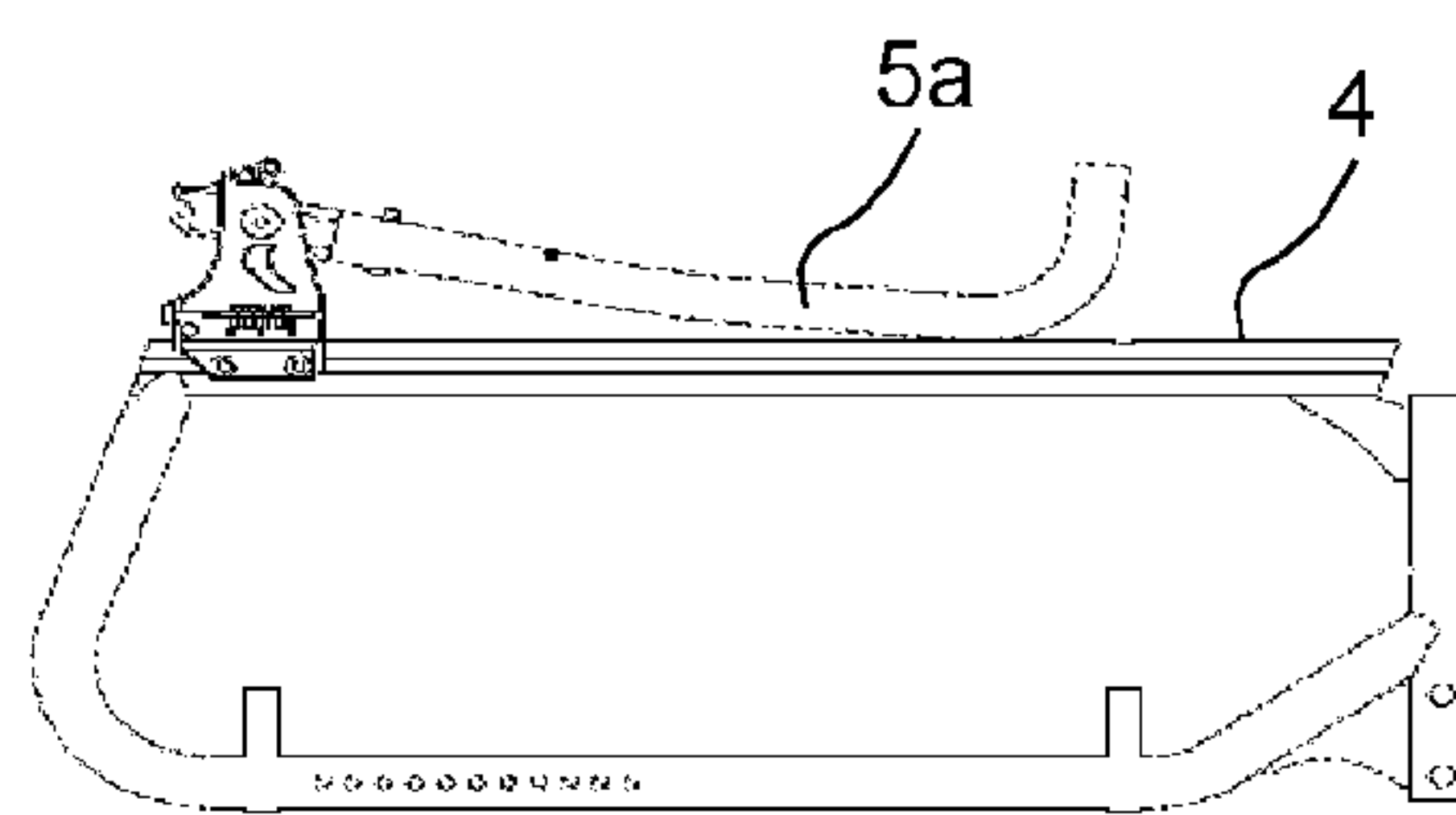


Fig. 4b

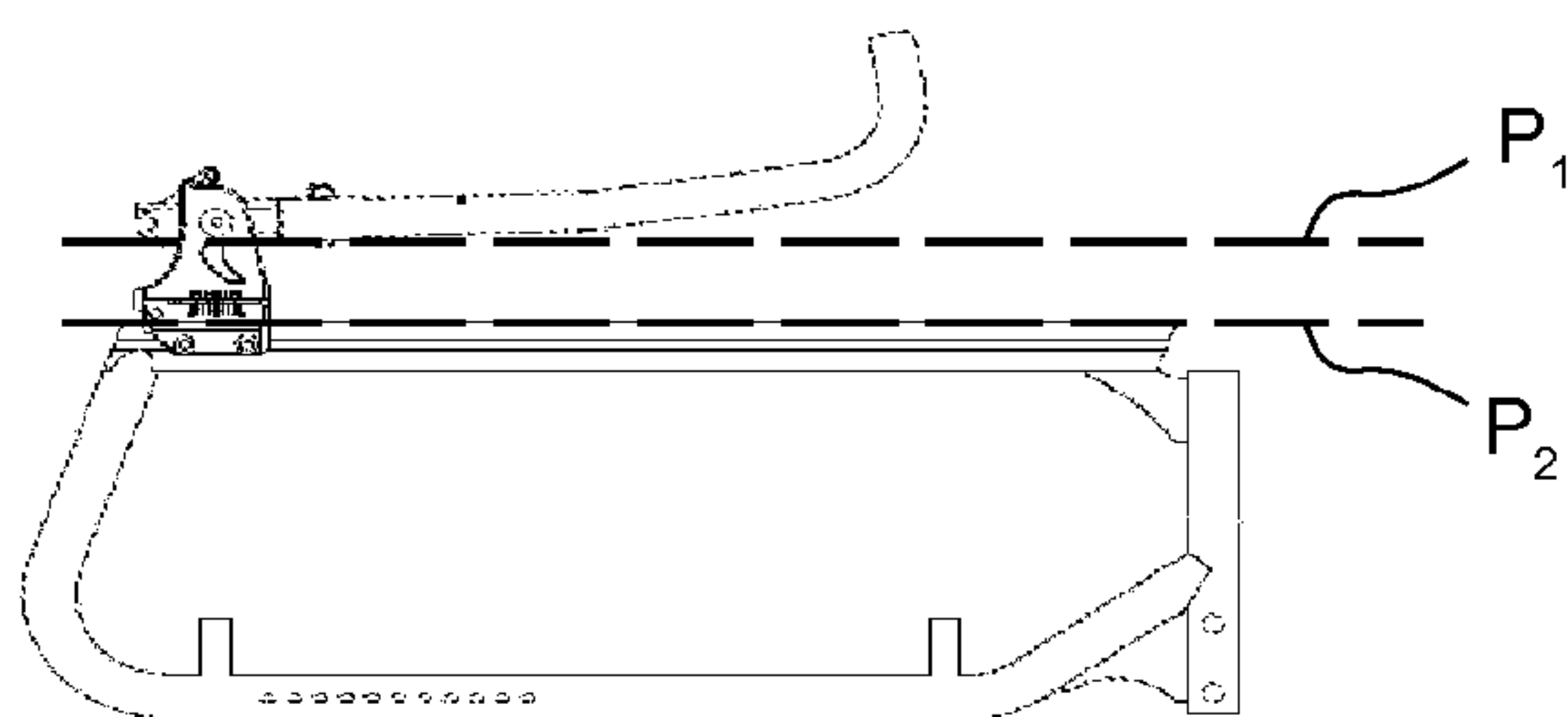


Fig. 4c

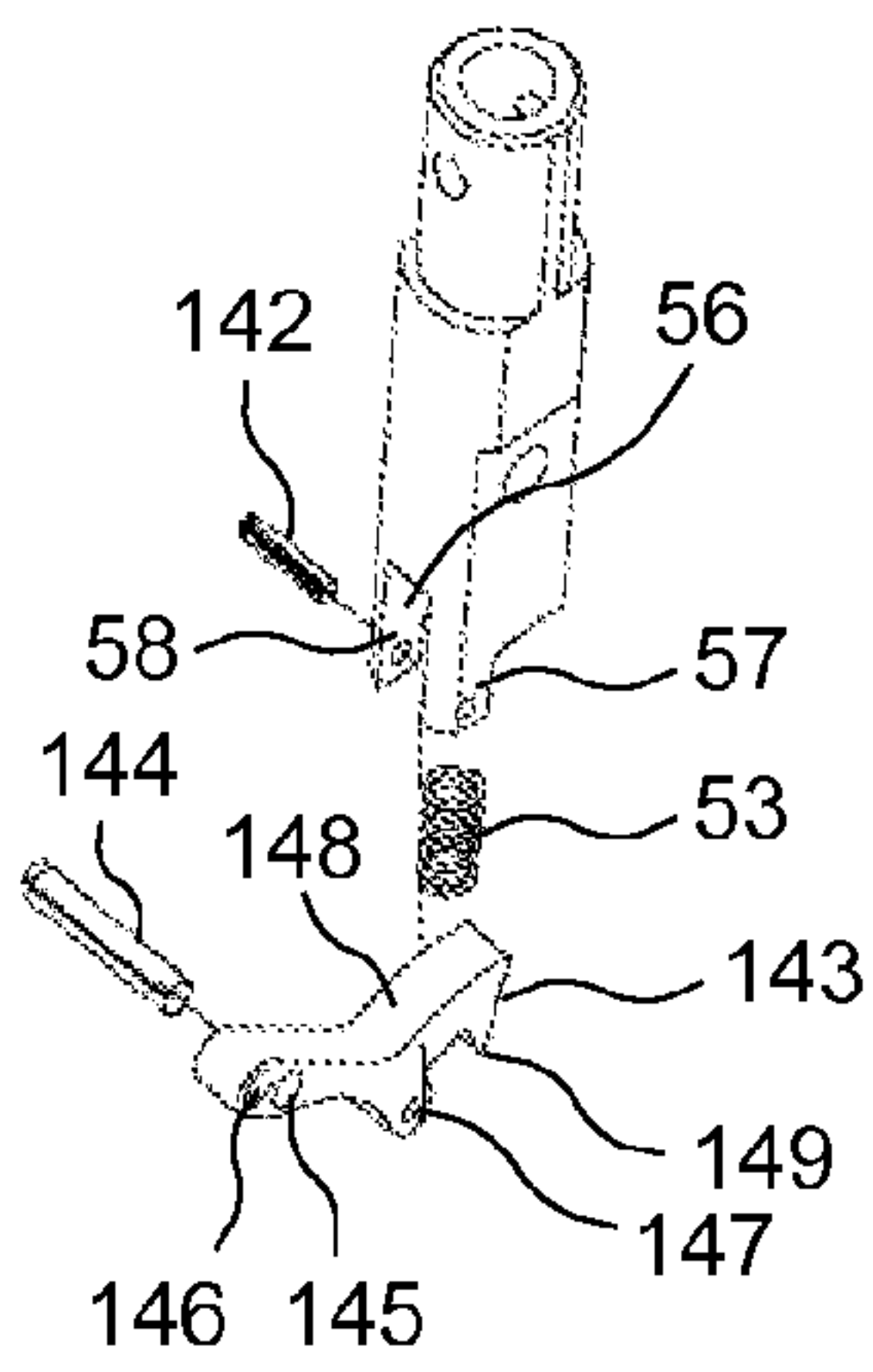


Fig. 5c

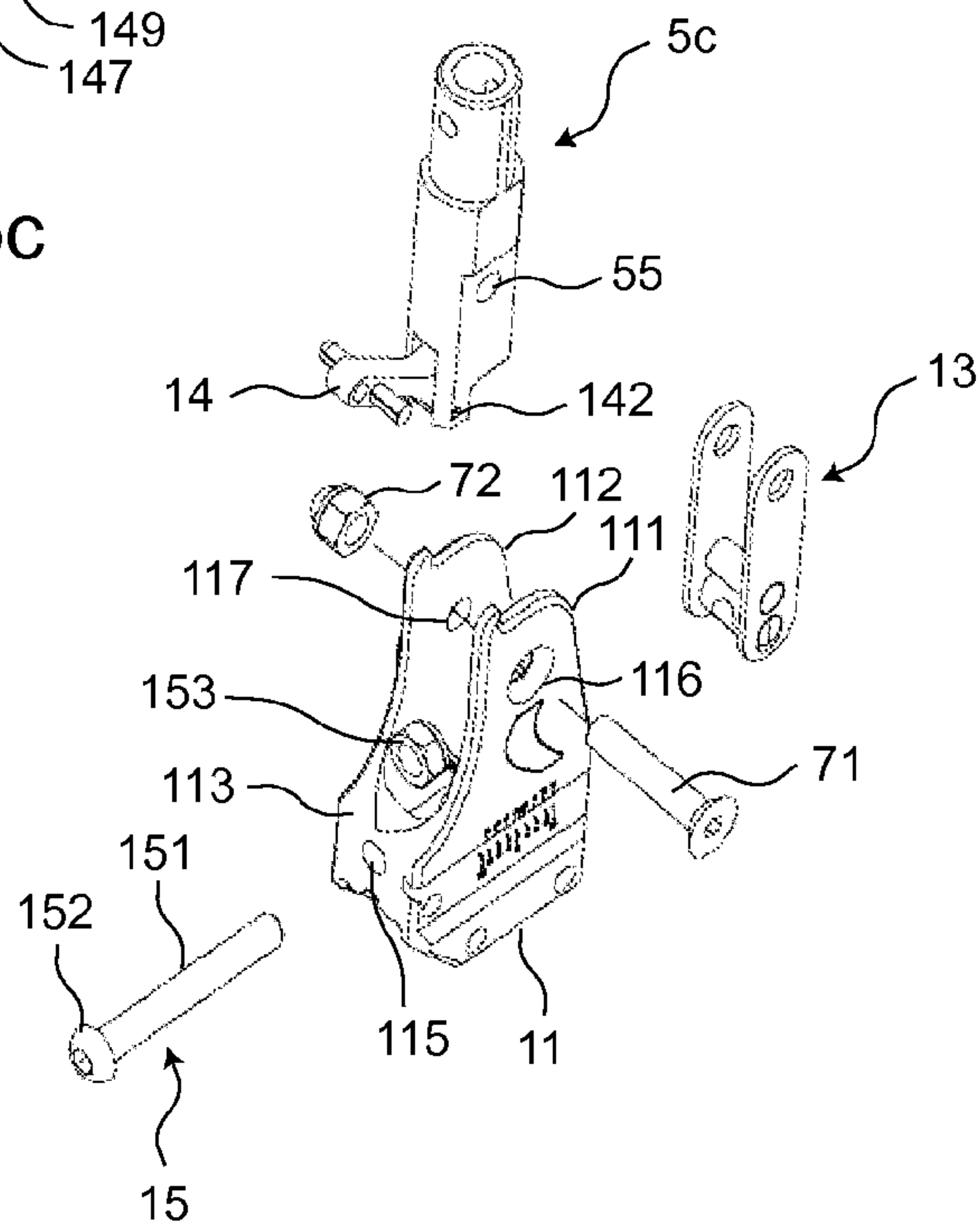


Fig. 5a

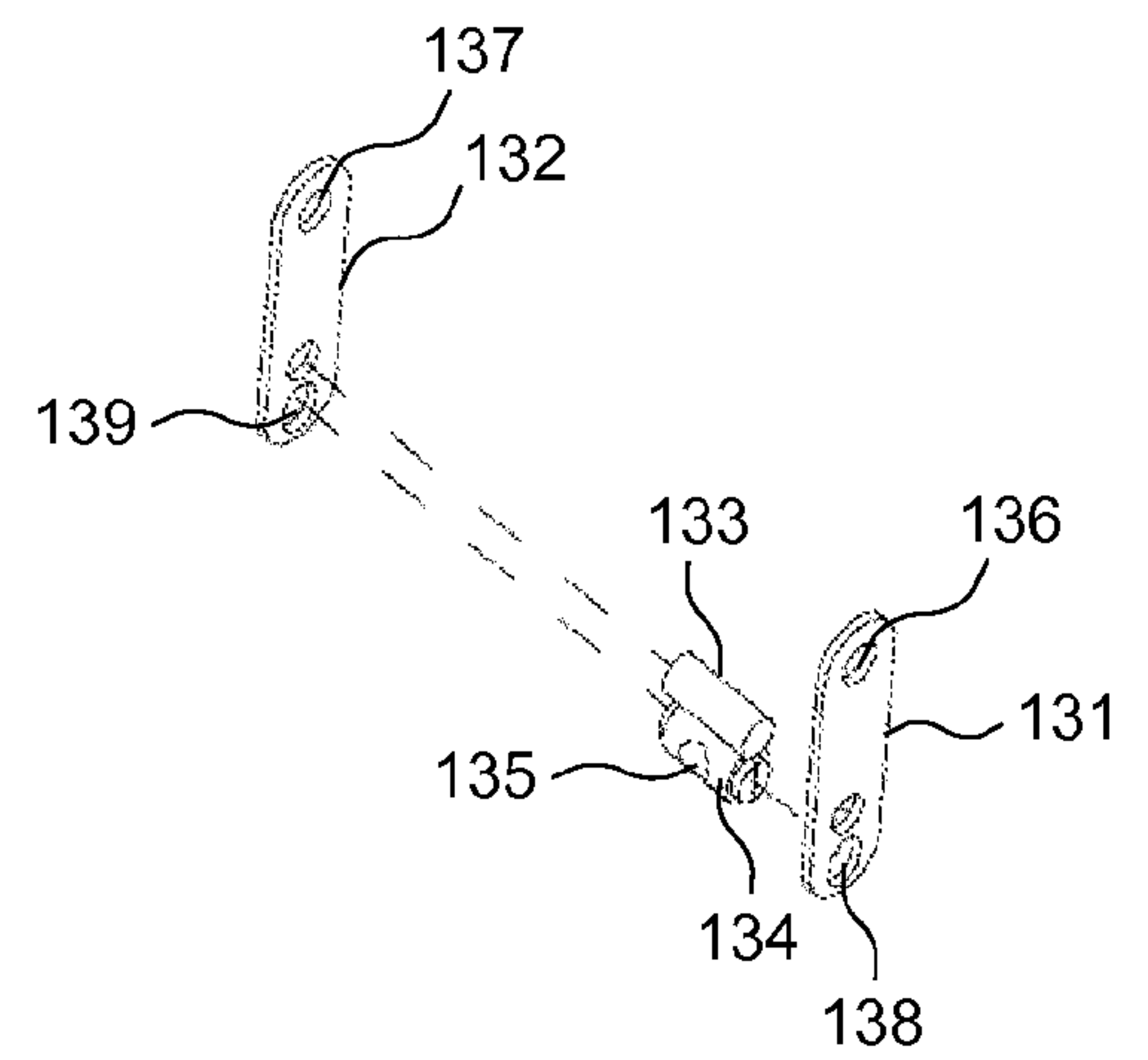


Fig. 5b

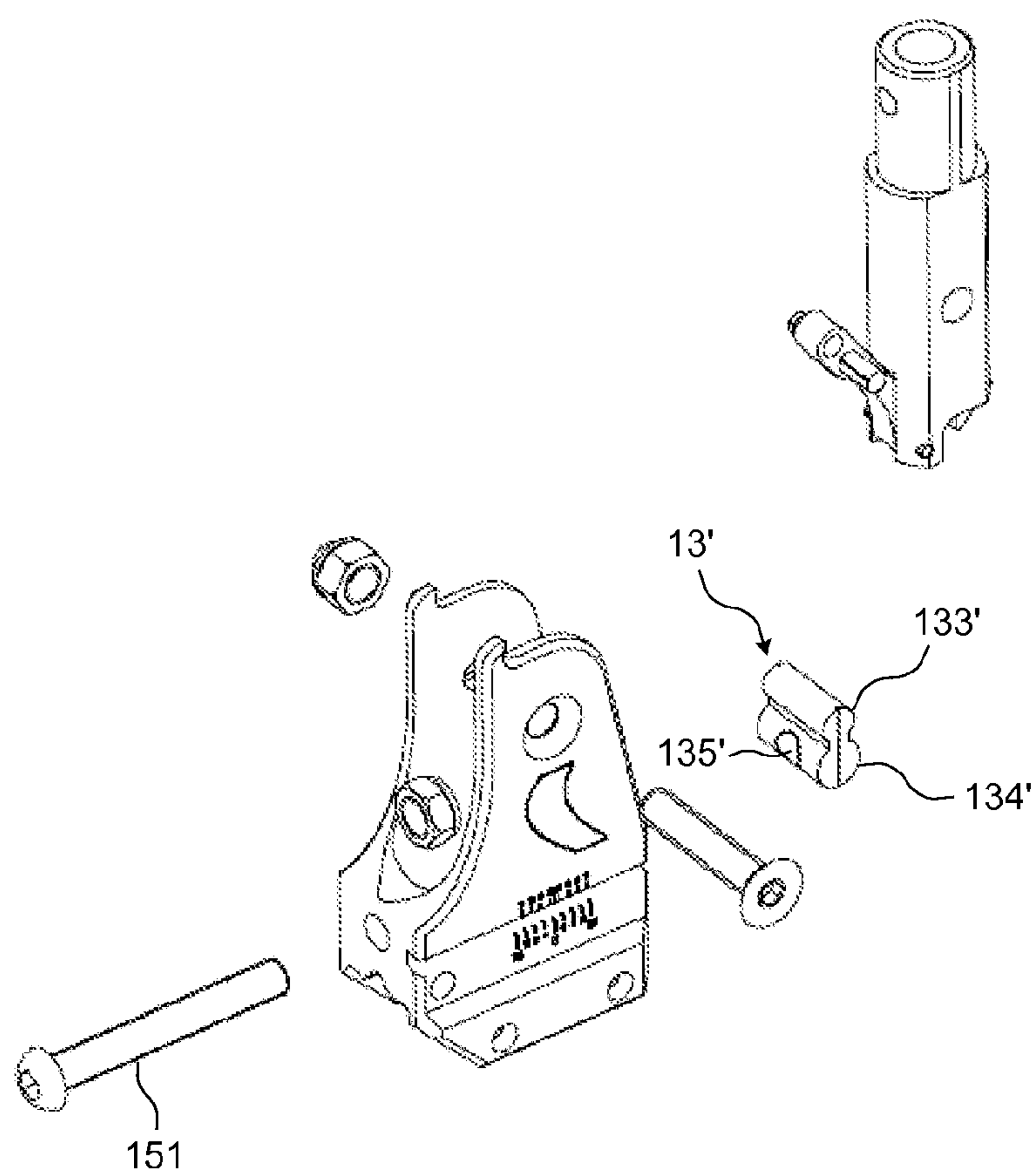


Fig. 6

7/10

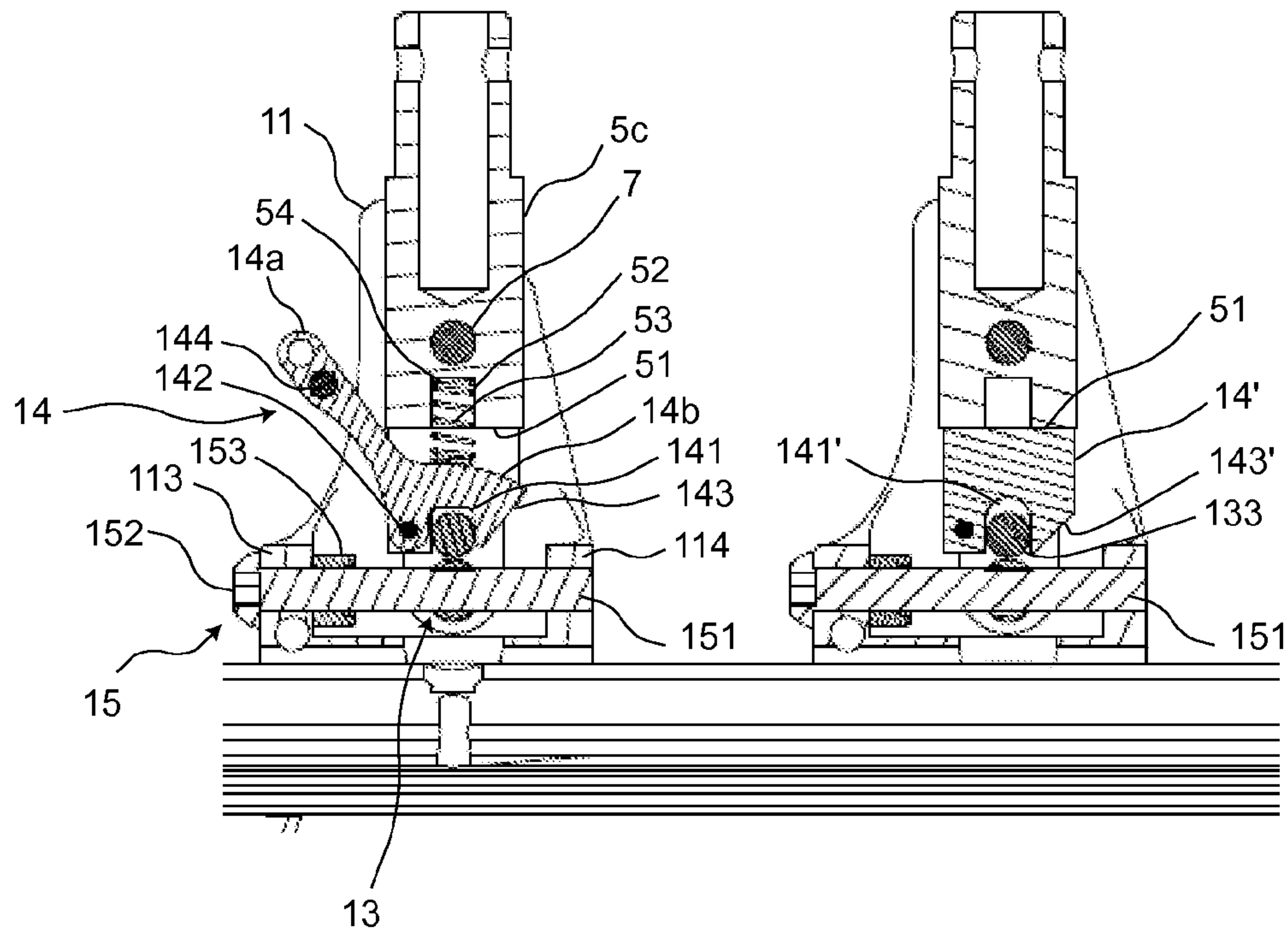


Fig. 7a

Fig. 7b

8/10

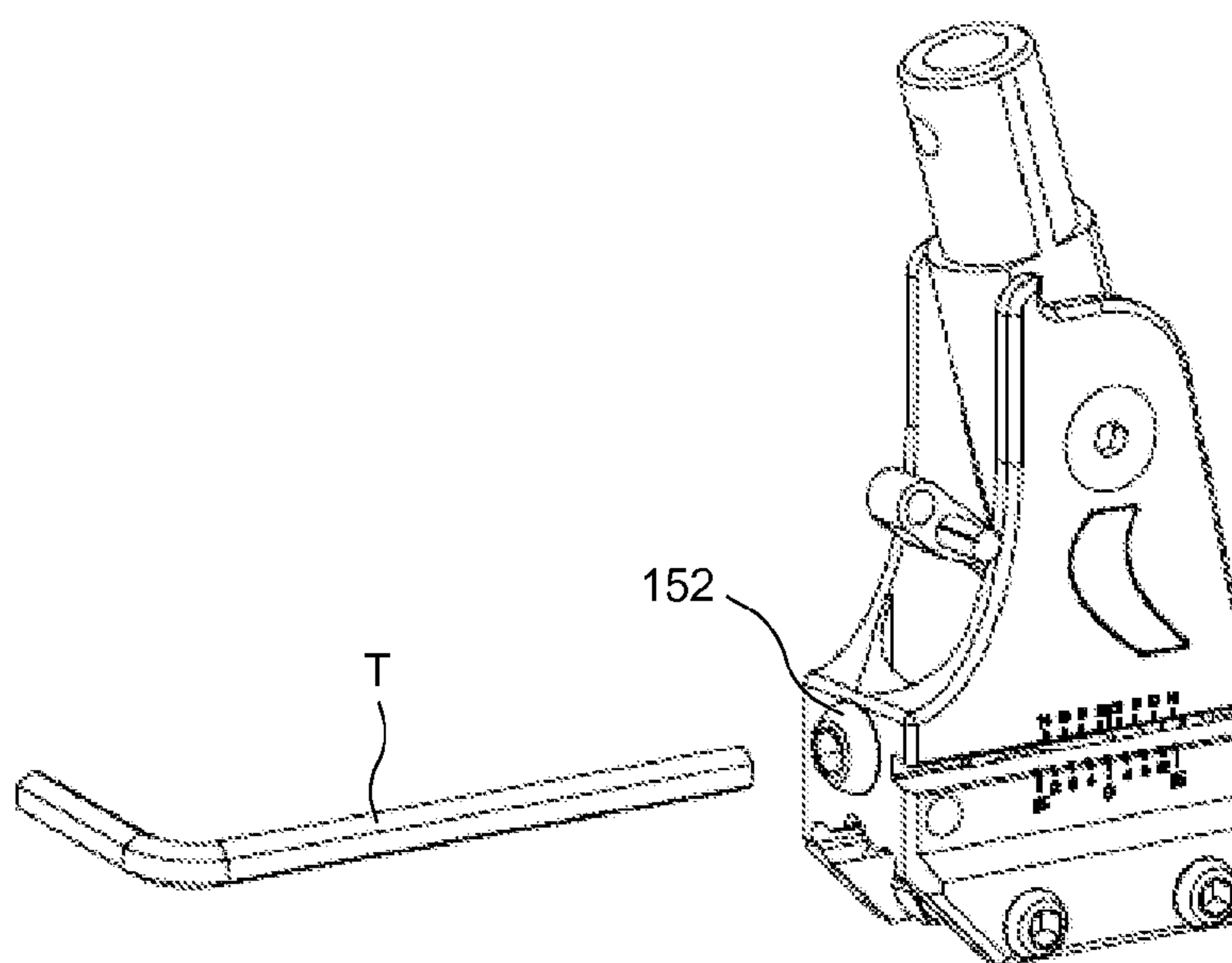


Fig. 8a

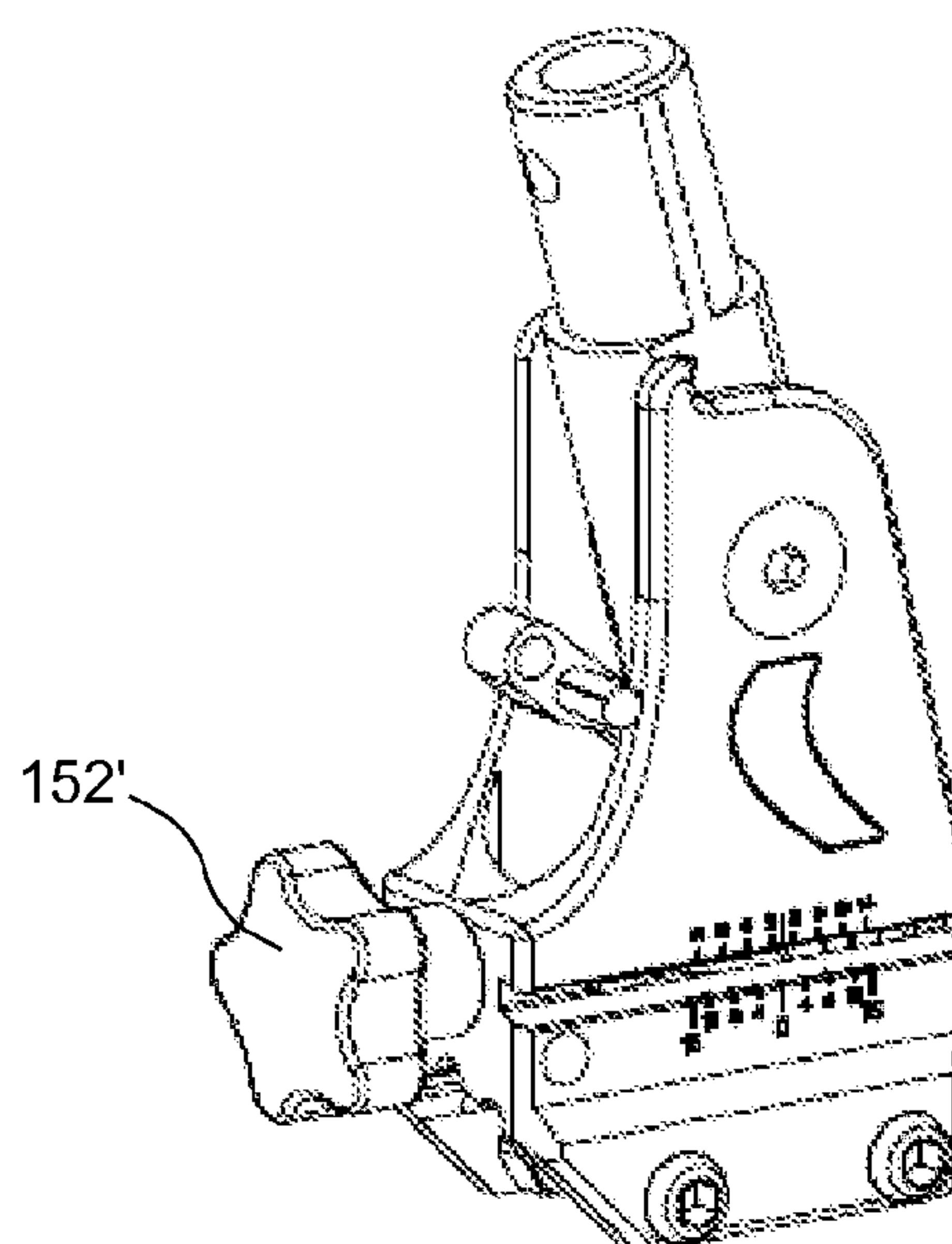


Fig. 8b

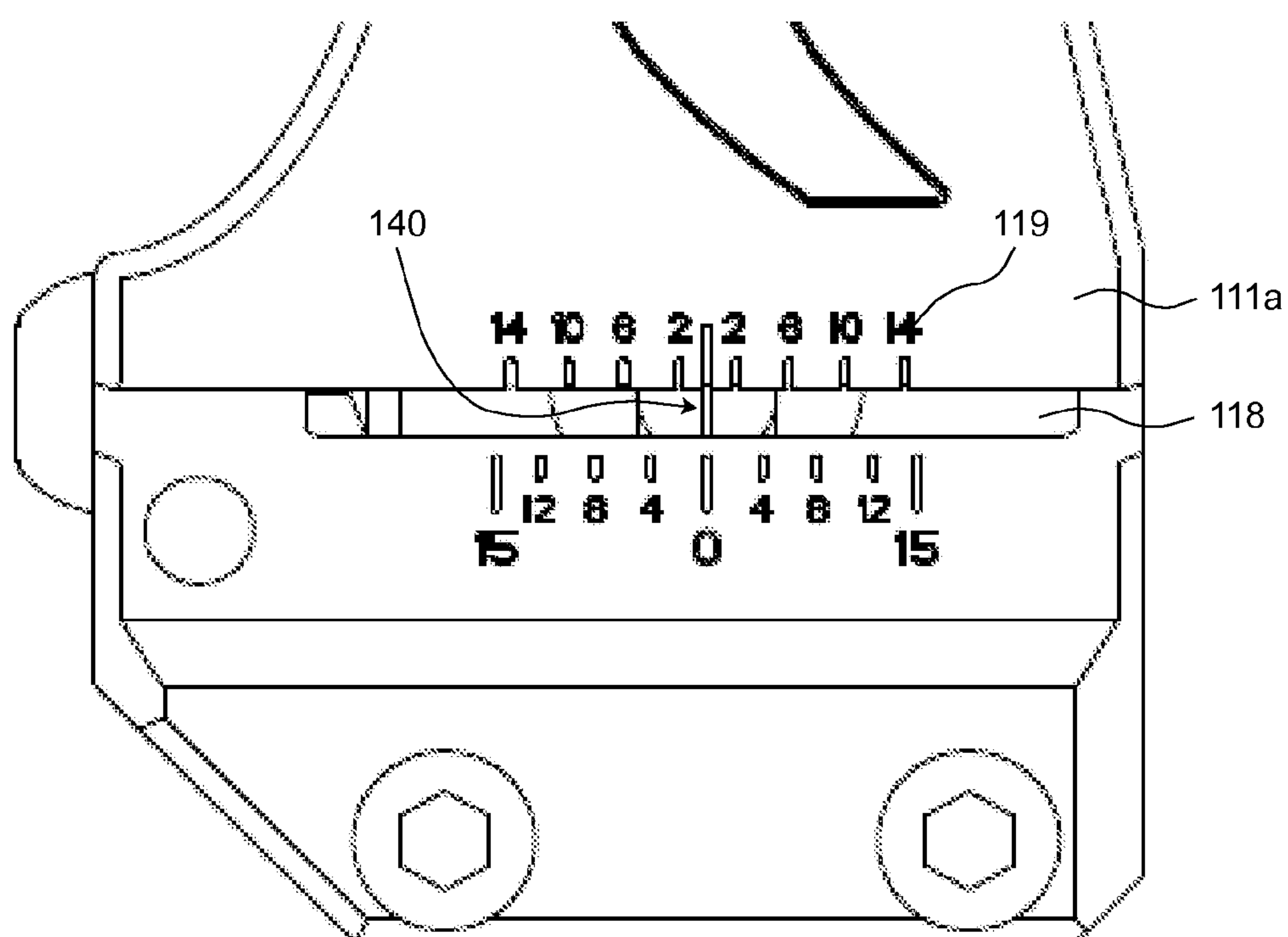


Fig. 9

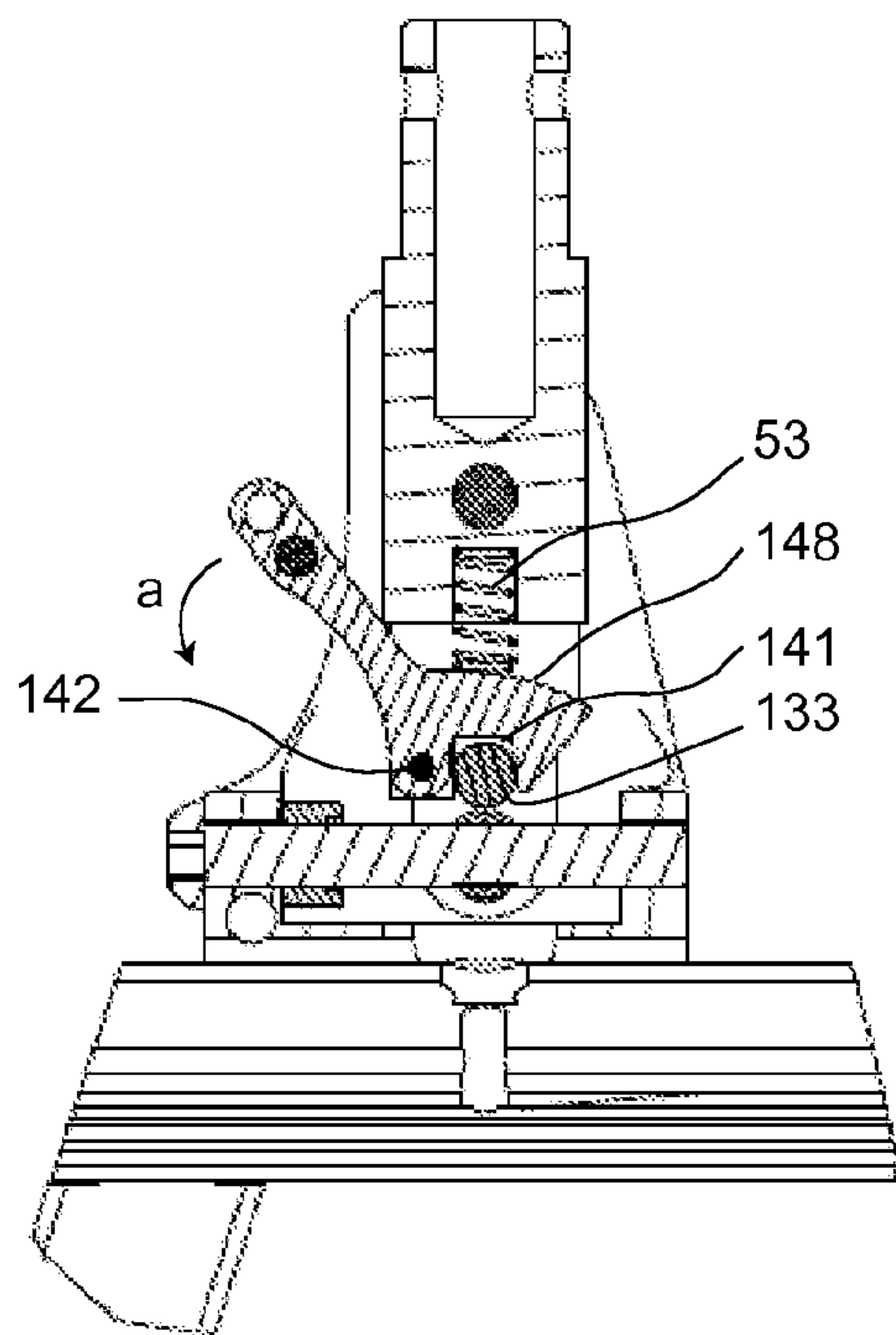


Fig. 10a

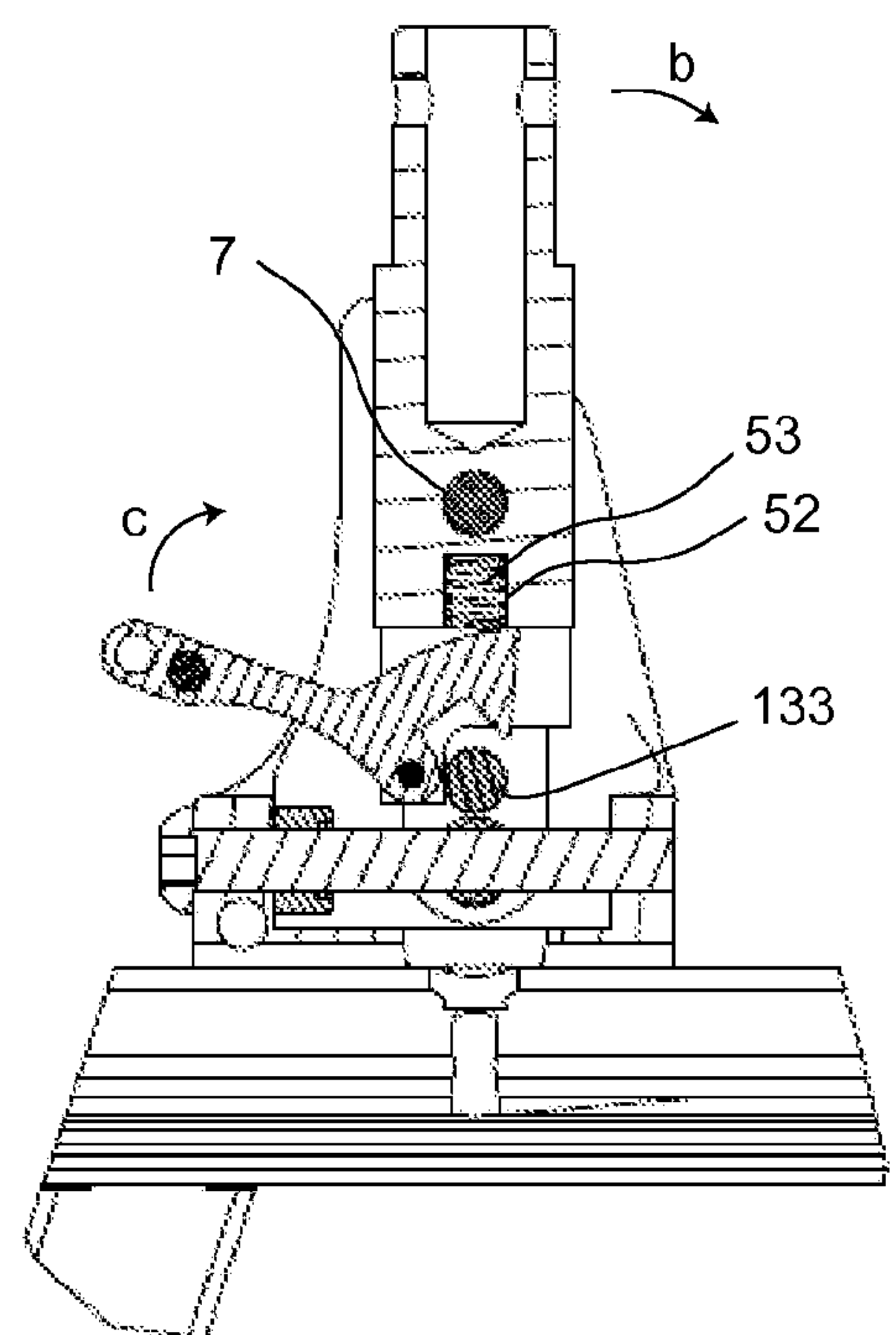


Fig. 10b

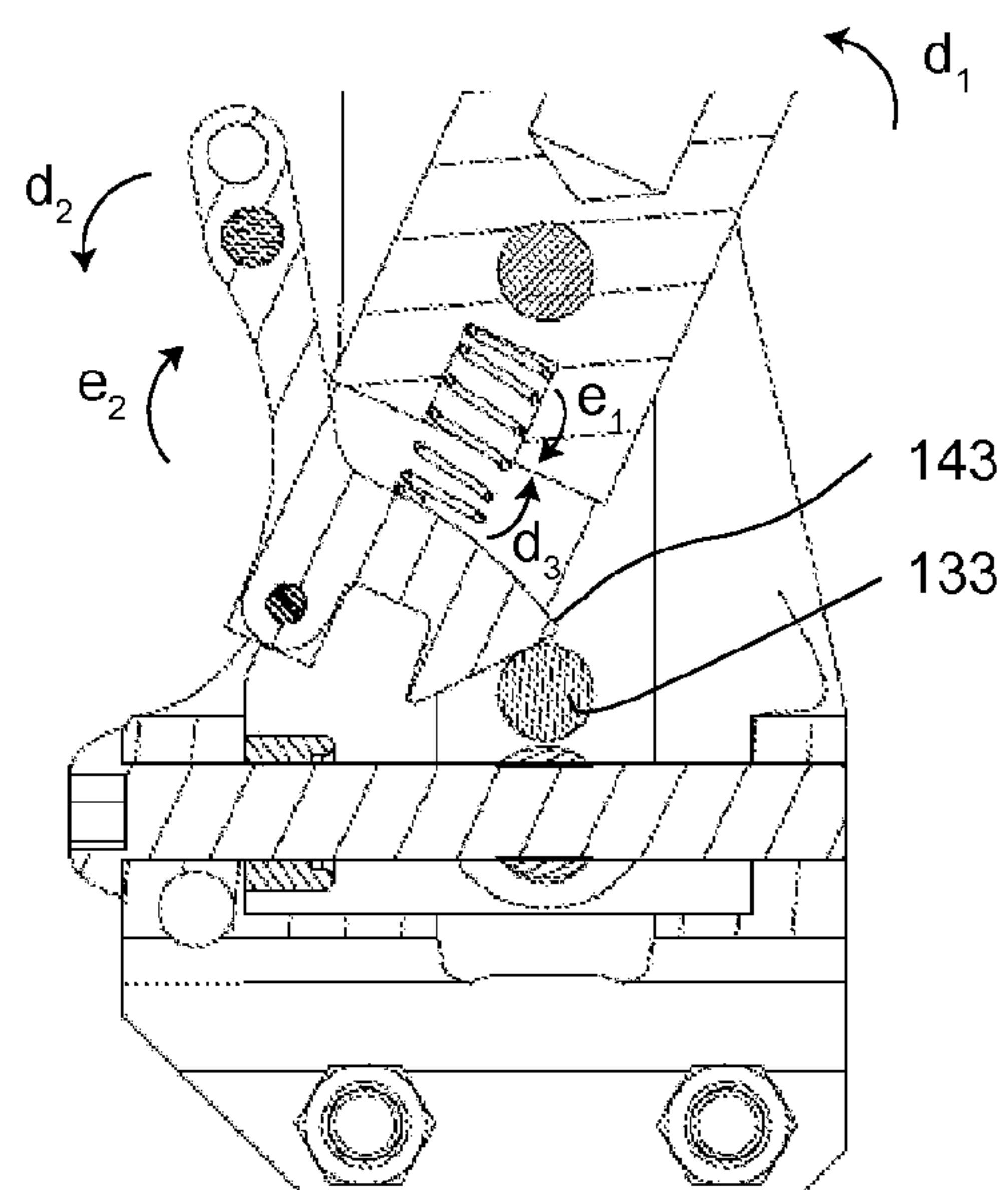


Fig. 10c

