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(54) **INTELLIGENT HOSPITAL BED AND METHOD FOR OPERATING SAME**

(57) The invention relates to an intelligent hospital bed comprising a lower main frame (1) and an upper frame (2) articulated to said lower main frame provided with movable parts, in which there is arranged a mattress (22) provided with several foldable sections, including a plurality of sensors arranged along the mattress (22) capable of measuring the initial force on the point at which the corresponding sensor is arranged, which sensors are interconnected to one another and associated with a control unit which controls servo-motors used for moving the movable parts of the upper frame (2) such that when a sensor detects a movement of the user in real time, a servo-motor which is associated with a corresponding sensor or a combination of sensors (S) moving at least one of the movable parts of the upper frame (2) is actuated.

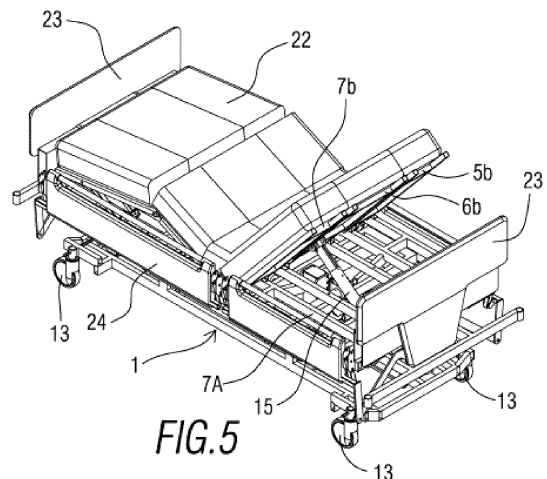


FIG. 5

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Description

Object of the Invention

[0001] The present invention patent application is aimed at the registration of an intelligent hospital bed and a method for operating same incorporating remarkable innovations and advantages.

[0002] More specifically, the invention proposes the development of an interactive hospital bed which allows improving the quality of life both of the patient lying on the bed and of the healthcare personnel as it detects the movements of the patient lying on the bed.

Background of the Invention

[0003] Positioning patients with reduced mobility on beds in health care centers is of great importance to prevent impairing health and to improve comfort during treatment.

[0004] The lack of autonomy to perform basic movements and posture changes may cause distress and discomfort in a patient which could negatively influence his/her health.

[0005] A wide variety of beds provided with a mechanism which can be electrically actuated allowing performing certain movements in an automated manner, such as raising-lowering or inclining a horizontal section of the bed itself, being actuated by means of a push button or remote control system which can be actuated by the user him/herself or by healthcare personnel in the case of a patient with reduced mobility, is known today.

[0006] However, despite the advantages of such electric beds, nurses must manually change the position of the patient every 2 or 4 hours according to the situation of the patient, for example, for drug administration, cleaning, etc. Constant and prolonged manual handling of patients by healthcare personnel can cause back pains in the latter that may result in a sick leave with the subsequent economic losses. Furthermore, another equally significant drawback is that in all the known actuation mechanisms there is always a need for actuation by the patient him/herself or healthcare personnel using push buttons, such that there is a need to find a system or device providing the patient with a higher degree of autonomy when moving the bed.

Description of the Invention

[0007] The present invention has been developed for the purpose of providing a hospital bed solving the aforementioned drawbacks, further providing other additional advantages which will be evident from the description attached below.

[0008] Therefore, an object of the present invention is to provide an intelligent hospital bed of the type comprising a lower main frame and an upper frame articulated to said main frame provided with movable parts, in which

there is arranged a mattress provided with several foldable sections. More particularly, said bed is characterized in that it includes a plurality of sensors arranged along the mattress capable of measuring the initial force on the point at which the corresponding sensor is arranged. These sensors, connected by means of a data multiplexing system to minimize internal wiring, are associated with a control unit which controls servo-motors used for moving the movable parts of the upper frame, such that when a sensor detects a movement of the user in real time, a servo-motor associated with a corresponding sensor moving one of the movable parts of the mentioned upper frame is actuated. Such sensors generate complete pressure images of the patient which are analyzed in real time by means of specific intelligent software based on automatic learning and image processing techniques for the purpose of interpreting the patient's intentions from very small movements. The software thus decides whether the patient wants to sit up, lean back, turn over onto one side or the other or stay in the current position as a result of analyzing the evolution of the characteristics of the patient extracted from the information provided by the sensors.

[0009] In this specification, a servo-motor is understood as an assembly formed by an electric motor and a piston-cylinder which can be actuated by said electric motor.

[0010] Therefore, the objective of the invention is to design a specialized hospital bed with a functionality from the functional point allowing patients with reduced mobility to change their position on the bed without needing the intervention of hospital personnel, providing greater comfort for the patient or due to the needs of the treatment that must be received by the patient on account of his/her disease. One actuation system will change the bed configuration with respect to the side and seated positions of the patient, several positions having been provided.

[0011] A support system based on an intelligent detection system which allows interpreting the movement of the patient and activating the system of motors has been proposed as a result. Another equally significant advantage is that it prevents the need of having remote controls and provides more autonomy to the patient since the bed can move without needing healthcare personnel.

[0012] This hospital bed is especially useful for elderly patients who may have greater movement limitations.

[0013] Pressure sensors preferably comprise the plurality of sensors.

[0014] In order for the patient (or user) to get out of bed in a considerably upright position, at one end of the bed there is provided at least one bar articulated on one side to the lower main frame and at the other end to the lower assembly of the upper frame which can follow an angular trajectory, whereas at an opposite end of the bed there is provided at least one bar which is articulated at one end to the lower main frame and has at its opposite end wheels which can slide on guides located in the lower assembly of the upper frame. These two bars can be

actuated by means of servo-motors.

[0015] Advantageously, the lower assembly includes a raising/lowering mechanism articulated to a central support part of the lower assembly which allows moving said central support part, and therefore the mattress, linearly up/down, raising/lowering mechanism being controlled by a servo-motor.

[0016] According to another aspect of the present invention, the aforementioned raising/lowering mechanism can have a rectangular framework provided with two sets of wheels, each of the sets being in opposite crosspieces of the rectangular framework, which wheels are placed on guide rails located transversely with respect to the longitudinal axis of the lower assembly. The central support part can thus move transversely with respect to the longitudinal plane of the bed.

[0017] Furthermore and advantageously, the aforementioned lower assembly of the bed can be articulated to the lower main frame by means of a servo-motor, such that it allows tilting said lower assembly with respect to the longitudinal axis of the lower main frame in both directions.

[0018] Another object of the present invention is to provide a method for operating a hospital bed such as that described above which comprises the steps of:

- obtaining a map of pressure images from the data obtained by each sensor;
- segmenting the pressure images;
- calculating the characteristics of each of the image segments;
- obtaining a relative difference of each of the characteristics of the patient with respect to the map of pressure images; and
- recognizing the patient's intention to move in real time actuating one or more actuators causing the movement of at least one movable part of the frame.

[0019] Other features and advantages of the bed object of the present invention will be evident from the description of a non-exclusive preferred embodiment illustrated by way of nonlimiting example in the attached drawings, in which:

Brief Description of the Drawings

[0020]

Figure 1 is a perspective view of a hospital bed according to the present invention in a resting condition with the mattress completely extended horizontally; Figure 2 is a front elevational view of the hospital bed; Figure 3 is a side elevational view of the hospital bed with the different sections forming the mattress in different planes; Figure 4 is an exploded perspective view of the hospital bed of the invention where the main parts are shown;

Figure 5 is a perspective view of the bed with the different sections forming the mattress adopting different planes simultaneously;

Figure 6 is a perspective view of the hospital bed as seen from the bottom;

Figure 7 is a perspective view of the bed of the present invention with the upper frame pivoted from one of its ends;

Figure 8 is a side elevational view of the bed depicted in Figure 7 with the upper frame pivoted from one of its ends;

Figure 9 is a perspective view of a second embodiment of the hospital bed with the upper frame tilted with respect to the longitudinal axis of the bed;

Figure 10 is a front perspective view of the hospital bed in which the sections of the mattress are folded together;

Figure 11 is a side elevational view of the position depicted in Figure 10;

Figure 12 is a rear perspective view of the position depicted in Figure 10; and

Figure 13 is a block diagram depicting the method for operating the bed of the invention in order to move it.

Description of a Preferred Embodiment

[0021] As shown in the attached drawings, an embodiment of the intelligent hospital bed according to the invention essentially comprises a lower main frame 1 formed by a metal structure with a rectangular base, and an upper frame 2 articulated to said lower main frame 1 provided with movable parts which are described in greater detail below, in which a mattress 22 provided with a plurality of foldable sections is arranged on top. In this description mattress is understood as both a single deformable body and as several independent portions with different sizes which define a mattress with a rectangular base in a planar and horizontal position.

[0022] This hospital bed which is described in greater detail below is suitable for patients with reduced mobility because it allows adopting different positions, such as lying face up in a horizontal position, on a side, seated, lying face down and in an inclined position in an automated manner and without needing healthcare personnel to be attentive to the needs of the patient at all times.

[0023] In reference to the upper frame 2, it comprises a lower assembly 3 formed by a metal structure, articulated to the lower main frame 1 at two pivot points located at opposite ends which allow the inclination thereof at two points opposite one another, and an upper assembly 4 on which the mattress 22 rests. This upper assembly 4 is provided with three longitudinal support parts 5, 6 and 7, the two support parts 5, 7 corresponding to the lateral ends being articulated to the central support part 6 such that they can be inclined integrally at the same time in different positions, as can be seen in the different drawings.

[0024] For the purpose of facilitating patient mobility without external help, i.e., of healthcare personnel, there is provided a plurality of interconnected sensors (not depicted) arranged along the mattress 22 capable of measuring the initial force on the point at which the corresponding sensor is arranged, which sensors are associated with a control unit which controls servo-motors located at different points of the hospital bed used for moving the movable parts of the upper frame 2. Therefore, when one or more sensors detects a specific movement of the user in real time, a servo-motor associated with a corresponding sensor or sensors moving at least one of the many movable parts of the mentioned upper frame 2 is actuated. These sensors have been distributed in the mattress at specific points corresponding with the most important parts of the patient's body, centers of mass or pressure distributions.

[0025] The information generated by the preceding sensors is used by software linked to the control unit for moving the different actuators provided in the bed, thus creating a simpler and more intuitive interface with the patient.

[0026] Therefore the method for operating the bed described herein has the steps of:

- obtaining a map of pressure images 100 from the data obtained by each sensor S arranged in the mattress 22;
- segmenting 200 the pressure images;
- calculating 300 the characteristics of each of the image segments;
- obtaining a relative difference 400 of each of the characteristics of the patient with respect to the map of pressure images; and
- recognizing 500 the patient's intention to move in real time actuating one or more actuators causing the movement 600 of at least one movable part of the frame of the bed being adapted to the patient's needs.

[0027] Referring again to each of the support parts 5, 6 and 7, it comprises a fixed portion 5A, 6A and 7A on which there are pivotally articulated inclinable portions 5B-5C, 6B-6C and 7B-7C which are linked to the foldable sections of the mattress 22, the articulation point having a pin 25. One of the mentioned portions 5B, 6B and 7B is designed for supporting the back of the user forming a type of backrest, while the other articulated sections are designed for supporting the lower limbs of the user.

[0028] As can be seen, the fixed portion 5A, 6A and 7A of the longitudinal support parts 5, 6 and 7 comprises a structure defined by two stringers attached by means of transverse crosspieces, the end crosspieces including inclined flanges 14 which are provided with through holes through which pins acting as a rotating shaft are inserted. The central support part 6, more specifically the fixed part 6A, has a servo-motor 15 articulated to the portion 6B which allows inclining said portion 6B with respect to

the fixed portion 6A. To move the three portions 5B, 6B and 7B simultaneously when actuating the servo-motor 15, fixing elements 26 are arranged in the upper part of the portions 5B, 6B and 7B. A servo-motor 27 (see Figure 4) articulated to the portion 6C which allows inclining said portion 6C with respect to the fixed portion 6A is also provided.

[0029] Figures 10-12 show how the lower assembly 3 is in a tilted position with respect to the central longitudinal axis of the bed and where one of the support parts 7 also has a different degree of inclination with respect to the other two support parts 5 and 6 as a result of the presence of the articulation points defined by flanges 14 and of the arrangement of two servo-motors 29, 30 located in the part lower of the central support part 6, one of the servo-motors 29 being associated with support part 5 whereas the other servo-motor 30 is associated with support part 7. To that end projecting tabs 31 have been arranged on one of the sides of the respective support parts 5 and 7 (see Figure 4) which are fixed to the corresponding servo-motor by means of pins (not depicted). As a result, the patient using the bed of the invention can adopt a larger number of positions with respect to the known art.

[0030] Additionally, as seen more clearly in Figure 4 the lower assembly 3 includes a raising/lowering mechanism, generally indicated with reference 8, which is articulated to the central support part 6 of the lower assembly 3 which allows moving said central part linearly up/down, said raising/lowering mechanism being controlled by a servo-motor 9. This raising/lowering mechanism 8 comprises a rectangular framework 10 provided with two sets of wheels 11, each of the sets being in opposite crosspieces of said rectangular framework 10, which wheels 11 are placed on guide rails 12 (formed by channel irons) located transversely with respect to the longitudinal axis of the lower assembly 3, such that the central support part 6 can move transversely with respect to the longitudinal plane of the hospital bed.

[0031] Furthermore, at one end there is provided a pair of bars 16 parallel to one another, which are articulated to the lower main frame 1 and the lower assembly 3 of the upper frame which can follow an angular trajectory, whereas at an opposite end there is provided a pair of bars 17 articulated at one end to the mentioned lower main frame 1 and has at its opposite end wheels 18 which can slide on guides 19 located in the lower assembly 3 of the upper frame 2 longitudinally.

[0032] The bars 16, 17 are actuated by a corresponding servo-motor 20, 21 which act when the sensors send a signal to the control unit.

[0033] The lower main frame 1 is provided with four swivel caster wheels 13 located in each of the corners which allow moving the hospital bed in any direction.

[0034] The hospital bed described herein can optionally have a remote control (not depicted) as an additional control and safety element which also allows for the different movements of the movable parts of the hospital bed even though it is not necessary for operating the bed

when the patient is lying down.

[0035] Plates 23 located in the front and rear part of the hospital bed as well as retractable side railings 24 preventing the patient from being able to fall off while lying thereon are also arranged, such side railings 24 being shown for example in a not-in-use condition in Figure 1, whereas the side railings 24 are raised in Figures 7 and 8.

[0036] As can be seen starting from Figure 9, in an alternative embodiment of the invention, there is a possibility that the lower assembly 3 is articulated to the lower main frame 1 by means of a servo-motor 28 which also allows tilting said lower assembly 3 with respect to the longitudinal axis thereof in both directions (right and left).

[0037] It must be pointed out that the same reference numbers have been used in the second embodiment to define common elements or parts provided in the two embodiments described herein.

[0038] Details, shapes, dimensions and other accessory elements, as well as the materials used in manufacturing the bed of the invention may be conveniently replaced with others which are technically equivalent and do not depart from the essential nature of the invention nor the scope defined by the claims included below.

Claims

1. An intelligent hospital bed comprising a lower main frame (1) and an upper frame (2) articulated to said lower main frame provided with movable parts, in which there is arranged a mattress (22) provided with several foldable sections, **characterized in that** it includes a plurality of sensors arranged along the mattress (22) capable of measuring the initial force on the point at which the corresponding sensor is arranged, which sensors are interconnected and associated with a control unit which controls servo-motors used for moving the movable parts of the upper frame (2), and such that when a sensor detects a movement of the user in real time, a servo-motor associated with a corresponding sensor or combination of sensors moving at least one of the movable parts of the mentioned upper frame (2) is actuated.
2. The hospital bed according to claim 1, **characterized in that** the plurality of sensors are pressure sensors.
3. The hospital bed according to claim 1, **characterized in that** the upper frame (2) comprises :
 - a lower assembly (3) articulated to the lower main frame (1) in at least two pivot points located at opposite ends; and
 - an upper assembly (4) on which rest the mattress which is provided with three longitudinal

support parts (5, 6, 7) connected to one another, the two support parts (5, 7) corresponding to the lateral ends being articulated to the central support part (6) such that they can be inclined.

4. The hospital bed according to claim 3, **characterized in that** at least one of the longitudinal support parts is associated with at least one servo-motor.
5. The hospital bed according to claim 3, **characterized in that** the lower assembly includes a raising/lowering mechanism articulated to the central support part of the lower assembly (3) which allows moving said central support part linearly up/down, said raising/lowering mechanism being controlled by a servo-motor.
6. The hospital bed according to claim 3, **characterized in that** each of the support parts comprises a fixed portion to which there are pivotally articulated inclinable portions which are linked to the foldable sections of the mattress (22).
7. The hospital bed according to claim 3, **characterized in that** at one end there is provided at least one bar which can be actuated by means of a servo-motor, which is articulated to the lower main frame (1) and the lower assembly (3) of the upper frame which can follow an angular trajectory, whereas at an opposite end there is provided at least one second bar which can be actuated by means of a servo-motor, articulated to the lower main frame at one end and having at its opposite end wheels which can slide on guides located in the lower assembly of the upper frame.
8. The hospital bed according to claim 7, **characterized in that** the at least one bar and the at least one second bar can be actuated by means of two servo-motors independent from one another.
9. The hospital bed according to claim 3, **characterized in that** the fixed portion of each of the longitudinal support parts (5, 6, 7) comprises a structure defined by two stringers attached by means of transverse crosspieces, the end crosspieces including flanges (14) provided with through holes through which pins acting as a rotating shaft are inserted.
10. The hospital bed according to claim 5, **characterized in that** the raising/lowering mechanism comprises a rectangular framework (10) provided with two sets of wheels (11), each of the sets being in opposite crosspieces of the rectangular framework (10), which wheels are placed on guide rails (12) located transversely with respect to the longitudinal axis of the lower assembly (3).

- 11. The hospital bed according to claim 1, **characterized in that** the lower main frame (1) is provided with caster wheels.

- 12. The hospital bed according to claim 3, **characterized in that** the lower assembly (3) is articulated to the lower main frame (1) by means of a servo-motor, such that it allows tilting said lower assembly (3) with respect to the longitudinal axis of the lower main frame (1) in both directions.

- 13. The hospital bed according to claim 1, **characterized in that** each of the several portions of the mattress (22) is at least provided with a sensor.

- 14. The hospital bed according to claims 3 and 6, **characterized in that** the central support part (6) is provided with servo-motors which are articulated at one of its ends to respective support parts located on both sides of the central support part, such that both lateral support parts can adopt a different inclination with respect to the central support part.

- 15. A method for operating the hospital bed according to claim 1, comprising a plurality of sensors arranged on a mattress and a frame provided with movable parts which can be moved in real time by means of actuators, **characterized in that** it comprises the steps of:
 - obtaining a map of pressure images (100) from the data obtained by each sensor (S);
 - segmenting (200) the pressure images;
 - calculating (300) the characteristics of each of the image segments;
 - obtaining a relative difference (499) of each of the characteristics of the patient with respect to the map of pressure images; and
 - recognizing (500) the patient's intention to move in real time actuating one or more actuators causing the movement of at least one movable part of the frame.

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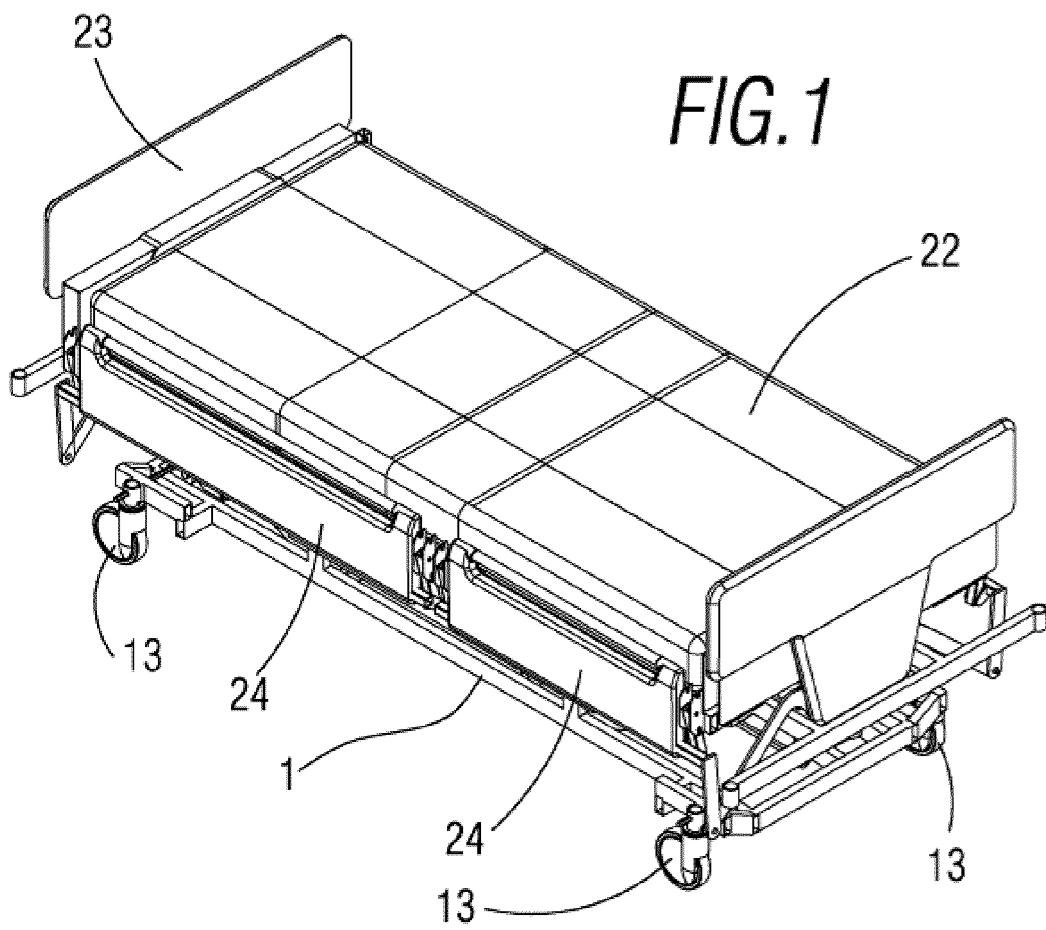
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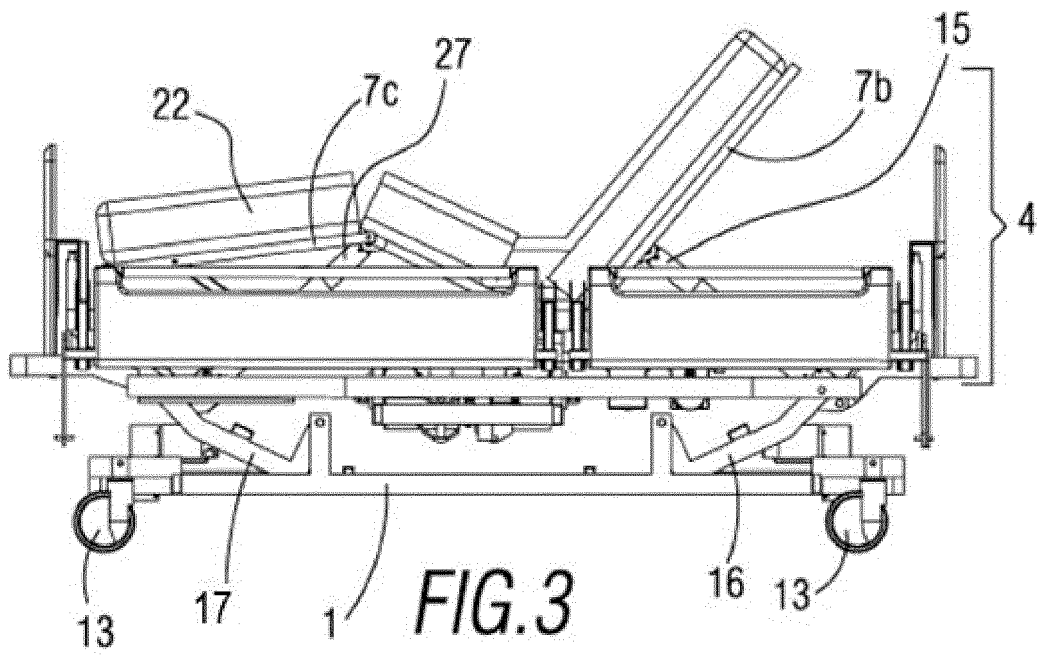
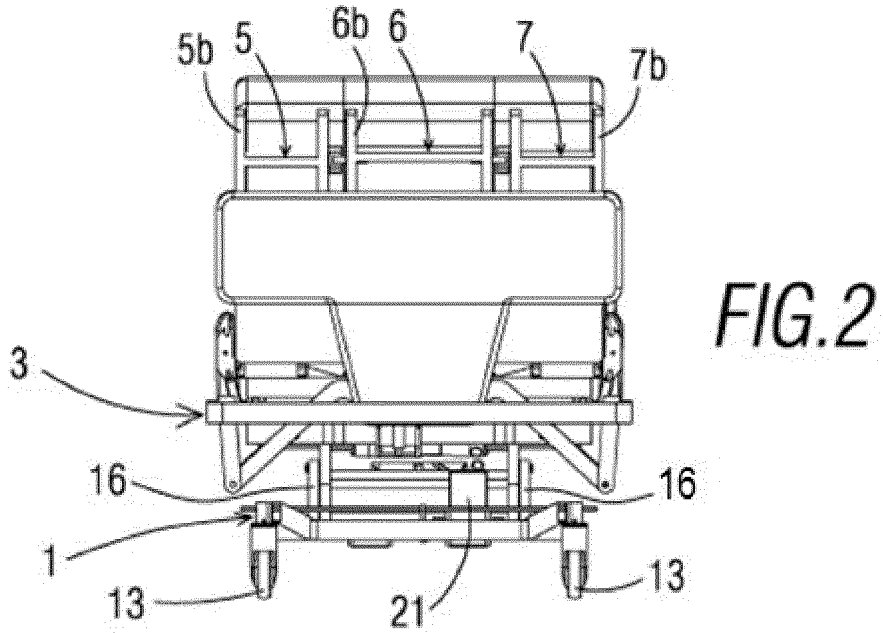
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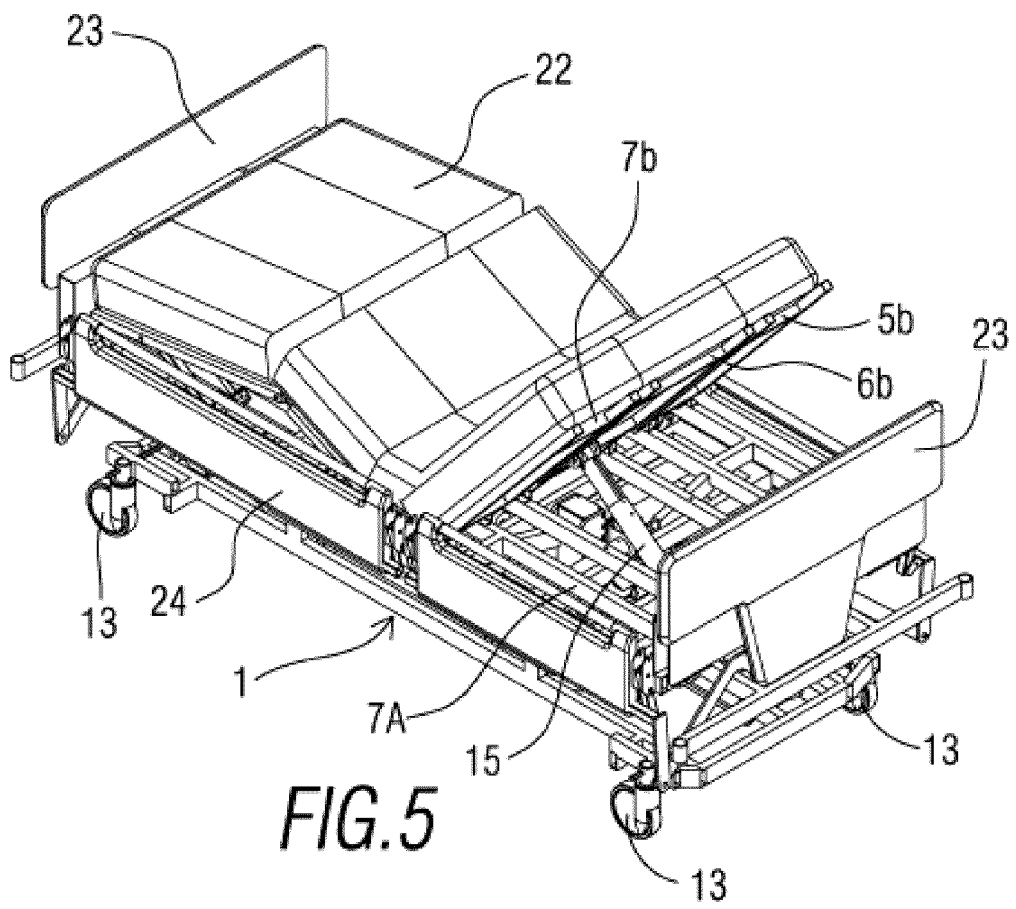
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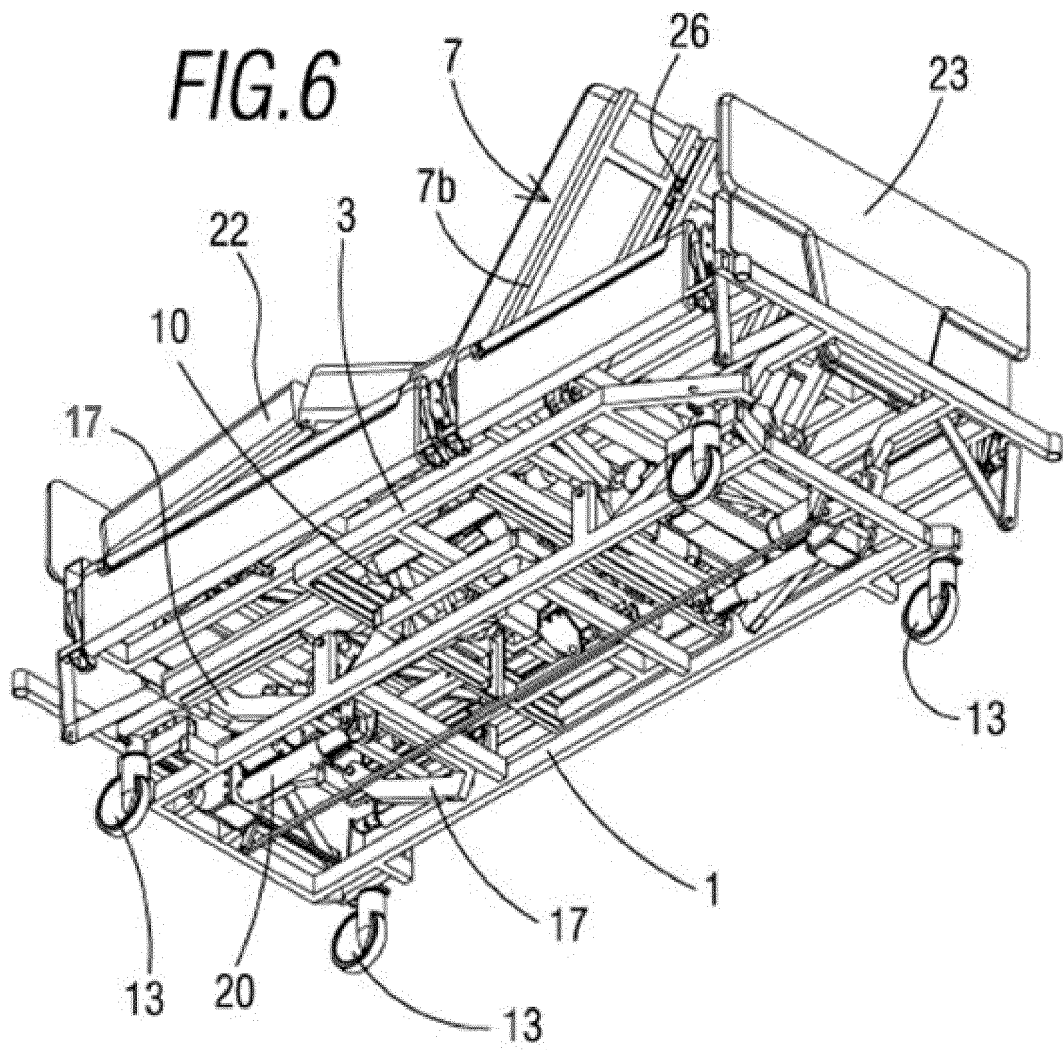
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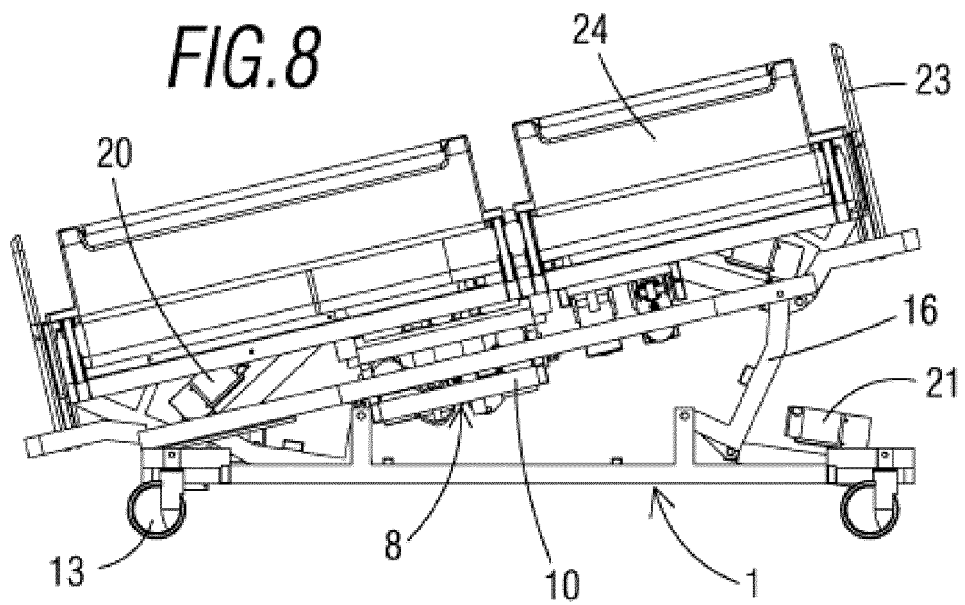
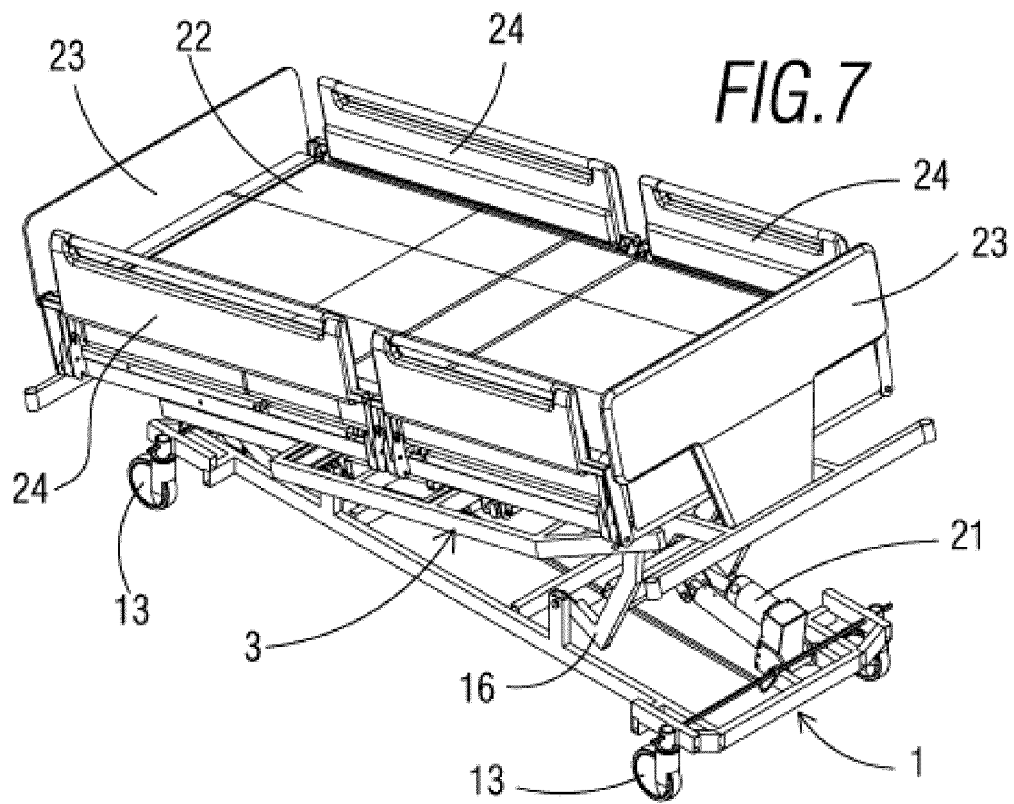
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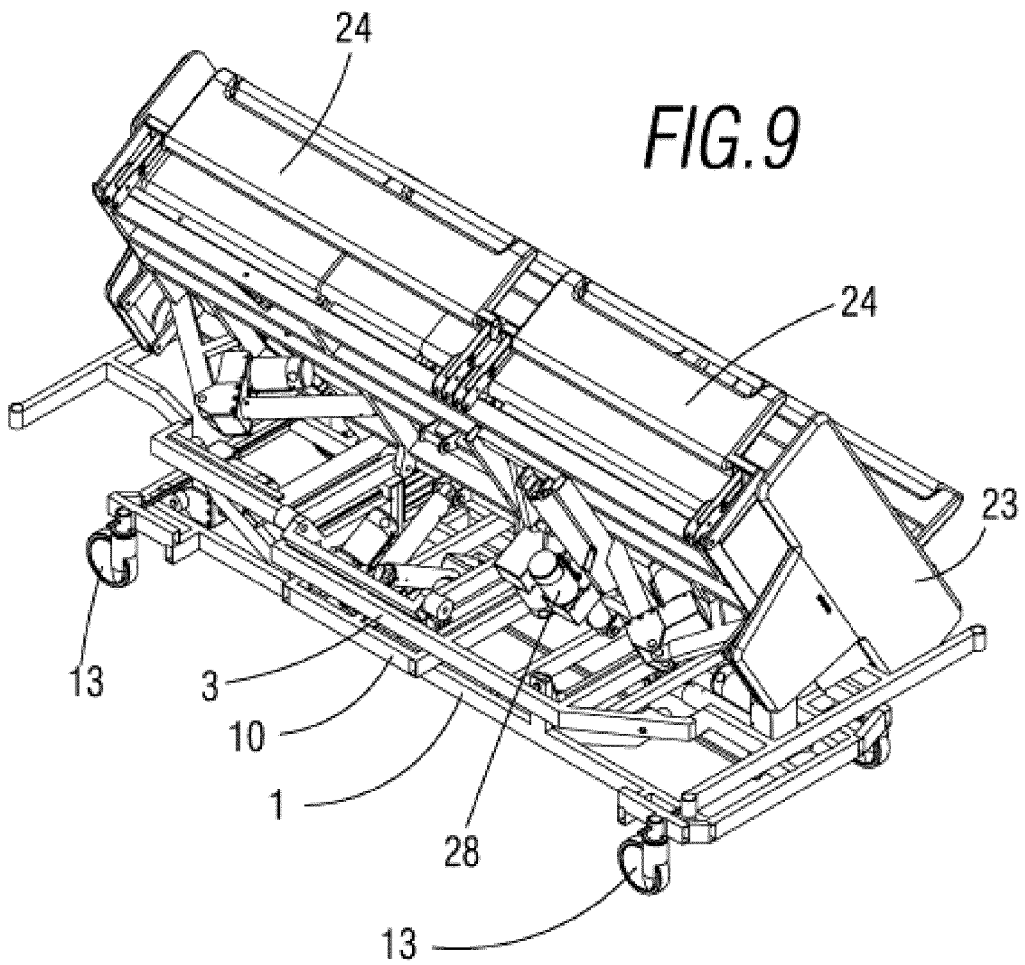


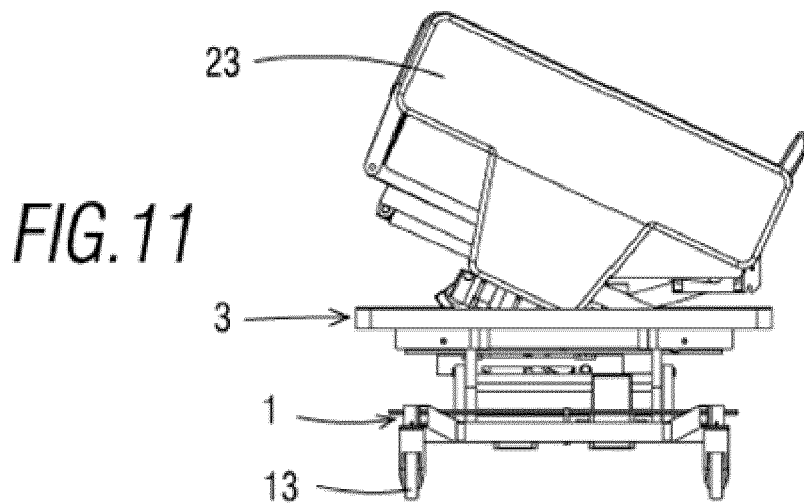
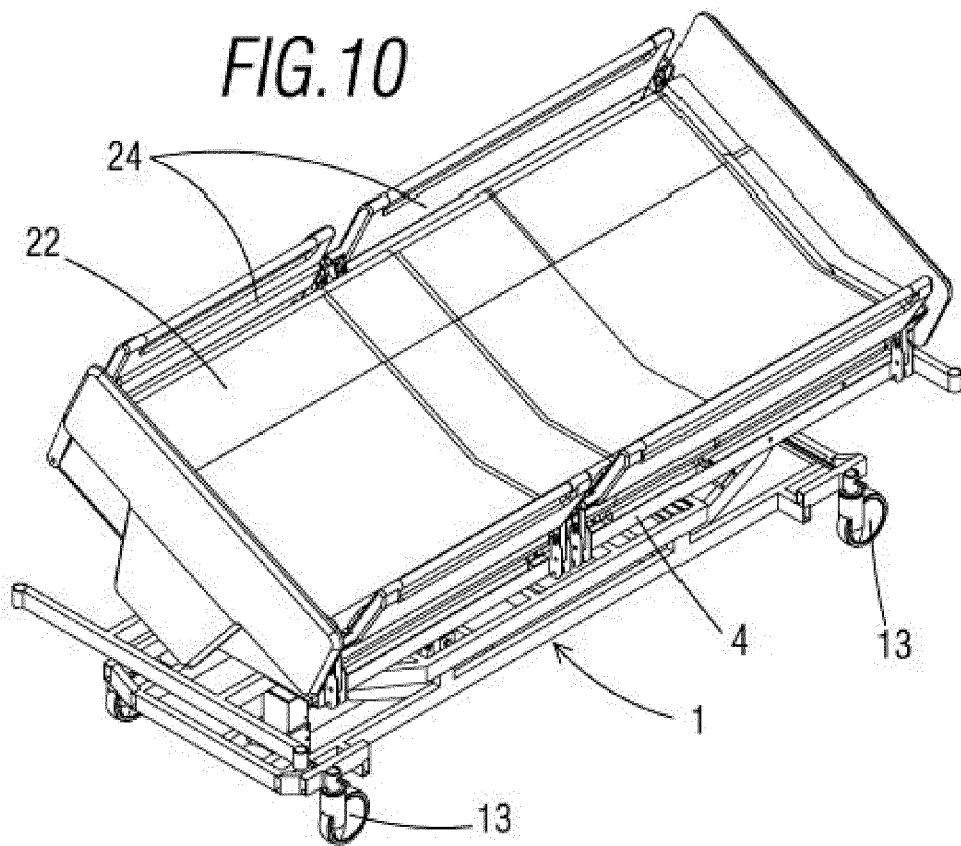












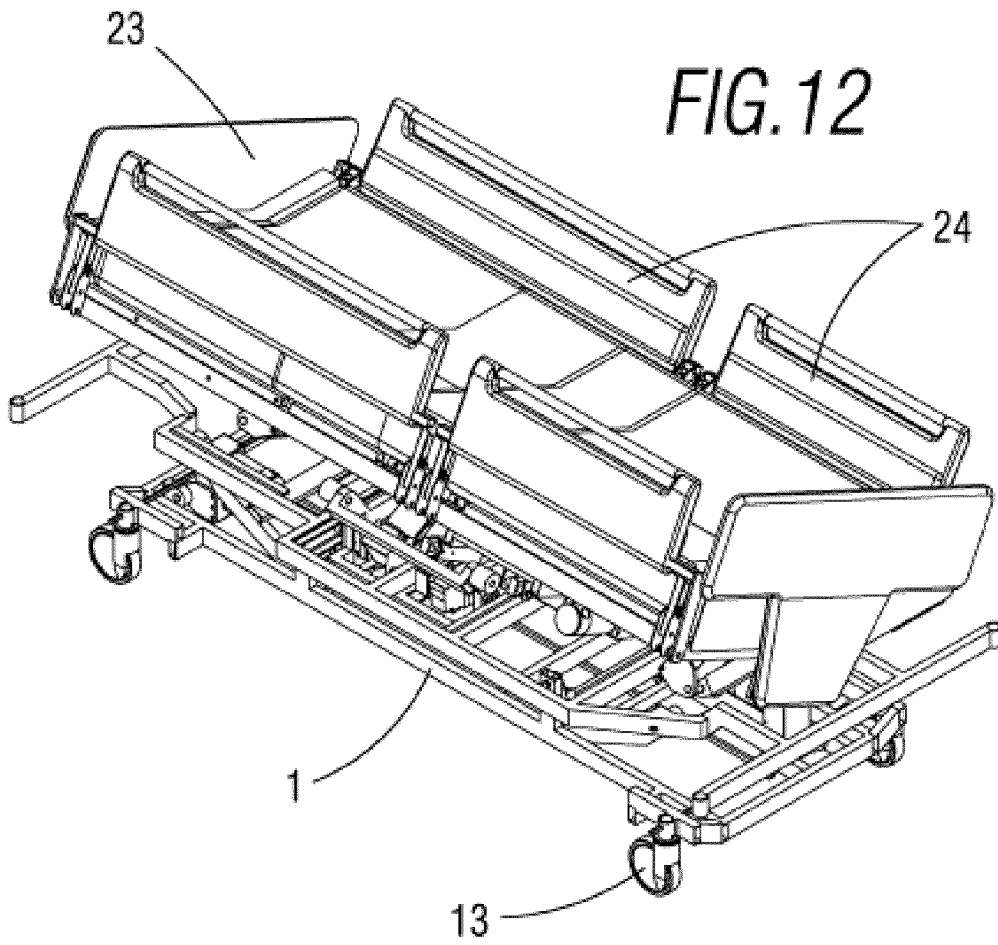
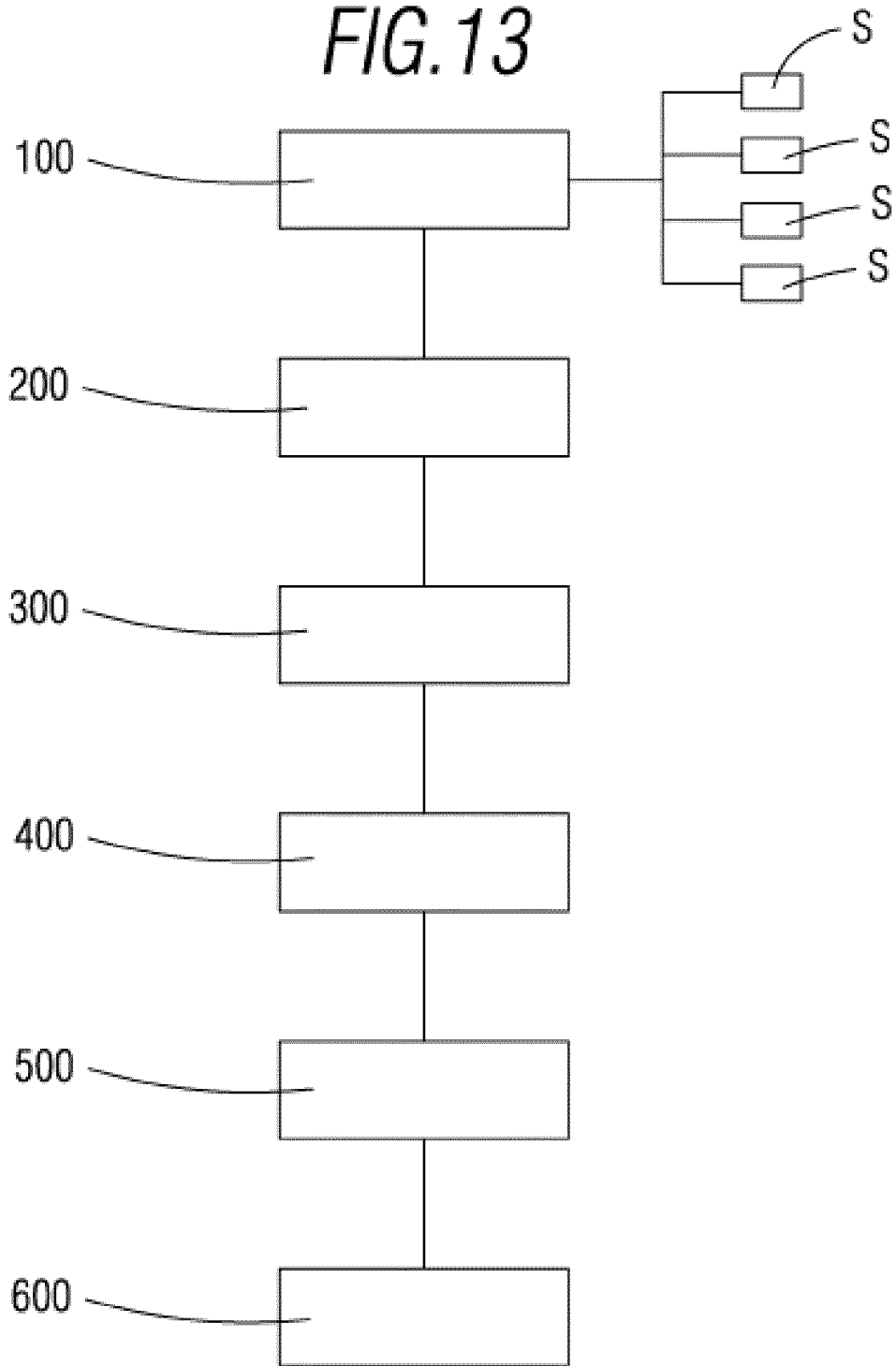


FIG. 13



INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES2010/070332

A. CLASSIFICATION OF SUBJECT MATTER		
See extra sheet		
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, A47C, A61B		
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 practicable, search terms used) EPODOC, INVENES, WPI		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB 2369047 A (NIGHTINGALE CARE BEDS LTD) 22/05/2002, pages 1 - 8; figures 1 - 5.	1-2, 15
Y		3-14
X	GB 2313540 A 03/12/1997, pages 1 - 16; figures 1 - 4.	1-2, 15
Y	EP 1486191 A1 (SANYO ELECTRIC CO) 15/12/2004, description; figures.	3-14
A	ES 8800592 A1 (EGERTON HOSPITAL EQUIP) 01/02/1988, description; figures.	1-14
A	US 5479665 A (CASSIDY JOSEPH P ET AL.) 02/01/1996, description; figures.	1-14
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INTERNATIONAL SEARCH REPORT

International application No. PCT/ES2010/070332
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C (continuation).		DOCUMENTS CONSIDERED TO BE RELEVANT
Category *	Citation of documents, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	JP 2001293037 A (FUKUJU SANGYO KK) 23/10/2001, figures & abstract of EPODOC DataBase (Retrieved from EPOQUE; AN JP-2000111558-A).	1-14
A	US 2004148704 A1 (TEKULVE DANIEL R) 05/08/2004, description; figures.	1-14
A	DE 10009314 A1 (MEDITEC GMBH) 20/09/2001, description; figures.	1-14
A	US 4084274 A (WILLIS DAVID JOHN ET AL.) 18/04/1978, description; figures.	1-14
A	WO 2004021952 A2 (HILL ROM SERVICES INC) 18/03/2004, description; figures.	1-14
A	US 2010069795 A1 (KANG CHIA HAO ET AL.) 18/03/2010, description; figures.	15
A	US 2005251914 A1 (SCHALLER STEFAN ET AL.) 17/11/2005, description; figures.	15
A	US 5010772 A (BOURLAND JOE D ET AL.) 30/04/1991, description; figures.	15
A	WO 2008065402 A1 (HUNTLEIGH TECHNOLOGY LTD ET AL.) 05/06/2008, description; figures.	15

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INTERNATIONAL SEARCH REPORT

International application No.

Information on patent family members

PCT/ES2010/070332

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
GB2369047 AB	22.05.2002	WO9955276 A	04.11.1999
		CA2329185 A	04.11.1999
		AU3436699 A	16.11.1999
		GB2339387 AB	26.01.2000
		EP1073394 A	07.02.2001
		EP19990915952	15.04.1999
		ZA200006867 A	05.07.2001
		AU746093 B	18.04.2002
		JP2002512852 T	08.05.2002
		NZ507273 A	27.09.2002
GB2313540 AB	03.12.1997	WO9745040 A	04.12.1997
		CA2257789 A	04.12.1997
		AU2911497 A	05.01.1998
		EP0902637 AB	24.03.1999
		EP19970923258	23.05.1997
		AU714191 B	23.12.1999
		US6105187 A	22.08.2000
		JP2000515033 T	14.11.2000
		JP3961573B2 B	22.08.2007
		AT213132 T	15.02.2002
DE69710454 T	02.10.2002		
EP1486191 A	15.12.2004	WO03073973 A	12.09.2003
		AU2003211974 A	16.09.2003
		JP2003310668 A	05.11.2003
		EP20030705137	14.02.2003
		TW230060 B	01.04.2005
		CN1638711 A	13.07.2005
		CN100417368 C	10.09.2008
		US2005160530 A	28.07.2005
		US7246389 B	24.07.2007
		ES8800592 A	01.02.1988
EP0183371 AB	04.06.1986		
EP19850307488	17.10.1985		
JP61128969 A	17.06.1986		
JP3074107 B	25.11.1991		
JP1708877 C	11.11.1992		
US4658450 A	21.04.1987		
CA1247805 A	03.01.1989		
AT59770 T	15.01.1991		
US5479665 A	02.01.1996		
JP2001293037 A	23.10.2001	NINGUNO	
US2004148704 A	05.08.2004	CA2456844 A	05.08.2004
		US6826793 B	07.12.2004
		US7257850 B	21.08.2007
		US2008250562 A	16.10.2008

Form PCT/ISA/210 (patent family annex) (July 2009)

EP 2 583 652 A1

INTERNATIONAL SEARCH REPORT

International application No.

Information on patent family members

PCT/ES2010/070332

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
DE10009314 A	20.09.2001	NINGUNO	
US4084274 A	18.04.1978	NINGUNO	
WO2004021952 A	18.03.2004	WO03079953 A	02.10.2003
		CA2477724 A	02.10.2003
		AU2003228324 A	08.10.2003
		CA2482462 A	30.10.2003
		WO03088885 A	30.10.2003
		AU2003225079 A	03.11.2003
		CA2495675 A	18.03.2004
		AU2003274957 A	29.03.2004
		AU2003274957 B	16.07.2009
		US2004177443 A	16.09.2004
		US7073220 B	11.07.2006
		EP1496830 AB	19.01.2005
		EP20030721786	21.04.2003
		US2005172405 A	11.08.2005
		US7296312 B	20.11.2007
		EP1572059 AB	14.09.2005
		EP20030726071	18.03.2003
		JP2005528139 T	22.09.2005
		EP1585473 A	19.10.2005
		EP20030759227	08.09.2003
		US2005268401 A	08.12.2005
		US7500280 B	10.03.2009
		US2006010601 A	19.01.2006
		US7472437 B	06.01.2009
		US2006096029 A	11.05.2006
		US7454805 B	25.11.2008
		JP2006515995 T	15.06.2006
		US2006162079 A	27.07.2006
		US7520006 B	21.04.2009
		US2006168731 A	03.08.2006
		US7669263 B	02.03.2010
		US2006168730 A	03.08.2006
		US7406731 B	05.08.2008
		US2008010748 A	17.01.2008
		US7506390 B	24.03.2009
		US2008201847 A	28.08.2008
		US7703158 B	27.04.2010
		US2008201851 A	28.08.2008
		US7533429 B	19.05.2009
		US2008289108 A	27.11.2008
		US7610637 B	03.11.2009
		AT424798 T	15.03.2009
		US2009109025 A	30.04.2009
		EP2055286 A	06.05.2009
		EP20090002423	21.04.2003
		US2009143703 A	04.06.2009

Form PCT/ISA/210 (patent family annex) (July 2009)

INTERNATIONAL SEARCH REPORT

International application No.

Information on patent family members

PCT/ES2010/070332

Patent document cited in the search report	Publication date	Patent family member(s)	Publication date
		AU2009225305 A	29.10.2009
		US2009313758 A	24.12.2009
		EP2181685 A	05.05.2010
		EP20100075016	08.09.2003
		JP2010155084 A	15.07.2010
		AT482635 T	15.10.2010
-----	-----	-----	-----
US2010069795 A	18.03.2010	JP2010069282 A	02.04.2010
-----	-----	-----	-----
US2005251914 A	17.11.2005	US7251845 B	07.08.2007
		DE102004021972 A	01.12.2005
-----	-----	-----	-----
US5010772 A	30.04.1991	US4827763 A	09.05.1989
-----	-----	-----	-----
WO2008065402 A	05.06.2008	CA2670114 A	05.06.2008
		AU2007327114 A	05.06.2008
		EP2083685 A	05.08.2009
		EP20070848413	28.11.2007
		CN101553169 A	07.10.2009
		US2010045474 A	25.02.2010
		JP2010510849 T	08.04.2010
		ZA200903339 A	28.07.2010
-----	-----	-----	-----

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ES2010/070332

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A61G7/015 (01.01.2006)

A61G7/018 (01.01.2006)

A61G7/10 (01.01.2006)

A47C20/04 (01.01.2006)

A61B5/103 (01.01.2006)