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(54) **PATIENT TRANSFER SYSTEMS**

TRANSFERSYSTEM FÜR EINEN PATIENTEN

SYSTEMES DE TRANSFERT DE PATIENTS

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(72) Inventor: **VOTEL, Thomas, W.**
St. Paul, MN 55105 (US)

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(74) Representative: **Findlay, Alice Rosemary et al**
Lloyd Wise
Commonwealth House,
1-19 New Oxford Street
London WC1A 1LW (GB)

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(73) Proprietor: **Hill-Rom Services, Inc**
Batesville, IN 47006 (US)

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Description

Field of the Invention

[0001] The invention relates to systems which assist with the movement of patients who are partly or completely incapacitated. The invention more particularly relates to systems which give a single healthcare worker the capability to move a patient.

Background of the Invention

[0002] Healthcare workers at hospitals, nursing homes and home care programs face the challenge of moving partly or completely incapacitated patients. A typical patient weighs between 45 and 90 kilograms, although many others weigh much more. Consequently, at least two to four healthcare workers are usually needed to move the patient. These activities often create unacceptable risks of injury, almost without regard to the number of healthcare workers used in the patient transfer. The risks are particularly high when a sufficient number of workers is not available to assist in a patient transfer. For example, injuries to workers' backs account for approximately 50% of worker's compensation costs for workplace injuries in the healthcare industry in the United States, and thus are a particularly vexing problem.

[0003] Patient transfers can be placed in several broad categories. A first category includes the horizontal transfer of a patient from one flat surface to another. A second category involves upright transfers where a patient is moved from a horizontal position to an upright or sitting position in a wheelchair, chair or commode, and the return of the patient to the horizontal position from an upright or sitting position. A third category of transfer relates to the positioning or movement of patients in order to change their position in a bed or chair, for example pulling the patient up in the bed or rolling the patient from side to side. Although many attempts have been made to devise improved systems for patient transfer, almost all of these transfers continue to be manually performed.

[0004] Current healthcare guidelines typically recommend that four healthcare workers participate in a patient transfer. Two workers are at the bed side and two workers are at the cart side. Each worker grabs an edge of a draw sheet, which is positioned under the patient. The patient is then transferred between the bed and the cart through a combination of lifting, pulling and pushing. An elongated plastic sheet is often placed beneath the patient to reduce friction or drag. Since a healthcare worker has to bend over at the waist to accomplish these patient transfers, the stresses encountered are magnified well beyond what would otherwise be expected for a maximum recommended lift of approximately fifty pounds (22.7 kg). Normally this recommended maximum lift is measured with the lift at or near the worker's center of mass. Extremes in a healthcare worker's

height, either taller or shorter than average, or any weakness in either the arms or legs further exaggerate these risks.

[0005] Many hospitals have swing-type mechanical lift devices to assist in certain patient transfers. However, these devices are not widely used because they are often cumbersome and time-consuming to set up and operate. Depending on the lift required, the devices may also be inappropriate.

[0006] The upright transfer and positioning categories provide similar difficulties, especially if the patient is unable to cooperate. For example, weak and elderly patients reclining in a semi-erect position tend to slide down. These patients must be returned to a position more toward the head of the bed. To do so, two health care workers usually grasp the patient by the upper arms to hoist the patient toward the head of the bed after the bed has been lowered to a more horizontal position. This manual transfer often causes strain on the workers' upper and lower backs and possible contact bruises on the patient. Similar difficulties occur with upright transfers.

[0007] Given these formidable difficulties, there have been other attempts to mechanize the patient transfer process. For example, U.S. Patent 2,665,432 (Butler), describes a cart with a manual crank connected to an extensive pull unit. The pull unit has a large number of straps which connect at an edge by hooks to a transfer sheet. Rotation of the crank winds the pull unit onto a roller. The size of the pull unit presents many difficulties including its attachment at many locations to the sheet and the awkwardness of winding it on the roller. The pull unit must be placed under the patient just prior to transfer, since it would not normally be kept there otherwise. Also, no means are provided for transferring the patient off the cart.

[0008] U.S. Patent 2,827,642 (Huff) describes a similar system mounted to the head of a bed and designed to move a patient from the foot toward the head of the bed. The '642 Patent does not describe the process of moving a patient laterally from one horizontal surface to another.

[0009] U.S. Patent 4,970,738 (Cole) discloses another patient transfer system which employs a manual crank and self-locking gear system. This system has an advantage over the system described in the '432 patent in that the transfer is reversible. Rotating the crank drives a belt system, which is attached to a semi-rigid transfer apron. The apron is thereby transferred horizontally while supporting a patient. This system has the disadvantage that the apron must be first positioned under the patient before the patient can be transported from a bed onto a cart. Another disadvantage is that the transfer support alone does not provide sufficient support for the patient or the transfer system. Because of the complexity of its design, considerable operator interaction would be required for the transfer support to be mounted to a cart and then operated to transfer a

patient.

[0010] U.S. Patent 2,733,452 (Tanney) describes a transfer system that uses a motorized pulley to transfer a patient on a metal-reinforced transfer sheet. The transfer sheet has metal grommets in its corners for attachment to cables. A motor is used to wind the cables onto reels thereby resulting in the transfer of the sheet and the patient thereon. However, the patient must first be moved onto the transfer sheet before being moved from a bed to the cart. Moreover, this invention fails to provide support beneath a patient being transferred thereby.

[0011] U.S. Patents 4,747,170 and 4,868,938 (both to Knouse) reveal a motorized winch-type transfer system. This transfer system has apparent advantages over the transfer system of the '452 patent, which include a more secure transfer sheet gripping mechanism and the use of a transfer sheet which does not need grommets or other similar devices. Though more secure, the gripping system is difficult and awkward to use.

[0012] U.S. Patent No. 5,038,424 (Carter et al.) teaches a system for reciprocally transferring a patient between a bed and a cart. This system employs a pliable transfer web wound about two detachable, cylindrical rollers and a drive motor mounted on the bed and the cart. In use, the bed and cart are positioned side-by-side and the web is placed beneath the patient. The roller adjacent the cart or bed onto which the patient is to be transferred is detached. While unwinding a sufficient length of transfer web wound thereon, the roller is extended to the opposite side of the bed or cart onto which the patient is to be transferred, and there connected to the drive motor. The drive motor is then activated, thereby rewinding the transfer web onto the roller and transporting the patient disposed thereon. Thus, while enabling reciprocal transfer, the system of the '424 patent is time consuming and awkward to set up. Moreover, as in the previous inventions discussed hereinabove, the patient is not supported adequately while being transferred.

[0013] British patent application GB-A-2 139 487 (Stala OY) discloses a transferring device for a patient using the sheet of the patient's bed as a transferring support. The transferring support is wound around a rod to pull the transferring support and the patient thereon from one support onto another.

[0014] While considerable effort has gone into developing horizontal patient transfer systems, all of the systems previously developed have significant drawbacks. These drawbacks primarily relate to the significant difficulties encountered in set-up and operation.

[0015] The patent described hereinabove primarily relate to systems for transferring patients from one horizontal surface to another horizontal surface. By partial contrast, U.S. Patents 4,700,415 and 4,837,873 (both to DiMatteo et al.) teach a system for transferring patients between a reclined wheelchair and a bed. The bed is equipped with a sheet wound about a right side roller

and a left side roller, the sheet positioned beneath a patient reclining thereupon. The right and left side rollers are positioned laterally on each side of the bed, usually slightly below the plane of the patient. Two corner rollers are situated above the right side and left side rollers and approximately level with the top surface of the bed. The reclined wheelchair is equipped with two articulated rollers. Extending between these rollers is a sheet, the sheet including three bands. The lateral edges of the sheet may be joined or separate. If the lateral edges are to be joined, the sheet spans above and below the wheelchair upper surface. If the lateral edges are free, the sheet spans the wheelchair upper surface, its ends wound about the two rollers. The separate transfer systems for the bed and wheelchair must be powered such that both sheets rotate with equal velocities. In use, the patient reclining upon the bed is conveyed laterally by the bed transfer system. Upon encountering the wheelchair transfer system, the patient is thereupon further conveyed onto the wheelchair. The wheelchair may then be further adjusted, allowing the patient to assume a sitting position.

[0016] While the system of DiMatteo allows for transfer to or from a reclining wheelchair and for adjusting the wheelchair between sitting and reclining positions, its shortfalls include the complexity of its design, the need to retrofit beds with the rollers and sheet provided, and the possibility of pinching the patient or catching clothing in the gaps between the bands.

[0017] US Patent 3597774 (Warren) describes a harness and winch mechanism for raising a patient reclining upon a bed. The winch is mounted to a post attached to the head of the bed and is operated by a hand crank. The harness loops under the patient's armpits such that excessive stress may be applied thereto during operation of the device.

[0018] The above mentioned US Patent 4747170 describes a system where a transfer sheet is locked in a tube by inserting a rod into the bore of the tube.

Summary of the Invention

[0019] According to a first aspect of the invention there is provided a transfer system for moving a patient reclining on a transfer sheet between a first horizontal surface and a second horizontal surface, comprising a winch apparatus configured for positioning adjacent to either of said first or second horizontal surfaces, the winch apparatus including a drive shaft and at least one spool attached to the drive shaft, a clamping device and means for coupling the clamping device to the spool, the clamping device comprising a retaining member assembly having a first portion and a second portion, the second portion being attached to the first portion to form a cavity therebetween, the clamping device further comprising a contact element assembly, a portion of the transfer sheet being locatable in the cavity in use and being releasably retained therein by the contact element

assembly, the contact element assembly cooperating with the retaining member assembly to releasably grip the transfer sheet when a transfer force is exerted by the winch apparatus whereby the transfer sheet is drawn by the transfer force to transfer the patient from the first surface to the second surface, characterised in that the contact element assembly comprises a closure element hingedly connected to the retaining assembly at the opening of the cavity such that the transfer sheet can be held within the cavity by the closure element until the closure element is released.

[0020] Preferably, the first portion is a curved section, and the second portion is a curved section.

[0021] Preferably, the contact element is a spring loaded gate.

[0022] Preferably, the contact element is L-shaped.

[0023] Preferably, the transfer system further comprises a rod which co-operates with the clamping device for holding the transfer sheet.

[0024] Preferably, the rod is tethered to the clamping device.

[0025] In a preferred embodiment, the winch apparatus is motorised or it may be manually operated.

[0026] Preferably, the at least one belt is comprised of two belts attached to two spools which are spaced apart.

[0027] According to a second aspect of the invention there is provided a method of transferring a patient reclining on a transfer sheet between a first horizontal surface and a second horizontal surface, the method comprising providing a winch apparatus and a first spool in mechanical communication with said winch apparatus, coupling the first spool to a clamping device, the clamping device having a retaining member assembly comprising a first portion and a second portion attached to the first portion to form a cavity therebetween, securing the transfer sheet to the clamping device by placing a portion of the transfer sheet in the cavity and actuating the winch apparatus to cause a transfer force to be exerted on the clamping device and hence the transfer sheet to draw the transfer sheet and a patient thereon, characterised in that the clamping device includes a releasable closure element hingedly connected to the retaining member assembly at the opening of the cavity, the securing step comprising securing the portion of the transfer sheet in the cavity with the closure element at the opening of the cavity to releasably retain the portion of the transfer sheet in the cavity.

[0028] Preferably, a second belt is also attached to the clamping device and wherein both belts are simultaneously wound on to respective spools to effect the transfer.

[0029] Preferably a tucking device is used to assist with securing the transfer sheet to the clamping device.

[0030] The invention includes devices for transferring patients which greatly simplify, and provide enhanced versatility over, any known device. The adoption of these transfer devices will likely reduce the wide inci-

dence of back injuries in health care workers. In a highly portable embodiment of this transfer device, the entire apparatus may weigh only about 8-15 kilograms, and may be readily attachable and removable to bed and cart rails.

[0031] A long narrow rectangular cushion can be placed between the bed and cart when using the portable transfer device. The cushion is, optionally, the length of the bed, and may be partially coated with a low friction surface. The cushion may have fasteners for attachment to a bed or cart, or it may also be configured to hang from the side of the bed or cart by the fasteners when not in use. The cushion is particularly convenient when used with a portable transfer device of the invention because no other modifications to the bed or cart may be needed.

[0032] The improved patient transfer system is capable of transferring a patient using only a single attendant.

[0033] The improved transfer system may also include a highly portable transfer unit. The portable transfer unit may be totally self-contained or may be installable on a bed or cart and connectable to a separate clamp. The portable transfer unit may utilize a plurality of detachable spools, as well as means for sensing the proximity of a patient being transferred and means for discontinuing the transfer in response to the sensing.

[0034] The improved transfer system may still further include a transfer bridge support means for supporting a patient being transported when the patient spans the bed or cart. The transfer bridge support means may be foldable and may include a stabilizer, a cross sectional camber and a leading edge camber to further prevent the transfer bridge support means from being displaced during patient transfer, and improved slip-resistant features.

BRIEF DESCRIPTION OF THE DRAWINGS

[0035]

Figure 1 is a perspective view of a bed with an adjacent cart adapted with a first embodiment of a horizontal patient transfer system;

Figure 2 is a front, schematic view of a cart adapted with the first embodiment of a horizontal patient transfer system with side rails in a lowered storage position;

Figure 3 is a front, schematic view of a cart adapted with the first embodiment of a horizontal patient transfer system with side rails in a raised patient transport position;

Figure 4 is a front, schematic view of a cart adapted with the first embodiment of a horizontal patient transfer system with one side rail in a raised position and a second side rail in a bridge position used during patient transfer;

Figure 5 is a front fragmentary view of one embodiment of hinges supporting a side rail;

Figure 6 is an exploded view of a side rail of the first embodiment of a horizontal transfer system;

Figure 7 is a cut away view of a second drive system within the side rail;

Figure 8 is a perspective view of a first embodiment of a clamping device useful with a first embodiment of the horizontal transfer system in an orientation to be clamped to a transfer sheet folded over a rod;

Figure 9 is an end view of a first embodiment of the clamping device;

Figure 10 is a perspective view of a second embodiment of the clamping device;

Figure 11 is an end view of the second embodiment of the clamping device;

Figure 12 is a perspective view of a third embodiment of the clamping device;

Figure 13 is an end view of the third embodiment of the clamping device;

Figure 14 is a perspective view of the attachment of a portable horizontal transfer device for the transfer of a patient from one horizontal surface to another;

Figure 15 is a perspective view of the portable horizontal transfer device;

Figure 16 is an exploded view of the portable horizontal transfer device;

Figure 17 is another embodiment of the transfer system of the present invention, whereby a patient may be bi-directionally transferred without the necessity of reinstalling this embodiment on another bed or cart;

Figure 18 is a side plan view of the embodiment of Figure 17, wherein a patient is being transferred away from the bed on which the embodiment is installed;

Figure 19 is a side plan view of the embodiment of Figure 17, wherein a patient is being transferred onto the bed or cart onto which the embodiment is installed;

Figure 20 is a top, side perspective view of a remote control usable for any of the embodiments described herein;

Figure 21 is a top, side view of a remote control, which may be used for any of the embodiments described herein;

Figure 22 is a top, side perspective view of a portable transfer device and clamp installed onto a hospital bed;

Figure 23 is a top, side perspective view of an embodiment of the portable transfer device, wherein a spool or reel may be detachably installed onto a drive shaft;

Figure 24 is a side plan view of the portable transfer devices of the present invention depicting a reel for winding a retraction belt, wherein an automatic cut-off device is operationally installed;

Figure 25 is another embodiment of a portable transfer device installed onto a bed, and wherein

one of the clamps of the present invention is connected thereto by means of belts;

Figure 26 is a side view of any of the portable transfer devices of the present invention, depicting a mounting bracket and quick release pin;

Figure 27 is a top plan view of a motor and winch system, suitable for any of the transfer devices of the present invention;

Figure 28 is an exploded view of the motor and winch assembly of Figure 27;

Figure 29 is a top perspective view of the transfer bridge spanning a gap between a bed with a patient reclining thereon and a transfer cart;

Figure 30 is a bottom plan view of an alternate embodiment of the transfer bridge of Figure 29;

Figure 31 is a fragmentary side view of the transfer bridge of Figure 29 or Figure 30, depicting the hinge thereon;

Figure 32 is top front perspective view of the bridge of Figure 29 being folded and prepared for either transport or storage;

Figure 33 is a side perspective view of a portable transfer unit;

Figure 34 is a side plan view of the portable transfer unit of Figure 33; and

Figure 35 depicts an attendant carrying a portable transfer unit.

[0036] These Figures are intended to be illustrative and non-limiting.

Detailed Description of the Drawings

[0037] The invention includes improved devices and methods for moving patients and other individuals who lack full mobility. Patients must be moved in a variety of ways while providing care in various locations, including hospitals, nursing homes and other residences. For example, patients may need to be transferred horizontally between a bed and a cart. The unifying feature of the various embodiments of this invention is the enablement of empowering a single healthcare worker to now be able to move a patient in a substantially low risk manner to either the patient or the healthcare worker. The embodiments of this invention further allow a patient transfer event to require between about 20 seconds and 28 seconds and preferably about 24 seconds.

[0038] A feature of the horizontal transfer systems of the present invention includes a support beneath the patient and a mechanical or electro-mechanical system for applying a horizontal force to the support to effect the transfer. The design of the various embodiments incorporate varying features to achieve this utility. In order to reduce cost, the simplest systems are designed to be adapted for use with beds, carts and transfer sheets now commonly in use in healthcare facilities. Other embodiments optimize the particular characteristics of the design with less regard to adaptation to existing equip-

ment. In all cases, each design focuses toward the goal of a safe and efficient patient transfer event by a single healthcare worker, or greatly reducing the number of healthcare workers required for each transfer event.

[0039] Referring to Figure 1, the first embodiment of the horizontal transfer system 100 includes a standard patient cart 102 retrofitted with a horizontal transfer mechanism 104. The cart 102 will generally have a base 106 with four wheels 108. The wheels 108 preferably have lock levers 110 for applying brakes that prevent the rotation of the wheels 108. The base 106 may have a top surface 112 that usually, but not necessarily, will have a flat portion 114.

[0040] Cart 102 has a support portion 116. The support portion 116 is attached to the base by one or more upright supports 118. The embodiment represented in Figure 1 has two upright supports 118. Some designs may have the wheels 108 attached directly to the upright supports 118 eliminating the need for a base 106. The support portion will preferably have cushioned bumpers 120. The cart 102 can have the capability of raising and lowering the support portion 116 relative to the base 106 and other features. The support portion 116 provides a support structure 122 for supporting a cushion or mattress 124 for holding a patient 126.

[0041] Horizontal transfer mechanism 104 includes two side rails 128. Referring to Figure 5, the side rails are mounted to the cart 102 with hinges 130 and 131. The side rails 128 and hinges 130 are preferably adapted from existing side rails and hinges on the cart 102. The hinges 130 can adjust to place the side rails 128 in either an elevated pull position or a lowered storage position. Preferably, hinges 131 are used to place the side rails 128 in a horizontal bridge position to provide support and a smooth surface for transferring the patient. The different positions are schematically depicted in Figures 2-4. Alternative designs for the side rail can allow for the side rail to slide straight down to a lowered position, and other variations are possible.

[0042] Each side rail 128 has a handle 132, a control panel 134 and two openings 136 for a power assembly, such as winch 138. Other numbers of openings can be used for access to the winch unit. The control panel 134 has a plurality of switches 140 to control the operation of the winch 138. The particular design of the side rail 128 and control panel 134 can be varied without effecting their function.

[0043] Referring to Figure 6, a convenient structure for the side rail 128 has a frame 142, winch 138, a front cover 144 and a back cover 146. The frame 142 has extensions 148 attached to frame substructure 150 at frame hinge 152. The frame substructure 150 has a winch mounting portion 154. The frame substructure 150 is preferably made from metal, a rigid polymer or a composite material, although other materials exhibiting the proper strength, weight, and cost characteristics may be suitable. The back cover 146 has open portions 156 for the passage of extensions 148 and motion of

frame hinges 152 as well as a portion of handle 132 and openings 136. The outer surface 147 of back cover 146 (Figure 2) is a transfer surface that preferably is made from a very low friction material to assist with the transfer process and reduce the risk of injury. Front cover 144 has parts of handle 132 and openings 136, and control panel opening 158.

[0044] The winch 138 is coupled to control panel 134 by wires 160. A conventional manual winch can also be used without excess difficulty, but less conveniently. The drive system 142 preferably has at least one motor 162 and can use a variety of conventional designs. The motor may directly rotate the drive shaft as depicted in Figure 6. Referring to Figure 7, the motor 162 rotates a first drive shaft 164 which has a first gear 166. First gear 166 engages a second gear 168 which preferably has a larger diameter than first gear 166 so that the rotation of the motor 162 is reduced. Second gear 168 is connected to a second drive shaft 170.

[0045] Two belts 172 each with a clip 174 are attached to the second drive shaft 170 at positions aligned with openings 136. The belt preferably winds on spools 175 which help ensure that the belts 172 wind and unwind straight. The belts 172 are preferably made from very strong synthetic fabric such as the material used in seat belts for automobiles. The winch 138 can be powered by a battery pack 176 utilizing power cord 178. Alternatively, winch 138 can be powered by alternating current using a power cord (not shown). Cart 102, or any other embodiment of the present invention, may also include aligning and docking mechanisms. Aligning mechanisms include powering and steering means, whereby at least two of the wheels of cart 102 are powered and steered by operation of control switched 140. Docking mechanisms include clamps and electromagnets, also operated by control switches 140, and which secure cart 102 to the horizontal surface on which the patient is to be transported is disposed. In addition to control switches 140, hand-held remote control units communicating with the control mechanism of cart 102 by electric or electromagnetic means are within the scope of the present invention. Voice actuated controls are also within the scope of the present invention, thereby enabling the patient, as well as an attendant, to begin and discontinue a transfer event.

[0046] Cart 102, or any other embodiment of the present invention, may further include means for sensing an asynchronous operation of the transfer mechanisms. Such means include sensing the individual belt torque or drag experienced when belts 172 are being retracted and a comparison of these sensings. A difference between sensings exceeding a predetermined value or a sensing ratio greater than or less than a predetermined ratio range would result in an alarm being actuated or an automatic discontinuance of transfer to be effected.

[0047] Cart 102 of Figure 1 is designed for use with a standard patient draw sheet 190. The standard patient

draw sheet 190 is sufficiently wide so that it can be folded over the patient 126, if desired, but typically not long enough so that it rests under the head or feet of the patient. Rather than using several people to move the patient with the draw sheet 190, horizontal transfer mechanism 104 performs the comparable function. Clips 174 can be designed to attach directly to draw sheet 190, but in accordance with the invention clamping device 194 is used to provide a more even pull over the length of the sheet 190 and smoother motion to the patient. For particularly tall patients, the draw sheet 190 can be wrapped around patient 126 for added support of the patient, and both ends of the sheet are attached to clamping device 194.

[0048] Three embodiments of the clamping device 194 are presented in Figures 8-13. In the first embodiment shown in Figures 8 and 9, clamping device 194 can be used to attach draw sheet 190 to winch 138 employing rod 192. A U-shaped portion 196 forms a cavity 198 which is covered by a spring loaded gate 200. Rod 192 can enter the cavity 198 when pushed against the gate 200. Force from the rod 192 against the gate 200 from inside the cavity 198 tends to force the gate 200 closed thereby preventing the withdrawal of the rod 192. Gate 200 has an upward extension 202. Forward force on the upward extension 202 opens the gate 200 for the withdrawal of rod 192 from cavity 198. Clips 174 are conveniently attached to the clamping device 194 at J-shaped flanges 204. Rod 192 can be optionally tethered to the clamping device 194 at one or more positions for convenience, and the rod 192 can be clipped to the clamping device 194 for storage.

[0049] In the second and third embodiments, the clamping device 194 has an upper portion 206 and a lower portion 208 attached at a hinge 210 to form a cavity 212. The front of the cavity 212 is closed by an L-shaped, hinged closure 214. The two embodiments differ in their design of J-shaped flanges 216 or 218 for the attachment of clips 174. In these two embodiments, the sheet 190 is directly placed into the cavity 212 without the need to wrap the sheet 190 around a rod 192, although a rod 192 could still be used if desired. The sheet is held in place by the L-shaped hinge closure. A thin rigid tucking device (not shown) of any convenient length can be used if desired to assist with tucking the sheet into the clamp.

[0050] Clearly, a variety of other designs for clamping device 194 are possible within the general concepts presented. For all of these embodiments, any portion of the sheet can be attached, not just the end of the sheet. This is important because the clamping device should, preferably, be placed as near as possible to the patient so that the transfer mechanism 104 can fully transfer the patient onto the second horizontal surface from the first.

[0051] In operation, the cart 102 is wheeled up to a patient's bed 220, as depicted in Figure 1, or another cart. The side rail 128 facing the patient's bed 220 is placed in the bridge position with the low friction surface

147 directed upward. The draw sheet 190 is attached to a clamping device. The belts 166 are unwound from drive shafts 164 so that they are long enough to reach rod 192 at the edge of the bed 220. The belts are unwound either by activating the motor to unwind the belts or by using a clutch to allow the belts to be freely withdrawn from the drive shaft. The clips 174 on the ends of the belts 166 are attached to a clamping device 194 and the clamping device 194 is engaged by the rod 192 and sheet 190. The clamping device can be used with or without the rod 192.

[0052] The appropriate switch 140 mechanism is actuated, and the winch 138 begins winding the belts 166 onto the drive shafts 164 (Figure 6). The motor 162 should be designed to apply a slow, steady and constant force to move the patient 126 without jerking or applying any other inappropriate forces, or provide variable speeds of movement consistent with gradual starts and stops and safe transfer throughout travel. The draw sheet 190 helps to distribute the forces over significant areas of the patient's body. When the patient 126 is on the cart's cushion 124, the motor 162 is turned off or otherwise disengaged. At this point, the belts 172 are disconnected from the clamping device 194, and the sheet 190 is removed from the clamping device.

[0053] In order to transfer a patient from a cart to a bed, the bed would have to be adapted with a similar winch as described on cart 102. This bed-based transfer device would preferably be adapted with the side rails of a conventional bed. These side rails may go up and down rather than folding under the bed. The winch could easily be adapted on one or both sides of the bed, and may be retrofitted to a bed in a comparable fashion as a cart, based on the above description.

[0054] Alternatively, a portable winch unit readily carried by a single health care provider can be used to replace the winch on the bed, on the cart or both. One embodiment of such a portable winch unit 250 is shown in Figures 14-16. The portable winch unit 250 includes a housing 252, a clamping device 254 and a winch 256. The clamping device 254 serves to hold a transfer sheet 190 in the same way as clamping device 194 in the first embodiment of the horizontal transfer device 100. The clamping device 254 also serves as a frame or a portion of the frame for the portable winch unit 250. The housing 252 preferably has a top portion 258 and a bottom portion 260 which are preferably heavy plastic shells surrounding the clamping device 254 and the winch 256, although other materials can be used.

[0055] The winch 256 includes a motor 262 that can rotate a drive shaft (not shown) connected to a reel 263. Belt 264 winds around reel 263. Belt 264 is comparable to belts 166 in embodiment 100. The free end of the belt 264 has a handle 266. Handle 266 attaches to a clamp 268 rigidly attached to the edge of a bed or cart. The clamp 268 can be designed to fold out of the way when not in use. The belt 264 passes out of housing 252 through an opening 270. The operation of winch 256 can

be controlled through a circuit board 272 which is connected to motor 262 by wire 274. Circuit board 272 can be similarly connected to a port 276.

[0056] A control unit 278 with switches 280 can be connected to port 276 by way of tether 282. The operator can operate the winch 256 using control unit 278. Alternatively, control switches 280 can be made integral with the housing 252, as shown in Figure 15, but this would be less desirable because the operator would have to lean over the bed or cart while the patient was being transferred. Control unit 278 can have a wireless connection with circuit board 272 using a transmitter/receiver (not shown). Winch 256 is powered by a standard wall outlet using a cord 284. A retractable cord assembly 286 is preferably used to keep the cord out of the way when not in use and to prevent excess cord being in the way during the transfer of the patient. Alternatively, a battery, preferably rechargeable, can be used to power the winch.

[0057] Referring to Figure 14, to transfer a patient from a first bed/cart 288 to a second bed/cart 290, a draw sheet 190 is used under the patient in the same way as in the first embodiment 100. A portable cushion 292 can be placed between the first bed/cart 288 and the second bed/cart 290 to a relatively smooth continuous surface for transferring the patient, as shown in Figure 17. Straps 294 with a hook and loop fastener can be used to attach the portable cushion 292 to the bed or cart when not in use. The portable cushion 292 can be used with other transfer devices or even as an aid during manual transfer. The cushion 292 would preferably have a top surface with a very low friction which is preferably made from a plastic material.

[0058] The portable winch unit 250 is attached to draw sheet 190 using clamping device 254, as shown in Figures 15 and 16. The design of the clamping device 254 can be similar to the clamping devices in Figures 8-13 or a comparable design based on similar concepts. The draw sheet 190 can be wrapped over a rod 192 (Figure 8) for attachment to the clamping device 254. Referring to Figure 14, belt 264 is withdrawn from housing 252 so that handle 266 can be attached to clamp 268. Clamp 268 is rigidly attached to the second bed/cart 290 on its side opposite the side near the first bed/cart 288. Clamp 268 can be optionally reversibly detachable or lowerable to storage position. The operator uses control unit 278 to activate the motor 262. As the motor 262 retracts belt 264, the portable winch unit 250 and the patient are drawn toward clamp 268 which result in the patient being moved onto second bed /cart 290.

[0059] Referring to Figure 14, the transfer devices of the present invention, especially the clamps, are designed to be centered at the patient's center of gravity when the patient is in a supine position. A patient's center of gravity is usually about midway between the patient's navel and buttocks, represented as lines N and B, respectively. Thus, for transfer to move the patient smoothly and evenly, the clamp center of gravity (rep-

resented by arrow C) should be aligned about midway between lines N and B on the patient.

[0060] Figures 22-26 and 33-35 relate to features of a portable patient transfer system.

[0061] Patient transfer system 900, as depicted in Figures 17 - 19, broadly includes bed 902, cart 904, motor-winch unit 906, perpendicular transfer units 908, 910, 912, clamp 914 and a plurality of belts discussed below. Although depicted as cart 904, a bed or other horizontal surface may be used and be within the scope of the present invention. Motor-winch unit 906 is ideally attached to base 916 of bed 902. Attached to the upper frame of bed 902 is perpendicular transfer unit 908. On adjoining cart 904, another perpendicular transfer unit 910 is attached to the upper frame. Finally, another perpendicular transfer unit 912 is attached to the lower frame of cart 904. As shown in Figure 47, a pair of belts 918 may extend generally upwardly and vertically from motor-winch unit 906 through perpendicular transfer unit 908, finally extending horizontally on mattress 915. Belts 918 are then attached to clamp 914 in any manner such as described herein. Alternately, belts 918 may proceed horizontally from motor-winch unit 906 beneath bed 902 and cart 904 through perpendicular transfer unit 912. Extending generally upwardly and vertically from perpendicular transfer unit 912, belts 918 pass through perpendicular transfer unit 910, then onto mattress 917. On mattress 917, belts 918 may be attached to a clamp such as a clamp of the present invention. Ideally, motor-winch unit 906 is attached to bed 902 by means of rings extending from housing 920. These rings 922 ideally enclose an upper portion of the casters 924 on which bed 902 is mounted.

[0062] In use, bed 902 and cart 904 are aligned and are preferably secured together. If a patient is to be transferred from bed 902 onto cart 904, clamp 914 is attached to a transfer sheet upon which the patient is disposed. The belts attaching to clamp 914 have been routed under bed 902 and cart 904 then upwards, and then horizontally by means of perpendicular transfer units 910 and 912. Once motor-winch unit 906 is activated, thereby retracting belts 918, the transfer force exerted will transport the patient in the direction of arrow 926 from bed 902 onto cart 904. Once the patient has been transferred onto cart 904, motor-winch unit 906 is disengaged.

[0063] Alternatively, a sensing device may be attached to perpendicular transfer unit 910. This sensing device may be either mechanical, electronic, magnetic, optical or a combination thereof in its operation and may detect the presence of the patient, the buckle, the belt portion proximate the buckle, or the clamp within a predetermined distance from perpendicular transfer unit 910. If the patient is to be transferred from cart 904 onto bed 902, belts 918 are routed through perpendicular transfer unit 908 and onto mattress 915 where they are attached to clamp 914. Clamp 914 is then securely attached to a transfer sheet upon which the patient is dis-

posed. Motor-winch unit 906 is then activated, thereby retracting belt 918 in the direction of arrows 930 and thereby generating a transfer force upon clamp 914. The transfer force acts upon the transfer sheet upon which the patient is disposed, thereby transferring the patient from cart 904 onto bed 902 and thereby further, or additionally, gripping the transfer sheet secured within clamp 914. Again, patient proximity sensing devices may be included in perpendicular transfer unit 908 as discussed hereinabove. Perpendicular transfer units 908, 910, and 912 may include either a pulley system or a roller system onto which belts 918 are emplaced prior to a patient transfer.

[0064] Clamp 914 may be any of the clamps disclosed herein. Some exemplary embodiments of motor-winch unit 906 are discussed in more detail herein.

[0065] Referring to Figures 20-22, patient transfer system 940 is depicted. Patient transfer system 940 broadly includes bed 942, portable transfer unit 944 and clamp 946. Bed 942 includes mattress 948 and side rail 950. Side rail 950 may include a plurality of horizontal bars 951. Portable transfer unit 944 includes housing 952, one or more belts 954, an equal number of attaching means or buckles 956 and a motor-winch unit. Further included in portable transfer unit 944 is mounting bracket 958 which will be further described below. Finally, handle 960 on portable transfer unit 944 enables an attendant to easily grasp and carry portable transfer unit 944 as desired.

[0066] Housing 952 is preferably a light weight, resilient plastic or other suitable, light weight material. Portable transfer unit 944 has the advantage of being light in weight, hence readily transportable by an attendant of virtually any size and lifting ability with little likelihood of injury therefrom.

[0067] Preferably, portable transfer unit weighs between about 20 and 35 pounds.

[0068] More preferably, portable transfer unit weighs between about 15 and 25 pounds.

[0069] Figures 21 and 22 depict two, of many, possible embodiments (966, 968) of control units to control the operation of portable transfer unit 944. Controls 970 of control units 966, 968 serve to operate portable transfer unit 944. Control unit 966 may communicate with portable transfer unit 944 by means of electromagnetic radiation, more particularly by radio frequency, or other means. Controls 970 include on/off simultaneous transfer power control 974 and left and right transfer actuator controls 976, 977. Control unit 968 communicates with portable transfer unit 944 by means of a cord or other suitable connecting means. The cord is mechanically and electrically attached to control unit 968 and is disposed on a spool or other retaining means within portable transfer unit 944. This spool is biased so that cord 974 winds thereon when control unit 968 is released by the operator. Control units 966 and 968 are preferably housed in a recess contained within portable transfer unit 944 when not in use. An alternative to the control

unit of the patient transporting system of the current invention is via voice actuation. Voice actuation would enable the patient to effect the patient's own transfer and to halt a transfer in progress if the need to do so arose.

[0070] Figure 23 depicts another embodiment of a portable transfer unit according to the teachings of the present invention. In this embodiment shaft 978 extends from housing 952 laterally. Exposed shaft 978 facilitates mounting of spools 980 thereon, with such spools providing means upon which belts 982 are wound. Since shaft 978 is exposed, each spool 980 may be easily and quickly detached from shaft 978, to facilitate cleaning and disinfecting of both shaft 978, spool 980 and belt 982.

[0071] Portable transfer unit 944' is depicted in later Figure 33. In this embodiment, a receiving cavity 962 is formed on the lateral portions of housing 952'. Within cavity 962 is a drive shaft upon which spool 980' may be reversibly mounted. Belt 988' is routed through slot 963 so that buckle 956 may be used to engage a clamp. Finally, cap 964 may be used to cover cavity 962 for various reasons.

[0072] Referring again to Figures 20-22, portable transfer unit 944 is secured to a side rail 950 by means such as those described below. Bed 942 is then placed beside a bed or cart onto which a patient is disposed upon a transfer sheet. The transfer sheet is then secured with clamp 946, proximate the patient, and belts 954 are extended from portable transfer unit 944 and attached to clamp 946. Either control unit 966 or 968 is detached from portable transfer unit 944 and used to actuate the motor-winch by means such as on/off controls 974. Upon actuation of the motor-winch mechanism, transfer unit 944 begins to wind belts 954 and thereby move clamp 946, the transfer sheet, and the patient. The motor-winch assembly ceases operation when the attendant operates control unit 966, 968 or when the sensing device, described above, functions.

[0073] During transfer it is desirable that the longitudinal axis of the patient be generally parallel to the longitudinal axis of the bed or cart onto which transfer is to be effected. If not, the patient may not be transferred completely onto the bed or cart and may require further manual adjustment by the attendant, possibly obviating some of the advantages of this system. Thus, left or right transfer actuator controls 976, 977 may be used. For example, left control 976 is actuated, the belt 982, attached toward the patient's head, continues to be wound and the other belt 982 either ceases to be wound or winding slows considerably. In similar manner, right control 977 is actuated, the belt 982 attached closest to the patient's feet continues to be wound and the other belt 982 either ceases to be wound or winding again decelerates.

[0074] When patient transfer is complete, much of patient transfer system 940 may be disengaged from the transfer sheet and detached from bed 942. Belts 954 may then be retracted until attached clamp 946 is prox-

imate portable transfer unit 944. Control unit 968 (or 966) is then stowed within a niche in portable transfer unit 944. The attendant then grasps handle 960 and carries portable transfer unit 944 and attached clamp 946 to another location (Figure 35), or shows the unit on the cart or bed awaiting subsequent use.

[0075] Another portable transfer unit, designated as unit 984, of the present invention is depicted in Figure 24. In this embodiment, belt 988 is bound onto spool 986. Spool 986, in turn, is detachably mounted onto bracket 990. Bracket 990 is, in turn, mounted onto the back of housing 952. Bracket 990 includes upper member 992 and lower member 994. An automatic sensing and motor disconnect may be included in this, as well as other, embodiments. A sensing mechanism detects the presence of either the patient, the clamp, or the terminus of an attached belt. Upon sensing one or more of these phenomena, portable transfer unit 984 ceases to wind belt 988, thereby stopping or easing (slowing) patient transfer.

[0076] The portable devices, as well as the other devices of the present invention, preferably also contain an automatic recording and/or display mechanism 988, representatively shown in Figure 25. Mechanism 988 records each patient transfer event. Recording is via a print out of paper or other means, or may comprise storage or transfer of relevant information electronically. The stored information may then be transferred to a computer or other device as desired. Relevant information with regard to a transfer event may include the time of day, the patient's number and name, the attendant's name and number, and the time length of the transfer event. Other items, such as motor performance and torque received by the motor-winch assembly, speed, acceleration, alignment, or other parameters of the patient or the clamp when transferring the patient might also be recorded.

[0077] Referring to Figures 25 and 26, patient transfer system 1000 broadly includes bed 1002 and portable transfer unit 1004. Bed 1002 includes mattress 1006 and side rail 1008. Portable transfer unit 1004 includes housing 1010, control unit 1012, belts 1014 and an engaging mechanism, such as clamp 1016. Belts 1014 and clamp 1016 include any of the embodiments discussed herein. Portable transfer unit 1004 combines a housing which encloses the motor and winch assembly and which is easily and reversibly mounted onto side rail 1008. Mounting bracket 1018 may be integral to housing 1010 of portable transfer unit 1004 and readily and securely mounts onto side rail 1008. A side view of one embodiment of mounting bracket 1018 is depicted in Figure 26. While shown as integral to the embodiment of Figure 25, the concept depicted in Figure 26 is applicable to any of the portable transfer units of the present invention. Mounting bracket 1018 includes lateral arm 1018, engaging side 1020 of portable transfer unit housing 1010, horizontal extension 1022 and substantially vertical member 1024.

[0078] In use, portable transfer unit 1004 is situated onto side rail 1008 such that the lower surface of horizontal extension 1022 rests on side rail 1008. Pin 1026 is then inserted in opening 1027, extending through member 1024 and into a slot or receiving orifice 1028, securely fastening therein. Mounting bracket 1018, thereby securely holds portable transfer unit 1004 onto side rail 1008 during a transfer event. Moreover, transfer unit 1004 is easily detachable from side rail 1008 by removing pin 1026.

[0079] An end view of another embodiment of a portable transfer unit 1004' is depicted in Figure 34, where an alternate mounting bracket 1018' is disclosed. Mounting bracket 1018' includes horizontal extension 1022' extending integrally from housing 1010'. Extending generally vertically from horizontal extension 1022' are fixed upper vertical member 1030 and pivotally mounted, lower vertical member 1032. A locking mechanism, actuated by cam lever 1034, is included. To install portable transfer unit 1004' on a bed with side rails 1008, portable transfer unit 1004' is tilted, allowing upper vertical member 1030 to be disposed such that an upper side rail is between member 1030 and housing 1010'. Lower vertical member 1032, extended in an open position, allows portable transfer unit 1004' to be disposed in position and lower side rails 1008 to be disposed proximate housing 1010'. Lower vertical member 1032 is pivoted to a closed position, generally coaxial to that of upper vertical member 1030. Finally, cam lever 1034 is pivoted into a locked position in the direction of arrow 1036.

[0080] Figures 27 and 28 disclose one embodiment of motor-winch assembly 1150 of the present invention. Motor-winch assembly 1150 broadly includes frame 1152, upon which are mounted motor bracket 1154, control board 1156, hook 1158, right clutch bracket 1160 and left clutch bracket 1162. Motor 1164 is operationally mounted on an upper portion of motor bracket 1154. Gear 1166 (which in one embodiment is a 42-tooth gear) is attached to a shaft (not shown) extending from motor 1164. Gear 1166, in turn, operably engages gear 1168 which is mounted onto shaft 1169. Also mounted on shaft 1169 are right clutch 1170 and left clutch 1172. Right clutch 1170 is disposed within right clutch bracket 1160. Left clutch 1172 is disposed within left clutch bracket 1162. Spring 1174 is disposed about right clutch 1170 and about left clutch 1172. Spring 1174, in turn, is enclosed by spring cover 1176. Spring cover 1176 is attached to spring hub 1178. Spring hub 1178 is affixed to right clutch bracket 1160 and left clutch bracket 1162. Finally, spool 1182 may be detachably disposed on the outboard portion of shaft 1169. Motor-winch assembly 1150 is suitable for providing the necessary power to operate the transfer units described herein.

[0081] Optimized patient transfer requires smooth transition of the patient from one platform to another. One means for achieving such optimization is through use of a transfer bridge 1200, shown in Figures 29-32.

A modified transfer bridge 1200' depicted in Figure 29 differs from transfer bridge 1200. Transfer bridge 1200 broadly includes one or more sections 1202. A stabilizer 1204 is ideally present on the underside of each section 1202. Where multiple sections are used, such sections 1202 are joined by hinge 1206 (discussed hereinbelow), and stabilizer 1204 extends generally perpendicularly from each section. Functionally, transfer bridge 1200 is placed between a bed or cart onto which a patient is lying and another bed or cart onto which the patient is to be transferred. Stabilizer 1204 is disposed between the platforms, thereby securely holding transfer bridge 1200 in place and preventing transfer bridge 1200 from being displaced by patient contact during a transfer. After use, transfer bridge 1200 is folded along hinge 1206 for storage or transport to another location.

[0082] One embodiment of the construction of hinge 1206 is depicted in Figure 67. Hinge 1206 is preferably manufactured as a "living hinge", i. e. a hinge made by removing a narrow, linear portion of the material along a portion of transfer bridge 1200 or transfer bridge 1200'.

[0083] Transfer bridge 1200', shown in Figure 30, includes a plurality of sections 1202' and a stabilizer 1204', perpendicularly mounted on the underside of each section 1202. As in transfer bridge 1200, hinge 1206 is present and divides 1202. Leading edge 1210 is present on the portion of transfer bridge 1200' opposite stabilizers 1204'. Although not depicted, transfer bridge 1200 and 1200' may include one or more carrying handles. The carrying handles may be attachable or integral or may be cutout sections within sections 1202 or 1202'. Preparing transfer bridge 1200' for a patient transfer is essentially done in an identical manner as preparing transfer bridge 1200, the only exception being leading edge 1210 is oriented toward the patient to be transferred.

[0084] Both transfer bridge 1200 and 1200' are preferably constructed of a smooth polyethylene sheet material, which is generally about 1.5 millimeters in thickness. Alternatively, hinge 1206 may be reinforced with a thin sheet of polyethylene on the underside of transfer bridge 1200, 1200'. Stabilizer 1204' may be centered about 7.5 centimeters from edge 1214. One embodiment of transfer bridge 1200' is preferably about 31 centimeters wide at hinge 1206 and tapering to about 25 centimeters in width at each end. The cambered radius for a side section of transfer bridge 1200' is about 105 centimeters. The cambered radius for the leading edge of transfer bridge 1200' is about 225 centimeters. The side camber insures that leading edge 1210 will firmly contact the mattress on which the patient is disposed, such that transfer bridge 1200' will not be displaced during a patient transfer. The leading edge camber allows for a gradually increasing amount of contact during patient transfer, rather than immediate total contact. The gradually increasing contact also tends to allow the patient to be pulled atop transfer bridge 1200', rather than fully abutting and possibly displacing transfer bridge

1200'. Transfer bridge 1200' is most advantageously positioned when leading edge 1210 is placed under at least a portion of the patient.

[0085] In an average male patient, 90% of the patient's weight resides in the portion between the patient's buttocks and shoulders. Hence, the overall length of transfer bridge 1200 or 1200' should minimally provide support therefor. Accordingly, preferred lengths for transfer bridge 1200 or 1200' include about 65, 120 and 173 centimeters, with the most preferred length being 120 centimeters. **[deletion(s)]**

Claims

1. A transfer system for moving a patient reclining on a transfer sheet (190) between a first horizontal surface and a second horizontal surface, comprising a winch apparatus (138, 250) configured for positioning adjacent to either of said first or second horizontal surfaces, the winch apparatus including a drive shaft (170) and at least one spool (175, 263) attached to the drive shaft, a clamping device (194, 254) and means for coupling the clamping device (194, 254) to the spool (175), the clamping device (194, 254) comprising a retaining member assembly having a first portion (206) and a second portion (208), the second portion (208) being attached to the first portion (206) to form a cavity (198, 212) therebetween, the clamping device (194) further comprising a contact element assembly (200, 202, 214), a portion of the transfer sheet (190) being locatable in the cavity (198, 212) in use and being releasably retained therein by the contact element assembly (200, 202, 214), the contact element assembly (200, 202, 214) cooperating with the retaining member assembly (206, 208) to releasably grip the transfer sheet (190) when a transfer force is exerted by the winch apparatus (138, 250) whereby the transfer sheet (190) is drawn by the transfer force to transfer the patient from the first surface to the second surface, **characterised in that** the contact element assembly comprises a closure element (200, 202, 214) hingedly connected to the retaining assembly at the opening of the cavity (198, 212) such that the transfer sheet (190) can be held within the cavity (198, 212) by the closure element (200, 202, 214) until the closure element (200, 202, 214) is released.
2. A transfer system according to claim 1 wherein the closure element (200, 202) is a spring loaded gate.
3. A transfer system according to claim 1, wherein the closure element (214) is L-shaped.
4. A transfer system according to any preceding claim, wherein the first and second portions (206, 208) are

curved sections.

5. A transfer system as claimed in claim 4 wherein the first portion comprises a substantially rigid, elongate first member (206) with a length, an exterior surface, an interior surface, a first edge and a second edge generally opposite the first edge, the first member (206) generally outwardly curved in cross-section for at least a portion of the exterior and interior surfaces, the second portion comprises a substantially rigid, elongate second member (208) with a length, an exterior surface, an interior surface, a first edge and a second edge generally opposite the first edge, the second member (208) generally outwardly curved in cross-section for at least a portion of the exterior and interior surfaces, the first edge of the first member (206) in proximal juxtaposition to the first edge of the second member (208), the second edge of the first member (206) being spaced apart from the second edge of the second member (208) and the interior surface of the first member (206) facing the interior surface of the second member (208).
6. A transfer system as claimed in claim 5 wherein the closure element comprises a substantially rigid, third member (200, 202) with a first surface, a second surface, a length, a first edge and a second edge, the third member (200, 202) pivotally affixed proximate the second edge of the first member (206), the first edge of the third member (200, 202) proximate the interior surface of the second member (208), and the third member further comprising a first generally planar section (200) and a second generally planar section (204), the first and second planar sections integrally joined at a bend, the first planar section (202) angling toward the first edges of the first and second members (206, 208), the second planar section (204) pivotally joined to the first member (206) proximate the second edge of the first member (206), wherein the first and second members (206, 208) are arranged such that the cavity (198) is formed between the interior surfaces of the first and second members (206, 208) and the clamping device (194, 254) is arranged such that the third member (202, 204) is forced against one or other of the first and second members (206, 208) on application of a transfer force thereby gripping the transfer sheet (190) therebetween.
7. A transfer system according to claim 5, wherein the second member (208) includes a bend such that the cross-section of the second member (208) defines a lip proximate the second edge of the second member (208) and such that the lip is pointed generally toward the second edge of the first member (206) and the first edges of the first and second members (206, 208) are integral, and wherein the

closure element comprises a substantially rigid third member (214) with a first surface, a second surface, a first edge, a second edge and an engaging surface on at least a portion of the third member (214) proximate the interior surface of the second member (208), the third member (214) being generally L-shaped in cross-section and with a bend, the first edge of the third member (214) being pivotally mounted within the second edge of the first member (206), the second edge of the third member (204) extending toward the first edges of the first and second members (206, 208), the bend of the third member (214) disposed proximate the interior surface of the lip of the second member (208), the third member (214) pivotally affixed proximate the second edge of the first member (206) with the first edge of the third member (214) proximate the interior surface of the second member (208).

8. A transfer system according to any preceding claim, further comprising a plurality of belt attaching devices (216, 218), the attaching devices (216, 218) having a portion generally L-shaped in cross-section and being connected to the clamping device.
9. A transfer system according to claim 8 as dependent on claim 7, wherein the attaching devices (218) are generally arcuate in cross-section with a terminal lip, the attaching devices (218) being rigidly attached to the interior surface of the first member (206) and extending through a portion of the second member (208) generally toward the first edges of the first and second members (206, 208), and the lip pointing generally toward the first member (206).
10. A transfer system according to any preceding claim, in which the winch apparatus (250) is at least partially disposed within the clamping device (254).
11. A transfer system according to claim 10, in which the winch apparatus (250) includes a strap apparatus (264).
12. A transfer system according to claim 11, in which the strap apparatus includes a pliable strap (264) and a handle (266).
13. A transfer system according to any one of claims 10 to 12, in which the winch apparatus (250) includes an electric motor (262).
14. A transfer system according to any one of claims 10 to 13, in which the winch apparatus (250) further comprises a control unit (278), the control unit (278) being operable at a distance from the clamping device (254).

15. A transfer system according to claim 14, in which the control unit (278) is detachable from the clamping device (254).
16. A transfer system according to any one of claims 1 to 9 wherein the coupling means comprises at least one belt (172) with a first end and a second end, the first end of the belt (172) attached to the spool (175) and the second end of the belt attached to the clamp (194).
17. A transfer system according to claim 16, wherein the at least one belt (172) is comprised of two belts attached to two spools (175) which are spaced apart.
18. A transfer system according to either claim 16 or claim 17, wherein the winch apparatus (138) is motorised.
19. A transfer system according to either claim 16 or claim 17, wherein the winch apparatus (138) is manually operated.
20. A transfer system according to any preceding claim, further comprising a rod (192) which co-operates with the clamping device (194, 254) for holding the transfer sheet (190).
21. A transfer system according to claim 20, wherein the rod (192) is tethered to the clamping device (194, 254).
22. A transfer system according to either claim 20 or claim 21 as dependent on any one of claims 5 to 7 or 9, wherein the rod (192) is positionable proximate the interior surfaces of the first and second members (206, 208) in the cavity (212) formed therebetween.
23. A clamping device according to claim 22, in which the rod (192) has a diameter and in which the rod (192) diameter is less than a distance between the second edge of the first member (206) and the second edge of the second member (208).
24. A method of transferring a patient reclining on a transfer sheet (190) between a first horizontal surface and a second horizontal surface, the method comprising providing a winch apparatus (138, 250) and a first spool (175) in mechanical communication with said winch apparatus (138, 250), coupling the first spool (175) to a clamping device (194, 254), the clamping device (194, 254) having a retaining member assembly comprising a first portion (206) and a second portion (208) attached to the first portion to form a cavity (198, 212) therebetween, securing the transfer sheet (190) to the clamping device (194, 254) by placing a portion of the transfer sheet (190) in the cavity (198, 212) and actuating the winch apparatus (138, 250) to cause a transfer force to be exerted on the clamping device (194, 254) and hence the transfer sheet (190) to draw the transfer sheet (190) and a patient thereon, **characterised in that** the clamping device includes a releasable closure element (200, 202, 214) hingedly connected to the retaining member assembly at the opening of the cavity (198, 212), the securing step comprising securing the portion of the transfer sheet (190) in the cavity (198, 212) with the closure element (200, 202, 214) at the opening of the cavity (198, 212) to releasably retain the portion of the transfer sheet (190) in the cavity (198, 212).
25. A method according to claim 24 wherein the first and second portions comprise first and second members (206, 208), each member with a first and second edge, the first edge of the first member (206) functionally disposed proximate the first edge of the second member (208), the second edge of the first member (206) spaced apart from the second edge of the second member (208) thereby defining the cavity opening, wherein the securing step comprises inserting at least one portion of the sheet within the clamping device (194, 254) by providing an elongate rod (192) having a diameter smaller than the cavity opening and folding at least one portion of the sheet (190) about the rod (192), such that at least one fold is formed about the rod (192) with at least one free end of the sheet (190) extending from the rod (192), inserting the rod (192) and at least one fold within the cavity of the clamping device (194, 254), and wherein exerting the transfer force forces the closure element (200, 202, 214) against one or other of the first and second members (206, 208) to securely and reversibly clamp the at least one portion of the sheet (190) within the clamping device (194, 254).
26. A method according to claim 25, in which the step of providing a rod (192) further comprises disposing the rod (192) near the patient such that the wrapped rod (192) is disposable within the clamping device (194, 254) and such that the clamping device (194, 254) is disposed proximate the patient when the wrapped rod (192) is disposed within the clamping device (194, 254).
27. A method according to claim 24, wherein the clamping device (194, 254) has a longitudinal axis, the first portion comprises a substantially rigid elongate first member (206) with a length, an exterior surface, an interior surface, a first edge, a second edge, the first member (206) generally outwardly curved in cross-section for at least a portion of the exterior and interior surfaces, the second portion

comprises a substantially rigid elongate second member (208) with a length, an exterior surface, an interior surface, a first edge and a second edge, the second member (208) generally outwardly curved in cross-section for at least a portion of the exterior and interior surfaces, the first edge of the first member (206) being in juxtaposition to the first edge of the second member (208), the second edge of the first member (206) being spaced apart from the second edge of the second member (208), and the interior surface of the first member (206) facing the interior surface of the second member (208), and the closure element comprises a substantially rigid third member (200, 202, 214) with a first surface, a second surface, a length, a first edge and a second edge, the third member (200, 202, 214) pivotally affixed proximate to the second edge of the first member (206), the first edge of the third member (200, 202, 214) proximate the interior surface of the second member (208) in a closed position and pivotable away from the interior surface of the second member (208) in an open position, the securing step comprising pivoting the third member (200, 202, 214) of the clamping device (194, 254) to the open position, placing a portion of the sheet (190) within the clamping device (194, 254), and engaging the third member (200, 202, 214) with at least one surface of the sheet (190), the sheet frictionally contacting the first edge of the third member (214) and the interior surface of the second member (208).

28. The method according to either claim 24 or claim 27, wherein a tucking device is used to assist with securing the transfer sheet (190) to the clamping device (194).

Patentansprüche

1. Transfersystem zum Verlegen eines auf einem Transfertuch (190) gebetteten Patienten von einer ersten horizontalen Fläche auf eine zweite horizontale Fläche, mit einer zur Anordnung neben entweder besagter erster oder zweiter Fläche konfigurierten Winde (138, 250), wobei die Winde eine Antriebswelle (170) und zumindest eine an der Antriebswelle befestigte Spule (175, 263), eine Klemmvorrichtung (194, 254) und Mittel zum Befestigen der Klemmvorrichtung (194, 254) an der Spule (175) einschließt, wobei die Klemmvorrichtung (194, 254) eine Halterung mit einem ersten Teil (206) und einem zweiten Teil (208) umfasst, wobei das zweite Teil (208) am ersten Teil (206) befestigt ist, um dazwischen einen Hohlraum (198, 212) zu bilden, wobei die Klemmvorrichtung (194) weiterhin mit einer Kontaktelementgruppe (200, 202, 214) versehen ist, wobei ein Teil des Transfertuches (190) bei Benutzung im Hohlraum (198, 212) zu lie-

gen kommt und darin durch die Kontaktelementgruppe (200, 202, 214) herausnehmbar gehalten wird, wobei die Kontaktelementgruppe (200, 202, 214) mit der Halterung (206, 208) zusammenwirkt, um das Transfertuch (190) so zu fassen, dass es wieder freigegeben werden kann, wenn von der Winde (138, 250) eine Transferkraft ausgeübt wird, wodurch das Transfertuch (190) von der Transferkraft gezogen wird, um den Patienten von der ersten Fläche auf die zweite Fläche zu verlegen, **dadurch gekennzeichnet, dass** die Kontaktelementgruppe ein Schließelement (200, 202, 214) umfasst, welches an der Öffnung des Hohlraumes (198, 212) so an die Halterung angelenkt ist, dass das Transfertuch (190) von dem Schließelement (200, 202, 214) innerhalb des Hohlraumes (198, 212) gehalten werden kann, bis das Schließelement (200, 202, 214) freigegeben wird.

2. Transfersystem nach Anspruch 1, wobei das Schließelement (200, 202) ein federbelastetes Gitter ist.
3. Transfersystem nach Anspruch 1, wobei das Schließelement (214) L-förmig ausgebildet ist.
4. Transfersystem nach irgendeinem der vorhergehenden Ansprüche, wobei das erste und das zweite Teil (206, 208) gewölbte Profile sind.
5. Transfersystem nach Anspruch 4, wobei das erste Teil ein im Wesentlichen starres, längliches erstes Element (206) mit einer Länge, einer Außenfläche, einer Innenfläche, einer ersten Kante und einer der ersten Kante normalerweise gegenüberliegenden zweiten Kante umfasst, wobei das erste Element (206) einen im Allgemeinen nach außen gewölbten Querschnitt über mindestens einen Teil der Außen- und Innenflächen hinweg aufweist, wobei das zweite Teil ein im Wesentlichen starres, längliches zweites Element (208) mit einer Länge, einer Außenfläche, einer Innenfläche, einer ersten Kante und einer der ersten Kante normalerweise gegenüberliegenden zweiten Kante besitzt, wobei das zweite Element (208) einen im Allgemeinen nach außen gewölbten Querschnitt über mindestens einen Teil der Außen- und Innenflächen aufweist, und wobei die erste Kante des ersten Elements (206) an die erste Kante des zweiten Elements (208) angrenzt und die zweite Kante des ersten Elements (206) von der zweiten Kante des zweiten Elements (208) abgesetzt ist und die Innenfläche des ersten Elements (206) der Innenfläche des zweiten Elements (208) gegenüberliegt.
6. Transfersystem nach Anspruch 5, wobei das Schließelement ein im Wesentlichen starres drittes Element (200, 202) mit einer ersten Fläche, einer

zweiten Fläche, einer Länge, einer ersten Kante und einer zweiten Kante umfasst, wobei das dritte Element (200, 202) nahe der zweiten Kante des ersten Elements (206) angelenkt ist, wobei die erste Kante des dritten Elements (200, 202) nahe der Innenfläche des zweiten Elements (208) und das dritte Element des Weiteren einen ersten im Allgemeinen planaren Abschnitt (200) und einen zweiten im Allgemeinen planaren Abschnitt (204) aufweisen, wobei die ersten und zweiten planaren Abschnitte fest mit einem gebogenen Teil verbunden sind, wobei der erste planare Abschnitt (202) relativ zu den ersten Kanten der ersten und zweiten Elemente (206, 208) winklig angeordnet ist und der zweite planare Abschnitt (204) nahe der zweiten Kante des ersten Elements (206) mit dem ersten Element (206) nahe der zweiten Kante des ersten Elements (206) eine schwenkbare Verbindung bildet, wobei die ersten und zweiten Elemente (206, 208) so angeordnet sind, dass der Hohlraum (198) zwischen den Innenflächen der ersten und zweiten Elemente (206, 208) ausgebildet und die Klemmvorrichtung (194, 254) so angeordnet ist, dass bei Ausübung einer Transferkraft das dritte Element (202, 204) gegen eines der ersten und zweiten Elemente (206, 208) gedrückt und somit dazwischen das Transferstück (190) gehalten wird.

7. Transfersystem nach Anspruch 5, wobei das zweite Element (208) eine solche Krümmung aufweist, dass der Querschnitt des zweiten Elementes (208) nahe der zweiten Kante des zweiten Elementes (208) einen Rand definiert und dass der Rand im Allgemeinen zu der zweiten Kante des ersten Elementes (206) gerichtet ist und die ersten Kanten der ersten und zweiten Elemente (206, 208) fest sind, und wobei das Schließelement ein im Wesentlichen starres drittes Element (214) mit einer ersten Oberfläche, einer zweiten Oberfläche, einer ersten Kante, einer zweiten Kante und einer Überdeckung auf zumindest einem Teil des dritten Elementes (214) nahe der Innenfläche des zweiten Elementes (208) umfasst, wobei das dritte Element (214) im Allgemeinen im Querschnitt L-förmig ist, und mit einer Krümmung, wobei die erste Kante des dritten Elementes (214) schwenkbar innerhalb der ersten Kante des ersten Elementes (206) befestigt ist, die zweite Kante des dritten Elementes (204) sich zu den ersten Kanten der ersten und zweiten Elemente (206, 208) erstreckt, wobei die Krümmung des dritten Elementes (214) nahe der Innenfläche des Randes des zweiten Elementes (208) angeordnet ist, wobei das dritte Element (214) schwenkbar nahe der zweiten Kante des ersten Elementes (206) befestigt ist, und wobei die erste Kante des dritten Elementes (214) nahe der Innenfläche des zweiten Elementes ist (208).

8. Transfersystem nach irgendeinem vorhergehenden Anspruch, welches weiterhin eine Vielzahl Gurtbefestigungsvorrichtungen (216, 218) umfasst, wobei die Befestigungsvorrichtungen (216, 218) einen im Querschnitt im Allgemeinen L-förmigen Teil aufweisen und mit der Klemmvorrichtung verbunden sind.
9. Transfersystem nach Anspruch 8 als Unteranspruch von Anspruch 7, wobei die Befestigungsvorrichtungen (218) im Allgemeinen im Querschnitt bogenförmig sind mit einem Endrandes, wobei die Befestigungsvorrichtungen (218) starr mit der Innenfläche des ersten Elementes (206) verbunden sind und sich durch einen Teil des zweiten Elementes (208) im Allgemeinen zu den ersten Kanten der ersten und zweiten Elemente (206, 208) erstrecken und der Rand im Allgemeinen zu dem ersten Element (206) hin gerichtet ist.
10. Transfersystem nach irgendeinem vorhergehenden Anspruch, bei dem die Winde (250) zumindest teilweise innerhalb der Klemmvorrichtung (254) angeordnet ist.
11. Transfersystem nach Anspruch 10, bei dem die Winde (250) einen Bandapparat (264) einschließt.
12. Transfersystem nach Anspruch 11, bei dem der Bandapparat ein biegsames Band (264) und einen Griff (266) einschließt.
13. Transfersystem nach irgendeinem der Ansprüche 10 bis 12, bei dem die Winde (250) einen Elektromotor (262) einschließt.
14. Transfersystem nach irgendeinem der Ansprüche 10 bis 13, bei dem die Winde (250) weiterhin eine Steuerungseinheit (278) umfasst, wobei die Steuerungseinheit (278) aus einer Entfernung von der Klemmvorrichtung (254) betätigbar ist.
15. Transfersystem nach Anspruch 14, bei dem die Steuerungseinheit (278) von der Klemmvorrichtung (254) abnehmbar ist.
16. Transfersystem nach irgendeinem der Ansprüche 1 bis 9, wobei die Kupplungsmittel zumindest einen Gurt (172) mit einem ersten und einem zweiten Ende umfassen, wobei das erste Ende des Gurtes (172) an der Spule (175) und das zweite Ende des Gurtes an der Klemme (194) befestigt ist.
17. Transfersystem nach Anspruch 16, wobei der zumindest eine Gurt (172) aus zwei an den Spulen (175) befestigten Gurten besteht, welche Spulen voneinander abgesetzt sind.

18. Transfersystem nach entweder Anspruch 16 oder Anspruch 17, wobei die Winde (138) motorbetrieben ist.
19. Transfersystem nach entweder Anspruch 16 oder Anspruch 17, wobei die Winde (138) von Hand betrieben wird. 5
20. Transfersystem nach irgendeinem vorhergehenden Anspruch, welches weiterhin eine Stange (192) umfasst, welche mit der Klemmvorrichtung (194, 254) zusammenwirkt, um das Transfertuch (190) zu halten. 10
21. Transfersystem nach Anspruch 20, wobei die Stange (192) in der Klemmvorrichtung (194, 254) gehalten wird. 15
22. Transfersystem nach entweder Anspruch 20 oder Anspruch 21 als Unteranspruch von Ansprüchen 5 bis 7 oder Anspruch 9, wobei die Stange (192) nahe den Innenflächen der ersten und des zweiten Elementes (206, 208) in dem dazwischen ausgeformten Hohlraum (212) positionierbar ist. 20
23. Klemmvorrichtung nach Anspruch 22, bei dem die Stange (192) einen Querschnitt aufweist und wobei der Querschnitt der Stange (192) geringer als ein Abstand zwischen der zweiten Kante des ersten Elementes (206) und der zweiten Kante des zweiten Elementes (208) ist. 25
24. Verfahren zum Transferieren eines auf einem Transfertuch (190) gebetteten Patienten zwischen einer ersten horizontalen Fläche und einer zweiten horizontalen Fläche, wobei das Verfahren darin besteht, eine Winde (138, 250) und eine erste Spule (175) in mechanischer Verbindung mit besagter Winde (138, 250) vorzusehen, wobei die erste Spule (175) mit einer Klemmvorrichtung (194, 254) verbunden ist, die Klemmvorrichtung (194, 254) eine Halterung aufweist, welche einen ersten Teil (206) und einen zweiten Teil (208) umfasst, welcher mit dem ersten Teil so verbunden ist dass, er dazwischen einen Hohlraum (198, 212) bildet, das Transfertuch (190) durch Platzieren eines Anteils des Transfertuches (190) in dem Hohlraum (198, 212) mit der Klemmvorrichtung (194, 254) zu sichern und die Winde (138, 250) zu betätigen, um eine Transfervkraft auf die Klemmvorrichtung (194, 254) und somit auf das Transfertuch (190) ausüben zu lassen, um das Transfertuch (190) und den darauf befindlichen Patienten zu ziehen, **dadurch gekennzeichnet, dass** die Klemmvorrichtung ein Schließelement (200, 202, 214), das freigegeben werden kann, einschließt, welches bei der Öffnung des Hohlraumes (198, 212) an der Halterung angelenkt ist, wobei der Sicherungsschritt das Sichern des Anteiles des Transfertuches (190) in dem Hohlraum (198, 212) umfasst, wobei das Schließelement (200, 202, 214) bei der Öffnung des Hohlraumes (198, 212) den Anteil des Transfertuches (190) herausnehmbar in dem Hohlraum (198, 212) festhält. 30
25. Verfahren gemäß Anspruch 24, wobei die ersten und zweiten Teile erste und zweite Elemente (206, 208) umfassen, jedes Element mit einer ersten und zweiten Kante, die erste Kante des ersten Elementes (206) funktionell nahe der ersten Kante des zweiten Elementes (208) angeordnet, die zweite Kante des ersten Elementes (206) abgesetzt von der zweiten Kante des zweiten Elementes (208), wodurch die Öffnung des Hohlraumes definiert wird, wobei der Sicherungsschritt umfasst: das Einfügen zumindest eines Anteils des Tuches innerhalb der Klemmvorrichtung (194, 254) durch das Vorsehen einer länglichen Stange (192), welche einen Querschnitt hat, der geringer ist als die Öffnung des Hohlraumes und das Falzen zumindest eines Anteils des Tuches (190) um die Stange (192), umfasst, derart, dass zumindest ein Falz um die Stange (192) mit zumindest einem freien Ende des Tuches (190) gebildet wird, welches sich von der Stange (192) erstreckt, Einführen der Stange (192) und zumindest eines Falzes in den Hohlraum der Klemmvorrichtung (194, 254), und wobei das Ausüben der Transferkräfte das Schließelement (200, 202, 214) gegen entweder das eine oder das andere des zweiten und dritten Elementes (206, 208) zwingen, um den zumindest einen Anteil des Tuches (190) sicher und umkehrbar in die Klemmvorrichtung (194, 254) einzuklemmen. 35
26. Verfahren nach Anspruch 25, bei dem der Schritt des Vorsehens einer Stange (192) weiterhin das Anordnen der Stange (192) nahe dem Patienten derart umfasst, dass die umwickelte Stange (192) innerhalb der Klemmvorrichtung (194, 254) angeordnet werden kann und derart, dass die Klemmvorrichtung (194, 254) nahe dem Patienten angeordnet ist, wenn die eingewickelte Stange (192) innerhalb der Klemmvorrichtung (194, 254) angeordnet ist. 40
27. Verfahren nach Anspruch 24, wobei die Klemmvorrichtung (194, 254) eine Längsachse aufweist, der erste Teil ein im Wesentlichen starres, längliches erstes Element (206) mit einer Länge, einer Außenfläche, einer Innenfläche, einer ersten Kante, einer zweiten Kante umfasst, das erste Element (206) im Allgemeinen im Querschnitt über zumindest einen Teil der Außen- und Innenflächen nach außen gebogen, der zweite Teil ein im Wesentlichen starres, längliches zweites Element (208) mit einer Länge, einer Außenfläche, einer Innenfläche, einer ersten 45

Kante und einer zweiten Kante, das zweite Element (208) im Allgemeinen im Querschnitt über zumindest einen Teil der Außen- und Innenflächen gebogen, wobei die erste Kante des ersten Elementes (206) in Berührung mit der ersten Kante des zweiten Elementes (208) ist, die Kante des ersten Elementes (206) von der zweiten Kante des zweiten Elementes (208) abgesetzt ist und die Innenfläche des ersten Elementes (206) der Innenfläche des zweiten Elementes (208) zugewandt ist, und das Schließelement ein im Wesentlichen starres drittes Element (200, 202, 214) mit einer ersten Oberfläche, einer zweiten Oberfläche, einer Länge, einer ersten Kante und einer zweiten Kante, wobei das dritte Element (200, 202, 214) schwenkbar nahe der zweiten Kante des ersten Elementes (206) befestigt ist, die erste Kante des dritten Elementes (200, 202, 214) nahe der Innenoberfläche des zweiten Elementes (208) in einer Geschlossen-Position und schwenkbar weg von der Innenfläche des zweiten Elementes (208) in einer Offen-Position, wobei der Sicherungsschritt das Schwenken des dritten Elementes (200, 202, 214) der Klemmvorrichtung (194, 254) in die Offen-Position umfasst, das Platzieren eines Anteiles des Tuches (190) innerhalb der Klemmvorrichtung (194, 254), und das Eingreifen des dritten Elementes (200, 202, 214) mit zumindest einer Oberfläche des Tuches (190) umfasst, wobei das Tuch Reibberührung mit der ersten Kante des dritten Elementes (214) und der Innenfläche des zweiten Elementes (208) hat.

28. Verfahren nach entweder Anspruch 24 oder Anspruch 27, wobei eine Fangvorrichtung zur Unterstützung beim Sichern des Transfertuches (190) in der Klemmvorrichtung (194) angewandt wird.

Revendications

1. Système de transfert pour déplacer un patient qui est allongé sur un drap de transfert (190) entre une première surface horizontale et une seconde surface horizontale, comprenant un treuil (138, 250) configuré pour le positionnement adjacent à l'une ou l'autre desdites première ou seconde surfaces horizontales, le treuil comprenant un arbre d'entraînement (170) et au moins une bobine (175, 263) fixée à l'arbre d'entraînement, un dispositif de blocage (194, 254) et des moyens pour coupler le dispositif de blocage (194, 254) à la bobine (175), le dispositif de blocage (194, 254) comprenant un ensemble d'élément de retenue ayant une première partie (206) et une seconde partie (208), la seconde partie (208) étant fixée sur la première partie (206) pour former une cavité (198, 212) entre elles, le dispositif de blocage (194) comprenant en outre un ensemble d'élément de contact (200, 202, 214), une partie du

drap de transfert (190) pouvant être positionnée dans la cavité (198, 212) à l'usage et étant retenue de manière amovible à l'intérieur par l'ensemble d'élément de contact (200, 202, 214), l'ensemble d'élément de contact (200, 202, 214) coopérant avec l'ensemble d'élément de retenue (206, 208) pour saisir de manière amovible le drap de transfert (190) lorsqu'une force de transfert est exercée par le treuil (138, 250), moyennant quoi le drap de transfert (190) est tiré par la force de transfert pour transférer le patient de la première surface à la seconde surface, **caractérisé en ce que** l'ensemble d'élément de contact comprend un élément de fermeture (200, 202, 214) raccordé de manière articulée à l'ensemble de retenue au niveau de l'ouverture de la cavité (198, 212) de sorte que le drap de transfert (190) peut être maintenu à l'intérieur de la cavité (198, 212) par l'élément de fermeture (200, 202, 214) jusqu'à ce que l'élément de fermeture (200, 202, 214) soit libéré.

2. Système de transfert selon la revendication 1, dans lequel l'élément de fermeture (200, 202) est une porte à ressort.
3. Système de transfert selon la revendication 1, dans lequel l'élément de fermeture (214) est en forme de L.
4. Système de transfert selon l'une quelconque des revendications précédentes, dans lequel les première et seconde parties (206, 208) sont des sections incurvées.
5. Système de transfert selon la revendication 4, dans lequel la première partie comprend un premier élément (206) allongé sensiblement rigide avec une longueur, une surface extérieure, une surface intérieure, un premier bord et un second bord généralement opposé au premier bord, le premier élément (206) étant généralement incurvé vers l'extérieur en section transversale pour au moins une partie des surfaces extérieure et intérieure, la seconde partie comprend un second élément (208) allongé sensiblement rigide avec une longueur, une surface extérieure, une surface intérieure, un premier bord et un second bord généralement opposé au premier bord, le second bord (208) étant généralement incurvé vers l'extérieur en section transversale pour au moins une partie des surfaces extérieure et intérieure, le premier bord du premier élément (206) étant en juxtaposition proximale par rapport au premier bord du second élément (208), le second bord du premier élément (206) étant espacé du second bord du second élément (208) et la surface intérieure du premier élément (206) étant en face de la surface intérieure du second élément (208).

6. Système de transfert selon la revendication 5, dans lequel l'élément de fermeture comprend un troisième élément (200, 202) sensiblement rigide avec une première surface, une seconde surface, une longueur, un premier bord et un second bord, le troisième élément (200, 202) étant fixé de manière pivotante à proximité du second bord du premier élément (206), le premier bord du troisième élément (200, 202) étant à proximité de la surface intérieure du second élément (208), et le troisième élément comprenant en outre une première section (200) généralement plane et une seconde section (204) généralement plane, les première et seconde sections planes étant assemblées de manière solidaire au niveau d'une courbure, la première section plane (202) étant coudée vers les premiers bords des premier et second éléments (206, 208), la seconde section (204) plane étant assemblée de manière pivotante au premier élément (206) à proximité du second bord du premier élément (206), dans lequel les premier et second éléments (206, 208) sont agencés de sorte que la cavité (198) est formée entre les surfaces intérieures des premier et second éléments (206, 208) et le dispositif de blocage (194, 254) est agencé de sorte que le troisième élément (202, 204) est forcé contre l'un ou l'autre des premier et second éléments (206, 208) sur l'application d'une force de transfert saisissant ainsi le drap de transfert (190) entre eux.
7. Système de transfert selon la revendication 5, dans lequel le second élément (208) comprend une courbure de sorte que la section transversale du second élément (208) définit une lèvre à proximité du second bord du second élément (208) et de sorte que la lèvre est orientée généralement vers le second bord du premier élément (206) et que les premiers bords des premier et second éléments (206, 208) sont solidaires, et dans lequel l'élément de fermeture comprend un troisième élément (214) sensiblement rigide avec une première surface, une seconde surface, un premier bord, un second bord et une surface de mise en prise sur au moins une partie du troisième élément (214) à proximité de la surface intérieure du second élément (208), le troisième élément (214) ayant généralement une section transversale en forme de L, et avec une courbure, le premier bord du troisième élément (214) étant monté de manière pivotante à l'intérieur du second bord du premier élément (206), le second bord du troisième élément (204) s'étendant vers les premiers bords des premier et second éléments (206, 208), la courbure du troisième élément (214) étant disposé à proximité de la surface intérieure de la lèvre du second élément (208), le troisième élément (214) étant fixé de manière pivotante à proximité du second bord du premier élément (206) avec le premier bord du troisième élément (214) à proximité de

la surface intérieure du second élément (208).

8. Système de transfert selon l'une quelconque des revendications précédentes, comprenant en outre une pluralité de dispositifs de fixation à courroie (216, 218), les dispositifs de fixation (216, 218) ayant une partie avec une section transversale généralement en forme de L et étant raccordés au dispositif de blocage.
9. Système de transfert selon la revendication 8 lorsqu'elle dépend de la revendication 7, dans lequel les dispositifs de fixation (218) ont une section transversale généralement arquée avec une lèvre terminale, les dispositifs de fixation (218) étant rigidement fixés à la surface intérieure du premier élément (206) et s'étendant à travers une partie du second élément (208) généralement vers les premiers bords des premier et second éléments (206, 208), et la lèvre étant généralement orientée vers le premier élément (206).
10. Système de transfert selon l'une quelconque des revendications précédentes, dans lequel le treuil (250) est au moins partiellement disposé à l'intérieur du dispositif de blocage (254).
11. Système de transfert selon la revendication 1, dans lequel le treuil (250) comprend un dispositif à sangle (264).
12. Système de transfert selon la revendication 11, dans lequel le dispositif à sangle comprend une sangle pliable (264) et une poignée (266).
13. Système de transfert selon l'une quelconque des revendications 10 à 12, dans lequel le treuil (250) comprend un moteur électrique (262).
14. Système de transfert selon l'une quelconque des revendications 10 à 13, dans lequel le treuil (250) comprend en outre une unité de commande (278), l'unité de commande (278) pouvant fonctionner à une certaine distance du dispositif de blocage (254).
15. Système de transfert selon la revendication 14, dans lequel l'unité de commande (278) est détachable du dispositif de blocage (254).
16. Système de transfert selon l'une quelconque des revendications 1 à 9, dans lequel les moyens de couplage comprennent au moins une courroie (172) avec une première extrémité et une seconde extrémité, la première extrémité de la courroie (172) étant fixée à la bobine (175) et la seconde extrémité de la courroie étant fixée au dispositif de blocage (194).

17. Système de transfert selon la revendication 16, dans lequel la au moins une courroie (172) est composée de deux courroies fixées aux deux bobines (175) qui sont espacées.
18. Système de transfert selon la revendication 16 ou la revendication 17, dans lequel le treuil (138) est motorisé.
19. Système de transfert selon la revendication 16 ou la revendication 17, dans lequel le treuil (138) est actionné manuellement.
20. Système de transfert selon l'une quelconque des revendications précédentes, comprenant en outre une tige (192) qui coopère avec le dispositif de blocage (194, 254) pour maintenir le drap de transfert (190).
21. Système de transfert selon la revendication 20, dans lequel la tige (192) est attachée au dispositif de blocage (194, 254).
22. Système de transfert selon la revendication 20 ou la revendication 21 lorsqu'elle dépend de l'une quelconque des revendications 5 à 7 ou 9, dans lequel la tige (192) peut être positionnée à proximité des surfaces intérieures des premier et second éléments (206, 208) dans la cavité (212) formée entre eux.
23. Système de blocage selon la revendication 22, dans lequel la tige (192) a un diamètre et dans lequel le diamètre de la tige (192) est inférieur à une distance situé entre le second bord du premier élément (206) et le second bord du second élément (208).
24. Procédé permettant de transférer un patient allongé sur un drap de transfert (190) entre une première surface horizontale et une seconde surface horizontale, le procédé comprenant les étapes consistant à prévoir un treuil (138, 250) et une première bobine (175) en communication mécanique avec ledit treuil (138, 250), coupler la première bobine (175) à un dispositif de blocage (194, 254), le dispositif de blocage (194, 254) étant doté d'un ensemble d'élément de retenue comprenant une première partie (206) et une seconde partie (208) fixée à la première partie pour former une cavité (198, 212) entre elles, fixer un drap de transfert (190) sur le dispositif de blocage (194, 254) en plaçant une partie du drap de transfert (190) dans la cavité (198, 212) et actionner le treuil (138, 250) pour provoquer l'application d'une force de transfert sur le dispositif de blocage (194, 254) et par conséquent le retrait du drap de transfert (190) par le drap de transfert (190) et d'un patient sur celui-ci, **caractérisé en ce**
- que** le dispositif de blocage comprend un élément de fermeture (200, 202, 214) amovible raccordé de manière articulée à l'ensemble d'élément de retenue au niveau de l'ouverture de la cavité (198, 212), l'étape de fixation comprenant une étape consistant à fixer la partie du drap de transfert (190) dans la cavité (198, 212) avec l'élément de fermeture (200, 202, 214) au niveau de l'ouverture de la cavité (198, 212) pour retenir de manière amovible la partie du drap de transfert (190) dans la cavité (198, 212).
25. Procédé selon la revendication 24, dans lequel les première et seconde parties comprennent des premier et second éléments (206, 208), chaque élément avec un premier et un second bord, le premier bord du premier élément (206) étant disposé de manière fonctionnelle à proximité du premier bord du second élément (208), le second bord du premier élément (206) étant espacé du second bord du second élément (208) définissant ainsi l'ouverture de la cavité, dans lequel l'étape de fixation comprend l'étape consistant à insérer au moins une partie du drap à l'intérieur du dispositif de blocage (194, 254) en prévoyant une tige allongée (192) ayant un diamètre plus petit que l'ouverture de la cavité et en pliant au moins une partie du drap (190) autour de la tige (192), de sorte qu'au moins un pli est formé autour de la tige (192) avec au moins une extrémité libre du drap (190) s'étendant à partir de la tige (192), insérer la tige (192) et au moins un pli à l'intérieur de la cavité du dispositif de blocage (194, 254), et dans lequel l'étape consistant à exercer la force de transfert force l'élément de fermeture (200, 202, 214) contre l'un ou l'autre des premier et second éléments (206, 208) pour fixer et bloquer de manière inversée la au moins une partie du drap (190) à l'intérieur du dispositif de blocage (194, 254).
26. Procédé selon la revendication 25, dans lequel l'étape consistant à prévoir une tige (192) comprend en outre l'étape consistant à disposer la tige (192) à proximité du patient de sorte que la tige enveloppée (192) peut être disposée à l'intérieur du dispositif de blocage (194, 254) et de sorte que le dispositif de blocage (194, 254) est disposé à proximité du patient lorsque la tige enveloppée (192) est disposée à l'intérieur du dispositif de blocage (194, 254).
27. Procédé selon la revendication 24, dans lequel le dispositif de blocage (194, 254) a un axe longitudinal, la première partie comprend un premier élément (206) allongé sensiblement rigide avec une longueur, une surface extérieure, une surface intérieure, un premier bord, un second bord, le premier élément (206) ayant une section transversale généralement incurvée vers l'extérieur pour au moins

une partie des surfaces extérieure et intérieure, la
seconde partie comprend un second élément (208)
allongé sensiblement rigide avec une longueur, une
surface extérieure, une surface intérieure, un pre-
mier bord et un second bord, le second élément 5
(208) ayant une section transversale généralement
incurvée vers l'extérieur pour au moins une partie
des surfaces extérieure et intérieure, le premier
bord du premier élément (206) étant en juxtaposi- 10
tion par rapport au premier bord du second élément
(208), le second bord du premier élément (206)
étant espacé du second bord du second élément
(208), et la surface intérieure du premier élément
(206) faisant face à la surface intérieure du second 15
élément (208), et l'élément de fermeture comprend
un troisième élément (200, 202, 214) sensiblement
rigide avec une première surface, une seconde sur-
face, une longueur, un premier bord et un second
bord, le troisième élément (200, 202, 214) étant fixé 20
de manière pivotante à proximité du second bord
du premier élément (206), le premier bord du troi-
sième élément (200, 202, 214) à proximité de la sur-
face intérieure du second élément (208) dans une
position fermée et pouvant pivoter à distance de la 25
surface intérieure du second élément (208) dans
une position ouverte, l'étape de fixation comprenant
l'étape consistant à faire pivoter le troisième élé-
ment (200, 202, 214) du dispositif de blocage (194,
254) dans la position ouverte, placer une partie du 30
drap (190) à l'intérieur du dispositif de blocage (194,
254), et mettre en prise le troisième élément (200,
202, 214) avec au moins une surface du drap (190),
le drap étant en contact de frottement avec le pre-
mier bord du troisième élément (214) et la surface 35
intérieure du second élément (208).

- 28.** Procédé selon la revendication 24 ou la revendica-
tion 27, dans lequel on utilise un dispositif d'accro-
chage pour aider à fixer le drap de transfert (190)
au dispositif de blocage (194). 40

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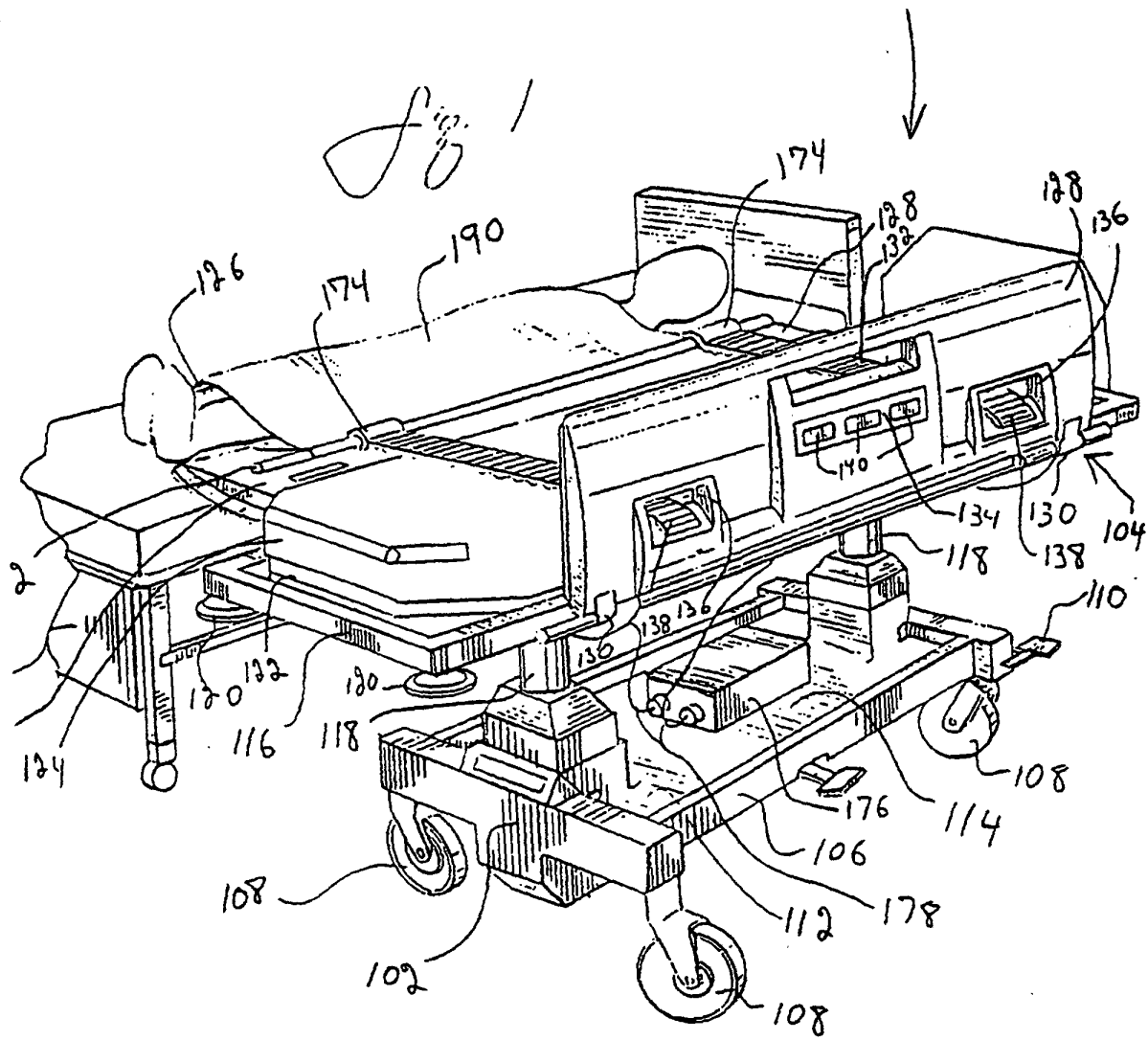


Fig. 2

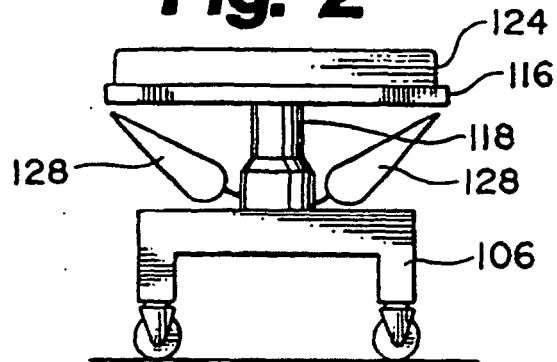


Fig. 3

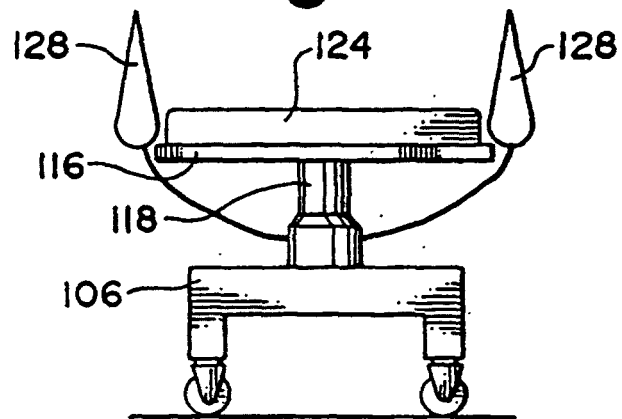


Fig. 4

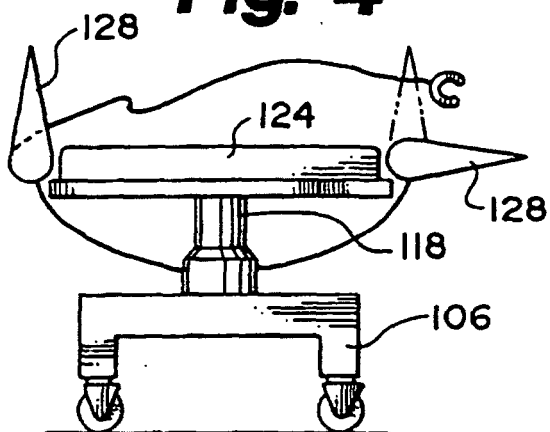


Fig. 5

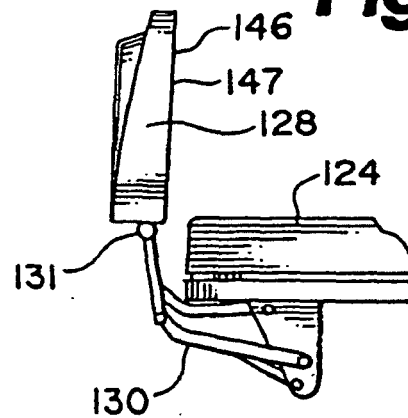
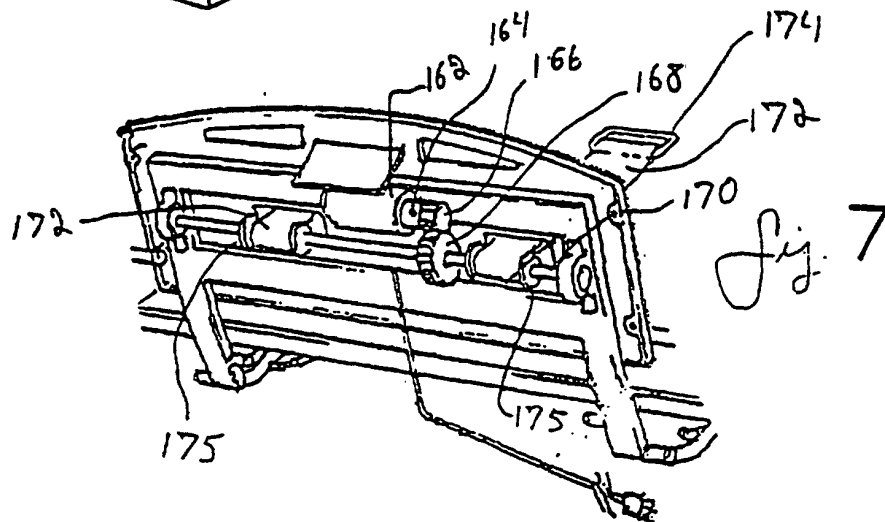
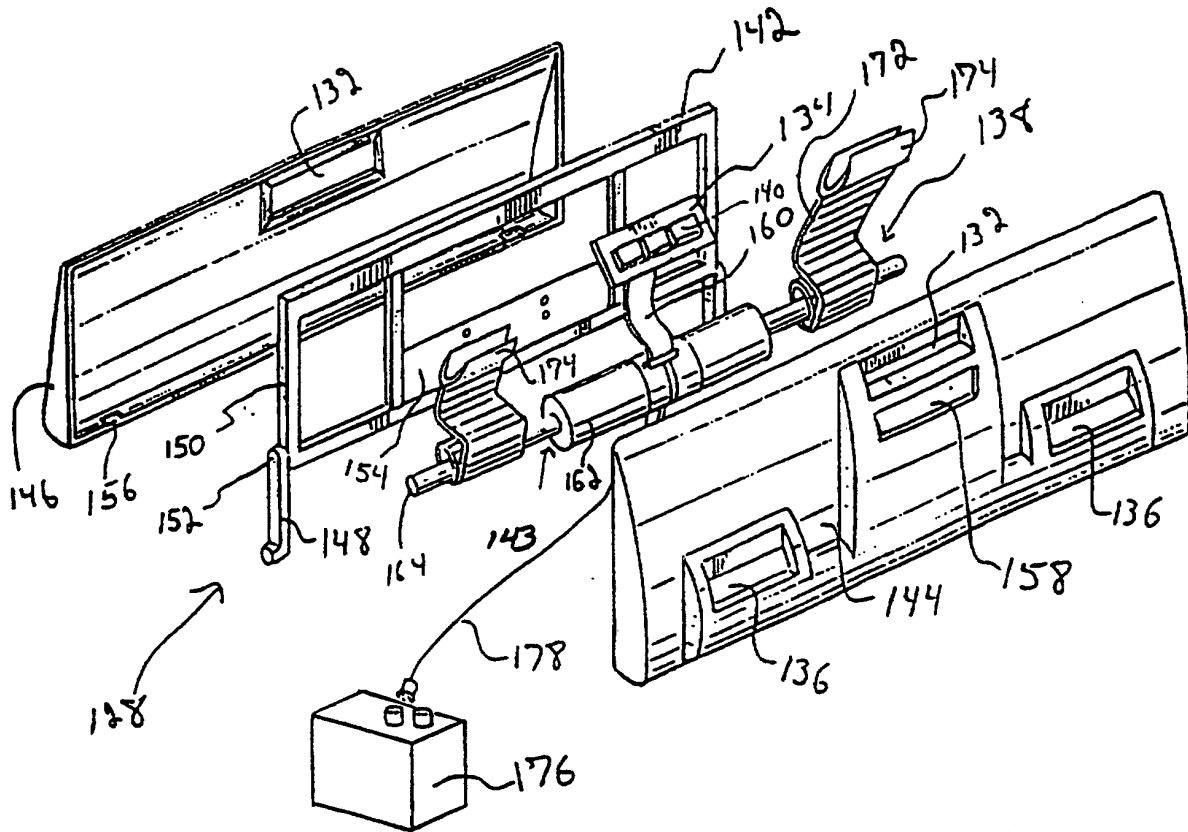
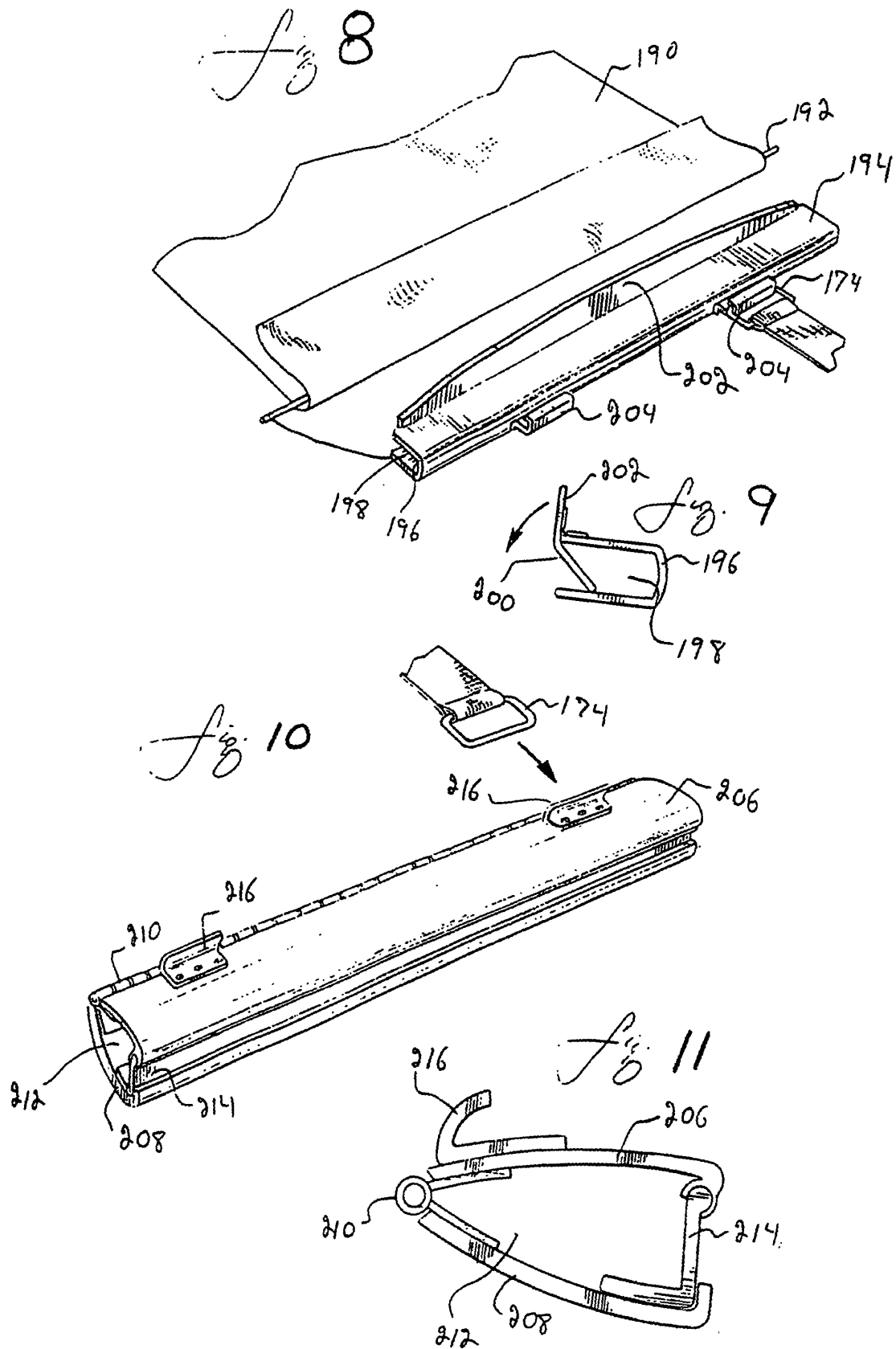
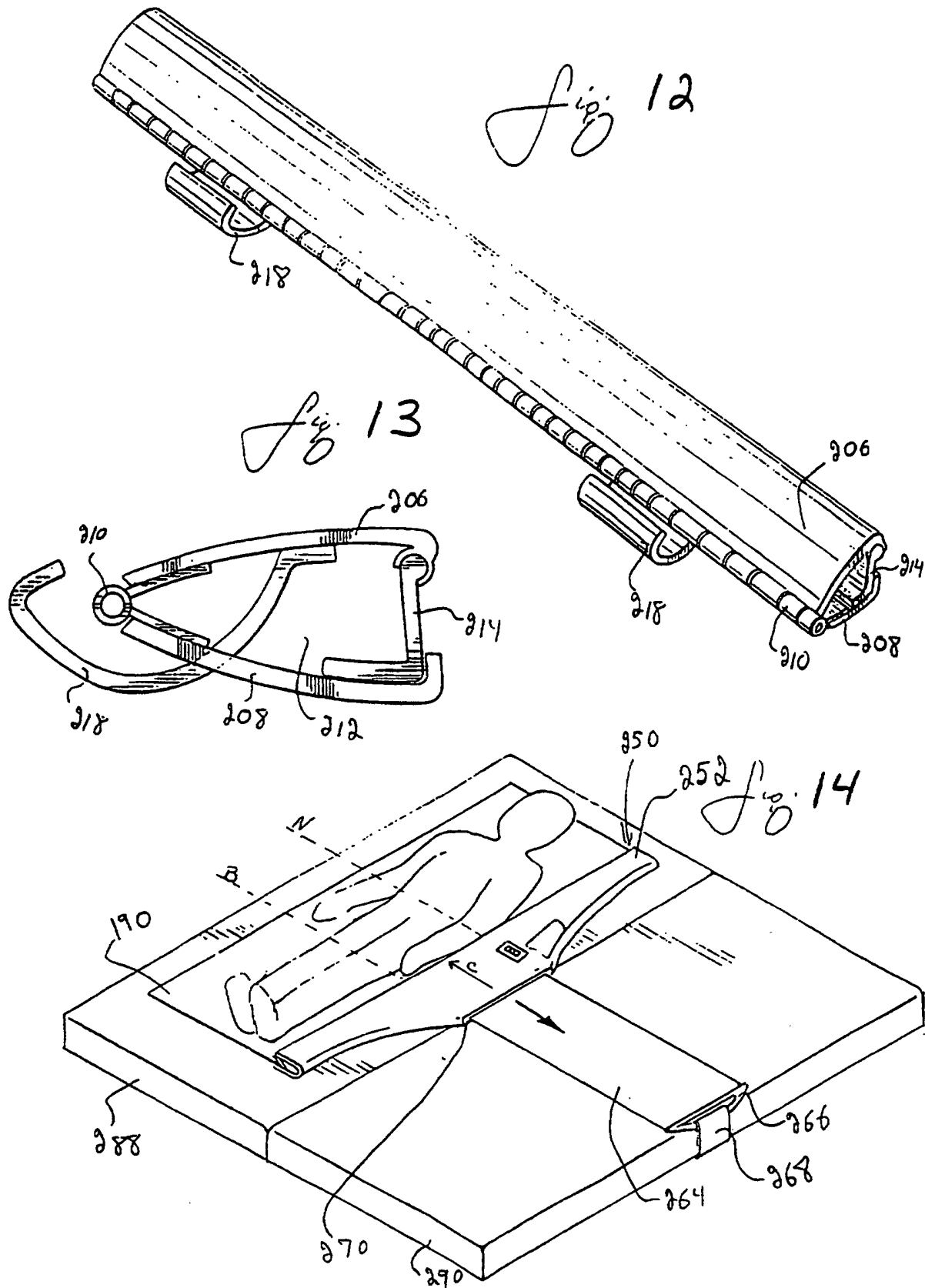
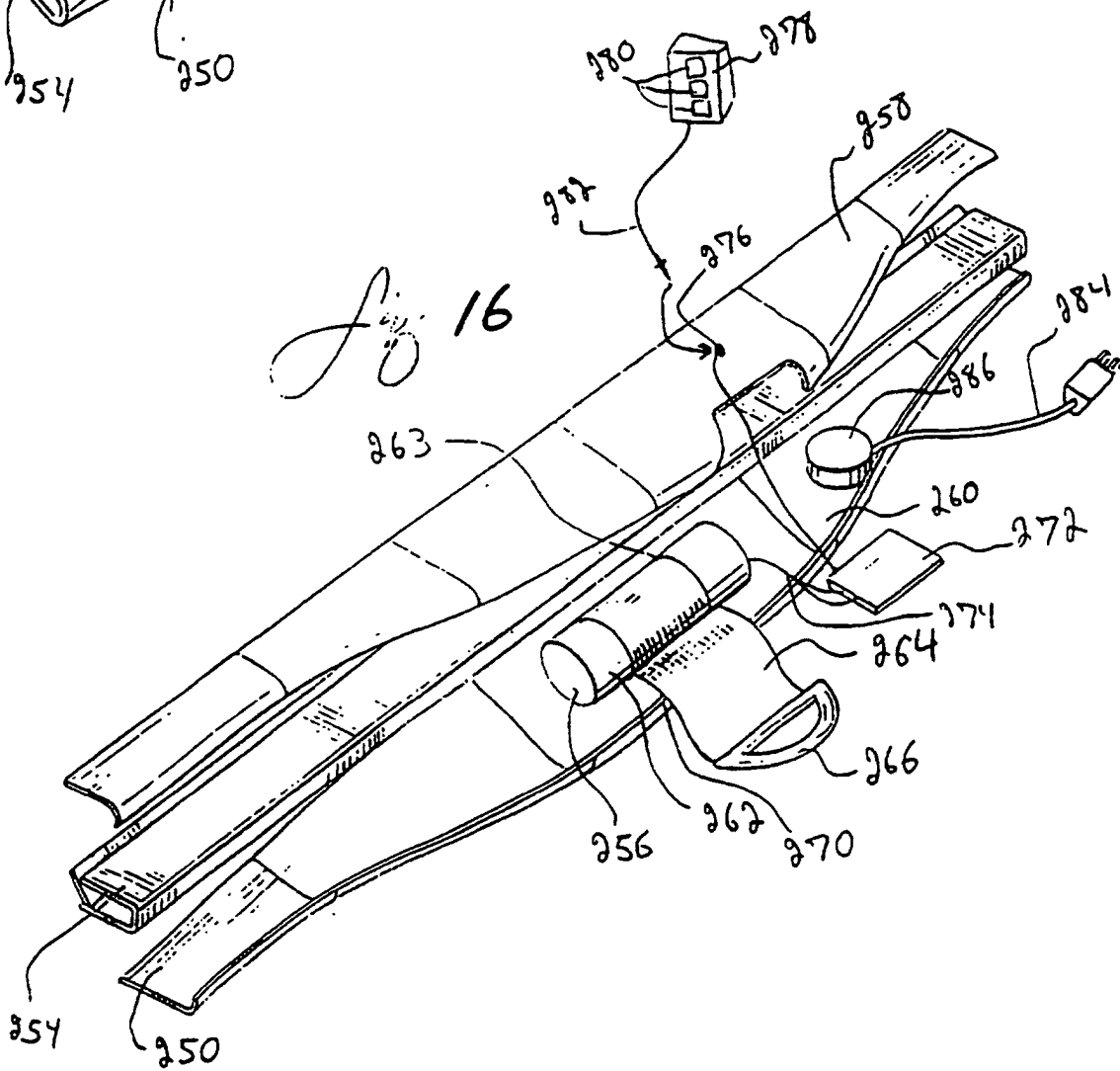
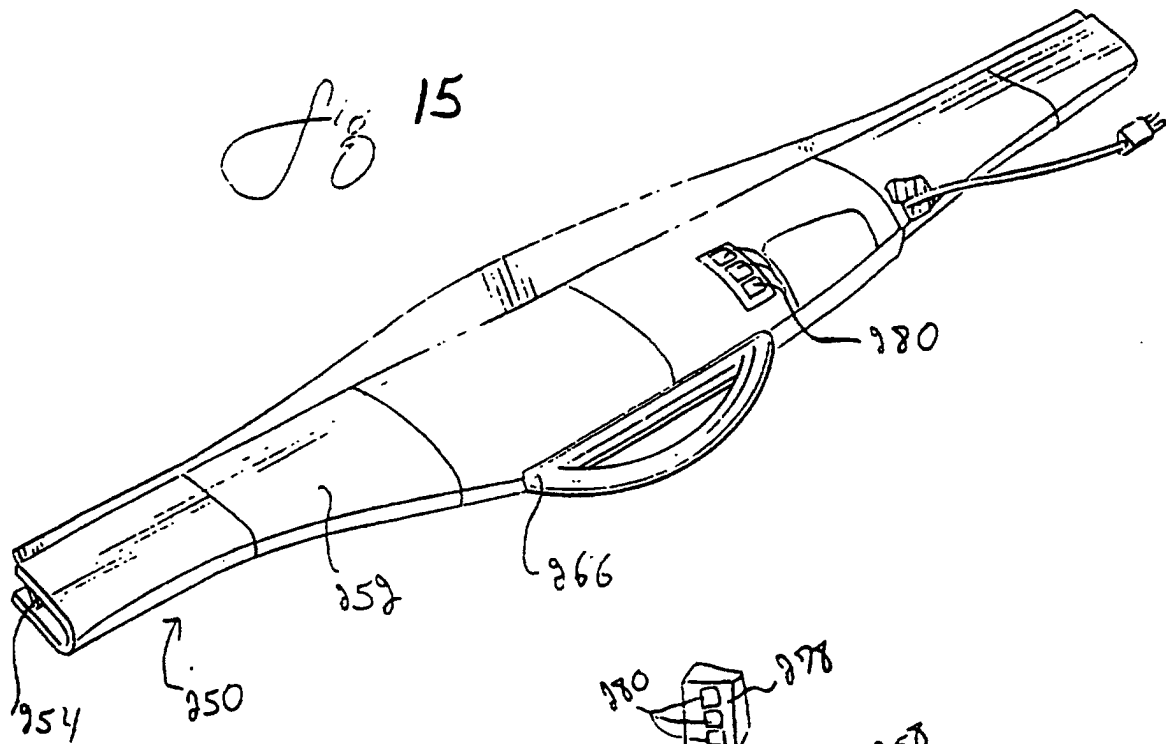


Fig. 6









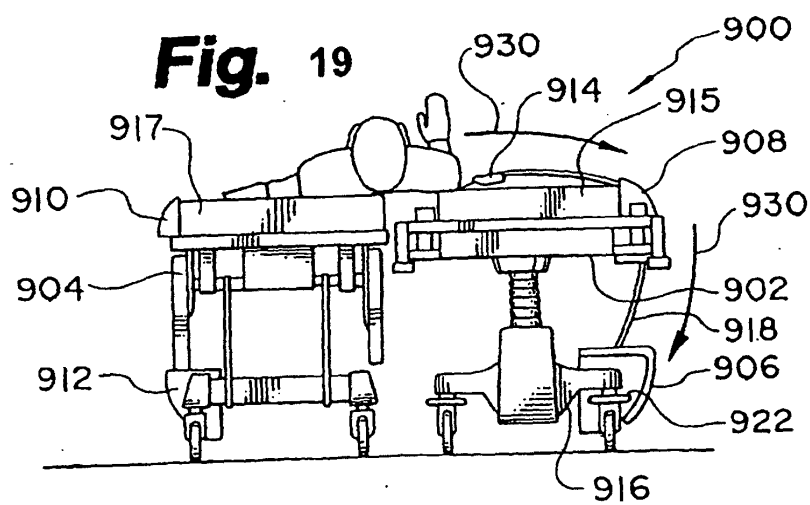
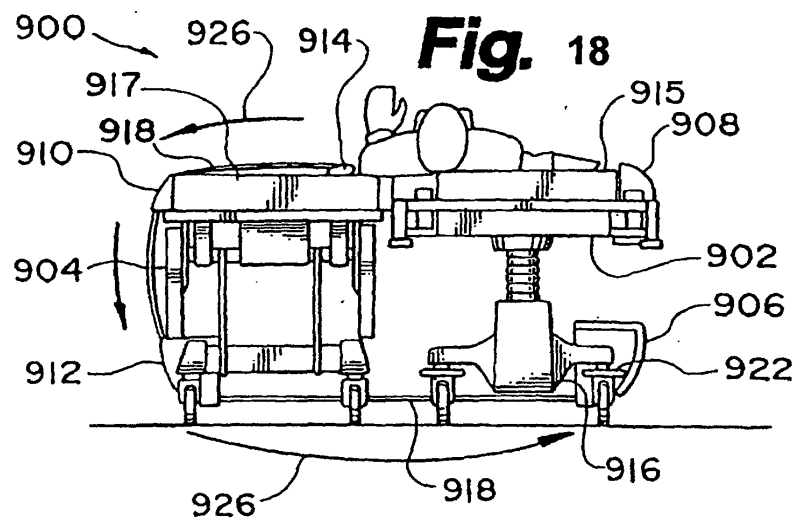
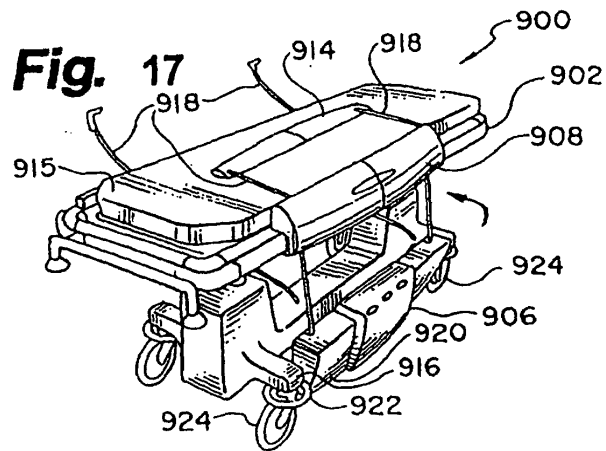


Fig. 20

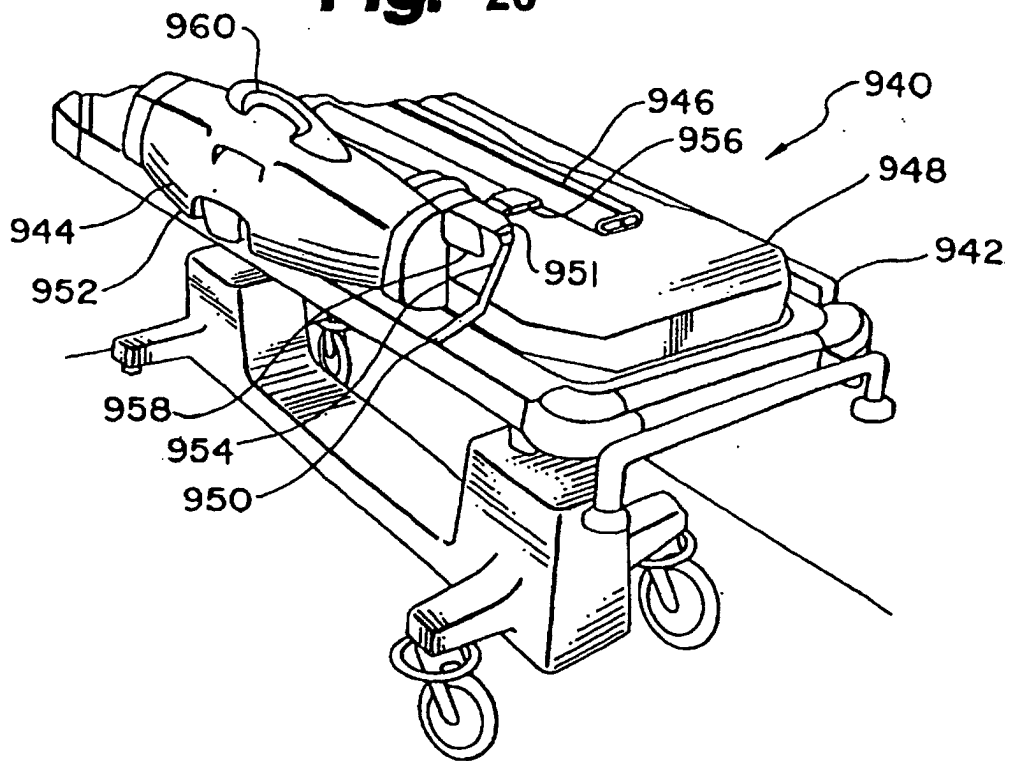


Fig. 21

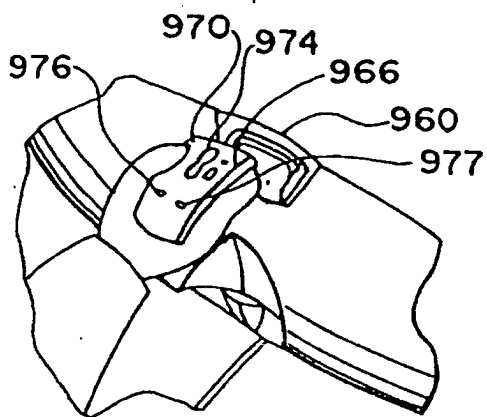


Fig. 22

