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(54) **Apparatus including a device for transferring a patient from a bed to the chair**

(57) A chair including a device for transferring a patient from a bed to the chair is provided with a mobile frame on which is mounted at least two segments which are pivotally connected, in particular a seat segment and a back support segment. These are at least adjustable between a seat condition in which they are angled with respect to each other and a laying condition in which they are substantially aligned. The segments are supported at one side and adjustable in height direction with respect to the frame. The chair is provided with transfer means for transferring the patient from the bed to the chair. The frame and the segments are adapted such, that the segments substantially rest on the floor in the laying condition in the lowest position of the segments so as to be able to transfer the patient from the floor to the chair by means of the transfer means.

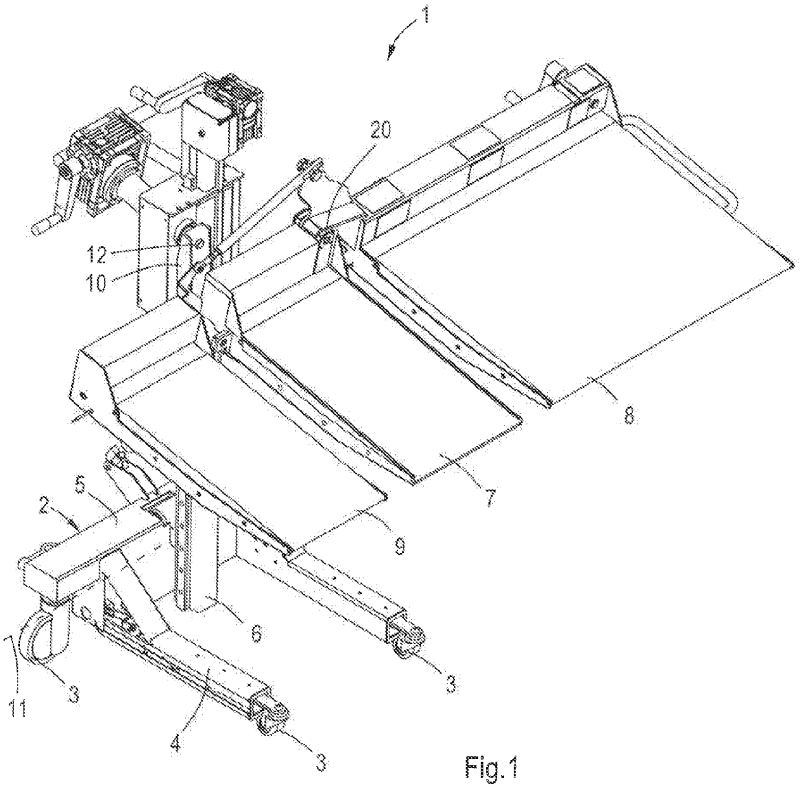

Fig.1

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Description

[0001] The present invention is related to a chair including a device for transferring a patient from a bed to the chair, comprising a mobile frame on which at least two segments are mounted which segments are pivotally connected, in particular a seat segment and a back support segment, which are at least adjustable between a seat condition in which the segments are mutually angled and a laying condition in which the segments are substantially aligned, wherein the segments are supported at one side and adjustable with respect to the frame in height direction, and wherein the chair is provided with transfer means for transferring the patient from the bed to the chair.

[0002] Such a chair is known from NL1027220. The known chair allows to transfer the patient in a laying condition from a bed to the chair and subsequently adjusting the chair to a seat condition such that the patient in the chair can be displaced in a seat condition.

[0003] An object of the invention is to provide a chair having an extended functionality.

[0004] This is achieved with the chair according to the invention, which is characterized in that the frame and the segments are adapted such, that the segments in the laying condition in their lowest position substantially rest on the floor.

[0005] The advantage of the chair according to the invention is that it provides the possibility to transfer a patient by means of the transfer means from the floor to the chair or in opposite direction. In the lowest position of the segments it is not necessary that they contact the floor, but the distance between the floor and the segments will be small, for example smaller than the diameter of wheels of the frame.

[0006] In a practical embodiment the frame is provided with a bar that is supported by a wheel, which bar is positioned with respect to the segments such that in the lowest position of the segments the bar lies at least partly next to one of the segments or between the segments. Therefore in this case the space which is present next to the segments or between the segments is used to enable the segments to be moved down as close as possible to the floor without being obstructed by a bar of the frame which is disposed below the segments.

[0007] The frame may be provided with wheels which are located at a distance from each other in transverse direction of the longitudinal axis of the segments when they are aligned and which are displaceable with respect to each other in transverse direction. This provides the possibility to enlarge the wheel base in certain situations so as to create an improved stability of the chair as a consequence of the segments that are supported at one side, for example in case of lifting up a heavy patient from a bed.

[0008] In a specific embodiment the frame is U-shaped as seen from above, including two legs which extend from a base, wherein the chair is also provided with an under leg segment which is pivotally connected to the seat segment, and wherein in the lowest position of the segments one leg is at least partly located between the seat segment and the back segment and an the other leg is at least partly located between the seat segment and the under leg segment.

[0009] In a preferred embodiment the seat segment is supported directly by the frame and rotatable the with respect to the frame about an upwardly directed axis. As a consequence, the chair can be rotated in the seat condition, such that the back segment and the seat segment can be adjusted to a direction which is the preferred direction to direct the frame to.

[0010] In practice the seat segment can be connected to an upwardly directed pillar of the frame wherein the upwardly directed axis at the seat segment is located at a distance from the pillar. This provides the possibility to locate the upwardly directed pillar, the back segment and the seat segment substantially behind each other in horizontal direction in a seat position such that a relatively narrow chair in the seat condition can be obtained. This facilitates the manoeuvrability of the chair through corridors and open doors.

[0011] Furthermore the seat segment may be connected to an upwardly directed pillar which is tiltable about a pillar tilting axis which extends parallel to the longitudinal axis of the segments when they are aligned, such that the free ends of the segments can be tilted downwardly so as to transfer a patient more easily from the bed or the floor to the chair.

[0012] In a more preferred embodiment the segments are adapted as the transfer means, hence they are provided with endless conveyor belts which are driveable in transverse direction with respect to the chair, wherein each conveyor belt is driven by driving means which engage at a location of engagement of the conveyor belt and move together with the conveyor belt under operating conditions. In principle these features are also applicable to a chair, which is not characterized in that the frame and the segments are provided such that the segments substantially rest on the floor in their lowest positions in the laying condition.

[0013] The driving means of the conveyor belts may comprise a cord, cable, chain, steel wire or tooth belt.

[0014] Preferably the driving means of the conveyor belts of the segments are connected to each other so as to synchronize the movement of the conveyor belts of the different segments.

[0015] The coefficient of friction of the side of the conveyor belt which is directed upwardly in the laying condition can be higher than the opposite side thereof. This is advantageous in that the patient can be transferred on the segments more easily, whereas a lower coefficient of friction at the inner side of the endless conveyor belt provides the opportunity to slide the conveyor belt about reverse members or guide members more easily. In principle this feature is also applicable to a chair, which is not characterized in that the frame and the segments are

adapted such that the segments substantially rest on the floor in their lowest position in the laying condition.

[0016] Each of the endless conveyor belts may be formed of an endless cloth of which the ends are connected to each other at the location of engagement by an engagement element. In this embodiment two functionalities are integrated: an engagement element to which the engaging means engage which is a connection member for coupling the ends of the conveyor belt at the same time so as to create an endless conveyor belt.

[0017] The engagement element may be provided with a reinforcement bar which extends transversely to the longitudinal direction of the conveyor belt and may connect both ends to each other by means of connecting means, preferably Velcro tape.

[0018] In a practical embodiment the conveyor belt is arranged about two reverse members and the location of engagement is located in the lower part, wherein the conveyor belt is driveable such that the location of engagement only moves to and fro between the reverse members under operating conditions. Since the location of engagement does not necessarily pass the reverse members, requirements to the shape of the conveyor belt at the location of engagement or of the engagement element are less strict.

[0019] The invention will be elucidated hereinafter by means of drawings, which show an embodiment of the invention very schematically.

Fig. 1 is a perspective view of an embodiment of the chair according to the invention, in which the laying condition is shown.

Fig. 2 is a side view of the embodiment according to Fig. 1.

Fig. 3 is a similar view as Fig. 1 of the chair, but in this case the seat condition is shown.

Fig. 4 is a side view of the embodiment according to Fig. 3.

Fig. 5 is a similar view as Fig. 1, wherein the lowest laying condition is shown.

Fig. 6 is a side view of the embodiment according to Fig. 5.

Fig. 7 is a similar view as Fig. 1, wherein the standing condition is shown.

Fig. 8 is a side view of the embodiment according to Fig. 7.

Fig. 9 is a perspective view of a conveyor belt of a segment of the embodiment of the chair according to Figs. 1-8.

Fig. 10 is a side view of the conveyor belt according to Fig. 9 on a larger scale.

Fig. 11 is a magnified view of a portion of the conveyor belt, which is indicated by XI in Fig. 10.

Fig. 12 is a very schematic perspective top view of the segments of the embodiment of the chair according to Figs. 1-8 to illustrate the driving means of the conveyor belts.

[0020] Figs. 1-8 show an embodiment of the chair 1 according to the invention. The chair 1 is intended for persons who are bedridden and who are incapable to come out of a bed by themselves. The chair 1 is used to transfer a patient from a bed to the chair 1 are in reversed direction. This functionality is described extensively in the Dutch patent NL 1027220.

[0021] The chair 1 is provided with a mobile frame 2 including four wheels 3. The frame 2 is U-shaped as seen from above including legs 4 which extend from a base 5. The legs 4 are lighter than the base 5 and are also located lower than the base 5. At each end portion of the legs 4 a wheel 3 is located at a distance from the base 5. In this embodiment the wheels 3 below the legs 4 are smaller than those below the base 5. The wheels 3 may be swivelling castors in order to facilitate the manoeuvrability of the chair 1. The legs 4 extend in transverse direction with respect to the longitudinal direction of the chair 1 in the laying condition.

[0022] The frame 2 is further provided with an upwardly directed pillar 6 which extends for the base 5 in upward direction. In the embodiment as shown three segments are mounted to the pillar 6, by which the patient can be supported. The middle segment is the seat segment 7, the neighbouring elongated segment is the back segment 8 and the segment located at the opposite side of the seat segment 7 is the under leg segment 9. Optionally a foot support segment may be present, as well, but that is not shown in this case. In the embodiment according to Figs. 1-8 only the seat segment 7 is directly supported by the upwardly directed pillar 6 and the seat segment 7 supports the other two segments 8, 9. Besides, the back segment 8 and the under leg segment 9 are pivotally connected to the seat segment 7. With respect to the seat segment 7 the back segment 8 and the under leg segment 9 are adjustable between a laying condition in which the segments are substantially aligned, as depicted in Figs. 1-2 and a seat condition in which the segments are angled with respect to each other, as depicted in Figs. 3-4.

[0023] The segments 7-9 are supported at one side, which can be seen in the side view according to Fig. 2. The segments 7-9 are supported at the side of the pillar 6 and have free ends at the opposite sides. Since the chair 1 has a laying U-shape in the laying condition as seen from a side, it is possible to ride the chair to the side of a bed and to place the segments 7-9 above or on the bed and to locate the legs 4 of the frame 2 below the bed. In this case the segments 7-9 may rest on the bed and the patient can be transferred from the bed onto the segments 7-9.

[0024] In the embodiment as shown the seat segment 7 is connected to the upwardly directed pillar 6 by means of an L-shaped arm 10. The arm 10 is adjustable in height direction along the upwardly directed pillar 6. In this embodiment the upwardly directed pillar 6 is furthermore tiltable about a pillar tilting axis 11 which extends parallel to the longitudinal axis of the segments 7-9 when these

are aligned. As a consequence the segments 7-9 can be tilted about a tilting angle X to a horizontal laying condition from an inclined condition, such as depicted in Fig. 2. In the orientation as shown in Fig. 2 a patient can be rolled from the bed onto the segments 7-9 easily, whereas it is then more comfortable and safer to tilt the segments 7-9 to a horizontal position by means of the upwardly directed pillar 6. In Fig. 4 and 8 the upwardly directed pillar 6 can be seen in the backwardly tilted position. The tilting angle X can be 0-14°, for example.

[0025] The arm 10 is tiltable about a seat tilting axis 12, such that in the seat condition a desired orientation of the seat segment 7 can be set. It is also possible to turn the seat segment 7 from the laying condition about the seat tilting axis 12, whereas the segments 7-9 remain aligned with respect to each other, see Figs. 7-8. This provides the possibility to bring the patient in a standing position. In this case it is desired to provide the chair 1 with a foot support segment (not shown).

[0026] In the embodiment as shown the seat segment 7 is rotatable with respect to the arm 10 about an upwardly directed axis 13. The upwardly directed axis 13 is located at the seat segment at a distance from the upwardly directed pillar 6. In particular it is advantageous to rotate the seat segment a quarter turn about the upwardly directed axis 13 in the seat condition of the chair 1, such that the upwardly directed pillar 6, the back segment 8, the seat segment 7 and the under leg segment 9 are located substantially behind each other in horizontal direction. This position is depicted in Fig. 3-4. This means that the chair 1 becomes relatively compact in width direction, such that the manoeuvrability through corridors and open doors becomes easier. As depicted in Fig. 3-4 the chair 1 in this condition functions as a wheelchair, wherein the small wheels 3 are located at the front side and the large wheels 3 are located at the rear side of the chair.

[0027] According to the present invention the frame 2 and the segments 7-9 are arranged such, that the segments 7-9 in their lowest position in the laying condition substantially rest on the floor. As a consequence, it becomes possible to transfer a patient from the floor to the chair 1 are in reversed direction. In the lowest position the segments 7-9 do not necessarily contact the floor, but they may also remain slightly above the floor. In the embodiment as shown this is achieved by the fact that the frame 2 is provided with the legs 4 which are supported by the wheels 3 which are positioned with respect to the segments 7-9 such that in the lowest position the legs 4 are located between the segments 7, 8 and 7, 9, see Fig. 5 and 6. In this case it is also an advantage that the upper side of the legs 4 at a distance from the base 5 are relatively low, preferably lower than the upper side of the segments 7-9 in the lowest position. The relatively small wheels 3 at the ends of the legs 4 also allow a low lowest position.

[0028] Fig. 6 shows that the free end portions of the segments 7-9 at the lower side are oblique, such that in the laying condition (on a bed or on the floor) the patient needs to bridge only a small height between the bed and the segments 7-9 or between the floor and the segments 7-9. The dimensions of the bevelled lower side correspond to the tilting angle X of the upwardly directed pillar 6, such that the bevelled lower side extends about horizontally in the tilted condition.

[0029] The legs 4 of the frame 2 of the embodiment according to Fig. 1-8 are adjustable in length direction, such that on one hand particularly in the laying condition a higher stability can be obtained, whereas on the other hand a compact chair 1 is obtained in situations in which the stability does allow this. Since in this case the legs 4 are slideable, the small wheels 3 at the end portions of the legs 4 are displaceable with respect to the large wheels 3 at the base 5 in transverse direction of the longitudinal axis of the segments 7-9 when they are aligned.

[0030] The segments 7-9 which are shown in Fig. 1-8 are each provided with an endless conveyor belt 14. In Fig. 9 and 10 the conveyor belt 14 is shown in perspective view and side view, respectively. In practice a pillow is present between the upper part and the lower part of the conveyor belt 14, but this is omitted here for clarity reasons. The conveyor belt 14 is moveable transversely with respect to the segment 7-9 in the laying condition of the chair 1. The conveyor belt 14 is guided about reverse members 15. The reverse members may be simple sliding surfaces, for example, or freely rotatable rollers. The tapered shape of the conveyor belt 14 is obtained by guiding this along a guiding element.

[0031] The conveyor belt 14 is made of an endless fabric, for example a cloth, of which the ends at a location of engagement are connected to each other by an engagement element 16. The engagement element 16 is connected with driving means formed by cords 17. Under operating conditions the cords 17 move together with the conveyor belt 14.

[0032] It can be seen in Fig. 9 and 10 that the engagement element 16 is located in the lower part of the conveyor belt 14. Under operating conditions the engagement element 16 only moves between the reverse members 15 to and fro. Therefore the thickness of the engagement element 16 is not very relevant. The engagement element 16 is provided with a reinforcement bar which extends transversely to the longitudinal direction of the conveyor belt 14 and connects both ends of the conveyor belt 14 to each other by means of Velcro tape so as to obtain the endless conveyor belt 14. The advantage of such a connection is that the conveyor belt 14 can be removed easily in case of maintenance of the chair 1. It is also possible that the engagement element 16 and the connection between ends of the conveyor belt 14 are not integrated, but the location at which the cords 17 engage the conveyor belt 14 may lie at a different location than the location at which the connection between ends of the conveyor belt 14 is created.

[0033] Fig. 12 shows a driving mechanism of the conveyor belts 14 for the segments 7-9 very schematically.

The conveyor belt 14 of each segment 7-9 is driven by a cord 17 which is guided about reverse rollers 18 and connected to the engagement element 16 at two locations. Each cord 17 of each conveyor belt 14 of the segments 7-9 runs to a central driving unit 19, where the cords 17 of the individual conveyor belts 14 can be pulled at the same time, such that the conveyor belts 14 can be moved synchronously. Fig. 12 shows the direction of movement of the cords 17 for one direction of movement of the conveyor belts 14 by means of arrows. It is also possible to apply chains, tooth belts or steel wires instead of cords 17.

[0034] Fig. 11 illustrates on a larger scale that the engagement element 16 serves as a connection member with the cords 17 on one hand and as a connection piece between the ends of a conveyor belt 14 on the other hand so as to create the endless conveyor belt 14.

[0035] The conveyor belt 14 may have a higher coefficient of friction at the side which is directed upwardly in the laying condition than at the side of the conveyor belt 14 which is located at the opposite side. This improves the engagement with a patient who must be displaced and reduces the resistance with the reverse members 15.

[0036] It can be seen in Fig. 1 that the back segment 8 can pivot with respect to the seat segment 7 about the pivoting axis 20. The pivoting axis extends transversely with respect to the longitudinal direction of the chair in the laying condition and extends above upper sides of the conveyor belts 14 in the laying condition. This has the advantage that in case of tilting upwardly of the back segment 8 the displacement of the back of a patient with respect to the seat segment 8 is minimized, such that an uncomfortable friction effect is avoided.

[0037] The invention is not limited to the embodiment as shown in the drawings and described hereinbefore which can be varied in different manners within the scope of the invention. For example, it is possible that the legs are replaced by a single bar which extends below the seat segment in the lowest condition. As shown in the drawings the adjustment of the chair takes place by means of manual force by means of swing bars, but it is also possible to apply drive motors.

Claims

1. A chair (1) including a device for transferring a patient from a bed to the chair (1), comprising a mobile frame (2) on which at least two segments (7-9) are mounted which segments are pivotally connected, in particular a seat and back support segment (7, 8), which are at least adjustable between a seat condition in which they are angled with respect to each other and a laying condition in which they are substantially aligned, wherein the segments (7-9) are supported at one side and adjustable in height direction with respect to the frame (2), and wherein the chair (1) is provided with transfer means (14) for transferring the patient from the bed to the chair (1), **characterized in that** the frame (2) and the segments (7-9) are adapted such, that the segments (7-9) in the laying condition in a lowest position thereof substantially rest on the floor so as to be able to transfer the patient by means of the transfer means (14) from the floor to the chair (1).

2. A chair (1) according to claim 1, wherein the frame (2) is provided with a bar (4) which is supported by a wheel (3), which bar (4) is positioned with respect to the segments (7-9) such that in the lowest position of the segments (7-9) the bar (4) is located at least partly next to one of the segments (7-9).

3. A chair (1) according to claim 2, wherein in the lowest position of the segments (7-9) the bar (4) is located at least partly between the segments (7-9).

4. The chair (1) according to one of the preceding claims, wherein the frame (2) is provided with wheels (3) which are located at a distance from each other in transverse direction of the longitudinal axis of the segments (7-9) when they are aligned and which are displaceable with respect to each other in transverse direction.

5. A chair (1) according to one of the preceding claims, wherein the frame is U-shaped as seen from above having two legs (4) which extend from a base (5), wherein the chair (1) is also provided with an under leg segment (9) which is pivotally connected to the seat segment (7), and wherein in the lowest position of the segments (7-9) said one leg (4) is located at least partly between the seat segment (7) and the back segment (8) and the other leg (4) is located at least partly between the seat segment (7) and the under leg segment (9).

6. A chair (1) according to one of the preceding claims, wherein the seat segment (7) is supported directly by the frame (2) and which is rotatable with respect to the frame (2) about an upwardly directed axis (13).

7. A chair (1) according to claim 6, wherein the seat segment (7) is connected to an upwardly directed pillar (6) of the frame (2) and wherein the upwardly directed axis (13) at the seat segment (7) is located at a distance from the pillar (6).

8. A chair (1) according to one of the preceding claims, wherein the seat segment (7) is connected to an upwardly directed pillar (6) which is tiltable about a pillar tilting axis (11) which extends parallel to the longitudinal axis of the segments (7-9) when they are aligned.

9. A chair (1) according to one of the preceding claims,

wherein the segments (7-9) are adapted as the transfer means and as such are provided with driveable endless conveyor belts (14) which are driveable in transverse direction of the chair (1), wherein each conveyor belt (14) is driven by driving means (17) which engage at a location of engagement (16) of the conveyor belt (14) and move together with the conveyor belt (14) under operating conditions.

10. A chair (1) according to claim 9, wherein the driving means (17) comprise a cord, cable, chain are tooth belt.

11. A chair (1) according to claim 9 or 10, wherein the driving means (17) of the conveyor belts (14) of the segments (7-9) are connected to each other so as to synchronize the conveyor belts (14).

12. A chair (1) according to one of the claims 9-11, wherein the coefficient of friction of the side of the conveyor belt (14) which is directed upwardly is higher than the opposite side thereof.

13. A chair (1) according to one of the claims 9-12, wherein each endless conveyor belt (14) is made of an endless cloth of which the ends at the location of engagement are connected to each other by an engagement element.

14. A chair (1) according to claim 13, wherein the engagement element is provided with a reinforcement bar which extends transversely to the longitudinal direction of the conveyor belt (14) and connects both ends to each other by means of connecting means, preferably Velcro tape.

15. A chair (1) according to one of the claims 9-14, wherein the conveyor belt (14) is arranged about two reverse members (15) and the location of engagement (16) is located in the lower part, wherein the conveyor belt (14) is driveable such that the location of engagement (16) only moves to and fro between the reverse members (15) under operating conditions.

16. A chair (1) including a device for transferring a patient from a bed to the chair (1), comprising a mobile frame (2) on which is mounted at least two segments (7-9) which are pivotally connected to each other, in particular a seat and back support element (7, 8), which are at least adjustable between a seat condition in which the segments are angled with respect to each other and a laying condition in which the segments are substantially aligned, wherein the segments (7-9) are supported at one side and adjustable in height direction with respect to the frame (2), and wherein the chair (1) is provided with transfer means (14) for transferring the patient from the bed to the chair (1), wherein the segments (7-9) are adapted as the transfer means hence provided with endless conveyor belts (14) which are driveable in transverse direction of the chair (1), wherein each conveyor belt (14) is driven by driving means (17) which engage at a location of engagement (16) and move together with the conveyor belt (14) under operating conditions.

17. A chair (1) including a device for transferring a patient from a bed to the chair (1), comprising a mobile frame (2) on which is mounted at least two segments (7-9) which are pivotally connected to each other, in particular a seat and back support segment (7, 8), which are at least adjustable between a seat condition in which the segments are angled with respect to each other and a laying condition in which the segments are substantially aligned, wherein the segments (7-9) are supported at one side and adjustable in height direction with respect to the frame (2), and wherein the chair (1) is provided with transfer means (14) for transferring the patient from the bed to the chair (1), wherein the segments (7-9) are adapted as the transfer means hence provided with driveable endless conveyor belts (14) extending in transverse direction of the chair (1), wherein the coefficient of friction of the side of the conveyor belt (14) which is directed upwardly in the laying condition is higher than the opposite side thereof.

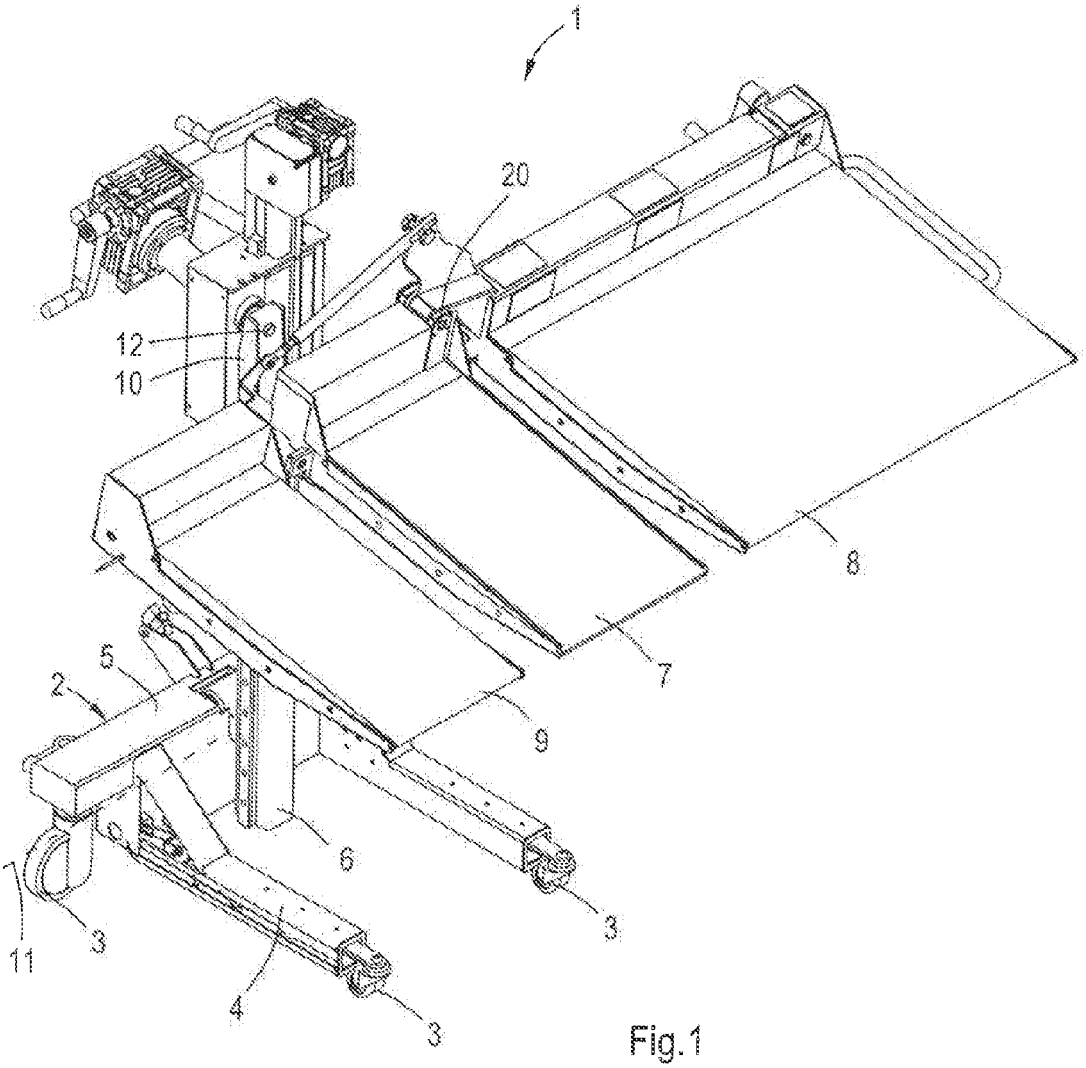

Fig.1

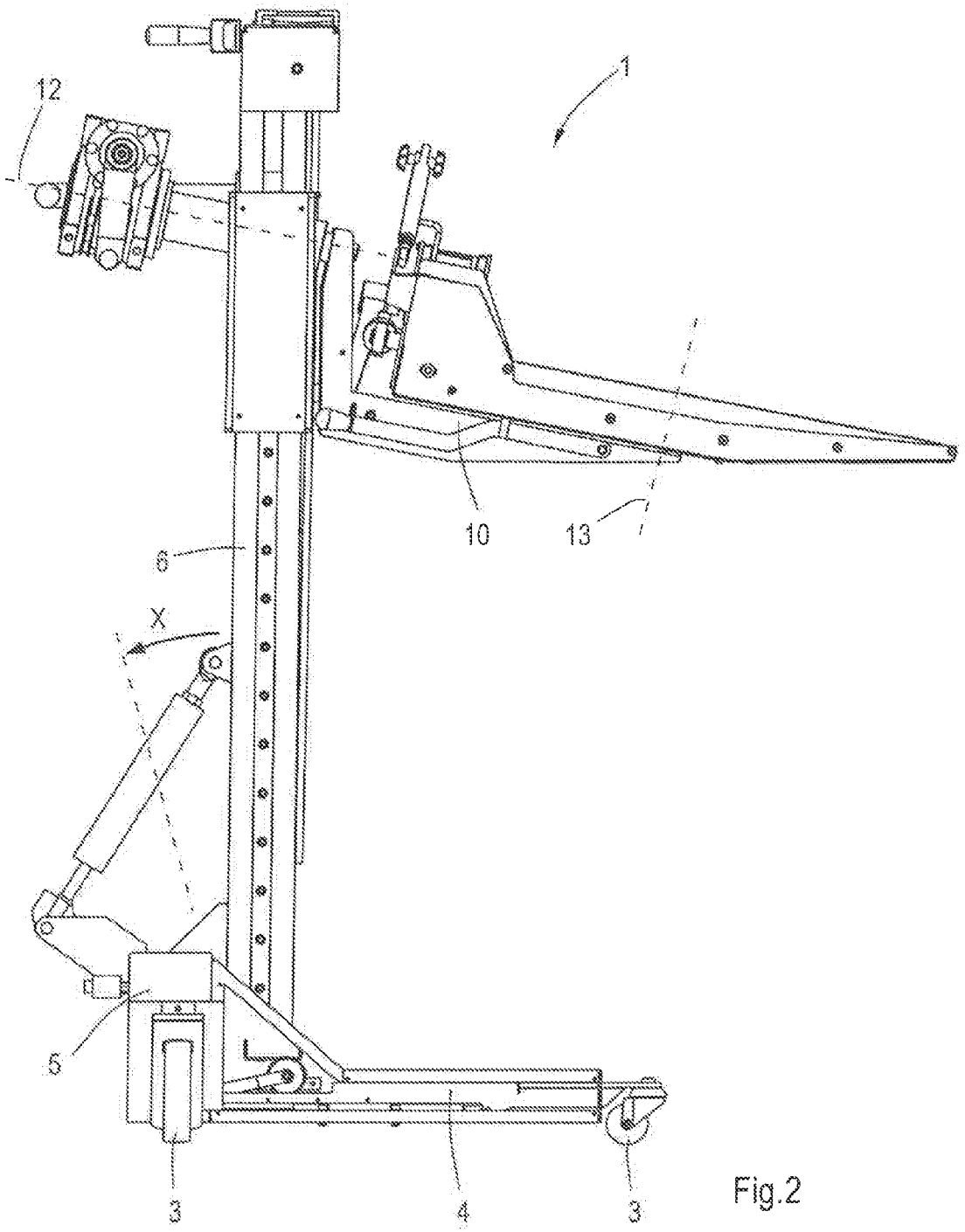

Fig.2

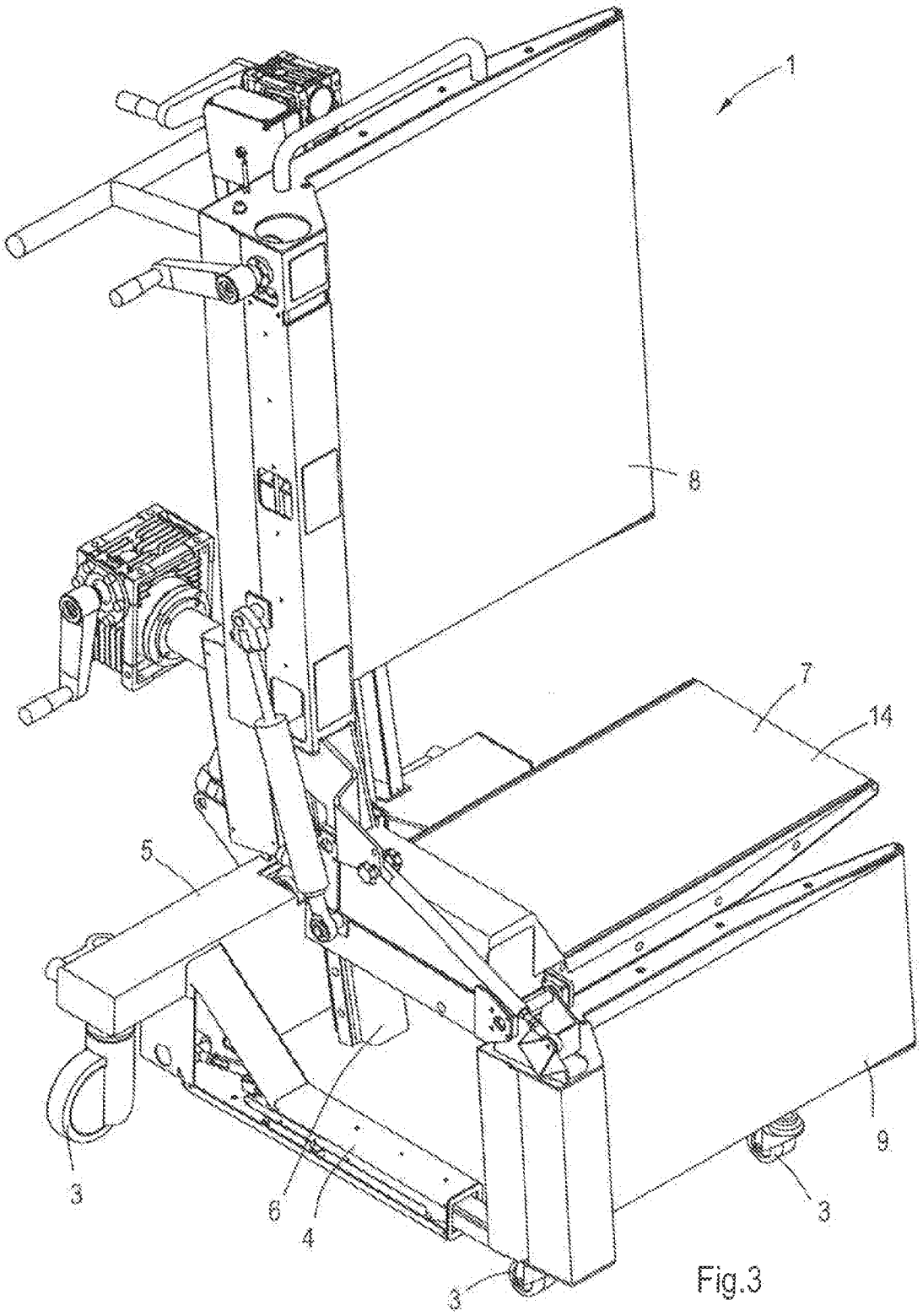

Fig.3

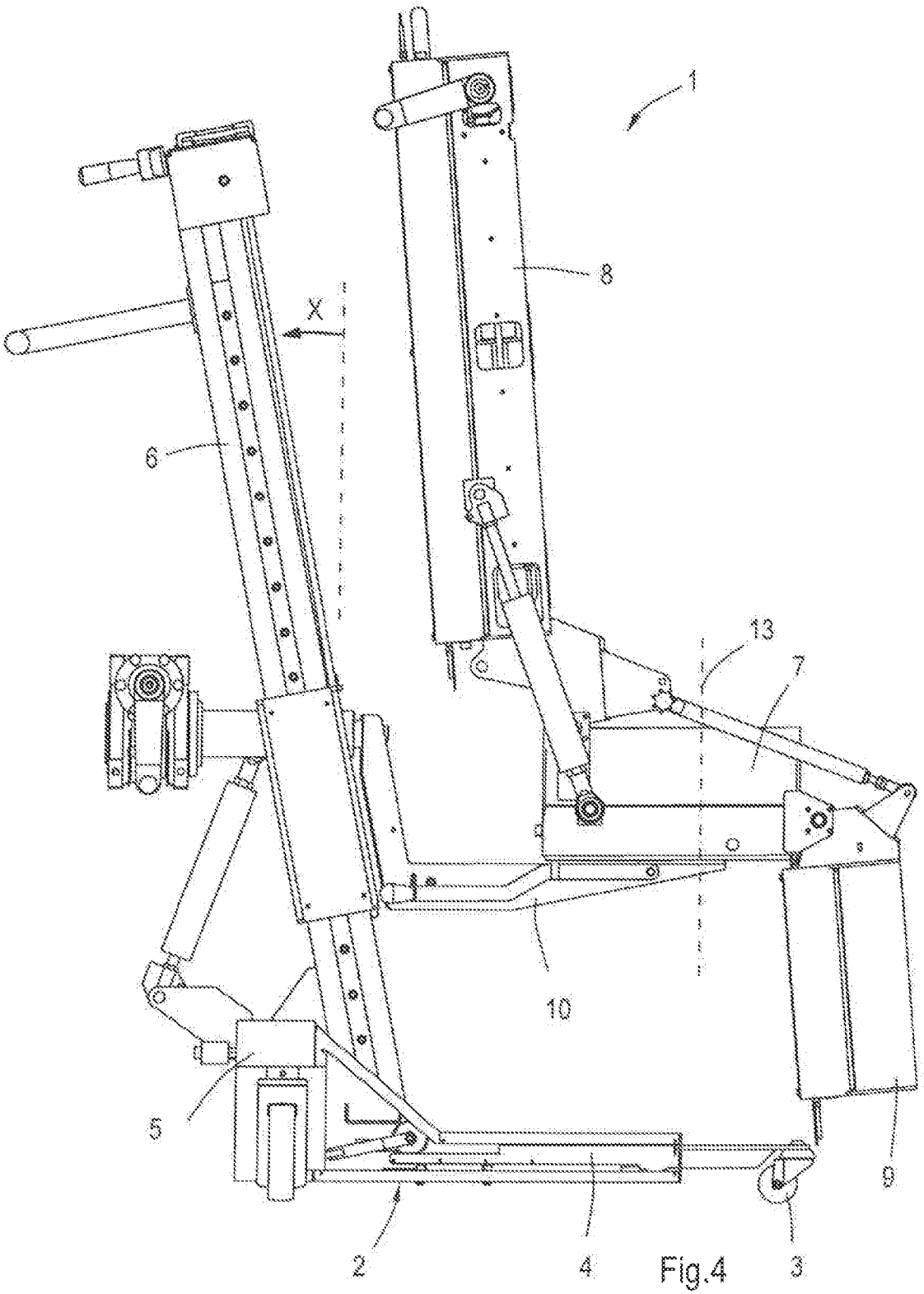

Fig.4

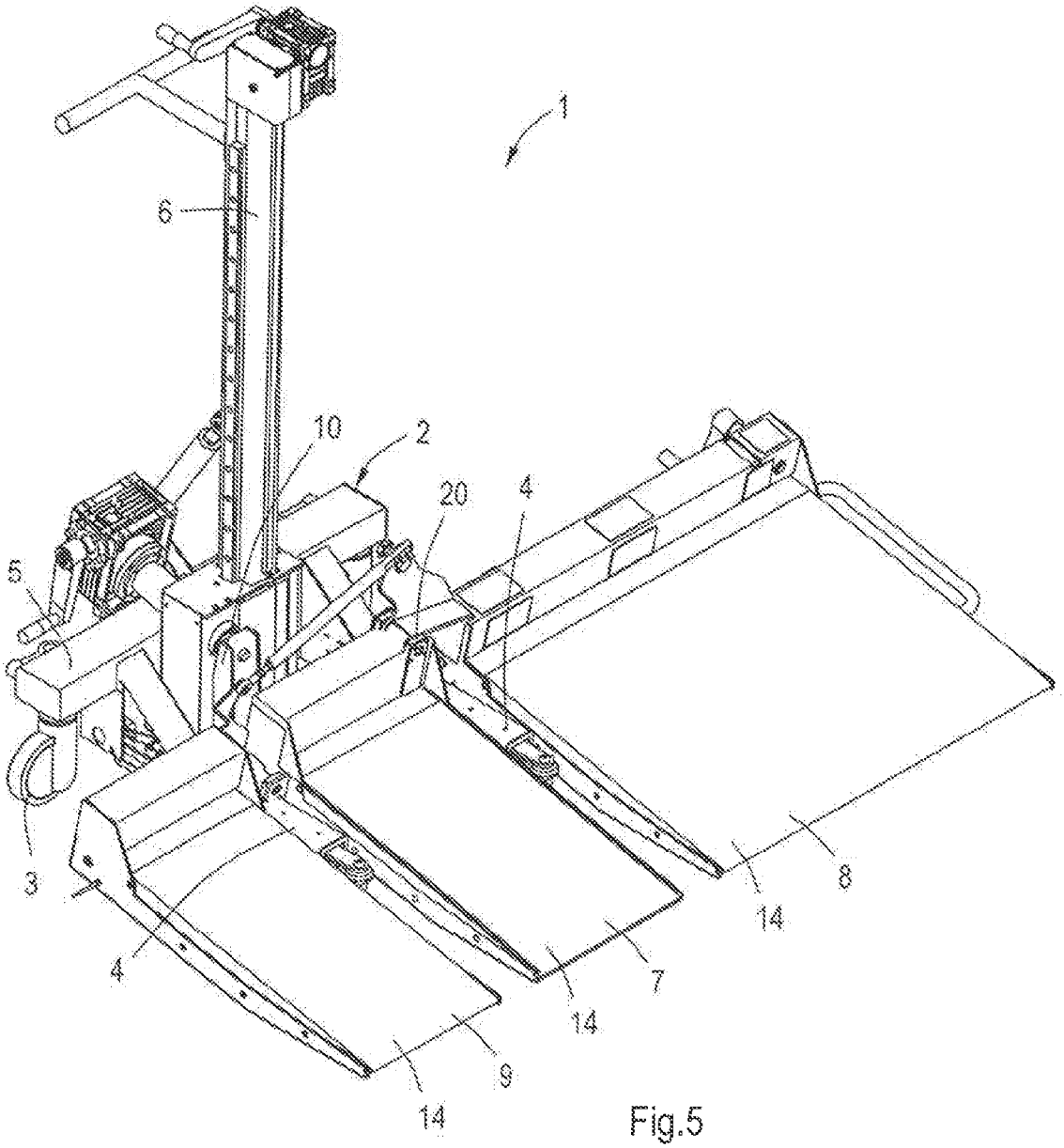

Fig.5

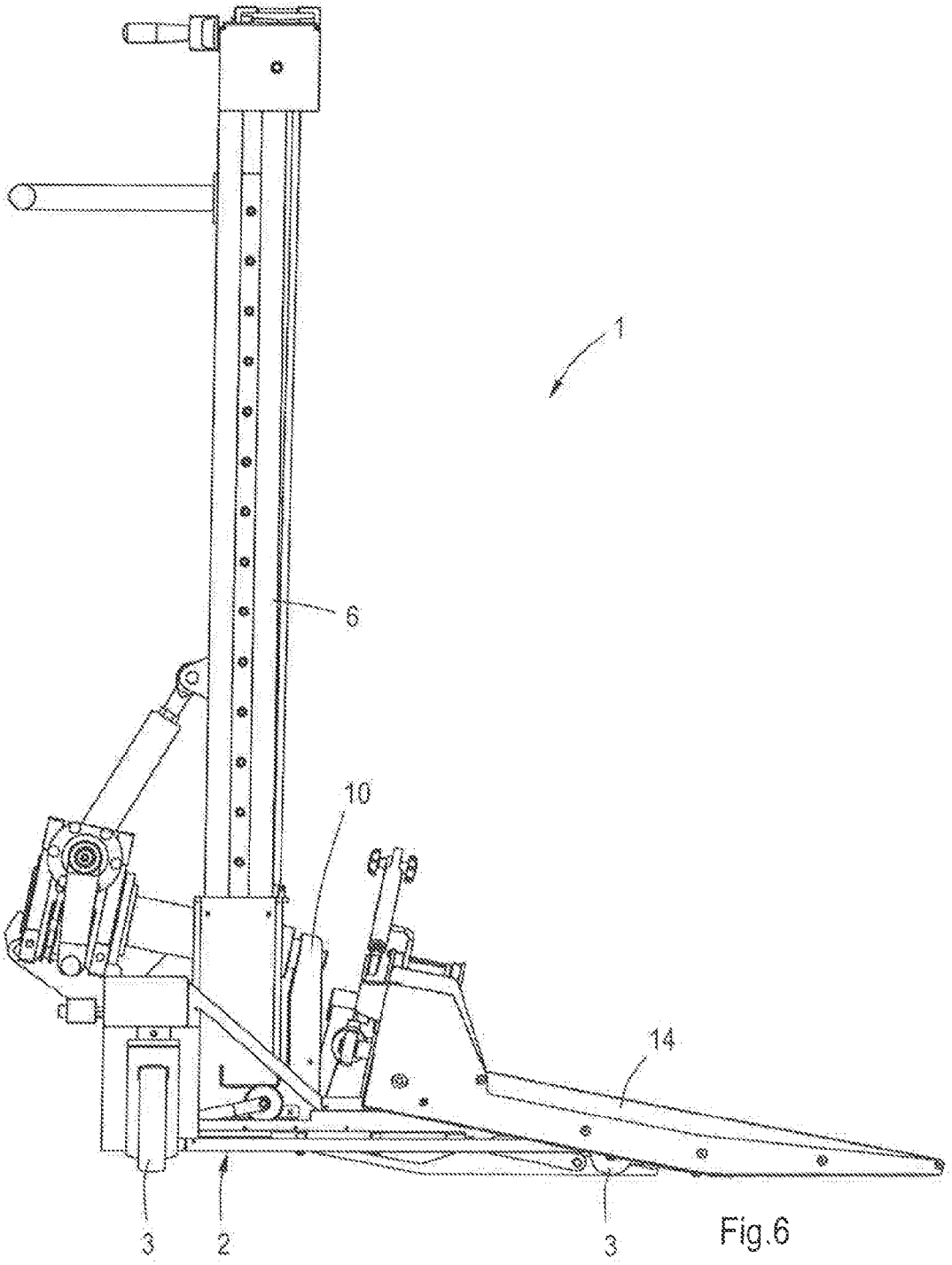

Fig.6

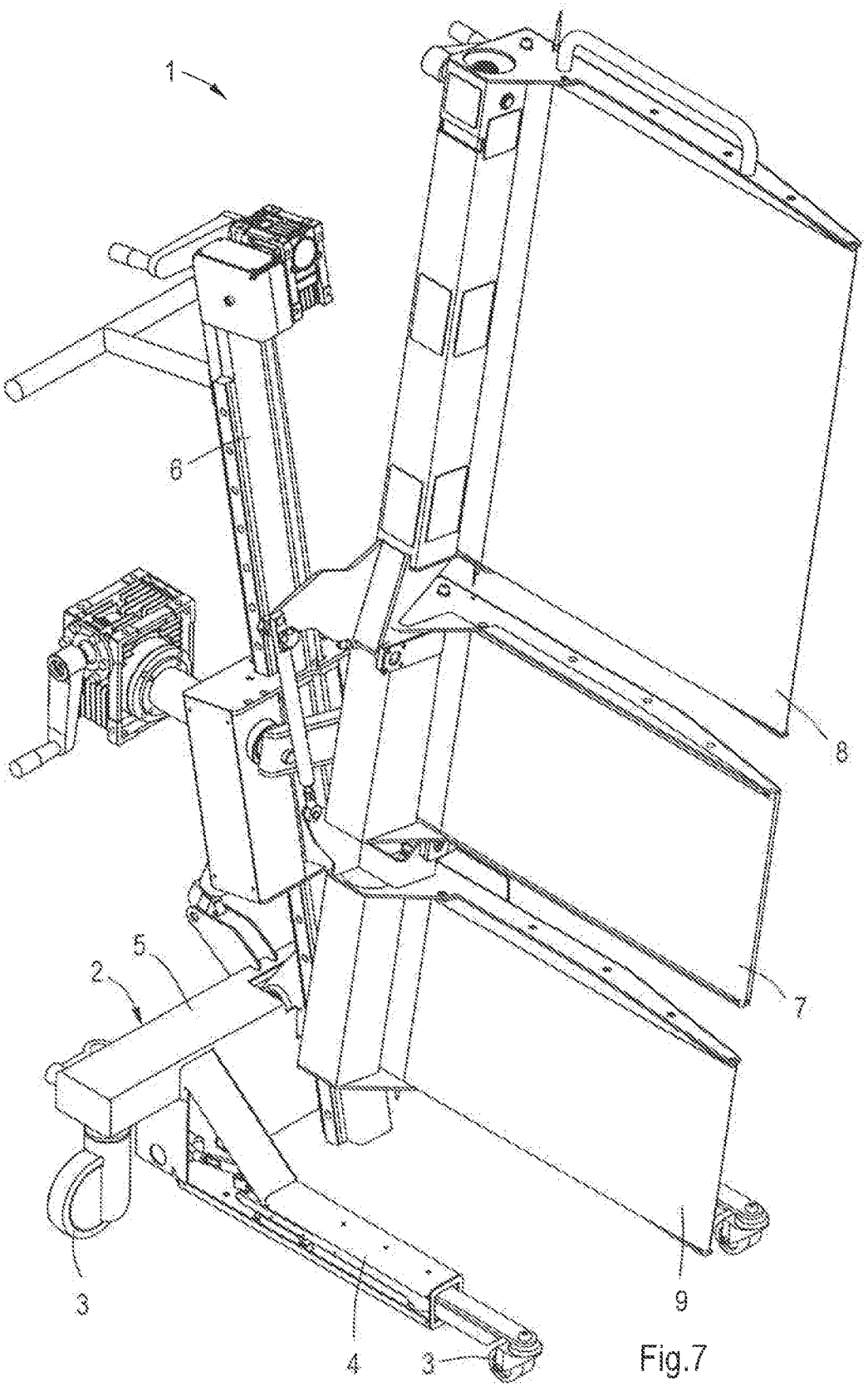

Fig.7

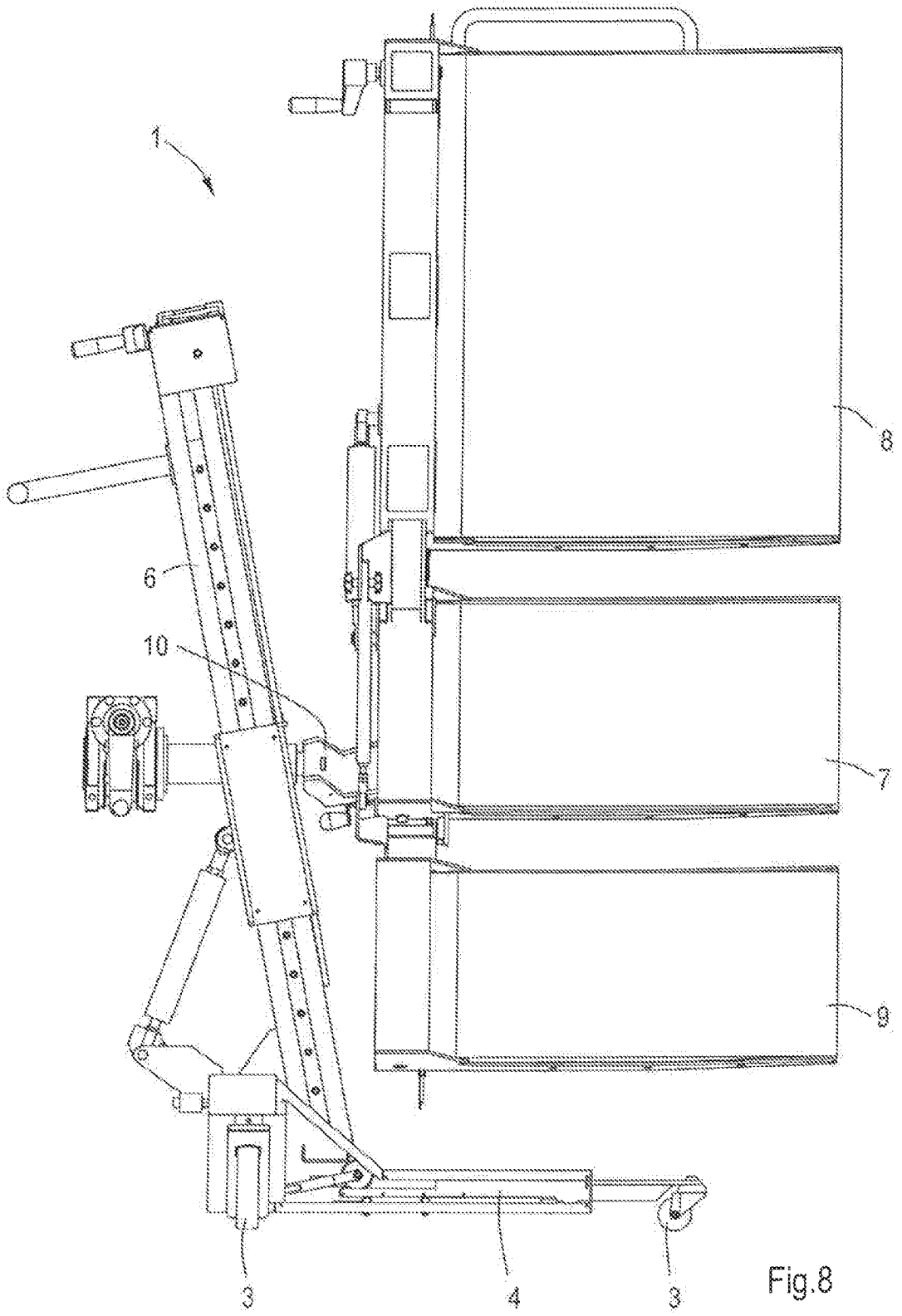

Fig.8

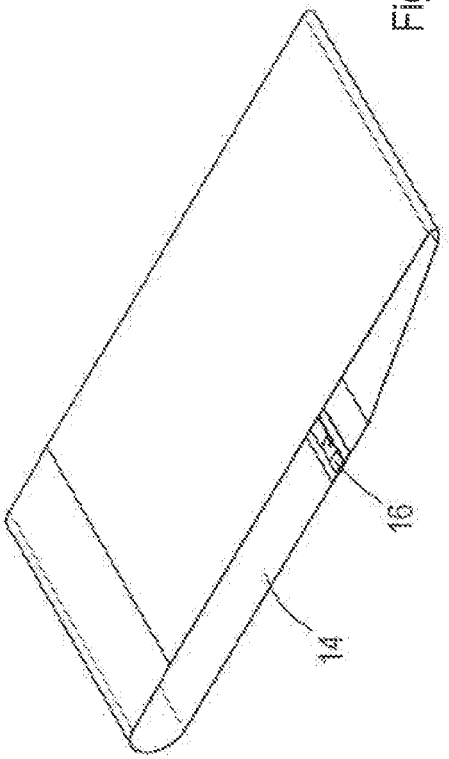

Fig.9

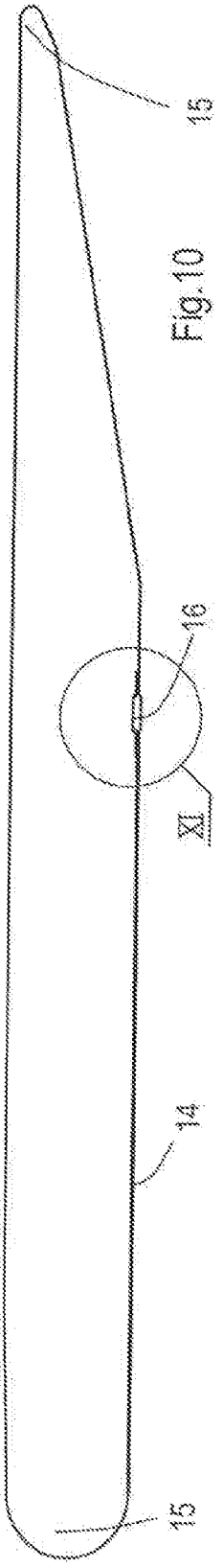

Fig.10

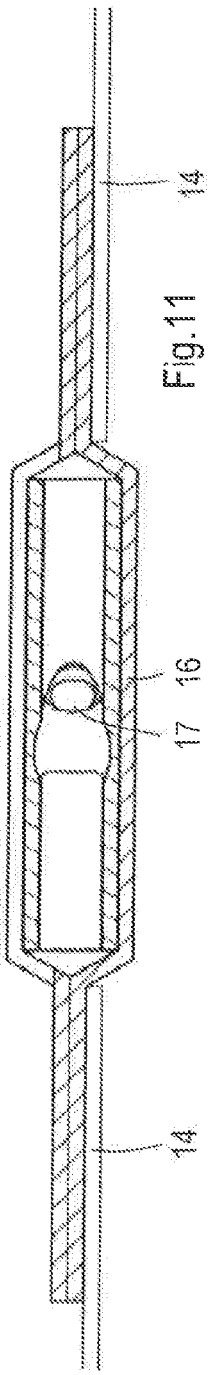

Fig.11

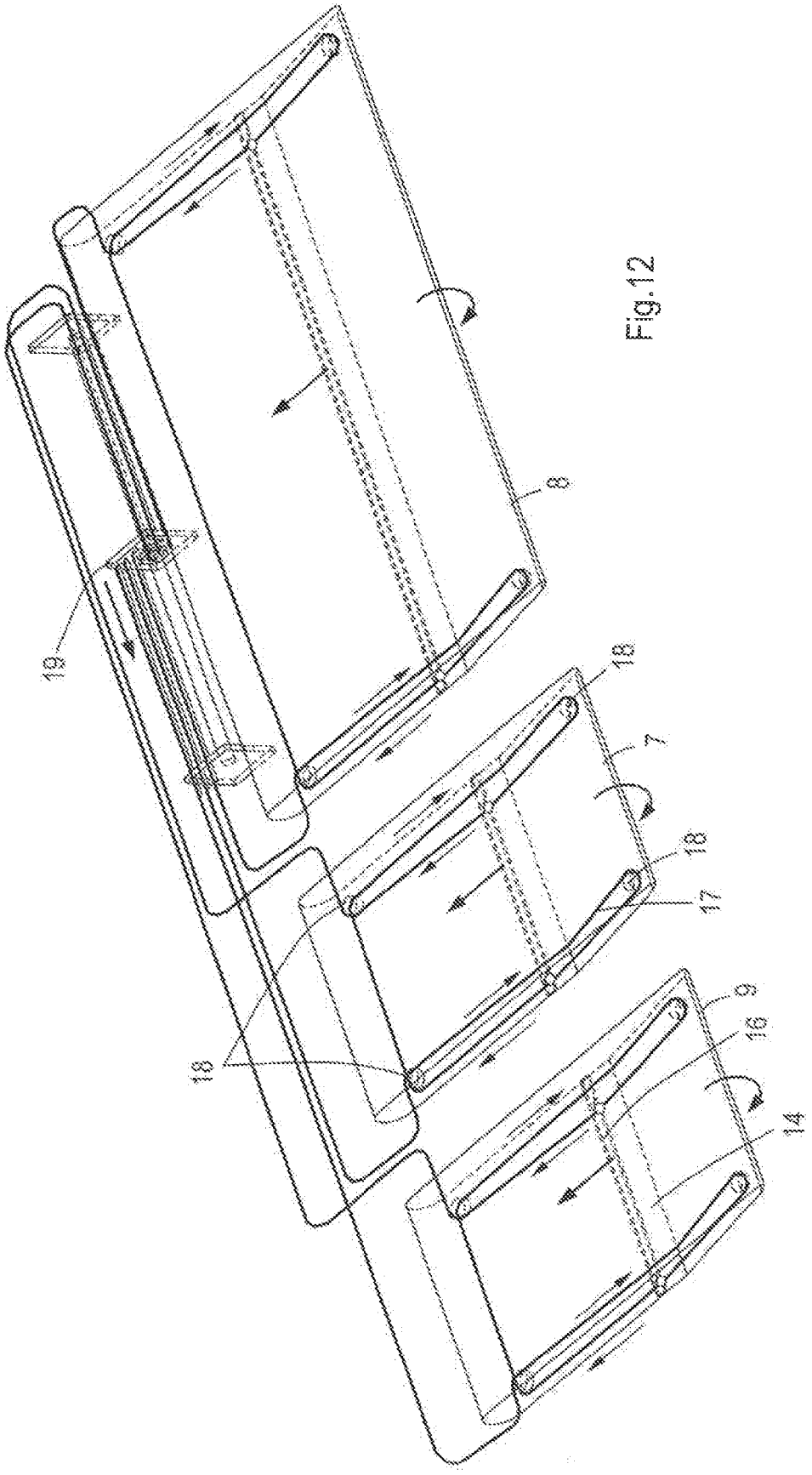

Fig.12

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EUROPEAN SEARCH REPORT

Application Number
EP 11 18 1105

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	WO 91/09585 A1 (SINPRO AB [SE]) 11 July 1991 (1991-07-11)	1,2	INV. A61G7/10
Y	* page 3, line 7 - page 8 *	9-15	A61G7/16
A	* page 2, line 13 - page 2, line 21 * * figures 1-4 *	3-8	

X	US 4 680 818 A (OOKA AKIHIRO [JP] ET AL) 21 July 1987 (1987-07-21)	16,17	
Y	* column 4, line 64 - column 5, line 30 * * figures 1-6 *	9-15	

X	US 3 967 328 A (COX ELLIS V) 6 July 1976 (1976-07-06) * column 2, line 55 - column 3, line 16 * * column 5, line 11 - column 6, line 46 * * figures 1-8 *	16	

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 December 2011	Ong, Hong Djien

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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