

(51) Int Cl.:
A47C 21/08 (2006.01)

(22) Date of filing: 16.09.2011

(71) Applicant: **Brevi S.R.L.**
24060 Telgate (BG) (IT)

(74) Representative: **Modiano, Micaela Nadia**
Modiano & Partners (IT)
Via Meravigli, 16
20123 Milano (IT)

(54) **Safety barrier for beds, particularly of the fold-down type**

(57) A safety barrier for beds, comprising a frame (1) and a supporting base (5a, 5b) fixable to a side of a bed, in which the frame (1) is pivoted on the supporting base

(5a, 5b) about a pivoting axis (12), the frame (1) being foldable back onto itself with respect to at least one rotation axis (7a, 7b) oriented transversely to the pivoting axis (12).



Description

[0001] The present invention relates to a safety barrier for beds, particularly of the fold-down type.

[0002] As is known, some types of bed, typically hospital beds or cots for small children, have safety side barriers, typically of the fold-down type, as an integral part of the bed frame. The conventional barriers are adapted, in the containment position, to prevent the accidental fall of the patient or of the child and, in the lowered position, i.e. inclined at 90° or 180° with respect to the containment position, to allow access to the mattress of the bed.

[0003] A problem with conventional side barriers is that they cannot be removed, because they form part of the frame of the bed. Moreover, in cases where the barriers can be removed from the frame of the bed, they are cumbersome and difficult to store, causing obvious drawbacks particularly when the barrier is used domestically.

[0004] The aim of the present invention is to overcome the above mentioned drawbacks, by providing a safety barrier of the removable type for beds that ensures the safety of the occupant and which at the same time is of reduced encumbrance when it is removed from the frame of the bed.

[0005] Within this aim, an object of the invention is to provide a safety barrier that is also of the fold-down type.

[0006] Another object of the invention is to devise a barrier that is very safe, that prevents or in any event obstructs movement from the containment position to the lowered position by children.

[0007] Another object of the invention is to provide a safety barrier that is highly reliable, easy to implement and at low cost.

[0008] This aim and these and other objects which will become better apparent hereinafter, are achieved by a safety barrier for beds according to claim 1, optionally provided with the features of one or more of the appended claims.

[0009] Further characteristics and advantages of the invention will become better apparent from the description of three preferred, but not exclusive, embodiments of the safety barrier for beds according to the invention, illustrated by way of non-limiting example in the accompanying drawings, wherein:

Figure 1 is a perspective view of the barrier according to a first embodiment of the invention;

Figure 2 is a plan view from above of the barrier in Figure 1, mounted on the frame of a bed;

Figure 3 is a side view from the right of the barrier in Figure 1, in the two positions, of containment and lowered;

Figures 4a and 4b are views of a joint of the upper stringer of the barrier in Figure 1, respectively in the two positions of open and closed;

Figure 5 is a perspective view of the barrier in Figure 1 in the closed position;

Figure 6 is a plan view from above of the barrier in

Figure 5;

Figure 7 is a plan view from above of the barrier according to a second embodiment of the invention; Figure 8 is a front elevation view of the barrier in Figure 7;

Figures 9 and 10 are views of a joint of the upper stringer of the barrier in Figure 7, respectively in the two positions of open and closed, seen in cross-section taken along the line IX-IX;

Figures 11 and 12 are sectional front views of a hinge of the barrier in Figure 7, respectively in the two positions of unlocked and locked;

Figure 13 is a plan view from above of the barrier according to a third embodiment of the invention;

Figure 14 is a front elevation view of the barrier in Figure 13;

Figure 15 is a plan view from above of the barrier in Figure 13, in the closed position;

Figure 16 is a sectional view taken along the line XVI-XVI of a joint of the upper stringer of the barrier in Figure 13, in the open position.

[0010] With reference to the embodiments illustrated in the figures, a safety barrier for beds according to the invention comprises a frame 1, preferably metallic, the function of which is to act as a side safety barrier for the occupant of the bed. The frame 1 is defined by an upper stringer 2 and by a lower stringer 3, which are rigidly connected one another by means of two uprights 4a and 4b which are arranged preferably at the ends of the stringers 2 and 3.

[0011] The frame 1 is preferably covered by a wrapping 13, for example a net, so as to cover the through area defined by the stringers and by the uprights. Alternatively, more than two stringers and uprights can be provided in the frame 1, so as to reduce the extent of the through areas and improve the safety of the containment function.

[0012] The frame 1 comprises, moreover, a supporting base that is adapted to be detachably fixed to a side of the frame 20 of a bed. The supporting base is preferably pivoted to the frame 1, so as to allow the rotation of the frame 1 about an axis 12 that is parallel to the longitudinal axis of the stringers 2 and 3 and the consequent arrival at two limit positions, respectively for containment and lowered.

[0013] In more detail, the supporting base comprises two wings 5a and 5b, which are pivoted to the frame 1 preferably at the end of the uprights 4a and 4b through respective hinges 6a and 6b, in the first embodiment, or 26a and 26b in the second and third embodiments. The wings 5a and 5b conveniently have a flat shape, which is adapted to be positioned between the mattress 23 and the frame 20 of the bed without altering the shape of the mattress or the correct posture of the occupant.

[0014] In order to fix the supporting base to the frame 20 of the bed, straps 22 can be used, which pass through respective slots 21 in the wings 5a and 5b and are adapted to be tightened around the longitudinal member of the

frame 20 on the opposite side from the member along which the frame 1 is arranged. Alternatively the straps 22 can be wound around the mattress.

[0015] The common hingeing axis 12 of the wings 5a and 5b is parallel to the longitudinal axis of the stringers 2 and 3, so as to allow the rotation of the frame 1 from a fixed position for containment, substantially perpendicular to the plane of the wings 5a and 5b (as shown in Figure 1), to a lowered position, not necessarily fixed, wherein the frame 1 is rotated substantially by 180° with respect to the containment position, as shown in dotted lines in Figure 3. The hinges 6a and 6b, or 26a and 26b, are moreover adapted to allow the mutual rotation toward each other of the frame 1 and of the wings 5a and 5b about the same common hingeing axis 12, in order to arrive at a folded position of reduced transversal encumbrance.

[0016] Advantageously, according to the first embodiment, which is illustrated in Figures 1 to 6, each one of the hinges 6a and 6b is provided with a locking catch 10 adapted to be inserted in a snap-acting manner in a groove 11 so as to prevent the mutual rotation of the frame with respect to the wings 5a and 5b. The locking catch 10, which can be spring loaded so as to remain inserted in the groove 11, is preferably connected to a release lever 9, which is adapted to move the locking catch from the groove 11 in order to allow the mutual rotation between the frame 1 and the respective wing 5a or 5b.

[0017] Obviously, the catch 10 can be substituted by equivalent locking elements, for example a spring latch or a ratchet brake.

[0018] In an alternative embodiment, not shown, the release levers 9 of the two hinges 6a and 6b can be optionally connected to each other so as to release them at the same time with a single manual operation.

[0019] Advantageously, with reference to the second and third embodiments, illustrated in Figures 7 to 16, the hinges 26a and 26b comprise means for the locking and release of the relative rotation between the frame 1, and specifically between the uprights 4a and 4b, and the wings 5a and 5b. With reference to Figures 11 and 12, which show an axial cross-section of the hinge 26b, the hinge 26b comprises two coaxial crowns 101 and 102, which are coupled respectively to the upright 4b and to the wing 5b.

[0020] Figure 11 shows the hinge 26b in a condition of locking the rotation between the frame 1 and the wing 5b, not visible in the figure, while Figure 12 shows the hinge 26b in a condition of allowing the free rotation between the frame 1 and the wing 5b, not visible in the figure.

[0021] The hinge 26a, between the frame 1 and the wing 5a, is provided with the same structure as the hinge 26b.

[0022] The two crowns 101 and 102 are axially held together by a pin 103, which allows the mutual rotation between the crowns 101 and 102 only. A toothed bush

104 is contained in the cylindrical space inside the crowns 101 and 102. The toothed bush 104 is coaxial with the crowns 101 and 102 and with the pin 103, and is provided with a plurality of lateral teeth 111, which extend axially along the outer lateral surface of the bush 104. The lateral teeth 111 of the bush 104 engage with respective axial recesses defined on the inner lateral surface of the crown 101, so that a rotation of the crown 101 involves an integral rotation of the toothed bush 104.

[0023] The toothed bush 104 can slide along its principal axis along the pin, and this is made possible by the toothed structure of the outer lateral surface of the bush 104, which engage with the recesses of the inner lateral surface of the crown 101.

[0024] The crown 102 comprises a disc 105, which is also coaxial with the crowns 101 and 102 and with the pin 103, and integral with the crown 102.

[0025] The disc 105 advantageously comprises, in its lower face, a pin 106 that is adapted to engage, thanks to its interlocking shape, with a seat 107 defined in the upper face of the bush 104, at the relative position between the two crowns 101 and 102 that corresponds to the position wherein the frame 1 is in a fixed position of containment, i.e. substantially perpendicular to the plane of the wings 5a and 5b.

[0026] The pin 106 of the disc 105 is kept engaged with the seat 107 of the bush 104 by elastic means 108, which press the bush 104 against the disc 105. The elastic means 108 can consist in at least one helical spring which abuts against the bottom of the crown 101 and a surface of the bush 104.

[0027] An outer button 109 that can slide, limited to positions defined by adapted stroke limits, along the rotation axis of the crowns 101 and 102, is in abutment against the upper surface of the bush 104, so that a pressure on this button 109 causes an axial sliding of the bush 104, which occurs in opposition to the elastic force generated by the elastic means 108, and which determines a disengagement of the seat 107 of the bush 104 from the pin 106 of the disc 105. By keeping the button 109 pressed, mutual rotation is allowed between the crown 101 and the crown 102, and therefore also the relative rotation between the wings 5a and 5b and the frame 1, from the containment position to a lowered position, not necessarily lockable, wherein the frame 1 is rotated substantially by 180° with respect to the containment position.

[0028] By means of the structure of the hinges 26a and 26b just described, by conveniently selecting the elastic constant of the spring 108 that acts in opposition to the pressure of the button 109, small children occupying the cot on which the safety barrier according to the invention is mounted can be prevented from opening it, deliberately or accidentally, toward the lowered position.

[0029] In all the embodiments, the frame 1 can be folded onto itself about a transverse axis A, i.e. in a direction that is transverse with respect to the upper stringers 2 and lower stringers 3. In particular, in the first and second

embodiments, the upper stringer 2 comprises at least two portions of upper stringer 2a and 2b that are mutually aligned and coaxial, and which are mutually connected by means of at least one upper joint 7, 27. Similarly, the lower stringer 3 comprises at least two portions of lower stringer 3a and 3b that are mutually aligned and coaxial, and which are mutually connected by means of at least one lower joint 8, 28.

[0030] The joints 7 and 8, or 27 and 28, are adapted to eliminate two degrees of freedom of the connection between the respective portions of stringer 2a-2b and 3a-3b, and to allow only the mutual rotation of the portions of stringer connected by the joint about an axis that is transverse with respect to the stringers 2 and 3.

[0031] If the safety barrier is particularly long, for example 150 cm, such as in the third embodiment, illustrated in Figures 13 to 16, more than one joint can be provided along each upper stringer and lower stringer, so as to allow multiple folding of the frame 1.

[0032] In particular, in the third embodiment, the upper stringer 2 comprises three portions of upper stringer 2a, 2b and 2c that are mutually aligned and coaxial, and which are mutually connected by means of two upper joints 27 and 47. Similarly, the lower stringer 3 comprises three portions of lower stringer 3a, 3b and 3c that are mutually aligned and coaxial, and which are mutually connected by means of two lower joints 28 and 48.

[0033] With reference to Figures 4a and 4b, in the first embodiment of the invention the upper joint 7 defines two rotation axes 7a and 7b which are transverse perpendicular to the longitudinal axis of the upper stringer 2. These axes 7a and 7b coincide with the axes defined by the identical lower joint 8, so that the frame 1 can be folded along one edge, book-fashion, by mutually moving the first portions of stringer 2a and 3a on one side of the joints 7 and 8 toward the second portions of stringer 2b and 3b on the other side of the joints 7 and 8.

[0034] Alternatively, the joint can be such as to have only one rotation axis, corresponding to or at any event parallel to the rotation axis A shown in Figure 1. In this case, the ends of the portions of upper stringer 2a-2b would be able to rotate on one common rotation pin only, as are the portions of lower stringer 3a-3b.

[0035] Advantageously, each one of the joints 7 and 8 is adapted to prevent the closing along one edge, book-fashion, of the frame 1 in one of the two possible directions of rotation of the first portions of stringer 2a-3a and of the second portions of stringer 2b-3b when the frame 1 is in the open position of Figure 1, and to selectively allow the rotation in the other direction, by acting on a manually-operable release.

[0036] In the preferred embodiments of the invention, such as the embodiments shown in the figures, each joint 7 and 8 is closed on the side that is directed toward the wings 5a and 5b when the frame 1 is in the containment position and is open on the other side, so that in this position the barrier defined by the frame 1 cannot be folded toward the outside of the bed.

[0037] The joints 7 and 8 can optionally be provided with respective means for locking the rotation which can be manually actuated so as to allow the closing along one edge, book-fashion, of the frame 1 in the other possible direction of mutual rotation of the portions of stringer 2a-3a and 2b-3b, starting from the open position of Figure 1. Such locking means can be, for example, a sliding latch, or they can be obtained with a surface interference between the ends of the portions of stringer 2a-3a and 2b-3b hinged in the joint and the joint proper, an interference such that it can be defeated only with effort greater than a certain threshold, for example 50N.

[0038] Figures 9 and 10, which illustrate the second embodiment of the invention, show the joint 27, which defines two rotation axes 7a and 7b which are perpendicular to the longitudinal axis of the upper stringer 2. The axes 7a and 7b coincide with the axes defined by the identical lower joint 28, so that the frame 1 can be folded along one edge, book-fashion, by mutually moving the first portions of stringer 2a and 3a on one side of the joints 27 and 28 toward the second portions of stringer 2b and 3b on the other side of the joints 27 and 28.

[0039] Advantageously, the joints 27 and 28 comprise a sleeve 29 that mechanically limits the rotation of the portions of stringer 2a, 2b and 3a, 3b to the position wherein those portions of stringer are respectively aligned, thus preventing the barrier from being folded toward the outside of the bed.

[0040] Advantageously, means for locking the portions of stringer 2a and 2b, 3a and 3b in a mutually coaxial position comprise, inside and coaxially to the portions of stringer, sliding latches 30 and 31, each pressed against the other by elastic means 32 and 33, such as respective helical springs. In the open position of the frame 1, shown in Figure 9, the ends 34 and 35 of the sliding latches 30 and 31 are in abutment against a stroke limit 36, which is interposed between the two stringers inside the sleeve 29. The stroke limit 36 is laterally contoured so as to accommodate the ends 34 and 35 of the sliding latches 30 and 31, in order to lock the aligned position of the portions of stringer 2a, 2b, 3a and 3b and cause a mechanical interference that can be defeated only with effort greater than a certain threshold, for example 50N. In this way, by conveniently selecting the elastic constant of the springs 32 and 33 which act on the sliding latches 30 and 31, small children occupying the cot that comprises the safety barrier according to the invention can be prevented from closing it book-fashion, deliberately or accidentally.

[0041] For example, the ends 34 and 35 can be provided with a protruding cap, with a curvature that is complementary to respective concavities 37 and 38 provided on the stroke limit 36.

[0042] In the third embodiment, each stringer 2 and 3 comprises respectively two pairs of joints 27 and 47 and 28 and 48, which are respectively interposed between three portions 2a, 2b and 2c, and 3a, 3b and 3c. The first joints 27 and 28 are identical to those described with reference to the second embodiment. The second joints

47 and 48 each define two rotation axes 57a and 57b which are perpendicular to the longitudinal axis of the stringers and which are also provided with sliding latches 30 and 31 and respective helical springs 32 and 33 pressed against each other, identical to those of the joints 27 and 28. In the joints 47 and 48, the rotation axes 57a and 57b are advantageously mutually spaced apart further than the similar rotation axes 7a and 7b in the joints 27 and 28, thanks to the presence, in each joint, of an intermediate sleeve that is wider than the sleeve 29, not shown in the figures, or by using in each joint 47 and 48 two stroke limits 36a and 36b which are identical to the stroke limit 36, conveniently mutually spaced apart and fixed to the respective portions of stringer, so as to engage respectively with the ends of the sliding latches 30 and 31.

[0043] In this manner, as can be seen in Figure 15, the barrier in the closed position has the portions 2a, 2b, 2c and 3a, 3b, 3c of the stringers 2 and 3 parallel to each other, making the closed barrier extremely compact.

[0044] Operation of the safety barrier according to the several embodiments described is obvious from the foregoing description and illustrations. In particular, with reference to the first embodiment, during normal use, i.e. when the barrier is fixed to the frame 20 of the bed with the frame 1 in the containment position, shown in unbroken lines in Figure 3, in order to gain access to the mattress 23 the operator must unlock the catches 10 by means of the levers 9, optionally lift the frame 1 upwardly (if required by the specific profile of the hinges 6a-6b), and rotate the frame 1 substantially 180° downwardly, thus arriving at the lowered position, as shown in dotted lines in Figure 3.

[0045] In order to return to the containment position, all that is necessary is to rotate the frame 1 upwardly again so that the catches 10 return in a snap-acting manner into the respective grooves 11.

[0046] Alternatively, in the second and third embodiments, merely pressing the button 109 of the hinges 26a and 26b makes it possible to release the rotation lock in place between the frame 1 and the wings 5a and 5b, in order to move from a fixed position of containment to a lowered position.

[0047] With the rotation toward the containment position, the bush 104 will be pushed axially by the spring 108 toward the pin 106, accommodating it in the seat 107 once it is aligned with the pin 106.

[0048] If it is desired to completely remove the barrier from the frame 20 of the bed, after unfastening the straps 22, the portions of stringer 2a-3a and 2b-3b are brought together, optionally after releasing the joints 7 and 8, 27 and 28, 47 and 48 or after defeating the corresponding minimum resistance to rotation, for example 50N, so as to close the frame along one edge, book-fashion. The wings 5a and 5b can also be released and folded toward the uprights 4a and 4b, thus arriving at the folded and compact position in Figure 5.

[0049] In a particular embodiment, not shown, for fur-

ther safety the release mechanisms of the joints 7 and 8 and of the hinges 6a and 6b can optionally be mutually connected by means of cables and/or mechanical linkages, so that the closing along one edge, book-fashion, of the frame 1 and the folding of the wings 5a and 5b onto the uprights of the frame occurs only if the operator acts simultaneously on the release mechanisms of the joints 7 and 8 and of the hinges 6a and 6b, or by releasing them in a determined sequence, in such a way that the release of the joints 7-8 or of the hinges 6a-6b is possible only by keeping released, respectively, the hinges 6a-6b or the joints 7-8.

[0050] In practice it has been found that the safety barrier according to the invention fully achieves the intended aim in that it makes it possible to provide a side barrier for beds that is solid and at the same time of reduced encumbrance.

[0051] Although the device according to the invention has been conceived for mounting on the longitudinal members of bed frames, it can also be used, more generally, on all the edges of a bed, including the cross-members at the head and foot.

[0052] The device, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the inventive concept. Moreover, all the details may be substituted by other, technically equivalent elements.

[0053] In practice, the materials employed, as well as the dimensions, may be any according to requirements and to the state of the art.

[0054] The content of Italian patent application no. MI2010A001682, the priority of which is claimed in the present application, is incorporated as a reference.

[0055] Where the technical features mentioned in any claim are followed by reference numerals and/or signs, those reference numerals and/or signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly, such reference numerals and/or signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference numerals and/or signs.

Claims

1. A safety barrier for beds, comprising a frame (1) and a supporting base (5a, 5b) fixable to a side of a bed, said frame (1) being pivoted on said supporting base (5a, 5b) about a pivoting axis (12), **characterized in that** said frame (1) is foldable back onto itself with respect to at least one rotation axis (A) oriented transversely to said pivoting axis (12).
2. The safety barrier according to claim 1, wherein said at least one rotation axis (A) is perpendicular to said pivoting axis (12).
3. The safety barrier according to claim 1 or 2, wherein

said frame (1) comprises at least one upper stringer (2) and at least one lower stringer (3), which are mutually connected through uprights (4a, 4b), each one of said upper and lower stringers comprising at least one respective joint (7, 8) which is adapted to allow folding, by means of rotation about said at least one rotation axis (7a, 7b), of a first portion (2a) of said upper stringer (2) and a first portion (3a) of said lower stringer (3) on a second portion (2b) of said upper stringer (2) and a second portion (3b) of said lower stringer (3).

4. The safety barrier according to claim 3, wherein said at least one joint (7, 8) comprises means for locking in an aligned and coaxial position of said first and second upper stringer portions (2a, 2b) and of said first and second lower stringer portions (3a, 3b) respectively.
5. The safety barrier according to claim 3 or 4, wherein said first upper and lower stringer portions (2a, 3a) are foldable along one edge, book-fashion, onto said second upper and lower stringer portions (2b, 3b) along a single direction of rotation with respect to said at least one rotation axis (7a, 7b), starting from said aligned and coaxial position.
6. The safety barrier according to claim 4 or 5, wherein said locking means are releasable manually so as to allow said folding along one edge, book-fashion.
7. The safety barrier according to one or more of the preceding claims, wherein said supporting base comprises wings (5a, 5b), which are connected to the frame (1) rotatably with respect to said pivoting axis (12) at said uprights (4a, 4b), through respective hinges (6a, 6b), said wings (5a, 5b) being detachably lockable with respect to said frame (1) so as to be extended in a direction that is substantially perpendicular to the plane of said frame (1).
8. The safety barrier according to claims 6 and 7, wherein said hinges (6a, 6b) comprise a manually releasable locking lever (9).
9. The safety barrier according to claim 8, wherein said locking lever (9) is connected to said locking means of said at least one joint (7, 8) so that said folding of the frame (1) onto itself and the rotation of said wings (5a, 5b) on said uprights of the frame is allowed only by releasing simultaneously, or in a preset sequence, said locking lever (9) and said locking means.
10. The safety barrier according to claim 3, wherein said at least one upper stringer (2) and said at least one lower stringer (3) comprise respectively two joints (27, 47; 28, 48), which are respectively adapted to

allow the folding, by means of rotation about said at least one rotation axis (7a, 7b), of a first portion (2a) of said upper stringer (2) and a first portion (3a) of said lower stringer (3) on a second portion (2c) of said upper stringer (2) and a second portion (3c) of said lower stringer (3) and to allow the folding, by means of rotation about at least one second rotation axis (57a, 57b), of a second portion (2c) of said upper stringer (2) and a second portion (3c) of said lower stringer (3) on a third portion (2b) of said upper stringer (2) and a third portion (3b) of said lower stringer (3).

11. The safety barrier according to claim 4, wherein said means for locking in an aligned and coaxial position of said portions of stringer (2a, 2b, 2c, 3a, 3b, 3c) comprise sliding latches that are coaxial to said portions of stringer (2a, 2b, 2c, 3a, 3b, 3c) and pressed elastically, against each other, against at least one intermediate stroke limit (36, 36a, 36b).
12. The safety barrier according to claim 4, wherein said locking means comprise a sleeve (29) that is adapted to mechanically limit the rotation of the portions of stringer (2a, 2b and 3a, 3b) in the direction of folding toward the outside of the bed.
13. The safety barrier according to claims 6 and 7, wherein said hinges (26a, 26b) comprise a first crown (101) integral with said frame (1) and a second crown (102) integral with said wings (5a, 5b) and a button (109) that can move axially with respect to said first and second crowns and is adapted to unlock the relative rotation between said first and second crowns (101, 102).
14. The safety barrier according to claim 13, wherein said hinges (26a, 26b) comprise a bush (104) that can move axially with respect to said first and second crowns and is kept pressed by elastic means (108) against said button, said bush comprising a seat (107) adapted to receive a pin (106) integral with one of said first and second crowns (101, 102) in order to lock the relative rotation between said first and second crowns (101, 102).

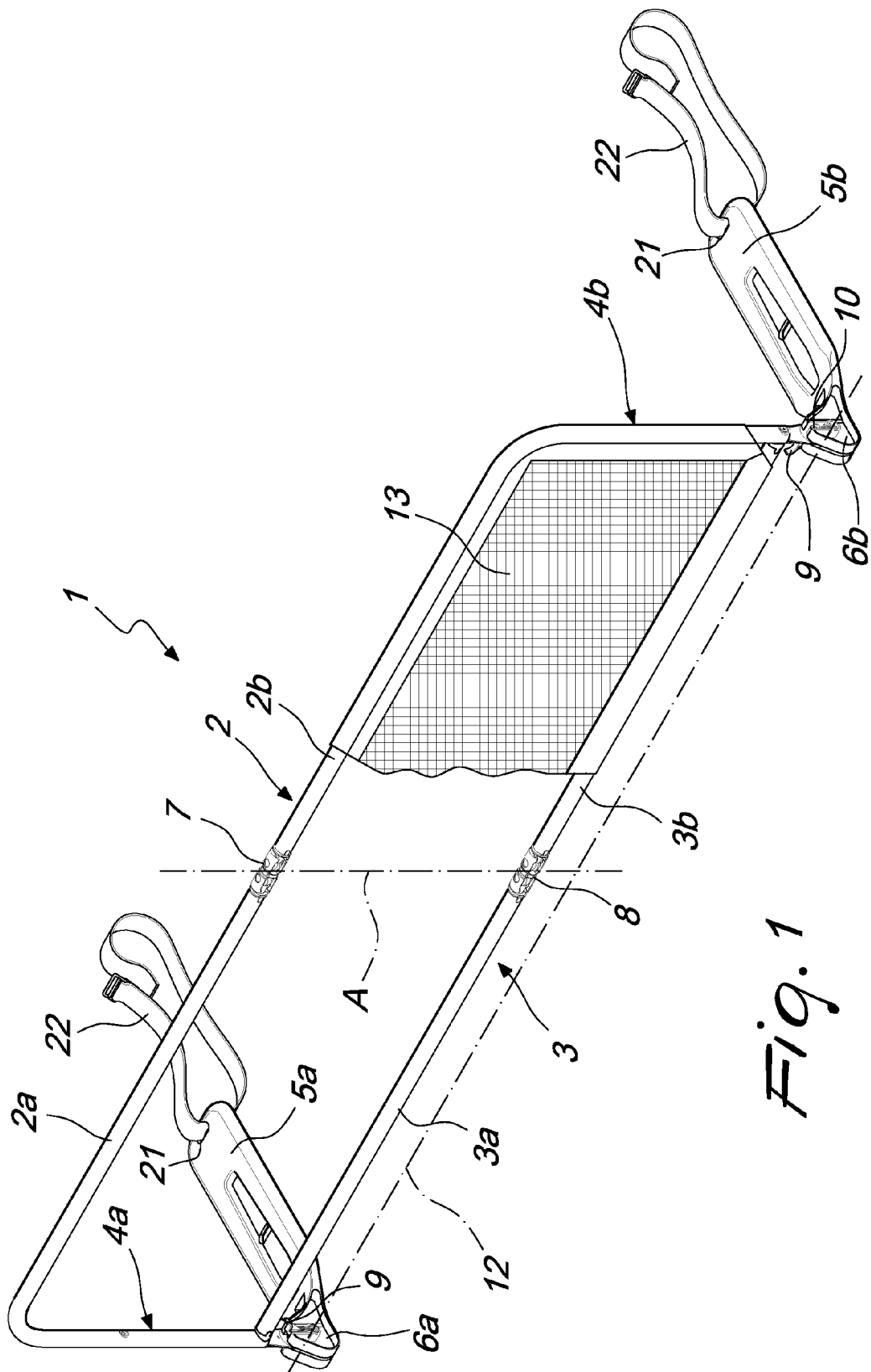


Fig. 1

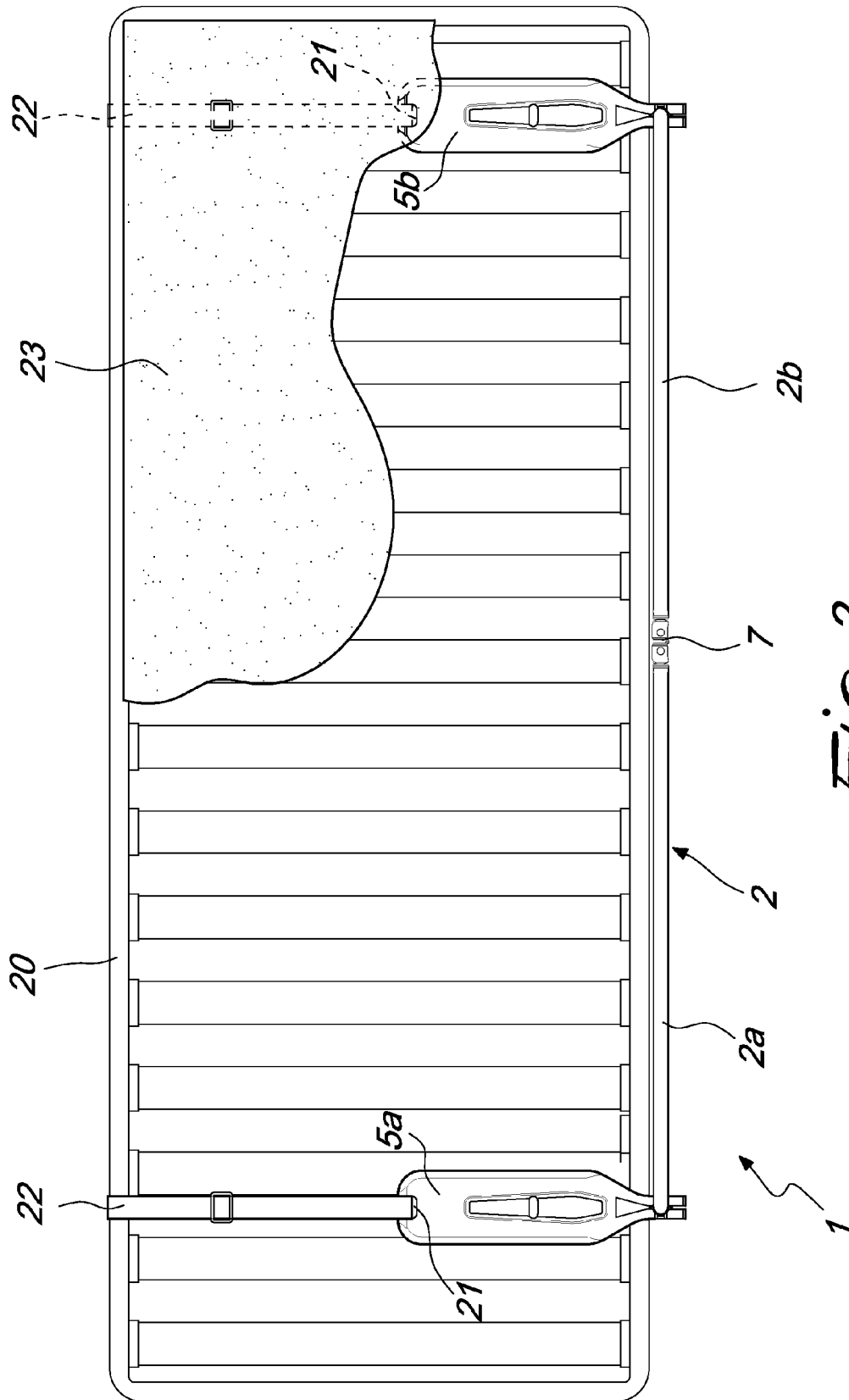


Fig. 2

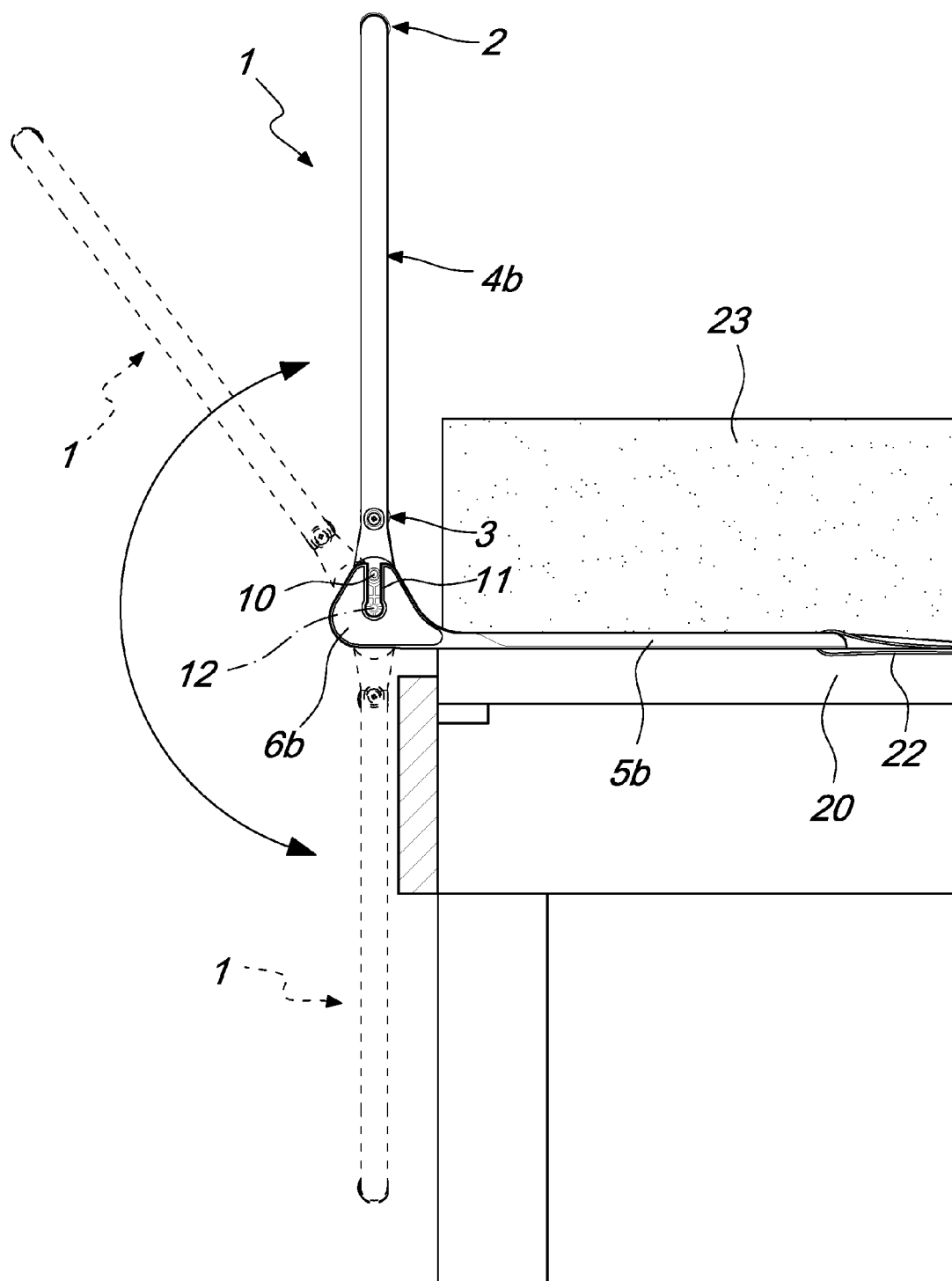


Fig. 3

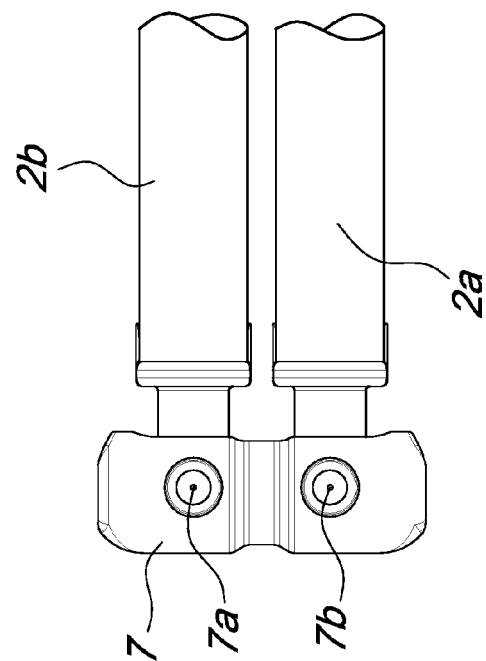


Fig. 4a

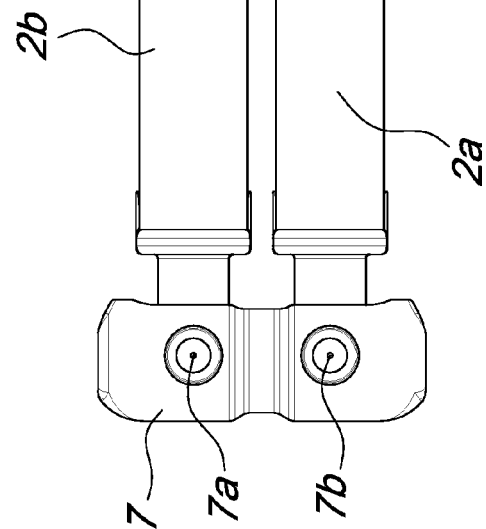


Fig. 4b

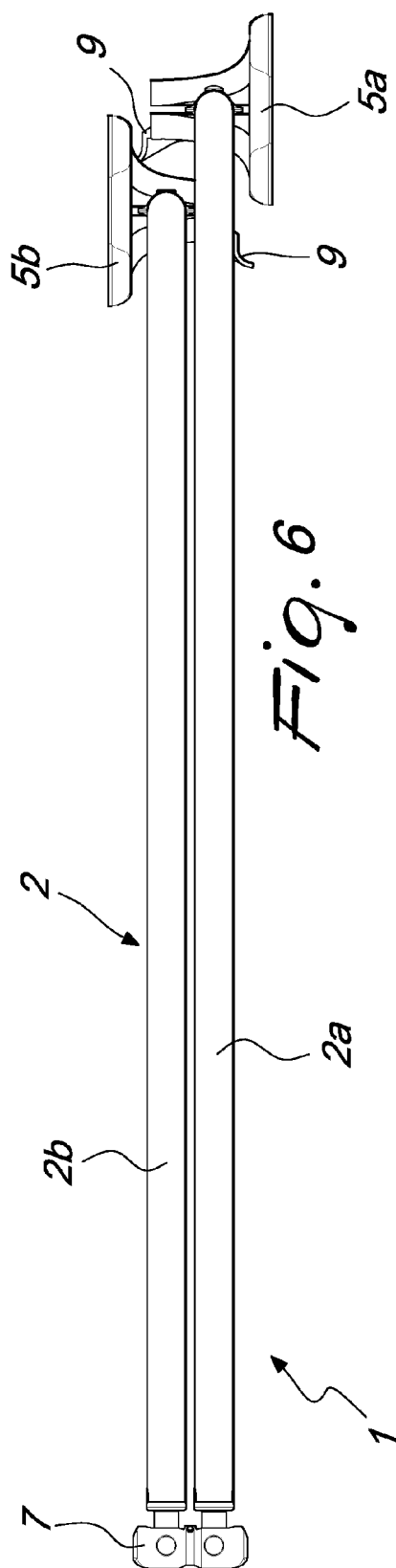
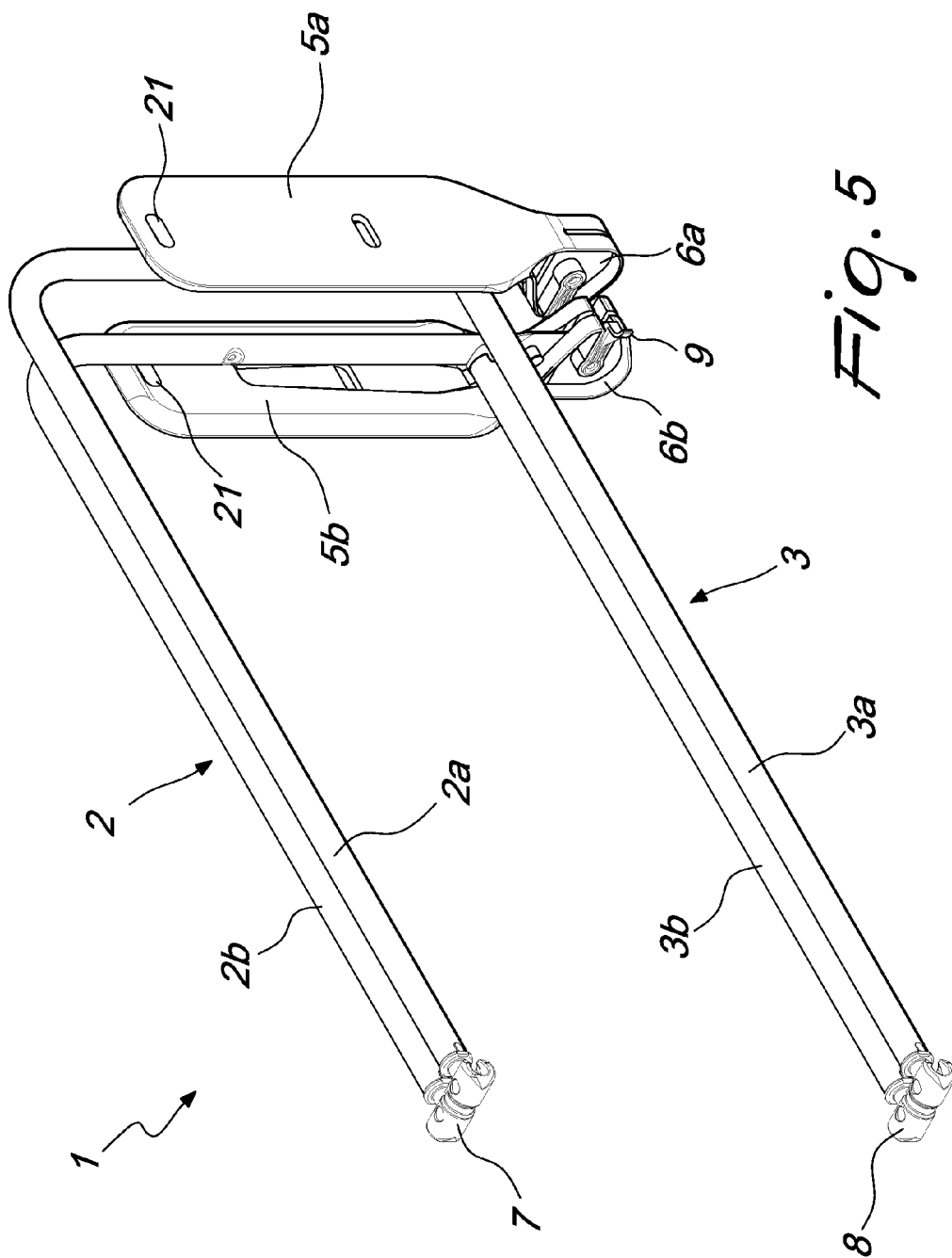
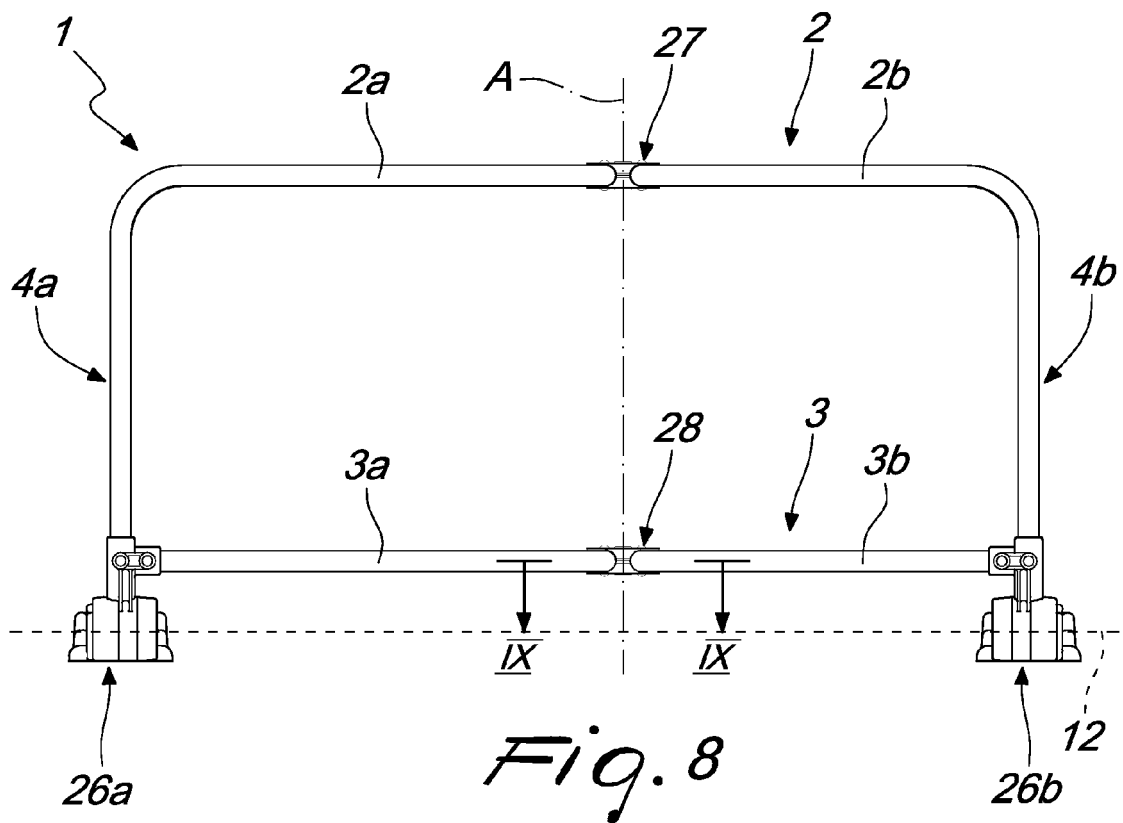
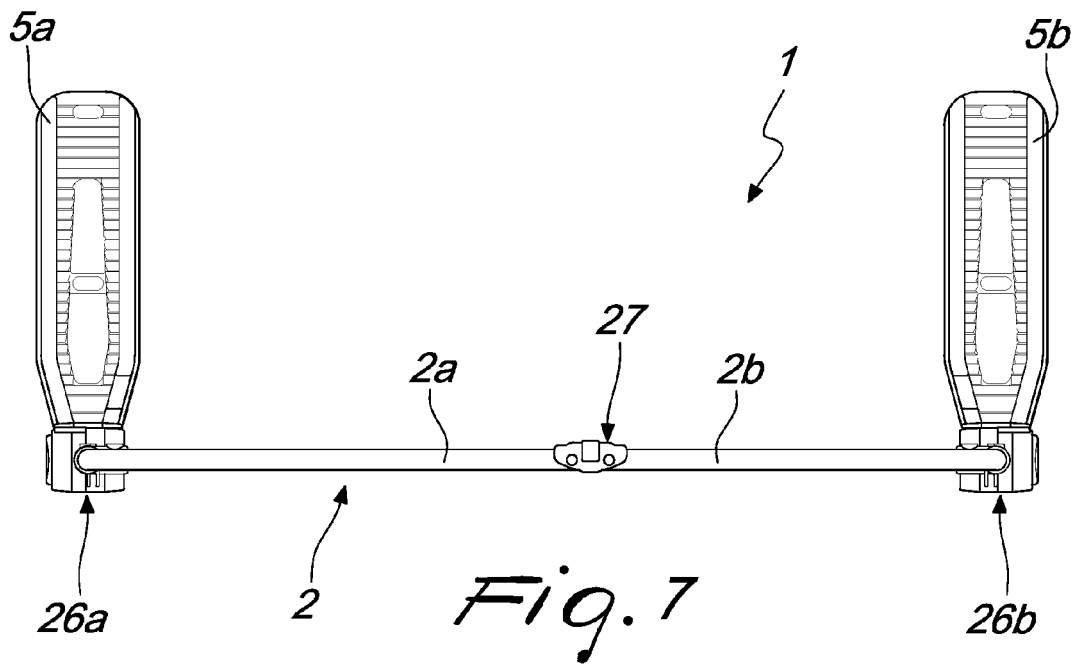


Fig. 6





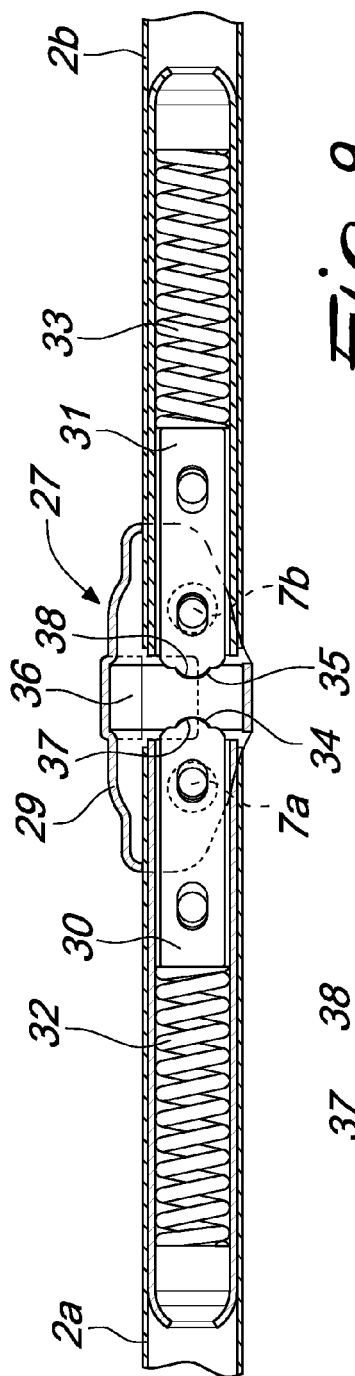


Fig. 9

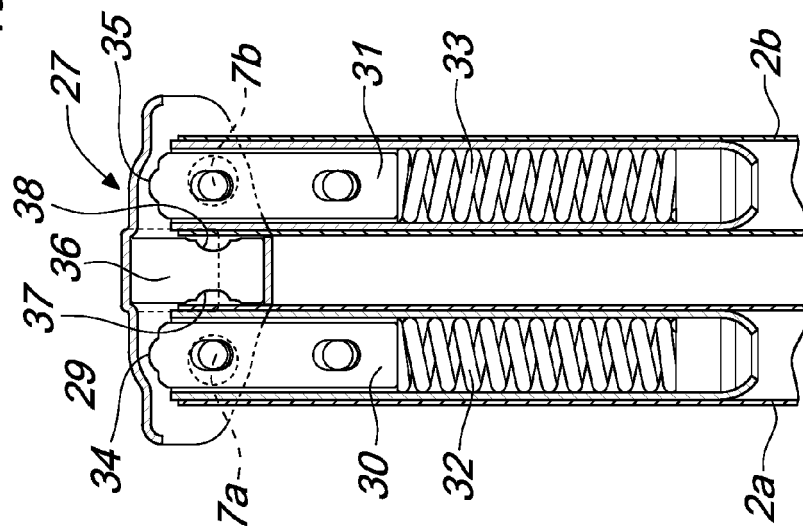
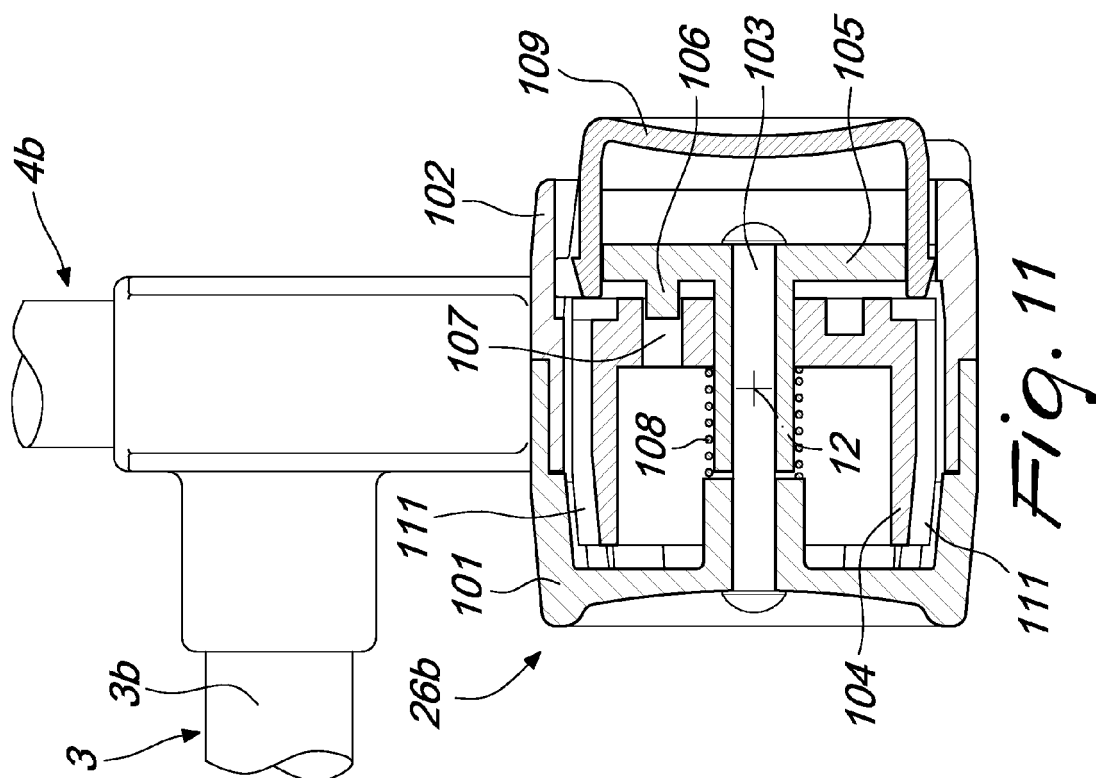
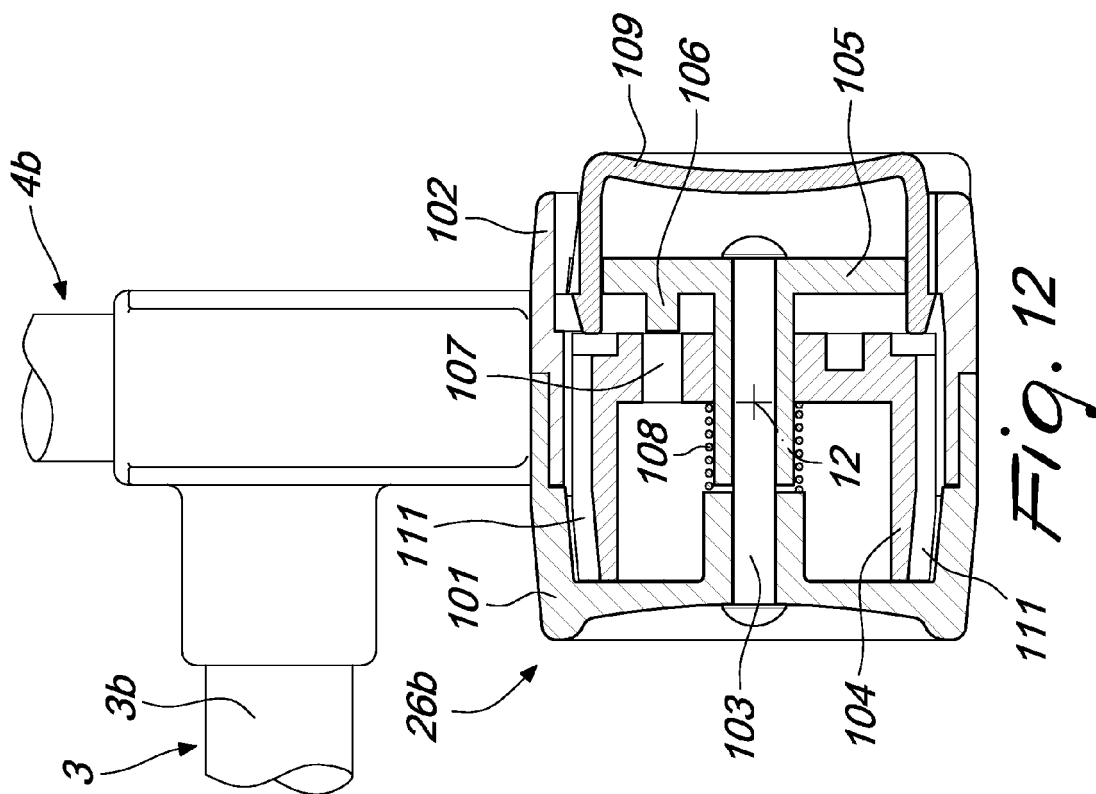
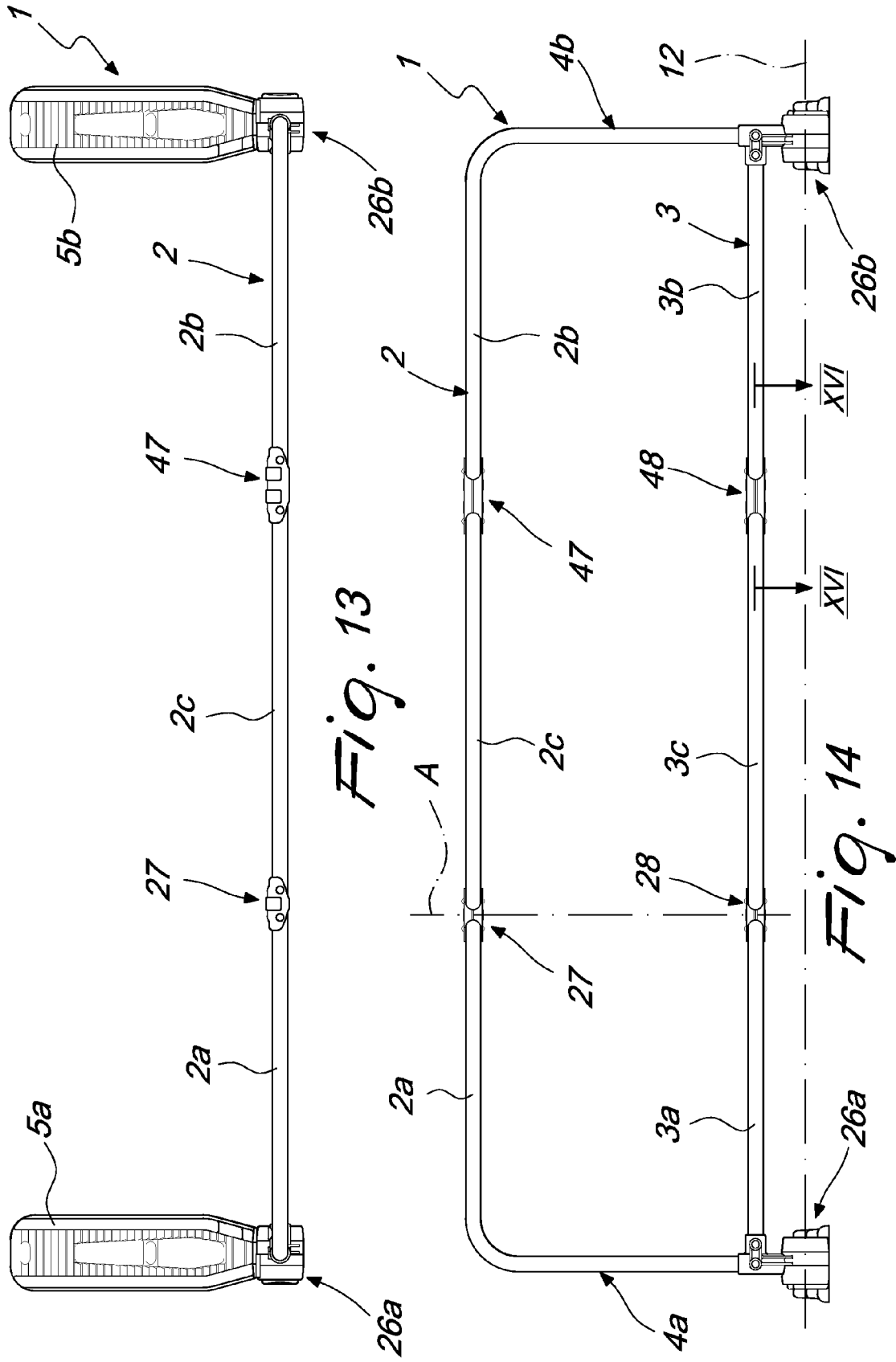
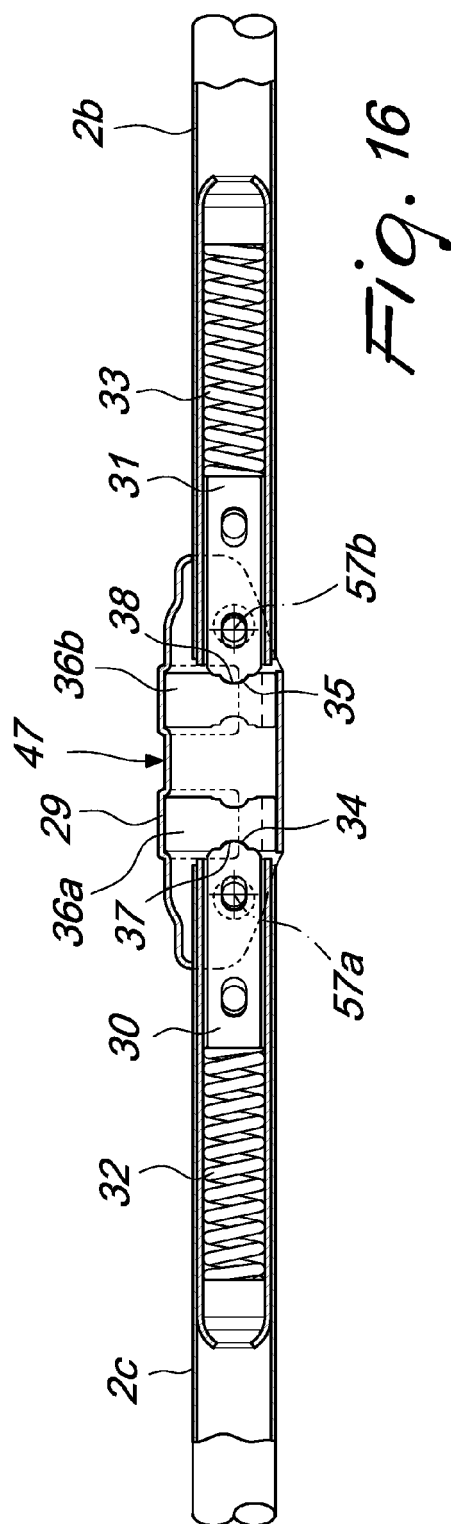
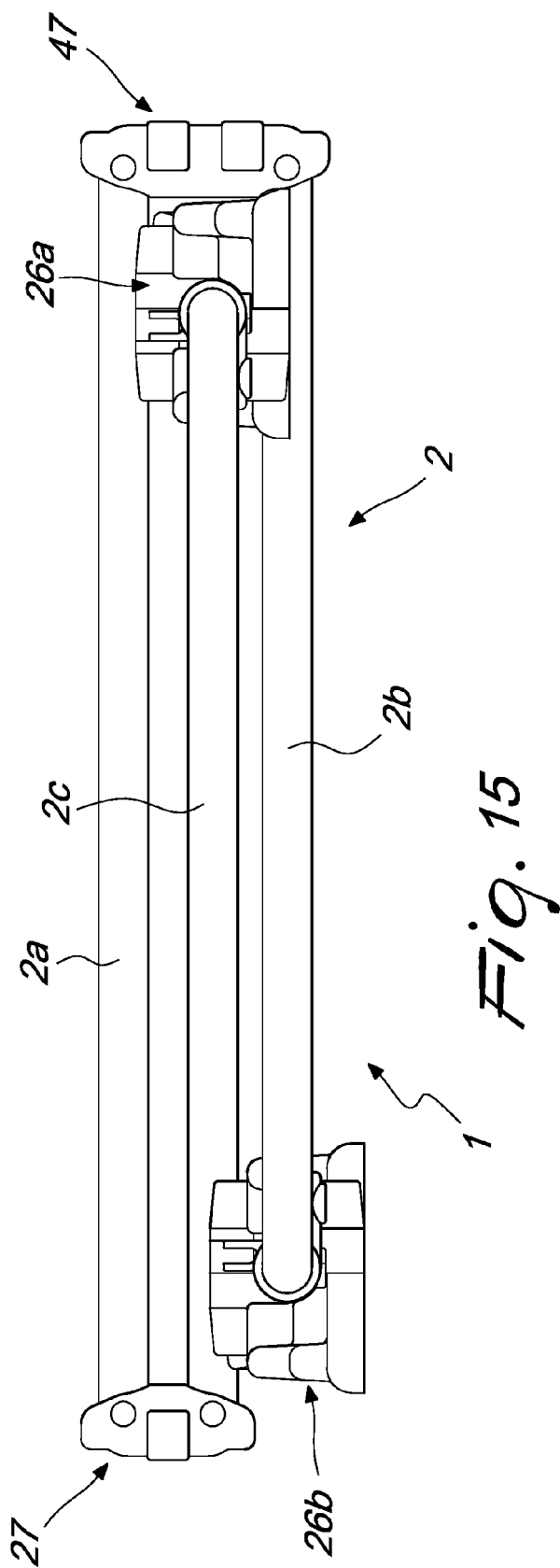


Fig. 10









EUROPEAN SEARCH REPORT

Application Number
EP 11 18 1680

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 596 776 A (HUANG LI-CHU C [TW]) 28 January 1997 (1997-01-28)	1-8,10,12	INV. A47C21/08
Y	* columns 1-4; figures 1-14 *	13,14	
Y	EP 1 852 038 A1 (WU SUNG-TSUN [TW]) 7 November 2007 (2007-11-07) * paragraphs [0010] - [0019]; figures 1-4 *	13,14	
A	US 2 763 014 A (LUGER KENNETH E) 18 September 1956 (1956-09-18) * the whole document *	1	
			TECHNICAL FIELDS SEARCHED (IPC)
			A47C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 13 December 2011	Examiner Vollering, Johannes
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

2
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 11 18 1680

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

13-12-2011

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 5596776	A	28-01-1997	NONE	
EP 1852038	A1	07-11-2007	NONE	
US 2763014	A	18-09-1956	NONE	

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- IT MI20101682 A [0054]