July 12, 1966 E. L. FISCHER 3,259,922

LIFTING AND TRANSPORTING DEVICE

Filed Oct. 7, 1964 3 Sheets-Sheet 1

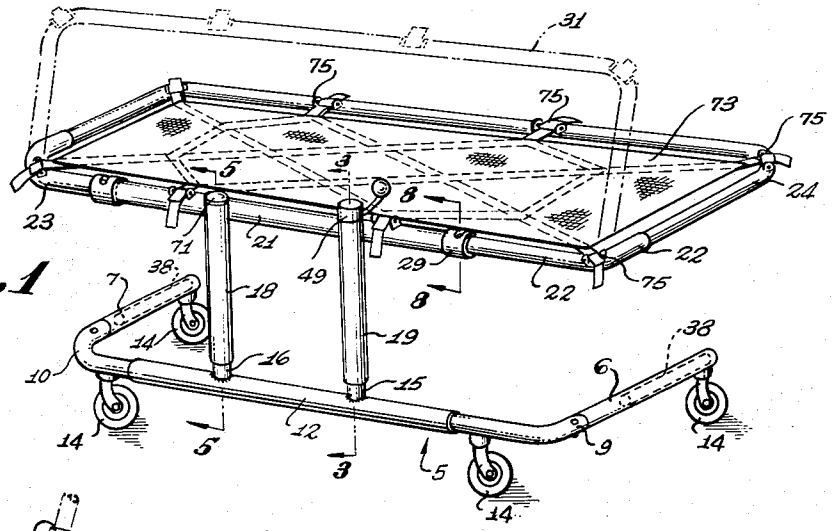


Fig. 1

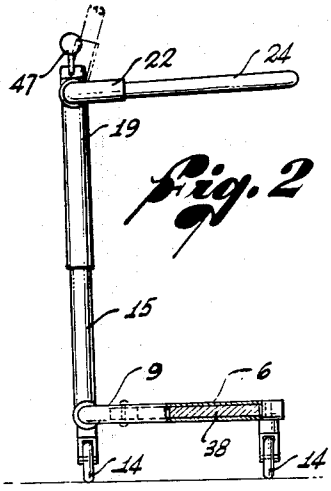


Fig. 2

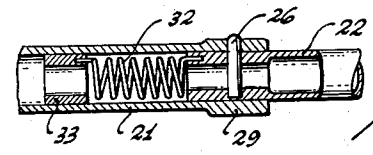


Fig. 6

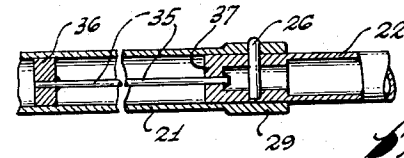


Fig. 7

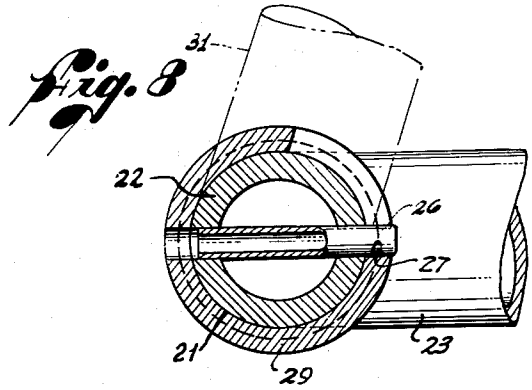


Fig. 8

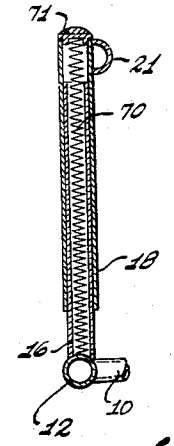


Fig. 5

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July 12, 1966 E. L. FISCHER 3,259,922

LIFTING AND TRANSPORTING DEVICE

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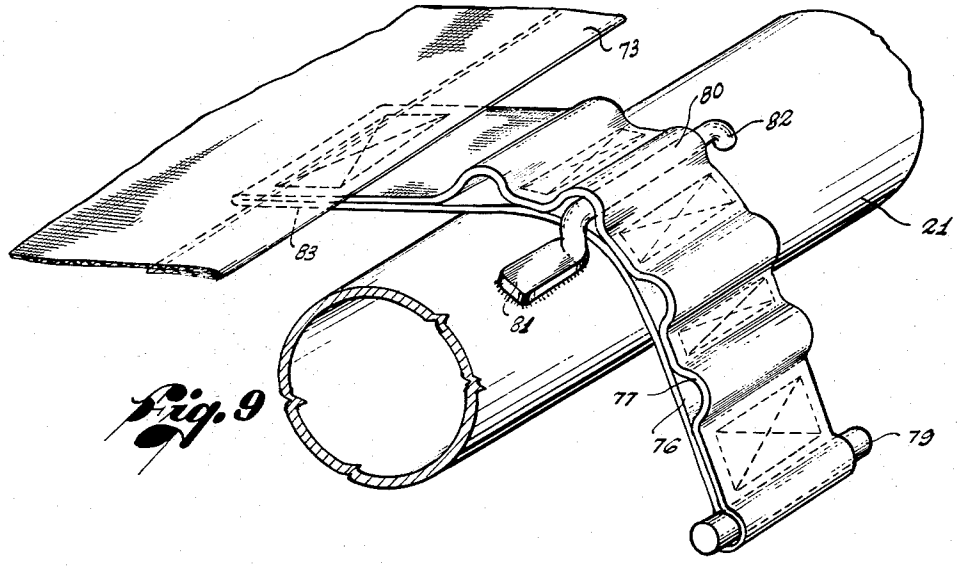


Fig. 9

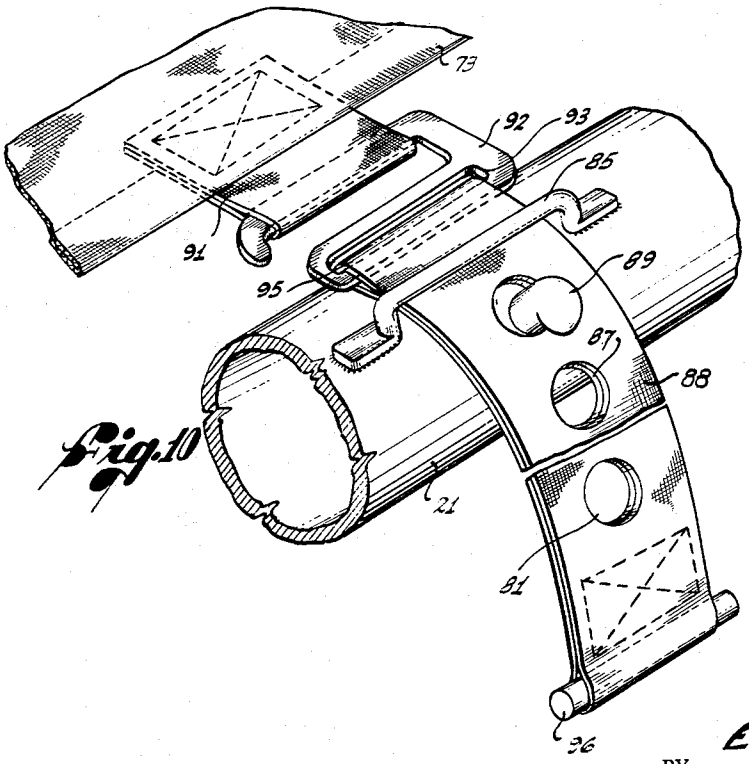


Fig. 10

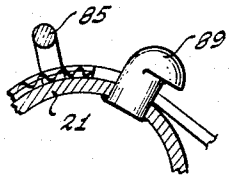


Fig. 11

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LIFTING AND TRANSPORTING DEVICE

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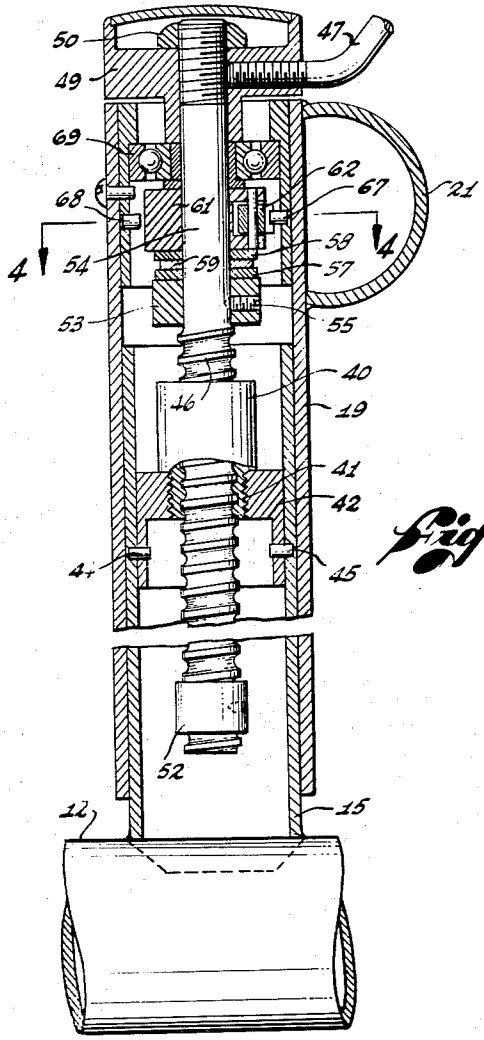


Fig. 3

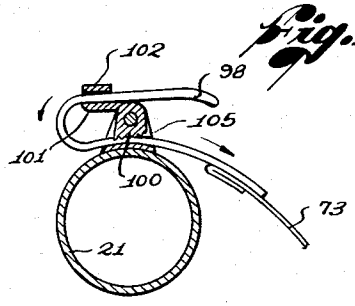


Fig. 13

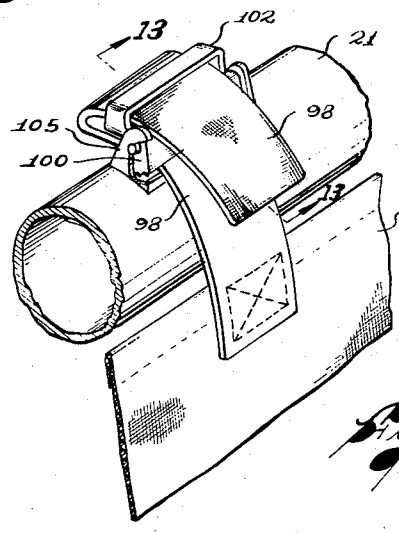


Fig. 12

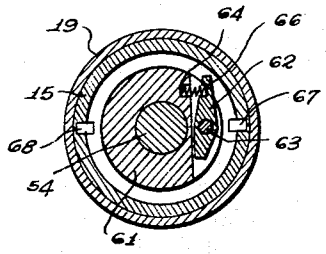


Fig. 4

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United States Patent Office 3,259,922 Patented July 12, 1966

3,259,922

LIFTING AND TRANSPORTING DEVICE

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Filed Oct. 7, 1964, Ser. No. 402,105
14 Claims. (Cl. 5—86)

This invention relates to lifting and transporting apparatus for persons such as invalids, injured and incapacitated persons with the minimum discomfort and movement of the person being lifted and transported.

In my joint Patent No. 2,908,916, of October 20, 1959, a device of the general type of this invention is disclosed and claimed. These devices are designed to lift patients to and from beds and to and from operating, X-ray, cystoscopic or surgery tables with the least possible disturbance of the patient. The present invention is an improvement over the apparatus disclosed in the above-mentioned patent since one person may more easily operate the device regardless of the size of the patient. For instance, a single ball bearing screw and nut combination raises and lowers the frame, cradle, and sheet, a one-way brake being incorporated to permit easy raising of a person and to prevent too rapid and uncontrolled lowering. Resilient aids are built into the device to counteract weight and friction between relatively movable elements. Other features of the device will be described hereinafter.

The principal object of the invention, therefore, is to facilitate the lifting and transporting of incapacitated persons.

Another object of the invention is to provide an improved lifting and transporting device for persons.

A further object of the invention is to provide an economic lifting and transporting device for incapacitated persons and which is operable by one person with ease and safety.

A better understanding of the invention may be had from the following detailed description when read in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view of a lifting and transporting device embodying the invention;

FIG. 2 is an end view partly in cross-section of the device shown in FIG. 1;

FIG. 3 is an elevational view partly in cross-section showing the raising and lowering mechanism embodied in the device;

FIG. 4 is a view taken along the line 4—4 of FIG. 3 showing the brake mechanism;

FIG. 5 is a cross-sectional detail view of the aiding mechanism for lifting and lowering the cradle and its frame;

FIG. 6 is a detail view of an aiding feature for the cradle;

FIG. 7 is a detail view of a modification of the aiding feature shown in FIG. 6;

FIG. 8 is a detail view of the cradle stop taken along the line 8—8 of FIG. 1;

FIG. 9 is a perspective view of a variable attachment of the transporting sheet to the cradle and cradle frame;

FIG. 10 is a perspective view of a modification of the attachment shown in FIG. 9;

FIG. 11 is a cross-sectional view of the variable attachment of the modification shown in FIG. 10;

FIG. 12 is a perspective view of a safety attachment between the sheet and cradle and frame; and

FIG. 13 is a cross-sectional view of the safety attachment shown in FIG. 12 and taken along the line 13—13 of FIG. 12.

Referring, now to the drawings in which the same element is identified by the same numeral, a base frame shown generally at 5 consists of a plurality of telescoping

tubing such as end sections 6 and 7, elbow sections 9 and 10 which are attached to each other by welding or other suitable means and attached to central section 12. Four caster wheels 14 support the base frame 5.

Attached by welding or other suitable means near the center of central section 12 are two upright tubes 15 and 16 which telescope into outer tubes 18 and 19 to form a pair of standards. Mounted on tubes 18 and 19 is a horizontal tubular member 21 in the ends of which are mounted a cradle consisting of a plurality of tubular members 22, 23, and 24 welded together. As shown in FIG. 8, the cradle member 22 is stopped by a pin 26 which contacts a shoulder 27 of a slot in enlarged end portion 29 of member 21. Thus, the cradle is restrained in a horizontal position when in use. This feature is described in detail in the above-identified patent.

Referring, now, to FIGS. 1 and 6, the cradle 22, 23, and 24 is substantially balanced when raised and lowered from the position shown in dotted lines 31 in FIG. 1 by a torsion spring 32 anchored at one end in a fixed plug 33 and engaged at the other end in the wall of frame section 22. This mechanism permits the easy and safe raising and lowering of the frame.

In FIG. 7, a torsion bar 35 is substituted for the spring 32 in FIG. 6, the torsion bar 35 being anchored in plug 36 at one end and attached to an element 37 at the other end.

In FIG. 2, a counterweight 38 is positioned in each of the end sections 6 and 7 for providing stability when the cradle is being lifted. This weight may be simply a bar of metal secured within each of the tubes 6 and 7.

Referring, now, to FIGS. 3, 4, and 5, a Saginaw ball bearing nut 40 has a portion 41 threaded into a threaded anchor nut 42 which is locked to inner tube 15 by pins 44 and 45. Passing through the nut 40 is a cooperating Saginaw screw 46, the upper end of which has a handle 47 for turning the screw 46 when cap 49 is tightened by lock nut 50. The lower end of the screw 46 has a stop collar 52.

Mounted above nut 40 is a load carrying collar 53 locked to unthreaded portion 54 of screw 46 by set screw 55. Above collar 53 is a series of sintered bronze washers 57 and 58 and a steel washer 59. The steel washer 59 is of a controlled diameter and surface finish to obtain the desired holdback friction when lowering the cradle or holding it stationary. The washers are loose on the unthreaded portion 54.

A brake cylinder 61 is rotatably mounted on portion 54 and has mounted in a segment thereof a pawl 62 pivoted on pin 63. (See FIG. 4.) A spring 64 biases the pawl 62 in an outwardly direction to lock the brake cylinder 61 by engaging the end 66 of pawl 62 with one or the other of pins 67 and 68 when the screw, frame, and cradle are being lowered or when stationary. When the screw, frame, and cradle are being raised, the pawl 62 overrides the pins 67 and 68 to eliminate any braking action and to permit the ball bearing 69 to provide the minimum of friction during this raising cycle. Simultaneously, there is substantially no friction introduced by the ball bearing, Saginaw nut and screw, so no difficulty is encountered in the raising operation. To aid in this raising cycle, a compression spring 70 within tube 16 exerts an upward force on the frame 21 and cradle 22, 23, and 24. The upper end of spring 70 abuts a cap 71 on tube 18 and the low end of the spring rests on tubing 12. This brake feature is described and claimed in my Patent No. 3,137,011, of June 16, 1964, on another of my lifting and transporting devices.

Referring, now, to FIGS. 1 and 9, a sheet 73 is supported by the frame and cradle 21, 22, 23, and 24 by means of eight strap fastenings 75 although a larger or

smaller number may be used. As shown in FIG. 9, one form of fastening consists of a looped strap consisting of a straight base **76** and a corrugated strap **77** fixed to base **76** between loops and having a hand grip **79** and a metal attachment **80** which is fixed to tubes **21**, **22**, **23**, or **24** by an enlarged end **81**. A bent over end portion **82** maintains the strap in position. To vary the length of the fastening, a loop is disengaged by passing over end **82** and a new loop engaged. The strap is sewed to sheet **73** as shown at **83**.

A modification of the fastener shown in FIG. 9 is shown in FIG. 10 and includes a safety bar **85** fixed to tube **21** at both ends. A plurality of holes or apertures **87** in a strap **88** are adapted to be placed over a lug **89** to vary the tightness of the sheet **73**. A portion **91** sewed to sheet **73** is looped around one side of an open ended buckle **92**, the closed side **93** of the buckle **92** containing the end of portion **95** of the strap. A hand grip **96** is provided at the free end of the strap.

FIGS. 12 and 13 show a safety fastening for the sheet straps. Strap **98** sewed to sheet **73** has its body portion extending under a self-energizing toothed toggle **100** and back over an actuating handle **101** and under a bar **102**. The toggle **100** is rotatably mounted in a yoke **105** which is welded to tubes **21**, **22**, **23**, or **24**. This fastening is particularly safe since if any accidental release pressure is applied to handle **101**, the movement of the folded back portion of the strap will move the handle to the locking position of the toggle.

The above-described lifting and transporting device has been found to be easily operated by one person for lifting and transporting patients between beds, X-ray tables, surgery tables, etc. The unit is light and strong with built-in safety features. It is economical to manufacture, is reliable in operation, and easily maintained.

I claim:

1. Lifting and transporting apparatus for incapacitated persons comprising a U-shaped base frame having end sections and a central section, a pair of vertical standards attached to the center portion of said central section of said base frame, a horizontal member attached to the upper ends of said standards, a screw and nut combination extending axially within one of said standards, rotation of said screw raising and lowering said horizontal member, a cradle attached in the ends of said horizontal member, a sheet, means for attaching said sheet to said horizontal member and said cradle, and a one-way brake on said screw and nut combination, said brake being effective only during the lowering of said horizontal member and said cradle.

2. Lifting and transporting apparatus in accordance with claim **1** in which said U-shaped base includes a plurality of telescoping tubular sections, said end sections having counterbalancing weights therein.

3. Lifting and transporting apparatus in accordance with claim **1** in which each of said standards includes a pair of telescoping tubes, the lower ends being attached to said U-shaped base frame and the upper ends being attached to said horizontal member, said nut of said screw and nut combination being attached to one of said telescoping tubes of one of said pairs of standards and said screw being attached to a cooperative tube of said one pair, and means at the end of said screw for rotating said screw.

4. Lifting and transporting apparatus in accordance with claim **1** in which the ends of said horizontal member includes resilient means between said horizontal member and said cradle to bias said cradle in an upwardly direction to aid in the rotation of said cradle and permit said cradle to slowly assume a horizontal position.

5. Lifting and transporting apparatus in accordance with claim **1** in which the other of said pair of standards includes resilient means to bias said horizontal member and said cradle upwardly to permit the height of said

cradle to be rapidly preadjusted by direct lifting force on said horizontal member.

6. Lifting and transporting apparatus in accordance with claim **1** in which said sheet attaching means includes multiple non-resilient looped straps between said sheet and said horizontal member and said cradle.

7. Lifting and transporting apparatus in accordance with claim **1** in which said sheet attaching means includes toothed toggles, release handles for said toggles and straps attached to said said sheet and passing under said toggles and back around said handles to activate said handles to locking positions of said straps by said toggles when said handles are accidentally released.

8. Lifting and transporting apparatus for incapacitated persons comprising a U-shaped base having end sections and a central section, caster wheels under said base, means for stabilizing said base, at least two pair of vertical telescoping tubes having one end of each of one of said pair of tubes connected to the center portion of said central section of said U-shaped base, a horizontal tube attached to the ends of the other one of said pair of tubes, a fixed nut within one pair of said tubes and fixed to one of said pair of tubes, a rotatable screw within said one pair of tubes and threaded through said nut, means at the upper end of said one pair of tubes for rotating said screw, and means for attaching said screw to the other tube of said one pair of tubes.

9. Lifting and transporting apparatus in accordance with claim **8** in which resilient means are enclosed within said other pair of vertical tubes, said resilient means being biased upwardly.

10. Lifting and transporting apparatus in accordance with claim **8** in which a one-way brake is associated with said screw, said brake being effective only when said screw is rotated in one direction.

11. Lifting and transporting apparatus in accordance with claim **8** in which said stabilizing means are counterweights attached to said end sections of said U-shaped base.

12. Lifting and transporting apparatus for incapacitated persons comprising a U-shaped base having end sections and a central section, vertical standards from the central section of said base, a horizontal member at the upper ends of said standards, a cradle formed by said member and a plurality of members attached to said horizontal member, a sheet attached to said cradle for positioning under said persons, means within at least one of said standards for raising and lowering said sheet, and means for braking only the lowering of said sheet.

13. Lifting and transporting apparatus in accordance with claim **12** in which resilient means are provided for aiding the pivoting of said plurality of members together with resilient means in one of said standards for aiding the raising of said cradle.

14. Lifting and transporting apparatus in accordance with claim **13** in which caster wheels are provided under said base, the end sections thereof being weighted.

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