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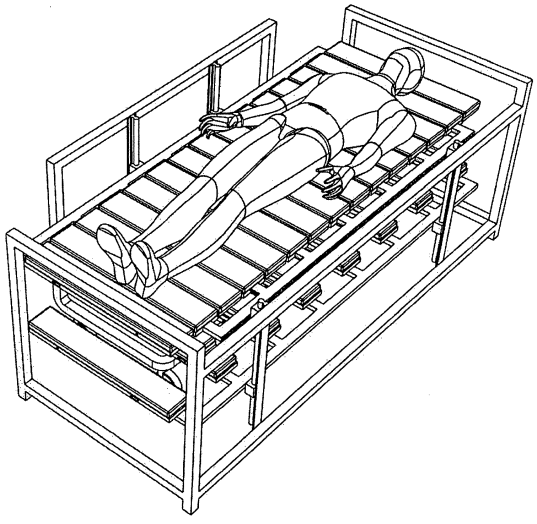
(54) Smart hospital bed

(57) A smart system for transferring a patient from the first bed (A) to the second bed or a stretcher (B) or to a surgery table(c) and or from the second or the first bed or from a surgery table to the other sections in a hospital smoothly without disturbing the patient. The other abilities of this system are turning the partitions of the surface to a solid stretcher for putting the patient on a MRI or X-Ray table, changing the sheets and dressing the patient without any movement, urinating or defecating system , preventing the bed sores by changing the parts under the patient constantly and washing and bathing the patient.

FIG 7



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Description

[0001] The surface (3) of the bed A (1) is made by sections (4) and (5) when they are leveled to each other. The surface (3) of the bed B (2) is made by sections (4) and (5) when they are leveled to each other. Fig1

[0002] The said sections of the first bed and the second bed are made of several fragments (6) which are removable. Each fragment is made of one solid base (8) and one soft cover (9).Fig 3

[0003] Several fragments are connected via a mechanical interface (7) FIG.2.

[0004] Section (4) and section (5) are mounted on a main base (10) as each section can move on separate wagons (12) and separate rails (11). This movement is possible with using hydraulic or pneumatic or electric jacks. The base itself it mounted on wheels (13).Fig4

[0005] The patient transfers from the bed A to the bed B in the following procedure,

1- Section (5) from the bed A(1) moves down (fig 5)
2- Section (5) from the bed B (2) moves down. (Fig 6)
3- The bed B (2) travels though the Bed A(1).(Fig 7)
4- Section (4) from the bed A (1) moves down. At this stage the patient is on the section (4) from the bed B (2)(Fig 8).
5- The Bed B (2) travels out of the bed A(1) (fig9)
6- Section (5) from the bed B (2) moved up (Fig 10).
7- Section (4) and (5) from the bed A moves up.

Attachments of the upper parts of the fragments to each other makes it possible to have a mobile stretcher.

[0006] Pin System: In this system there are two holes (14) on each fragment. On each said hole Pins (15) have been embedded that their length is as long as Fragment's width. Fig 11

[0007] When Pin's safety bolt (16) are being forced forward, half of pins are getting in the next fragment's In this situation fragments are being locked together and they form a mobile surface. Fig 12-13

[0008] Rod System: In this system, on each side of fragments, hook- shaped Hollows have been formed. That with placing fragment's hook- shaped (17) hollows on top of two long lever handles (18); the flat surface can be integrated and forms a mobile stretcher. Fig 14

Ability to attach and detach the surface

[0009] Also the said surface is attachable and detachable to the bed/trolley base.
By detaching the flat surface from the base, it is usable as stretcher.
The stretcher is attached and mounted via pin (19) into the hole (20) and being locked. Fig 15

The patient transferring surface which can be added to any bed or another surface.

[0010] The bed D (21) has a surface divided in three separate parts. (22). One part in the middle (23) and two on the sides. (24).The side parts are connected to the main one by hinges (27). The side part can turn and go under the middle part in order to make a narrower bed which is able to pass through doors and ext.

[0011] The said surface is hold up by a long metal tube (27) fixed on the base.(28). On the legs two hooks are holding the surface. When surface (22) is on the base it is firmed by two safety metal locks (30) and one screw (31). When the side parts are added to the surface the arms (32) and the Pins (33) keep it straight. When the patient supposed to be transferred the mobile base F (34) stays beside bed D. The hooks(29) should be free and the two side parts turned under the main part .There are two rods (35) mounted on the base (36) Which enter the tubes (27) and then the main part now is on the mobile base F.

Transferring the patient from the surgery table to another hospital bed.

[0012] An specific surgery table C (37) that by making high and low spaces under the patient's Surgery gives the necessary spaces and makes the necessary tunnels (38) for another device with several long arms (39) to enter and lift the body smoothly and transfers it to another bed.

[0013] This surgery bed contains the following parts,

1 -Table's surface (40).

2 - Lifting and movement system,

3 - Base and legs system.

[0014] The surface is made of two parts.The soft part containing the cover (41) and the spongy (42) section under it and the hard part.

[0015] The small tunnels under the patient can be made by air bags (43) or a mechanical system (44) which can work manually or by electricity.

[0016] The transferring system can be done in two ways.

1 - A transferring system which is built as a part of the table and helps to transfer the patient to a Stretcher.

2- A transferring system which is built as a part of a stretcher trolley which lifts the patient by the long arms entering the said tunnels and lifts the patient smoothly or these long arms can be part of the surgery table while the surgery is in progress and then be attached to the said stretcher.

[0017] An electronic unit is also controlling the movements and the electric motors.

Fig 23-27

Adjustable Sliding Surface

[0018] For more convenience of moving the second bed in hallways and through entrance doors of Hospital or rooms and ambulances, the width of second bed is smaller than the width of first bed. In order to relocate the patient, once the second bed's fragments enter the first bed's fragments, the second bed's fragments are shorter. Therefore the second bed's fragments don't reach the end of the first bed's fragments.

[0019] So if the patient is in the center of the first bed, by moving him to the second one, he will be placed by the edge of the first bed.

[0020] In order to solve this problem, some sliding rails (45) have been mounted on the fragments of the first bed. By using this system the width of the first and the second bed can be assimilated so that we can relocate the patient from any location on the first bed into the center of the second bed.

[0021] This system includes a fragment base (46) that is placed under the soft cover (9) and the rail sliding system. A mechanical, hydraulically, pneumatically or electromechanical system provides the force that is needed for fragments transverse directional movement on the transverse axis. Fig 28,29

Changing the sheets by rotating system.

[0022] The sheet (47) is attached to the fragment (6), and in the center of each fragment, there is Holes (48) and axes (49). Each dirty face of the sheet is changeable by rotating the fragments. The rotation is possible when a sections is lowered down and away from the patient Fig 30, 31, 32

Changing the sheets by sliding system.

[0023] On the solid part (8) from each fragment, a rail (50) and under the soft cover (9) a rail (51) are mounted. Changing the sheet is possible by sliding these rails over each other. Fig 33

[0024] When changing sheets, section (4) and (5) move downward alternatively, the dirty sheet is replace with the clean one.

[0025] **Periodically Interchangeability of sheets**The mechanism of the fragments has been designed in a such manner that each fragment can be raised or lowered down on its own, independent of the rest. This is possible since each fragment has its own separate pneumatic pump supplied with the required air pressure through an opening (52) of a tube connected to the control tap (53). An electronic unit (54) controls the opening and closing of the tap enabling the entry of air pressure through a tube (55) onto a cylinder (56), exiting through an exit (57) to empty onto the pneumatic or hydraulic pump of a fragment through a shaft (58). Fig 34, 35

[0026] This mechanism enables the performance of two tasks:

1. The change of a bed sheet (59) under a hospital patient without the necessity of moving the patient; and FIG 36

2. The change of a patient's hospital gown (60) A without the need to lift the patient.

[0027] For the first task i.e. the change of a bed sheet under a hospital patient, the steps detailed below are to be followed: Fig.37

1. The first fragment is lowered Fig.38

2. A rolled bed sheet (59) is placed on the first fragment which has been lowered (Fig.39)

3. The second fragment in the sequence is lowered and the rolled bed sheet moves onto it. Fig.40

4. The first fragment is raised Fig.41

5. The third fragment in the sequence lowers down Fig.42

6. The bed sheet rolls onto the third fragment Fig.43

7. The second fragment goes up Fig.44

8. The fourth fragment in the sequence goes down Fig.45

9. The bed sheet rolls onto the fourth fragment Fig.46

10. The third fragment goes up Fig.47

11. The fifth fragment in the sequence goes down Fig.48

[0028] The sequence of steps is repeated until the bed sheet is completely spread out under the patient lying on the bed. To remove the sheet, the same steps are followed but from the opposite end of the bed.

Periodically Interchangeability of patient's gown

[0029] To change a patient's hospital gown (60)

[0030] The mechanism used to change a patient's hospital gown follows the same steps as that of changing a bed sheet except that in this case a hospital gown is rolled and thereafter unrolled under a patient's posterior. Herewith, the hospital gown (60) has been designed in such manner that after steps 1 to 11 as above are done, the

gown completely covers the patient after folding both sides over the body and fastening with buttons (61), laces (62), or zippers. Fig 49-50-51

Ability to Rise of the bed dorsal

[0031] While patient is eating or urinating or taking shower, Surface (3) is being bent from the axis (63). Fig 52

Ability to relocate and replace a part and use a Chamber Pot:

[0032] Once a patient needs to urinate, one of the bed's fragments (64) that is under his hips rotates on its axis (69) and being moved from that spot, therefore an empty space (65) appears. At this time a portable Chamber Pot (66) that is equipped with rails (67), slides up on to the rails under the bed and stays under the empty spot (65). The width of the central part of fragment (64) is more and the width of the central part of fragment (68) is less, this way by removing fragment (64) there will be an empty space of (65) under patient's hip.Fig 53

Special bed for urinating and washing

[0033] This bed (70) is designed for urinating and washing the patient. This bed is equipped with a water source (71) that is able to heat the water with electricity current (72), a water pump (73), a shower hose (74), a chute system to gather the water and sewage (75).

[0034] A room divider separates inside from outside environment. This room is created by a curtain (76) that is installed on a metal or plastic structure (77). Fig 54

[0035] The tank to gather the sewage. chute (78)

Sliding system using movable walls

[0036] In situations that are needed to relocate the patient from this special bed on a regular bed, a movable wall (79) that slides on sliding rails (80) will be installed on this bed that will transfer the patient with Transverse movement in to the wanted bed. A mechanical, hydraulically, pneumatically or electromechanical system provides the force that is needed for fragments transverse directional movement on the transverse axis. Fig 55

Pulling system with hooks

[0037] A pulling system that is equipped with hooks (81) works with a motor (82), rack (83) and a Pinion (84).

[0038] Said hook portion of the base (85) grabs second bed and directs it towards the first bed. In this situation the two systems communicate with each other, fragments move automatically and the device automatically transfers the patient. Fig 56

Replacement sheets using a pulley system

[0039] To replace the sheets, under each fragment two pulleys (86) and (87), rolls of fabric (88) mounted in parallel with the fragments that rotates on the basis of (89) by gear (90) and gear (91) and motor (92),that by turning the spool (87) Old bed sheets are replaced by new ones.

[0040] Bed sheet replacement is done via a reel manually and the rotating spool (87) which is done by hand. This system changes all fragments' sheets by a control box (88) and the manual button (89).Also by adjustments via (90) buttons and Top LCD (91), system can be adjusted in a way that automatically can replace the sheets at the scheduled time. Fig 57, 58

Bed height adjustment system

[0041] Once placing the patient from the said bed on a regular bed, a CT-scan, MRI, an ultrasound exam, or surgery bed, it is able to be adjusted to any desirable height, so that patient can be easily placed on the desirable surface. This is done by bed's height adjustability using cylinder system (56), piston (58) and hydraulic or pneumatic pump and or electromechanical mechanisms by which it is attached to Fragments.

[0042] Electronic connection between hospital beds An electronic system can make possible electronic communication between two hospital beds. This system includes an electronic control unit which has been programmed (93) to do the necessary tasks without manual intervention. Each bed has its own electronic control unit; thus making it possible for the system to work automatically when transferring patients, changing sheets or hospital gowns, when bathing patients, feeding them, or when they wish to urinate or defecate. These works are done through electronic coordination between the two beds in this transfer system. On each bed has been provided a mechanical electrical system making it possible for the bed to be moved automatically to the left, to the right, backward or forward without manual intervention. This is also possible because the system has wheels (94), which are turned by an engine (95). Likewise, one spinning wheel is provided (96), one end of which is attached to the wheel and the other end to the turning mechanism (97). This turning mechanism is attached to the shaft of the engine (98) with the use of a smaller turning mechanism; thus, with the turning of the engine (98), the wheel is moved to the left or to the right, as desired. A control unit (93) regulates speed and the desired direction to which the wheel is to move. Through sensors (99), the control unit initially determines the position of the beds in relation to each other then simultaneously arranges the fragments as programmed; after which, the engines (98, 95) move the beds to their positions. Thus, patients and tasks pertaining to the patients can be done automatically.

[0043] Also the communication between said two beds has been established via cables and by the means of

sockets (100), (101) that have been mounted on first and second bed. The system is equipped with a control panel or a joy stick (102) that the movement of the bed is being handled by motors or manually. Fig 59

BRIEF DESCRIPTION OF THE DRAWINGS

[0044]

Fig 1 - the surface (3) is made when sections (4) and (5) stay beside each other at same level.

Fig 2 - A bed section which is made by fragments being in a row.

Fig 3 - A fragment with its soft part and its solid part.

Fig 4 - A complete bed which contains the surface (1) and surface (2), the rails, the legs and the wheels.

Fig 5 - Section (4) from the bed A (1) moves down

Fig 6 - Section (5) from the bed B (2) moves down.

Fig 7 - The bed B (2) travels though the Bed A (1).

Fig 8 - Section (5) from the bed A (1) moves down. At this stage the patient is on the section (5) from the bed B (2)

Fig 9 - The Bed B (2) travels out of the bed A (1)

Fig 10 - Section (4) from the bed B (2) moved up

Fig 11 - Showing the details of a fragment.

Fig 12 - A mechanism for integrating the bed surface. Sections are in a free status. In this status the bed is not integrated.

Fig 13 - A mechanism for integrating the bed surface. Sections are in a lock status. In this status the bed is integrated.

Fig 14 - Showing two long level handles under the fragment's hook so the surface of the stretcher is shaped.

Fig 15 - A perspective dawning of the stretcher, when it is separated from the bed.

Fig 16 -The surface of bed D which is divided into three parts.

Fig 17 - showing the details of the arms and the pin of the bed D's surface.

Fig 18 -The mobile base F and the bed D.

Fig 19 - showing the side parts of the bed D with its base and the safety metal locks.

Fig 20 - A drawing of the two beds D and F when they are getting ready for transfer.

Fig 21 - The beds D and F are attached and ready for transferring.

Fig 22 - The patient is transferred on the mobile bed F.

Fig 23 - Showing the air tube, tunnels of the surgery table.

Fig 24 - A perspective drawing of the long arms of the surgery table.

Fig 25 - Showing , cover, soft part, the mechanical parts and the bases of the surgery table.

Fig 26 - The surgery table C.

Fig 27 - showing the long arms when it is a part of the surgery table.

Fig 28 - A mechanism for increasing the width of a fragment by sliding the upper side.

Fig 29 - A perspective dawning of the bed in a status that all the upper side of the fragments are slide out.

Fig 30 - A section showing its middle whole for revolving

Fig 31 - Showing how a section is mounted on its axes

Fig 32 - A draw of a part of sections, holding down in order to change the old sheets by new ones.

Fig 33 - showing how sections replacing is done by the sliding mechanism.

Fig 34 - A general drawing from the sections up and down movement.

Fig 35 - Showing the details of the mechanism for the sections movement (going upward and downward). In this drawing the jacks, control box and other parts are shown.

Fig 36 - A perspective dawning of changing the sheets.

Fig 37 - The change of a bed sheet under a hospital patient without the necessity of moving the patient

Fig 38 - The first fragment is lowered.

Fig 39 - A rolled bed sheet is placed on the first fragment which has been lowered

Fig 40 - The second fragment in the sequence is lowered and the rolled bed sheet moves onto it.

Fig 41 - The first fragment is raised

Fig 42 - The third fragment in the sequence lowers down

Fig 43 - The bed sheet rolls onto the third fragment

Fig 44 - The second fragment goes up

Fig 45 - The fourth fragment in the sequence goes down

Fig 46 - The bed sheet rolls onto the fourth fragment

Fig 47 - The third fragment goes up

Fig 48 - The fifth fragment in the sequence goes down

Fig 49 - A perspective dawning of the special patient's gown or dress under him or her.

Fig 50 - the special patient's gown or dress in an open view.

Fig 51 - the special patient's gown

Fig 52 - A perspective dawning of the dorsal for a better sitting status to eat or urinate.

Fig 53 - When urinating or defecting, a fragment is separated from the bed to make space for the patient's bowl.

Fig 54 - A drawing of the special devices and accessories for washing and bathing the patient.

Fig 55 - A drawing of the special device that as a moving wall, slides across the bed in order to transfer the patient to the other bed.

Fig 56 - A system for pulling the bed B, towards bed A.

Fig 57 - A system for changing the sheets by turning the two cylinders under the fragment.

Fig 58 - A drawing from all the above system on a bed.

Fig 59 - A drawing showing the Electronic connection between hospital beds.

Claims

1. - A smart system for transferring the patient from first bed (A) to the second bed or a stretcher (B) or to a surgery table (C) and or from the second or the first bed or from a surgery table to the other surface in a hospital smoothly without disturbing the patient. The other abilities of this system are turning the fragments of the surface to a solid stretcher for putting the patient on the other surfaces in a hospital. Changing the sheets and dressing the patient without any movement, urinating or defecating system, preventing the bed sores by changing the sections under the patient constantly and washing and bathing the patient by a specially designed bed with private space.

2. -The said fragments can be attached to each other in order to make a solid surface to be used as a stretcher.

3. - One or two of the said fragments in claim 1 which are under the patient's hip, can move in order to make a whole and a private space for urinating and defecting.

4. - While changing the sheets, the said fragments in claim 1 also can slide out of their place or rotate around their axes replaced the dirty sheet.

5. -The said fragments in claim 1 move to a lower space in a row one by one to make space for the rolling sheet or hospital gown to be changed.

6. -The surfaces of the beds said in claim 1 are made of sections which are made of fragments spread in width. These figments have the movement through and across each other in order to replace those fragments which are under the patient, without moving the patient.

7. - This system has an extra special unit with ability of bathing and washing the patient in a private space by having the necessary devices.

8. - This system has a movable wall which can transfer the patient by sliding him or her trough the width of the bed.

9. - This system has a puling device when transferring the patient, it pulls the bed B towards bed A.

10. - There is a smart communication system between the beds A,B,C,D and F which the movement of each part of each bed is possible in a exact moment.

11. - A surgery table that its surface can be changed from flat to a surface with ups and downs in order to make tunnels and spaces for entering the long arms to lift and transfer the patient.

12. -The said tunnels or spaces in claim 1 are made by air cylinders or mechanical devices.

13. - The arms said on claim 18 are mounted either on the surgery table which still has its smooth surface or on the transferring bed B.

14. -The bed D has a variable, transportable, and attachable surface that contains several parts.

15. - The said surface in claim 27 can be attached to any bed or on any stands in a hospital or just stays on its own base.

16. - The patient on the surface from the bed D is not separated from the surface when transferring.

FIG 1

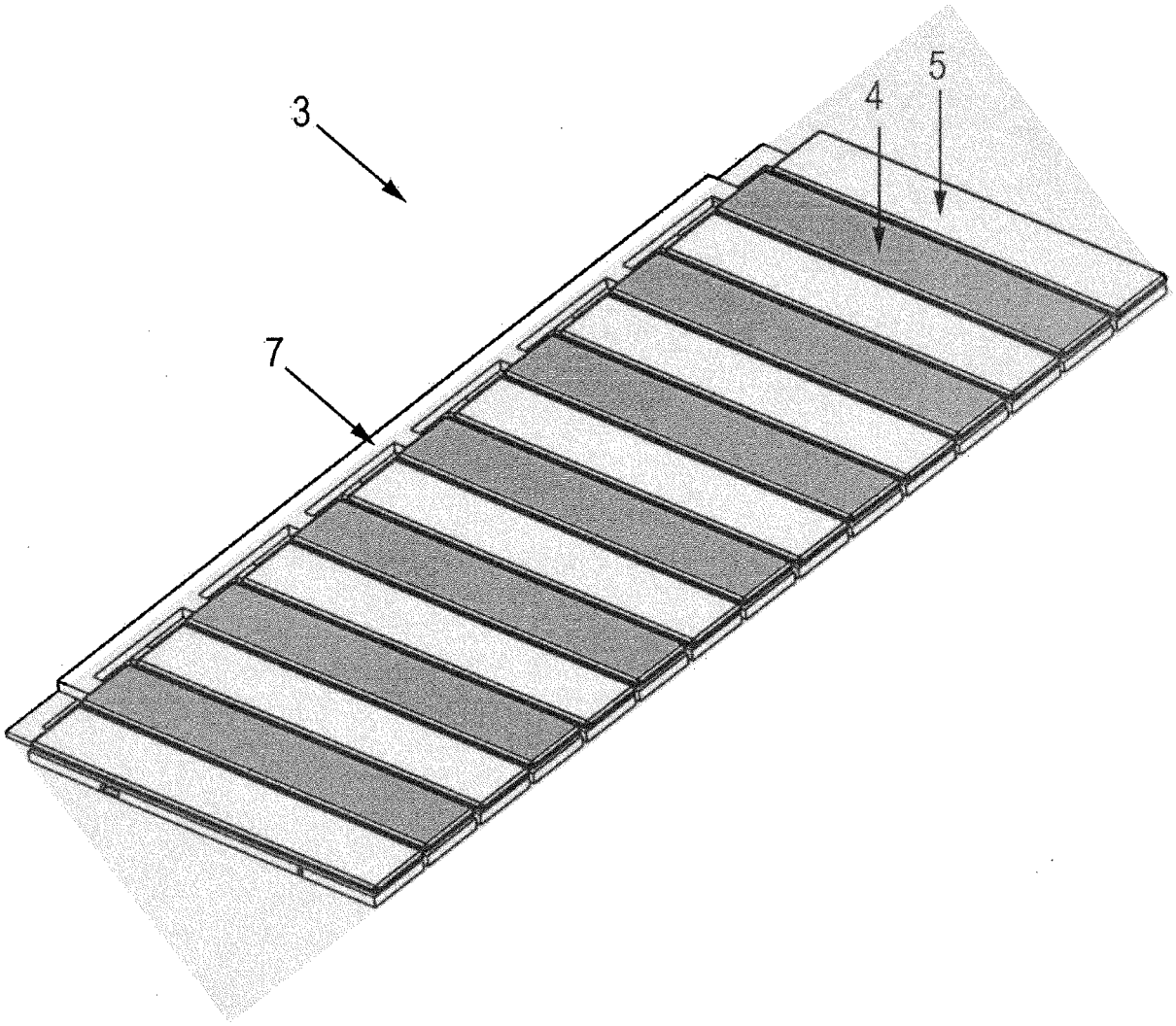


FIG 2

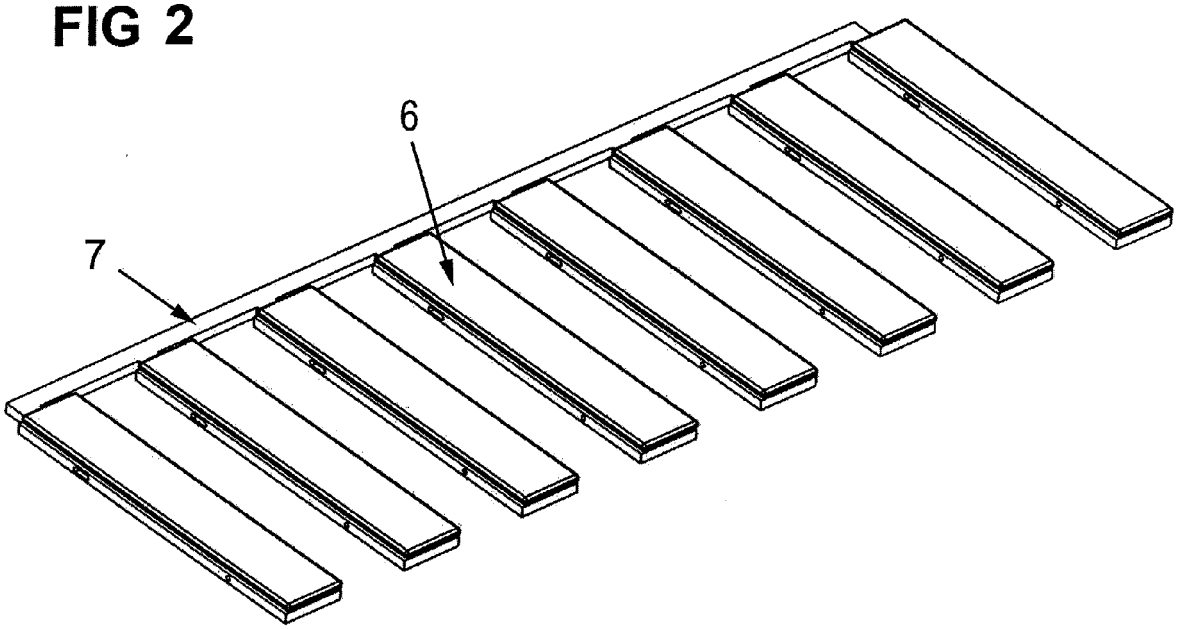


FIG 3

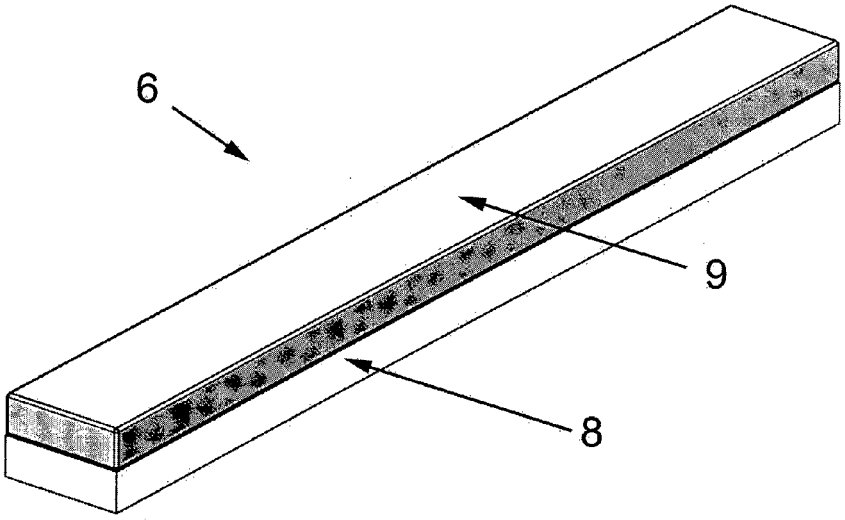


FIG 4

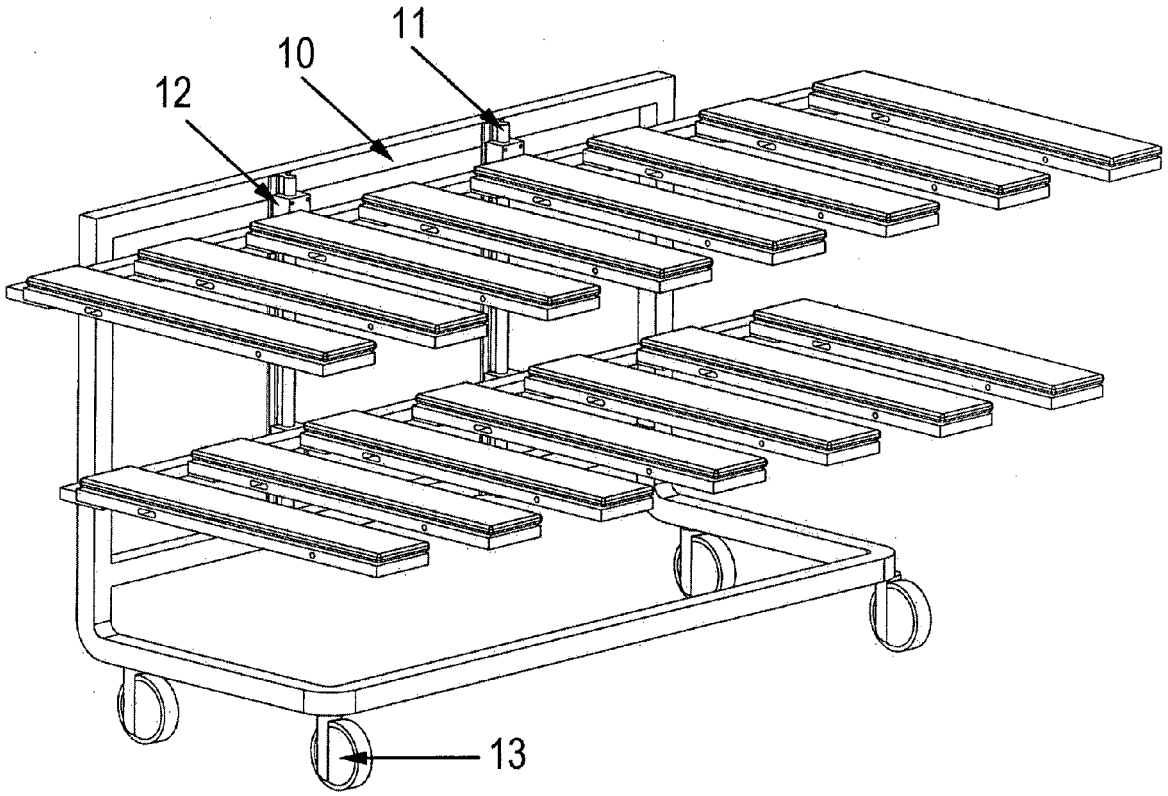


FIG 5

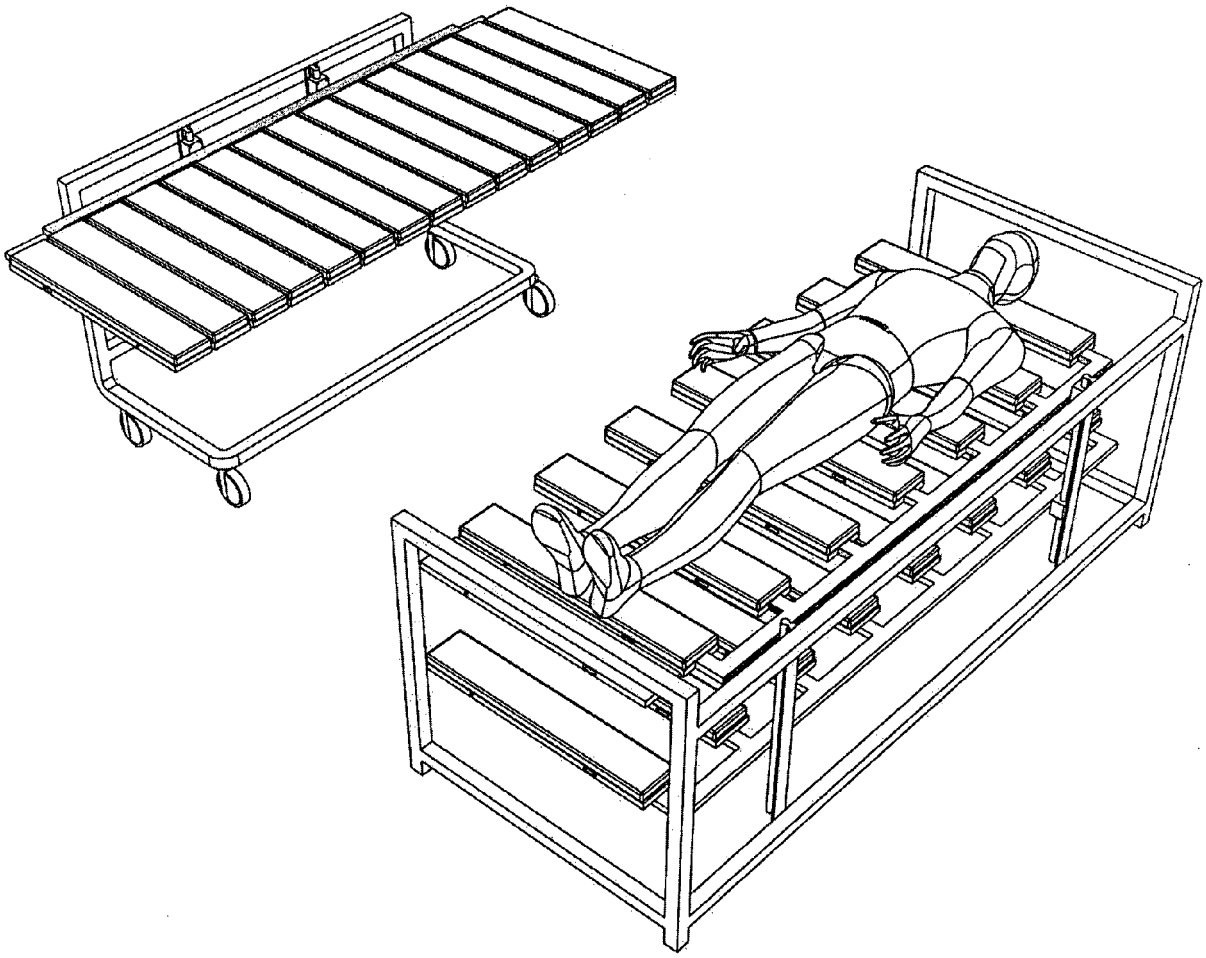


FIG 6

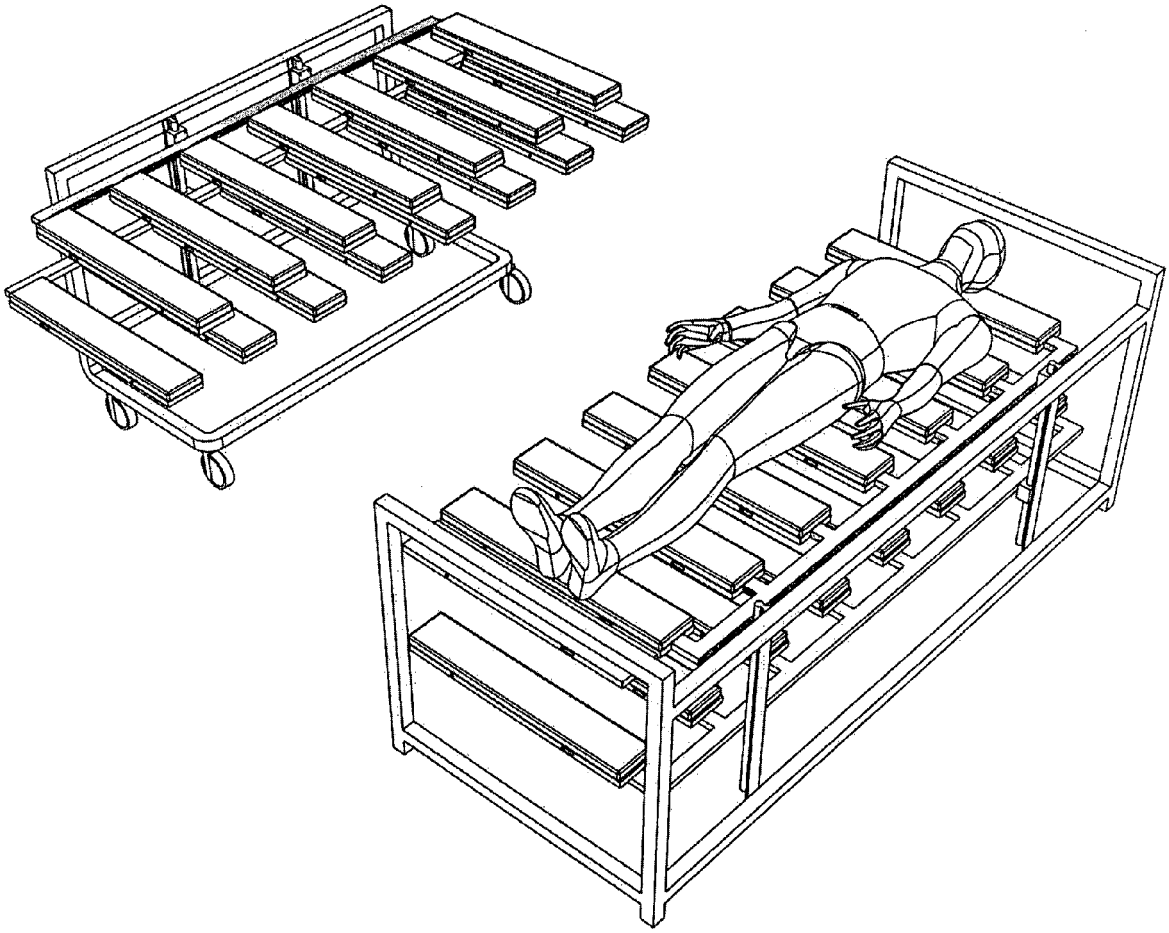


FIG 7

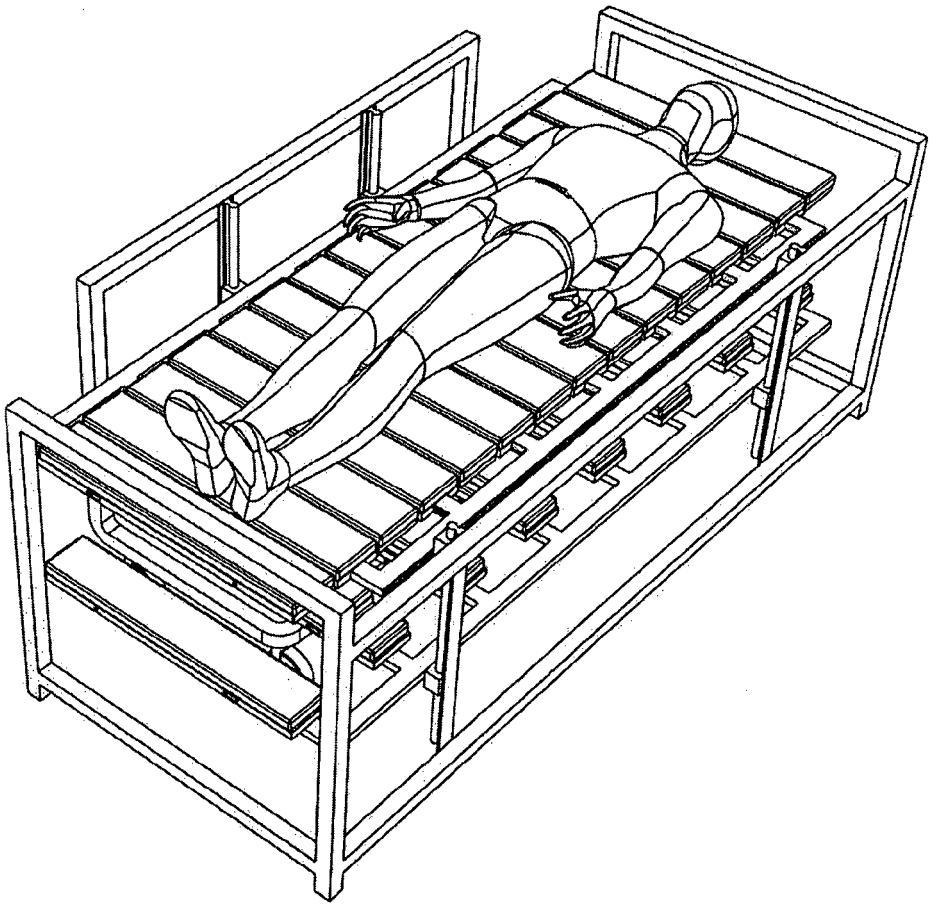


FIG 8

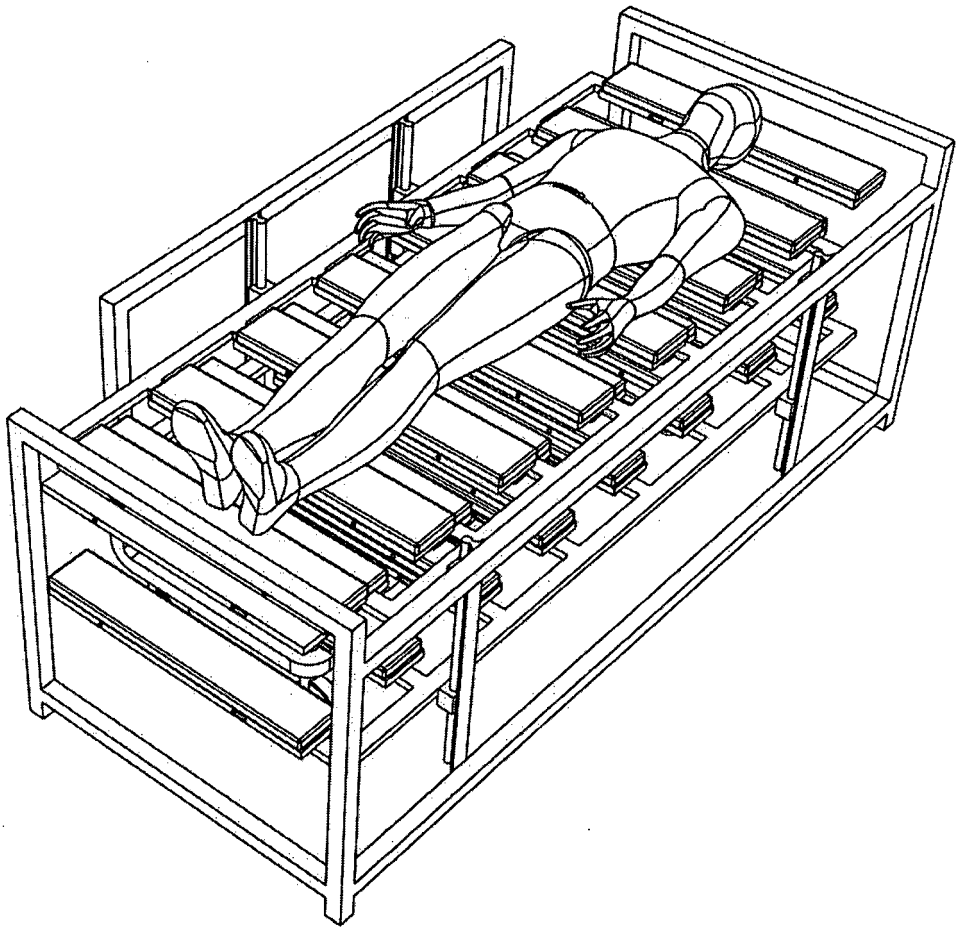


FIG 9

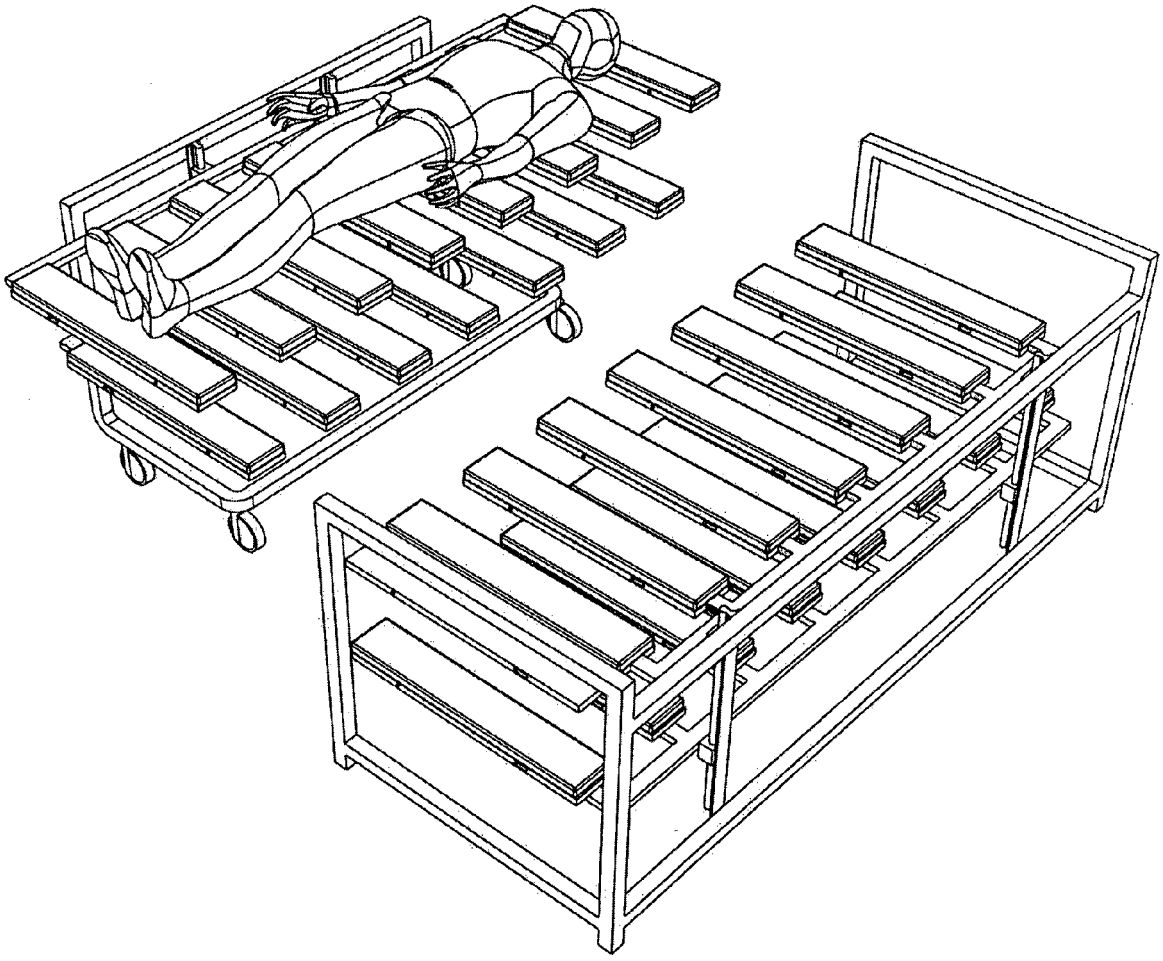


FIG 10

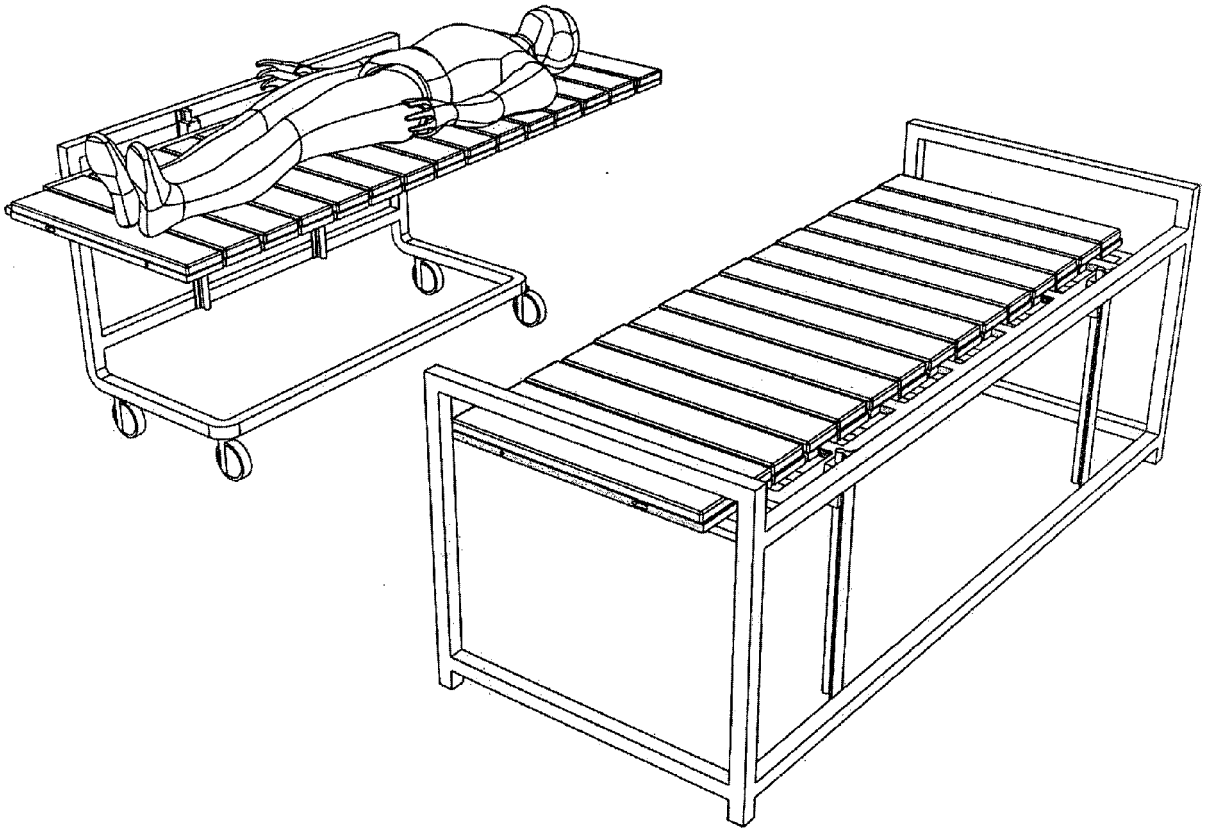
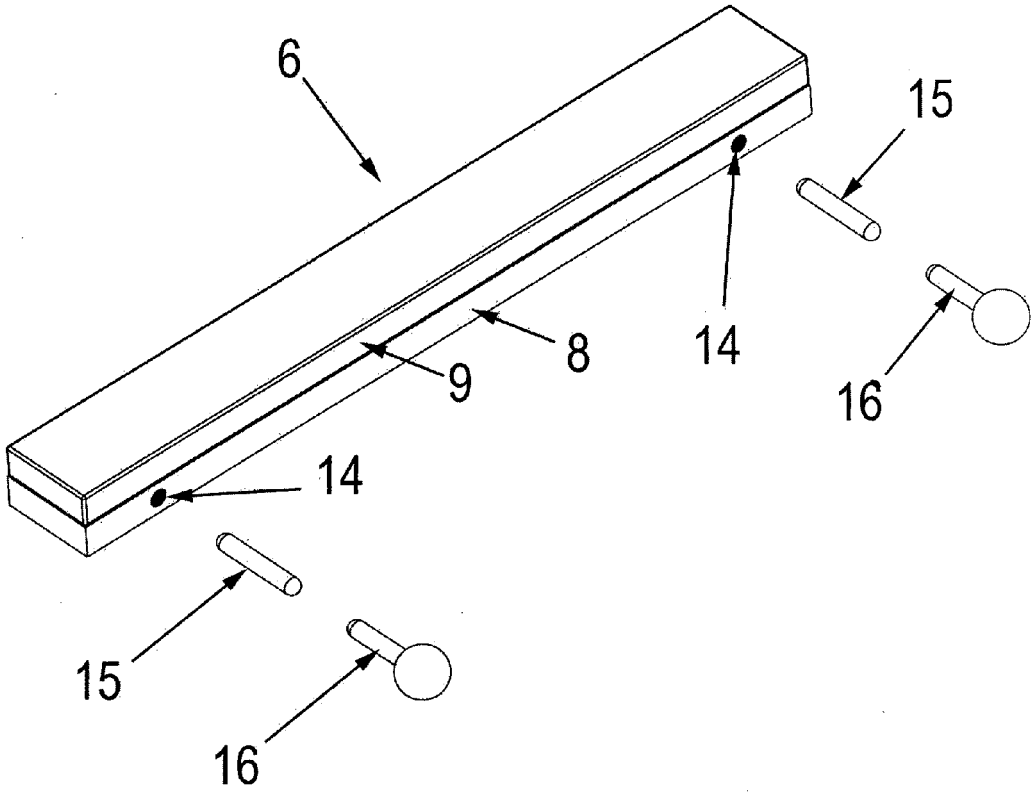


FIG 11



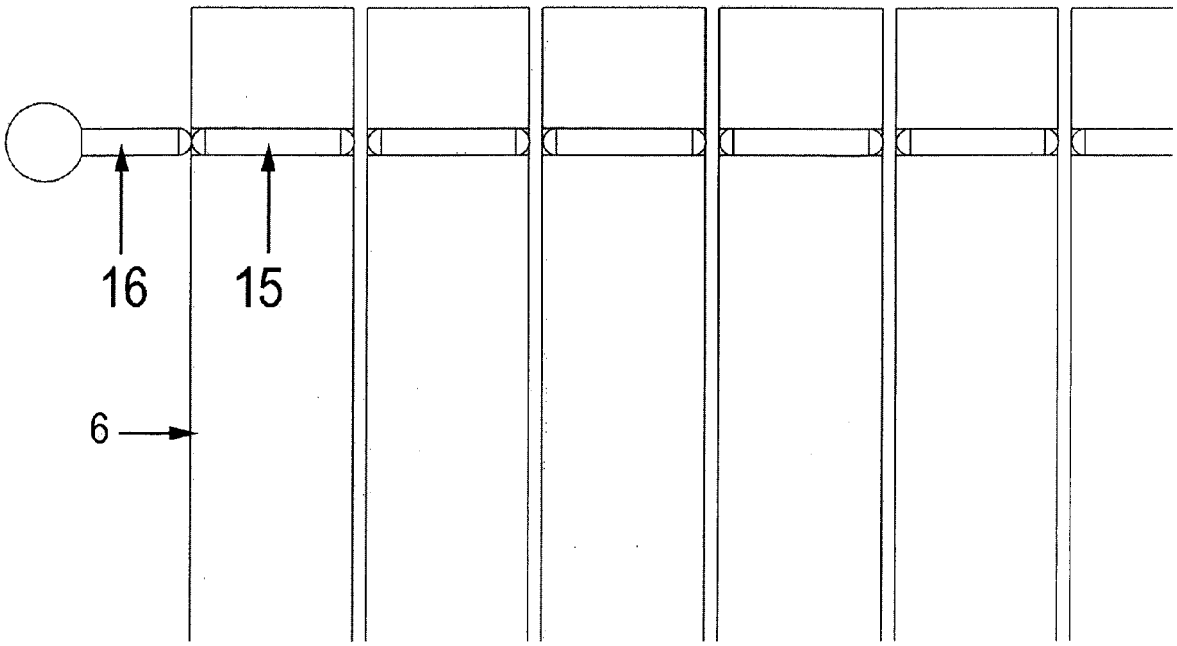


FIG 12

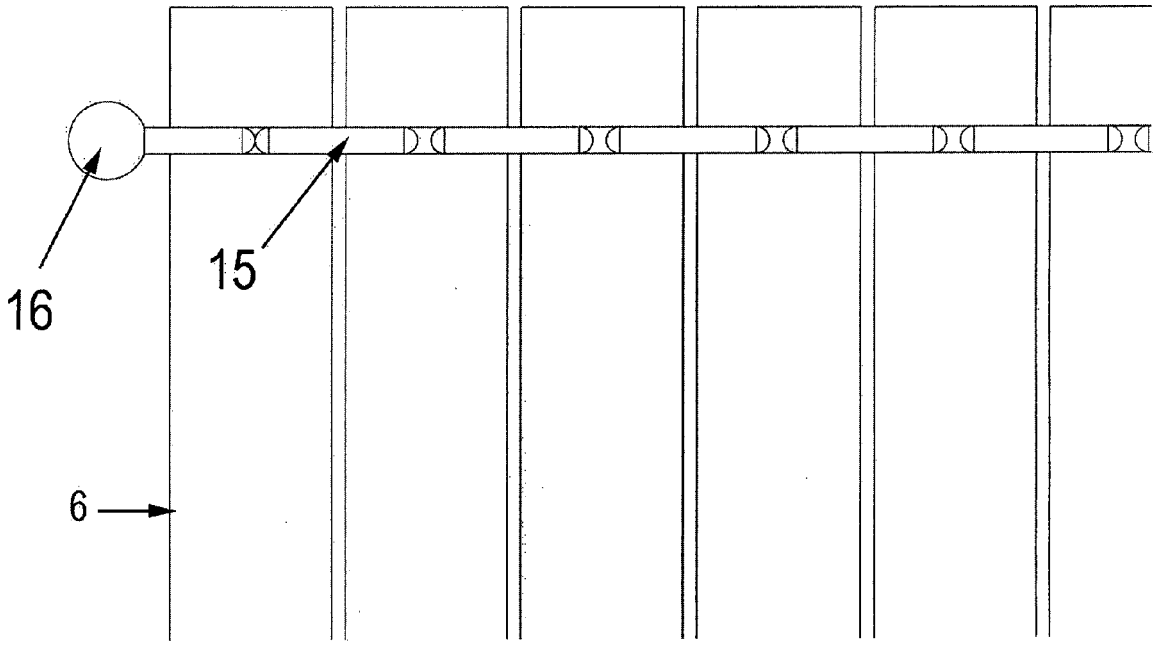


FIG 13

FIG 14

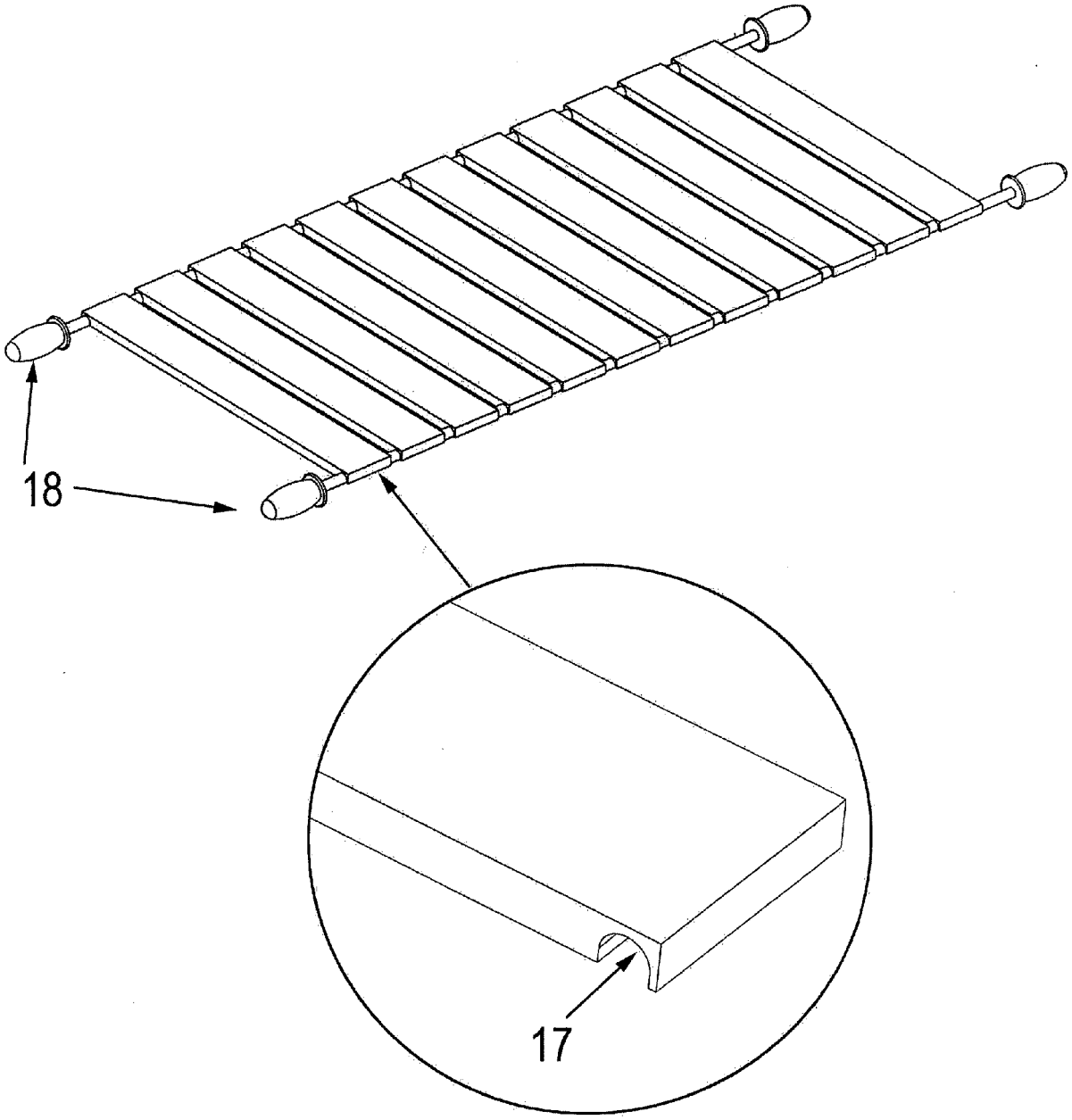


FIG 15

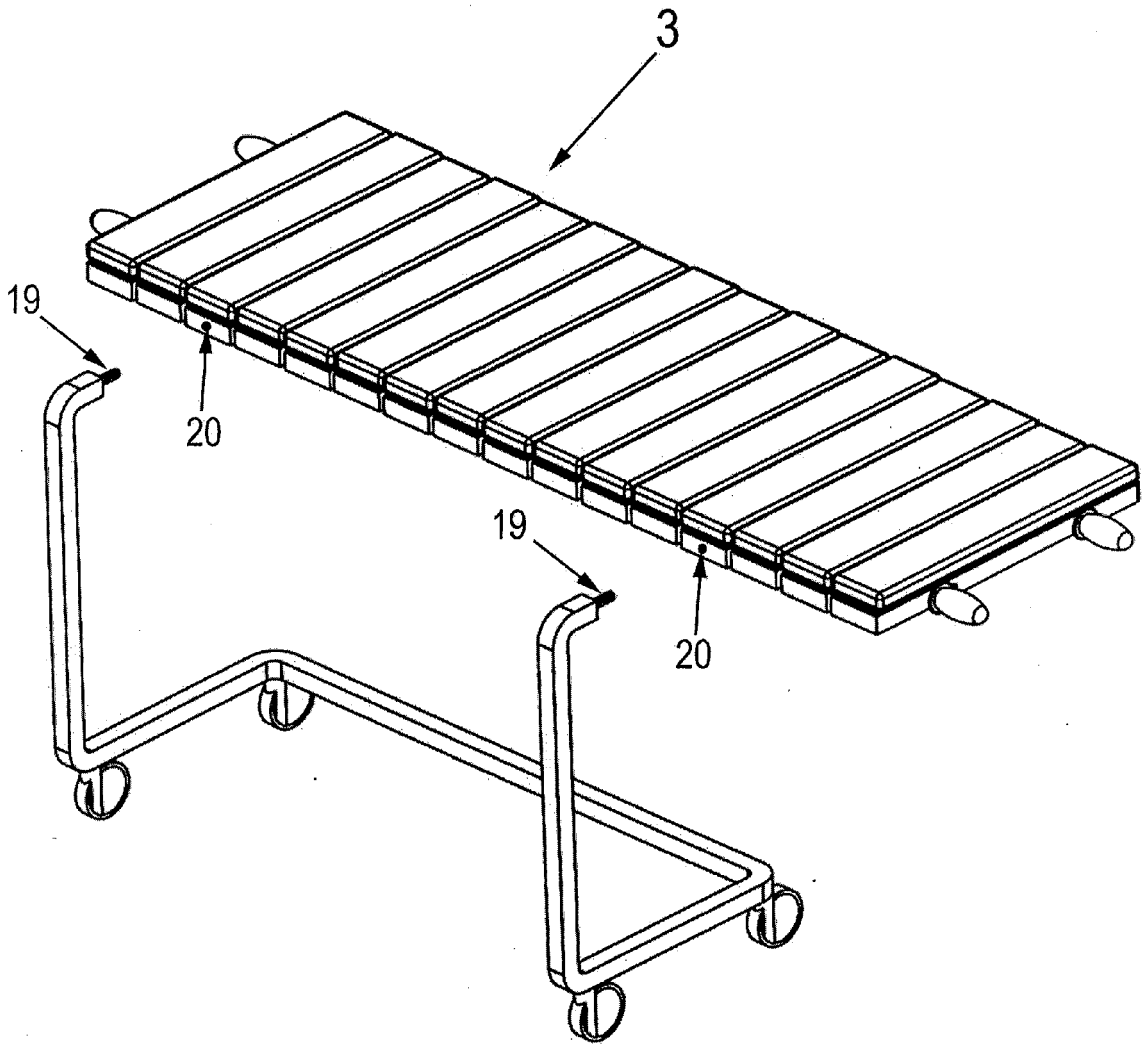
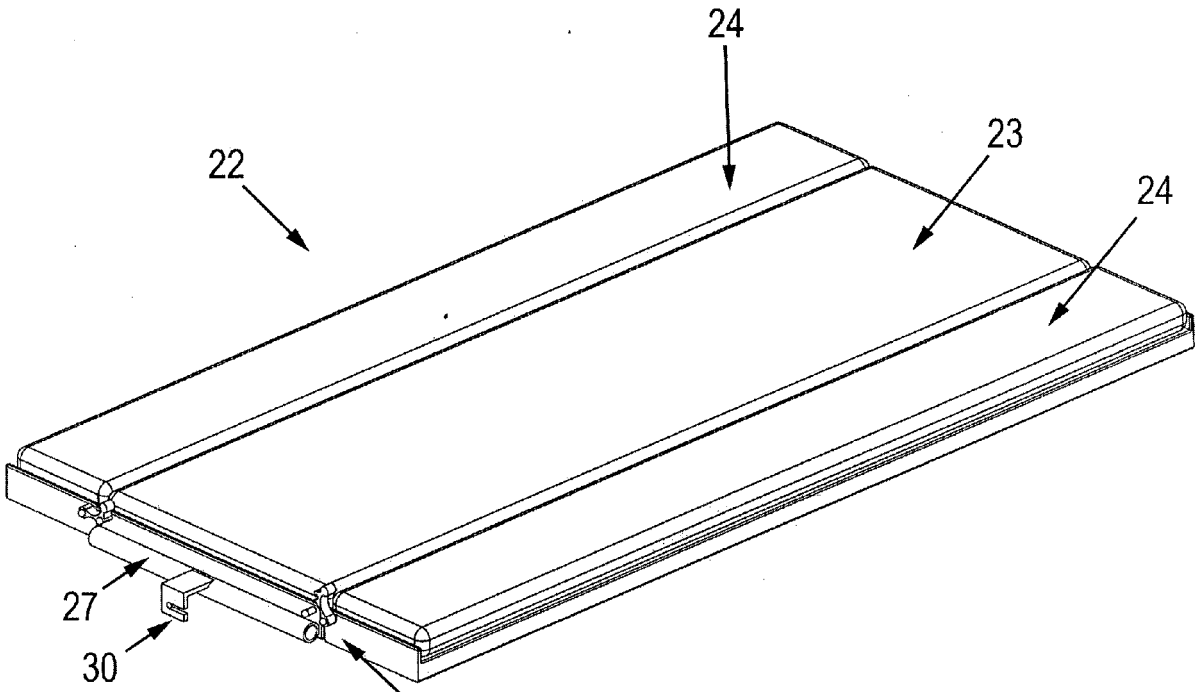


FIG 16



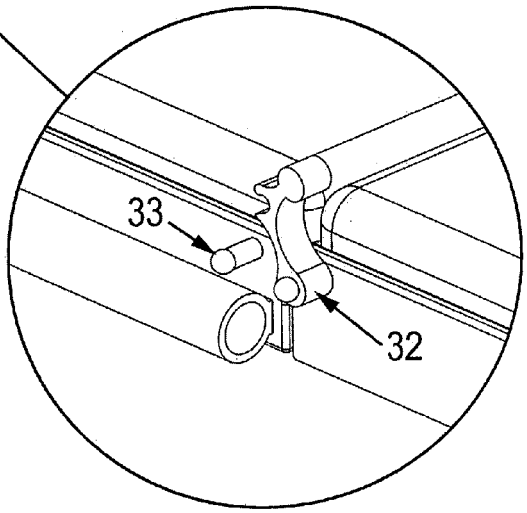


FIG 17

FIG 18

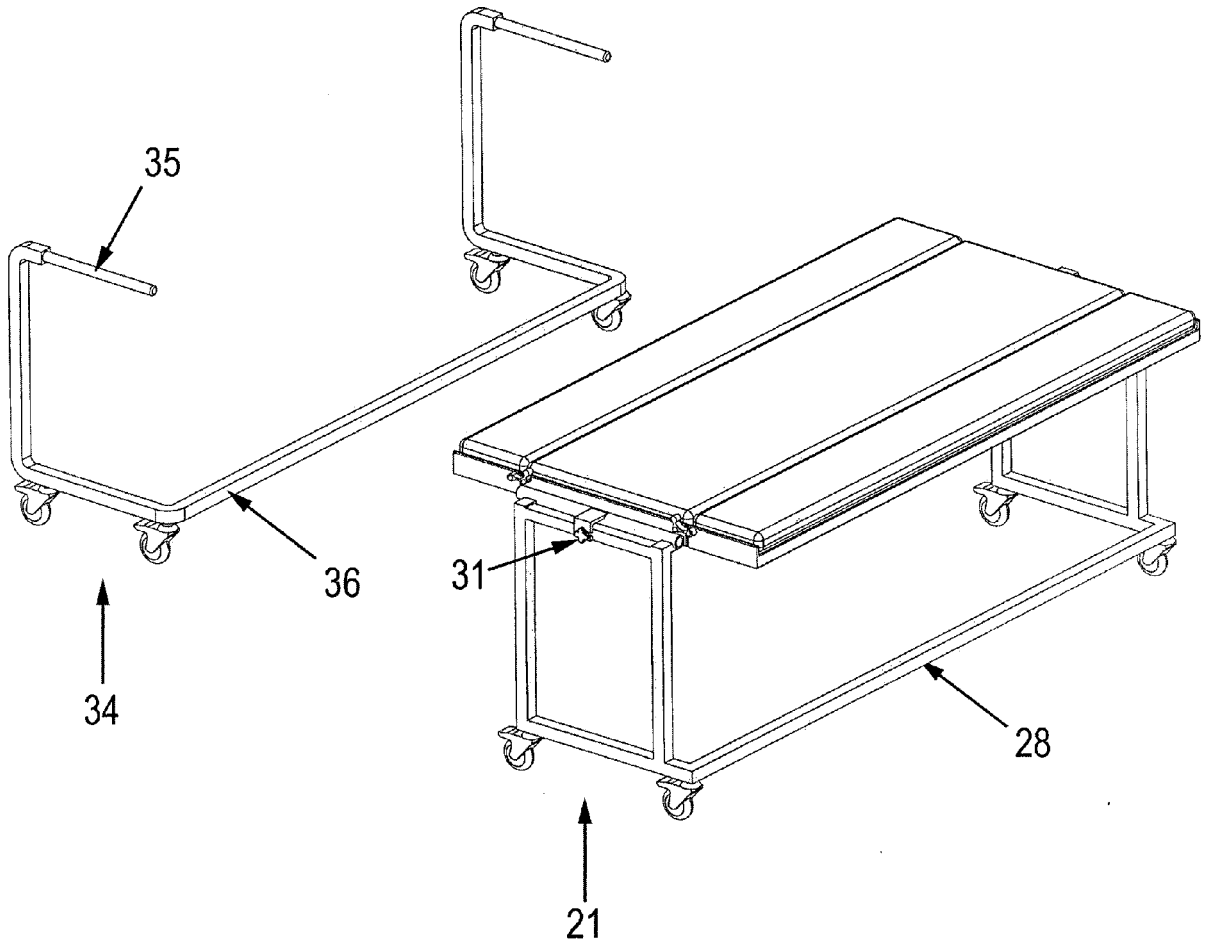


FIG 19

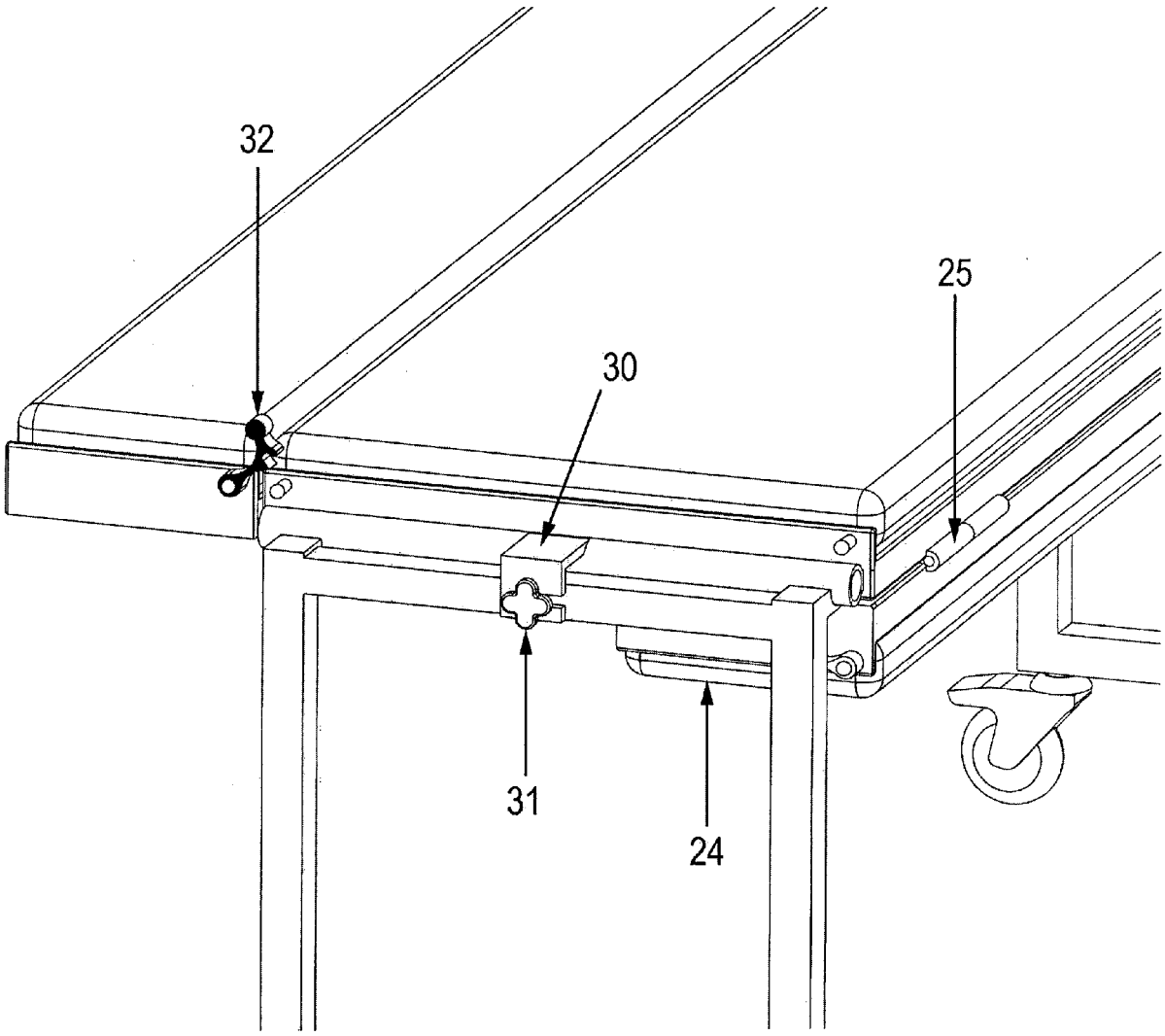


FIG 20

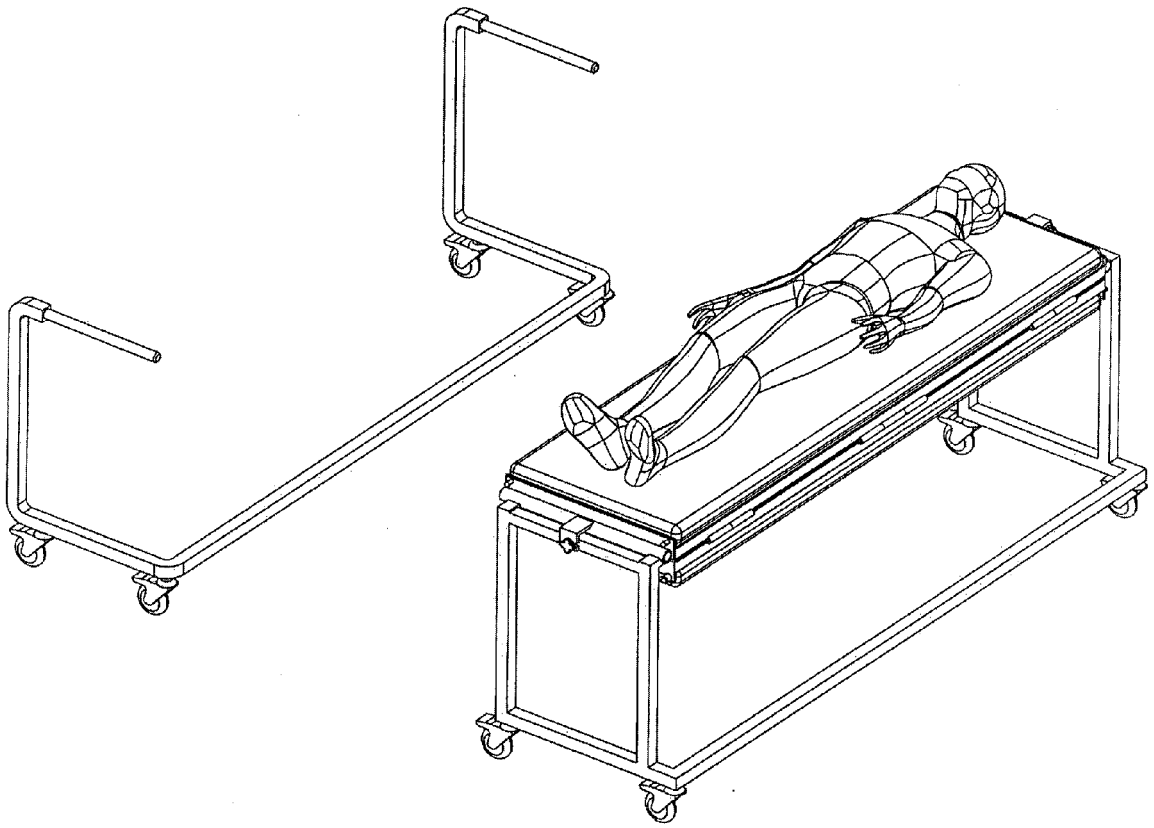


FIG 21

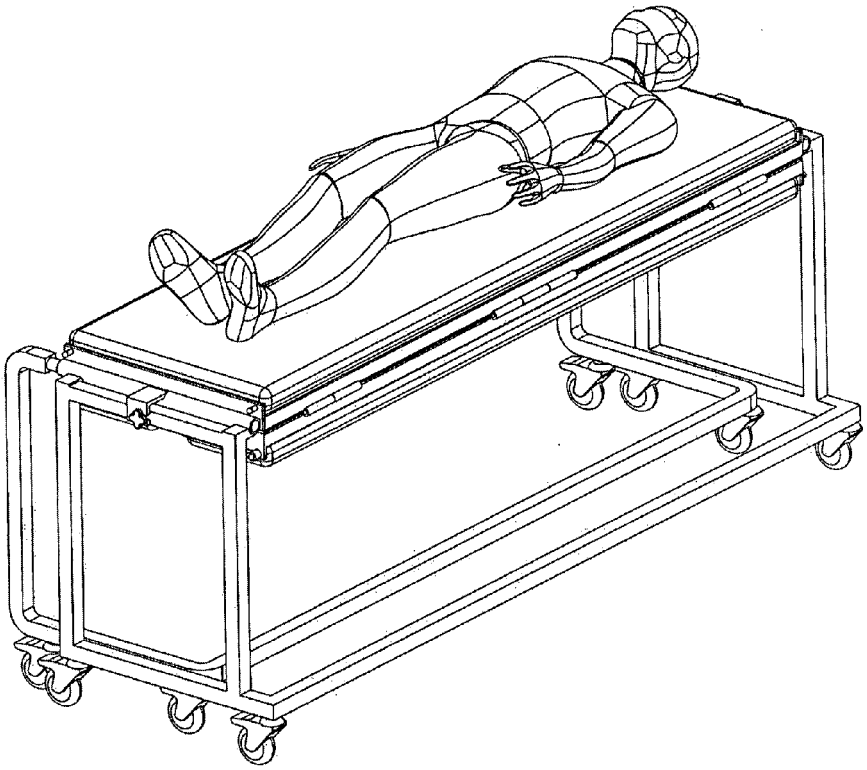


FIG 22

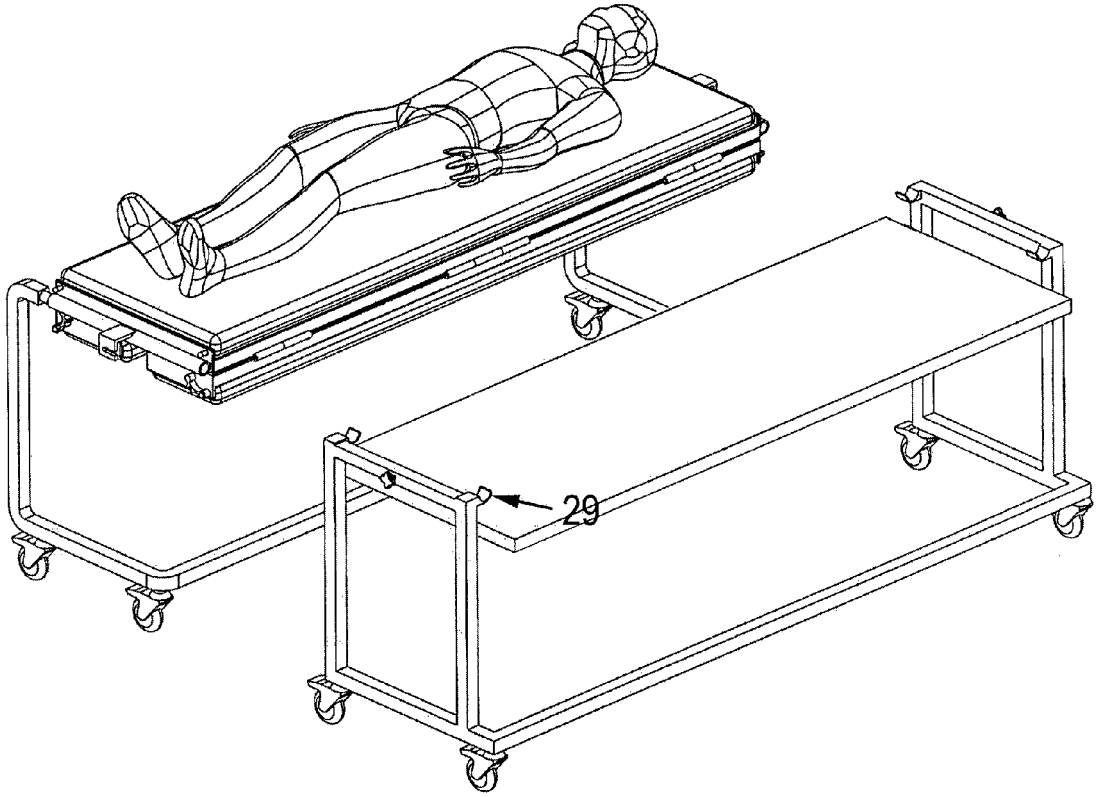


FIG 23

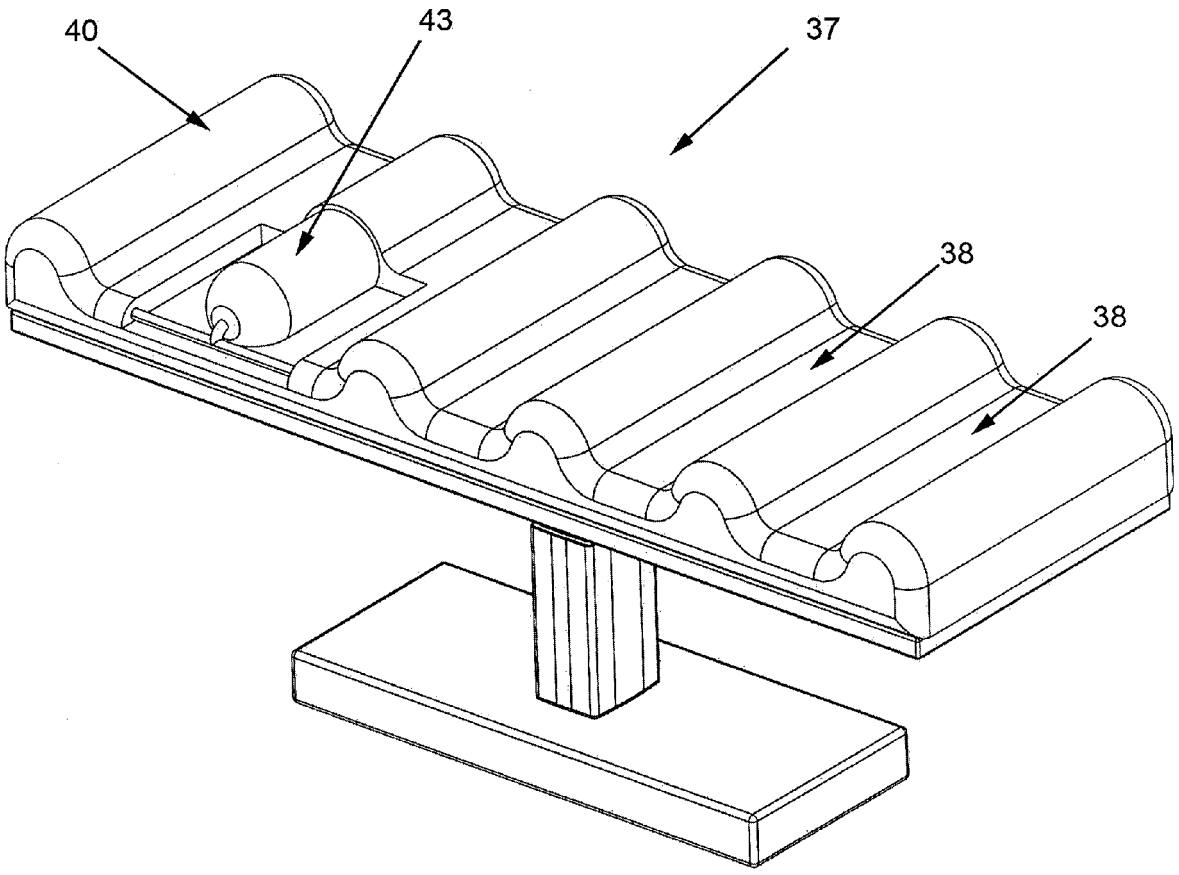


FIG 24

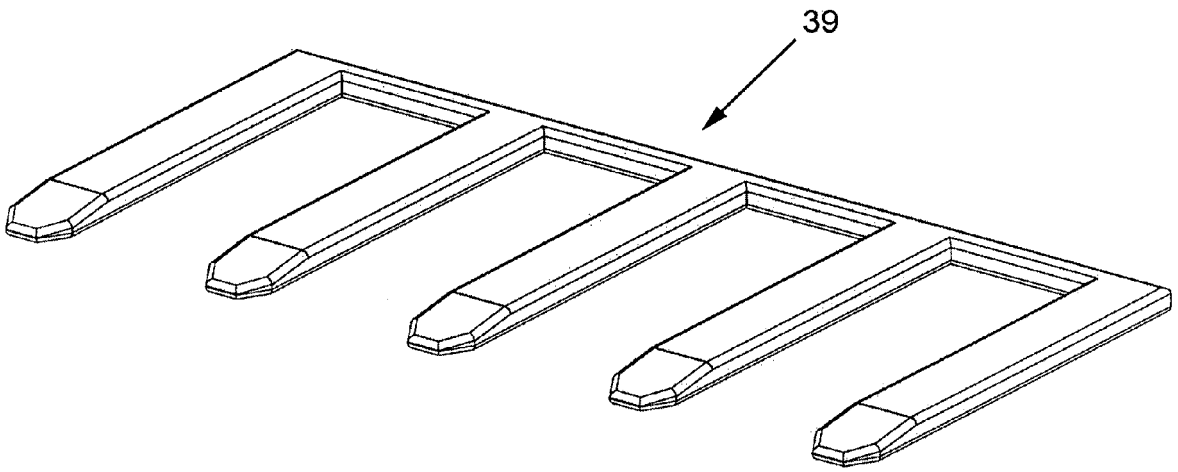


FIG 25

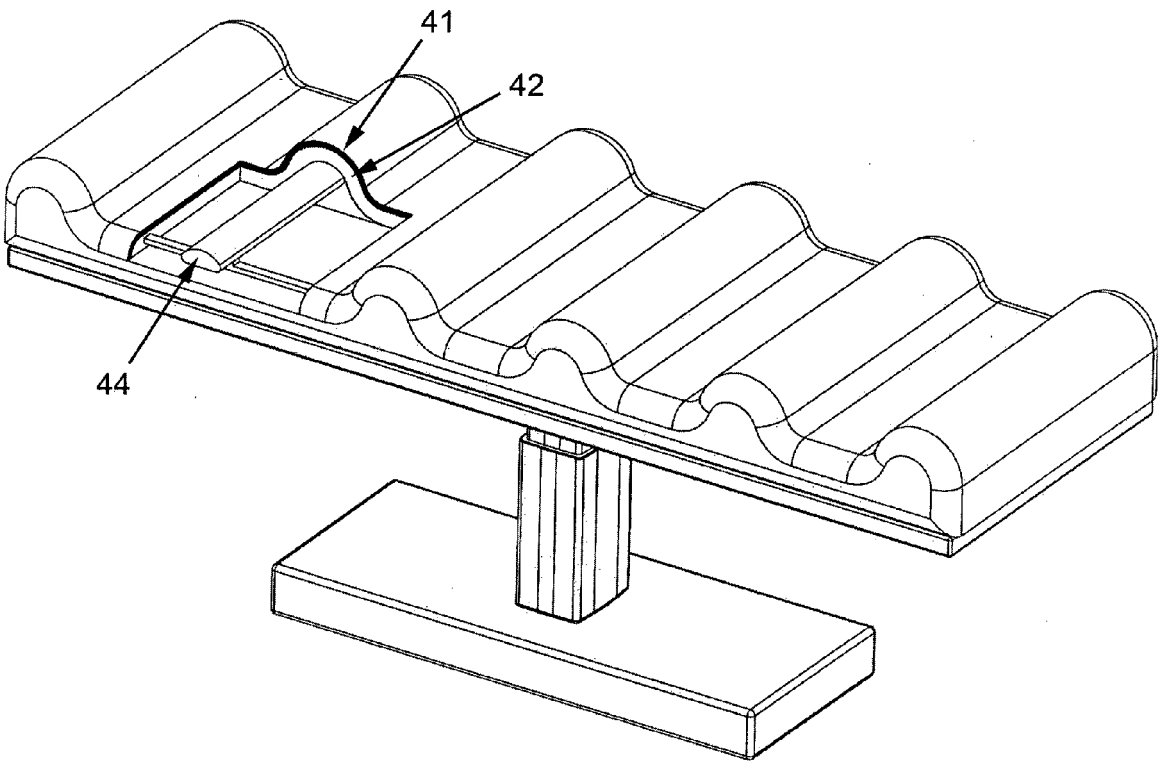


FIG 26

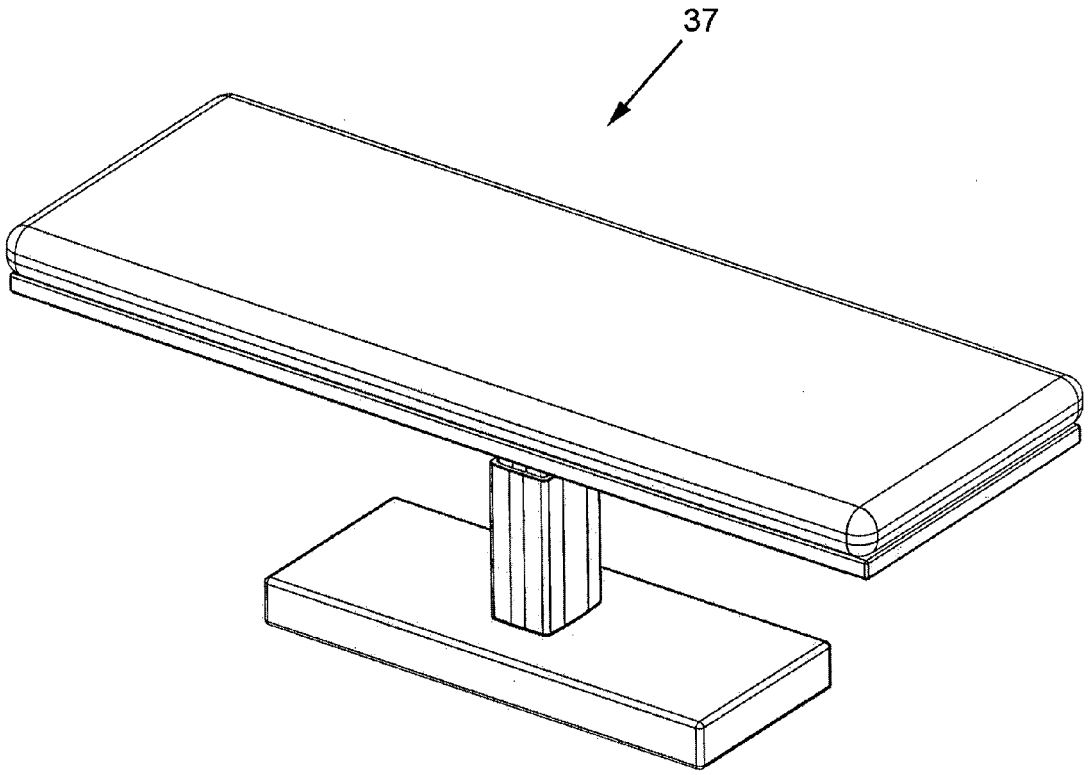


FIG 27

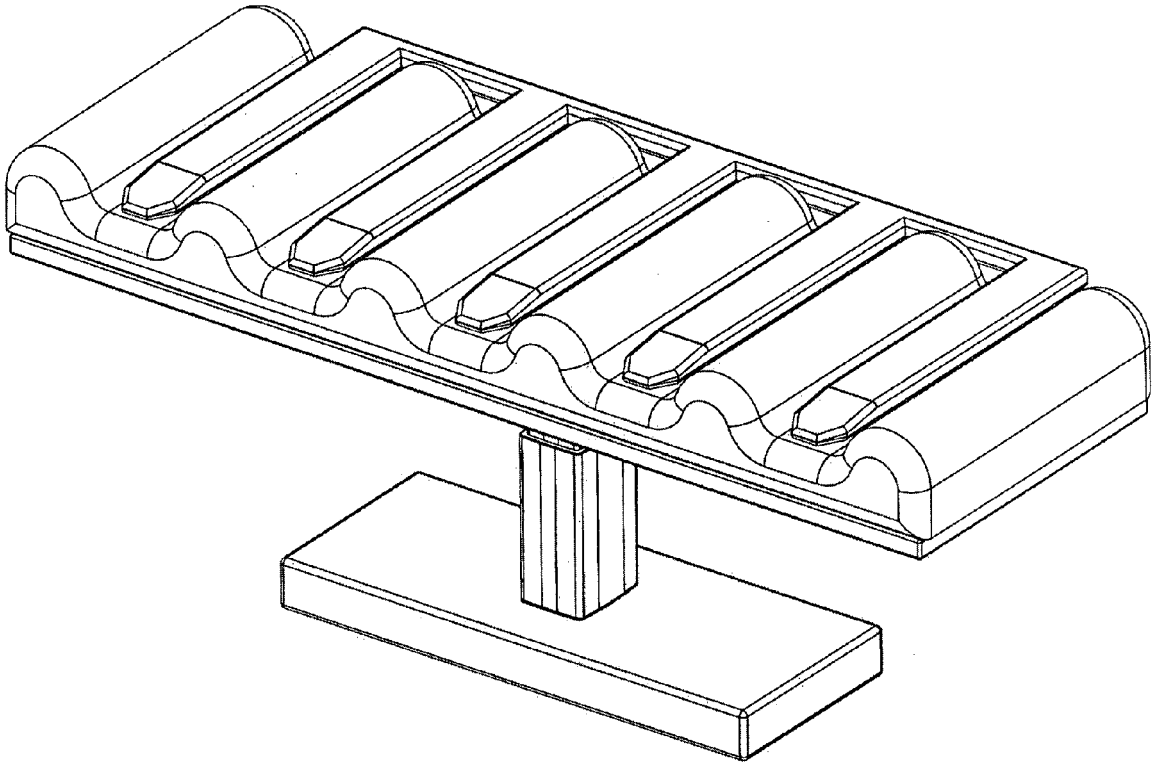


FIG 28

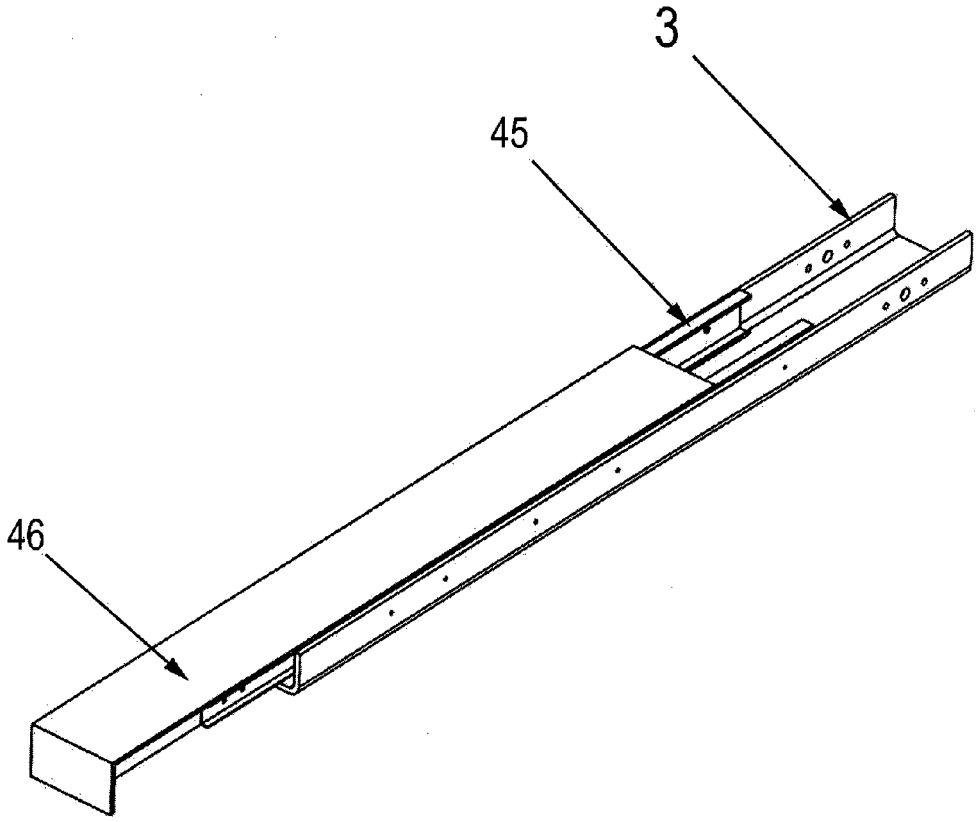


FIG 29

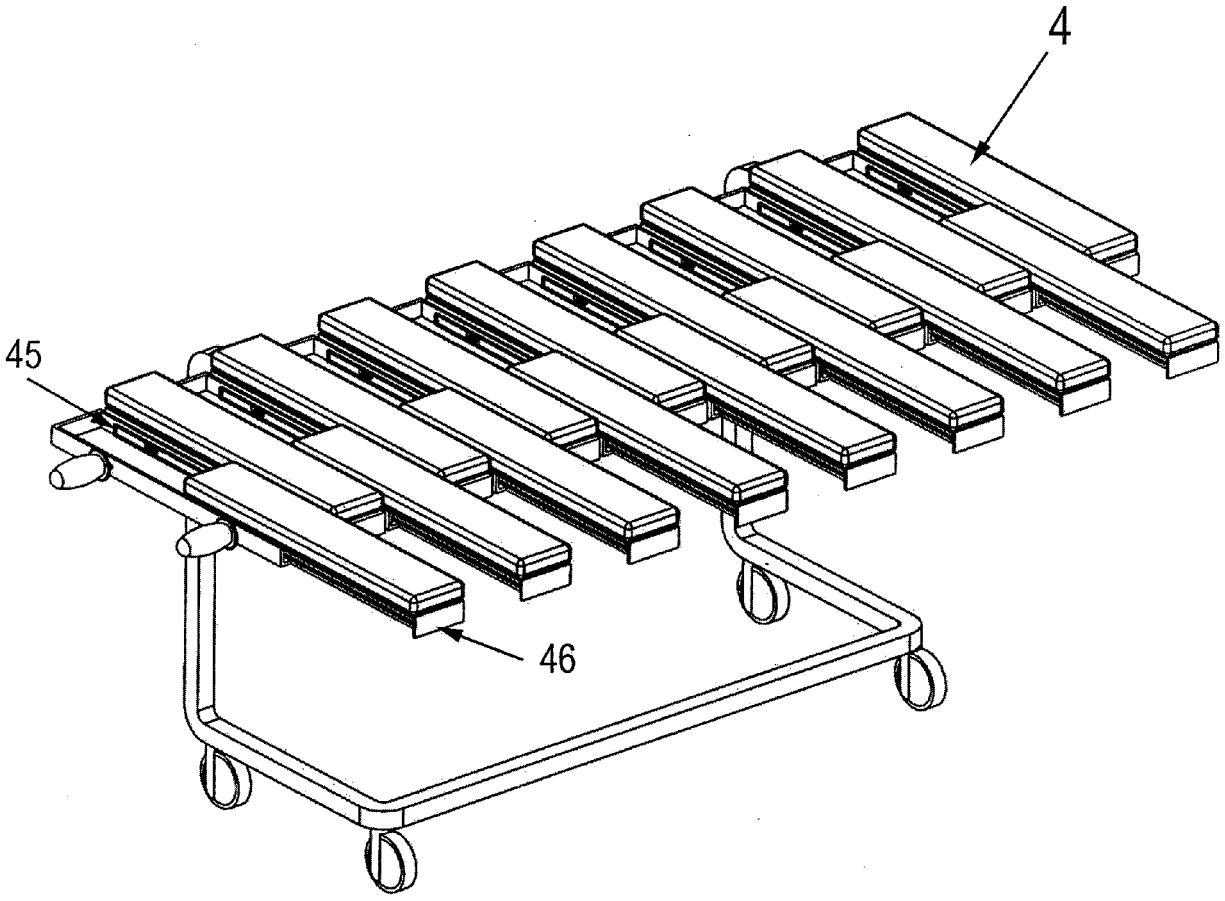
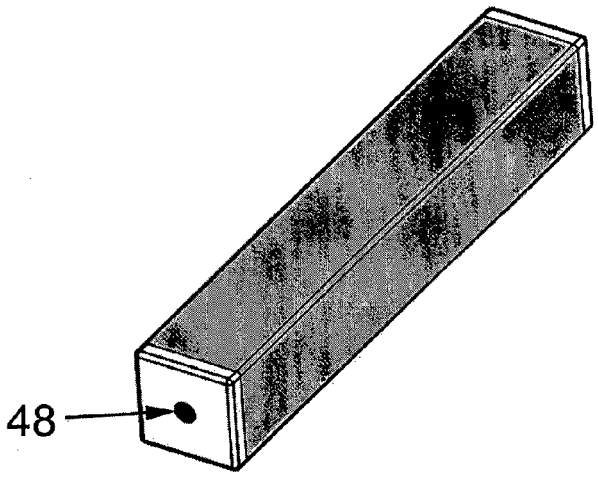


FIG 30



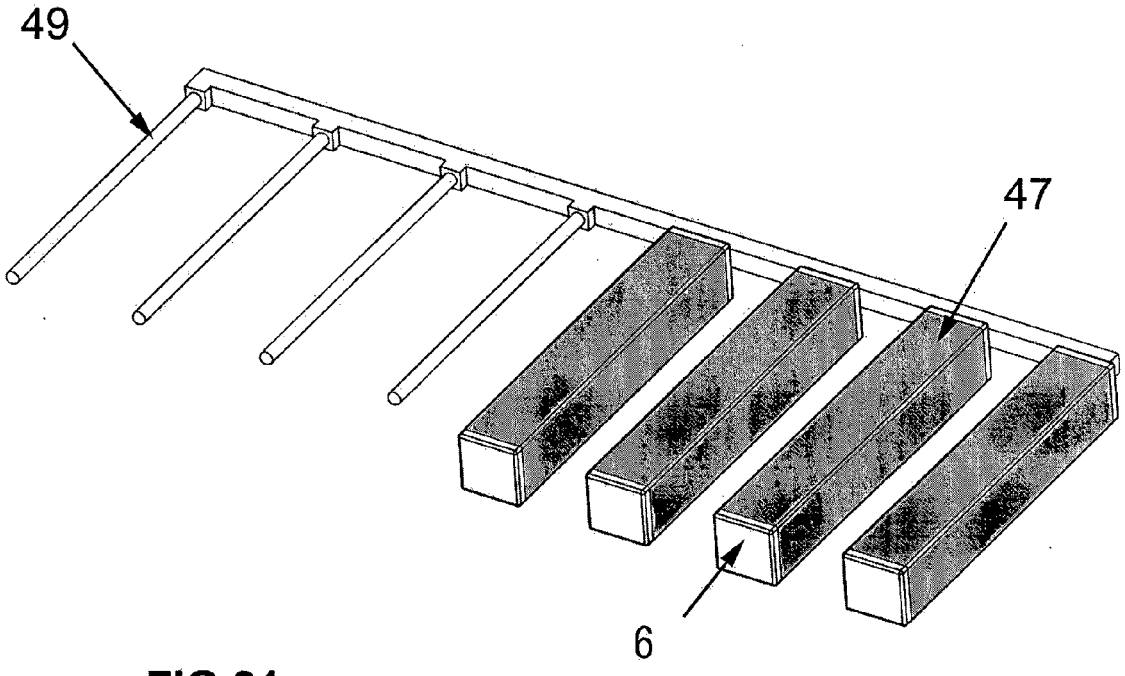


FIG 31

FIG 32

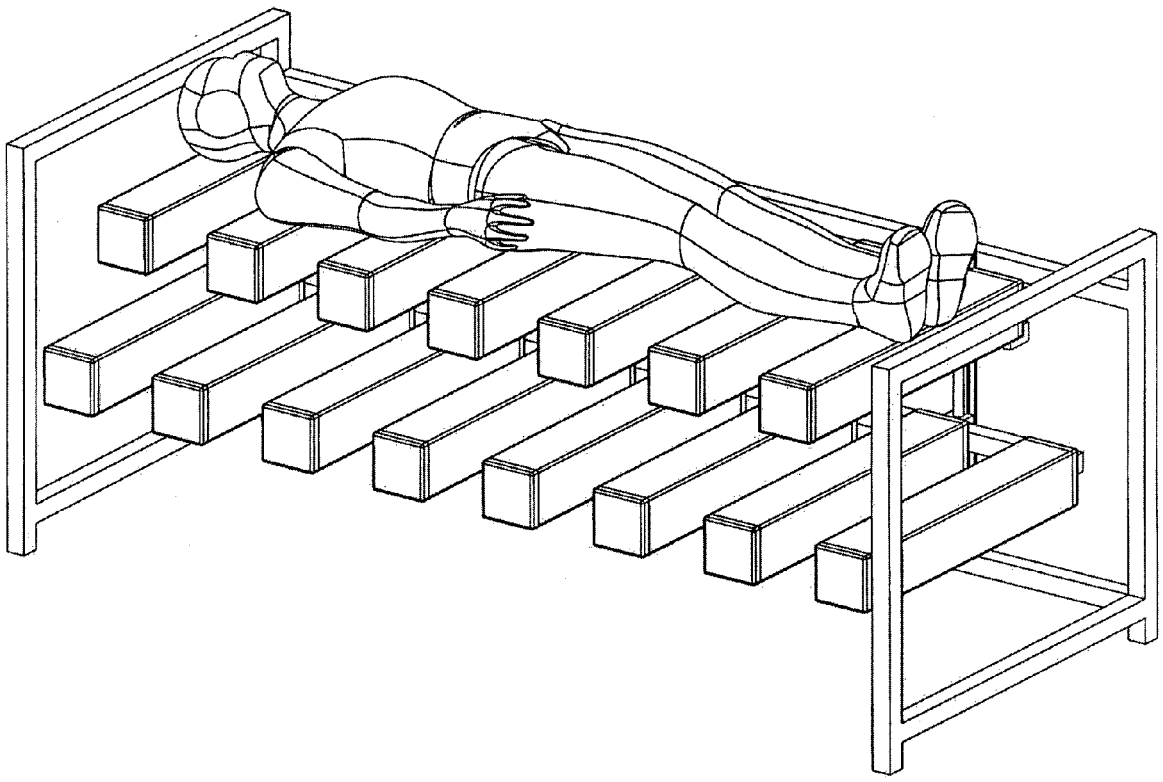


FIG 33

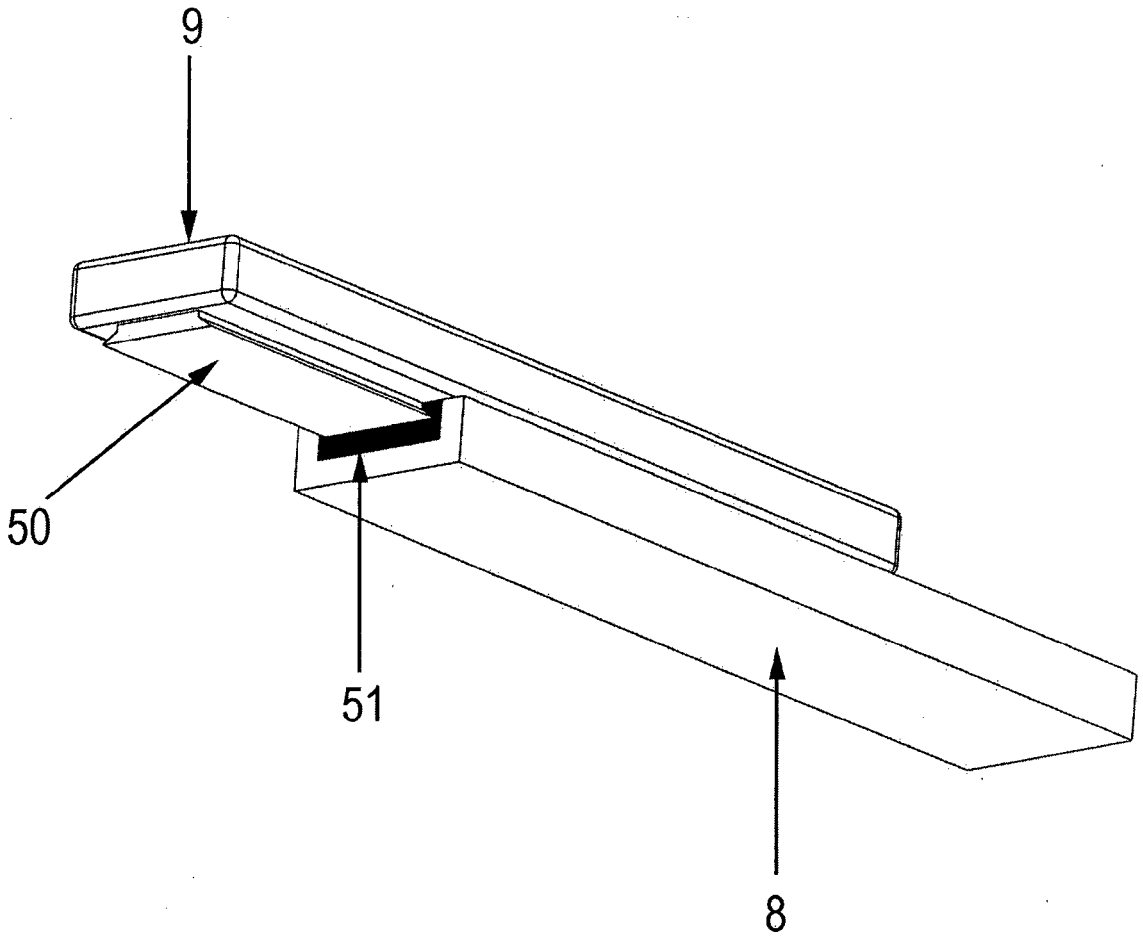
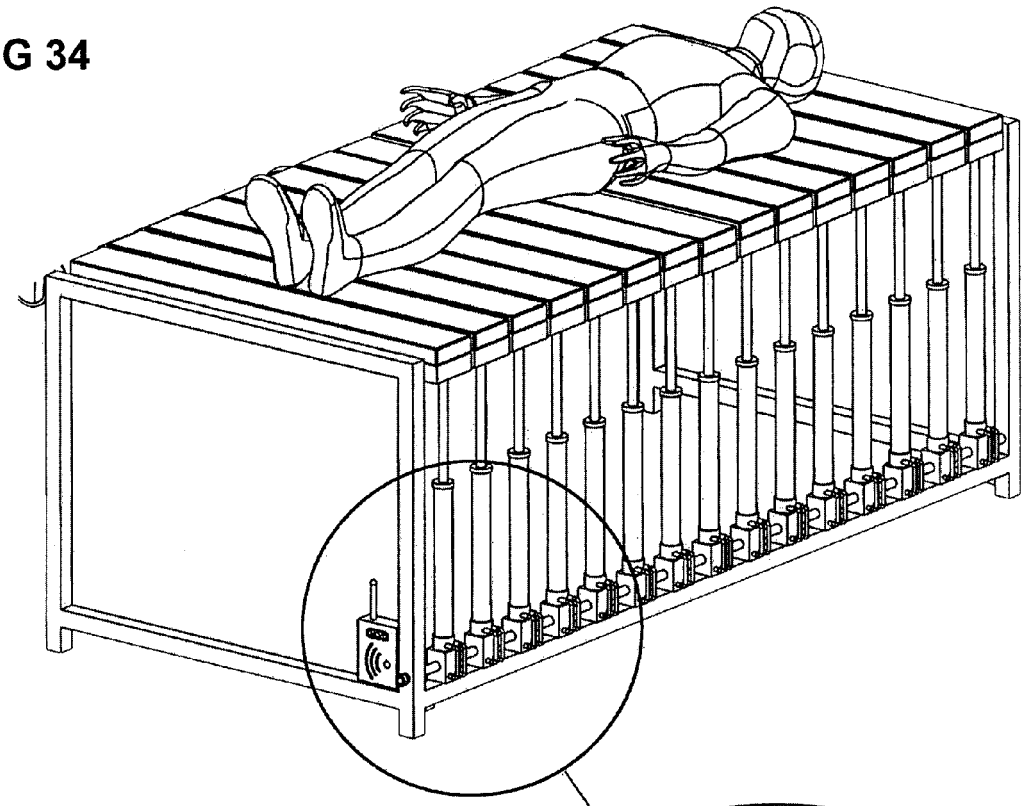


FIG 34



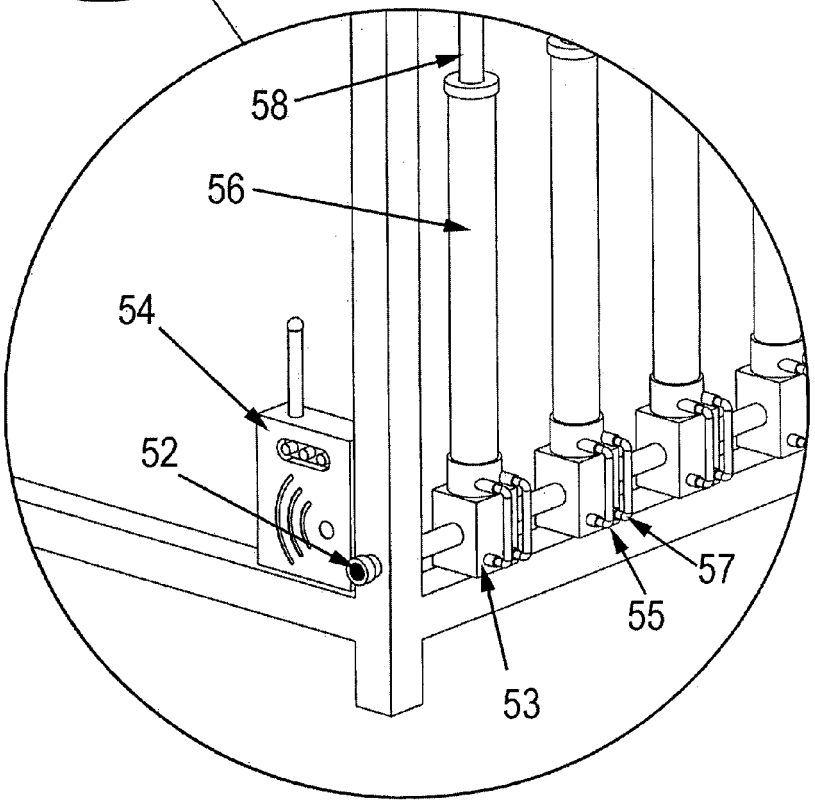
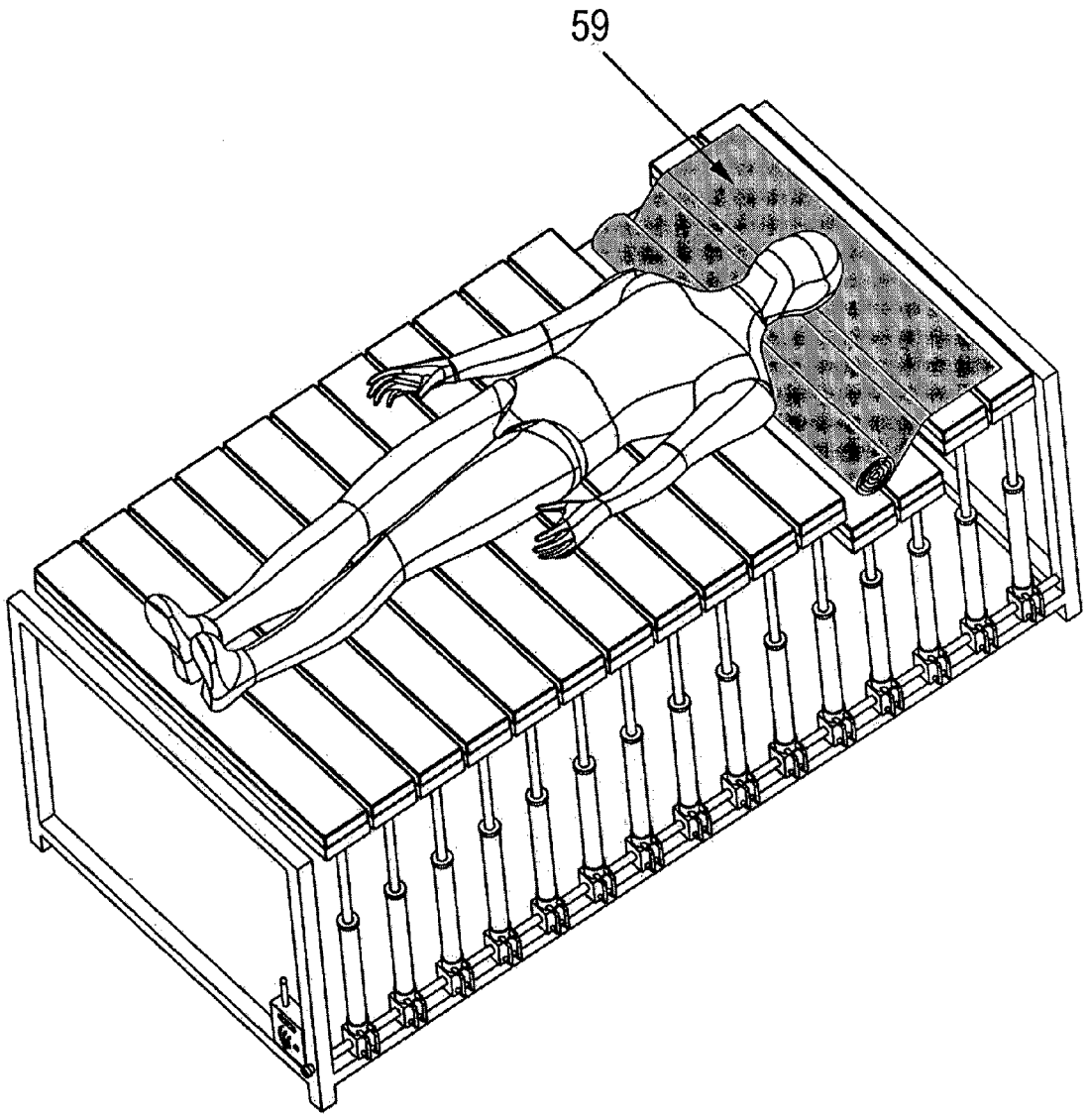


FIG 35

FIG 36



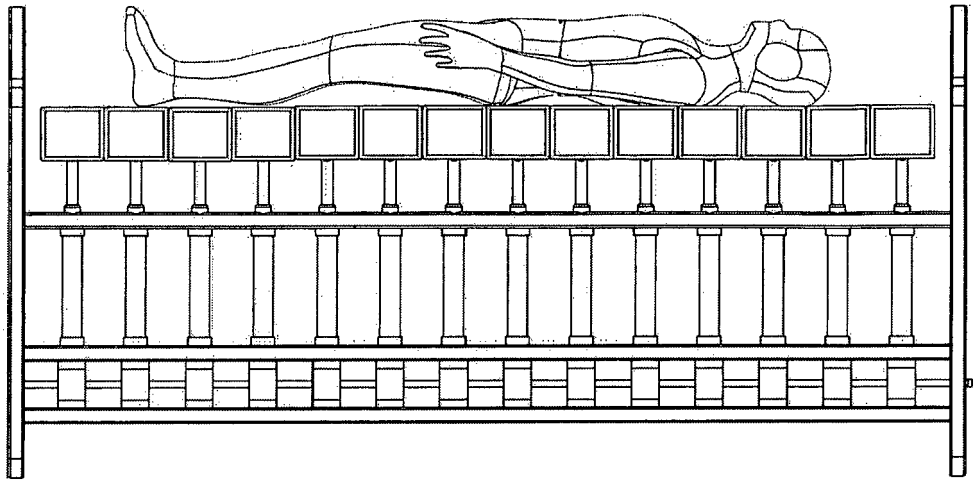


FIG 37

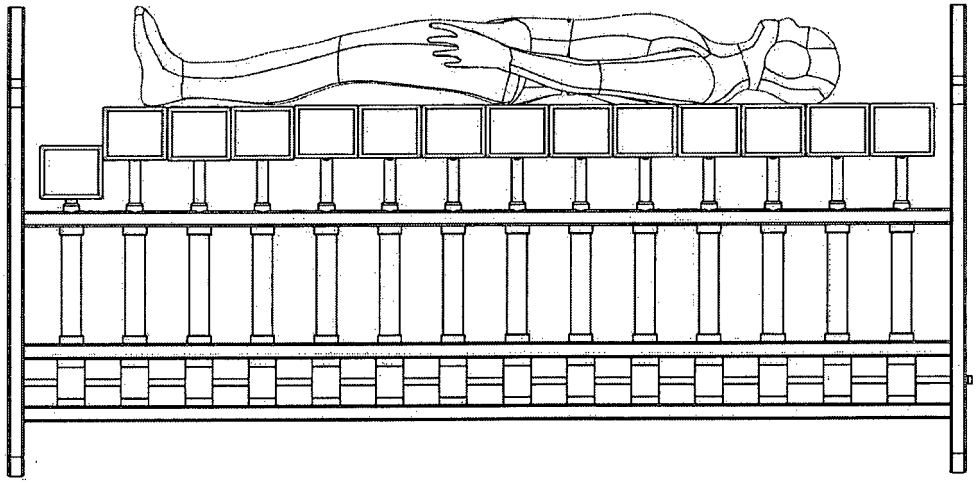


FIG 38

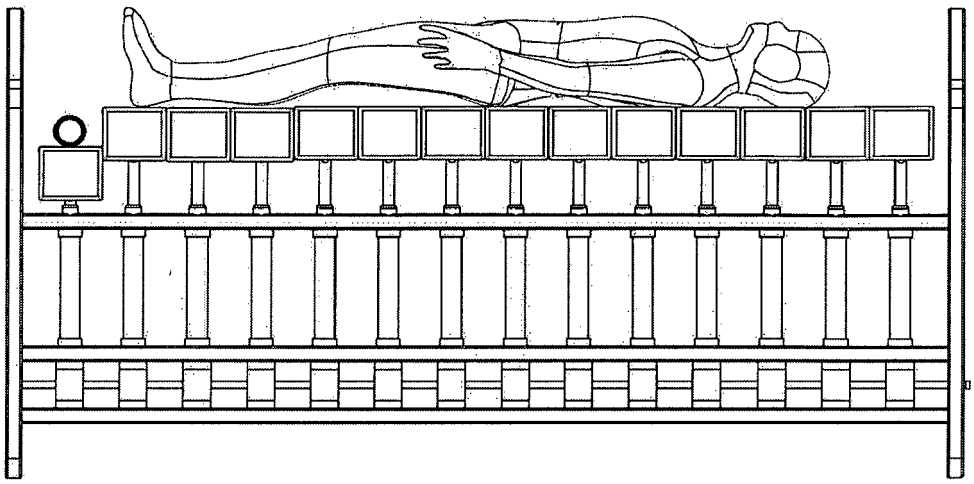


FIG 39

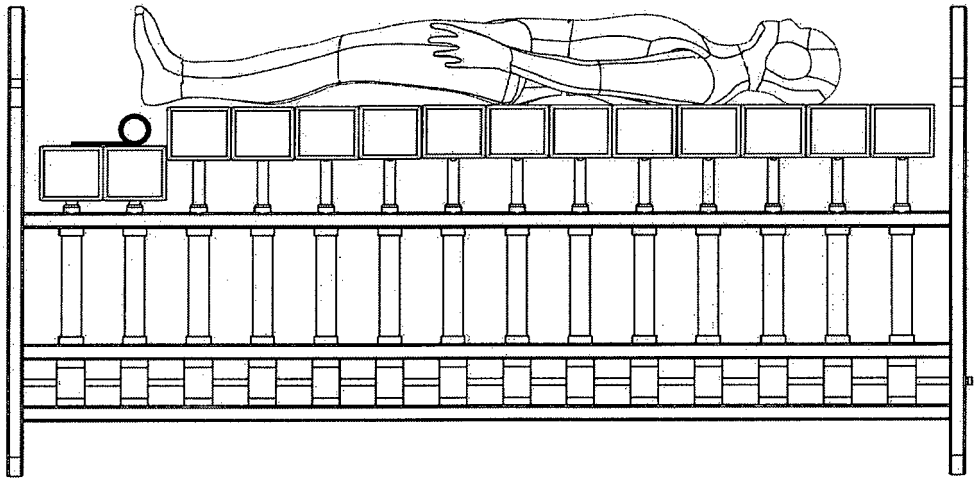


FIG 40

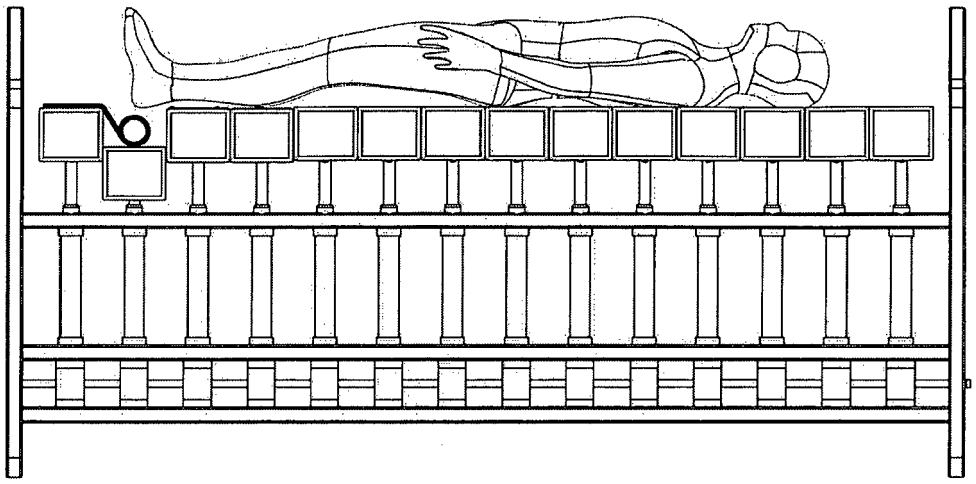


FIG 41

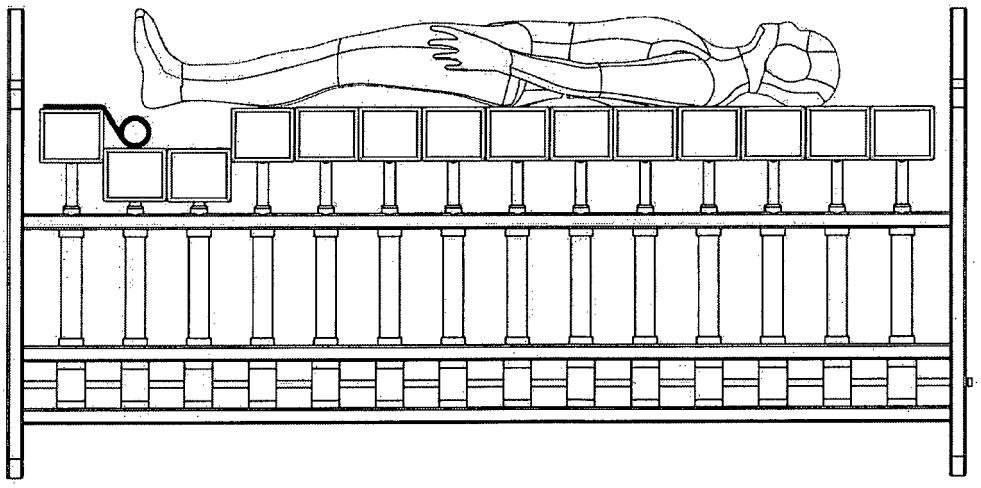


FIG 42

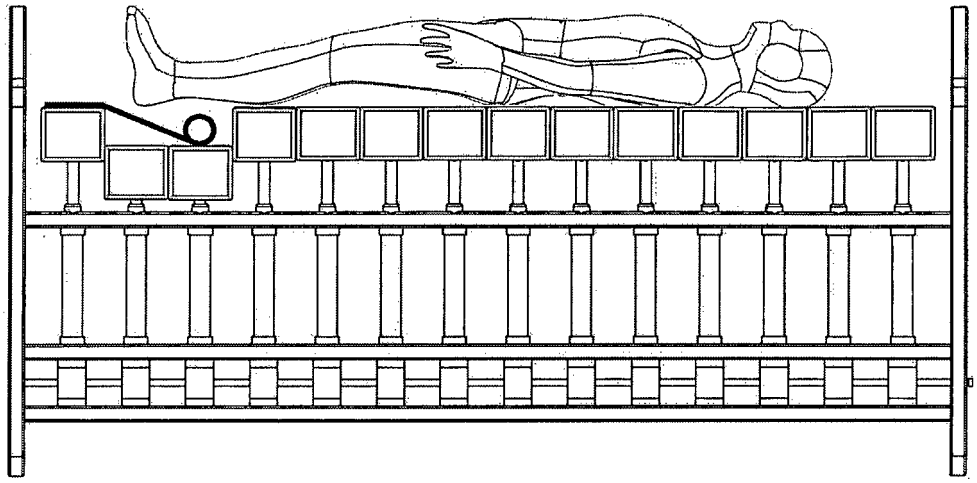


FIG 43

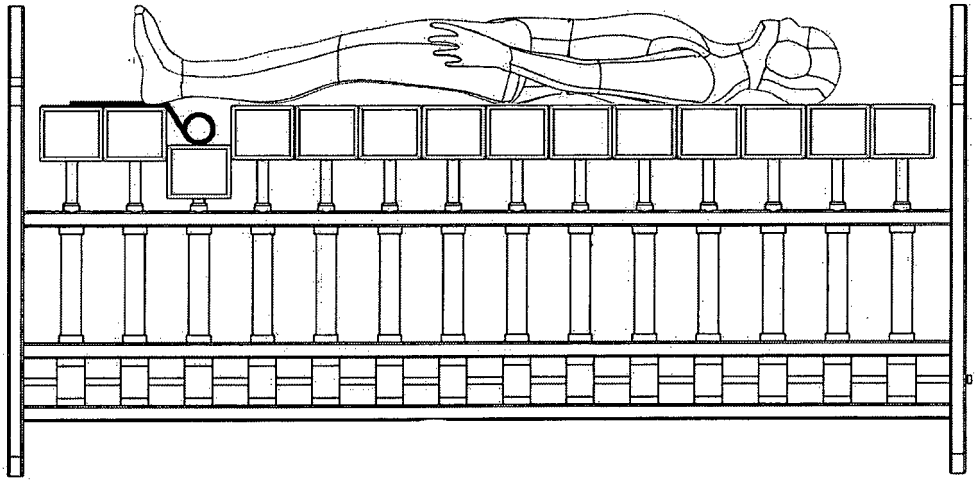


FIG 44

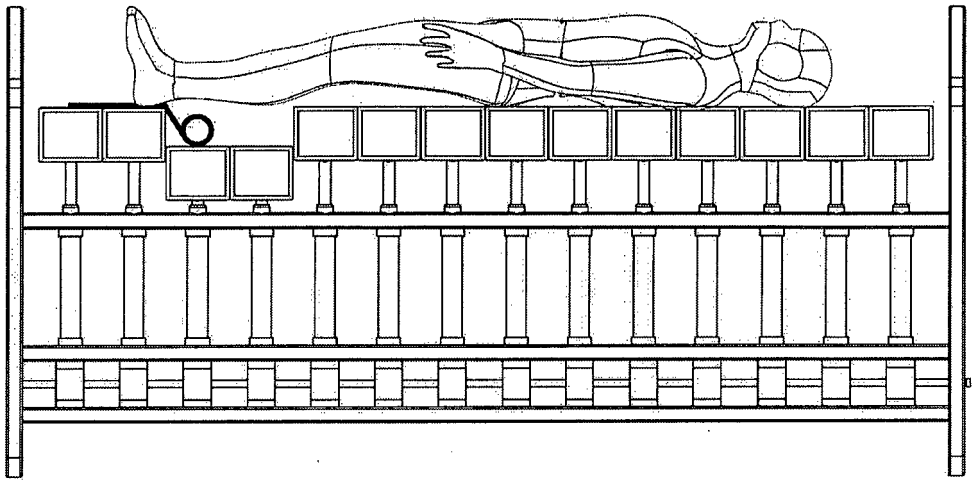


FIG 45

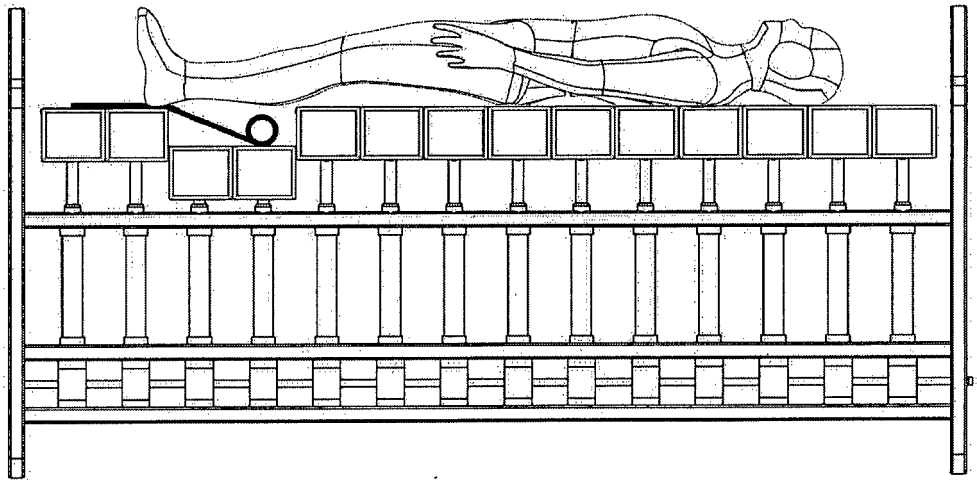


FIG 46

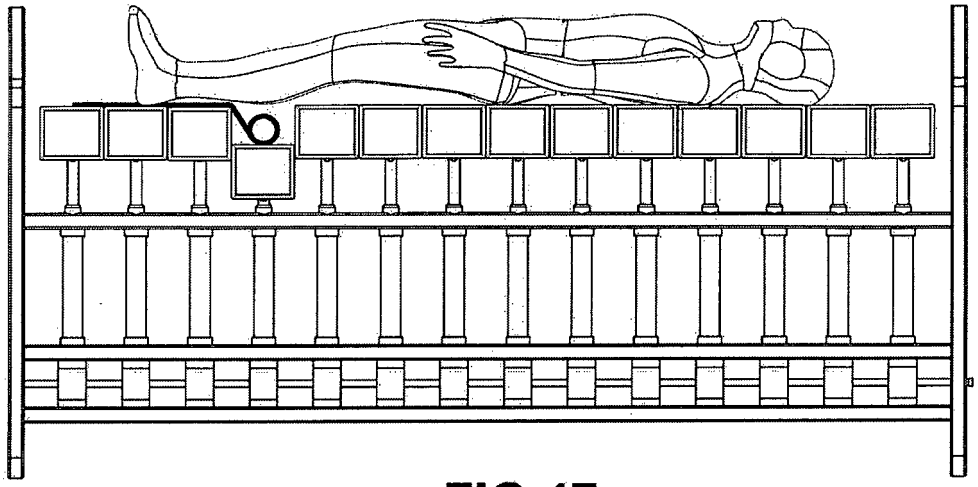


FIG 47

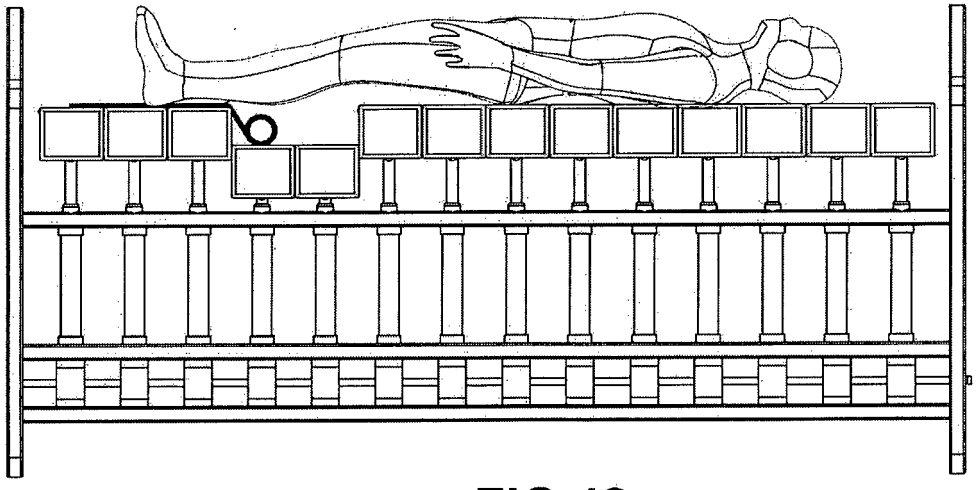
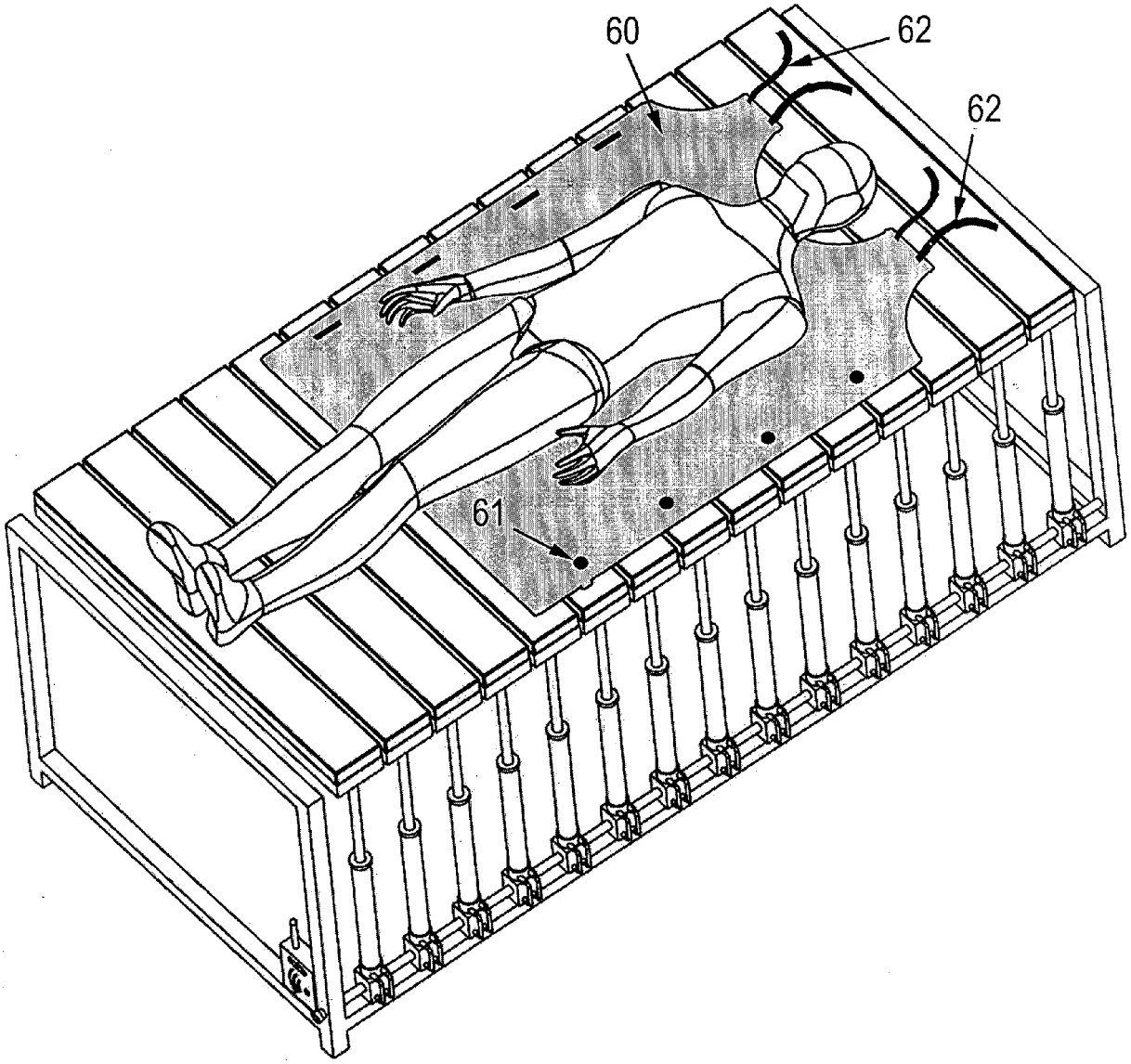


FIG 48

FIG 49



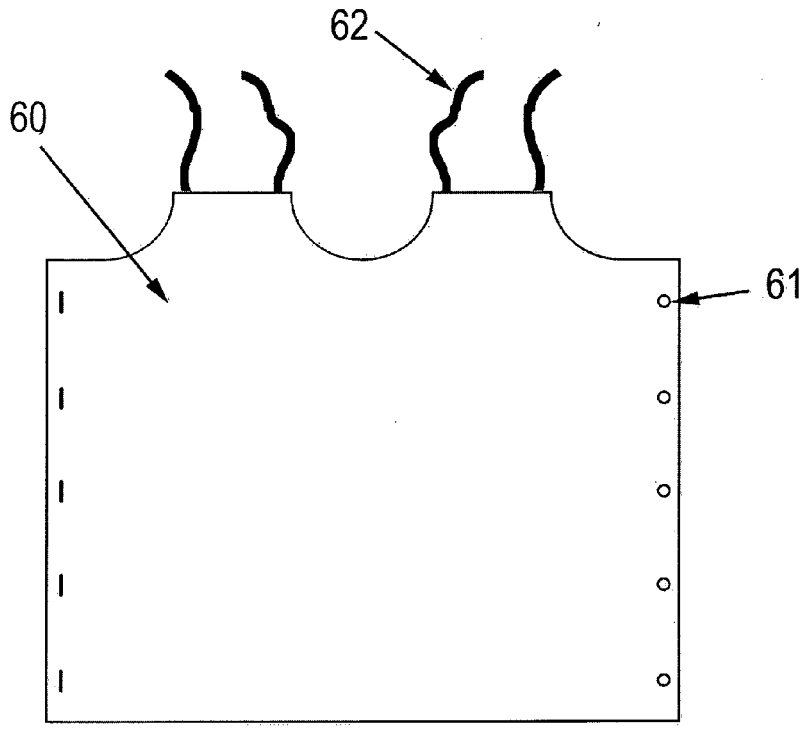


FIG 50

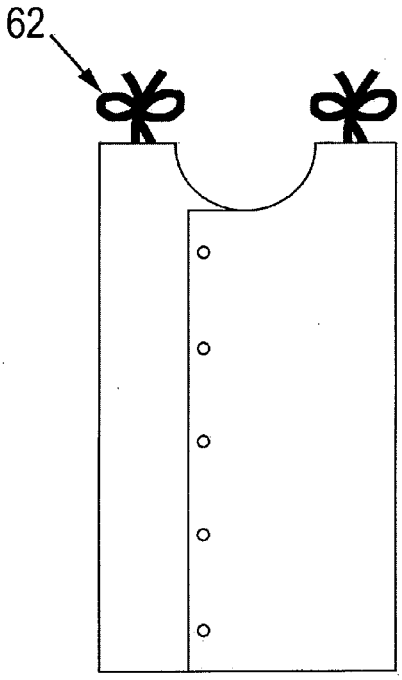


FIG 51

FIG 52

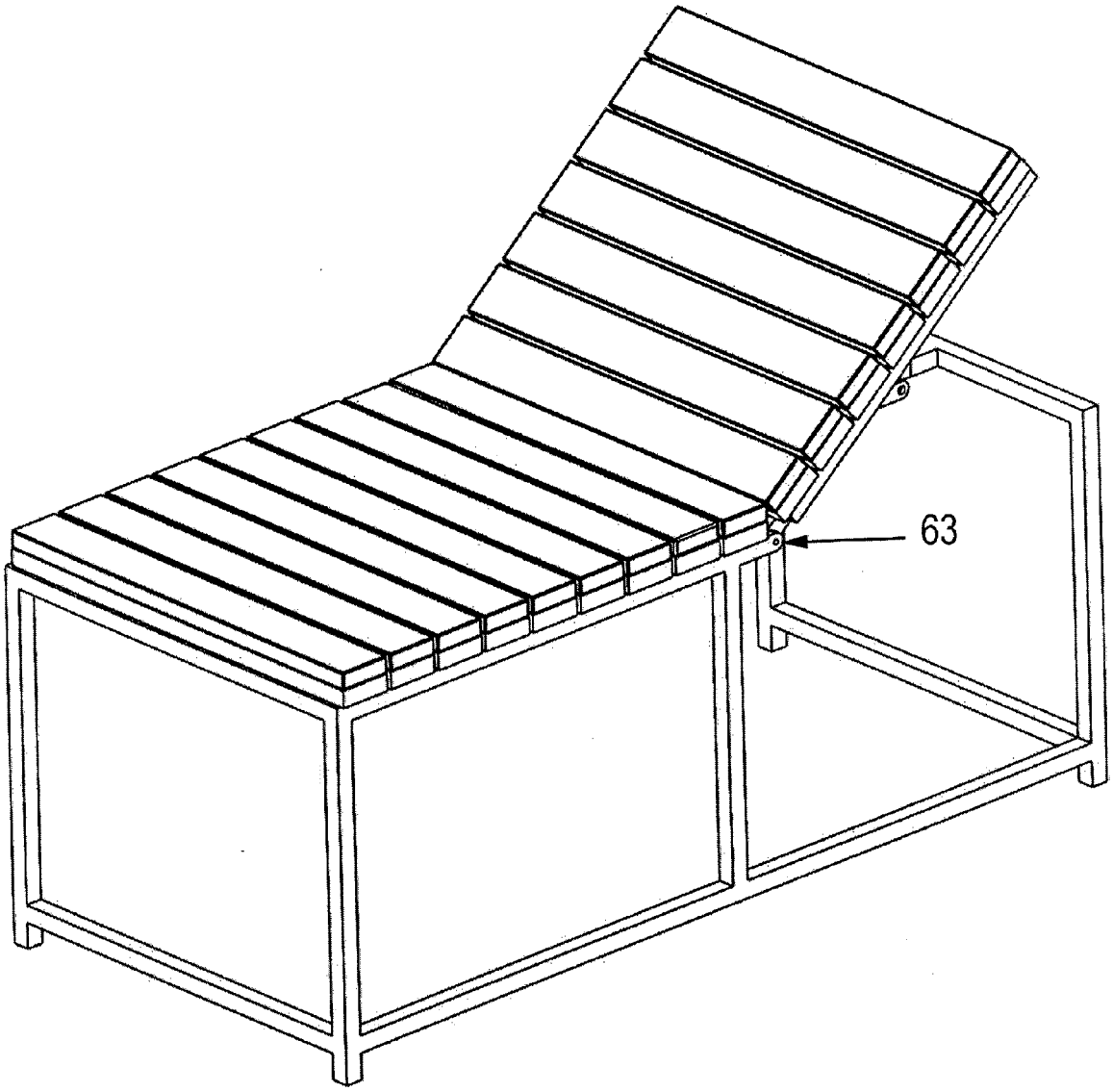


FIG 53

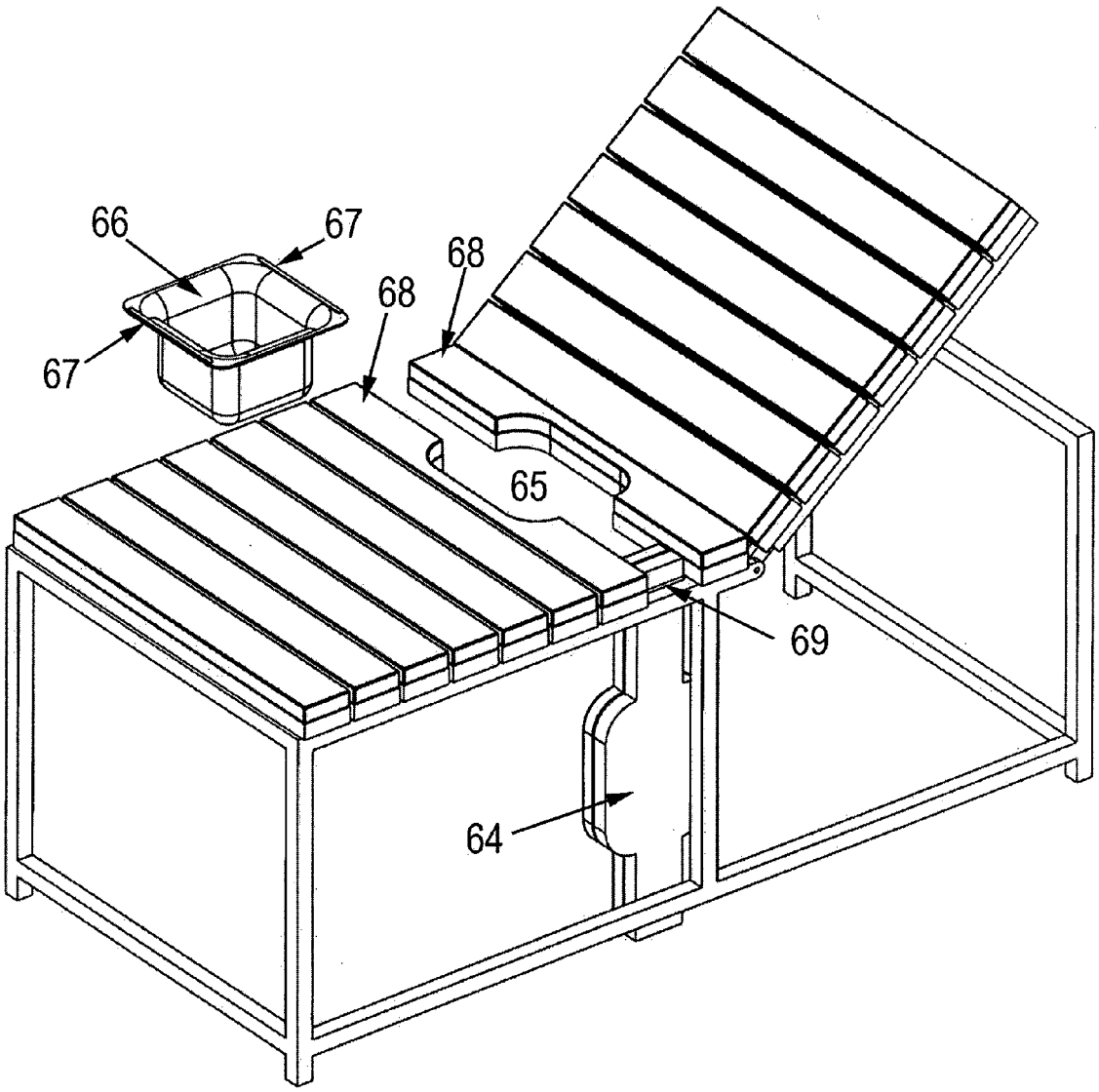


FIG 54

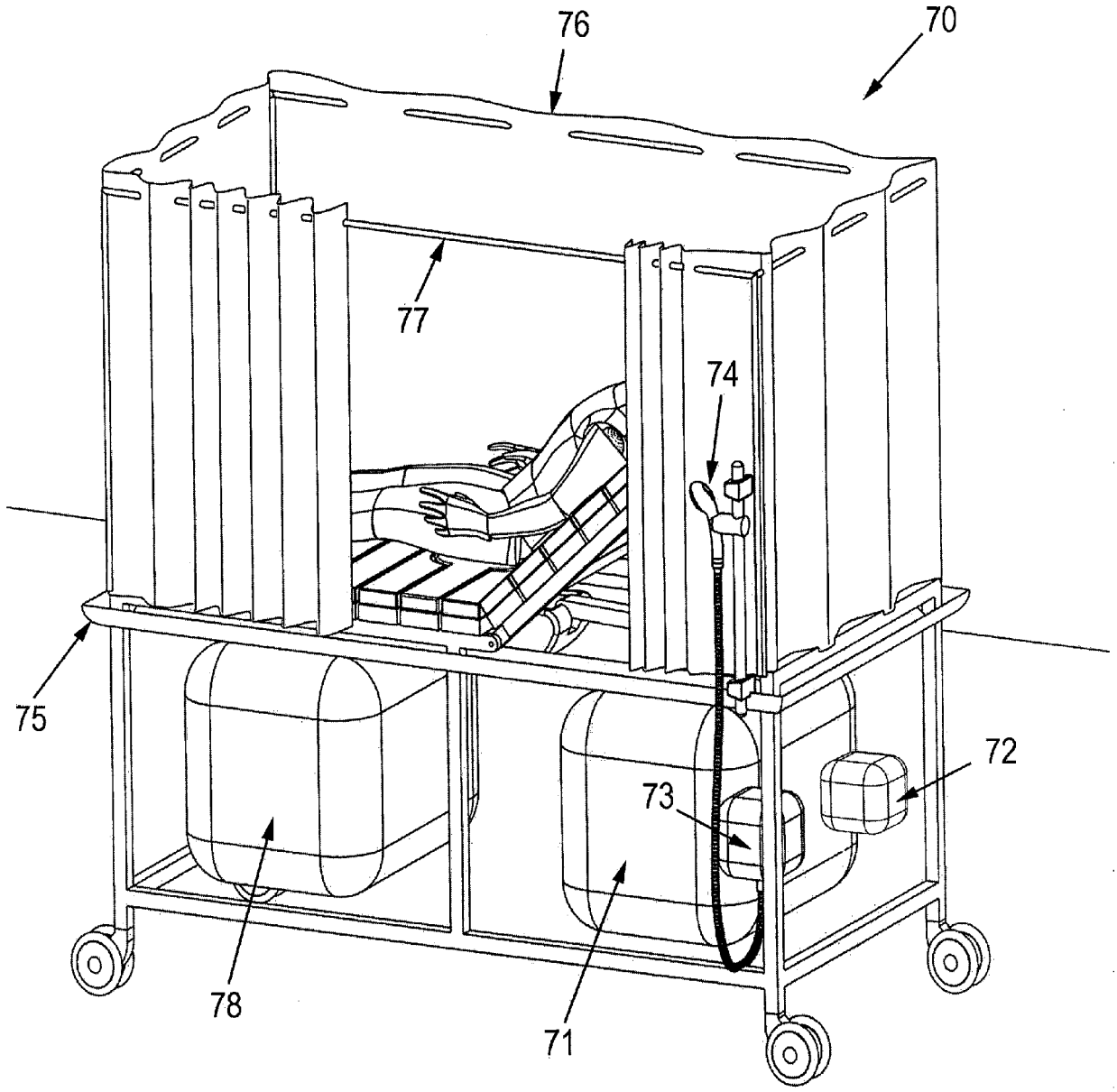


FIG 55

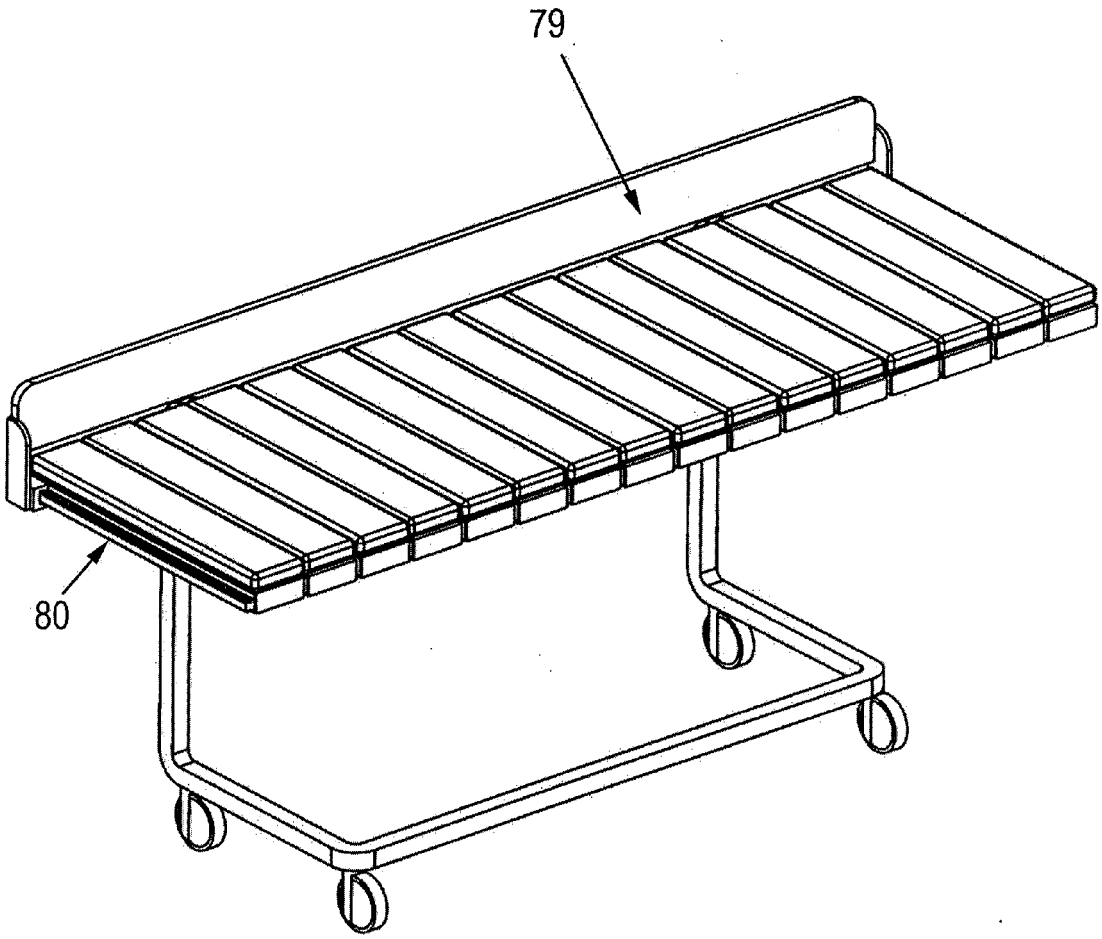


FIG 56

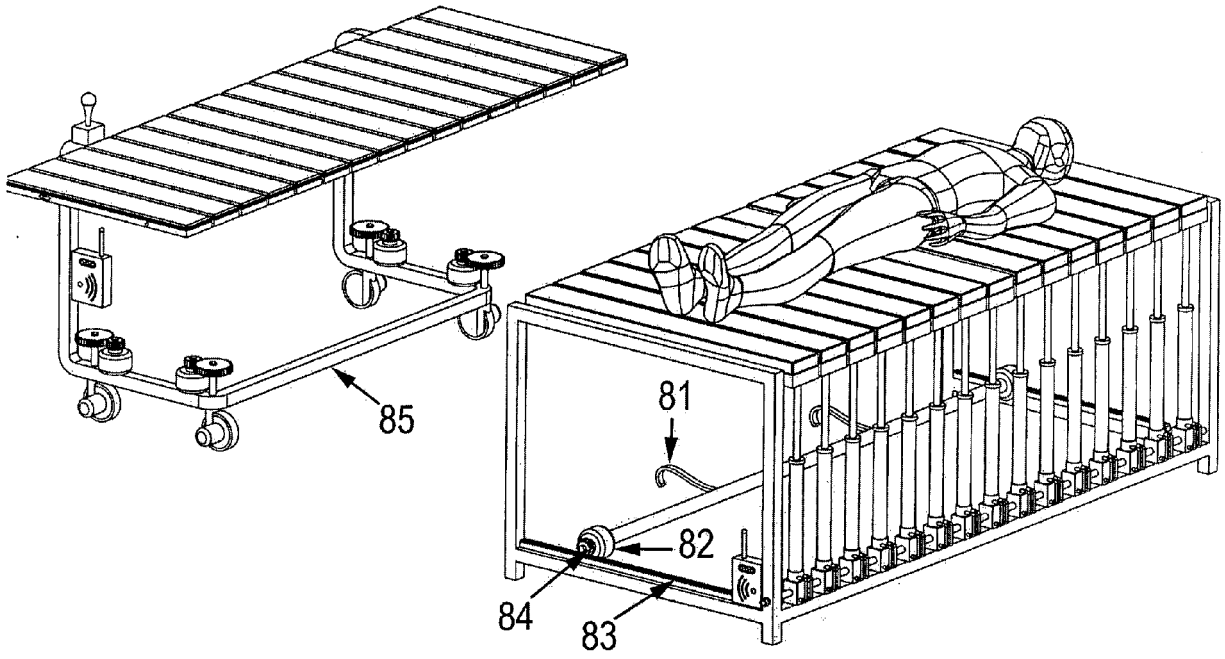


FIG 57

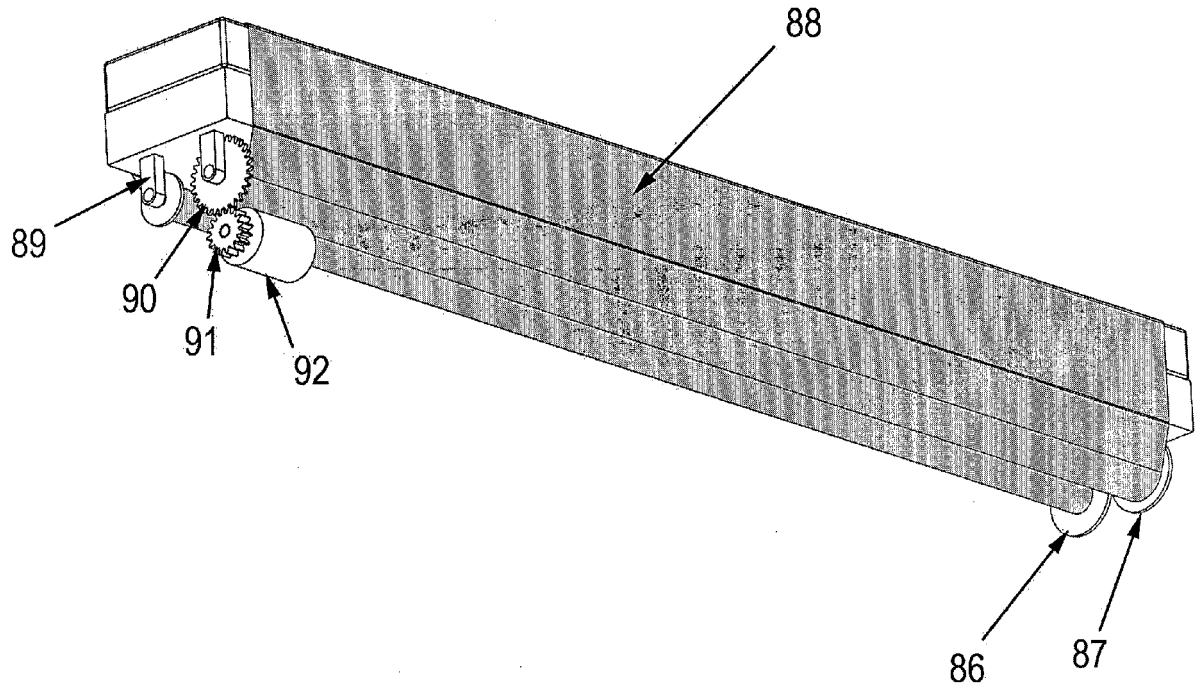


FIG 58

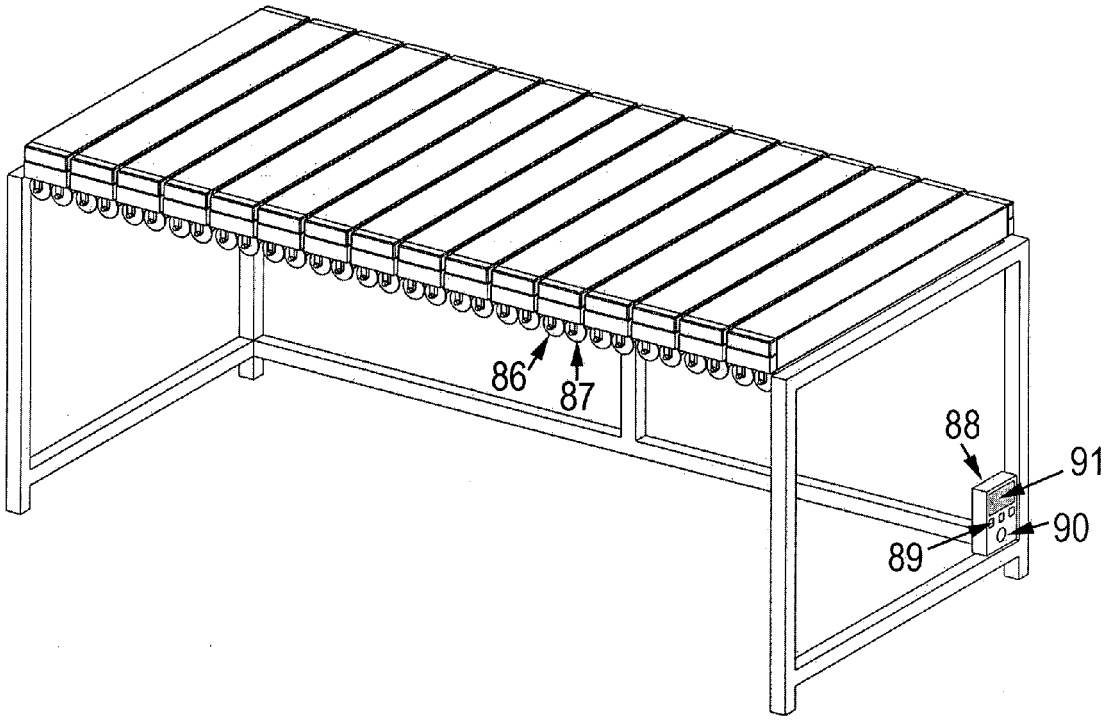
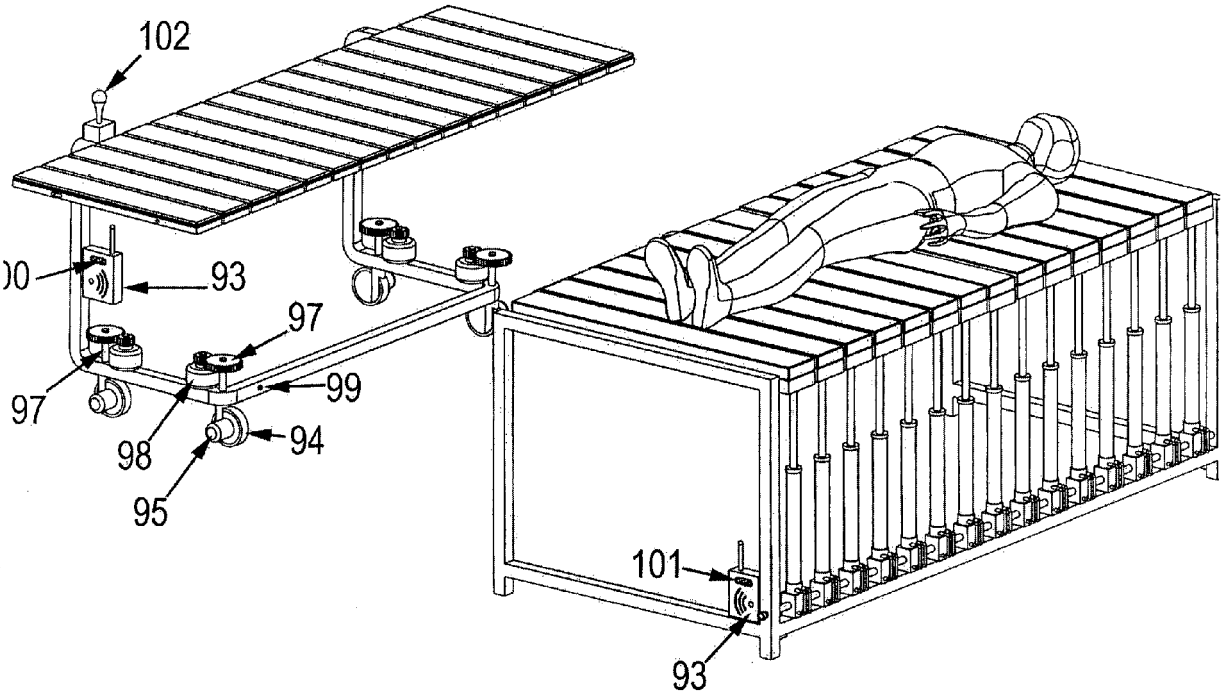


FIG 59



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EUROPEAN SEARCH REPORT

Application Number
EP 14 00 2386

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	WO 2012/134429 A1 (MAHDJOHBI MOHAMMAD HASSAN [US]) 4 October 2012 (2012-10-04) * the whole document *	1-10	INV. A61G7/057 A61G7/10
X	US 2012/159709 A1 (NGUYEN VU L U [CA]) 28 June 2012 (2012-06-28) * the whole document *	1-10	
X	DE 24 58 953 A1 (MATSURA TAKASHI; SAITO TAMOTSU; SATO) 26 June 1975 (1975-06-26) * the whole document *	1-10	

TECHNICAL FIELDS SEARCHED (IPC)
A61G

~~The present search report has been drawn up for all claims~~

Place of search	Date of completion of the search	Examiner
The Hague	12 January 2015	Kousouretas, Ioannis

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

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Application Number
EP 14 00 2386

CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

☐ Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

☐ No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

☐ All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

☐ As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

☐ Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

☒ None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

1-10

☐ The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

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LACK OF UNITY OF INVENTION
SHEET B

Application Number
EP 14 00 2386

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-10

A smart system having fragments for transferring a patient from a first bed to a second, the system further allowing changing sheets and assisting the patient on certain physical functions.

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2. claims: 11-16

A surgery table having a surface that can be changed from flat to a surface with ups and down in order to make tunnels for entering the long arms.

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 14 00 2386

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

12-01-2015

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 2012159709 A1	28-06-2012	NONE	
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		US 3945063 A	23-03-1976

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82