

(19)



(11)

EP 3 000 454 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
30.03.2016 Bulletin 2016/13

(51) Int Cl.:
A61G 7/015 (2006.01) A61G 7/16 (2006.01)

(21) Application number: **14186090.8**

(22) Date of filing: **24.09.2014**

(84) Designated Contracting States:
**AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR**
Designated Extension States:
BA ME

(72) Inventor: **Langelund, Erik**
5854 Gislev (DK)

(74) Representative: **Patentgruppen**
Aaboulevarden 31, 4
8000 Aarhus C (DK)

(71) Applicant: **Familien Langelund Holding ApS**
5854 Gislev (DK)

(54) **A bed, a method for transforming a bed into a chair and use of a bed**

(57) Disclosed is a bed (1) comprising a mattress unit (2) and displacing means (3) arranged for displacing the mattress unit (2) in a displacement direction. The bed further comprises guide means (4) for guiding the mattress unit (2) at least during the displacement and wherein

the guide means (4) are arranged for guiding the mattress unit (2) in a direction away from the displacement direction.

A method for transforming a bed (1) into a chair and use of a bed (1) is also disclosed.

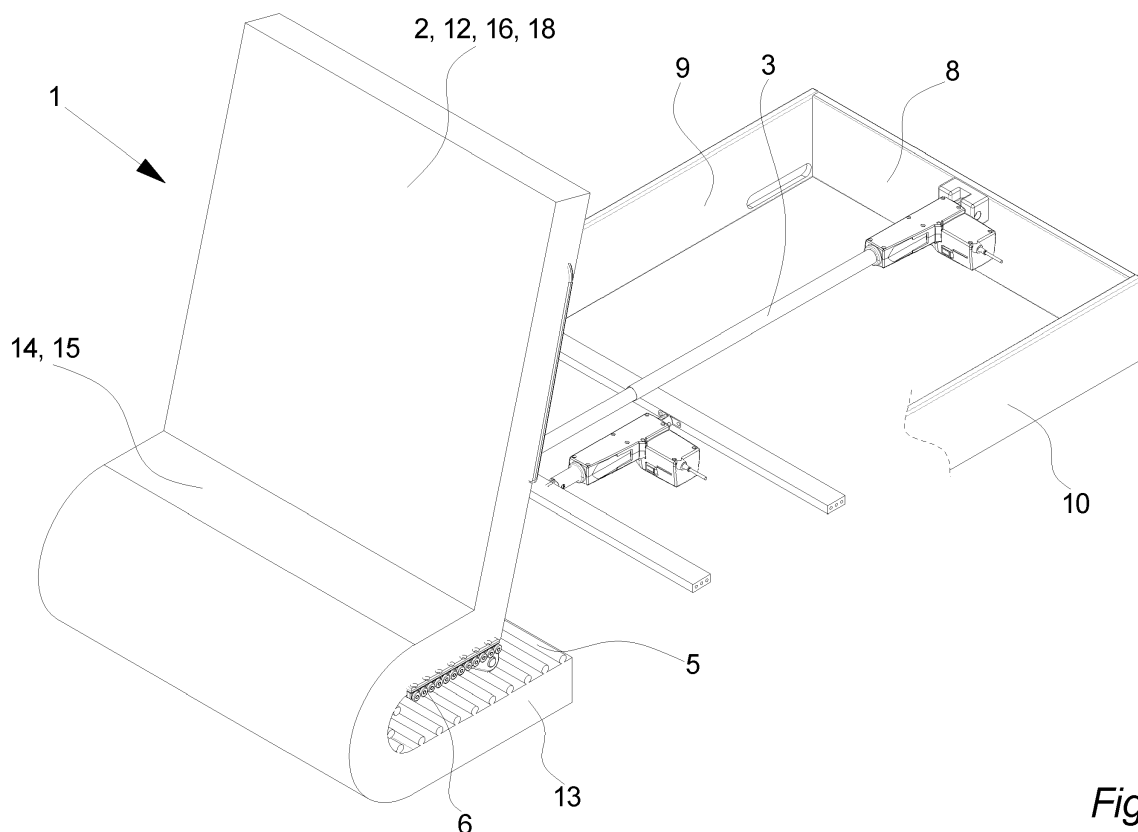


Fig. 4

EP 3 000 454 A1

Description

Field of the invention

[0001] The invention relates to a bed comprising a mattress unit and displacing means. The invention further relates to a method for transforming a bed into a chair and use of a bed.

Background of the invention

[0002] Beds comprising some sort of motorised elevation mechanism for adjusting the height of the bed have been known for several years particularly for use within hospitals, retirement homes, care homes but also in private homes e.g. to enable easier access to the bed for less mobile persons and/or to ensure a good working position for a nurse or similar.

[0003] However, often a bedbound patient is so immobile that auxiliary equipment - like mobile lifts, ceiling mounted lifts etc. - has to be used to ensure that the patient can get in and out of the bed and such equipment is costly and space consuming.

[0004] Thus, from EP 2308442 A1 it is known to provide a bed with a mechanism enabling that the bed can be transformed to a chair. But first of all this such a bed/chair would only fit a person of a given size and even if the thigh portion of the chair actually fitted the person using the bed/chair the lower leg portion will typically be so long that the person occupying the bed/chair cannot reach the floor of when the bed is formed as a chair. This is not advantageous in that these kinds of beds typically are used in relation with patients or other less mobile persons who will find the jump from the chair to the ground very inconvenient. Furthermore, the disclosed mechanism for transforming the bed into a chair is complicated and expensive.

[0005] An object of the invention is therefore to provide for an advantageous technique for transforming a bed into a chair.

The invention

[0006] The invention provides for a bed comprising a mattress unit and displacing means arranged for displacing the mattress unit in a displacement direction. The bed further comprises guide means for guiding the mattress unit at least during the displacement and wherein the guide means are arranged for guiding the mattress unit in a direction away from the displacement direction.

[0007] Providing the bed with guide means capable of guiding the mattress unit in a direction away from the displacement direction is advantageous, in that the guide means hereby can guide the foot end of the mattress unit e.g. back in under the rest of the mattress unit, enabling that the foot end or lower leg part of the mattress is not the defining factor regarding how close the seat portion can be positioned in relation to the floor. This means that

the mattress unit can either be permanently arranged in a convenient height enabling that the users feet will touch the ground when the chair is formed or (more likely) the transformation process includes lowering the mattress unit to a height enabling that the specific user can reach the floor when the chair is formed.

[0008] Furthermore, guiding the mattress unit e.g. back in under the rest of the mattress unit also enables that the seat part of the chair can be adapted to the given user, thus increasing the functionality of the bed/chair in a simple and inexpensive way.

[0009] It should be noted that by the term "*displacing means*" is to be understood any kind of displacing device capable of displacing the mattress unit in a displacement direction i.e. any kind of actuator - electrical, pneumatic or hydraulic - any kind of motor drive or any kind of manually driven mechanism.

[0010] It should be noted that by the term "*guide means*" is to be understood any kind of guide or guides suitable for guiding the mattress unit in a specific direction during the displacement - i.e. any kind of track, carriage, cart, guideway, roller arrangement or other.

[0011] In an aspect of the invention, said displacement direction is substantially parallel with the longitudinal extent of said mattress unit.

[0012] Displacing the mattress unit in the direction of the longitudinal extent of the mattress unit - i.e. the direction extending between the head end and the foot end of the mattress - is advantageous in that it enables a more simple design of the guide means.

[0013] In an aspect of the invention, said guide means are arranged for guiding said mattress unit in a direction substantially opposite said displacement direction.

[0014] Guiding the mattress unit in a direction substantially opposite the displacement direction in under the rest of the mattress unit is advantageous in that it enables a very compact design where the seat portion of the mattress unit can be brought very close to the floor - thus enabling that even children and short legged people using the bed can reach the floor when the bed is formed as a chair.

[0015] In an aspect of the invention, said mattress unit comprises slats and wherein said slats are provided with guide members of said guide means, said guide members being arranged to engage track means of said guide means and wherein said track means are arranged on a bed frame structure of said bed.

[0016] If the foot end of the mattress unit has to be guided in under the rest of the mattress unit, the position and shape of the mattress unit has to be firmly controlled. Providing the mattress unit with slats comprising guide members is advantageous in that the slats can firmly hold and shape the mattress and the guide members can be arranged to engage track means arranged on the bed frame structure of the bed - thus providing simple and efficient control of the shape and position of the mattress.

[0017] In an aspect of the invention, said guide members are rolling elements.

[0018] Using rolling elements - such as bearings - as guide members is advantageous in that rolling elements will reduce friction.

[0019] In an aspect of the invention, said bed frame structure comprises a first side section extending along a first side of said bed and a second side section extending along a second side of said bed, wherein said mattress unit is suspended between said first side section and said second side section at least partly through said guide means.

[0020] Hereby is achieved an advantageous embodiment of the invention.

[0021] In an aspect of the invention, said track means are arranged in or on said first side section and said second side section.

[0022] Suspending the mattress unit between the side sections of the bed enables that the guide means can be moved to the sides of the bed and thus not take up space underneath the bed, hereby ensuring that the mattress unit can be arranged close to the ground.

[0023] In an aspect of the invention, said bed comprises foot end elevating means arranged to elevate at least a part of said track means.

[0024] The mattress unit has to be flexible to be able to be guided away from the displacement direction so it is difficult to e.g. enable that the foot end of the bed can be raised as often required in a hospital bed. However, by providing foot end elevating means for elevating parts of the track means, simple, efficient and inexpensive means for raising the foot end is provided.

[0025] In an aspect of the invention, said displacing means comprises an electrical linear actuator including an electrical motor and a spindle drive.

[0026] Hereby is achieved an advantageous embodiment of the invention.

[0027] In an aspect of the invention, said displacing means is arranged to push at least a part of said mattress unit in said direction away from said displacement direction.

[0028] Hereby is achieved an advantageous embodiment of the invention.

[0029] In an aspect of the invention, said bed further comprises back rest means arranged to raise a head end part of said mattress unit to form a back rest of said chair.

[0030] Since this type of bed most often is used by patients or other less mobile persons it is advantageous to provide the bed with back rest means arranged to raise a head end part of the mattress unit to form a back rest of the chair.

[0031] The invention also provides for a method for transforming a bed into a chair. The method comprises the steps of:

- raising a head end part of a mattress unit of the bed to form a back rest of the chair, and
- pushing the mattress unit forward towards a foot end part of the bed while guiding the foot end part of the mattress unit downwards and in under the chair to

form a seat part of the chair of a middle part of the mattress unit.

[0032] By forming a back rest and removing the foot end of the bed by guiding it in under the rest of the mattress, the bed can very gently be transformed into a chair where the foot end of the bed will not hinder that the seat of the chair can be arranged so close to the ground that the used easily can get in and out of the bed.

[0033] In an aspect of the invention, said method further comprises lowering said mattress unit substantially vertically downwards.

[0034] If the mattress unit is permanently arranged in a height enabling that the user can touch the ground when the chair is formed, the bed will typically be so low that it is very inconvenient for caretakers and others interacting with the user. Thus, it is advantageous to arrange the bed in a suitable height and then lowering the mattress unit when transforming the bed into a chair.

[0035] In an aspect of the invention, said method is a method for transforming a bed according any of the previously mentioned beds into a chair.

[0036] Hereby is achieved an advantageous embodiment of the invention.

[0037] Furthermore, the invention provides for a bed according to any of the previously mentioned beds for bringing a person lying in said bed into a sitting position.

[0038] Using a bed according to the present invention to move a person lying in the bed into a sitting position is advantageous in that a bed according to the present invention is particularly suited for arranging a bed surface so that the seat portion of the bed is conveniently close to the ground hereby enabling that the user can more easily and gently get in and out of the bed.

Figures

[0039] The invention will be described in the following with reference to the figures in which

fig. 1 illustrates a bed according to the invention formed flat, as seen from the side,

fig. 2 illustrates a bed with the back rest raised, as seen from the side,

fig. 3 illustrates a bed transformed into a chair, as seen from the side,

fig. 4 illustrates a bed transformed into a chair, as seen in perspective, and

fig. 5 illustrates track means elevated at the foot end of the bed, as seen from the side.

Detailed description

[0040] Fig. 1 illustrates a bed 1 according to the inven-

tion formed flat, as seen from the side.

[0041] In this embodiment - and all the other embodiments disclosed in fig. 2-5 - the outer side panel of the bed frame structure 8 (and in this case also the displacing means 3) has been removed to enable free view of the inner parts of the bed 1.

[0042] In this embodiment the bed 1 is arranged so that the mattress unit 2 is substantially flat and level. I.e. in this configuration the bed 1 can be used as any other bed 1.

[0043] In this embodiment the bed 1 simply comprises a mattress unit 2 arranged on a bed frame structure 8. However, in another embodiment the illustrated bed frame structure 8 would only form a top frame of the bed. I.e. in another embodiment the bed 1 could further comprise fixed legs, runners or similar or the bed 1 could comprise a lifting mechanism enabling that the height of the bed 1 - i.e. the mattress units distance from the floor - could be adjusted. Such a lifting mechanism could comprise a scissor lift mechanism, linear actuators, motor drives, any combination thereof or other.

[0044] Fig. 2 illustrates a bed 1 with the back rest 16 raised, as seen from the side.

[0045] In this embodiment the bed 1 is provided with back rest means 11 enabling that the head end part 12 of the mattress unit 2 can be raised either to enable that the upper part of a user of the bed 1 can be raised or as part of a process of transforming the bed 1 into a chair.

[0046] In this embodiment the back rest means 11 comprises a back rest actuator 17 arranged to drive the movement of the back rest 16 in response to input from an operator. However, in another embodiment the raising and the lowering of the back rest 16 could be performed manually or be driven by other means, such as motors, hydraulic or pneumatic cylinders or other.

[0047] Fig. 3 illustrates a bed transformed into a chair, as seen from the side.

[0048] In this embodiment the displacing means 3 has been activated and the mattress unit 2 has therefore been pushed forward toward the foot end 13 of the bed 1.

[0049] In this embodiment the mattress unit 2 comprises a mattress 18 and slats 5 which at either ends are provided with guide members 6 arranged to engage track means 7 which in this case are arranged on a bed frame structure 8 of the bed 1.

[0050] In this embodiment the guide members 6 are rolling elements in the form of standard ball bearings ensuring very little friction when the guide members 6 travel in the track means 7.

[0051] However, in another embodiment the guide members 6 may comprise plain bearings, roller bearings or any other type of bearings, the guide members 6 may be formed as pins, slides, rods or any combination thereof or any other mechanical device suitable for engaging track means 7.

[0052] In this embodiment the slats 5 are connected to the underside of the mattress 18 but in another embodiment the slats 5 may be incorporated in the mattress

18 or the mattress unit 2 could be formed without slats 5 so that the guide members 6 would be connected directly to the mattress 18 or to the mattress 18 through another type of device.

[0053] In this embodiment the bed frame structure 8 comprises a first side section 9 extending along a first side of the bed 1 and a second side section 10 (see fig. 4) extending along a second side of the bed 1 and the track means 7 are arranged on these side sections 9, 10 so that when the guide members 6 engage the track means 7, the mattress unit 2 is suspended between these side sections 9, 10. However, in another embodiment the track means 7 could be supported on one or more individual structures e.g. engaging then mattress unit 2 at the middle of the mattress 18 or elsewhere.

[0054] In this embodiment the track means 7 are formed as rails connected to the side sections 9, 10 but in another embodiment the track means 7 could be a track milled into the side sections 9, 10 or into a part connected to the side sections 9, 10 or the track means 7 could comprise rods, bars or other means suitable for forming a track. In this embodiment the track means 7 are arranged and formed so that when the displacing means 3 pushes the mattress unit 2 towards the foot end 13 of the bed 1 the foot end of the mattress 18 will be forced downwards and backward in a direction opposite of the actual moving direction of the displacing means 3. In this way the foot end part 13 of the mattress unit 2 is forced back in under the rest of the mattress unit 2 so that the middle part of the mattress 18 - i.e. the part of the mattress 18 between the head end 12 and the foot end - will form a seat part 14 of the chair into which the bed 1 has now been transformed.

[0055] In this embodiment the guide means 4 are arranged to guide the mattress unit 2 in a direction substantially opposite the displacing direction of the displacing means 3. However, in another embodiment the guide means 4 could be arranged to guide the mattress unit 2 in another direction away from the displacement direction i.e. in an angle 45° downwards and forwards, in an angle 90° downwards, in an angle 45° incline backwards and downward, the guide means 4 could be arranged to guide the mattress unit 2 in any other angle downwards - either forwards or more likely backwards - either in a substantially straight line or along a more or less complex curve or any combination thereof. Or the guide means 6 could be arranged to roll the mattress unit 2 into at least part of a coil.

[0056] In this embodiment the length of the seat part 14 can be adjusted to the length of the thighs of a specific user by simply adjusting the stroke of the displacing means 2 i.e. e.g. by stopping the extension of the displacing means 3 before the displacing means 3 reaches its limit switch.

[0057] Fig. 4 illustrates a bed 1 transformed into a chair, as seen in perspective.

[0058] In this embodiment the displacing means 3 is a single electrical linear actuator comprising an electrical

motor and a spindle drive but in another embodiment of the invention the displacing means 3 could be motors, hydraulic or pneumatic cylinders or the motor driving the linear actuator could be powered by other means that electricity. Or the displacing means 3 could comprise a winch, a handwheel, a winding gear or similar mechanisms designed for manual operation.

[0059] In this embodiment the displacing means 3 are arranged to push the mattress unit 2 towards the foot end 13 of the bed 1 but in another embodiment the displacing means 3 could be arranged to draw the mattress unit 3 in the direction of the foot end 13 of the bed 1.

[0060] In this embodiment the back rest 16 is fully raised before the displacing means 3 is activated to push the mattress unit 2 forward but in another embodiment the back rest 16 could be raised while the displacing means 3 is pushing the mattress unit 2 forward or the back rest 16 could be raised after the displacing means 3 has pushed the mattress unit 2 forward.

[0061] In this embodiment of the invention the bed 1 would start out with the mattress unit 2 formed flat as disclosed in fig. 1 i.e. with the back rest 16 in bottom position and the displacing means 3 fully contracted. However, as indicated above in another embodiment the bed-to-chair transformation could start with the back rest 16 in a partly or fully elevated state.

[0062] The person laying in the bed 1 or an external operator would then operate a control panel (not shown) to activate the back rest means 11 and/or the displacing means 3 so that the head end 12 of the mattress unit 2 would be raised and so that the displacing means 2 would start forcing the mattress unit 2 in the direction of the foot end 13 to enable that the guide means 6 would guide the foot end part 13 of the mattress unit 2 in under the seat part 14 and e.g. the back rest 16 of the mattress unit 2 to form a chair. While, before or after this happens the distance from the upper side 15 of the seat part 14 to the ground can e.g. also be adjusted by mechanically or manually adjusting the height of the bed/chair.

[0063] However, in another embodiment the flat bed 1 could also be transformed into the chair-like device through at least partly manual operation, through semi-manual operation or through a fully automated process.

[0064] To transform the chair back into the bed configuration the above process is more or less reversed.

[0065] Fig. 5 illustrates track means 7 elevated at the foot end 13 of the bed 1, as seen from the side.

[0066] In this embodiment the bed 1 is further provided with foot end elevating means 19 enabling that at least a part of the foot end 13 of the bed 1 can be elevated independently from the rest of the bed 1. In this embodiment the foot end elevating means 19 comprises parts of the track means 7 and a foot end actuator 20 arranged so that when the foot end actuator 20 is activated, it will lift an upper part of the track means 7 upwards while holding the (now) elevated foot end 13 of the mattress 18 substantially parallel with the head end part 12 of the mattress 18. However, in another embodiment the foot

end elevating means 19 could be arranged to elevate the foot end 13 of the bed 1 upwards in another angle.

[0067] Since the far end of the elevated track means 7 will be left open when the foot end elevating means 19 are elevated the bed 1 could be provided with some kind of blocking means (not shown) - either mechanical or electronically - preventing that the displacing means 3 can be operated forward - or at all - while the foot end 13 is elevated.

[0068] It should also be noted that in all illustrated embodiments the bed 1 is provided with only one actuator as displacing means 3, one back rest actuator 17 and one foot end actuator 20 but in another embodiment one or more of these functions could be actuated by means of two, three or more actuators that could be coupled in parallel and/or in series.

[0069] The invention has been exemplified above with reference to specific examples of beds 1, displacing means 3, guide means 4 and other. However, it should be understood that the invention is not limited to the particular examples described above but may be designed and altered in a multitude of varieties within the scope of the invention as specified in the claims.

List

[0070]

1. Bed
2. Mattress unit
3. Displacing means
4. Guide means
5. Slat
6. Guide member
7. Track means
8. Bed frame structure
9. First side section
10. Second side section
11. Back rest means
12. Head end part of mattress unit
13. Foot end part of said mattress unit
14. Seat part of said mattress unit
15. Upper side of seat part
16. Back rest
17. Back rest actuator
18. Mattress
19. Foot end elevating means
20. Foot end actuator

Claims

1. A bed (1) comprising a mattress unit (2), displacing means (3) arranged for displacing said mattress unit (2) in a displacement direction, wherein said bed (1) further comprises guide means (4) for guiding said mattress unit (2) at least during

said displacement and wherein said guide means (4) are arranged for guiding said mattress unit (2) in a direction away from said displacement direction.

2. A bed (1) according to claim 1, wherein said displacement direction is substantially parallel with the longitudinal extent of said mattress unit (2). 5
3. A bed (1) according to claim 1 or 2, wherein said guide means (4) are arranged for guiding said mattress unit (2) in a direction substantially opposite said displacement direction. 10
4. A bed (1) according to any of the preceding claims, wherein said mattress unit (2) comprises slats (5) and wherein said slats (5) are provided with guide members (6) of said guide means (4), said guide members (6) being arranged to engage track means (7) of said guide means (4) and wherein said track means (7) are arranged on a bed frame structure (8) of said bed (1). 15 20
5. A bed (1) according to claim 4, wherein said guide members (6) are rolling elements. 25
6. A bed (1) according to claim 4 or 5, wherein said bed frame structure (8) comprises a first side section (9) extending along a first side of said bed (1) and a second side section (10) extending along a second side of said bed (1), wherein said mattress unit (2) is suspended between said first side section (9) and said second side section (10) at least partly through said guide means (4). 30
7. A bed (1) according to claim 6, wherein said track means (7) are arranged in or on said first side section (9) and said second side section (10). 35
8. A bed (1) according to any claims 4-7, wherein said bed (1) comprises foot end elevating means (19) arranged to elevate at least a part of said track means (7). 40
9. A bed (1) according to any of the preceding claims, wherein said displacing means (3) comprises an electrical linear actuator including an electrical motor and a spindle drive. 45
10. A bed (1) according to any of the preceding claims, wherein said displacing means (3) is arranged to push at least a part of said mattress unit (2) in said direction away from said displacement direction. 50
11. A bed (1) according to any of the preceding claims, wherein said bed (1) further comprises back rest means (11) arranged to raise a head end part (12) of said mattress unit (2) to form a back rest (16) of said chair. 55

12. A method for transforming a bed (1) into a chair, said method comprises the steps of:

- raising a head end part (12) of a mattress unit (2) of said bed (1) to form a back rest (16) of said chair, and
- pushing said mattress unit (2) forward towards a foot end part (13) of said bed (1) while guiding the foot end part (13) of said mattress unit (2) downwards and in under said chair to form a seat part (14) of said chair of a middle part of said mattress unit (2).

13. A method according to claim 12, wherein said method further comprises lowering said mattress unit (2) substantially vertically downwards.

14. A method according to claim 12 or 13, wherein said method is a method for transforming a bed (1) according to any of claims 1-11 into a chair.

15. Use of a bed (1) according to any of claims 1-11 for bringing a person lying in said bed (1) into a sitting position.

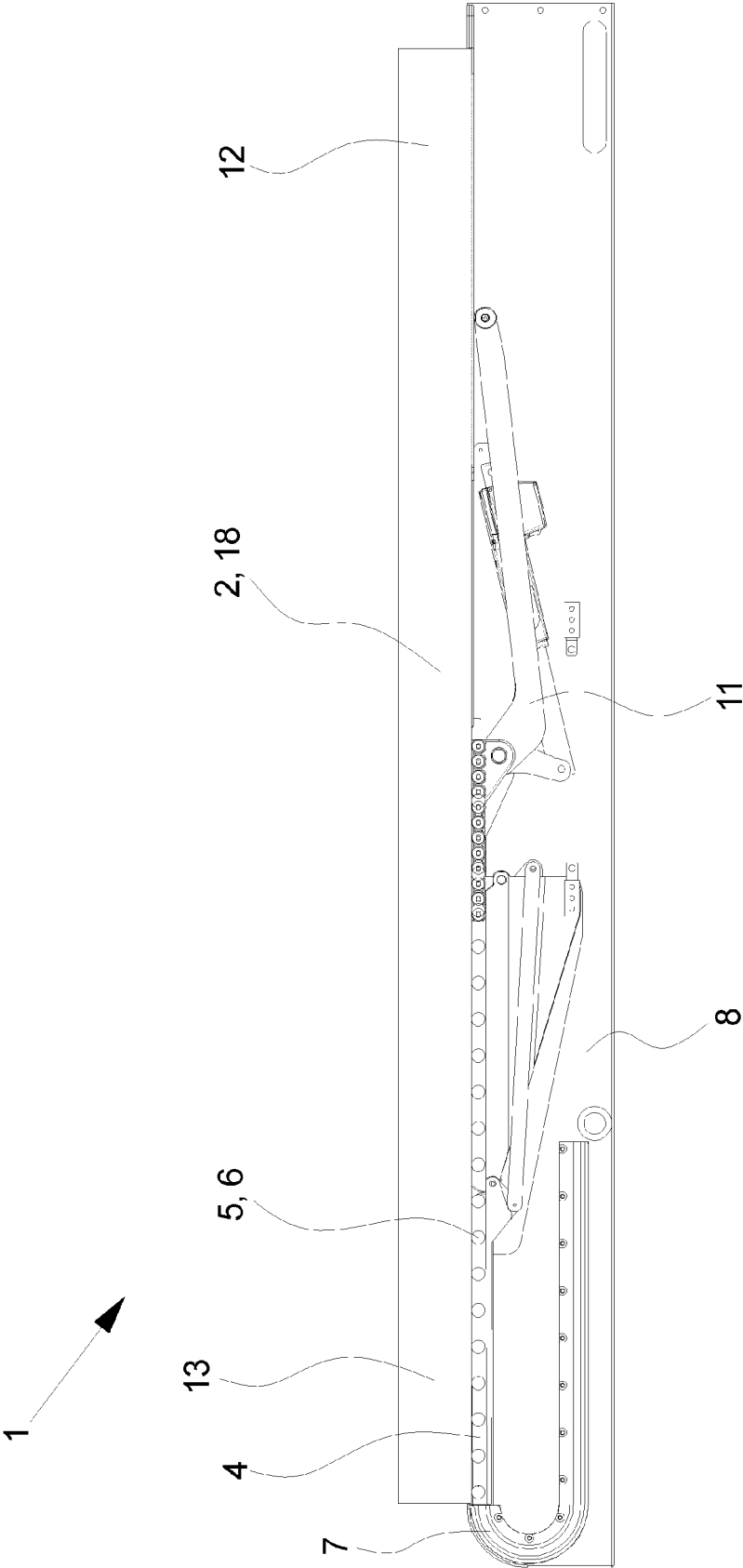
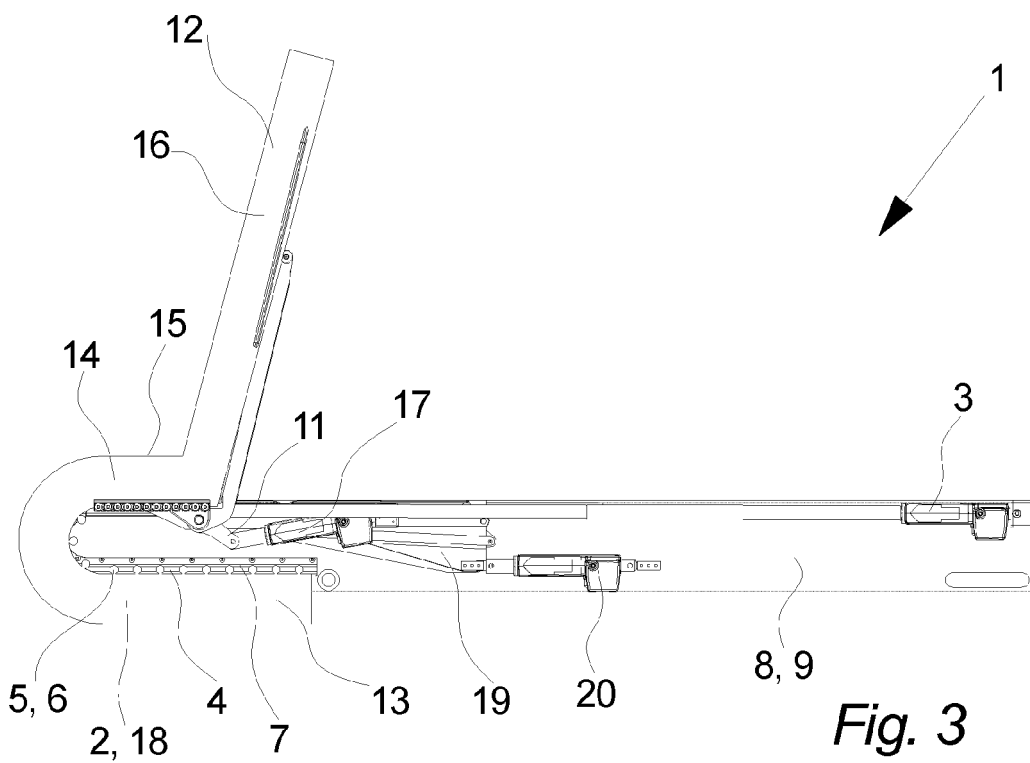
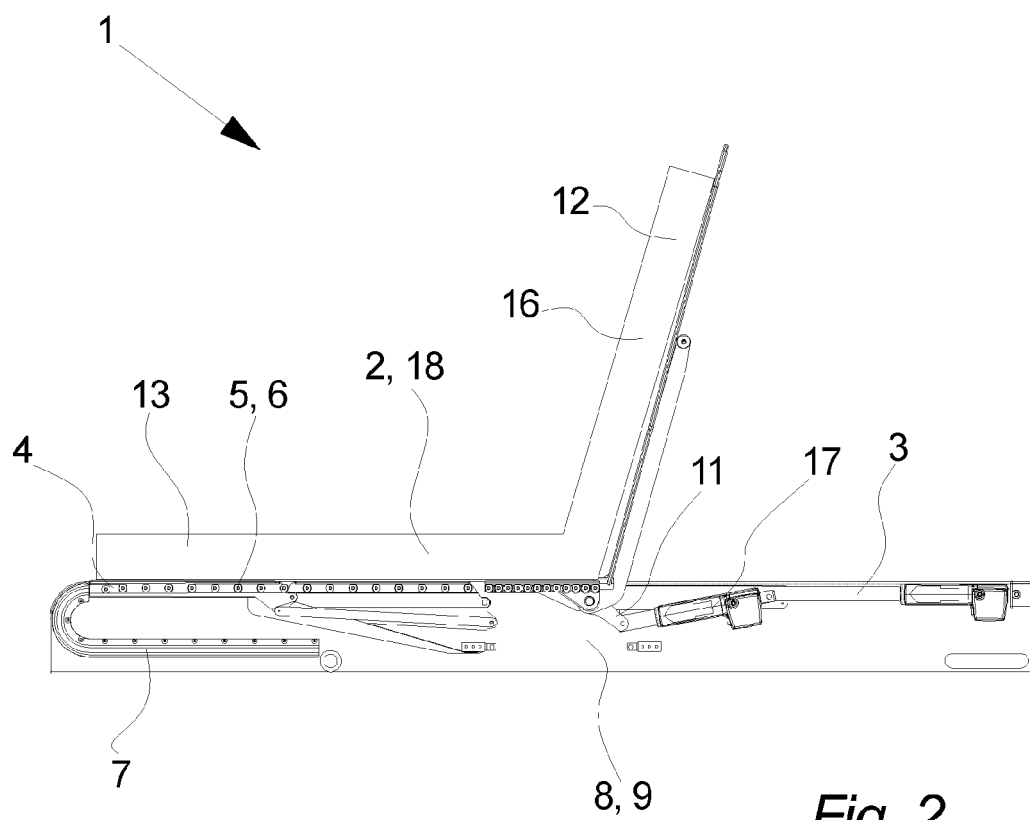


Fig. 1



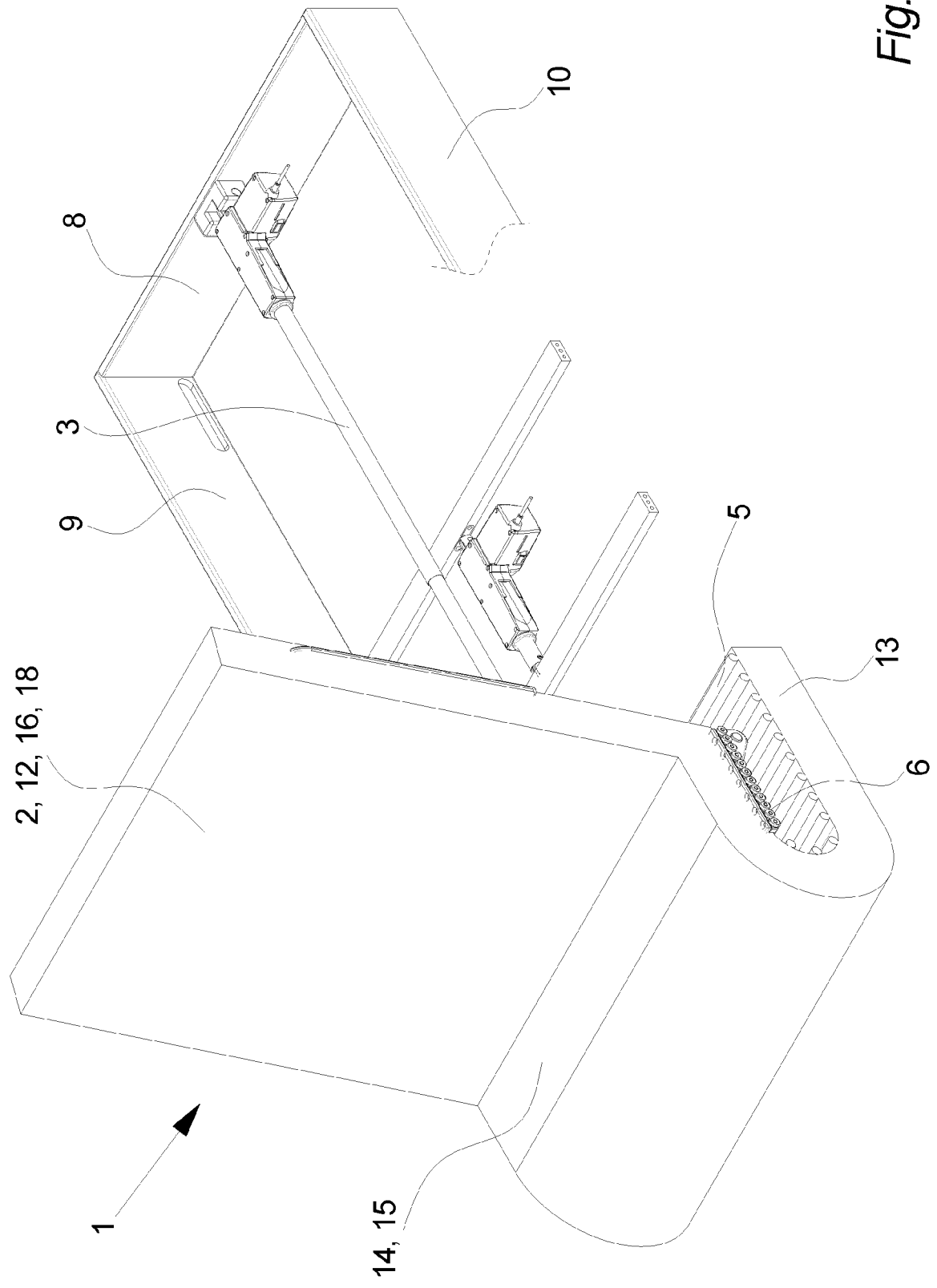


Fig. 4

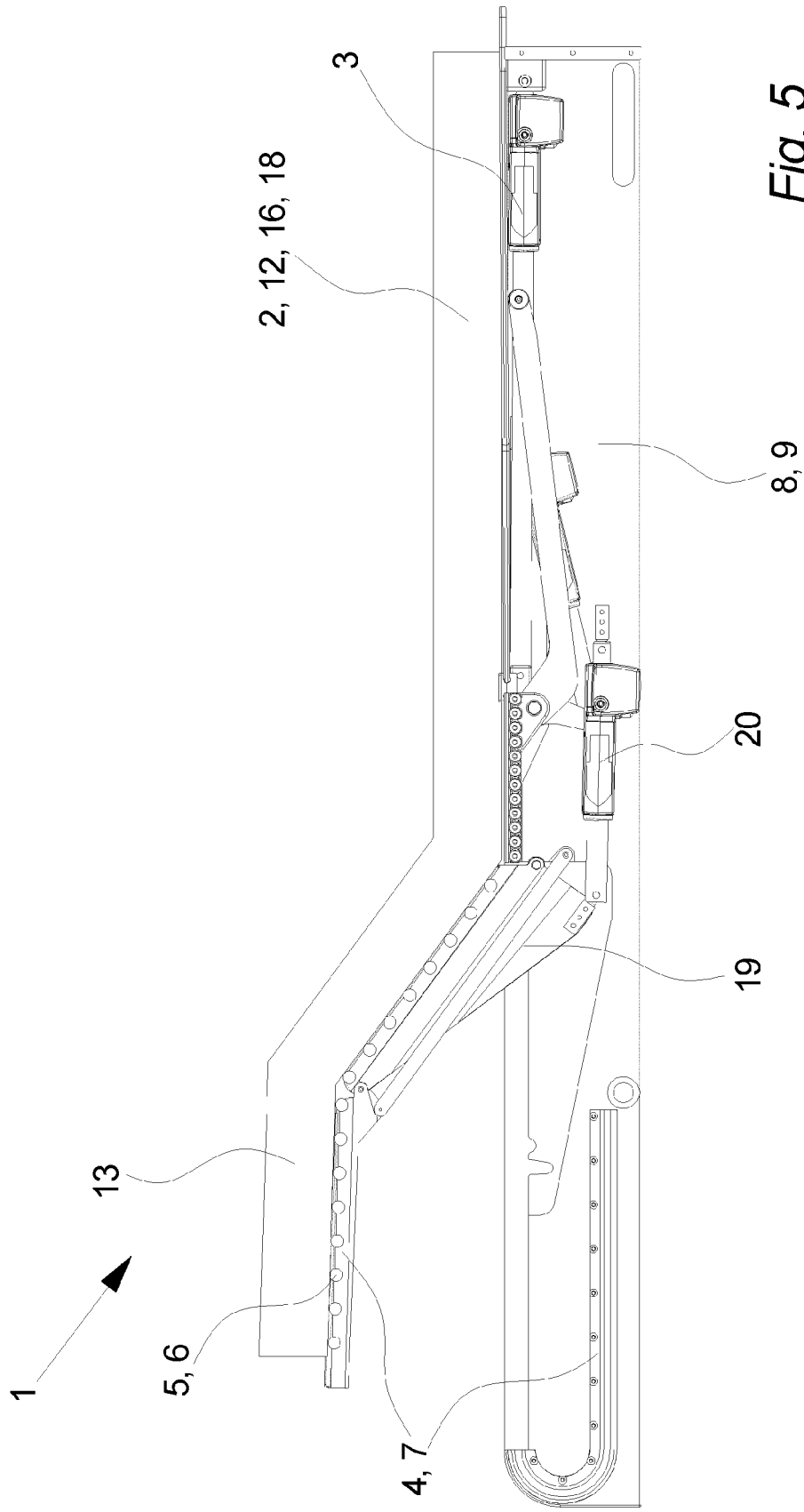


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 14 18 6090

5

10

15

20

25

30

35

40

45

50

55

1

EPO FORM 1503 03.82 (P04C01)

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 2005/027813 A1 (LEKSVIK ENGINEERING AS [NO]; MALMIN ANDREAS [NO]) 31 March 2005 (2005-03-31) * page 4, line 24; figures 1, 3-7 * * page 5, lines 1-6, 23-25, 32 - page 6, line 2 * * page 7, line 4 - line 6 * -----	1,2,4-15	INV. A61G7/015 A61G7/16
X	US 8 640 286 B1 (HOCHMAN LEON [US] ET AL) 4 February 2014 (2014-02-04) * column 3, line 39 - line 65; figures 1, 3, 9-12 * * column 4, lines 19, 43-59 * * column 6, line 24 - line 27 * -----	1-7,9-15	
X	EP 0 178 951 A2 (GRANTHAM FREDERICK W) 23 April 1986 (1986-04-23) * page 5, line 35 - page 6, line 10; figures 1-7 * * page 6, line 30 - page 7, line 2 * * page 9, line 24 - line 33 * -----	1-4,6-8, 10-15	
X	JP H03 212211 A (PARAMOUNT BED KK) 17 September 1991 (1991-09-17) * the whole document * -----	1-3,9,11	TECHNICAL FIELDS SEARCHED (IPC) A61G A47C
X	US 5 920 928 A (PIRETTI GIANCARLO [IT]) 13 July 1999 (1999-07-13) * the whole document * -----	1-7	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 24 March 2015	Examiner Koszewski, Adam
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			

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

EP 14 18 6090

5 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.

24-03-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2005027813 A1	31-03-2005	AU 2003268798 A1	11-04-2005
		WO 2005027813 A1	31-03-2005
US 8640286 B1	04-02-2014	US 8640286 B1	04-02-2014
		US 2014304919 A1	16-10-2014
EP 0178951 A2	23-04-1986	EP 0178951 A2	23-04-1986
		US 4787104 A	29-11-1988
JP H03212211 A	17-09-1991	JP H0587242 B2	16-12-1993
		JP H03212211 A	17-09-1991
US 5920928 A	13-07-1999	EP 0811341 A2	10-12-1997
		IT T0960491 A1	05-12-1997
		JP 2900252 B2	02-06-1999
		JP H10243838 A	14-09-1998
		US 5920928 A	13-07-1999

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

- EP 2308442 A1 [0004]