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㉙ **An invalid chair.**

㉚ An invalid chair comprising a back section, a seat section, and a frame which supports the back and seat sections. The back section is pivotable relative to the frame about an axis located above the level of the seat section, the back section being pivotable between an upright position and a lowered position, and the seat section is connected to the back section by a linkage which causes the seat section to move upwards and forwards as the back section is pivoted towards the lowered position. Thus the configuration of the chair can be altered to that of a couch when the chair is occupied.



The present invention relates to an invalid chair, and in particular to an invalid chair the configuration of which can be adjusted when occupied.

The current practice when transferring a patient
5 between a chair and a bed is for nursing staff to directly lift the patient. Even when the patient is relatively light this is a difficult procedure which can be distressing to the patient. When the patient is overweight the procedure is extremely difficult
10 and often results in the nursing staff doing damage to themselves. Back trouble caused by lifting heavy patients is a major occupational hazard for nursing staff.

As an alternative to the current practice, slings
15 can be used. This involves securing the patient in a sling, jacking the patient up by attaching the sling to a small mobile crane device, moving the sling over the place to which the patient is to be transferred, and then lowering the patient and removing the sling.
20 Patients find this procedure distressing, and staff find it time consuming. Therefore this procedure is not often used.

It is an object of the present invention to provide an invalid chair the configuration of which
25 can be adjusted when occupied to move the occupant from a sitting position to an elevated lying position or vice versa.

According to the present invention, there is provided an invalid chair comprising a back section, a seat section, and a frame which supports the back and seat sections, characterised in that the back
5 section is pivotable relative to the frame about an axis located above the level of the seat section, the back section being pivotable between an upright position and a lowered position, and the seat section is connected to the back section by a linkage which causes the seat
10 section to move upwards and forwards as the back section is pivoted towards the lowered position, whereby the configuration of the chair can be altered to that of a couch when the chair is occupied.

Preferably the seat and back sections are pivotally
15 connected.

The linkage may comprise a flexible link connected at one end to the seat section and connected at the other end to the back section, the link extending around at least one pulley mounted on the frame. For example,
20 with the back section in the upright position, the link can be arranged such that it extends from its point of attachment to the seat section upwards and forwards to pass around a first pulley mounted on the frame, backwards from the first pulley to pass around a second
25 pulley mounted on the frame, and upwards from the second pulley to its point of attachment to the back section, the point of attachment to the back section being in between the back section pivot axis and the seat section.

Preferably two flexible links are provided one on each side of the chair.

Outriggers may be pivotally mounted on the frame above each wheel, a linkage interconnecting each out-
5 rigger to a common actuating means operation of which causes each outrigger to pivot into contact with the surface on which the chair is supported to thereby immobilize the chair.

The seat section may be pivotally connected to
10 two leg support sections the angular position of which relative to the seat section can be adjusted.

The leg support sections may be pivotally connected to respective foot support sections the angular positions of which relative to the leg support sections can be
15 adjusted.

The chair may be converted to the couch configuration by pulling on the top of the back section. Return to the chair configuration may be controlled by a hydraulic piston and cylinder arrangement having
20 a bypass circuit which may be opened by a suitably located lever.

By arranging for the level of the chair in its couch configuration to be the same as that of a hospital bed, a patient may be transferred to or from
25 a bed by a simple horizontal movement.

Embodiments of the present invention will now be described, by way of example, with reference to the accompanying drawings, in which :

Figs. 1 to 3 illustrate the general construction of a first invalid chair embodying the invention;

Figs. 4, 5 and 6 show details of an immobilizing device as provided on a second invalid chair embodying the invention;

Figs. 7 and 8 show details of the frame of the second invalid chair;

Figs. 9 and 10 show details of leg and foot support sections of the second invalid chair; and

Fig. 11 shows details of a device for maintaining leg support sections in a predetermined orientation relative to the seat section of the second invalid chair.

Figs. 1, 2 and 3 schematically illustrate the basic structure of the chair which comprises a back section 1, a seat section 2, two leg support sections 3 and two foot rest sections 4. The back 1 is supported on horizontally aligned pivots 5 (Fig. 3) fixed to a rigid tubular steel main frame having sides defined by vertical struts 6 and horizontal cross struts 7. The two frame sides are interconnected by further horizontal struts (not shown). The seat 2 is hinged to the back 1 by hinge 8 and to the leg supports 3 by hinges 9, and the foot rests 4 are hinged to the leg supports 3 by hinges 10.

The seat 2 comprises a rigid subframe 11 to either side of which are welded downwardly extending support arms defined by struts 12 and 13. The ends of the

struts 12 and 13 are welded together so as to define with the subframe a strong triangular assembly. Two pairs of pulley wheels 14 and 15 are pivotally mounted on suitable supports rigidly secured to the main frame, one pair of wheels being located on each side of the chair. A cable 16 is secured at one end to a subframe 17 of the chair back 1 and at the other end to the support arm defined by struts 12 and 13. The arrangement is such that one cable 16 is provided on each side of the chair, each cable lying in a vertical plane. The space below the seat 2 and between the support arms is completely free. Handles are also secured to the subframe 17 at a convenient height for pushing the chair.

15 A hydraulic cylinder 18 is pivotally connected at its ends to the main frame 6 and to the chair back subframe 17. The cylinder is arranged such that its piston can be extended freely but retracted only if a lever 19 controlling a hydraulic bleed valve (not shown) is released. A one way valve and bypass channel controlled by the lever can be arranged to provide this sort of operation.

If a patient is seated in the chair in its configuration as shown in Figs. 1 and 2, the wheels 20 can be locked and then the top of the back 1 can be pulled back and down towards the intermediate position shown in dashed lines in Fig. 3 and labelled 21. The weight of the patients upper torso counterbalances the

weight of the patients lower torso to a certain extent so that the physical effort required is not excessive. The back 1 swings about pivots 5, pushing the hinge 8 and the seat 2 forwards and upwards. As the seat 2
5 moves upwards, so too do the struts 12, 13. The distance between the back subframe 17 and pulley 14 increases, the distance between the pulleys 14 and 15 is fixed, and therefore the cable pulls the struts 12, 13 towards the pulley 15. The seat 2 therefore remains
10 horizontal. Further pulling down of the seat back 1 moves the chair to the configuration shown in dashed lines in Fig. 3 and labelled 22, in which the back 1 and seat 2 are both horizontal and level with padded arms 23 of the chair.

15 The relative orientation of the seat 2 and leg supports 3 is not altered automatically by movement of the chair back 1. The leg supports 3 may however be independently pulled upwards to any desired position. A mechanism described below can be provided to automati-
20 cally adjust the angle between the supports 3 and foot rests 4 as the supports are pulled up so that when the supports 3 are in line with the seat 2 so too are the foot rests 4. Thus a patient can be moved from a sitting position to a horizontal elevated position simply and
25 without undue stress or strain to either the medical staff or the patient. By arranging for the level of the chair arms to be the same as that of a hospital bed, a patient can be transferred to and from bed by

a simple horizontal movement, avoiding any lifting.

If a person is lying on the chair in its horizontal orientation and it is desired to return the patient to a sitting position, the lever 19 is
5 depressed and hydraulic fluid can flow through a bypass channel at a controlled rate. The weight of the patient causes the chair to move at a slow rate towards the sitting position. This movement can be stopped when desired simply by releasing the lever
10 19.

A range of ancillary equipment can be carried on the chair. For example a pin can be inserted into a hole in the seat subframe between a patients legs to prevent the patient from slipping out of the chair.
15 A table, small tray, bookstand or hand rest can be mounted on the chair arms. A side rail can be mounted on the chair arms to prevent a patient rolling off when the chair is in its couch configuration, and a drip support can be mounted on the main frame. Obviously
20 any other ancillary equipment such as fluid receiving bags, oxygen bottles etc. can also be supported on the frame. The chair seat can accommodate a commode normally covered by a padded seat panel. As the mechanism of the chair does not occupy the area beneath
25 the commode, the chair can be wheeled backwards over a lavatory or a disposable container can be placed in the commode.

In the embodiment of Figs. 1 to 3, the chair

wheels are locked before the chair configuration is altered by actuation of locking mechanisms associated with each of the four wheels. This obviously requires access to each wheel which can cause problems if for
5 example the chair is positioned up against the side of a bed. Furthermore the locking mechanisms may not be fully effective or may accidentally not be actuated at all. This is a serious matter as, particularly with an overweight patient, it is necessary to make
10 the chair feel very solid if the patient is to be happy about using the chair.

Figs. 4, 5 and 6 show an arrangement which enables the chair to be completely immobilized. An outrigger 24 is mounted on a horizontal pivot 25 supported on the
15 chair frame 26 above each wheel 27. (The wheels 27 are not shown in Fig. 6). The outrigger is welded to a lever 28 connected by a push rod 29 to an actuating lever 30 welded to a pivot bar 31 supported by the chair frame. The pivot bar extends across the width
20 of the chair and is welded to an actuating lever 30 on both sides of the chair. Thus all four outriggers can be actuated by one lever from either side of the chair. Each wheel can swivel through 360° to make the chair highly manoeuvrable.

25 Fig. 4 shows the immobilizing device in its released position, whereas Figs. 5 and 6 show the device having immobilized the chair, each wheel having been lifted off the floor so that all the weight of

the chair is taken by the outriggers.

Figs. 7 and 8 are side and rear views of a chair frame suitable for supporting the arrangement of Figs. 4 to 6. Brackets 32 receive the outriggers 24 and the pivot bar 31 is supported in a bearing 33. The illustrated frame is designed to accommodate a flexible linkage of the type shown in Fig. 3, pulleys equivalent to pulleys 14 and 15 being mounted on pivots 34 and 35 respectively. A pivot 36 is provided to support the chair back. The two sides of the chair are interconnected by cross struts 37 indicated by dotted lines in Fig. 7. The entire frame is fabricated from square section tube with the exception of the portion 38 (Fig. 7) which is a flat bar.

Referring now to Figs. 9, 10 and 11, the supporting mechanism for the leg and foot rests will be described in detail. The leg supports 3 are welded to tubes 39 one of which is shown in Fig. 11. A member 40 is welded to an extension 41 of the subframe of the seat 2 and inserted into the tube 39. Another member 42 is welded to the seat subframe midway across the width of the seat. This member defines a bore into which is inserted a pin 43 extending from a member 44 welded inside the tube 39. The facing surfaces of the members 42 and 44 are notched to define a ratchet. A ring 45 is secured inside the tube 39 and a compression spring 46 bears against the ring and a face of the member 40 to bias the tube towards the right in Fig. 11.

The ratchet teeth are arranged such that, looking along the axis of the tube 39 from the left in Fig. 11, the tube 39 can be rotated anticlockwise only with the ratchet engaged. Thus the leg support which is
5 secured to tube 39 can be pulled up but is prevented from falling by the ratchet. If it is desired to lower the leg support, the support is simply pushed to the left in Fig. 11 against the force of the spring, thereby releasing the ratchet. The other leg support is
10 mounted in a similar manner, the ratchet teeth again being arranged to permit the pulling up of the support.

The leg support 3 can pivot about axis 47 relative to the seat 2, and the foot rest 4 can pivot relative to the leg support 3 about axis 48. In addition two
15 rods 49 are positioned between the leg supports, each rod connecting a support 50 rigidly connected to the seat subframe to a support rigidly connected to a respective one foot rest 4. The spacing and position of the pivot points between the rods 49 and the leg
20 supports 3 are such that the foot rests 4 are always parallel to the seat 2. The rods 49 are connected to the foot rests 4 by quick-release linkage to enable the orientation of the foot rests to be adjusted. A tie bar 52 mounted to pivot about axis 53 is normally
25 held in a stowed position by a magnet 54 but can be used to lock the foot rest 4 in a variety of positions as shown in Fig. 10.

The side panels on either side of the seat 2

may be rigid with the main frame, or may be arranged to fold down to bridge the space between the chair and another chair, for example a car seat, or may be entirely removable. This makes it easier for a patient
5 to move himself or be moved to another chair.

The chair side panels and the sides of the main frame are preferably filled in by covering panels to prevent the hands of the occupant of the chair from being trapped in the mechanism.

10 To increase patient comfort, the seat and back of the chair may incorporate inflatable bags which could be inflated to a pressure to suit a particular patient's requirement. For example, the seat could be provided with one bag and the back could be provided
15 with three bags spaced apart from the top to the bottom of the back to support the lumbar region, the shoulders and the head respectively. The top bag could be in two sections to provide support to either side of the patients head.

20 The seat could be covered by a porous fabric so that warm air could be passed into the interior of the covering. This air could pass out through the fabric to both warm and ventilate the patient.

It will be appreciated that the chair could be
25 motorised if desired to enable a patient to manoeuvre the chair and/or to drive various components of the mechanism which enables the chair to be converted from one configuration to another. For example the leg

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supports could be driven cyclically up and down to
exercise a patients legs.

CLAIMS:

1. An invalid chair comprising a back section,
a seat section, and a frame which supports the back
and seat sections, characterised in that the back
section is pivotable relative to the frame about an
5 axis located above the level of the seat section,
the back section being pivotable between an upright
position and a lowered position, and the seat section
is connected to the back section by a linkage which
causes the seat section to move upwards and forwards
10 as the back section is pivoted towards the lowered
position, whereby the configuration of the chair can
be altered to that of a couch when the chair is
occupied.
2. An invalid chair according to claim 1, wherein
15 the seat and back sections are pivotally connected.
3. An invalid chair according to claim 1 or 2,
wherein the linkage comprises a flexible link connected
at one end to the seat section and connected at the
other end to back section, the link extending around
20 at least one pulley mounted on the frame.
4. An invalid chair according to claim 3,
wherein, with the back section in the upright position,
the link extends from its point of attachment to the
seat section upwards and forwards to pass around a
25 first pulley mounted on the frame, backwards from
the first pulley to pass around a second pulley mounted
on the frame, and upwards from the second pulley to its

point of attachment to the back section, the point of attachment to the back section being in between the back section pivot axis and the seat section.

5 5. An invalid chair according to claim 4, wherein the flexible link is connected to a strut extending downwards from the seat section and both the pulleys are located beneath the seat section.

10 6. An invalid chair according to claim 5, wherein two flexible links are provided one on each side of the chair.

7. An invalid chair according to any one of claims 3 to 6, wherein the or each flexible link comprises a steel cable.

15 8. An invalid chair according to any preceding claim, comprising means for holding the seat and back sections in a configuration to which they have been moved, and for controlling the rate at which the chair can assume the upright position.

20 9. An invalid chair, wherein the holding and controlling means comprises a hydraulic cylinder having a bypass circuit actuation of which permits the chair to slowly assume the upright position.

25 10. An invalid chair according to any preceding claim, comprising four wheels located at respective corners of the frame, an outrigger pivotally mounted on the frame above each wheel, and a linkage inter-connecting each outrigger to a common actuating means, operation of the actuating means causing each outrigger

to pivot into contact with the surface on which the chair is supported and thereby immobilize the chair.

11. An invalid chair according to claim 11, wherein the actuating means comprises a bar extending
5 beneath the seat section and having a hand operated lever on each of its ends, the bar being linked by rods to each outrigger such that all the outriggers can be raised and lowered using a single lever.

12. An invalid chair according to any preceding
10 claim, wherein the seat section is pivotally connected to two leg support sections the angular position of which relative to the seat section can be adjusted.

13. An invalid chair according to claim 12, wherein the leg support sections are pivotally
15 connected to respective foot support sections the angular positions of which relative to the leg support sections can be adjusted.

14. An invalid chair according to claim 13, comprising releasable means linking each foot support
20 section to the seat section, the releasable means defining with the respective leg support section and the portions of the seat and foot support sections interconnecting them a parallelogram such that the foot section extends substantially parallel to the seat
25 section regardless of the orientation of the respective leg support section.

15. An invalid chair substantially as hereinbefore described with reference to the accompanying drawings.

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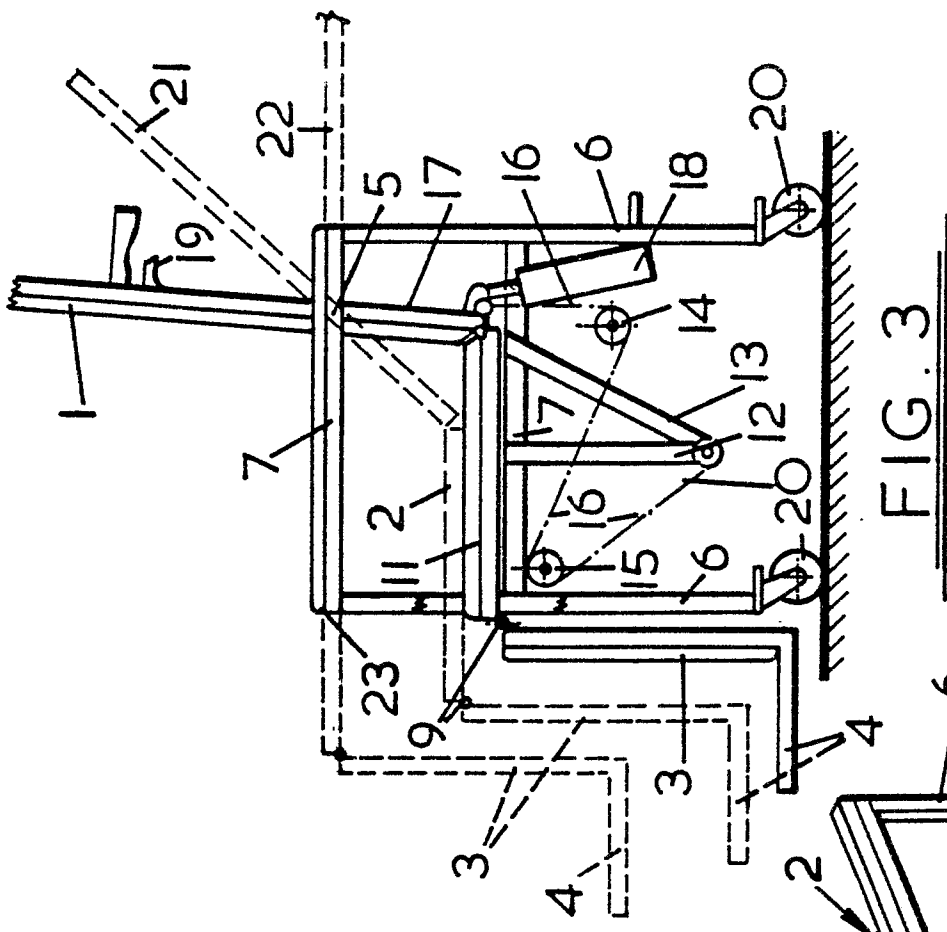


FIG. 3

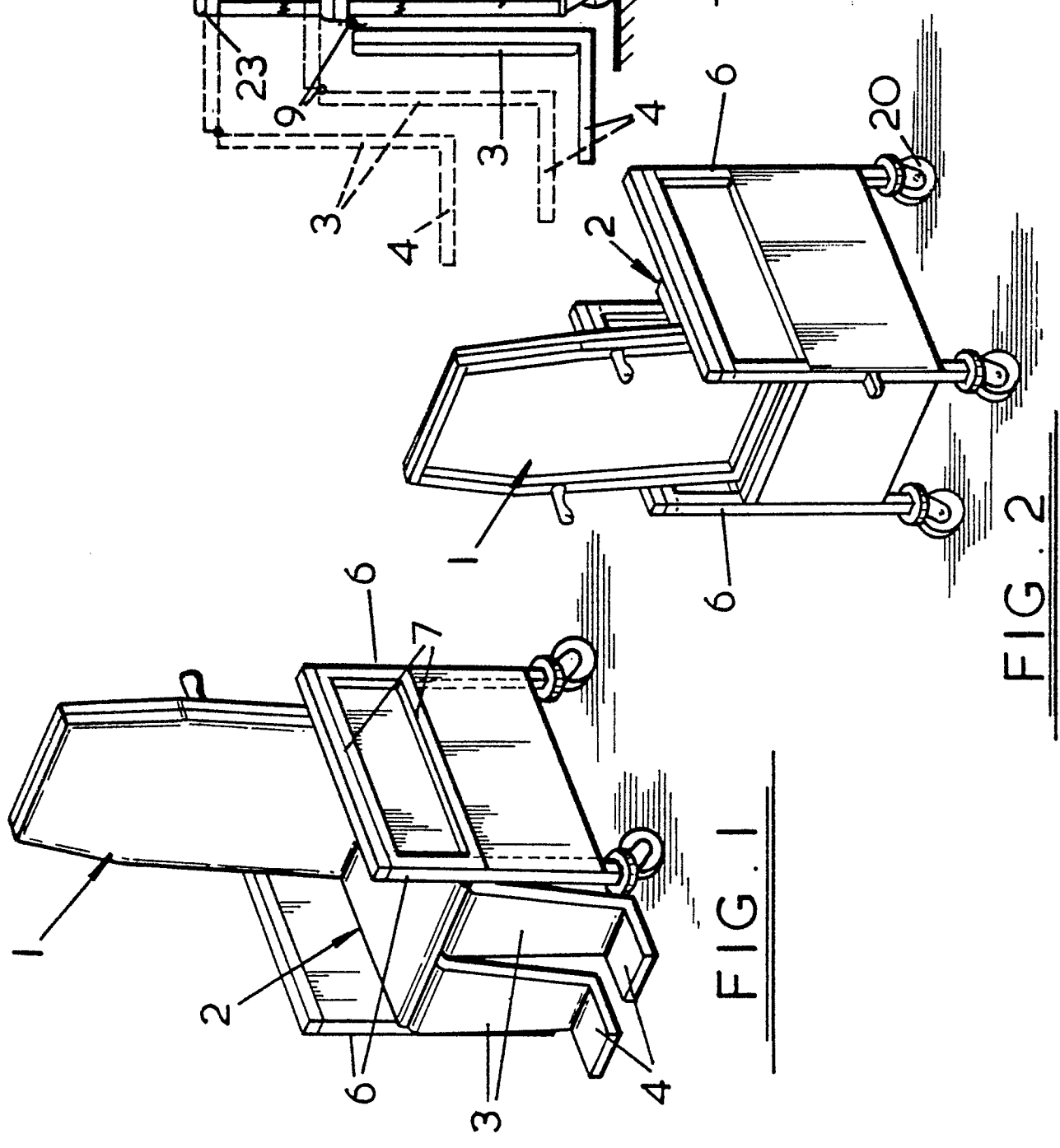


FIG. 1

FIG. 2

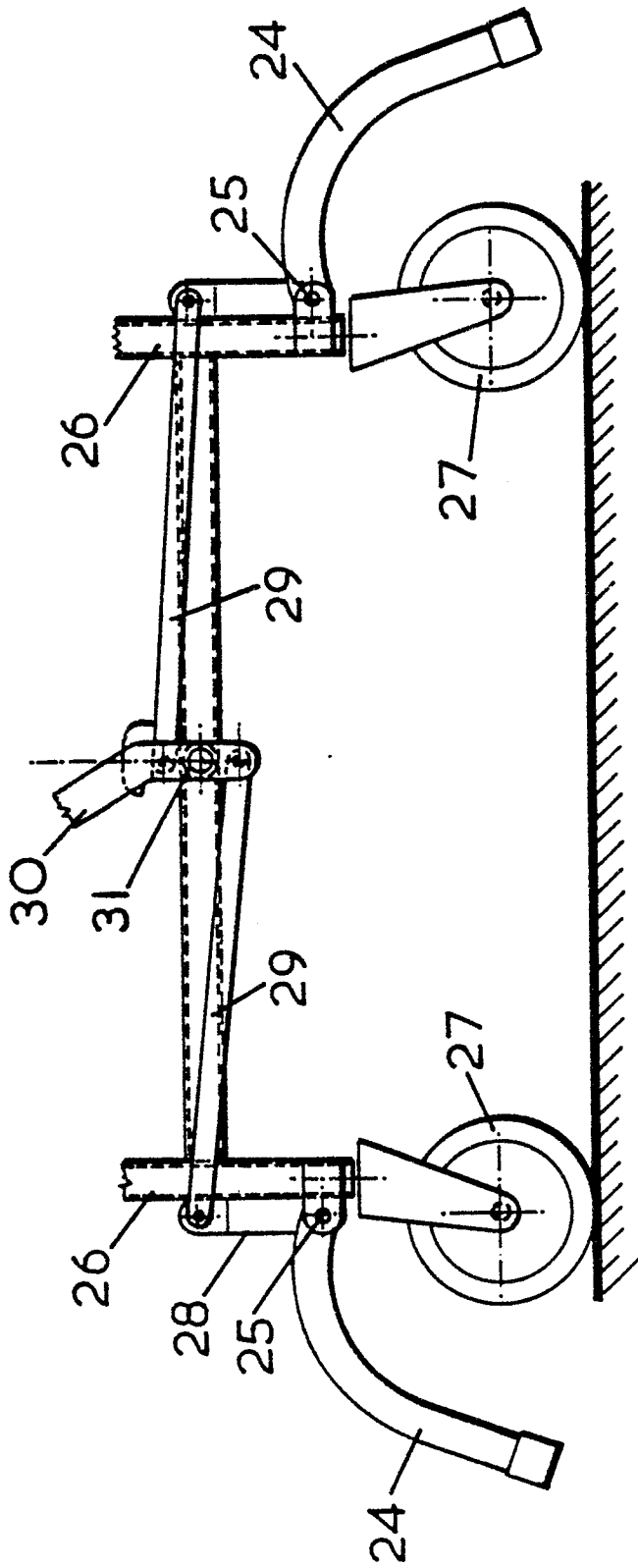


FIG. 4

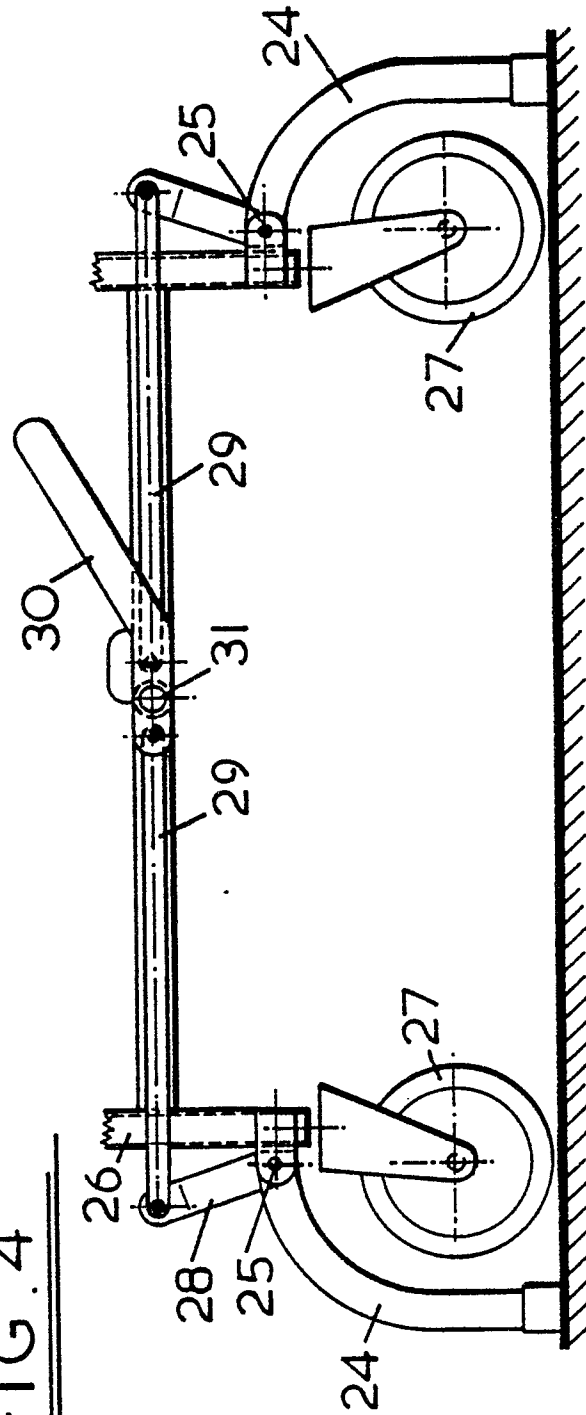


FIG. 5

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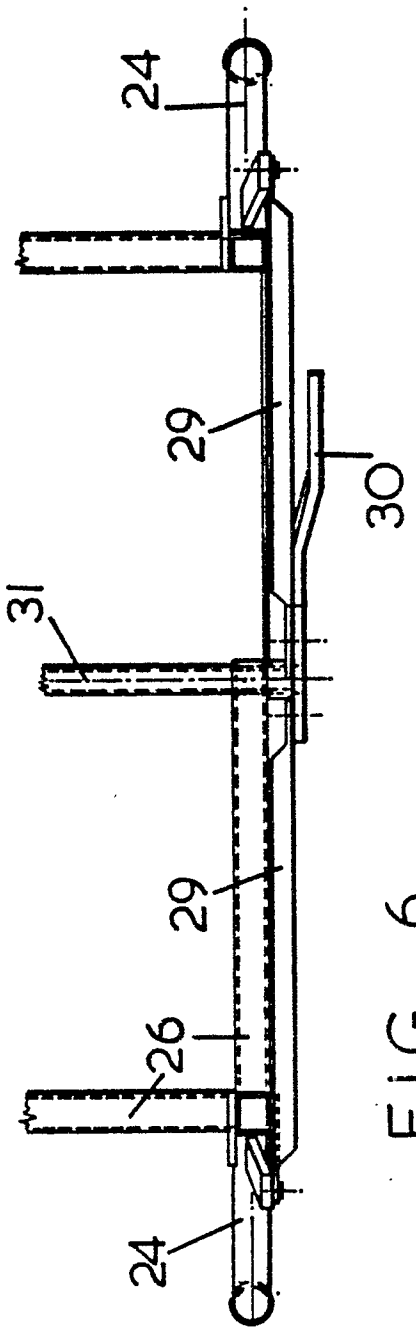


FIG. 6

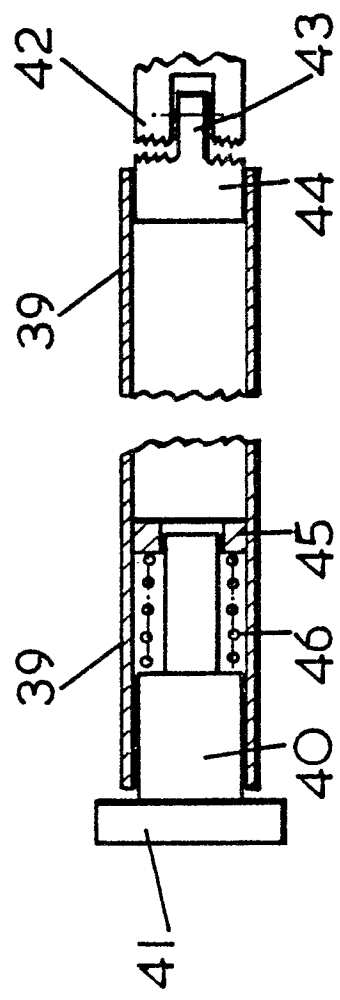
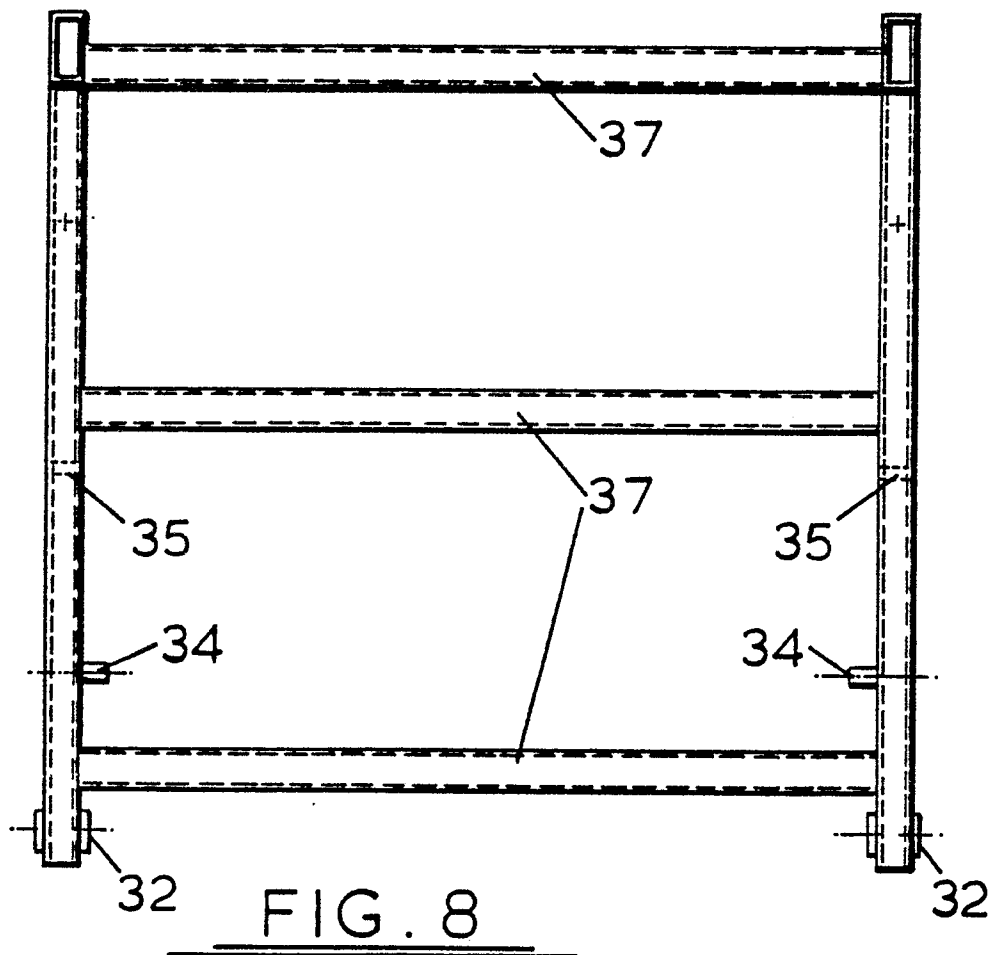
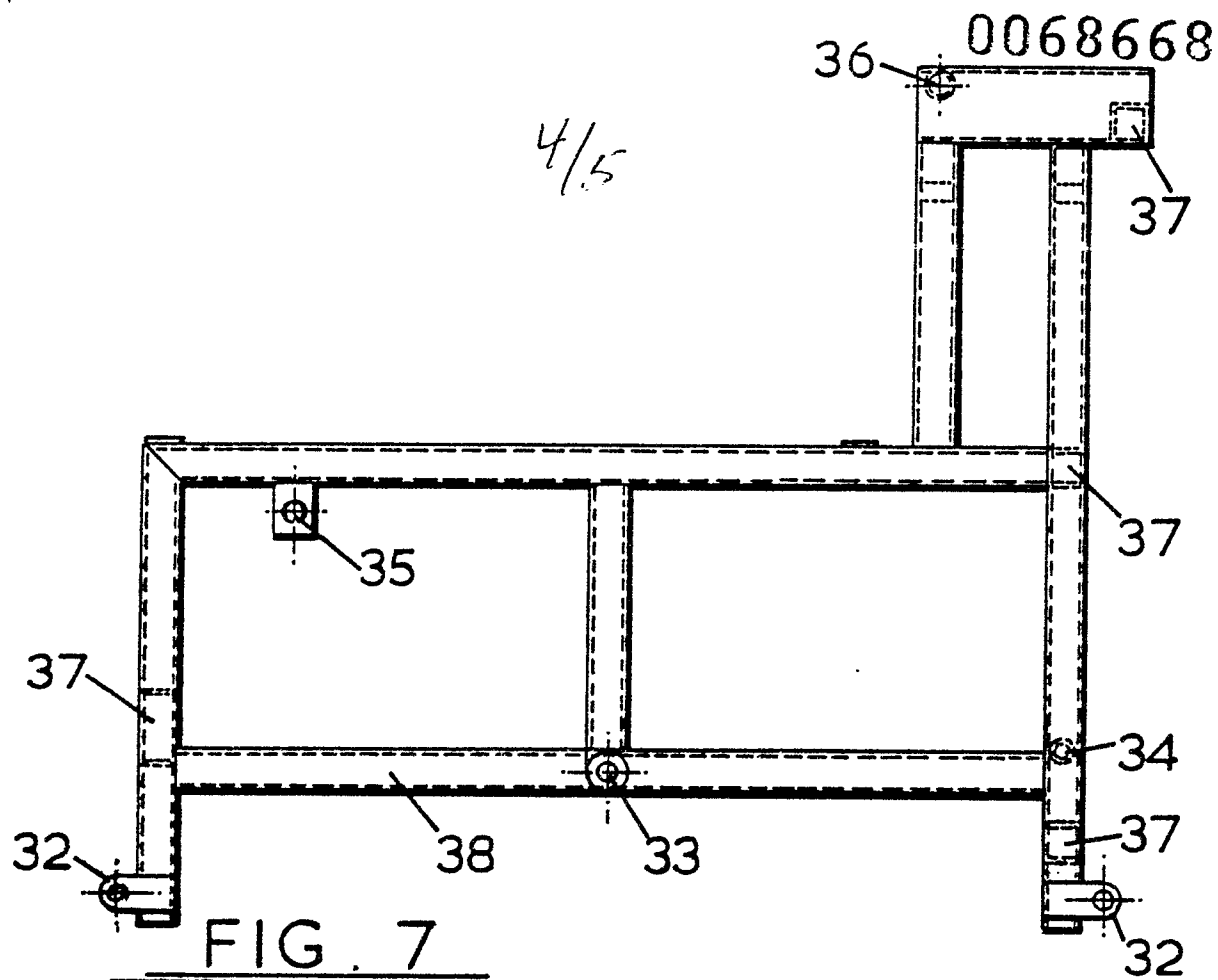


FIG. II



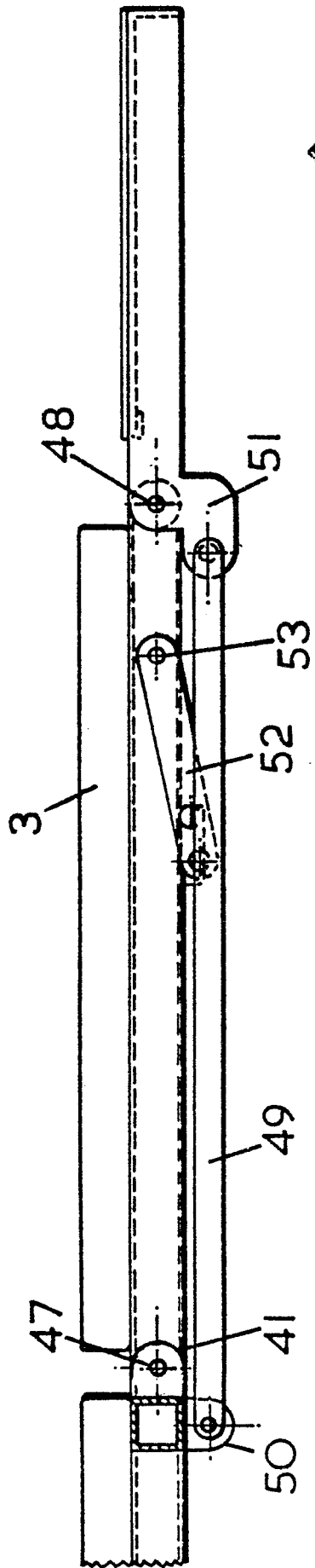


FIG. 9

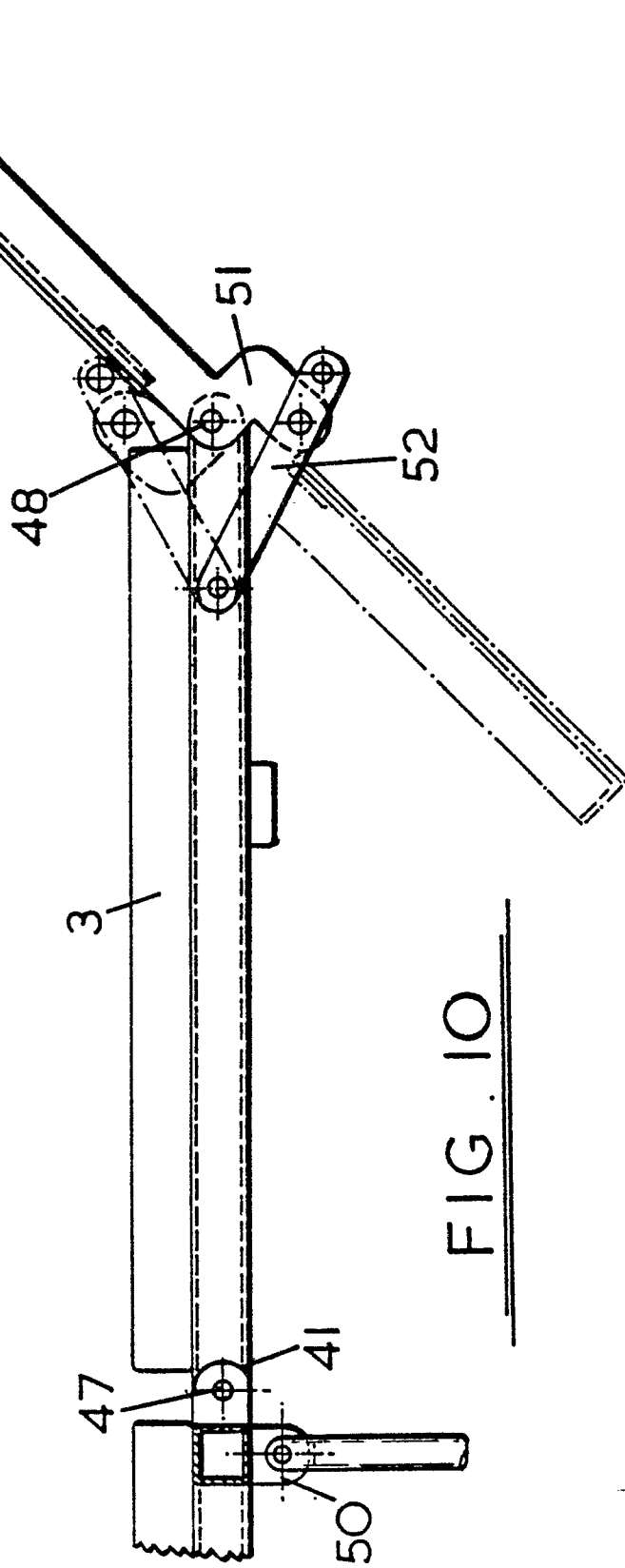


FIG. 10



European Patent
Office

EUROPEAN SEARCH REPORT

0068668
Application number

EP 82 30 2926.9

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
Y	<u>US - A - 4 119 342 (C.C. JONES)</u> * claim 1; column 5, lines 16 to 19, 34 to 36, 40 to 44, 60 to 66; fig. 5 * --	1-5	A 61 G 5/00
Y	<u>AT - B - 241 047 (D. HABSBURG-LOTHRINGEN)</u> * fig. * --	1-5	
Y	<u>GB - A - 1 099 197 (J. BUNYAN)</u> * claims 1, 3; fig. 1, 2 * --	1-5	TECHNICAL FIELDS SEARCHED (Int.Cl. ³)
Y	<u>US - A - 2 133 471 (O.F. OPPERMAN)</u> * claim 9; page 3, right-hand column, lines 9 to 18; page 4, right-hand column, lines 31 to 34; fig. 1 * --	1-5	A 47 C 1/00 A 61 G 5/00 A 61 G 7/08
A	<u>FR - A - 2 155 717 (W. MEYER)</u> * claims 1, 5; page 4, lines 16 to 28; fig. * & GB - A - 1 401 866 --	8,9	
A	<u>DE - B - 1 218 657 (N.P.E. CHRISTENSEN)</u> * fig. 1 * --	10,11	CATEGORY OF CITED DOCUMENTS
A	<u>US - A - 2 690 788 (B. AMES)</u> * claim 1; column 5, lines 5 to 13; fig. 1, 3 to 5 * -- ./...	12,13	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
☒ The present search report has been drawn up for all claims			&: member of the same patent family, corresponding document
Place of search Berlin		Date of completion of the search 11-10-1982	Examiner CLOT



DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	<u>US - A - 1 650 826</u> (E. FARGO) * fig. 1, 2 * -----	14	
			TECHNICAL FIELDS SEARCHED (Int. Cl. ³)