May 31, 1966 O. M. ST. JOHN 3,253,284

ADJUSTABLE STRETCHER

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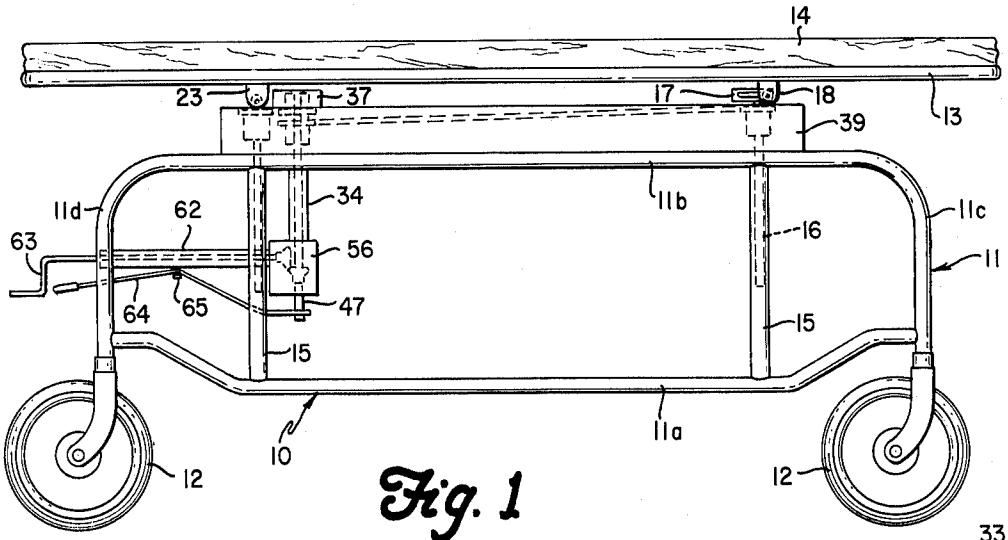


Fig. 1

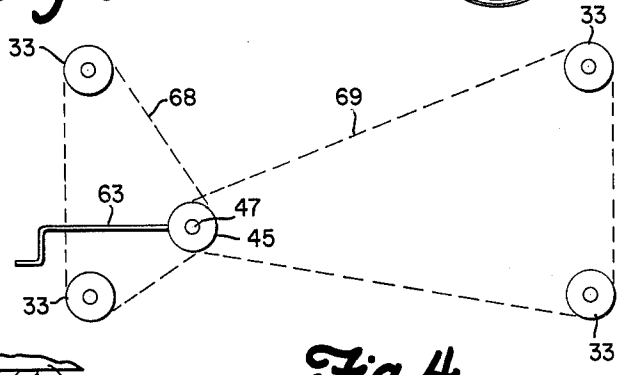


Fig. 4

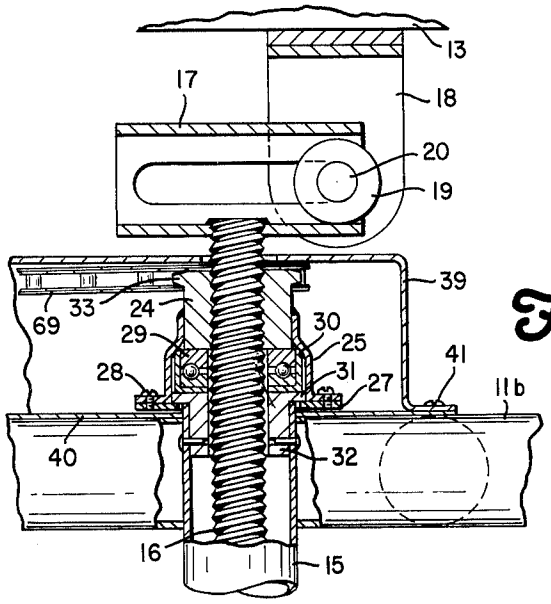


Fig. 3

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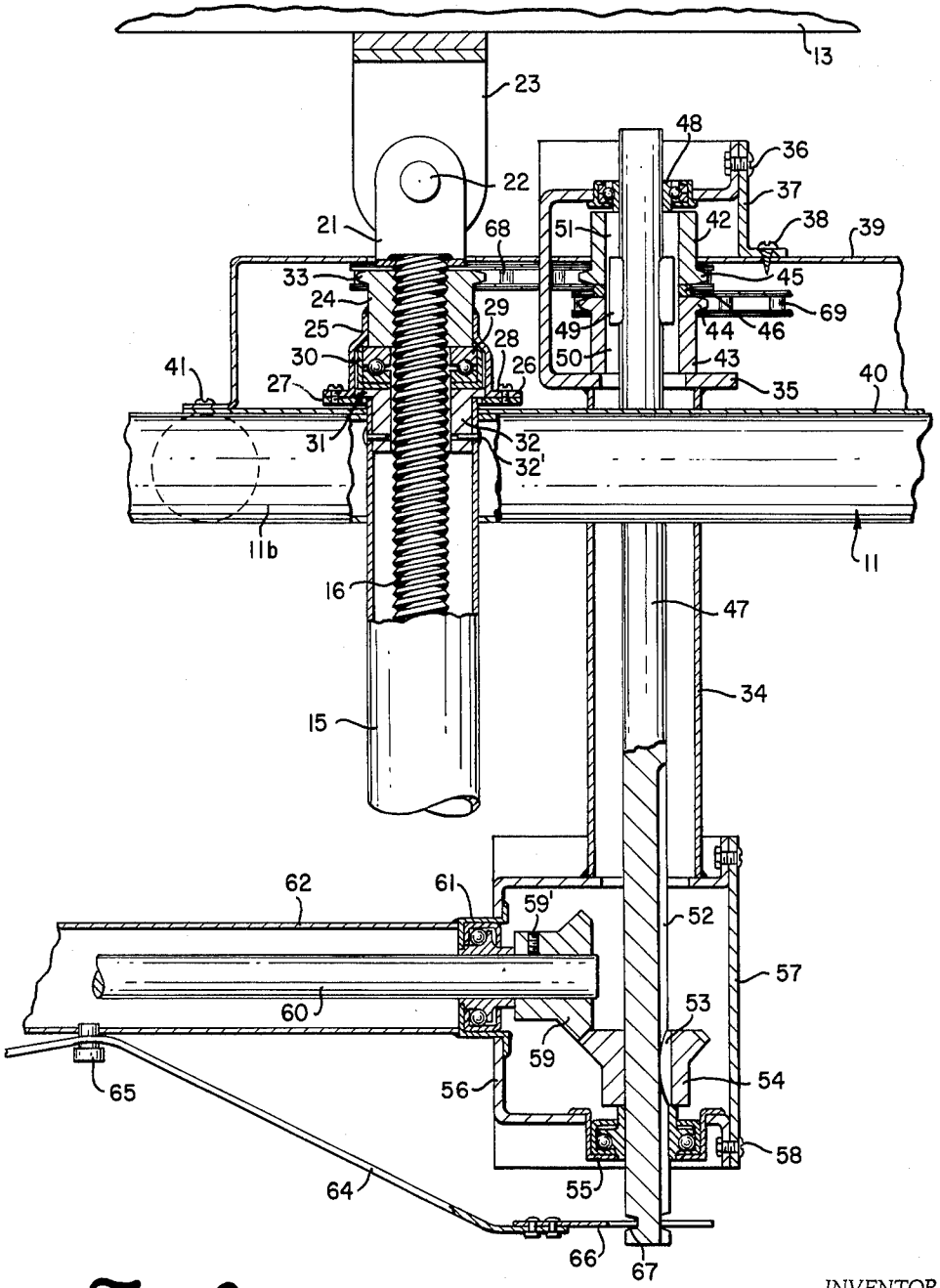


Fig. 2

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ADJUSTABLE STRETCHER

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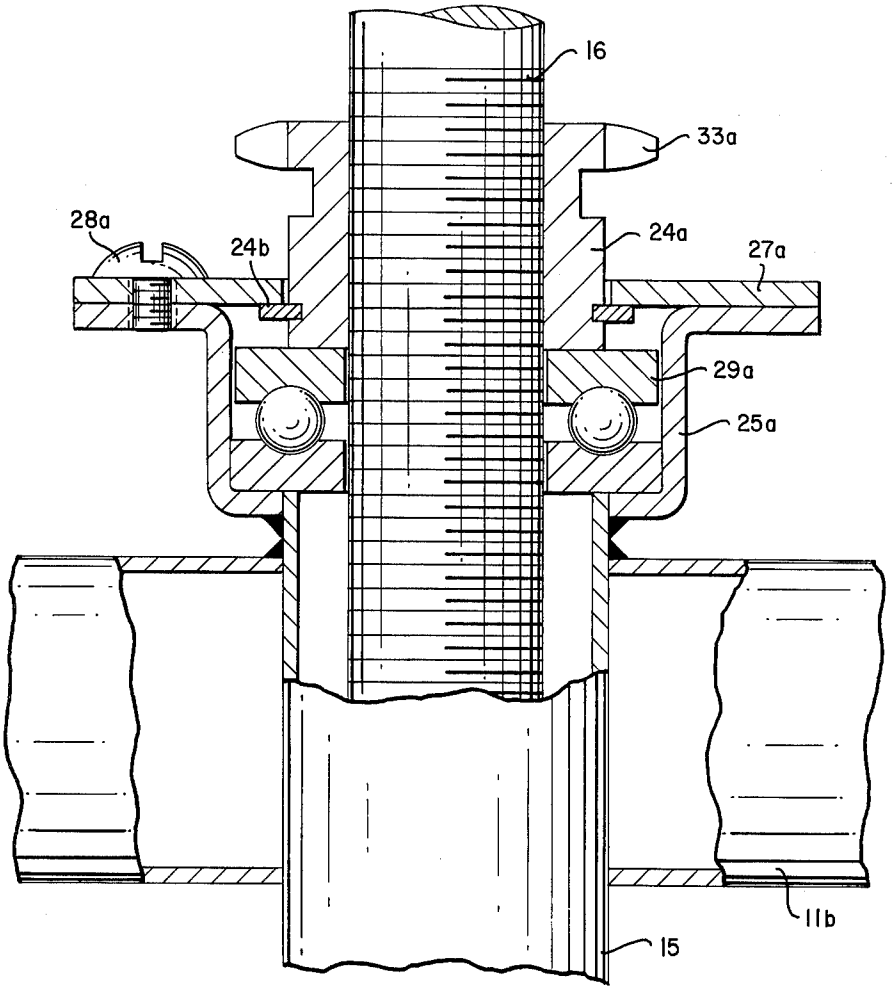


Fig. 5

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3,253,284

ADJUSTABLE STRETCHER

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2 Claims. (Cl. 5—62)

This invention relates to stretchers but particularly to those which are adjustable so as to alter the position of the patient both from the standpoint of height and/or Trendelenberg position.

An object is to produce new and improved adjusting mechanism for the bed of a stretcher to regulate the height position and achieve Trendelenberg posture which can be operated easily and shifted conveniently from one form of adjustment to another; can be manufactured and assembled economically; is almost noiseless in operation; and is free of actuating complexities.

Other objects and advantages of the invention will hereinafter appear and, for purposes of illustration but not of limitation, an embodiment of the invention is shown on the accompanying drawings, in which:

FIGURE 1 is a side elevation of the structure equipped with the novel means of elevating the bed thereof as well as adjusting it to Trendelenberg position;

FIGURE 2 is an enlarged fragmentary sectional view of the adjusting mechanism and the associated adjustment at the rear end of the structure;

FIGURE 3 is a fragmentary sectional view showing a portion of the adjusting mechanism for the front end portion of the structure;

FIGURE 4 is a diagrammatic view showing the manner in which the chains extend about the sprockets for both the rear and front end of the structure; and

FIGURE 5 is an enlarged fragmentary sectional view of an alternate structure of mounting the sprocket nut and associated elements.

The illustrated embodiment of the invention comprises a stretcher **10**, which has a pair of laterally spaced interconnected upright members constituting a frame **11** formed of tubular members, the same being supported on caster wheels **12**. Only a single frame member is shown on the drawings. Each upright frame member **11** has a pair of vertically spaced horizontal tubular bars **11***a* and **11***b* and a pair of horizontally spaced vertical tubular bars **11***c* and **11***d*. Supported by the frame **11** is a horizontal bed **13**, on which is a pad **14**. As shown, there are upright posts **15** suitably connected to the bars **11***a* and **11***b* and disposed at the front and rear of each frame member. Although two are shown in FIGURE 1 it is to be understood that a similar arrangement is incorporated in the other laterally spaced frame member so that there are four tubular upright posts **15**, in which are disposed bed-supporting members. Thus the bed of the stretcher is supported at four points, two at the front and two at the rear, as will fully appear hereinafter.

Disposed in each of the four tubular posts is a screw-threaded shaft **16**. FIGURE 3 illustrates the connection between the screw-threaded shafts and the forward end of the bed **13**. As shown, a horizontally slotted channel **17** is welded to the upper end of the respective screw-threaded shafts **16**. Depending from the under side of the bed **13** is a U-shaped bracket **18** which embraces a part of the channel **17**. The bracket **18** has a roller **19** carried by a shaft **20**, which roller rides in the horizontal slot. The roller **19** is rotatable along the channel of the member **17** when the stretcher bed is adjusted to a Trendelenberg position.

The screw-threaded shafts **16** at the rear of the stretcher as shown on FIGURE 2 are welded at their

upper ends to upright brackets **21**, which are connected by a pivot pin **22** to clevis-like brackets **23**, which are fixed to and depend from the under side of the bed **13**.

Rotatable on each of the four screw-threaded shafts **16** are internally screw-threaded nuts or sleeves **24**. The lower portion of each nut **24** is enclosed by a sheet metal housing **25**, which is welded to the outside of the sleeve. At the lower end of the housing **25** is an outwardly extending flange **26**. At the lower end of the housing **25** and abutting against the under side of the flange **26** is a plate **27** which is secured thereto by screws **28**.

Bearing against the under side of the nut **24** is a ball bearing unit **29** contained within a cage **30**. For receiving downward thrust from the ball bearing unit **29** is a T-shaped head or flange **31** disposed between the upper side of the plate **27** and the bearing unit. The flange **31** bears against the upper end of the tubular housing **15** and is integral with a plug-like body **32** which fits the inside of the housing **15** and is apertured freely to receive the threaded shaft **16**. Pins **32'** extend through the walls of the housing **15** and the plug **32** to hold the latter in place. It will be understood that the housing **25** and plate **27** rotate with the nut **24** and the flange **31** holds these parts against upward movement. Movement in the opposite direction is prevented by the flange **31** against which the thrust bearing **29** bears.

In each case the nut **24** also serves as a sprocket wheel and integral with the upper portion thereof is a circular row of sprocket teeth **33**. As will hereinafter appear, chains interconnect the two sprocket wheels at the rear of the stretcher with a driving sprocket and the two sprocket wheels at the front of the stretcher connect by a chain to another driving sprocket.

An alternate mounting for the sprocket nut is shown on FIGURE 5 in which the nut **24***a* has sprocket teeth **33***a* and threadedly engages the screw shaft **16**. A bearing cup **25***a* has an outward flange at the top which is secured by series of screws **28***a* to a plate **27***a*. The latter is apertured freely to receive the nut **24***a* which has an external annular groove to receive a retaining ring **24***b* disposed beneath the plate **27***a* to militate against upward movement of the sprocket nut relative to the bearing cup **25***a*. The cup **25***a* is secured against movement by being welded to the adjacent post **15**. Within the cup **25***a* is a ball thrust bearing unit **29***a* which receives the downward thrust of the nut **24***a* and resists downward movement thereof. The lower race of the bearing unit **29***a* has a press fit within the cup **25***a*. It will be manifest that turning movement of the nut **24***a* in one direction or the other causes appropriate up or down movement of the screw shaft **16** and the nut is retained against axial movement.

Suitably arranged and supported between the rear pair of tubular legs **15**, and disposed forwardly thereof, is a driving mechanism. As shown, an upright tubular support **34** has its upper end welded to a housing bracket **35**. Disposed at the upper end of the housing bracket **35** is a flange bracket **37**, which is connected by screws **38** to the top surface of a sheet metal housing **39**, which, as shown in FIGURE 1, is of substantial length and width sufficient to cover the actuating mechanism. The open bottom of the housing **39** is covered by a bottom panel **40** and the housing and panel **40** are secured to the frame **11** by screws **41**. Arranged within the bracket housing **35** and in superposed axial alignment are sleeves **42** and **43**, which are separated by a bearing ring **46**. The lower end of the sleeve **42** has an integral sprocket wheel **45** and the upper end of the sleeve **43** has an integral sprocket wheel **44**.

Concentric of the sleeves **42** and **43** and mounted for up and down movement is an operating shaft **47**, the upper end portion of which operates in a ball bearing unit

48 carried by the bracket 35, so as to turn freely and also to slide axially therethrough. Rigid with the shaft 47 and projecting outwardly therefrom are longitudinally elongate keys 49, which ride in keyways 50 and 51 in the sleeves 42 and 43 respectively. The arrangement is such that the keys 49 may selectively engage both sleeves for conjoint operation thereof or engage one or the other depending upon the vertical position of the shaft and the arrangement of keys with respect to the sleeves. Thus, depending upon the vertical position of the keys 49, both sleeves 42 and 43 may be rotated together, or one or the other of the sleeves may be independently driven.

At the lower end of the operating shaft 47 is an elongate keyway 52 and extending into this keyway is a key 53 carried by a bevel gear 54. This arrangement is such that the operating shaft 47 may be raised or lowered and in any of its vertically adjusted positions the gear 54 may rotatably drive the shaft 47.

The lower end of the operating shaft 47 is rotatable and longitudinally slideable in a ball bearing unit 55, which is carried by a cup-shaped housing 56 to which the lower end of the tubular support 34 is welded. The open end of the housing 56 is closed by a plate 57 connected thereto by screws 58. Also disposed within the housing is a second bevel gear 59 disposed at right angles to the gear 54 and in mesh therewith. The bevel gear 59 is connected to a horizontal drive shaft 60 by a set screw 59'. The drive shaft 60 has its opposite end portions rotatable in ball bearing units, a ball bearing unit 61 being shown at the inner end portion of the shaft but the ball bearing unit at the outer end is not shown in the drawings. The drive shaft 60 is disposed within a housing tube 62 which projects through an opening in the cup housing 56 and is flanged thereover, the opposite end portion being suitably supported on the stretcher frame by means not shown. Suitably connected to the outer end of the drive shaft 60 is an operating crank handle 63.

From the above description it will be understood that by turning the crank handle 63 the vertical operating shaft 47 is rotated in one direction or the other through the bevel gears 59 and 54. Rotation of the operating shaft 47 imparts movement to one or both of the sprocket gear carrying sleeves 42 and 43 and the sprocket gear 45 has a chain 68 common to both of the sprocket gears 33 arranged at the rear portion of the stretcher. A chain 69 extends from the sprocket gear 44 to both of the sprocket gears 33 at the front portion of the stretcher. It will be understood that turning of the sprocket gears 33 in one direction causes the respective screw shafts to move upwardly, thereby to elevate that portion of the stretcher bed and rotation of the sprocket gears 33 in the opposite direction serves to move that portion of the stretcher bed downwardly.

Vertical shifting movement of the operating shaft 47 is effected by a hand lever 64, which is pivoted on a headed bolt 65 connected to the under side of the drive shaft housing tube 62. The hand lever 64 is of bent form and of generally V shape. The free end of the lever 64 is forked at 66 to engage an annular groove 67 in the lower end portion of the operating shaft 47. Manifestly, by rocking the hand lever in one direction the operating shaft 47 is moved upwardly and when rocked in the opposite direction the operating shaft is moved downwardly.

In operation when it is desired to raise or lower the bed 13 uniformly the hand lever 64 is operated to move the operating shaft 47 to such position that the keys 49 engage both sleeves 42 and 43. Then by rotating the crank handle 63 in one direction the bed 13 is raised and in the opposite direction the bed 13 is lowered, this operation being effective through the sprocket and chain connections above described. In order to adjust the bed 13 of the stretcher to a Trendelenberg position the hand lever 64 is operated in order to move the operating shaft 47 axially to bring the keys 49 either wholly in engagement

with the sleeve 43 or wholly in engagement with the sleeve 42. By engagement wholly with the sleeve 43 and then by turning the crank arm 63, the front of the bed 13 is either moved upwardly or downwardly whereas the rear end portion of the bed 13 remains stationary. This action is effected by the rocking movement about the pivots 22. Such freedom of movement is made possible by the connection between the rollers 19 and the horizontally slotted brackets 17 disposed at the front end portion of the bed.

Similarly, if it is desired to raise or lower only the rear end of the bed 13, then the operating shaft 47 is shifted to a position so that the keys 49 are disposed wholly within the sleeves 42, then by turning the crank arm 63 it will be manifest that the rear end portion only is rocked in the desired direction. It will be further apparent that when the bed of the stretcher has been adjusted to a Trendelenberg position, the bed then may be moved upwardly or downwardly in its inclined position by then disposing the operating shaft 47 so that the keys 49 engage both of the sleeves 42 and 43.

Numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention, especially as defined in the appended claims.

What I claim is:

1. A stretcher comprising an upright frame, a bed above said frame, combined support and adjustment means for said bed including vertically disposed screw shafts connected to said bed and depending therefrom, a nut having a sprocket wheel rigid therewith and in screw threaded engagement with each screw shaft, means to mount each nut upon said frame and retain same against axial movement, means for selectively rotating said nuts to effect bed adjustment, said last means comprising sprocket and chain connections to said sprocket wheels, driving means for said sprocket and chain connections comprising a pair of driving sprocket wheels, chains connecting each driving sprocket with nut carrying sprocket wheels arranged respectively fore and aft of the stretcher bed so that rotation of one driving sprocket wheel in one direction raises one end of the bed and in the opposite direction lowers said end of the bed, and rotation of the other driving sprocket wheel raises or lowers the opposite end of the bed in accordance with the direction of rotation, and conjoint rotation of both driving sprocket wheels raises or lowers the bed in the position to which it has previously been adjusted, and common means for actuating said driving sprocket wheels together or for actuating one or the other of said driving sprocket wheels.

2. A stretcher comprising an upright frame, a bed above said frame, groups of supporting elements arranged respectively fore and aft of said frame and pivotally connected to said bed, said supporting elements comprising vertically disposed screw threaded rods, operating members in the form of sprocket wheels fixed to nuts contained on the frame and connected individually to said screw threaded rods respectively and effecting linear movement of the latter in one direction or the other in response to predetermined rotative movements of said screw threaded rods and driving mechanism for said screw threaded rods, said driving mechanism comprising sprocket chains and a pair of driving sprocket wheels, the driving sprocket wheels being fixed to axially aligned sleeves, one sprocket chain being common to one driving sprocket wheel and one group of sprocket wheel carrying nuts, and another chain being common to the other group of sprocket wheel carrying nuts and the other driving sprocket wheel, and control means for said driving mechanism for selectively establishing an operative drive for one or the other or both groups of screw threaded rods thereby to raise or lower the bed in a horizontal operation, to effect a Trendelenberg position, or to raise and lower the bed when in a Trendelenberg position, said control means including a rotary shaft slidable axially

through said sleeves, keyways in said sleeves, and a key on said rotary shaft to operatively engage one or both of said keyways.

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