(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number : **0 490 660 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number : **91311534.1**

(22) Date of filing : **11.12.91**

(51) Int. Cl.^{5} : **A61G 5/00**

(30) Priority : **13.12.90 GB 9027068**

(43) Date of publication of application :
17.06.92 Bulletin 92/25

(84) Designated Contracting States :
BE DE FR GB NL SE

(71) Applicant : **F J PAYNE (MANUFACTURING) LTD**
Stanton Harcourt Road, Eynsham
Oxford OX8 1JT (GB)

(72) Inventor : **Sanders, John, c/o F J Payne (Manufacturing) Ltd.**
Stanton Harcourt Road
Eynsham, Witney OX8 1JT (GB)

(74) Representative : **Rock, Olaf Colin**
Rock and Company Trelawn
Cassington Oxford OX8 1 DN (GB)

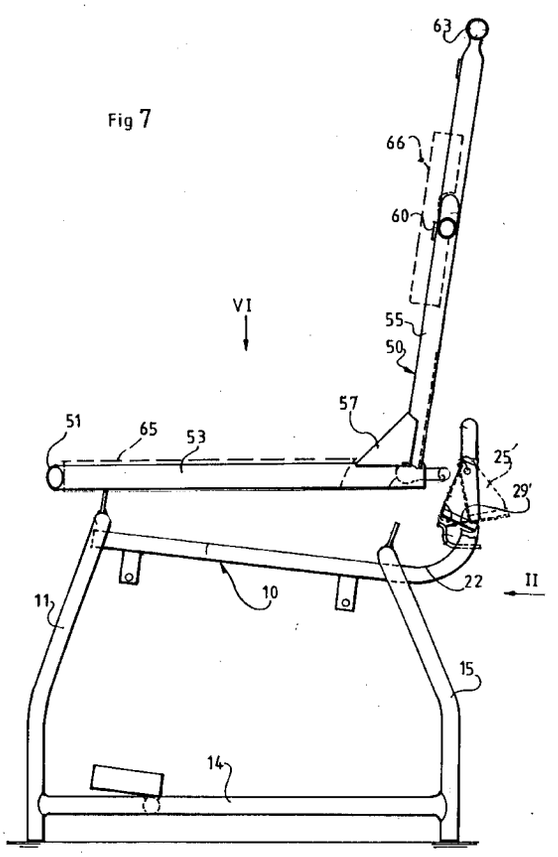
(54) Wheel chair.

(57) A wheel chair (10, 50) having a fore and aft axis (A, B) and a horizontal lateral axis at right angle to the fore and aft axis and comprising a seat (50) and a wheeled chassis (10) which are each discrete self supporting structures ; a demountable coupling (25, 64) linking the seat (50) to the chassis (10) ; the coupling (25, 64) including a latch (25) operable with the seat (50) in a mounting position relative to the chassis (10) between a locked state when the seat (50) is secured to the chassis (10) and a free state when the seat (10) is released from engagement with the chassis ; and a lifting point (63, 60) incorporated in the seat (50) to enable at least the seat (50) (with or without an occupant) to be lifted whether or not coupled to the chassis ; **characterized by** first alignment structure (30, 31, 21, 22, 23, 24, 25) mounted on the chassis (10) and second alignment structure (53, 54, 64) mounted on the seat (50), one alignment structure incorporating the latch (25) and the other alignment structure incorporates a latch engaging member (64) ; the second structure serving to functionally interact with the first so that :

(a) on lowering the seat (50) towards the chassis (10) to juxtapose the first and second alignment structure the structures interact to urge the seat towards a final mounting position in the lateral direction and in the fore and aft direction ;

(b) when the seat (50) is coupled to the chassis (10) in the final mounting position the engaging member (64) is retained by the latch (25) so as to couple the seat (50) to the chassis (10) and to limit any tendency of the seat (50) to move relative to the chassis (10) ; the latch (25) and retaining member (64) when coupled being at a given single location permitting ready inspection of the coupled members.

Fig 7



EP 0 490 660 A2

This invention relates to a wheel chair.

A known type of wheel chair in widespread use comprises a frame fitted with a seat and back support to accommodate an occupant together with two relatively large wheels for driving by the hands of the occupant. To allow the chair to be stowed within a vehicle the lateral width of the chair can be reduced by folding the side elements of the frame towards one another. This requires that the side frames are rigid and are joined by a folding linkage. The seat and back support extending between the side frames are typically of flexible material to enable the frames to be drawn towards one another.

European Patent Application 88305871.1 shows wheelchair comprising a wheeled chassis incorporating a seat characterised in that the seat and the chassis are discrete, self supporting members; a demountable coupling is provided linking the seat to the chassis; the coupling being operable between a first position where the coupling is secures the seat to the chassis and a second position where the coupling releases the seat from engagement with the chassis; a control linkage provides for regulating the operation of the coupling at least from the first to the second position ; and a lifting point is incorporated in the seat structure to enable at least the seat (with or without an occupant) to be lifted alone is not when combined with the chassis. However a difficulty that could arise with the unit was that the coupling was in several spaced parts disposed generally beneath the seat and it proved difficult for an able bodied helper to establish that all parts had operated appropriately to engage the seat to the chassis and difficult if not impossible for an occupant of the seat to do so.

Nevertheless such a unit enables an incapacitated person to be lifted by means of a crane while continuing to be seated in the self supporting seat, to be lowered into a bath for washing or recreation and to be restored to the chair by remounting the seat on the chassis. This provided for a minimum amount of physical effort to be needed from a helper (especially if the crane is powered in some way) and caused less disturbance to the seat occupant.

With a wheel chair of this type of seperable seat and chassis the operations of engaging the seat with a crane device and engaging and disengaging the seat from the chassis are be undertaken by a helper. It is however desirable that the occupant of the seat should be able to undertake these operations by themselves or at least check that they have been completed.

According to the present invention there is provided a wheel chair having a fore and aft axis and a horizontal lateral axis at right angle to the fore and aft axis and comprising a seat and a wheeled chassis which are each discrete self supporting structures; a demountable coupling linking the seat to the chassis; the coupling including a latch operable with the seat in a mounting position relative to the chassis between a locked state when the seat is secured to the chassis and a free state when the seat is released from engagement with the chassis; and a lifting point incorporated in the seat to enable at least the seat (with or without an occupant) to be lifted whether or not coupled to the chassis; **characterized by** first alignment structure mounted on the chassis and second alignment structure mounted on the seat, one alignment structure incorporating the latch and the other alignment structure incorporating a latch engaging member; the second structure serving to functionally interact with the first so that:

(a) on lowering the seat towards the chassis to juxtapose the first and second alignment structure the structures interact to urge the seat towards a final mounting position in the lateral direction and in the fore and aft direction;

(b) when the seat is coupled to the chassis in the final mounting position the engaging member is retained by the latch so as to couple the seat to the chassis and to limit any tendency of the seat to move relative to the chassis; and the latch and retaining member when coupled or close to being coupled are at a given single location on an outer part of the juxtaposed seat and chassis permitting ready inspection of the interaction between the latch and the retaining member.

According to a first preferred version of the present invention the wheel chair is **characterized in that** the first alignment structure includes at least one member on the chassis defining a laterally disposed inclined surface; and the second alignment structure includes at least one member on the seat defining a sliding surface adapted when initially juxtaposed with the laterally disposed surface of the first alignment structure to cause a resultant force to act on the seat to displace it laterally relative to the fore and aft axis of the chassis.

According to the present invention or the first preferred version thereof the wheel chair is **characterized in that** the first alignment structure includes a surface inclined in a fore and aft direction adapted when initially juxtaposed with a part of the second alignment structure to cause a resultant force to act on the seat to displace it in a fore and aft direction relative to the fore and aft axis of the chassis.

According to a third preferred version of the present invention or the first or second preferred versions thereof the wheel chair is **characterized in that** the chassis when carrying the seat in a first, working, configuration is adapted for reduction in overall size when the seat has been removed such as by folding or other reversible process to enable the chassis to be stored or transported in a second, transportable, configuration which has a smaller overall size than that of the chassis in its working configuration.

An exemplary embodiment of the invention will

now be described with reference to the accompanying drawing of a wheel chair having two discrete structural members. One is a chassis referred to with reference to Figures 1 to 3 of which:

Figure 1 is a side elevation;

Figure 2 is rear elevation from the direction of arrow II in Figure 1; and

Figure 3 is a plan view form the direction of arrow III in Figure 1.

The other is a seat referred to with reference to Figures 4 to 6 of which:

Figure 4 is a side elevation of the chassis;

Figure 5 is rear elevation as seen from the direction of arrow V in Figure 4; and

Figure 6 is a plan view as seen form the direction of arrow VI in Figure 4.

The combination of seat and chassis are shown in Figure 7 which shows a side elevation of the two structural members just prior to being linked.

Items appearing in more than one Figure have the same reference in each.

Figures 1 to 3

Chassis 10 is fabricated from welded tubular material. The chassis 10 includes a front inverted-U member made up of left leg 11, front cross member 12 and right leg 13. Lower side member 14 extends backwardly from left leg 11 to left rear leg 15. Likewise lower side member 16 extend backwardly from right leg 13 to right rear leg 17. The left and right rear legs 15, 17 form legs of an inverted-U. They are linked at their upper ends by a rear cross member 18. In this case the bottom of each of legs 11, 13, 15, 17 have plugged into them trailing castors to enable the chassis 10 and loads which it normally bears to be readily moved. Alternatively a combination of large wheels and castors can be fitted.

The front cross member 12 is joined to the rear cross member 18 by side rails 19, 20 welded to the underside of the cross members.

The side rails are linked at their rear ends by an integral back rail 21 which has depending from its central section a rigid J-shaped coupling 22 with a shaped entry jaw 23 and a holding space 24. A latch 25 in the form of a block is pivotably mounted on a horizontal pin 26 extending from opposite sides of the coupling 22. The latch 25 has a front face 27 and a lower face 28. It is shown in Figure 1 in its normal freely hanging position where clearance 29 between face 28 and jaw 23 is a minimum. In normal operation gravity, and the assistance of a torsion spring 25A, serve to bias the latch 27 to the position shown in full outline in Figure 1.

The latch 25 can be swung backwards from the position shown in Figure 1 to that shown in broken outline 25′ so as to leave an extended clearance 29′ between face 28′and jaw 23.

The chassis 10 is equipped with alignment components in the form of frusto triangular guide elements 30, 31 welded to the top of front cross member 12 being equispaced from fore and aft axis A of the chassis. The elements 30, 31 have inclined faces 32 to serve to align tubular elements of the seat when it is lowered onto the chassis as will be described hereafter.

A single guide element 33 is welded to rear cross member 18 symmetrically about the axis A. The guide element 33 has inclined faces 34 which serve to align tubular elements of the seat when it is lowered onto the chassis 10 as will be described hereafter. The holding space 24 lies along axis X which extends horizontally transverse axis A.

Figures 4 to 6

Seat 50 is made up of a tubular frame with a fore and aft axis B. Front rail 51 linked to rear rail 52 by left side rail 53 and right side rail 54.

The back of the seat 50 is provided by left side tube 55 and right side tube 56 which are welded at their lower end to their corresponding left and right side rails 53, 54. Gusset plate 57 serves to stiffen the joint between tube 55 and rail 53; plate 58 likewise stiffens the joint between tube 56 and rail 54. Further stiffening of the seat structure is provided by a plate 59 welded between the lower sections of side tubes 55, 56 and the top of rear rail 52.

A transverse strut 60 serves to stiffen the central region of the back of seat 50 by linking the middle regions of the side tubes 55, 56. Stubs 61, 62 extend outwardly from, respectively, left side tube 55 and right side tube 56 to enable arms to be connected to the seat.

The upper ends of tubes 55, 56 are joined by cross member 63.

A tubular locking member 64 projects backwardly from the rear rail 52 and serves to engage the chassis 10 as will be described hereafter.

To support an occupant the seat 50 is completed with a rigid plastics squab seat 65 shown in broken outline in Figure 6 and a back pad 66 in the same material shown in broken outline in Figure 5.

The type and finish of the components of the seat allow for a range of uses for the seat including immersion in water and for ready cleaning. In this case the tubular components of the seat are of galvanized mild steel with an ethylene vinyl acetate dipped finish.

In use the seat 50 is retained on the chassis 10 by the retention of locking member 64 in holding space 24 by way of lower face 28 of the latch 25. In this position the seat left side rail 53 seats on front cross member 12 at the foot of the outside inclined face 32 of guide element 30 and on rear cross member 18 at the foot of the left hand outside inclined face 34 of guide element 33. Likewise the right side rail 54 seats on front

cross member 12 at the foot of the outside inclined face 32 of guide element 31 and on rear cross member 18 at the foot of the right hand outside inclined face 34 of guide element 33. Apart from location on the front and rear cross members the plate 59 in the back of the seat 50 also seats against back rail 21 so limiting any tendency of the seat 50 to rotate about axis X while locking member 64 is retained by latch 25 in holding space 24.

To enable the seat 50 to be lifted from the chassis 10 the wheelchair is located by a patient lift. A lifting hook from the lift is then attached to the seat by way of a rigid attachment on the back of the seat 50. The latch 25 is then swung to position 25′ to provide extended clearance 29′. Thereafter the lift is operated to raise the seat so that locking member 64 is raised through the clearance 29′ to enable the seat 50 to clear the chassis 10. Thereafter the lift with the seat and any occupant can be manoeuvered as required.

To restore the seat 50 to the chassis 10 the seat is positioned by a user vertically over the chassis with the axis B of the seat substantially aligned with axis A of the trolley. The user then causes the seat to be lowered to the position shown in Figure 7 with side rails 53, 54 contacting inclined faces 32 of guide elements 30, 31. With a small amount of angular mis-alignment between axis A of the chassis and axis B of the seat the inclined faces 32 ensure that one or other of the rails 53, 54 will interact with an inclined face 32 which will tend to displace the seat relative to the chassis so as to align the axes A, B so allowing for the lowering of the seat to proceed without pause. In the event of a substantial degree of angular misalignment the inclined faces 32 will tend to cause increased misalignment so providing a readily observed warning to the user that correct matching of the seat and chassis cannot occur. The user then raises the seat and realigns the seat relative to the chassis before repeating the lowering operation.

After initial contact at the front of the seat and chassis and correct initial alignment further lowering of the seat results in the seat pivoting about a horizontal axis at the front of the trolley formed by the initial contact between the seat and the chassis. Locking member 64 moves into the shaped entry jaw 23 on the chassis and the rear ends of side rails 53, 54 seat on inclined faces 34 of guide element 33 to finally align the axes A, B. Contact between the locking member 64 and face 27 of the latch 25 pushes the latch backwardly resulting in an increased clearance between the jaw 23 and the latch 25 which provides for the entry of the locking member 64 into the holding space 24. Once the member 64 is within the space 24 the latch 25 drops back under the action of gravity and the spring 25A into its normal working position so retaining the locking member 64 in the holding space 24 unless the latch is positively operated to provide increased clearance 29′ and the seat is raised from the chassis.

When making use of a lift with the seat a user will normally be positioned at the back of the seat. Consequently by locating the latch 25 at the rear of the wheelchair a user besides checking that the initial contact alignment of seat and chassis is correct can also readily see whether the locking member 64 is entering correctly into, and is thereafter retained in, the holding space 24. If a problem occurs the user is in a position to see it and do something about it without having to move around the chair or to view components masked by the seat and/or its occupant. This tends to promote a degree of confidence in both user and seat occupant.

The embodiment discloses a seat and chassis which are both rigid. However it is also envisaged that the chassis could be of a folding type so that with the seat, and an occupant, raised on a lift the chassis could be folded or otherwise collapsed to enable the chassis to be stowed in a confined space. Typically for a car journey for an incapacitated person the seat would be separated as described previously and the chassis folded or otherwise collapsed and stowed in a car boot. The lift is then used to locate the seat and its occupant elsewhere within the car. Thereafter the lift is also dismantled and stowed with the chassis to enable a corresponding unloading sequence to be undertaken at the end of the journey.

Claims

1 A wheel chair having a fore and aft axis and a horizontal lateral axis at right angle to the fore and aft axis and comprising a seat and a wheeled chassis which are each discrete self supporting structures; a demountable coupling linking the seat to the chassis; the coupling including a latch operable with the seat in a mounting position relative to the chassis between a locked state when the seat is secured to the chassis and a free state when the seat is released from engagement with the chassis; and a lifting point incorporated in the seat to enable at least the seat (with or without an occupant) to be lifted whether or not coupled to the chassis; **characterized by** first alignment structure (30, 31, 21, 22, 23, 24, 25) mounted on the chassis (10) and second alignment structure (53, 54, 64) mounted on the seat (50), one alignment structure incorporating the latch (25) and the other alignment structure incorporating a latch engaging member (64); the second structure serving to functionally interact with the first so that:

(a) on lowering the seat (50) towards the chassis (10) to juxtapose the first and second alignment structure the structures interact to urge the seat towards a final mounting position in the lateral direction and in the fore and aft direction;

(b) when the seat (50) is coupled to the chassis

(10) in the final mounting position the engaging member (64) is retained by the latch (25) so as to couple the seat (50) to the chassis (10) and to limit any tendency of the seat (50) to move relative to the chassis (10); and the latch (25) and retaining member (64) when coupled or close to being coupled are at a given single location on an outer part of the juxtaposed seat (50) and chassis (10) permitting ready inspection of the interaction between the latch (25) and the retaining member (64).

2 A wheel chair as claimed in Claim 1 **characterized in that** the first alignment structure (33, 30, 31, 21, 22, 23, 24, 25) includes at least one member (30, 33) on the chassis defining a laterally disposed inclined surface (32, 34); and the second alignment structure includes at least one member (55, 56) on the seat (50) defining a sliding surface adapted when initially juxtaposed with the laterally disposed surface (32, 34) of the first alignment structure to cause a resultant force to act on the seat (50) to displace it laterally relative to the fore and aft axis (A) of the chassis.

3 A wheel chair as claimed in Claim 1 or Claim 2 **characterized in that** the first alignment structure includes a surface (23) inclined in a fore and aft direction adapted when initially juxtaposed with a part (64) of the second alignment structure to cause a resultant force to act on the seat (50) to displace it in a fore and aft direction relative to the fore and aft axis of the chassis (A).

4 A wheel chair as claimed in any preceding claim **characterized in that** the chassis (10) when carrying the seat (50) in a first, working, configuration is adapted for reduction in overall size when the seat (50) has been removed such as by folding or other reversible process to enable the chassis (10) to be stored or transported in a second, transportable, configuration which has a smaller overall size than that of the chassis (10) in its wording configuration.

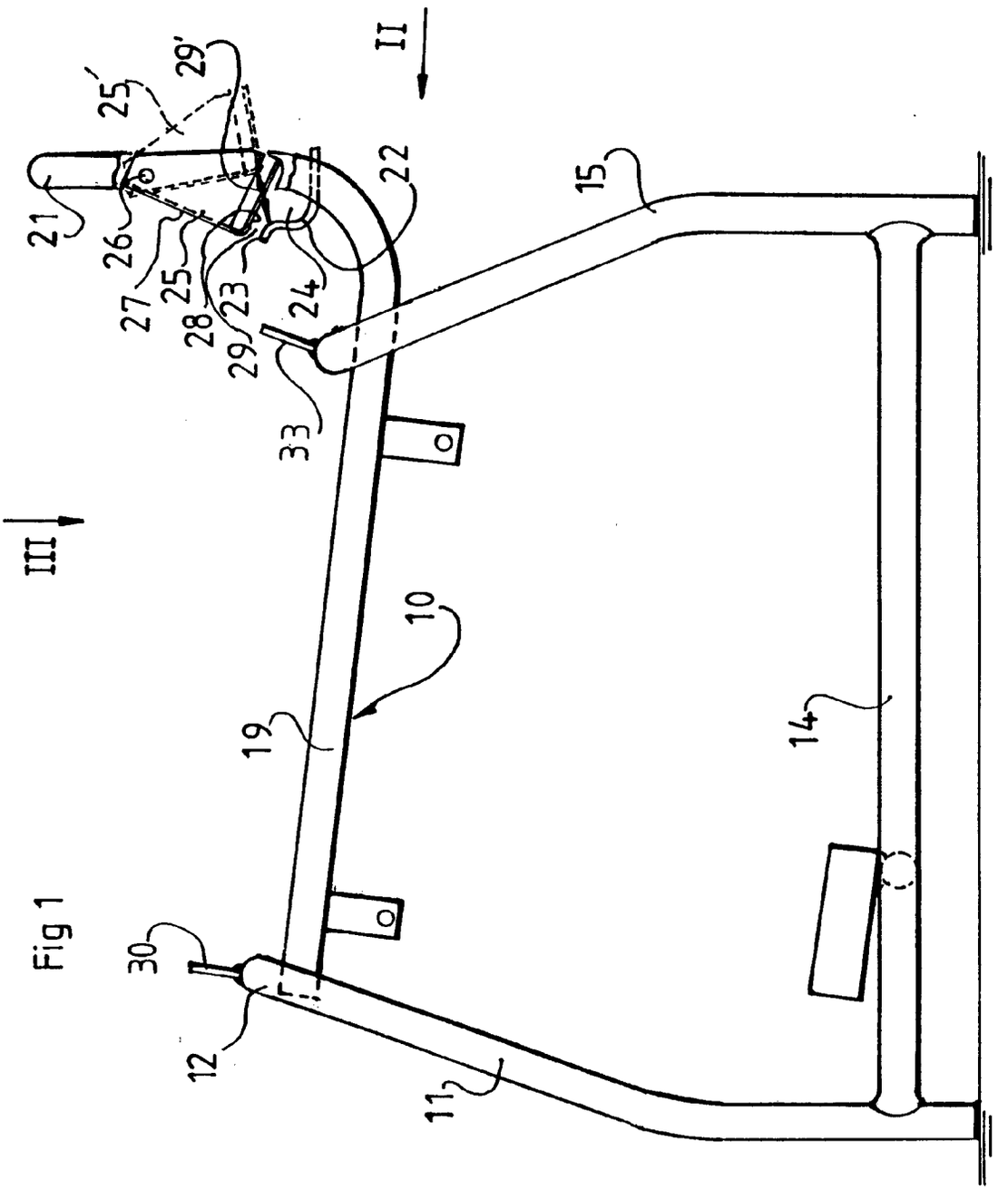


Fig 1

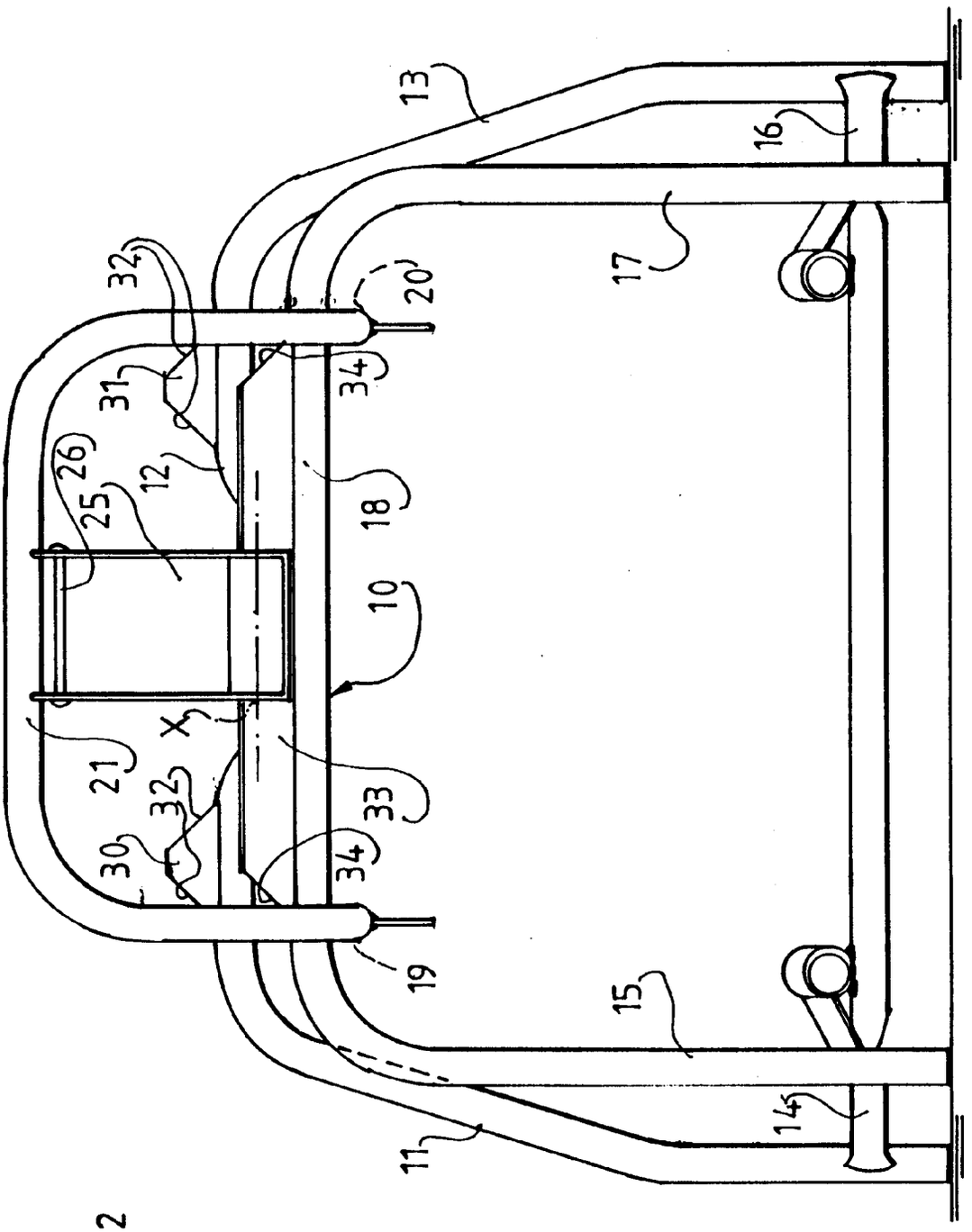


Fig 2

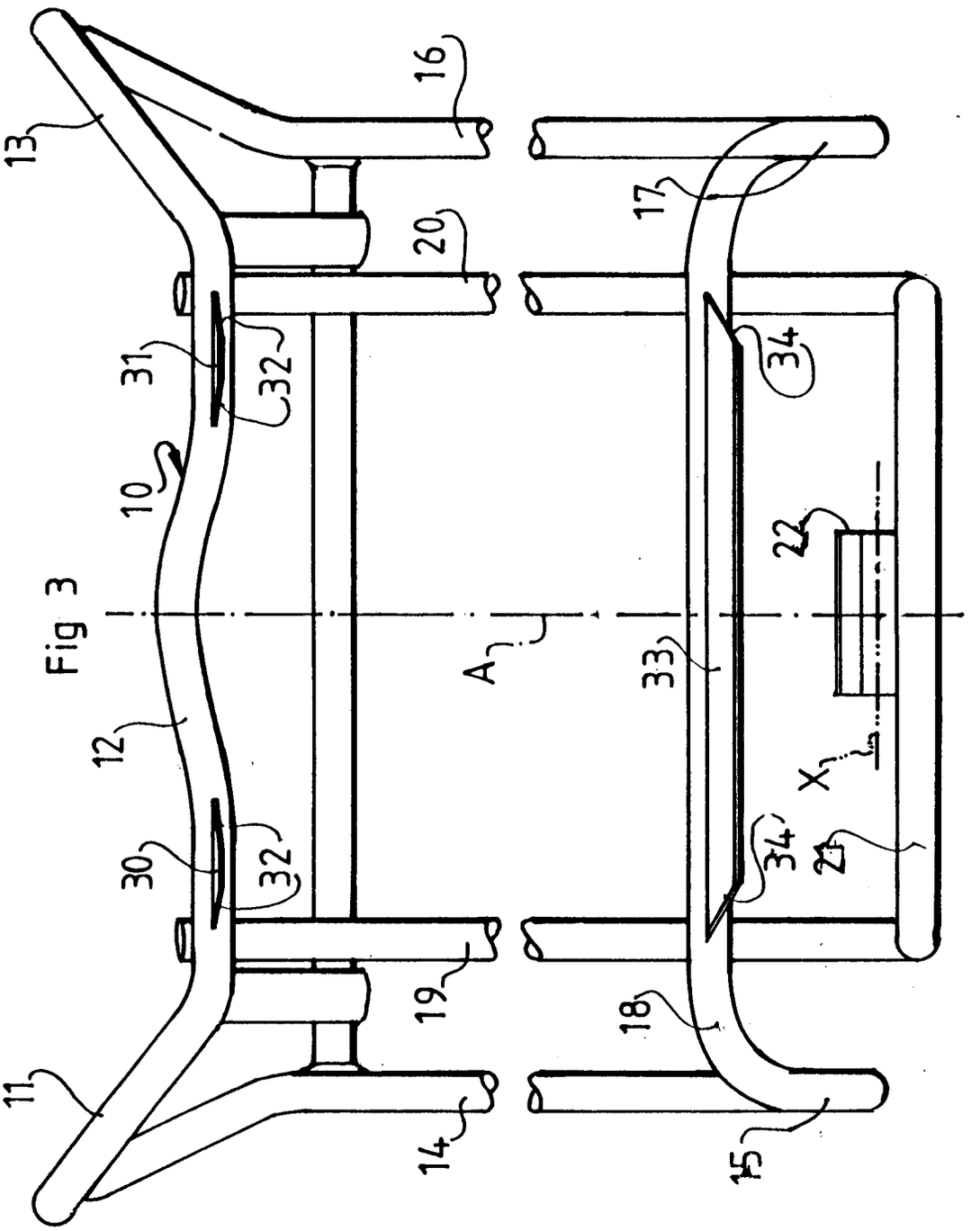
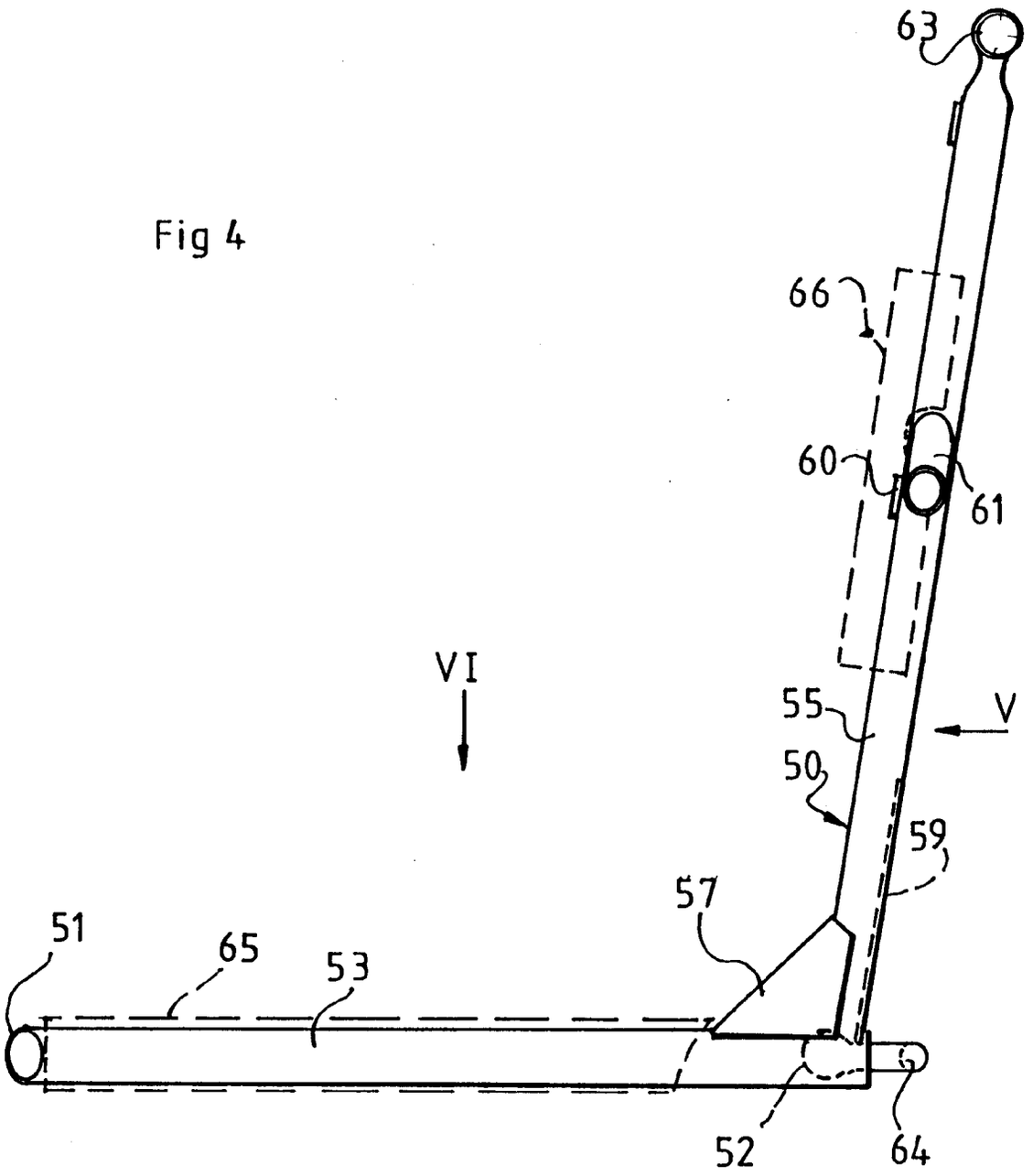


Fig 3

Fig 4



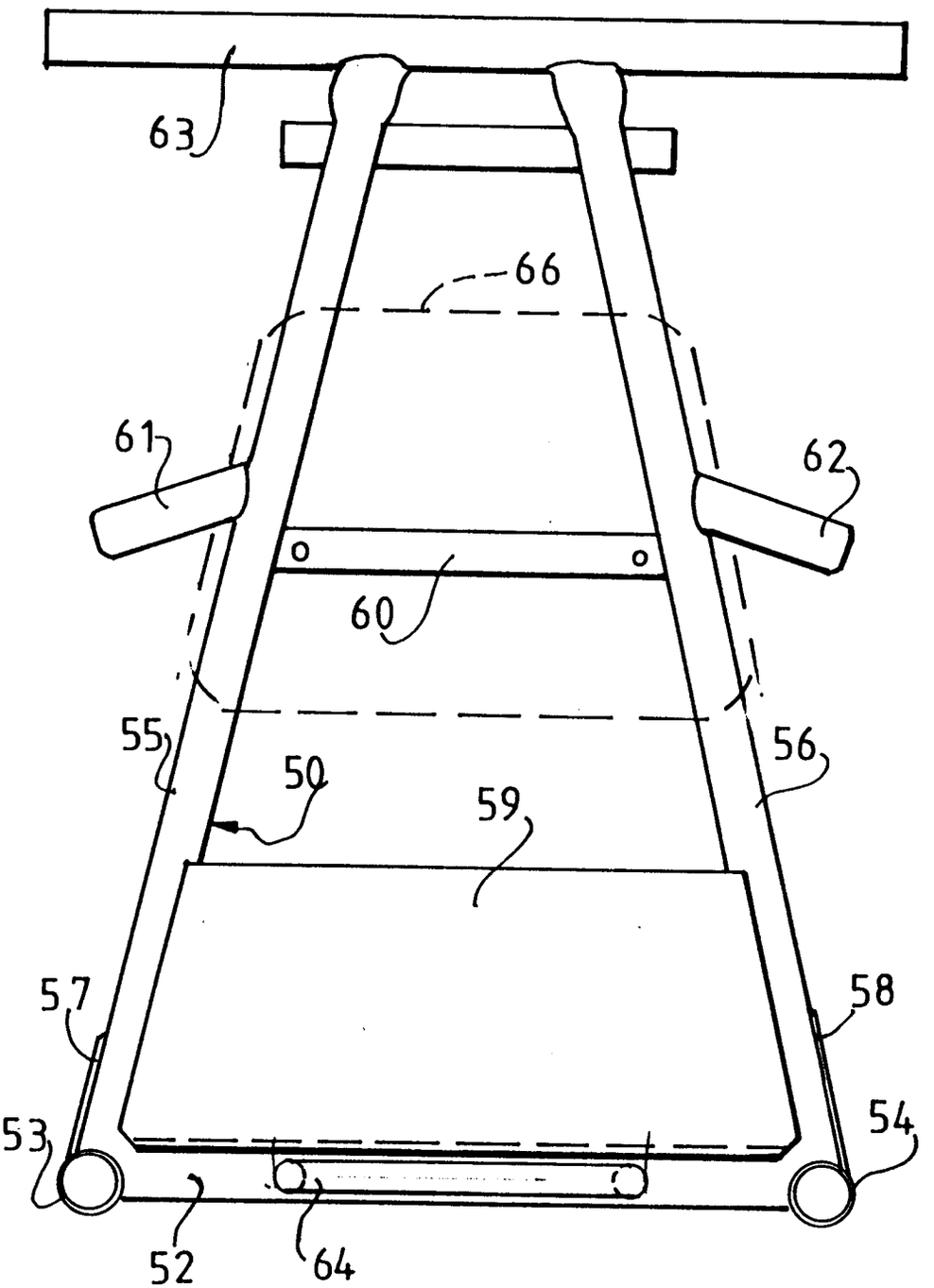


Fig 5

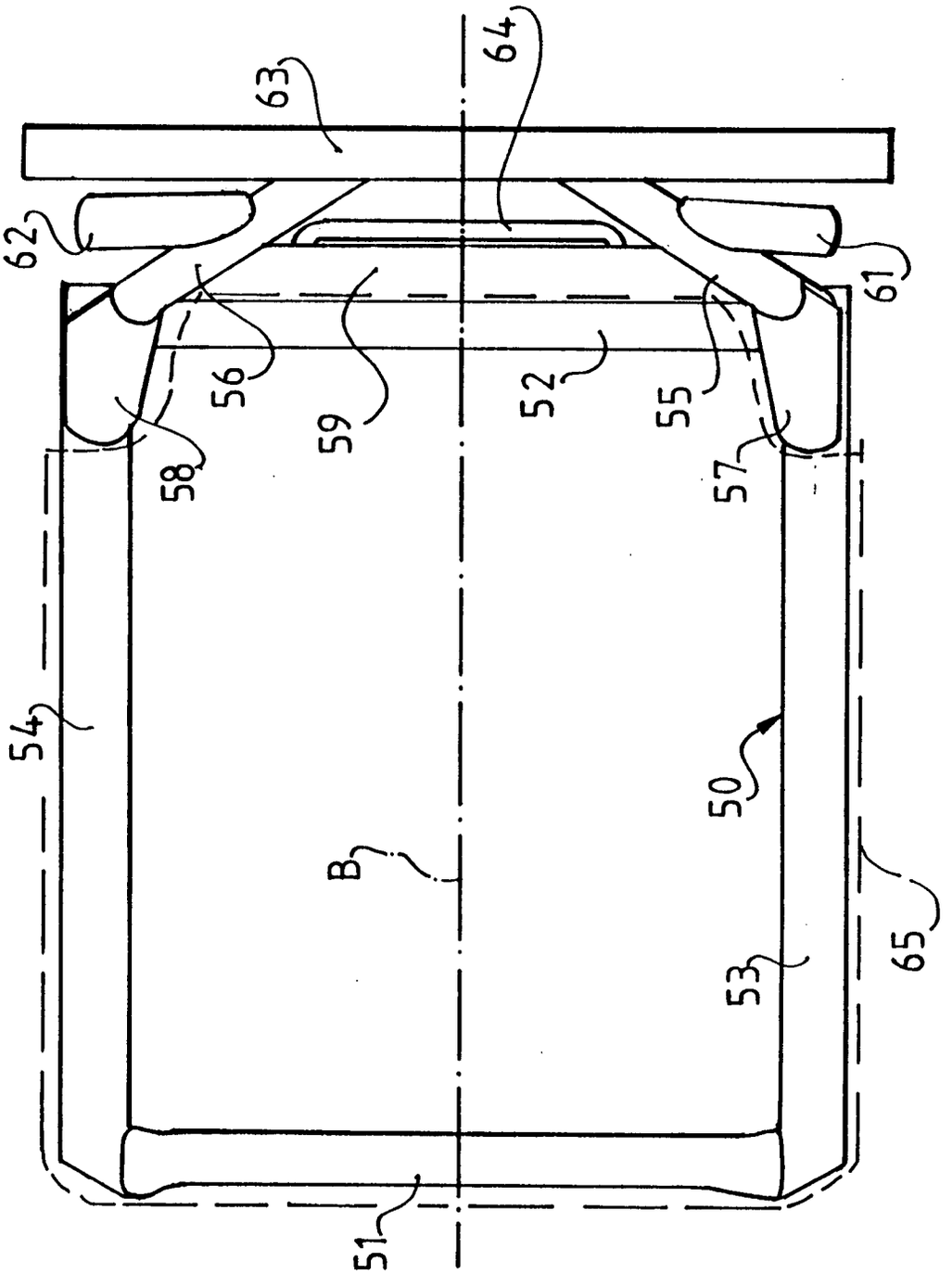


Fig 6

Fig 7