July 15, 1958 T. KRUSE 2,843,240

LIMIT STOP FOR BED OPERATING MECHANISM

Filed Sept. 27, 1954 2 Sheets-Sheet 1

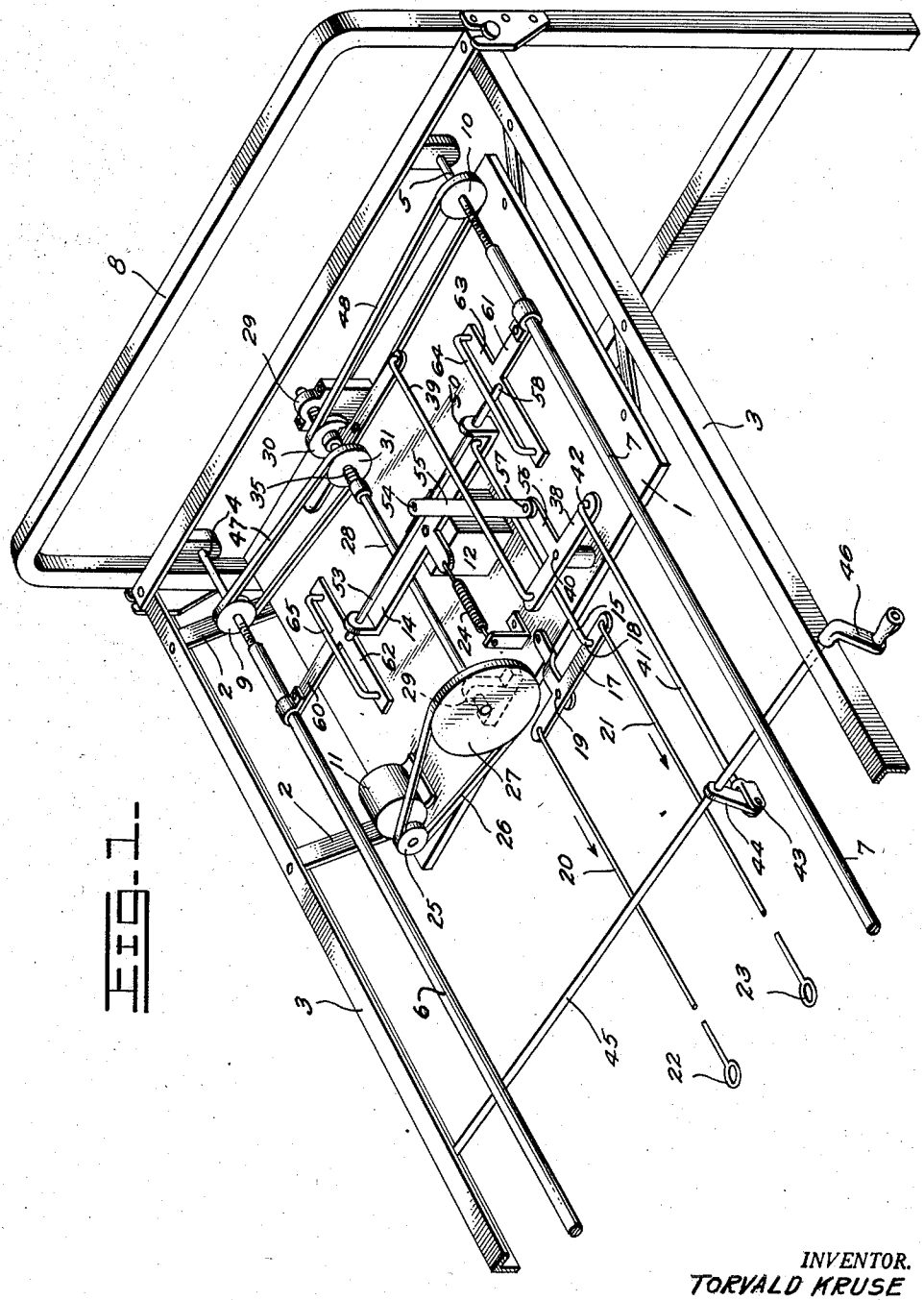

FIG. 1

INVENTOR.
TORVALD KRUSE
BY Michael J. McDonald
AGENT

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LIMIT STOP FOR BED OPERATING MECHANISM

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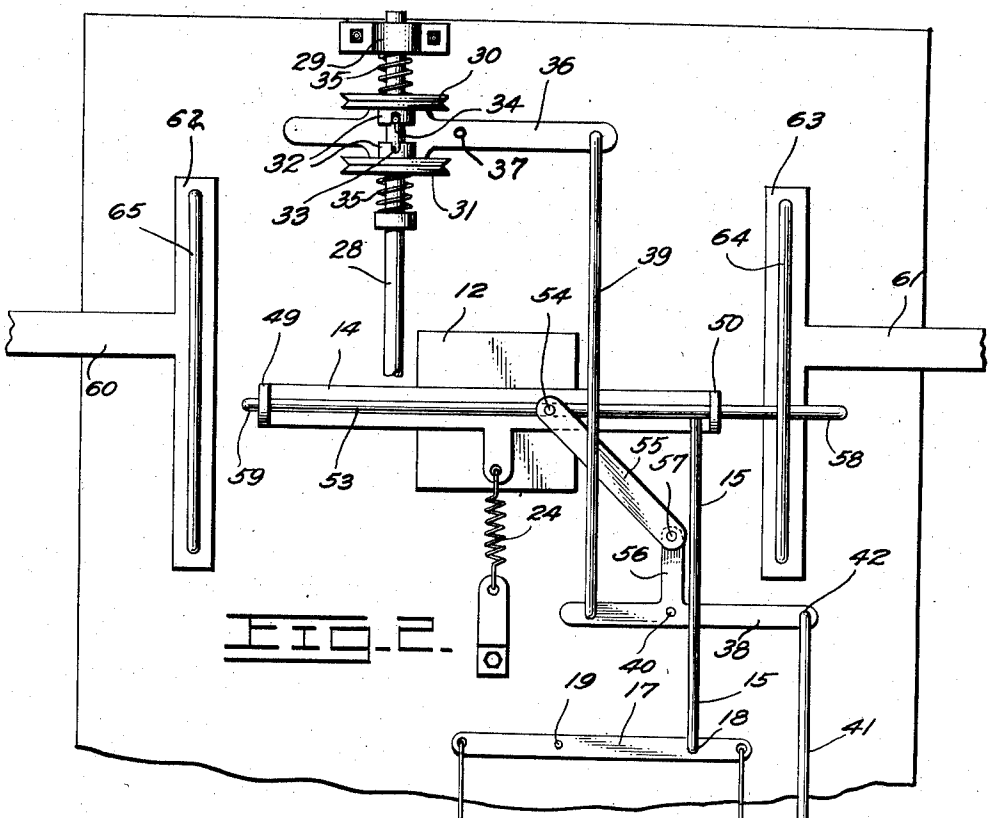

FIG. 2.

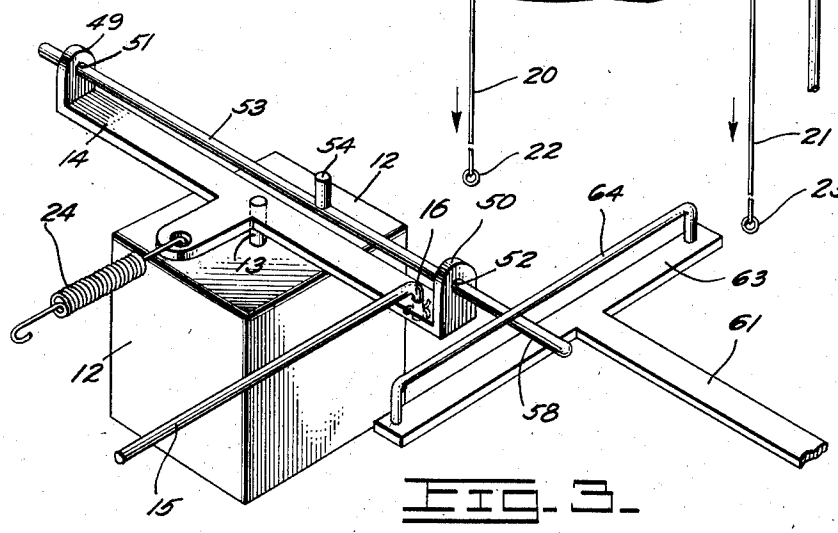

FIG. 3.

INVENTOR

TORVALD KRUSE

BY Michael J. McDonald

AGENT

United States Patent Office

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LIMIT STOP FOR BED OPERATING MECHANISM

Torvald Kruse, Puente, Calif.

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4 Claims. (Cl. 192—143)

This invention relates to a new and useful drive mechanism for operating the head and foot elevating and lowering shafts of conventional hospital type beds.

One of the objects of the invention is to provide a simple power operated mechanism which may be readily attached to hospital beds and operated selectively, by the bed occupant or attendant, to raise or lower either the head or foot section of the bed.

A further object is to provide a mechanism that is foolproof, rugged and easily maintained.

A further object is to provide a mechanism that is safe in that it will not drop either section of the bed in the event of power or mechanical failure.

A further and more specific object is to provide a mechanism in which a reversing switch is arranged to also serve to limit the travel in both directions of both the head and foot sections of the bed.

Other objects and advantages will appear on reference to the accompanying specifications and to the drawings in which:

Fig. 1 is a fragmentary perspective view showing my device mounted on a conventional hospital bed;

Fig. 2 is a diagrammatic plan view showing the control linkages; and

Fig. 3 is a detail perspective view of my reversing switch and its operating yolk.

The operating mechanism of my device is mounted generally on a platform 1 supported by means of suitable straps 2 attached to the side rails 3 of a conventional hospital bed having a foot 8 and a head (not shown). Such beds are provided with head and foot operating shafts 4 and 5 which when operated by a suitable crank serve to move telescoping tubes 6 and 7 longitudinally to elevate or lower the head or foot section of the bed depending on the direction of rotation.

In installing my device I provide a pulley 9 on head operating shaft 4 and a similar pulley 10 on foot operating shaft 5.

Mounted on the platform 1 is a reversible motor 11 which is controlled by a conventional reversing switch 12 having an operating shaft 13 on which operating yolk 14 is secured. One end of link 15 is pivoted to the yolk at 16 and other end of the link is pivoted to lever 17 at 18. Lever 17 is pivoted at 19 and oscillated about this pivot by means of control wires or rods 20 and 21 which are connected to pull rings 22 and 23 which are conveniently located at the head or side of the bed within reach of its occupant. The occupant by pulling ring 22 or 23 can swing lever 17 in either direction and through the link 15 swing the yolk in either direction. A spring 24 urges the yolk to a normal central position which is the off position for the switch 12. Movement of the yolk in a clockwise direction will operate the motor in one direction and movement of the yolk in a counterclockwise direction will operate the motor in the opposite direction. It will thus be seen that the motor is normally off and may be operated

in either direction depending on whether ring 22 or 23 is pulled. Because of spring 24 the motor will run only when one of the operating rings is pulled, when it is released the yolk will return to a neutral position and the motor will stop.

The motor is provided with a pulley 25 which through belt 26 drives pulley 27 mounted on one end of drive shaft 28 mounted in bearings 29. Loosely mounted on the shaft are two pulleys 30 and 31 each of which is provided with a hub 32 slotted at 33 to receive selectively pin 34 secured to the shaft. Springs 35 urge the pulleys toward the pin, and the pulley that engages the pin as permitted by clutch lever 36 will be driven by the shaft. Clutch lever 36 is pivoted at 37 and is linked to a T-shaped lever 38 by means of link 39. T lever 38 is pivoted at 40 and operated about its pivot by means of a link 41 one end of which is pivoted to the lever at 42 and the other end of which is pivoted at 43 to an arm 44 secured to a rod 45 suitably pivoted in or on the side rails of the bed for partial rotation by means of a crank 46. A duplicate crank may be provided on the other end of rod 45 if desired. It will thus be seen that by operating crank 46 either pulley 30 or 31 may be clutched to and driven by shaft 28. These pulleys are belted to pulleys 9 and 10 by means of belts 47 and 48.

Yolk 14 is provided with upstanding ears 49 and 50 having openings 51 and 52 in which rod 53 is slidably mounted. Rod 53 is provided with an upstanding lug 54 which is connected by link 55 to arm 56 of T lever 38 by means of pivot 57. When the T lever is operated about its pivot it will not only operate the clutch lever 36 but will also shift rod 53 in its yolk in a direction depending on the direction of movement of the T lever about its pivot. In the drawings the rod is shown at the right limit of its movement with rod end 58 extended some distance from ear 50. When the rod is shifted to its left hand limit rod end 59 will similarly extend beyond ear 49 and pulley 31 will move into engagement with pin 34. Mounted on the longitudinally moving tubes 6 and 7 are arms 60 and 61 which are provided with heads 62 and 63. U-shaped bails 64 and 65 which function as limit stops are mounted on each of the heads and under which rod end 59 or 60 may protrude when extended. In the drawings rod end 58 is shown extending under bail 64 and it will be seen that as the arm and bail move in either direction as the foot section of the bed raises or lowers, the rod end will be engaged by one or the other end of the bail which will urge the yolk and switch to its off position. The arrangement is such that when the yolk is moved to its clockwise position bail 64 will be moving upwardly as viewed in Fig. 2 which shows foot operating pulley 30 in driven position. Similarly when the yolk is in its counterclockwise position the bail will be moving downwardly. The bails will consequently force the yolk to its neutral or switch off position under all circumstances of operation when the head or foot section of the bed reaches either limit of its range of operation.

When crank 46 is operated to clutch head operating pulley 31 to the drive shaft, rod 53 will simultaneously be shifted so that rod end 59 is in a position to be engaged and operated by bail 65 which will travel longitudinally of the bed through its mounting on tube 6 which functions when the head section of the bed is raised or lowered. Bail 65 will accordingly operate in conjunction with rod end 59 in the same manner that bail 64 cooperates with rod end 58 as explained above.

The length of bails 64 and 65 is such that their ends will contact and operate rod ends 58 and 59 respectively to shut off the motor and thus prevent the motor and its associated drive from operating the bed elevating and

lowering mechanism beyond either their upper or lower limit of travel. Unless this limit arrangement is provided it would be possible to badly damage this bed mechanism through driving it beyond its intended limit of operation.

While I have for the sake of clarity shown single controls for operation by the bed occupant, duplicate controls extending to any suitable location out of reach of the bed occupant could be provided. These, in connection with a suitable line switch out of reach of the occupant, could provide for operation of the device by an attendant only, when the condition of the occupant was such that it was not desirable for him to have control.

Crank **46** is moved to one or the other of its two positions in order to select whether the head or the foot of the bed is to be operated. Suitable means (not shown) may be provided to hold the crank in either one of its two positions. Movement of this crank operates the clutch to drive either the head or foot mechanism as selected and also sets rod **53** in a corresponding position to function to limit movement of said mechanism. A further selection as to up or down movement of the selected bed section is obtained by operating either control ring **22** or **23**. When either ring is released by the operator the bed will remain in the position it has assumed at the time of release.

In the event of power failure or mechanical failure of any element of my device the bed may still be operated by means of cranks. My device does not rely on electric power or any mechanical element to maintain the bed in its adjusted position. It will therefore be seen that a bed provided with my device will be fully as safe from collapsing and suddenly dropping the occupant as the same bed would be without my device.

It is to be understood that the preferred embodiment as disclosed herein may be modified within the scope of my invention as set forth in the appended claims.

I claim:

1. In a bed having head operating means including a rotatable shaft and a longitudinally movable tube and foot operating means including a rotatable shaft and a longitudinally movable tube, a reversible motor, a normally off reversing switch for controlling said motor, a drive shaft coupled to said motor, a clutch having clutch operating means for coupling the drive shaft selectively to either of said rotatable shafts, a limit stop mounted on each of said longitudinally movable tubes, a switch operating member mounted on the switch and including an element coupled to the clutch operating means and projectable thereby into the path of movement of either of said limit stops when said clutch operating means is actuated.

2. In a bed having head operating means including a rotatable shaft and a longitudinally movable tube and foot operating means including a rotatable shaft and a longitudinally movable tube, a reversible motor, a normally off reversing switch for controlling said motor, a drive shaft coupled to said motor, a clutch having clutch operating means for coupling the drive shaft selectively to either of said rotatable shafts, a limit stop mounted on each of said longitudinally movable tubes, a switch operating member mounted on the switch and including an element coupled to the clutch operating means and projectable thereby into the path of movement of the limit stop mounted on the longitudinally movable tube associated with the head operating means when the clutch is operated to drive the rotatable shaft of the head operating means, and into the path of movement of the limit stop mounted on the longitudinally movable tube associated with the foot operating means when the clutch is operated to drive the rotatable shaft of the foot operating means.

3. In a bed having head operating means including a rotatable shaft and a longitudinally movable tube and foot operating means including a rotatable shaft and a longitudinally movable tube, a reversible motor, a switch for controlling said motor, a clutch for selectively connecting said motor to either of said rotatable shafts, clutch operating means, a limit stop mounted on each of said longitudinally movable tubes, an element mounted on said switch and linked to the clutch operating means for projection into the path of one or the other of said limit stops depending on the clutch position and operable when contacted by either of said stops to move the switch to its off position and disable the motor.

4. In a bed having head operating means including a rotatable shaft and a longitudinally movable tube and foot operating means including a rotatable shaft and a longitudinally movable tube, a reversible motor, a switch for controlling said motor, means for maintaining said switch in off position, a drive shaft coupled to said motor, a clutch having clutch operating means for coupling the drive shaft selectively to either of said rotatable shafts, a limit stop mounted on each of said longitudinally movable tubes for movement therewith, a switch operating member mounted on the switch, a slideable element mounted on the switch operating member, said slideable element being coupled to the clutch operating means and projectable thereby into the path of movement of either of said limit stops for operation thereby when the head or the foot operating means reaches either limit of travel to move said switch to its off position.

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