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(54) Locking for a bed safety rail

(57) The invention relates to a locking for a safety rail of a bed. The locking is configured to lock the safety rail in the upper position by a releasable coupling of the safety rail to one of the end frames of the bed. The locking can particularly comprise a control element for unlocking the safety rail from the end frame, wherein the locking is configured to be so that it can be unlocked by the control element only when the safety rail has been displaced to a release position.

The invention also relates to a method for opening a safety rail, comprising of:
- displacing the safety rail from a locked position, in which the locking is locked and non-releasable, to a release position in which the locking can be unlocked;
- unlocking the locking in the release position.

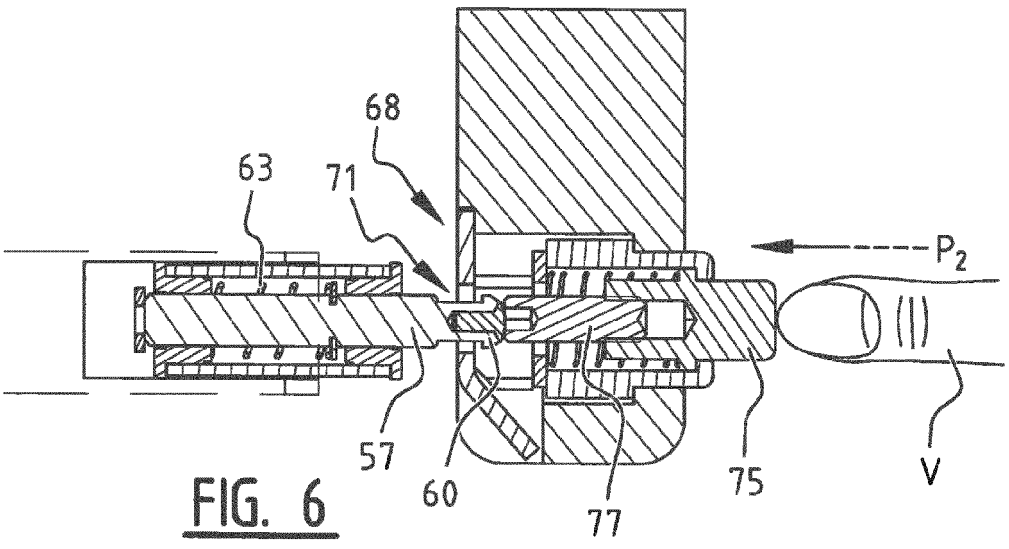

FIG. 6

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Description

[0001] The present invention relates to a bed comprising a bed frame, an upright end frame on at least one of the two outer ends of the lying frame and at least one safety rail along at least a part of at least one side of the bed frame, wherein the safety rail is guidable between a lower, opened position and an upper, closed position. The invention also relates to a locking therefor and to a method for unlocking a safety rail of a bed.

[0002] In institutions such as hospitals, care homes and rehabilitation centres use is often made of special beds which are provided with a safety construction so as to ensure that the persons lying in the beds cannot fall out of bed or climb out of bed. Such a safety construction can be formed by one or more protective elements, also referred to in the field as safety rails or safety barriers, which are arranged around the mattress on the bed frame. In a specific type of bed one or more such safety rails are arranged along both longitudinal sides of the bed and can be pivoted up or downward using a pivot construction so as to respectively close and open the passage from and to the bed.

[0003] It is important that such safety rails cannot be easily opened by the patient him/herself, while this should on the contrary be easy for the care staff. It is further necessary to avoid a safety rail being opened accidentally, for instance because the locking snaps loose as a result of a person accidentally knocking against the release mechanism.

[0004] In a known type of bed the safety rails are locked relative to the bed by means of a locking engaging on the pivot construction. This locking is quite complex however, and often provided at an inconvenient location for the care staff. It can moreover be released relatively easily by a patient present in the bed, for instance by operating a single release knob. The patient can hereby open the safety rail and leave the bed, which may result in undesirable situations.

[0005] Document DE 39 38 3377 A1 describes a hospital bed constructed from a bed frame, end frames and at least one safety rail. The safety rail is constructed from an upper and lower part and is mounted on the end frames of the bed. The safety rail can slide straight up and downward via a number of recesses provided in the end frames. The bed likewise comprises a locking with which the safety rail can be fixed to one of the end frames or both end frames. In a first embodiment the locking makes use of a pull knob. Should it be wished to release the safety rail, the pull knob is first operated and the safety rail can then be pulled slightly upward in order to bring about release. The safety rail can then be opened by sliding the safety rail downward. A drawback of this embodiment is that unintentional unlocking still occurs sometimes in practice, which may result in undesirable situations.

[0006] In an alternative embodiment use is made of a push knob. In this embodiment the safety rail need not be brought into a release position to enable unlocking thereof, and unlocking can take place at all times. In this embodiment the chance of unintentional opening of the safety rail is even greater.

[0007] It is an object of the present invention to provide a locking, a bed comprising such a locking and/or a method for unlocking such a locking, wherein at least one of the above stated drawbacks is obviated.

[0008] It is also an object of the invention to provide a locking, a bed comprising such a locking and/or a method for unlocking such a locking, wherein unlocking is relatively difficult from the bed itself (for instance by a patient), but is relatively simple from outside the bed (for instance by care staff).

[0009] It is also an object of the invention to provide a locking, a bed comprising such a locking and/or a method for unlocking such a locking, wherein the risk of accidental unlocking is reduced.

[0010] According to a first aspect of the invention at least one of the above stated objects is achieved in a bed comprising:

- a bed frame;
- an upright end frame on at least one of the two outer ends of the lying frame; and
- at least one safety rail along at least a part of at least one side of the bed frame, wherein the safety rail is guidable between a lower, opened position and an upper, closed position;
- a locking for the purpose of locking the safety rail in the closed position;

wherein the locking is configured to lock the safety rail in the upper position by a releasable coupling of the safety rail to the end frame.

[0011] Having the locking take place by a coupling between the rail and the end frame makes it possible to avoid a complex construction for locking the hinges of a safety rail.

[0012] According to an embodiment of the invention, the locking comprises a control element, for instance a press control knob or a pull knob, for the purpose of unlocking the safety rail from the end frame. The locking is further configured so that it can be unlocked by the control element only when the safety rail has been displaced to a release position. In other positions no unlocking can take place.

[0013] The locking can comprise a control element provided in the end frame for the purpose of unlocking the safety rail from the end frame, for instance a push-knob in the end frame. Additionally or alternatively, the locking can comprise a control element provided in the safety rail for the purpose of unlocking the safety rail from the end frame, for instance a pull knob in the safety rail.

[0014] The locking is preferably arranged close to the upper outer end of the safety rail. This has the advantage that in locked position the safety rail and bed frame are firmly connected to each other and the entity of safety

rail and bed frame allows only limited mutual displacements.

[0015] The safety rail is connected via a pivot construction to the bed frame. This pivot construction can be embodied here such that the safety rail is pivotable between the open and closed position. The pivot construction can further be embodied such that the safety rail always tends to move toward the locked position. Starting from a closed safety rail, the safety rail has to be displaced by the user from this locked position to the release position in order to enable unlocking of the locking by operating the control element. Starting from an opened safety rail the rail can be closed, after which locking takes place (and the safety rail is in the locking position). The chance of undesired release is reduced because the safety rail tends to move toward the locking position. After all, the locking cannot be unlocked in the locking position. In determined embodiments the safety rail presses toward the locking position, for instance in outward direction, wherein the safety rail remains firmly locked, with less chance of rattling.

[0016] In a further embodiment the safety rail is coupled only via the locking to the end frame (at least in locked position), while for the upward and downward displacement use is made of a pivot construction coupled only to the bed frame. This construction has a number of advantages. The pivot construction on (a lying part of) the bed frame provides for a good support of the safety rail with an improved guiding thereof. With safety rails which are guided in rails on the end frames the safety rail can after all occasionally become jammed, for instance as a result of bed linen finding its way between the rails.

[0017] Described above is that, starting from a closed safety rail, the safety rail can be displaced from the locked position to the release position by the user. In a determined embodiment the safety rail is displaced inward over a predetermined distance from the locked position, preferably in embodiments wherein the safety rail does tend to displace outward and the safety rail is opened in outward direction. The risk of undesired opening of the safety rail is hereby reduced still further.

[0018] According to a further embodiment, the end frame comprises an end plate and the control element protrudes at least partially relative to the side of the end plate remote from the mattress of the bed. This makes the control element less easy to operate and invisible or less visible from the bed itself, which can reduce the risk of the patient opening the safety rail him/herself.

[0019] In an embodiment of the invention the locking comprises:

- a slidable locking pin provided on the safety rail;
- an opening provided in the end frame into and out of which an outer end of the locking pin is slidable for the purpose of respectively locking and unlocking the safety rail;

wherein the control element is arranged slidably in the opening for the purpose of sliding the locking pin.

[0020] The outer end of the locking pin comprises a widened part. The dimensions of the widened part are however such that the widened part can slide through the opening. The widened part can take different forms, although it is important that it is formed such that, once it has been moved in a first direction through the opening, it can come to rest against the edge of the opening such that the widened part remains caught behind this edge and the locking pin can no longer be displaced in a second, opposite direction. The widened part is more particularly embodied such that in the locked position it remains caught behind the opening edge and in the release position it is released and is thus slidable out of the opening. In a determined embodiment the user pushes for instance against the safety rail in order to displace the locking pin over a short distance (about 0.5 - 5 cm) relative to the opening so that the locking pin is released. The locking pin can now be slid out of the opening, for instance by pressing the control element, whereby the safety rail is unlocked and can be lowered. In the reverse operation the locking pin snaps into the opening under the spring action when the safety rail is displaced from the opened position to the closed position.

[0021] In a further embodiment the pivot construction comprises a parallelogram mechanism. The mechanism comprises four pivot arms arranged in parallelogram arrangement. In a determined embodiment such a mechanism comprises a first set of short arms of essentially equal length and a set of long arms of essentially equal length. This geometry enables the safety rail to be pivoted in a substantially upright orientation between the lower and upper positions.

[0022] Provided according to a further aspect of the invention is a method for unlocking a safety rail of a bed, the method comprising of:

- displacing the safety rail from a locked position, in which the locking is locked and non-releasable, to a release position in which the locking can be unlocked;
- displacing a control element in the release position for the purpose of unlocking the locking. Following unlocking the safety rail can be displaced from the upper, closed position of the rail to the lower, open position thereof.

[0023] In a preferred embodiment the displacement from the locked position to the release position comprises of pivoting the safety rail inward, for instance over a short distance which is sufficient to enable unlocking. After the locking in the release position has been unlocked, the safety rail can be opened, for instance by pivoting the safety rail outward.

[0024] Further advantages, features and details of the present invention will be elucidated on the basis of the following description of several embodiments thereof. Reference is made in the description to the figures, in

which:

Figure 1 is a perspective view of a hospital bed provided with an embodiment of the locking according to the invention;
Figure 2 is a partially cut-away perspective view of two safety rails (in the open position on the left, in the closed position on the right) and the end surfaces at the foot and head of the bed;
Figure 3 is a partially cut-away top view in cross-section of an embodiment of the locking provided in a safety rail and in one of the end surfaces;
Figure 4 shows a detail of the locking of figure 3;
Figure 5 is a schematic side view of a safety rail which can be displaced up and downward relative to the rest of the bed using a parallelogram mechanism;
Figure 6 shows the top view of figure 3, wherein the safety rail 19 has been displaced inward;
Figure 7 is a cross-sectional side view of the locking device in the position shown in figure 6;
Figure 8 shows a cross-sectional side view with pressed-in control knob;
Figure 9A is a schematic view of an embodiment of the pivot construction (on the left) and an even more schematic figure (on the right), wherein the safety rail is in the closed position;
Figure 9B shows corresponding views with the safety rail in the opened position.
Figures 1-9 show a mobile hospital bed assembly 1 provided with a locking according to a specific embodiment of the invention. Assembly 1 comprises a mobile frame 2 on which the actual bed 3 is arranged. Frame 2 comprises a number of profiles 5 on which four swivel wheels 6 are arranged. Further mounted on profiles 5 are a number of pivotable profiles 8 which can be operated in known manner by means of control handle 7. Profiles 8 form a scissor construction with which bed 3 is displaceable in up and downward direction.

[0025] Bed 3 comprises a frame 11 on which a slatted base 13 is arranged. The slatted base comprises two frames 15 in which a number of parallel flexible slats 14 are arranged. Bed element 3 has a substantially elongate rectangular form. End frames 18, 19 are provided on the two outer ends of the bed element. End frames 18, 19 are formed in the shown embodiment by upright panels arranged substantially fixedly (though optionally removably) on frame 11. Arranged transversely of end frames 18, 19 and along the longitudinal side of bed element 3 are a number of safety rails 20, 20', 20", 20"'. In the shown embodiment two safety rails are arranged per longitudinal side. In other embodiments this number can vary, for instance a single safety rail per longitudinal side or more than two safety rails per longitudinal side. It is also possible to provide per longitudinal side only a part with a safety rail, wherein the other part thereof then comprises a more permanent rail, or to embody safety rails in different lengths. The safety rails can be partially open, for instance by being embodied with a number of horizontal parts with intermediate spaces, or be closed. Safety rails 20-20"' are further each individually displaceable in upward and downward direction. Shown in figure 1 for instance is the situation where only safety rail 20" on the left front side of the bed has been moved downward, while the other safety rails 20, 20' and 20"' have been moved upward.

[0026] Each of the safety rails is arranged on frame 11 of bed 3 using two pivot mechanisms 34 arranged on either side. In the upward (upper) position each of the safety rails 20-20"' can be locked via a single locking mechanism 50 relative to the respective end frame 18, 19, in particular an upright element 30 thereof.

[0027] Figure 2 shows the safety rail and the associated locking mechanism 50 in more detail. The safety rail is constructed from two upright parts 26, 27 with parallel slats 23, 24, 25 arranged therebetween. A first pivot construction 34 is arranged at the position of the right-hand upright element 27, while a second pivot construction 34 is arranged on the left-hand upright element 26. The two pivot constructions are in principle identical. Pivot construction 34 is shown in more detail in figures 9A and 9B.

[0028] Each of the pivot constructions 34 is constructed substantially from a number of arms. In the shown embodiment the arms are manufactured from relatively thin metal strips which are pivotable relative to each other using a number of pivots. Figure 9A shows that pivot construction 34 comprises an upright support part 35 which can be attached to frame 11 of bed 3 using a bracket 36 and a pin 37. A first pivot arm 38 and a second pivot arm 39 are arranged on the support part by means of respectively a first pivot 42 and second pivot 43. Pivot arms 38, 39 are in turn mounted pivotally on a fastening part 40 via pivots 45 and 44. Fastening part 40 is fixed in the end surfaces of a safety rail (i.e. on upright elements 26 or 27) using screws 41.

[0029] The pivot arms form a so-called parallelogram construction with which the safety rail can be displaced up and downward. Figure 9A shows the upward (upper) position, while figure 9B shows the downward (lower) position. During the up and downward displacement of the safety rail for the purpose of respectively closing and opening the safety rail, the safety rail extends substantially vertically relative to the ground as a result of a suitable choice of the lengths and positions of the pivot points of the parallelogram construction. This has the advantage, among others, that the safety rail always takes up little lateral space. Although the shown parallelogram construction provides advantages when applied to hospital beds, other pivot constructions also fall within the scope of the present invention. What is important is that the safety rail can be displaced between an upper position in which the bed is closed and a lower position in which the bed is at least partially opened, so that the patient can get into or out of the bed.

[0030] In order to prevent the pivot construction making it possible to displace the safety rail further than said opened and closed positions, one or more stops are provided which limit the pivoting movement of the pivot construction.

[0031] Figure 3 shows locking mechanism 50 in more detail. Figure 3 is a cross-sectional top view at the position of locking mechanism 50. The locking mechanism comprises an assembly 51 arranged in the relevant end frame, in particular upright element 30, and an assembly 52 arranged in the relevant safety rail. Assembly 51 comprises a control knob 75 which can be operated manually by being pressed (with a finger V). Control knob 75 comprises an outer end 76, the end surface of which is provided with a bore. A pin 77 can be fixed in this bore. Control knob 75 is movable in a housing 74 using a helical spring 78. Housing 74 is arranged in a recess in end frame 30. The housing also comprises a cover 79 provided with a central opening 80 along which control pin 77 can be displaced. Control pin 77 can in principle be displaced by pressing control knob 75. When the finger releases knob 75, the control knob will once again return to its original position under the influence of spring 78, whereby control pin 77 is again retracted.

[0032] On the opposite side, i.e. on the side of the safety rail, assembly 52 comprises a casing 55 arranged in the end surface. The inner space of casing 55 is closable using a closing element 56. Closing element 56 comprises a central opening through which an elongate locking pin 57 can move. The elongate locking pin 57 comprises a relatively wide rear body part 58, a relatively narrow middle body part 59 and a substantially toadstool-like wide body part 60 arranged on the outer end. Casing 55 is closed on the rear side using a support part 64 into which pin 57 extends. The outer end of pin 57 comprises a number of stops 65 which prevent pin 57 displacing too far outward. The part of pin 57 provided with the toadstool-like outer end can be guided into an elongate opening 71 in a closing plate 68 (figure 4) of assembly 51. Referring to figure 4, closing plate 68 comprises a substantially flat plate part 69 and a flat plate part 70 extending at a slight angle thereto. Arranged in flat plate part 69 are two openings 72 with which closing plate 68 can be screwed fixedly to a safety rail 20 using screws 73 (figure 2).

[0033] Figure 4 also shows a part of pin 57. The figure makes clear that in determined positions of the safety rail the pin 57, at least the toadstool-like outer end 60 thereof, remains caught with a peripheral edge behind the edge around opening 71 of closing plate 68.

[0034] The unlocking of locking mechanism 50 is described below.

In the position shown in figure 3 the pin 57 extends into opening 71 in closing plate 68 so that the relevant safety rail cannot be pivoted out of the upper position. Pressing control knob 75 is pointless since control pin 77, which presses against the toadstool-like outer end 60 of pin 57, cannot slide mounting pin 77 out of opening 71 because the peripheral edge of the toadstool-like outer end 60 remains caught behind edge 81 (figure 4) of opening 71. The locking cannot therefore be unlocked solely by pressing control knob 75.

[0035] When the safety rail is however displaced slightly inward (direction P_1, figure 3), pin 57 comes to lie in the position shown in figure 6. In this position control knob 75 can be pressed (direction P_2, figure 6/7) so that control pin 77 can slide. The control pin now pushes against the toadstool-like outer end 60 of locking pin 57 until the outer end 60 has been displaced beyond opening 71 in closing plate 68. This latter end position is shown in figure 8. In this position pin 57 is pressed so far counter to the action of helical spring 63 that the widened outer end 60 of pin 57 can no longer stop the displacement of safety rail 20. In this position of the locking mechanism the safety rail is thus able to pivot from the upper position shown in figure 9A to the lower position shown in figure 9B. In the lower position the outer end 60 of pin 57 rests in a recess 53 provided specially for this purpose in the upright element 30 of end frame 18, 19 (figure 2).

[0036] It will be apparent from the foregoing that two operations have to be performed to unlock the locking device. The safety rail firstly has to be displaced inward to some extent. Secondly, following displacement of the safety rail, control knob 75 has to be pressed. Only when both operations have been successively performed (in this sequence) can the safety rail be opened, this enhancing the safety of the locking and reducing the risk of undesired unlocking.

[0037] In the shown embodiment the control knob is provided on the outside of end frame 18, 19. This means that in practice release cannot take place with one hand. The safety rail is moved inward and held in the moved-inward position with a first hand, while the control knob is then pressed with the other hand. For a person operating outside the bed this is no problem, since this person has both hands free. For a patient in the bed, having to use both hands forms an extra obstacle to being able to open the safety rail.

[0038] In other embodiments (not shown) the construction with control knob and locking pin can be embodied the other way round, i.e. with a locking pin in end frame 18, 19 and a control knob in the safety rail. In this embodiment two operations also have to be performed, being firstly the inward displacement of the safety rail followed by operation of the control knob. In this embodiment however the control knob is slightly easier for the patient to operate, which is undesirable in specific situations. In other embodiments (not shown) a pull-out element is applied instead of making use of a press-in control knob. When the locking pin for instance takes a pull-out form, the locking can be released by pulling the pin outward when the safety rail has been pivoted slightly inward. If the safety rail is not pivoted inward a widened part provided at the outer end of the pin would remain caught behind the edge of an opening provided in end frame 18, 19 or in the safety rail itself.

[0039] In such embodiments it is for instance even possible to combine the control pin and the locking pin with each other to form a single pin. When the pin is pulled out without the safety rail being displaced inward (or outward), the toadstool-like outer end of the control pin/locking pin remains caught behind a closing plate (or similar element) so that the locking is maintained. Only when the safety rail has been displaced (for instance inward or outward), so that the toadstool-like outer end can no longer remain caught behind the closing plate, can the control/locking pin be displaced by being pulled, whereby the outer end of the pin is moved to the opening in the closing plate. In this situation the safety rail is unlocked.

[0040] The invention is otherwise not limited to the embodiments thereof described herein. Other constructions can be envisaged wherein the safety rail is fixed at only one outer end to the end frame, and particularly where (at least) two operations are necessary to bring about unlocking, and still more particularly where two operations are necessary with different hands. The rights sought are not therefore limited to the specific embodiments described herein, but are rather defined by the following claims, within the scope of which many modifications and adjustments can be envisaged.

Claims

1. Bed comprising:

- a bed frame;
- an upright end frame on at least one of the two outer ends of the lying frame; and
- at least one safety rail along at least a part of at least one side of the bed frame, wherein the safety rail is displaceable between a lower, opened position and an upper, closed position;
- a locking for the purpose of locking the safety rail in the closed position, wherein the locking is configured to lock the safety rail in the upper position by a releasable coupling of the safety rail to the end frame;

characterized in that

- a pivot construction is provided between the safety rail and the bed frame which is configured to pivot the safety rail in a substantially upright position between the lower and the upper position; and that
- the locking comprises a control element for unlocking the safety rail from the end frame, wherein the control element can be operated only when the safety rail has been displaced to the release position.

2. Bed as claimed in claim 1, wherein the control element is provided in the end frame or in the safety rail.

3. Bed as claimed in claim 1 or 2, wherein the safety rail can be coupled only via the locking to the end frame and is coupled only via the pivot construction to the bed frame.

4. Bed as claimed in any of the foregoing claims, wherein the pivot construction is embodied in order to displace the safety rail from the release position to a locked position under the influence of gravitational force.

5. Bed as claimed in any of the foregoing claims, wherein in the release position the safety rail is displaced inward over a predetermined distance from the locked position.

6. Bed as claimed in any of the foregoing claims, wherein the pivot construction is configured to pivot the safety rail outward from an upper, closed position to a lower, opened position of the safety rail.

7. Bed as claimed in any of the foregoing claims, wherein the end frame comprises an end plate and wherein the control element protrudes at least partially relative to the side of the end plate remote from the mattress of the bed.

8. Bed as claimed in any of the foregoing claims, wherein the locking is arranged at only one outer end of the safety rail and/or wherein the locking is arranged close to the upper outer end of the safety rail.

9. Bed as claimed in any of the foregoing claims, wherein the locking comprises:

- a slidable locking pin provided on the safety rail;
- an opening provided in the end frame into and out of which an outer end of the locking pin is slidable for the purpose of respectively locking and unlocking the safety rail;

wherein the control element is arranged slidably in the opening for the purpose of sliding the locking pin, wherein the outer end of the locking pin is preferably provided with a widened part and/or wherein in the locked position the widened part remains caught behind an edge of the opening and in the release position is slidable out of the opening.

10. Bed as claimed in any of the foregoing claims, wherein the pivot construction comprises a number of pivot arms for pivoting the safety rail in substantially upright position between the lower and the upper position, wherein the pivot arms preferably extend in parallelogram arrangement and/or wherein the pivot arms are mounted rotatably on a longitudinal beam of the bed frame and on both end surfaces of the safety rail.

11. Bed as claimed in any of the foregoing claims, wherein the pivot construction comprises a set of pivot arms on both outer ends of the safety rail.

12. Bed as claimed in any of the foregoing claims, wherein the safety rail extends parallel to the long side of the bed frame and/or the pivot construction is configured to displace the safety rail upward and downward in parallel arrangement.

13. Locking as defined in any of the foregoing claims.

14. Method for opening a safety rail of a bed, in particular a bed as claimed in any of the foregoing claims, the method comprising of:

- pivoting the safety rail from a locked position, in which the locking is locked and non-releasable, to a release position in which the locking can be unlocked;
- unlocking the locking in the release position.

15. Method as claimed in claim 14, wherein the displacement from the locked position to the release position comprises of pivoting the safety rail inward, and/or wherein the opening of the safety rail comprises of pivoting the safety rail outward until the safety rail is located in the lower position.

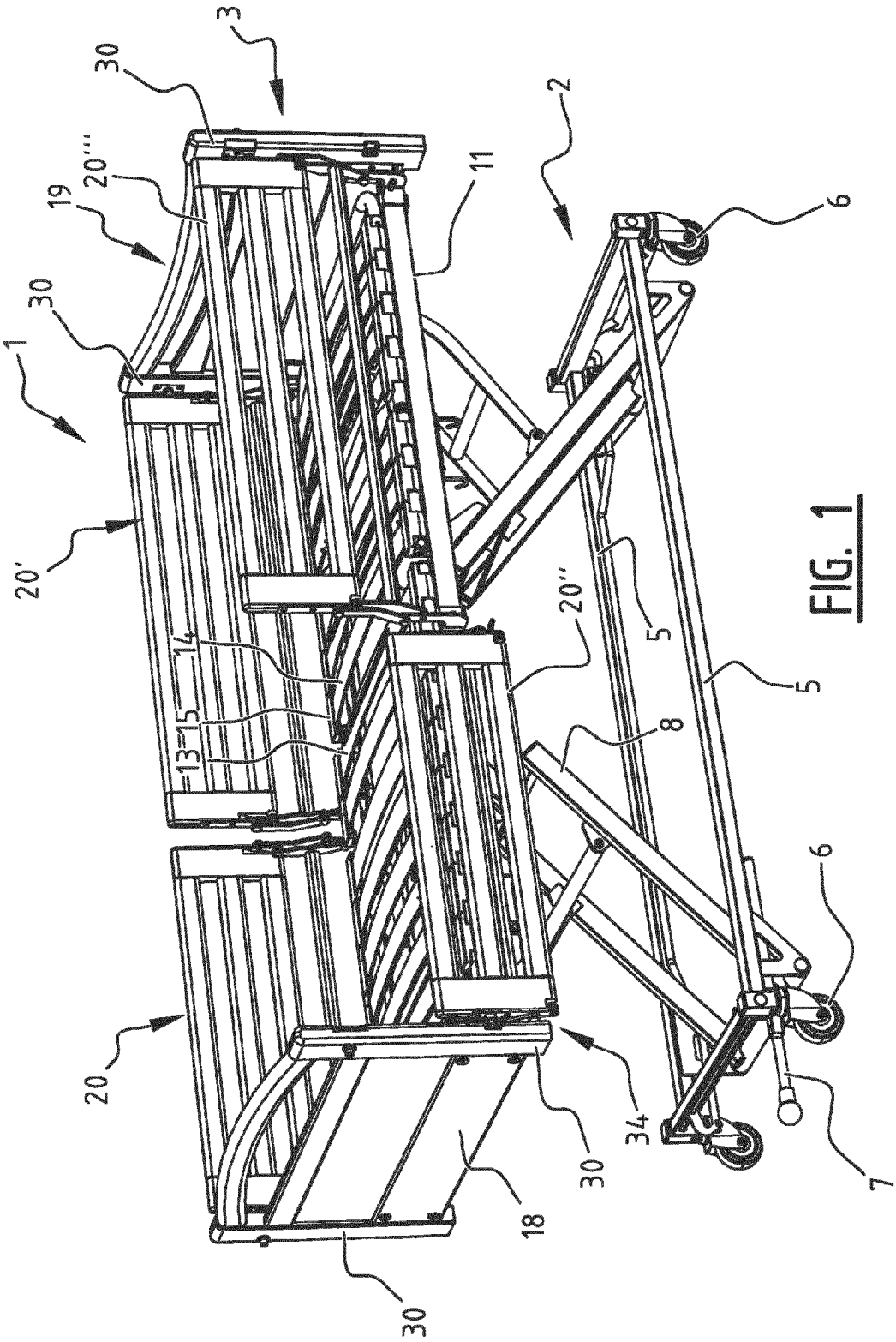

FIG. 1

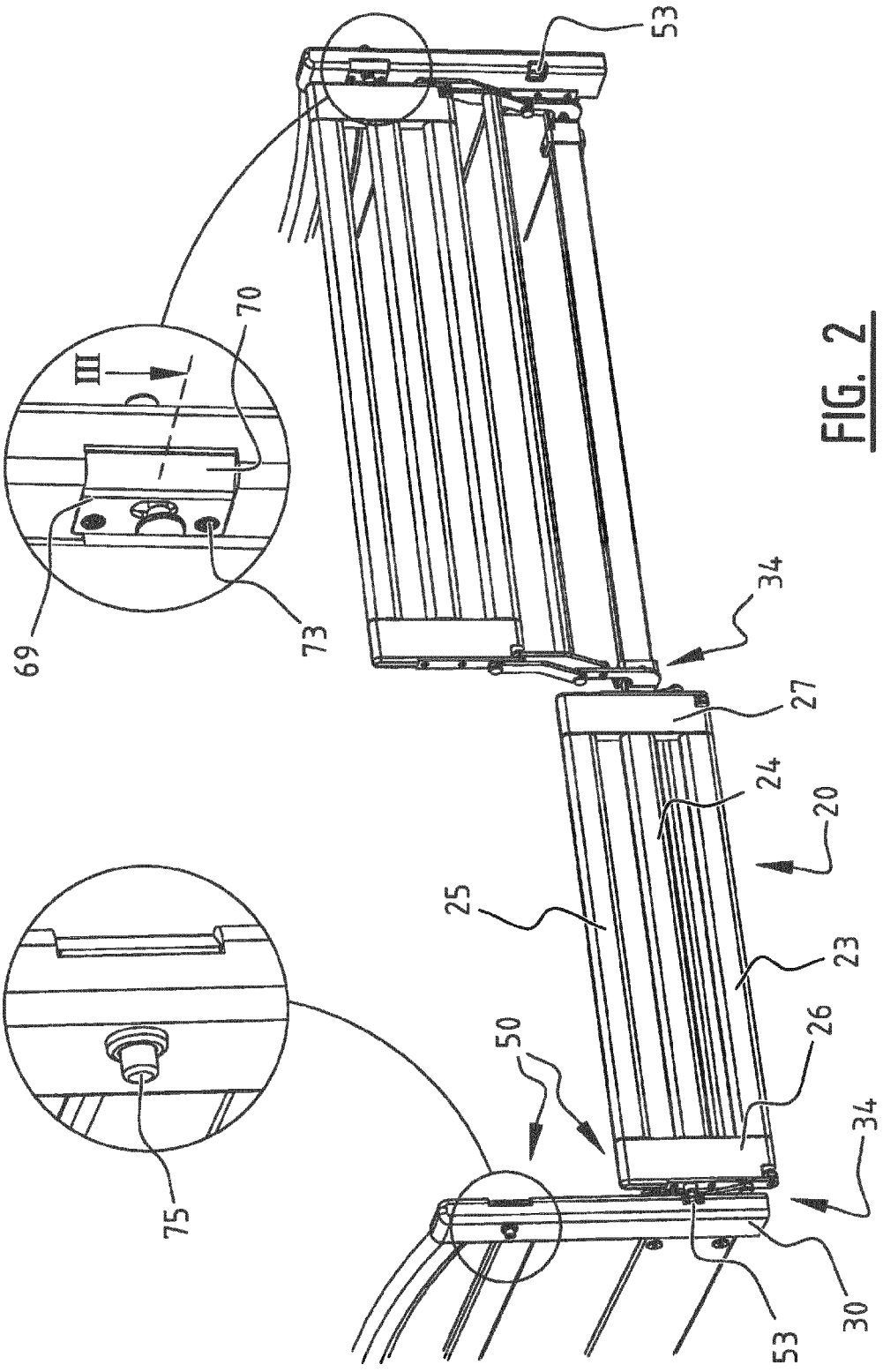

FIG. 2

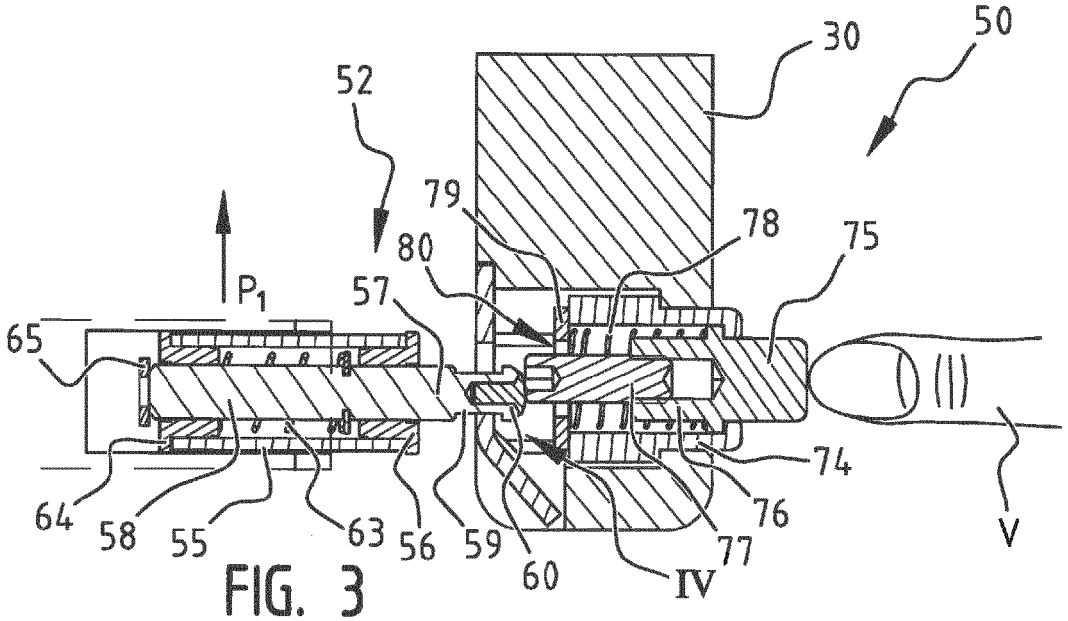
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FIG. 3

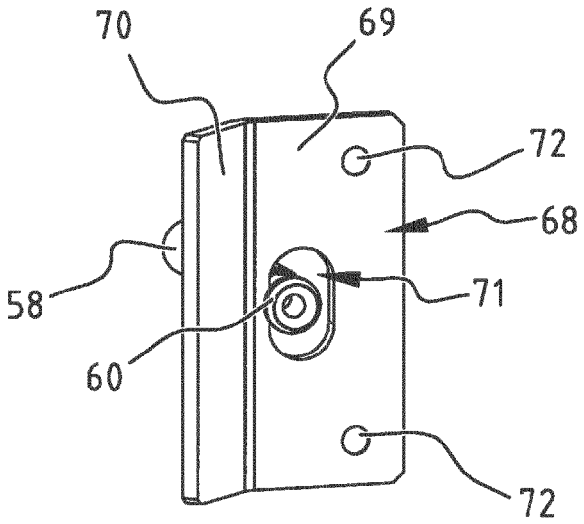
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FIG. 4

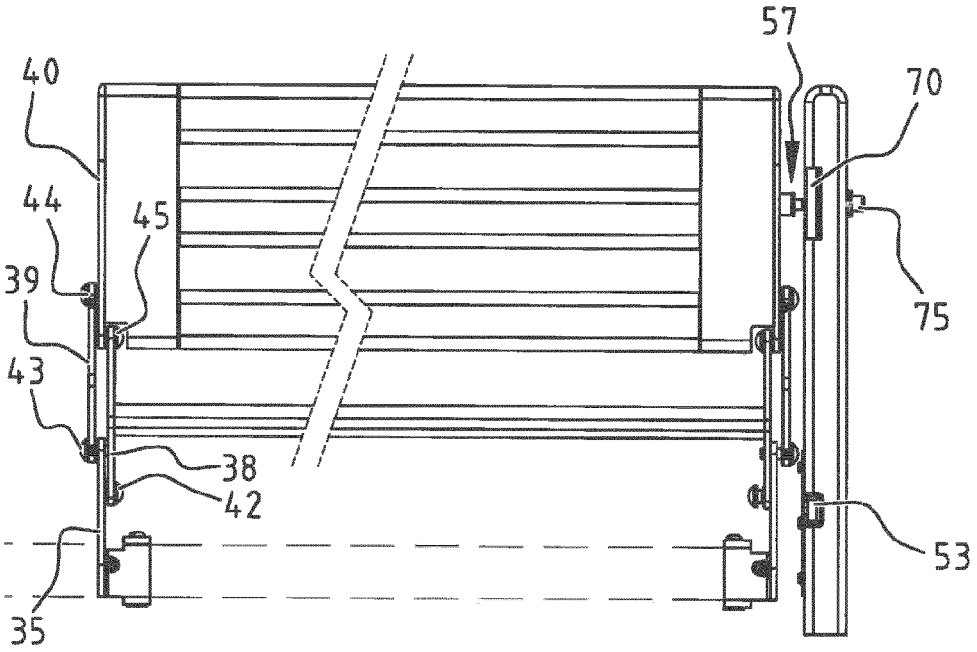

FIG. 5

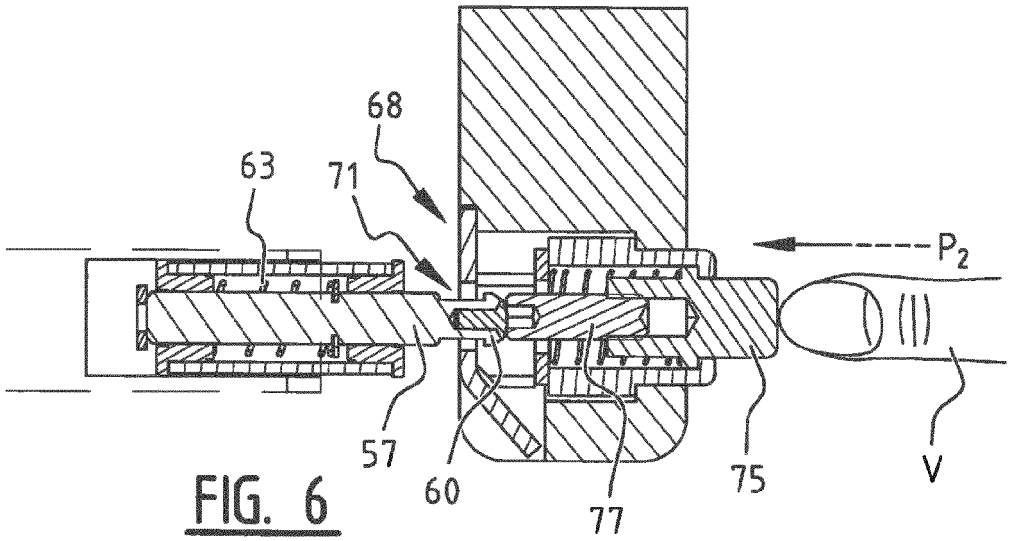

FIG. 6

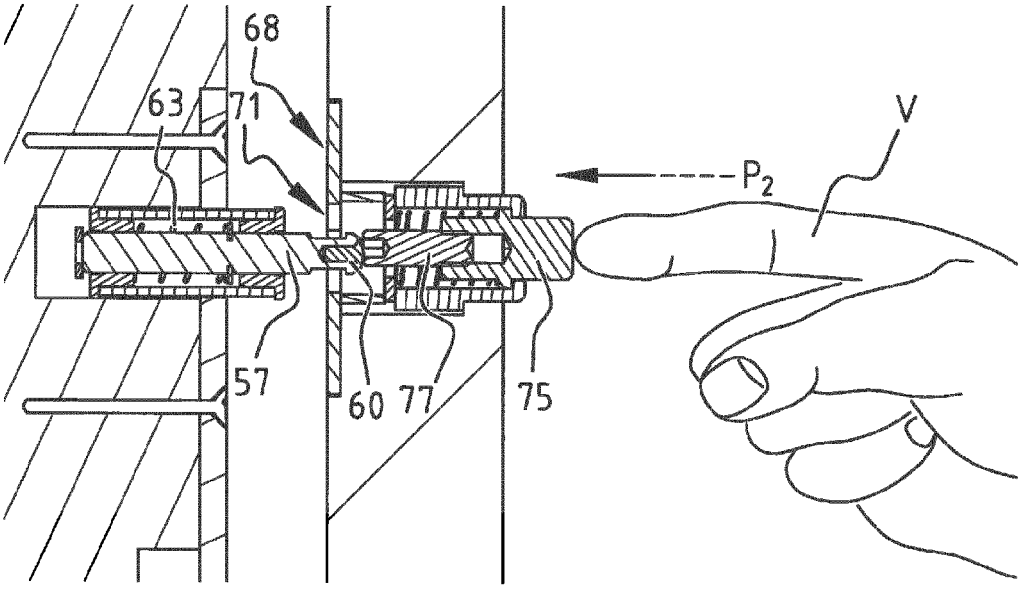

FIG. 7

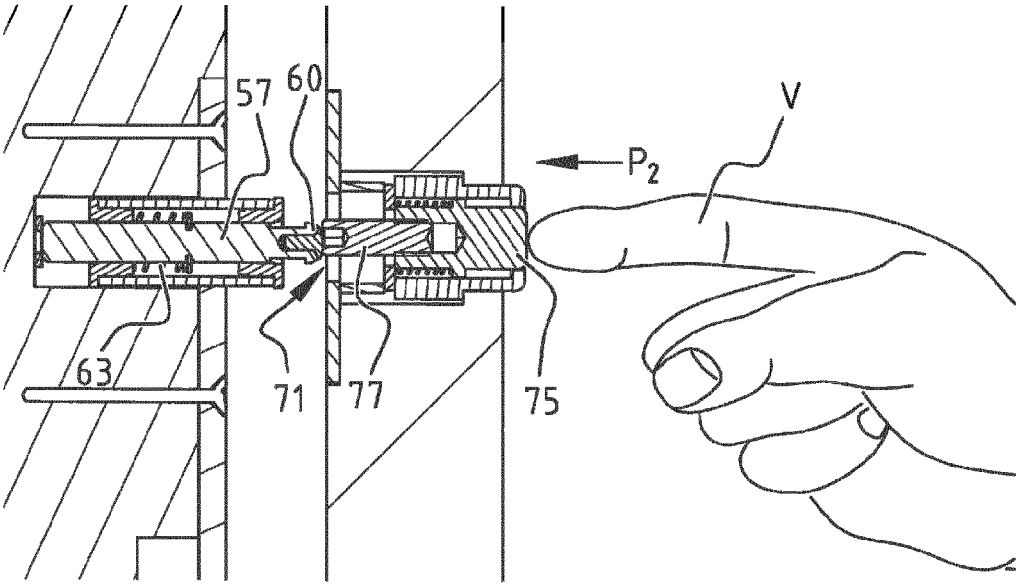

FIG. 8

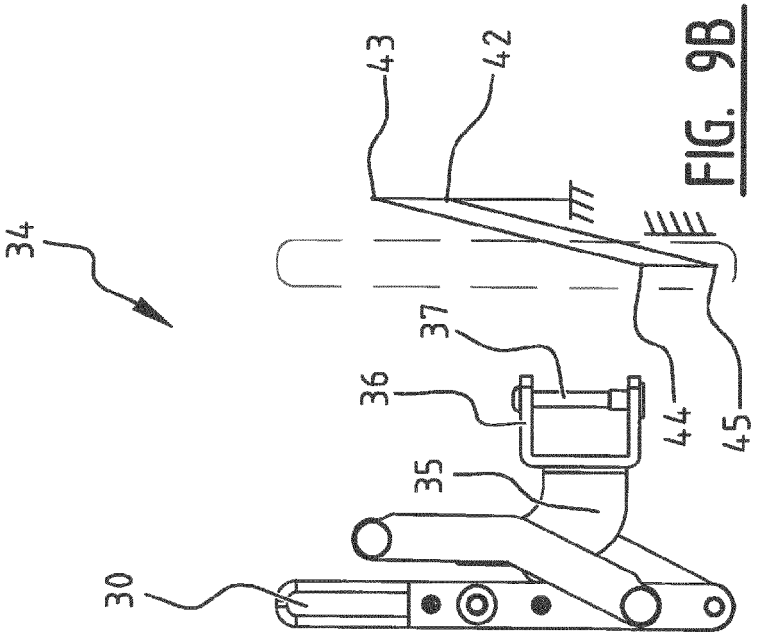
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FIG. 9B

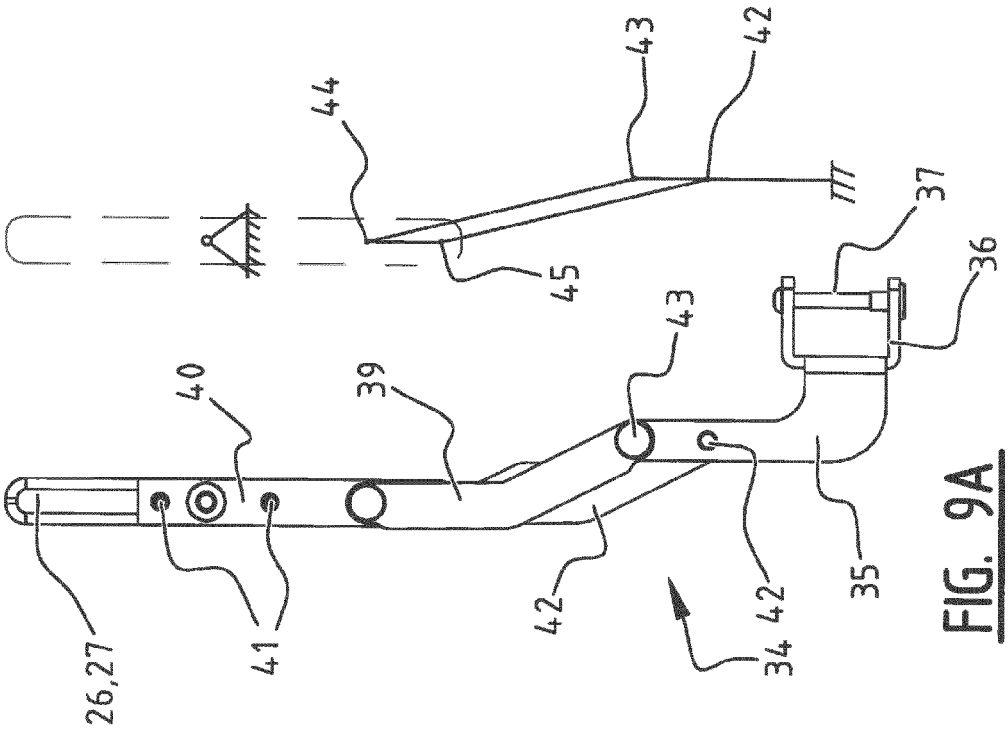
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FIG. 9A

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EUROPEAN SEARCH REPORT

Application Number
EP 13 16 9971

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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TECHNICAL FIELDS SEARCHED (IPC)

A47C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	4 September 2013	Vollering, Johannes

CATEGORY OF CITED DOCUMENTS

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