(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
5 June 2008 (05.06.2008)

PCT

(10) International Publication Number
WO 2008/065442 A1

(51) International Patent Classification:
A61G 1/02 (2006.01) *A61G 1/056* (2006.01)
A61G 1/013 (2006.01)

(21) International Application Number:
PCT/GB2007/050653

(22) International Filing Date: 24 October 2007 (24.10.2007)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
0624003.0 1 December 2006 (01.12.2006) GB

(71) Applicant *(for all designated States except US)*: **FERNO (UK) LIMITED** [GB/GB]; Ferno House, Stubs Beck Lane, Cleckheaton, Yorkshire BD19 4TZ (GB).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **SALEEM, Shahid** [GB/GB]; Ferno House, Stubs Beck Lane, Cleckheaton, Yorkshire BD19 4TZ (GB). **WYMAN, David** [GB/GB]; Ferno House, Stubs Beck Lane, Cleckheaton, Yorkshire BD19 4TZ (GB).

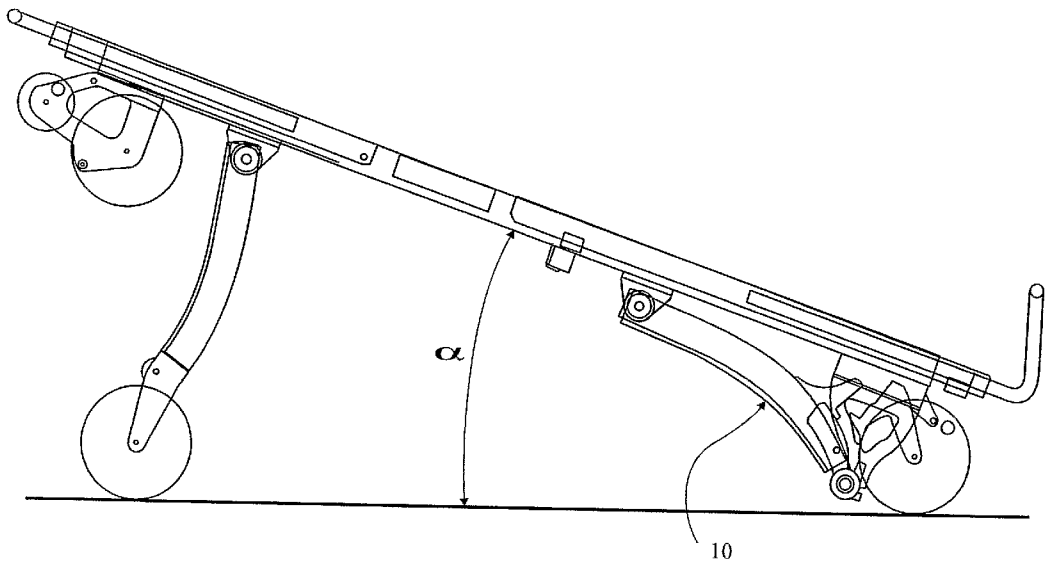
(74) Agent: **SHERRARD-SMITH, Hugh**; Appleyard Lees, 15 Clare Road, Halifax Yorkshire HX1 2HY (GB).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, MT, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

(54) Title: STRETCHER



(57) **Abstract:** Legs (3A, 3B, 3C and 3D) of a stretcher have their upper end pivotally connected to the frame and transporting wheels (24,25,26,27) located at their lower end. The legs are curved such that when they abut an ambulance upon moving into the ambulance they collapse with minimum stress being exerted about their pivotal connection to the frame. The wheels (24 and 25), in the extended position, are located forwardly of a line bending vertically downwardly from the pivot connection to the stretcher to bias the legs forwardly or in an over centre direction. When the legs are folded the wheels (24 and 25) are located between the pivotal connection of the two leg assemblies to the frame.

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Stretcher

The present invention relates to stretchers and a method of operating a stretcher.

Herein any reference to a stretcher includes a stretcher trolley.

Stretchers that have a collapsible undercarriage to ease the loading and un-loading of stretchers from an ambulance are known. So called easy loading stretchers are transported on the ambulance with the undercarriage down and with abutment with the ambulance causing the abutment to collapse upwardly.

To unload the stretcher, an operator pulls the foot of the stretcher out of the ambulance until the main wheels at the foot end are able to be lowered, by rotating about a pivot point on the patient support, into contact with the ground and locked in place. The operator then continues to pull the stretcher from the ambulance with the foot of the stretcher being supported by the extended main wheels, which are in contact with the ground, and the head of the stretcher being supported by the floor of the ambulance. Before the stretcher is clear from the ambulance, the main wheels at the head of the stretcher are lowered, by rotating about a pivot point on the patient support, and locked in place. The stretcher is then supported by both main wheels and can be moved clear of the ambulance and manoeuvred on the ground.

Loading of the stretcher into the ambulance is a reverse of the unloading. During loading or unloading the stretcher is maintained generally level.

It is known to lock the head and foot wheels in the extended or lowered position by engaging a pin in a series of holes. However, if the pin is not correctly engaged when the undercarriage takes the weight of the stretcher and patient, the undercarriage can collapse. The undercarriage can collapse either partially, where the pin engages with another hole, or totally, where the pin doesn't engage with any of the holes and the respective wheel collapses to its folded up position.

When moving stretchers into the ambulance, the leg is caused to abut the rear of the ambulance. The leg is therefore necessarily angled rearwardly in order to minimise the stress occurring at the joint between the leg and the frame of the stretcher. This results in the wheel that is attached to the leg being located rearwardly of the pivot attachment to the frame of the stretcher. Consequently considerable stress is exerted on the leg when the stretcher is being used with the leg in the extended position.

It is an object of the present invention to attempt to overcome at least one of the above or other disadvantages.

According to one aspect of the present invention a stretcher comprises:

a patient support;

at least one wheel assembly which is movable between a collapsed position and an extended position;

monitoring means; and

an indicator wherein

the monitoring means is arranged to operate the indicator whereby the indicator is arranged to give an indication of when the wheel assembly is in the extended position.

According to a further aspect of the present invention a method of operating a stretcher comprises a patient support and at least one wheel assembly that is movable between a collapsed position and an extended position, includes moving the wheel assembly towards the extended position; and monitoring with monitoring means that operate an indicator when the wheel assembly is in the extended position.

According to a further aspect the stretcher comprises

a patient support; and

at least one wheel assembly that is connected to the patient support and movable in a first direction from a collapsed position to the extended position by rotating about a pivot; wherein

when the wheel assembly is in the extended position further movement in the first direction is restricted by a control means; characterised in that

when the wheel assembly is moved from the collapsed position to the extended position, the wheel assembly moves from one side of the pivot to the other, such that the wheel assembly is urged to rotate away from the collapsed position, under the weight of the stretcher.

The control means may be attached at one end to the patient support and at the other end to the wheel

assembly. The control means may be attached to the patient support at one side of the pivot point and, when in the extended position, the wheel assembly contacts a surface on the other side of the pivot point.

The control means may be movable to a fully extended position from a partially extended position and in which the control means is in the fully extended position when the wheel assembly is in the extended position.

The control means may comprise a selectively locking means which may be releasable to allow rotation of the wheel assembly. When the selectively lockable means are released, the wheel assembly may be arranged to be biased towards the extended position by those means.

The wheel assembly may comprise at least one leg with a wheel attached at its free end region. Each leg may be non linear. The wheel assembly may include two legs and two legs may be attached by a cross member. Control means may be attached to the wheel assembly at the cross member.

The stretcher may include a forward and a rearward wheel assembly and each wheel assembly and each wheel assembly may be movable independently between a collapsed and an extended position.

The at least one wheel assembly may be the forward wheel assembly with respect to the intended direction of advancement of the stretcher into an ambulance. When in the extended position, the control means may be attached to the patient support rearward of the pivot point and the

wheel assembly contacts the ground forward of the pivot point.

The wheel assembly may be arranged to move from the extended to the collapsed position by abutment with the rear of an ambulance upon movement of the stretcher in a first direction and the wheel assembly includes at least one leg pivotally connected to the support at one end and extending towards at least one wheel at the other end which leg is arranged to effect that abutment with an upper region of the leg, in the extended position, extending downwards and rearwardly with respect to the first direction and at a second region of the leg also extending downwardly but having less of a rearwards extent than at the upper region. At the second end region, the leg may extend downwardly and forwardly.

The stretcher may include two wheel assemblies each movable about a pivot between a collapsed and an extended position in which the wheels of each assembly support the stretcher and in which, in the extended position, the distance between the pivots of each assembly is less than the distance between the rotational axes of the wheels of each assembly.

According to another aspect of the present invention, a stretcher comprises a patient support and at least one wheel assembly connected to the patient support and movable between a collapsed position and an extended position, the wheel assembly being arranged, in use, to be moved from the extended position to the collapsed position by abutment with the rear of an ambulance upon movement of the stretcher in a first direction into an ambulance

characterised in that the wheel assembly includes at least one leg pivotally connected to the support at one end and extending towards at least one wheel at the other end which leg is arranged to effect that abutment with an upper region of the leg, in the extended position extending downwardly and rearwardly with respect to the first direction and at a second region also extending downwardly but having less of a rearwards extent than the upper region.

The second region may extend downwardly and forwardly.

The leg may be curved along at least part of its extent. In the extended position a pivot axis of the wheel may be located forwardly of pivotal connection of the leg to the support.

Two wheel assemblies may be spaced from each other in the longitudinal extent of the stretcher each having the features as herein referred to.

The stretcher may include two wheel assemblies each being movable about a pivot between a collapsed and an extended position and each having at least one wheel in which, in the extended position, the distance between the pivots of each assembly is less than the distance between the axes of each assembly.

When the wheel assembly moves from the collapsed to the extended position, the axis of rotation of a wheel of the assembly may move from one side of a line extending downwardly from the pivot to the other side.

According to a further aspect of the present invention, a stretcher comprises a patient support and a pair of wheel assemblies spaced from each other with respect to the longitudinal extent of the stretcher each wheel assembly being movable about a pivot between a collapsed position and an extended position in which wheels of each assembly support the stretcher characterised in that, in the extended position, the distance between the pivots of each wheel assembly is less than the distance between the rotational axes of the wheels.

The ratio of the distance between the axes and distance between the pivots may be greater than 10:9 or 10:8 or in the region of 10:7.5.

When each wheel assembly moves from the extended position to the collapsed position, each wheel assembly may move about the pivot in the same direction and the wheels of one assembly move upwardly and towards the pivot of the other assembly with those wheels remaining between the pivots of each assembly with respect to the longitudinal direction, when in the collapsed position.

At least one wheel assembly may include at least one leg that is pivotally connected to the support at one end that extends towards the or each wheel at the other end with an upper region of the leg, in the extended position, extending downwardly and rearwardly with respect to the direction of forwards movement of the stretcher into an ambulance and, at a second region, also having a downwards extent with less of a rearwards extent than the upper region. The second region may extend downwardly and forwardly.

When the wheel assembly moves from the collapsed position to the extended position, the axis of a wheel from one assembly may move from one side of a line extending vertically down from the pivot to the other side of the pivot.

The present invention is defined in the claims or elsewhere in the specification.

Further features are described in the claims appended hereto.

The present invention shall now be described by way of example and with reference to the following drawings in which:

Figure 1 is a perspective view of a stretcher according to the first embodiment of the present invention.

Figure 2 is a side perspective view of the stretcher with the undercarriage in an extended position.

Figure 3 is a side perspective view of the stretcher with the undercarriage in a collapsed position.

Figure 4 is a side view of the stretcher in a mid transition position.

Figure 5 is a perspective view of the stretcher with part of the patient support removed for clarity.

According to the first embodiment and as shown in Figure 1, a stretcher 1 includes: a patient support 2, which comprises a mattress 4 and frame 6; a forward wheel assembly 8 at the head end; and a rearward wheel assembly 10 at the foot end. The forward 8 and rearward 10 wheel assemblies are mounted on the frame 6 by pivots 13 and 14 respectively. Assisted gas struts 16 and 18 control the movement of the wheel assemblies. The struts are pivotally mounted at one end to the frame 6 and to the respective wheel assembly at the other end. Left 40 and right 42 levers are operable to allow the forward and rearward struts to extend or contract. When the levers are not operated the struts are locked such that they can not extend or contract.

The stretcher is shown with the wheel assemblies in an extended position in Figure 2. The forward wheel assembly 8 is attached to the frame 6 at vertical plane A-A. The wheel assembly is in contact with the ground at vertical plane B-B. Plane B-B is forward of the pivot point, which creates a bending moment that urges the forward wheel assembly away from a collapsed position. The forward wheel assembly is restrained from moving further by the extended strut 16. The forward strut 16 is attached to the frame 6 at vertical plane C-C, which is rearward of the pivot point.

The forward and rearward wheel assemblies each include two legs 3A;3B: 3C,3D spaced apart and interconnected by top and bottom cross-members 20, 21 and 22, 23. The struts are attached to the wheel assemblies mid way across the top cross member 21, 23. The legs are bent or curved towards the head of the stretcher. The top of each leg is

pivotally connected to the frame and wheels 24, 25, 26, 27 are attached to the bottom free end of each leg. The legs of the rearward wheel assembly also include mini-wheels 30, 31. Forward of the front wheel assembly's pivot point and located on either side of the frame 6. Towards the head of the stretcher are small 32 and large 34 transfer wheels. The transfer wheels are spaced closely to and supported by the frame 6 such that they provide support to the front end of the stretcher during loading onto and unloading from an ambulance as will be herein described.

With the wheel assemblies in the extended position, the stretcher is manoeuvred about the ground by an operator at the rearward end. The struts stop the wheel assemblies from rotating. In the event that pressure in the forward strut 16 is lost, the natural bending moment prevents the wheel assembly from collapsing rearwardly. The maximum extent of the strut restricts the wheel assembly from rotating forwardly.

The stretcher is loaded onto an ambulance by the operator pushing the stretcher into the ambulance until the larger transfer wheels 34 are in contact with the floor of the ambulance. Depending on the height of the ambulance floor from the ground, the small transfer wheel 32 may engage with the ambulance floor first. When the large transfer wheels 34 support the head end, the operator may push the lever 42 on one side of the foot end. The lever 42 releases pressure in the forward strut 16 thereby unlocking the assembly. As the stretcher is pushed further into the ambulance, the legs of the forward wheel assembly 8 abut a bumper of the ambulance and, with the lever operated such that the forward wheel assembly is

free to rotate, the wheel assembly rotates rearwardly to a collapsed position. The lever 42 can then be released, which locks the forward strut 16 and therefore retains the forward wheel assembly 8 in the collapsed position.

With the head end of the stretcher supported by the large transfer wheel 32 and the forward wheel assembly in the collapsed position, the operator can push the stretcher further into the ambulance until the rearward wheel assembly 10 abuts the ambulance's bumper. At this point, the operator may push the lever 40 on the other side of the foot end, which releases pressure in the rearward strut 18 thereby unlocking the assembly. With the rearward wheel assembly 10 free to rotate, the operator supports the foot end and further pushes the stretcher into the ambulance. Abutment with the bumper as the stretcher moves forwardly causes the reward wheel assembly 10 to rotate rearwardly to a collapsed position. The lever 40 can then be released.

The curved nature of the legs 3A, 3B, 3C, 3D assists in the collapse of the wheel assembly since, during loading on to an ambulance, the bumper initially abuts an extent of the wheel assembly that is angled downwardly and rearwardly. This reduces the force imparted on the wheel assembly.

The position of the mini wheels 30, 31 and the curved nature of the legs creates an advantageous force on the rearward wheel assembly. The force acts to urge the rearward wheel assembly towards the patient support, when the stretcher is supported by the transfer wheels and mini wheels. Furthermore, the curved nature of the legs

enables there to be no overlap of the wheel assemblies when in the collapsed position, as shown in Figure 3, without comprising the wheel base when in the extended position

Figure 3 shows the stretcher with the two wheel assemblies in the collapsed position, which is how the stretcher is arranged when loaded onto the ambulance. The stretcher is supported by the large transfer wheels 34, the mini wheels 30, 31, and the wheels 24, 25.

The stretcher is unloaded from the ambulance by an operator who supports the foot end whilst pulling the stretcher from the ambulance. When the rearward wheel assembly 10 is clear of the ambulance, the operator releases the rearward struts 18 by operating lever 42. The rearward wheel assembly rotates to the extended position under a combination of gravity and possibly also residual pressure in the gas strut. When in the extended position the lever is released and the strut locks the wheel assembly in the extended position. The operator continues to pull the stretcher from the ambulance, with the foot end supported by the reward wheel assembly and the head end supported by the large transfer wheels 34 in contact with the ambulance. When the forward wheel assembly 8 is clear of the ambulance, the lever 40 is operated to unlock the strut 16 thus allowing the wheel assembly to rotate downwards, under gravity and possibly residual pressure in the gas strut, to the extended position.

The levers 42 and 40 are colour coded to relate to the front and rear wheel assemblies respectively. This

assists the operator in identifying the correct lever to operate at the correct time.

Figure 5 shows the stretcher arranged in a mid transition position. The stretcher is unloaded from the ambulance as above and manoeuvred about the ground to a location adjacent to a patient. Where the patient is already standing, the patient may be transferred in to the stretcher by collapsing the rearward wheel assembly 10, such that the stretcher is arranged in the mid transition position. The patient may then sit on the stretcher before twisting about their bottom to a lying position. The rearward foot end of the stretcher can then be lifted and the wheel assembly 10 extended.

The foot end of the stretcher is lowered to the floor by operating lever 40 and thereby releasing the pressure in the strut. When the pressure is released, the operator supports the foot end and lowers it. When the rearward wheel assembly 10 is fully collapsed, the lever is released and the wheel assembly locked in position. In the mid transition position the stretcher remains supported by wheels 24, 25, 26, 27, however, the frame 6 and mattress 4 are arranged at an incline. The incline is approximately 20°.

The patient approaches the stretcher in the mid-transition position from a side. With their back to the stretcher the patient adopts a sitting position on the inclined mattress with their legs overhanging the side of the stretcher. The patient's legs are then swung on to the stretcher, allowing the patient to then lie on the inclined mattress with the patient lying on the stretcher,

the stretcher can be returned to a horizontal arrangement wherein both the wheel assemblies are extended. To do this, the foot of the stretcher can then be raised before the lever 40 is operated thereby allowing the rearward wheel assembly to rotate downwardly. Alternatively, the lever 40 may be operated as the foot end is lifted such that the rearward wheels remain in contact with the ground.

Figure 5 shows the stretcher with the mattress 4 removed. Forward 44 and rearward 46 detection systems can be seen. Each detection system includes a detector 48 and magnet 50. The detector 48 is attached to the frame 6 of the stretcher. The magnet 50 is attached to the top cross members 21, 23 of each wheel assembly. The detector 48 detects when the magnet 50 is in close proximity to the detector. The detector and magnet are arranged to be in close proximity when the wheel assemblies are in the extended position. As the wheel assemblies rotate towards the collapsed position, the magnet moves away from the detector, such that it is not in close proximity and the detector does not detect the magnet.

The forward 44 and rearward 42 detection systems control indicators 52 and 54 respectively. The indicators are positioned on the frame towards the foot end and on either side such that they correspond with the forward and rearward levers 42, 40 respectively. The indicators are coloured lights, for instance red lights, and are coloured to correspond to the lever colours.

The lights may be controlled to be on when the detector detects the magnet. Alternatively, they may be on when

the detector does not detect the magnet or they may flash on and off either when the detector detects or does not detect the magnet. In an alternative embodiment the indicators may be audible alarms or both available and visual alarms.

In a further embodiment of the present invention the detection system of a stretcher, which is substantially as herein described, comprises a micro-switch that is mechanically triggered by a portion of each wheel assembly to indicate when the wheel assembly is in the extended position.

When the operator is loading/unloading the stretcher from an ambulance or manoeuvring the stretcher in the extended position, the indicators enable the operator to identify when the wheel assemblies are in the extended position and to adjust his actions accordingly.

The present invention has various advantages over current stretchers. These advantages include providing an increased wheel base when in the extended position, which increases the stability of the stretcher. For example, the present invention can be arranged to provide a wheel base of approximately 1006mm but with the two pivots 13-14 being spaced apart by approximately 760 mm.

Attention is directed to all papers and documents which are filed concurrently with or previous to this specification in connection with this application and which are open to public inspection with this

specification, and the contents of all such papers and documents are incorporated herein by reference.

All of the features disclosed in this specification (including any accompanying claims, abstract and drawings), and/or all of the steps of any method or process so disclosed, may be combined in any combination, except combinations where at least some of such features and/or steps are mutually exclusive.

Each feature disclosed in this specification (including any accompanying claims, abstract and drawings) may be replaced by alternative features serving the same, equivalent or similar purpose, unless expressly stated otherwise. Thus, unless expressly stated otherwise, each feature disclosed is one example only of a generic series of equivalent or similar features.

The invention is not restricted to the details of the foregoing embodiment(s). The invention extends to any novel one, or any novel combination, of the features disclosed in this specification (including any accompanying claims, abstract and drawings), or to any novel one, or any novel combination, of the steps of any method or process so disclosed.

CLAIMS

1. A stretcher comprising:

a patient support;

at least one wheel assembly which is movable between a collapsed position and an extended position;

monitoring means; and

an indicator wherein

the monitoring means is arranged to operate the indicator whereby the indicator is arranged to give an indication of when the wheel assembly is in the extended position.

2. A stretcher as claimed in Claim 1 in which the at least one wheel assembly is connected to the patient support and movable between the two positions by rotating about a pivot point.

3. A stretcher as claimed in Claim 1 or 2 in which the wheel assembly is restricted in the extended position by a control means.

4. A stretcher as claimed in any of Claims 1 to 3 in which the monitoring means includes a magnet.

5. A stretcher as claimed in Claim 4 in which the magnet is arranged on the wheel assembly and is spaced from the pivot point.

6. A stretcher as claimed in any of Claims 1 to 5 in which the indicator is a light.

7. A stretcher as claimed in Claim 6 in which the light is arranged to be on when the wheel assembly is in the extended position.

8. A stretcher as claimed in Claim 6 or 7 in which the light is arranged to be on when the wheel assembly is in the collapsed position.

9. A stretcher as claimed in any of Claims 1 to 8 in which the light is arranged to be intermittently on when the wheel assembly is in the extended position.

10. A stretcher as claimed in any of Claims 6 to 9 in which the light is arranged to be intermittently on when the wheel is in the collapsed position.

11. A stretcher as claimed in any of Claims 1 to 10 in which the indicator is an audible alarm.

12. A stretcher as claimed in any of Claims 1 to 11 in which the stretcher comprises at least two wheel assemblies.

13. A stretcher as claimed in Claim 12 in which each wheel assembly includes a monitoring means and an indicator arranged to give an indication of when their respective wheel assemblies are in the extended position.

14. A stretcher as claimed in Claim 12 or 13 in which the wheel assemblies are independently movable between the two positions.

15. A stretcher as claimed in any of Claims 12 to 14 in which the stretcher includes an indicator for each wheel assembly at a common end region of the stretcher.

16. A method of operating a stretcher, which comprises a patient support and at least one wheel assembly that is movable between a collapsed position and an extended position, includes moving the wheel assembly towards the extended position; and monitoring with monitoring means that operate an indicator when the wheel assembly is in the extended position.

17. A method as claimed in Claim 16 comprising operating the stretcher by continuing to monitor that the wheel assembly is in the extended position by monitoring the indicator.

18. A method as claimed in Claim 16 or 17 including manoeuvring the stretcher with the wheel assembly in the extended position.

19. A method as claimed in any of Claims 16 to 18including periodically monitoring the indicator to ensure the wheel assembly is in the extended position.

20. A method as claimed in any of Claims 16 to 19 including ensuring that the wheel assembly is in the extended position by viewing an indicator.

21. A method as claimed in any of Claims 16 to 20 including monitoring that the wheel assembly is in the extended position by hearing an indicator.

22. A method as claimed in any of Claims 16 to 21 comprising two wheel assemblies that are each movable between the two positions, the method including two monitoring indicators with monitoring means for each assembly, each monitoring means operating a different indicator when the respective wheel assemblies are in the extended position.

23 A method of operating a stretcher when the stretcher is as claimed in any of Claims 1 to 15.

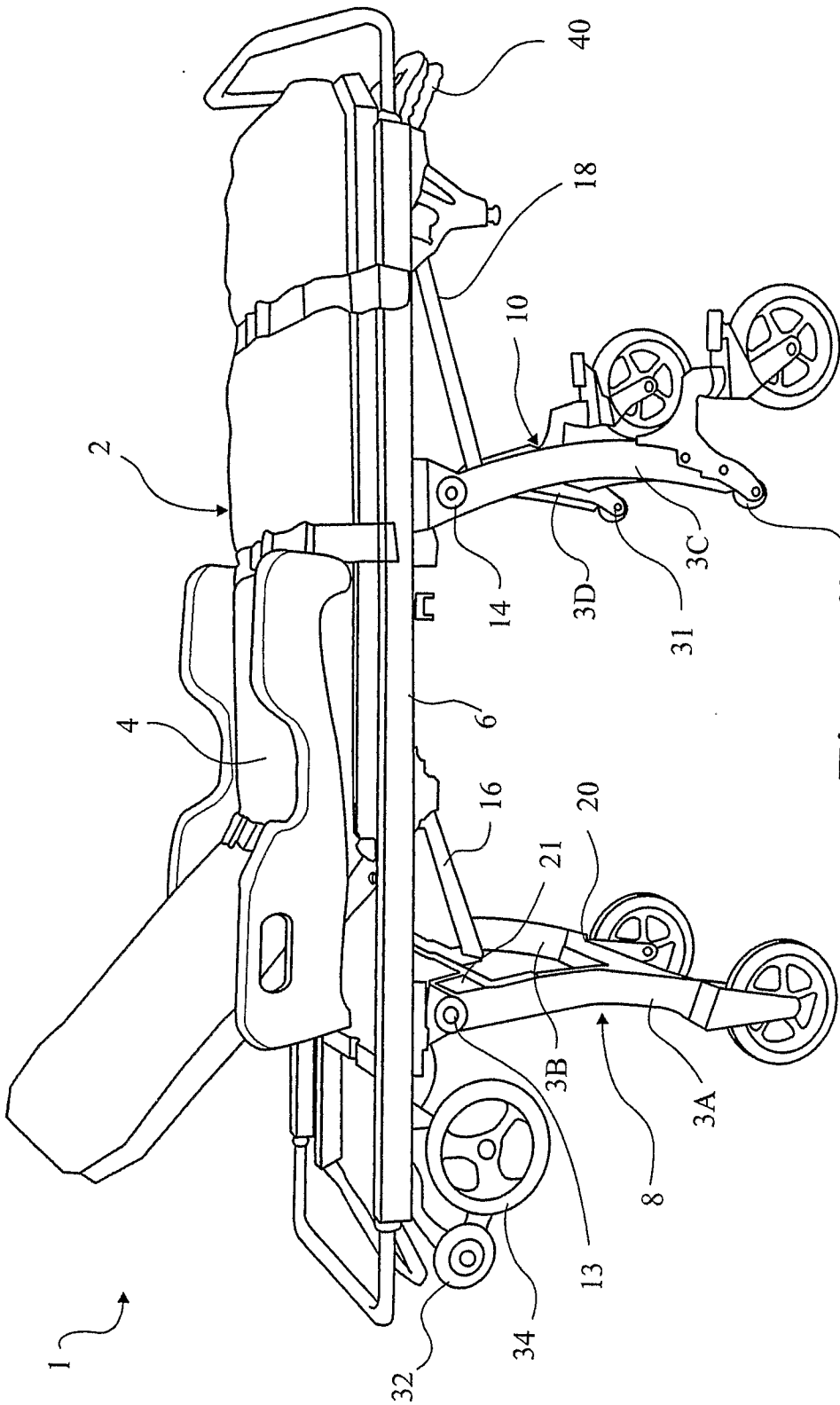

Fig. 1

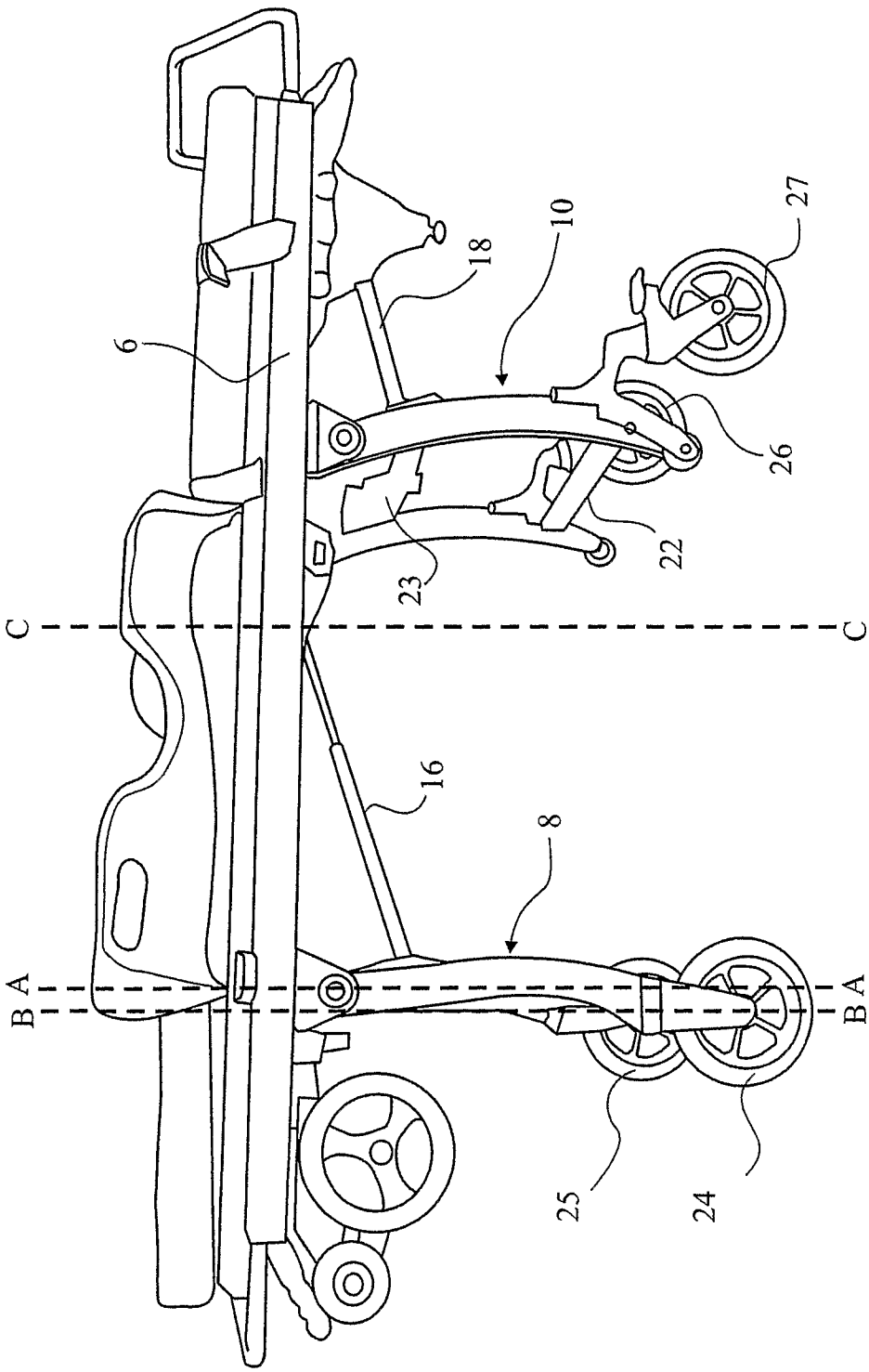

Fig. 2

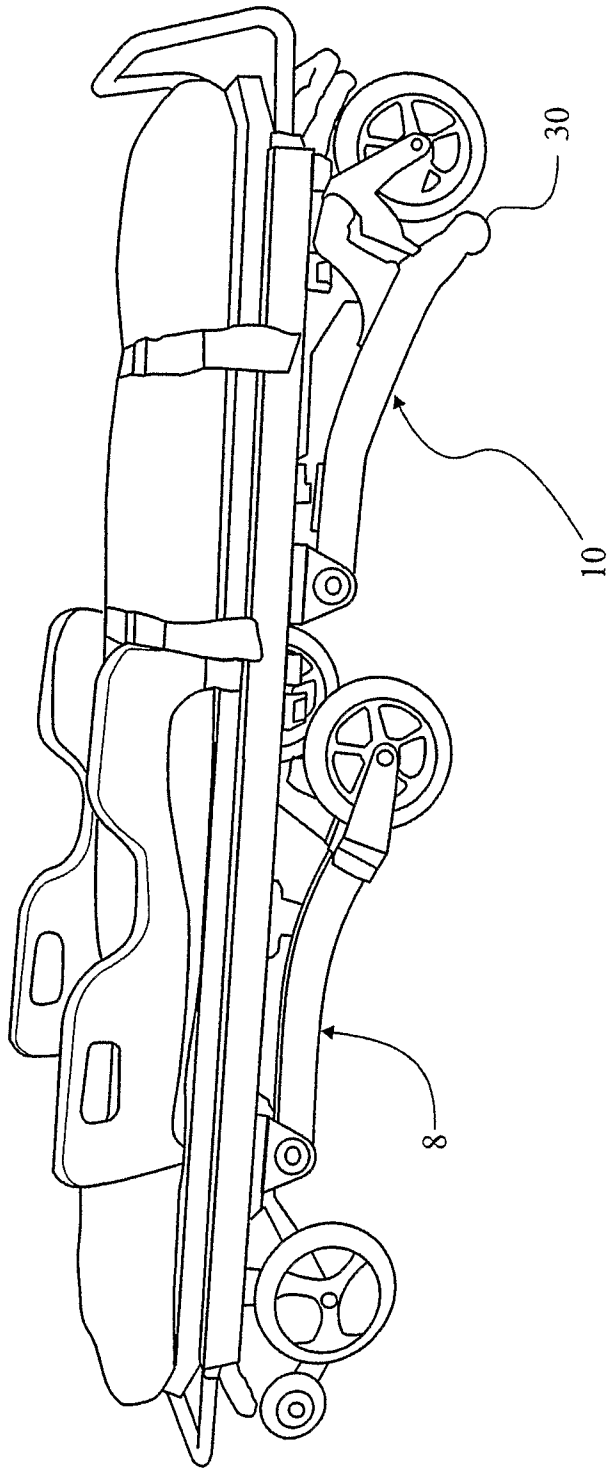

Fig. 3

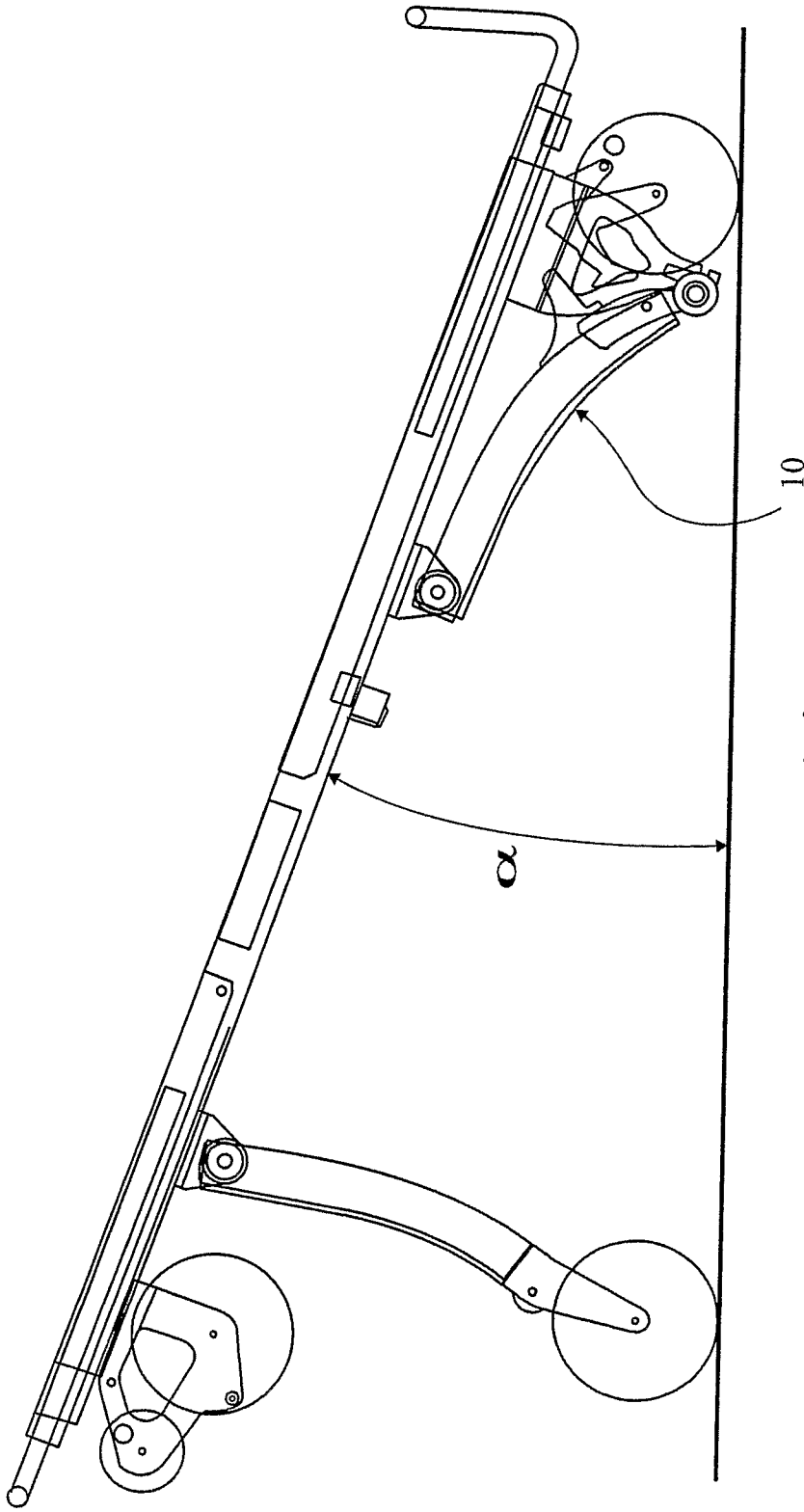

Fig. 4

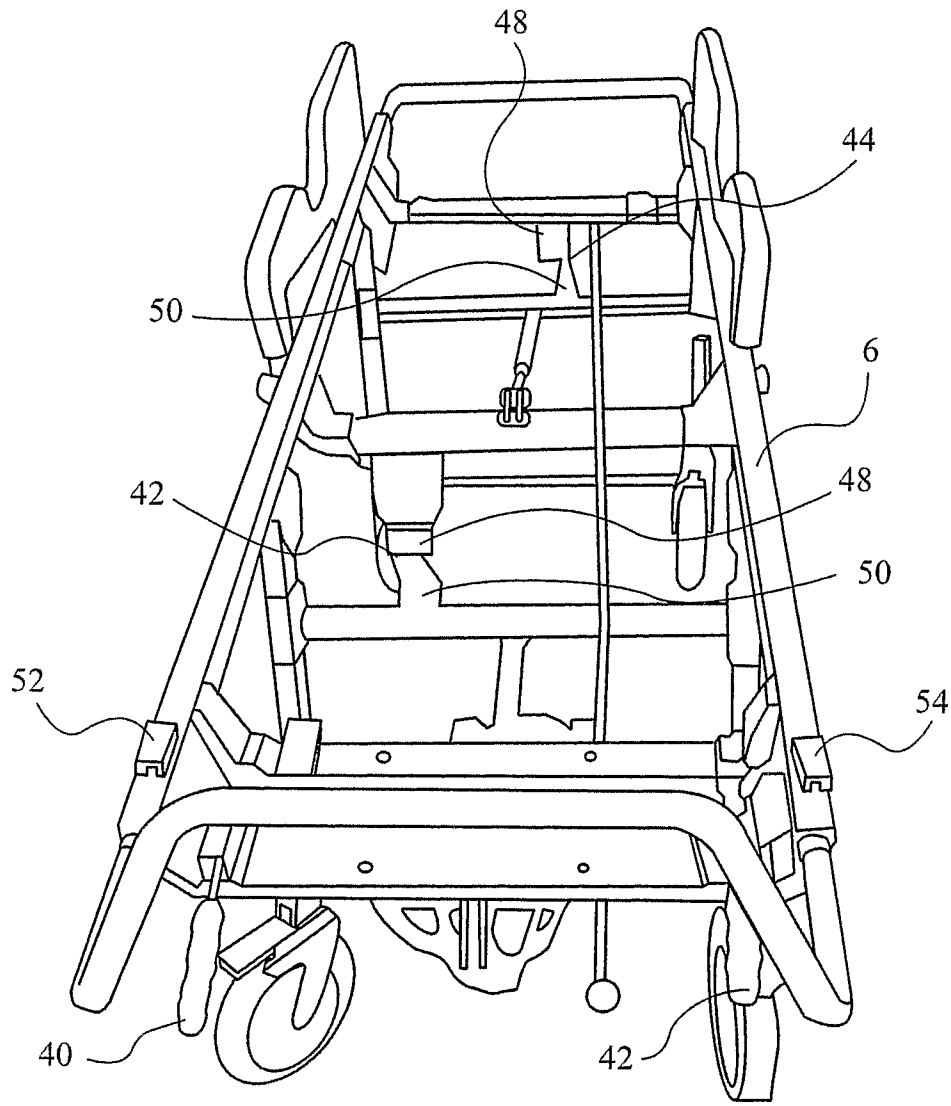

Fig. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2007/050653

A. CLASSIFICATION OF SUBJECT MATTER
INV. A61G1/02 A61G1/013 A61G1/056

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A61G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/036980 A (STRYKER CORP [US]; LAMBARTH CLIFFORD E [US]; SOUKE CHAD [US]; GATTO TO) 6 April 2006 (2006-04-06) paragraphs [0002], [0085], [0086]; figures 1,3,26	1-6,11, 16,18,23
X	FR 2 800 344 A (CONTACT SECURITE [FR]) 4 May 2001 (2001-05-04) page 5, lines 4-32 page 6, lines 21-23 page 7, line 35 - page 8, line 17 page 9, lines 32-35; figure 1	1-3, 12-20, 22,23

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[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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Date of the actual completion of the international search	Date of mailing of the international search report
7 March 2008	18/03/2008

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL – 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Petzold, Jan

INTERNATIONAL SEARCH REPORT

International application No
PCT/GB2007/050653

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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