Jan. 20, 1953 B. V. COLEMAN 2,625,839

HAND OR POWER-OPERATED ACTUATING MECHANISM

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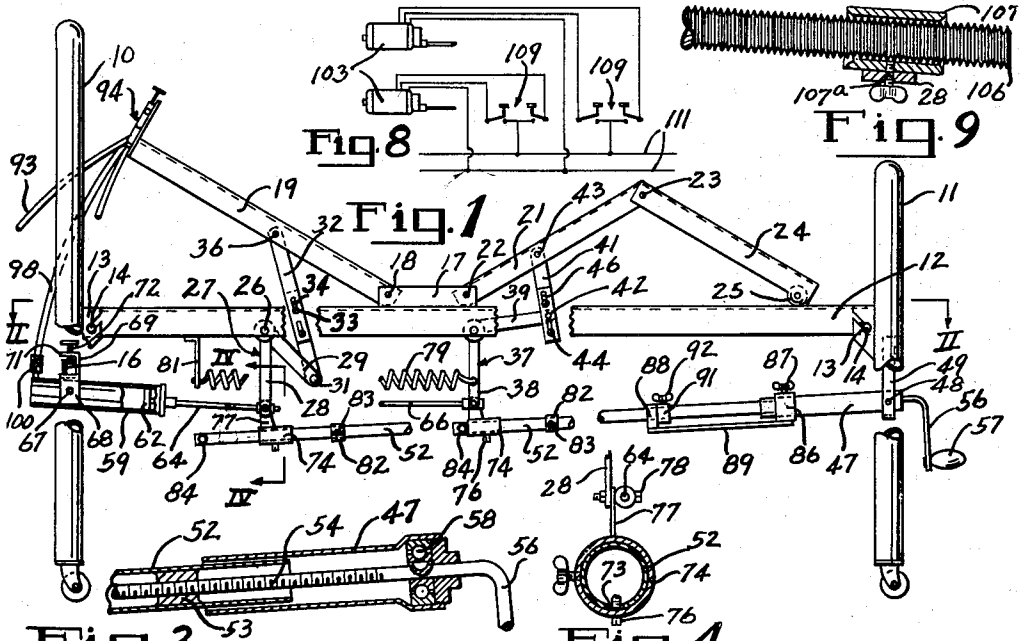


Fig. 1

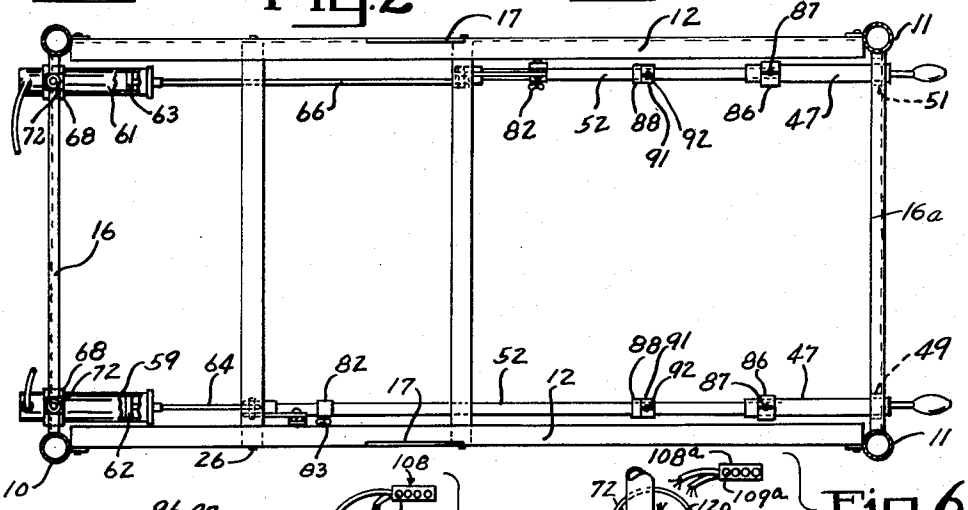
Fig. 8

Fig. 9

Fig. 3

Fig. 4

Fig. 2



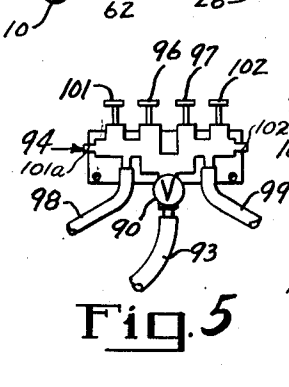


Fig. 5

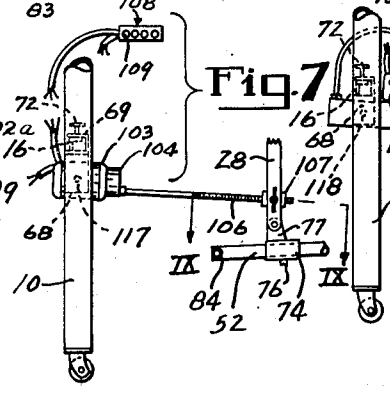


Fig. 7

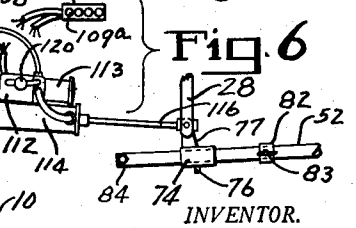


Fig. 6

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HAND OR POWER-OPERATED ACTUATING MECHANISM

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3 Claims. (Cl. 74—625)

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My present invention relates to hospital beds and more particularly to hospital beds embodying an articulated head and foot section which, as is well known, are disposed to be raised out of the normal plane of the mattress carrying frame of the bed, thus to support the patient's head or legs at a given desired angle.

An object of my invention is to provide simple, economical and positively actuated means for raising the head and foot sections of the bed and which shall be in the form of mechanism readily attached to and removed from an existing bed equipped with the usual manually operated screws and rods for raising the head and foot sections.

More specifically, my invention contemplates a hospital bed of the character designated in which there is associated with the link mechanism forming a part of the actuating means for the head and foot sections, a pair of fluid pressure cylinders or electric motors mounted pivotally on brackets which may be removably attached to a portion of the under frame of the bed and operatively connected to the raising and lowering mechanism of the bed, whereby the actuating mechanism may be attached in minimum time and with minimum effort.

A further object of my invention is to provide power driven apparatus for operating the head and foot sections of the bed and which may be associated with the existing manually operated screw mechanism for accomplishing the raising and lowering functions, and which when installed on a bed permits the use of the power raising and lowering mechanism or the manually operated and existing crank mechanisms, selectively, thus assuring that the bed may be raised or lowered at all times.

Heretofore in the art to which my invention relates various forms of apparatus for raising and lowering the pivoted or articulated head and foot sections of hospital beds have been proposed. Insofar as I am aware none of the apparatus and systems heretofore proposed have been practical or economical enough to permit the installation of the same on the average hospital bed. My invention is characterized by the absence of complicated parts, by its simplicity of operation and structure, and by the fact that it may be attached to a bed of standard design and which when so attached permits the bed to be operated either by the pre-existing manually operated means or by my improved hydraulic, air or electrical mechanism.

Apparatus illustrating the features of my invention is shown in the accompanying drawing forming a part of this application in which:

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Fig. 1 is a side elevational view of a hospital bed, partly broken away and in section and having my improved apparatus applied to the pivoted head section and articulated foot section thereof;

Fig. 2 is a view of the bed partly broken away and in section and taken generally along line II—II of Fig. 1;

Fig. 3 is a detail sectional view partly broken away and illustrating one of the manually operated raising and lowering mechanisms generally employed on hospital beds;

Fig. 4 is a detail sectional view taken generally along line IV—IV of Fig. 1 and drawn to an enlarged scale;

Fig. 5 is a plan view of the control valves for use with the form of the invention shown in Figs. 1 and 2;

Fig. 6 is a fragmental side elevational view showing a slightly modified form of my invention;

Fig. 7 is a view corresponding to Fig. 6 and showing a still further slightly modified form in which the power supply for raising and lowering the head and foot sections may be in the form of electric motors;

Fig. 8 is a diagrammatic view illustrating the circuits and control switches for the modified apparatus shown in Fig. 7; and,

Fig. 9 is an enlarged detail sectional view taken on line IX—IX of Fig. 7.

Referring now to the drawings for a better understanding of my invention and more particularly to Figs. 1 to 4 inclusive, I show a hospital bed embodying a head section 10 and a foot section 11. The head and foot of the bed are connected in the manner understood by means of the side rails 12 through the medium of slotted brackets 13 and pins 14. The bed embodies a cross brace member 16 at the head section, a cross brace member 16a at the foot section.

Secured in suitable manner to each of the rails 12 of the bed is a stationary mid section of the upper or mattress frame indicated at 17. Pivotally mounted as at 18 to the fixed mid section 17 is the head section 19 of the mattress frame. The foot section comprises a section of the mattress framework indicated at 21 and pivoted to the center section 17 at 22. Pivoted to the section 21 at 23 is the foot section proper 24 carrying rollers 25 which roll on the upper surface of the rails 12.

Pivoted at 26 to the side of one of the rails 12 is a crank arm indicated generally by the numeral 27 and having arms 28 and 29. Pivotally mounted at 31 to the outer end of the arm 29

is a link 32 which may be adjustable as to length by means of screws 33 and slots 34. The opposite or upper end of the link 32 is pivoted at 36 to the head section 19, which is at a point fowardly of the pivot point 18.

Similarly to the manner just desecribed, and preferably on the opposite rail 12, there is pivotally mounted a crank arm indicated generally by the numeral 37 and having arms 38 and 39. The arm 39 carries at its outer end a link 41, pivotally mounted at 42 to the end of the arm 39 and at 43 to the section 21 of the mattress frame. The link 41 may be adjustable as to length by means of screws 44 and slots 46.

Pivotally mounted in suitable brackets, usually at the foot of the bed are the manually operable mechanisms for raising and lowering the sections of the mattress frame. In the manner understood these units comprise a tubular member 47 pivoted at 48 to brackets 49 and 51 mounted in suitable manner beneath the rails 12. Telescopically mounted within the outer tube 47 is a push pull tube 52. Secured to the inside of the tube 52 is a nut 53. Threadably passing through the nut 53 is a stem 54 carrying on its outer end a crank 56 having a handle 57. It will be seen that when the crank 56 is turned the tube 52 moves axially of the tube 47. Suitable anti-friction bearings indicated at 58 in Fig. 2 may be provided if desired.

The structure so far described is, for the most part, substantially standard with respect to certain types of hospital beds now in existence. While my invention is adapted for association with other types of hospital beds it is particularly adapted for use in association with that type embodying the axially movable tubes for raising and lowering the head and foot sections.

As shown more clearly in Figs. 1 and 2 I provide a pair of hydraulic cylinders 59 and 61 which are connected respectively to raise the head and foot sections by the means now to be described.

Each of the cylinders 59 and 61 preferably is an air cylinder embodying pistons 62 and 63 and piston rods 64 and 66, respectively. Each of the cylinders is pivotally mounted as at 67 between the legs of a U-shaped clamp 68. The clamp 68 may have an upwardly extending portion 69 having a laterally directed flange 71 and is disposed to straddle the cross frame member 16 of the bed. A set screw 72 serves to secure the bracket and hence the cylinders to the cross member 16 whereby the cylinders are pivotally mounted for movement in a vertical plane.

As best shown in Fig. 4 of the drawing I preferably provide an elongated slot 73 adjacent the outer ends of each of the push pull tubes 52. Around the tubes 52 I place sleeves 74 each of which has a screw 76 threaded therein and passing slidably into the slot 73. Each of the sleeves 74 has an upstanding bracket 77 secured thereto.

The piston rods 64 and 66 are pivotally secured to the upper ends of one of the brackets 77 by means of a bolt 78. In like manner, the arms 28 and 38 are pivotally connected by means of the bolts 78 to the respective piston rods 64 and 66. The arm 38 is biased clockwise as viewed in Fig. 1 by means of a spring 79 having one end anchored to the arm 38 and its opposite end anchored to a bracket 81 depending from the bed rails 12.

Adjustably mounted on the tubes 52 are collars 82 carrying therein set screws 83. In the end of each of the rods 52 is a stop in the form of a through bolt 84.

Mounted adjustably along the outer tube 47 of each of the manually actuated screw mechanisms is a collar 86 held in place by means of a set screw 87. Loosely fitting about the tubes 52 is another collar 88, and the collars 88 and 86 are joined by a bar 89. Adjustably mounted on the tube 52 between the collar 88 and the ends of the tubes 47 is a collar 91 which may be secured to the tube 52 by means of a set screw 92.

Air under pressure may be admitted from a source not shown through a flexible hose 93 through a hand operated valve 96 to a bank of control valves indicated generally by the numeral 94. See Fig. 5. The bank of valves may conveniently be mounted on the head of the head section 19, and may embody valves of the push type indicated at 96 and 97 for admitting air into hose 98 and 99 leading respectively to the cylinders 59 and 61. Discharge or exhaust valves 101 and 102 may be respectively associated with the hose 98 and 99, thus to exhaust air from the cylinders 59 and 61 through exhaust ports 101*a* and 102*a*. At the time air is being discharged through the exhaust valves 101 and 102, the supply of air from the hose 93 is cut off by closing the valve 96 or by providing other suitable means for automatically cutting off the supply of air from the hose 93 when the exhaust valve is opened. The hose 98 and 99 are connected to the respective cylinders by means of a quick connector coupling 100.

From the foregoing the method of construction and operation of the embodiment of my invention just described may now be explained and understood. The cylinders 59 and 61 are pivotally secured to the bed by means of the clamps 68 and the screws 72 thereof. The bolts 84 are temporarily withdrawn and the sleeves 74 are slipped over the outer ends of the tubes 52 with the screws 76 thereof engaged in the slots of the tubes. The piston rods 64 and 66 are connected respectively to the arms 28 and 38 and to the brackets 77. The collars 86 and 88 are put in place, and the stop collars 82 and 91 are likewise secured to the respective parts as shown for the purpose later to be mentioned. If it is desired to operate the bed by means of the cylinders, the head and foot sections are raised merely by pressing the valves 96 and 97, and having raised the same they may be lowered by opening the valves 101 and 102. It will be seen that the sleeves 74 slide on the rods 52 in accordance with the setting of the collars 82. Thus, if it is desired to limit the upward travel of the head or foot sections, the collars are set closer to the ends of the rods 52, or if it is desired that the cylinders move the head and foot sections through the maximum allowable travel of the piston rods 64 and 66, the collars 82 are moved out of the range of movement of the sleeves 74.

When it is desired to operate the head and foot sections by means of the screws and cranks 56 the hose 98 and 99 are disconnected, or the valves 101 and 102 are held open. When the cranks 56 are operated in one direction the tubes 52 move to the right as viewed in Fig. 1 bringing the stop 84 against the left side of the sleeves 74, whereby further rightward movement of the tubes raises the sections of the bed. The collars 86 and 88 together with the tie bar 89 therebetween and the set collar 91 are adapted to prevent the screws 54 from being run completely out of the nuts 53 in the tubes 52. The spring 79 biases the foot section toward lowered position for the reason that there is considerable friction in this part of the usual bed.

As shown in Figs. 7 and 8 of the drawings I

may employ an electric motor 103 having thereon a gear box 104 as the motive power in place of the cylinders 59 and 61. In this instance the drive for the head or foot section may be in the form of a threaded rod 106 passing through a sleeve 107 pivotally secured to the arm 28 or 38 as the case may be. As shown in Fig. 9 the sleeve 107 has threaded therethrough a screw 107a having a thread engaging end. By loosening the screw it will be appreciated that the sleeve 107 is readily slidable on the rod 106.

The control system for this modification of my invention may comprise a bank of electric switches indicated at 108 and comprising a series of individual push button switches indicated at 109. Likewise, the motors 103 are reversible so that the selective closing of the switches 109 is effective to complete the circuits clearly indicated in Fig. 8 of the drawings at the will of the person lying on the bed. Power is supplied through the lines 111 from any suitable source, not shown.

In Fig. 6 of the drawings I show a self-contained electric-hydraulic unit embodying an electric motor 112 having associated therewith an hydraulic pump 113. The pump 113 supplies fluid selectively to the ends of a fluid pressure cylinder 114 in response to the direction of rotation of the motor 112. The motor 112 may be under control of a bank of switches 108a, comprising the individual switches, 109a, similar to those just described. The piston rod 116 may be connected directly to the arm 28 or 38 as the case may be.

In the modifications just described it is contemplated that the motors 103 or the motor driven hydraulic units and cylinders be pivotally mounted as indicated at 117 and 118, respectively, on the brackets 68, attachable to the cross member 16 or the like of the bed. The hydraulic system just described may be provided with the usual manually operated bypass valve indicated at 120. When it is desired to operate the bed from the screws valve 120 is opened, permitting the hydraulic fluid to flow freely from either end of the cylinder back into the reservoir of the unit, rendering the same inoperable.

From the foregoing it will be apparent that I have devised an improved actuating mechanism for use on hospital bed. My improved apparatus may be easily attached to an existing hospital bed of the usual type, and as such lends itself admirably to those cases wherein a relatively few such devices may be kept in a hospital and applied to a bed when desired. The provision of the removable clamps 68 for pivotally mounting either the cylinders 59 or 61, the motors 103, or the electrically driven fluid pump and cylinder unit shown in Fig. 6 afford simple and reliable means for removably securing such units to a hospital bed. Likewise, it will be apparent that with either form of my invention applied to the push pull tubes 52 the use of the mechanical system or the manually operated system already in existence may be employed at will. Also, the stop collars 82 provide means for accurately limiting the movement of the mechanically actuated mechanism, while the collar 91 may be used to similarly limit the movement of the manually operated mechanism.

While I have shown my invention in several forms, it will be obvious to those skilled in the art that it is not so limited, but is susceptible of various other changes and modifications without departing from the spirit thereof, and I desire, therefore, that only such limitations shall be placed thereupon as are specifically set forth in the appended claims.

What I claim is:

1. The combination with a manually operable reciprocable member operatively connected to a crank arm for raising and lowering a pivoted mattress frame section of a hospital bed, of a power actuated reciprocable member, a pivotal connection between the crank arm and said power actuated member, a member slidable on the manually operable reciprocable member, a pivotal connection between the slidable member and said power actuated member, and means engaging the slidable member with the manually operable reciprocable member when said manually operable reciprocable member moves in a direction to elevate the pivoted mattress frame section.

2. Apparatus as defined in claim 1 in which there is provided stop means on the manually operable reciprocable member disposed to limit movement of the power actuated member when it moves in a direction to elevate the pivoted mattress frame section.

3. The combination with a manually operable reciprocable member operatively connected to a crank arm for raising and lowering a pivoted mattress frame section of a hospital bed, of a power driven reciprocable member, a pivotal connection between said power driven member and the crank arm, a sleeve slidable on the manually operable reciprocable member and pivoted to said crank arm adjacent the point of connection therewith of the power driven member, a stop member on the manually operable reciprocable member engageable with said sleeve when the manually operable reciprocable member moves in a direction to elevate the pivoted mattress frame section, control mechanism for energizing and de-energizing the power driven member, and means to render inoperable the power driven member.

BEAMON V. COLEMAN.

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