June 6, 1944. C. E. DIVINE 2,350,595

APPARATUS FOR LIFTING AND TURNING INVALIDS IN BED

Filed July 12, 1941 2 Sheets-Sheet 1

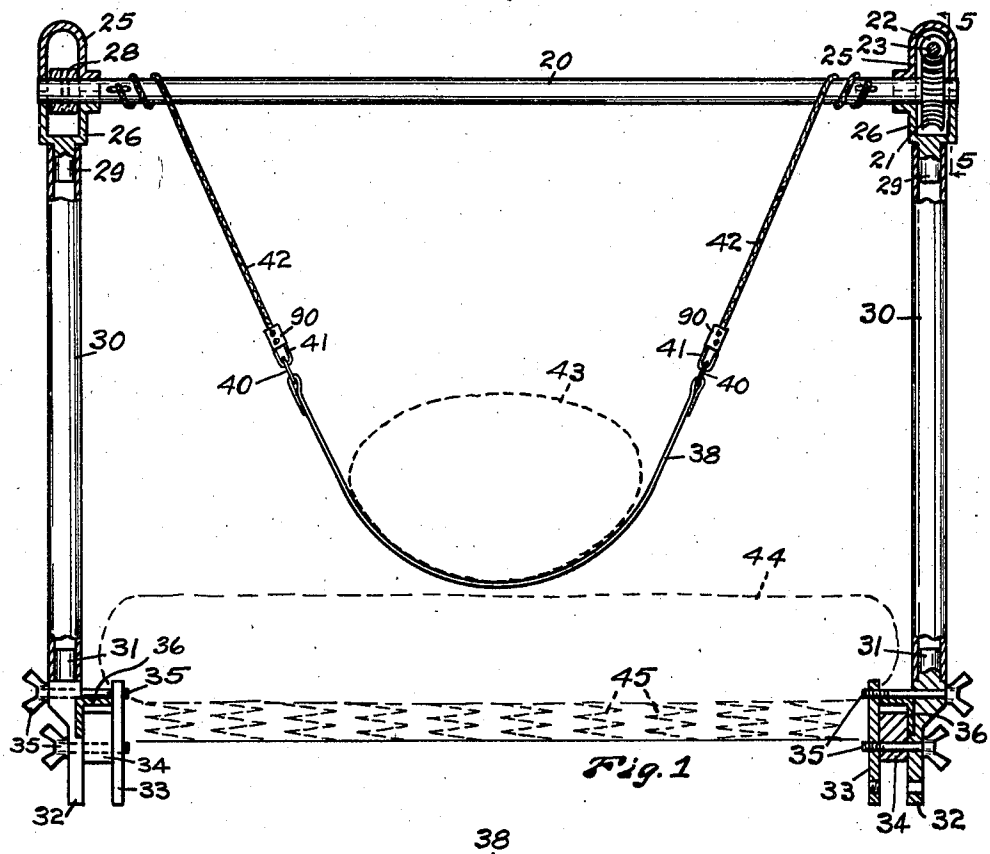


Fig. 1

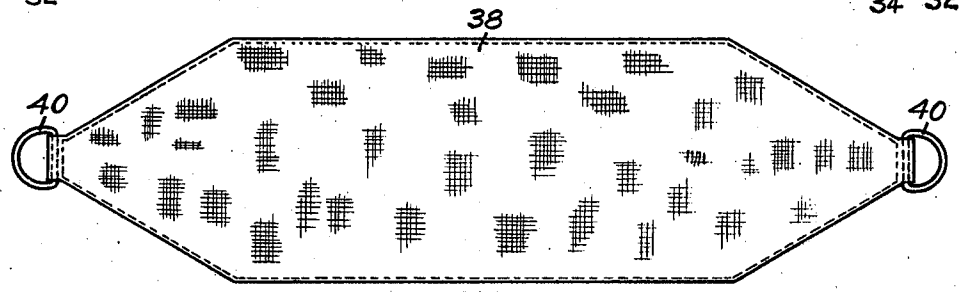


Fig. 2

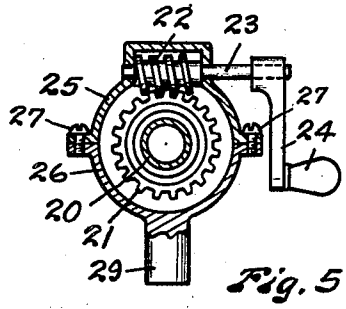


Fig. 5

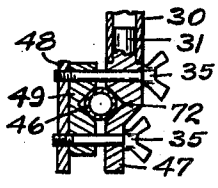


Fig. 4

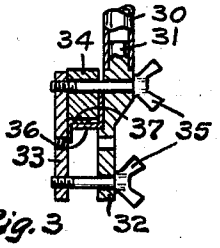


Fig. 3

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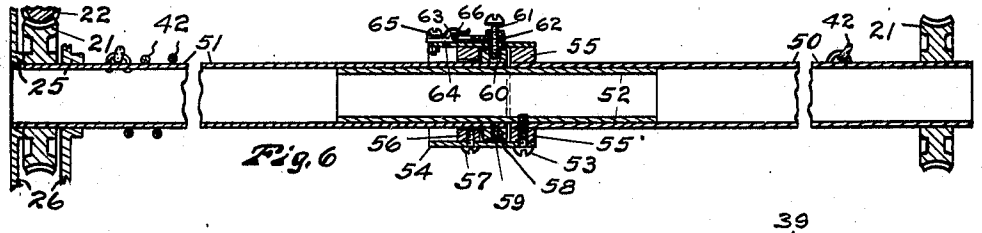


Fig. 6

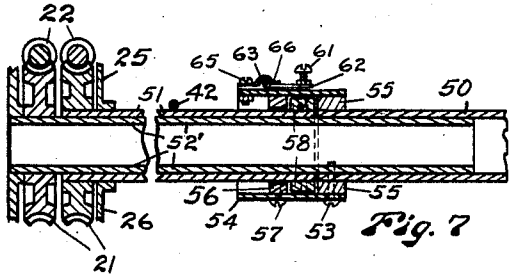


Fig. 7

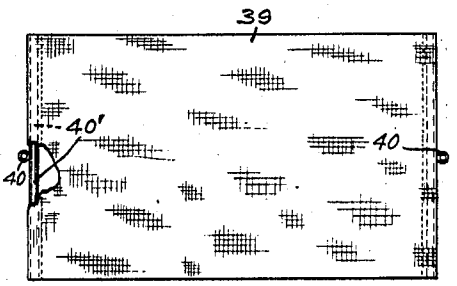


Fig. 9

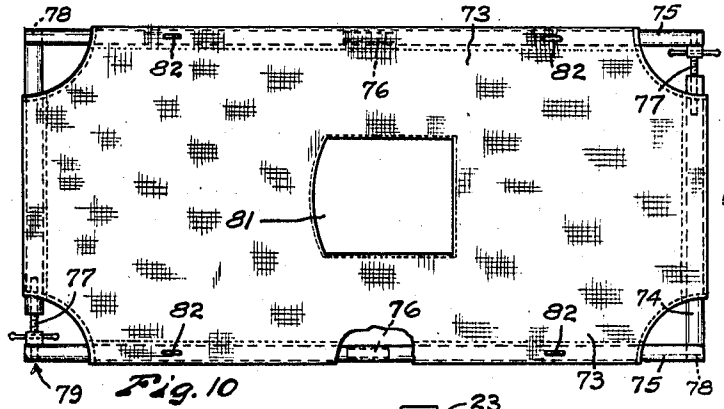


Fig. 10

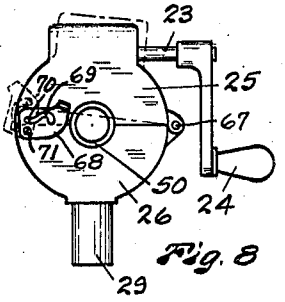


Fig. 8

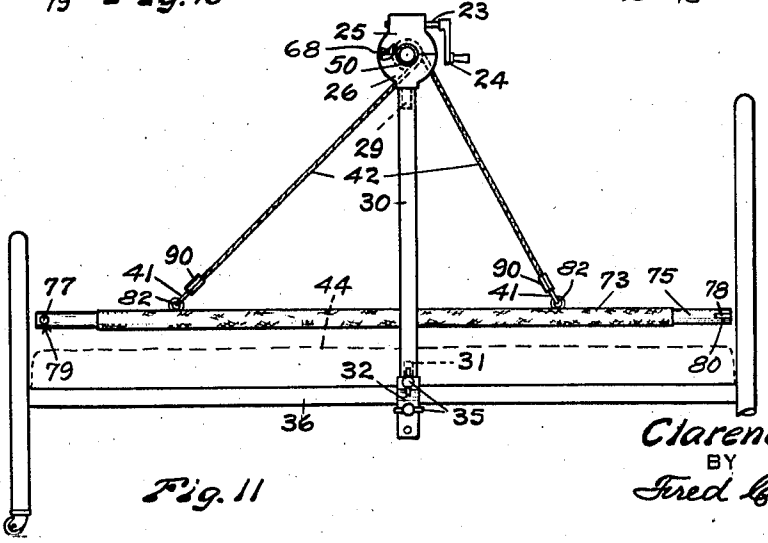


Fig. 11

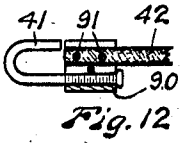


Fig. 12

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APPARATUS FOR LIFTING AND TURNING INVALIDS IN BED

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Application July 12, 1941, Serial No. 402,068

3 Claims. (Cl. 5—88)

This invention relates to apparatus for lifting and turning an invalid in bed.

An object of this invention is to provide a device of this nature which is strong and simple in construction, easy to set up or apply to a bed, easy to operate and efficient and reliable in operation.

Another object of this invention is to provide a light weight collapsible invalid lifter and turner which can be quickly and easily taken down and folded into a compact package for handling and storage and shipment.

Another object is to provide apparatus for lifting or turning an invalid in bed, which apparatus makes it possible for one person, such as a nurse, to easily and gently lift or turn a heavy person with the expenditure of a small amount of energy.

Another object is to provide apparatus of this nature comprising pliable sling means arranged to be slipped under a patient and independently controlled power step-up means connected with each end of said sling for independently lifting or lowering either end portion of the sling to turn the patient.

Another object is to provide apparatus of this nature comprising sling lifting means that is self locking and that makes it substantially impossible to drop a patient on the bed after the patient has been lifted.

Another object is to provide a device of this nature having simple and efficient and readily detachable means for supporting the device from the side rails of a bed.

Other objects will be apparent from the following description taken in connection with the accompanying drawings.

In the drawings, Fig. 1 is a view partly in section and partly in elevation of an invalid lifter and turner constructed in accordance with my invention, showing the same attached to a bed, the bed shown partly in section and partly by broken lines.

Fig. 2 is a plan view of a sling member to be used in raising a portion of the body of a patient.

Fig. 3 is a fragmentary sectional view showing the bed rail clamping means clamped to a bed in which the angle bar side rail is in a different position from the side rail shown in Fig. 1.

Fig. 4 is a detached view partly in section and partly in elevation of bed rail clamping means adapted to clamp onto a cylindrical bed rail.

Fig. 5 is a view partly in section and partly in elevation substantially on broken line 5—5 of Fig. 1, showing a housing and worm gear means on a larger scale than Fig. 1.

Fig. 6 is a fragmentary sectional view with parts in elevation showing a winding or lifting tube device of two part construction with worm gear means at both ends thereof.

Fig. 7 is a fragmentary sectional view with parts in elevation of a double tube winding device similar to the one shown in Fig. 6, except that the two worm devices thereof are positioned at one end so that both may be operated from the same side of the bed.

Fig. 8 is a side elevation of one of the worm gear devices used in Figs. 6 and 7, showing cam means for locking two housing parts in two positions to maintain the worm and worm gear therein in meshed relation or unmeshed relation.

Fig. 9 is a plan view of a sling member to be used in turning a patient and which is particularly adapted for use with the winding tube device shown in Figs. 6 and 7, and may also be used with the winding tube device shown in Fig. 1.

Fig. 10 is a plan view of a rectangular sling long enough to support an adult patient from head to foot and comprising a fabric sling supported on a rigid but demountable frame.

Fig. 11 is a side elevation of my device attached to a bed and supporting the sling member shown in Fig. 10.

Fig. 12 is a detached view partly in elevation and partly in section showing a hook used on the end of a lifting cable.

Like reference numerals designate like parts throughout the several views.

Figs. 1 to 5 show a device constructed in accordance with my invention and comprising a rotatively mounted horizontal cylindrical member 20 of tubular construction, herein referred to as a winding tube, and adapted to have winding cables wound thereon. One end portion of the winding tube 20 has a worm wheel 21 secured thereon. A worm 22 meshes with the worm wheel 21. The worm 22 is mounted on a shaft 23 that has a crank 24 secured thereon for turning said worm. The worm 22 and worm wheel 21 constitute self locking power step-up means by which the winding tube 20 may be easily rotated. The worm 22 and worm wheel 21, being self locking, will always hold the patient in any position in which he is allowed to come to rest irrespective of the load on the winding cables 42 that support the patient.

The supporting devices at the two end portions of the winding tube 20 are of duplicate construction and the same numerals apply to like parts at the two sides of the apparatus.

Each supporting device comprises a housing

formed of an upper portion 25 and lower portion 26. In Fig. 5, I show these two housing parts as secured together by screws 27. In Fig. 8, I show similar housing parts hinged together at one side and connected by readily releasable cam means adapted to hold the upper housing part in two different positions.

In the structure shown in Fig. 1, the worm wheel 21 and worm 22 are disposed within the housing parts 25—26 shown at the right and a collar 28 on the winding tube 20 is disposed within the corresponding housing parts shown at the left. The housings 25—26 form bearings for the two end portions of the winding tube 20.

Each lower housing member has a cylindrical shank 29 that fits telescopically and removably within an upright supporting tube 30.

The lower end portion of each upright supporting tube 30 fits telescopically and removably over a cylindrical shank 31 on a bed rail clamping plate 32. An instantly demountable slip joint coupling is thus formed at each end of each upright support 30.

The clamping plate 32 is adapted to cooperate with another clamping plate 33 and with a block 34 and hand screws 35 to securely clamp onto the side rail 36 of a bed, the side rail 36 in this instance being an angle bar. It is to be noted that the angle bar bed rail 36 will be positioned as shown in Fig. 1, in some beds and will be positioned as shown in Fig. 3, in other beds. However the same bed rail clamping parts are used in both instances.

The block 34 fits within the angle bar 36 and between the clamping plates 32 and 33 and cooperates with said plates and with the hand screws 35 to provide a clamping means that will clamp the angle bar 36 firmly and hold the upright supports 30 in a vertical position.

In the structure shown in Fig. 3, the block 34 is inverted as respects the showing in Fig. 1. Also the Fig. 3 disclosure shows the angle shaped side rail 37 of a bed spring as resting on the angle bar bed rail 36 and positioned between the two clamp plates 32 and 33. These clamp plates 32 and 33 can also be clamped onto a bed rail of square, rectangular or channel shaped cross section by omitting the block 34 entirely.

Fig. 4 shows modified clamp means of a type adapted to clamp onto a bed rail of cylindrical or oval or any rounded shape. This means comprises modified clamping members 47 and 48 and block 49. Notches 72 of V shape are provided in clamp 47 and block 49.

The bed rail structure of Fig. 1 is a type commonly used in hospital beds while the structure shown in Figs. 3 and 4 are types commonly found in home beds.

A sling 38, preferably formed of fabric such as drill or canvas, is shown in plan in Fig. 2, and an edge view of the same is shown in an operative position in Fig. 1. Also a sling 39 which can be used with the Fig. 1 device is shown in plan in Fig. 9. The sling 38, Fig. 2, is preferably about three feet long and from ten to fifteen inches wide. It is tapered at each end and provided at each end with a ring 40. In use this sling is positioned under the upper hip and waist portion of a patient and this portion of the body raised enough to facilitate the use of a bed pan. The sling 39, Fig. 9, preferably has a rigid bar 40' in each end.

Two flexible cables 42 are fixedly secured to the winding tube 20 and connected by readily releasable means, such as hooks 41, with the rings 40. A preferred hook 41 for this use is shown in Fig. 12, but obviously any readily releasable hook or snap may be used. The hook 41, shown in Fig. 12, has a longer shank portion that fits rotatively in a sleeve 90. Preferably cable 42 is a strong piece of braided sash cord and this can be firmly secured within sleeve 90 by inserting one or more screws 91 through the sleeve 90 and cable 42. This serves to clamp the cable 42 as well as holding it by passing the screws therethrough. Hook 41 can be turned sidewise from the position shown in Fig. 12 to engage it with one of the rings or eye members of the slings and after being so engaged may be turned back into the position shown in Fig. 1 to prevent it from becoming unhooked.

In Fig. 1, I have indicated by dot and dash lines a patient's body 43 supported in the sling 38 in a slightly elevated position above bedding and mattress 44 that rests on a bed spring 45.

The worm 22 and worm wheel 21 provide efficient power step-up means by which any portion of the body or all of the body of a patient may be easily and gently raised any desired amount and comfortably supported in a raised position for any desired length of time, due to the action of the self locking worms, and then easily and gently lowered onto the bed. This makes it easy for any nurse to handle even the heaviest patients irrespective of the strength of the nurse.

In some instances, such for example as when turning a patient by the use of the sling shown in Fig. 9, it may be desirable to have independent control of the winding and unwinding of the two lifting cables that are connected with opposite end portions of the sling member. Figs. 6 and 7 show two different winding tube devices for providing such independent control.

In Fig. 6, 50 and 51 are two winding tubes supported in end to end alignment and independently rotatable except when they are locked together, 52 is a short tube secured by screws 53 to the tube 50 and extending telescopically into the tube 51. A short tubular housing member 54 is provided around the tubes 50 and 51 at the location where their two ends come together. A spacing ring 55 is interposed between the housing member 54 and tube 50 and the screws 53 extend through the housing member 54, spacing ring 55 and tubes 50 and 52 and rigidly secure all of these parts together. A latch ring 58 is positioned between tube 51 and housing 54 and secured by one or more set screws 59 to the tube 51. A plurality of radial holes 60 are provided in the latch ring 58 for the reception of a latch bolt 61. The latch bolt 61 is carried by a member 62 that is secured by a pivot 63 to another member 64. The member 64 and a flat spring 66 which rests thereon are secured to the housing 54 by a bolt 65. The spring 66 yieldingly engages the member 62 and normally holds the latch member 61 in latched position thereby locking the two winding tubes 50 and 51 together so that they will rotate as a unit. When the latch member 61 is withdrawn from the holes 60 the two winding tubes 50 and 51 are free so that they may be rotated independently of each other.

A stop ring 56 is secured by screws 57 within the housing member 54 on the side of the latch ring 58 opposite from the spacer ring 55. This provides a structure in which the stop ring 56 cooperates with the latch ring 58 to prevent endwise displacement or pulling apart of the two winding tubes 50 and 51.

The respective outer end portions of each tube 50 and 51 are connected with worm gear means similar to that hereinbefore described and in which the parts thereof are correspondingly numbered. The housings for these worm gears are similar to housings 25—26 except that the two parts thereof are connected with each other, at one side, by hinge means 67 and a cam plate 68 is secured to one housing member 26 by a pivot 71. The cam plate 65 is provided with a cam slot 69 to receive a pin 70 on the other housing member 25. When the cam plate 68 is in the position shown by full lines in Fig. 8, the two housing members will be securely locked together and the worm therein will be held in operative mesh with its worm wheel. When the cam plate 68 is in the position shown by broken lines in Fig. 8, the two housing members will be held apart and the worm and worm wheel therein will be out of mesh.

It is desirable to be able to hold the worm and worm wheel at one end of the two part winding tube 50—51 out of mesh, as above described, so that said two part winding tube, when the two parts thereof are locked together, may be rotated as a unit by one worm and one worm wheel and thus operated in the same manner as the device of Fig. 1.

The device shown in Fig. 7, is similar to the device shown in Fig. 6, except that an inside shaft 52', which corresponds to shaft 52 of Fig. 6, is made long enough to extend beyond the end portion of the shaft 51 and has a worm wheel 21 secured thereto. This makes it possible to operate the two worm gear devices which control the shafts 50 and 51 from one side of the bed.

The devices having two part winding tubes with an independent worm gear control for each tube, as shown in Figs. 6 and 7, are particularly well adapted for use with the sling 39 of Fig. 9, for turning a patient in bed. When thus used, the sling 39 which is preferably from two to three feet wide and from three to four feet long, is slipped under a patient and connected with the flexible cables 42. The cables 42 and sling 39 are then wound taut so as to support at least the major portion of the weight of the patient in the sling. The two worm means are then reversely operated or are operated at different speeds or one worm is operated while the other is immovable. This turns the patient gently and slowly in the sling. The latch bolt is disengaged while one worm is being operated independently of the other.

Obviously the patient can be lifted in the sling 39, without turning in substantially the same manner as in the sling 38.

Figs. 10 and 11 show a sling long enough to support the body of a patient from head to foot together with cable means, for use in connection with the winding device of Fig. 1, or Fig. 6, or Fig. 7, to lift said sling.

The sling 73, shown in Fig. 10, is supported on a rectangular frame comprising end bars 74 and side bars 75. The side bars 75 are of two piece construction telescopically and detachably connected by slip joint means 76 thereby making it possible to collapse said side bars into a compact package when the sling is folded.

Each end bar has expansion screw means 77 at one end and has tongue means 78 at the other end. The expansion screws 77 each fit into a hole 79 in a side rail and thread into an end rail. The tongue members 78 each fit into a notch 80 in the end of a side rail. The expansion screws 77 provide means for stretching the canvas or drill sling member 73 transversely of the frame to keep it taut. An opening 81 is provided in the central portion of the sling member 73.

Each side bar 75 has two eye members 82 connected therewith a short distance from the ends of the side rails for the reception of hooks 41 on the end portions of lifting cables 42. Four lifting cables 42 are provided two at each side of the sling. Each lifting cable is secured to its winding tube. All of the cables are wound in the same direction on the winding tube so that when said winding tube is rotated in one direction all of said cables will be wound up and when said winding tube is rotated in the other direction all of said cables will be unwound. This provides for raising or lowering the sling of Fig. 10 and, at the same time, keeping it horizontal.

All of the tubular members used in this device are preferably of light strong material thereby reducing weight and making the device easy to set up and take down and easy to carry around. The cables 42 may be wound in either direction on the winding tubes depending on how the operator desires to operate the cranks 24 in lifting the patient.

The operation of this device is believed to be clear from the foregoing description. If a portion of the body of a patient is to be raised, such for instance as the hip portion, then the sling 38 of Fig. 2 may be used. This sling may be used with any winding tube means herein shown by operating the winding tube as one unit. If the patient is to be turned in bed then preferably the sling 39 shown in Fig. 9 will be used with one of the two part winding tubes as shown either in Fig. 6 or Fig. 7. For thus turning a patient the two winding tubes 50 and 51 will ordinarily be operated independently of each other so that one end portion of the sling 39 may be raised or lowered independently of the other to roll the patient gently in the sling. If one of the slings 39 is not long enough to turn the patient entirely over then one sling may be used for a portion of the turn and a second sling placed on the bed so that the patient, in making the first part of the turn, will be turned onto the second sling thus allowing the second sling to be used to complete the turn.

The screw 65 preferably allows the hinge means 62—65 to be turned sidewise far enough when the bolt member is withdrawn from the recess 60 so that said bolt member will rest on the housing 54 and be held in unlocked position until it is again manually replaced in one of the openings 60. This allows for free operation of the winding tubes 50 and 51 independently of each other. The self locking worm means always holds these tubes in any position in which they are allowed to come to rest.

If the entire body of a patient is to be lifted clear of the bed then the sling shown in Fig. 10 is used with any of the winding tube means herein disclosed and with the cable hook-up shown in Fig. 11. With the apparatus shown in Figs. 10 and 11 the patient can be maintained in a horizontal position above the bed to facilitate changing the bedding or for any other purpose. Also, if desired the sling shown in Figs. 10 and 11 can be held at an incline by properly adjusting the cables. For instance the foot portion of said sling may be elevated higher than the head portion thereof or the head portion may be elevated higher than the foot portion. To do this the length of the cables at one end of the sling would have to be adjusted before the sling was lifted. This might be done by giving the cables at one

end of the sling an additional turn around the lifting tube.

Either of the slings **38** or **39** may be used to lift and support the shoulder and trunk portions of a patient in an inclined position if desired. Also the slings **38** or **39** may be used to support one or both legs of the patient in an elevated position.

The slings, being made out of flexible and pliable fabric may be left under the patient in the bed without discomfort to the patient.

The foregoing description and accompanying drawings clearly disclose certain preferred embodiments of my invention but it will be understood that this disclosure is merely illustrative and that changes may be made within the scope and spirit of the following claims.

I claim:

1. A bed sling for handling an invalid in a bed comprising a winding tube formed of two independently rotatable parts having relatively telescopic portions that extend to a common location; means rotatively supporting said winding tube crosswise of the bed and in spaced relation above the bed; locking means operable to lock said two parts together for simultaneous rotation; two power step-up tube-rotating devices both positioned adjacent one end of said winding tube and respectively connected with the relatively telescopic portions of said two independently rotatable parts for selectively rotating either of said parts from one side of the bed; means for selectively rendering either of said tube rotating devices inoperative; an invalid sling; and a flexible lifting member connecting each part of said winding tube with one end portion of said sling.

2. A bed sling for handling an invalid in bed comprising a winding tube formed of two independently rotatable parts; means operable to lock said two winding tube parts together and to relatively unlock the same; bearing and support means rotatively supporting said two part winding tube crosswise of the bed and in spaced relation above the bed; two self locking worm devices operatively connected with said two independently rotatable winding tube parts respectively providing an independent power step up and tube rotating and locking means for each winding tube part; means adapted to selectively unmesh either of said self locking worm devices to thereby render said unmeshed worm device inoperative and provide for the operation of both of said winding tube parts when said parts are locked together by the other worm device; an invalid sling; and a flexible lifting member connecting each winding tube part with one end portion of said sling.

3. A bed sling for handling an invalid in a bed comprising a winding tube formed of a first winding tube part and a second winding tube part, said two winding tube parts being independently rotatable and of the same diameter and being positioned in end to end relation and extending crosswise of the bed in spaced relation above the bed; bearing means supporting said two winding tube parts; a tube of smaller diameter than said winding tube parts rigidly secured to said first winding tube part and rotatively disposed in said second winding tube part and protruding outwardly from the outer end portion of said second winding tube part; two independently operable self locking power step up worm devices operatively connected respectively with the outer end portion of said second winding tube part and with the outwardly protruding end portion of said tube of smaller diameter, said two worm devices being positioned adjacent to each other and at one side of the bed and providing for selective rotation of said first and said second winding tube part from one position; an invalid sling; and two flexible lifting members wound on said first and said second winding tube parts respectively and connected with the respective end portions of said sling.

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