Aug. 1, 1950 T. V. COX 2,517,466

HYDRAULICALLY OPERATED ADJUSTABLE BED

Filed June 22, 1946 4 Sheets-Sheet 1

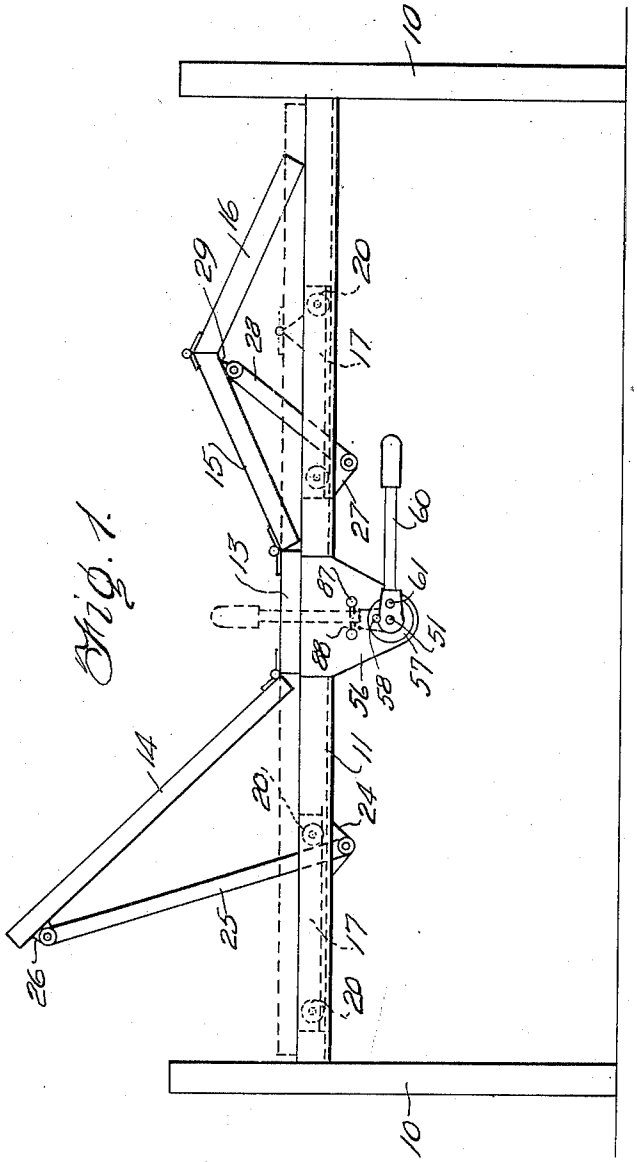


Fig. 1.

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HYDRAULICALLY OPERATED ADJUSTABLE BED

Filed June 22, 1946 4 Sheets-Sheet 2

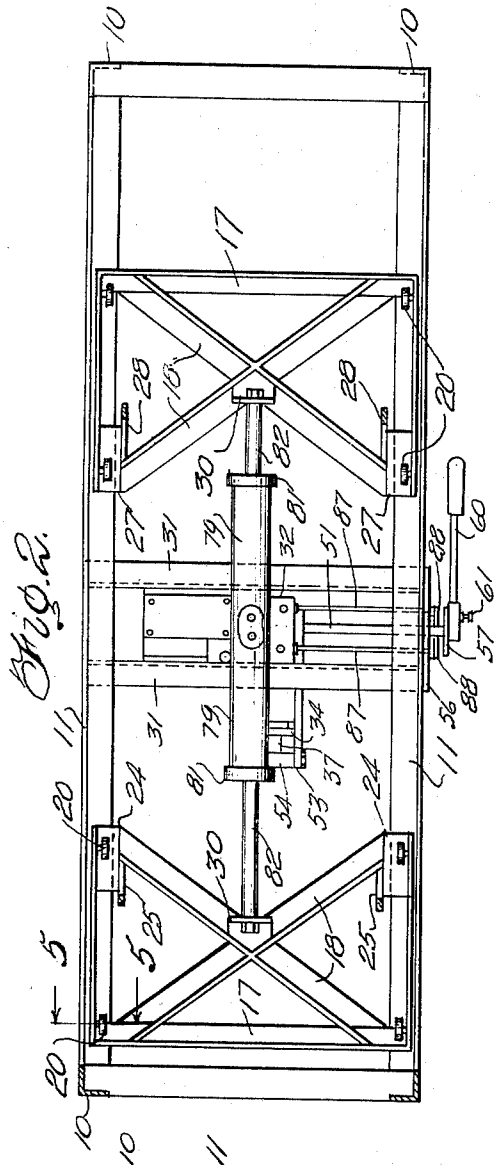


Fig. 2.

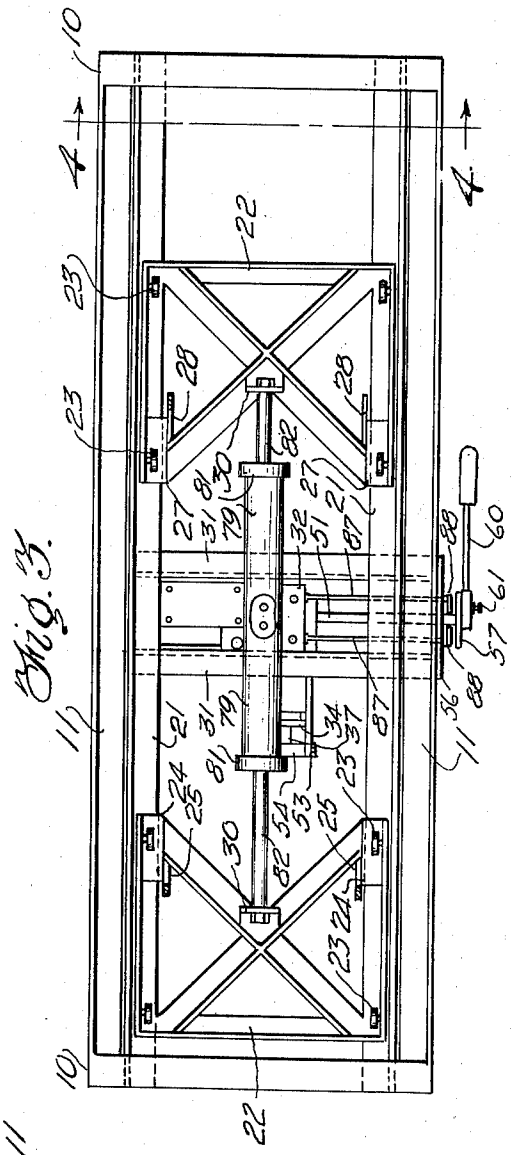


Fig. 3.

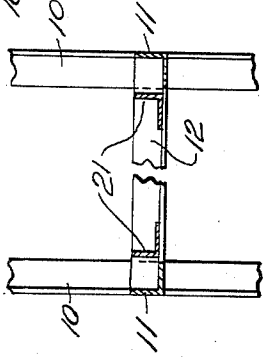


Fig. 4.

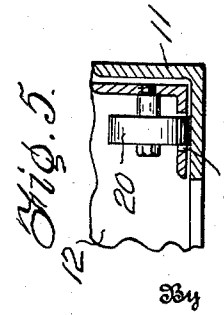


Fig. 5.

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HYDRAULICALLY OPERATED ADJUSTABLE BED

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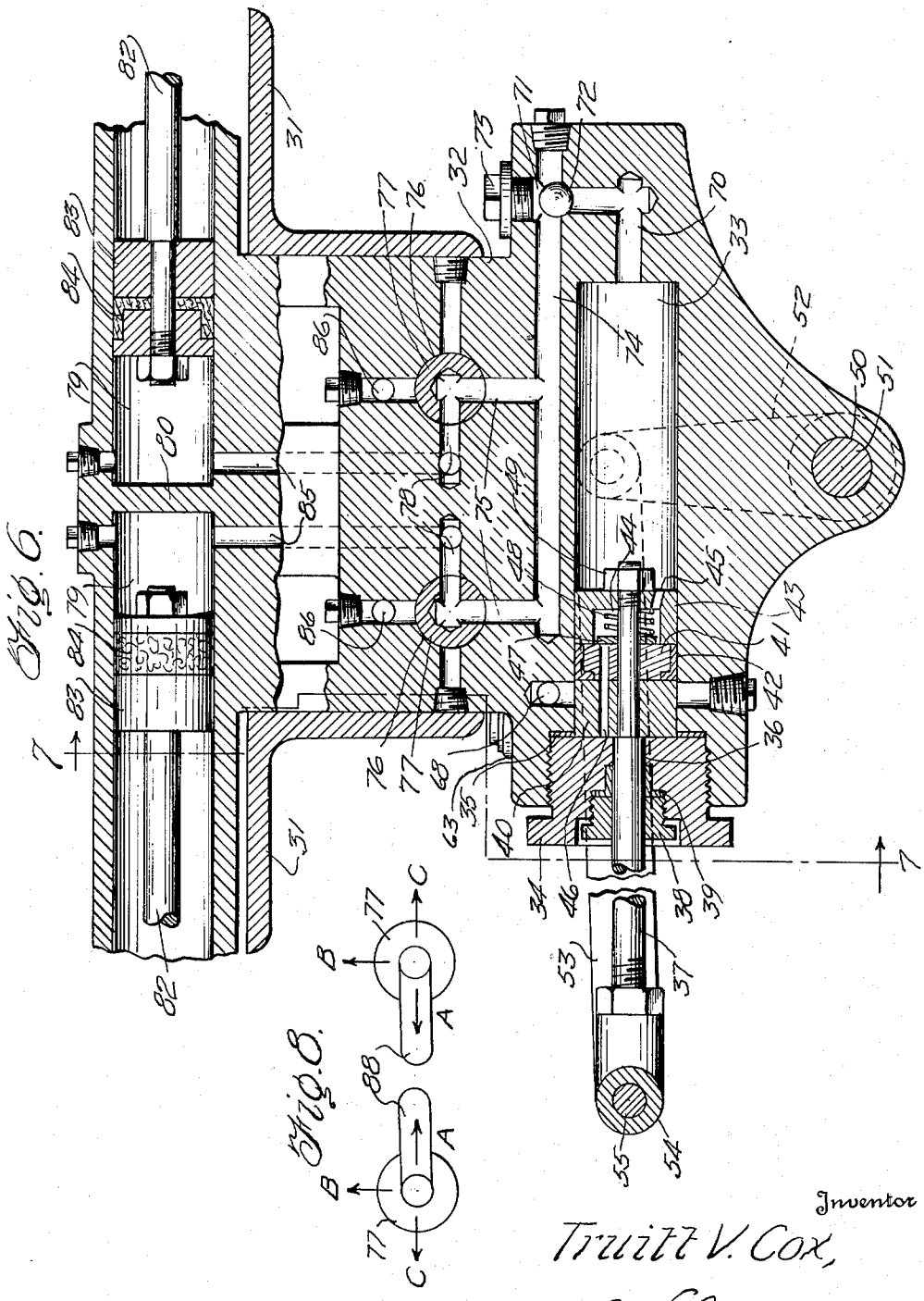


Fig. 6.

Fig. 8.

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HYDRAULICALLY OPERATED ADJUSTABLE BED

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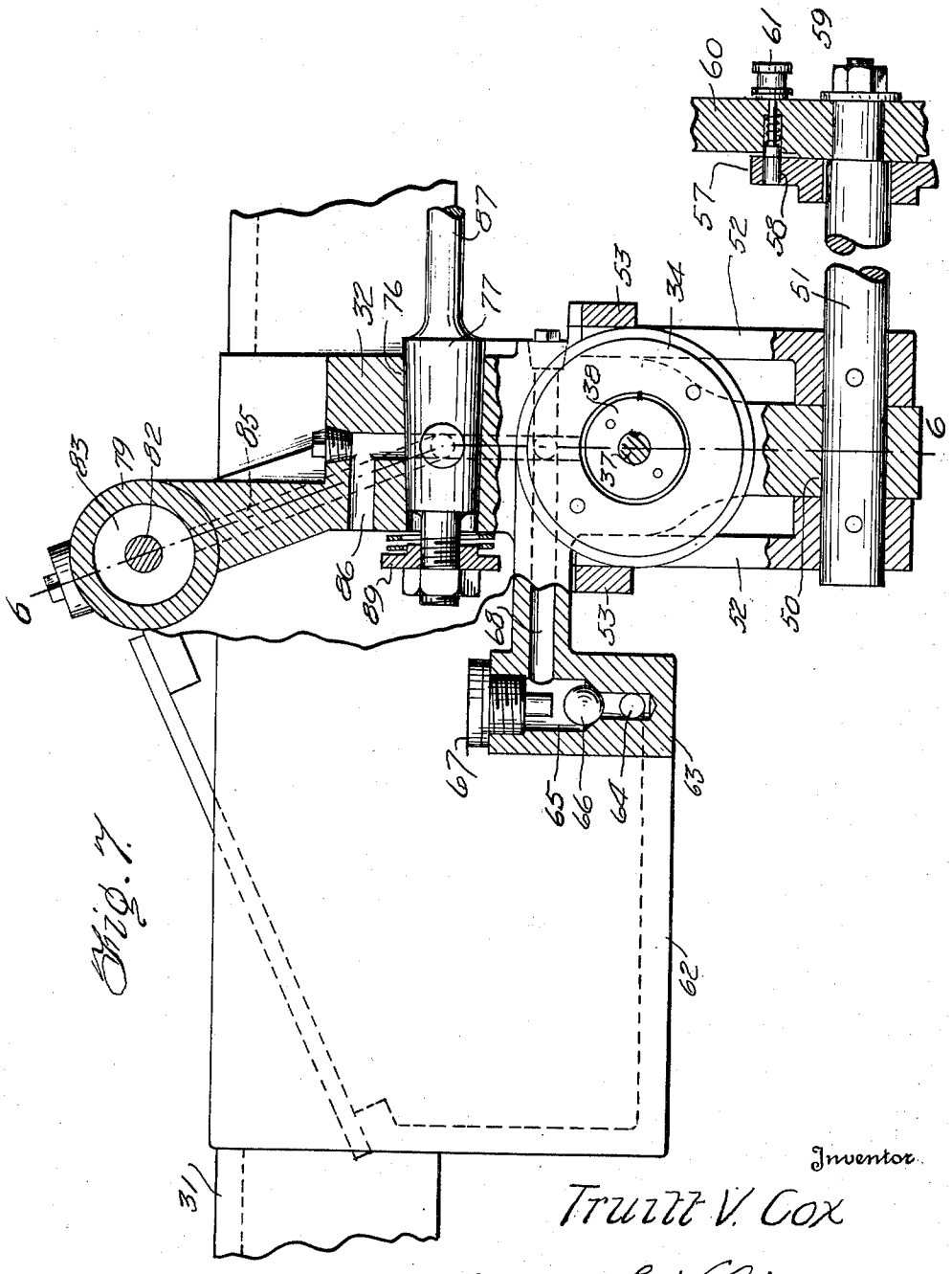


Fig. 4.

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UNITED STATES PATENT OFFICE

2,517,466

HYDRAULICALLY OPERATED ADJUSTABLE BED

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Application June 22, 1946, Serial No. 678,611

4 Claims. (Cl. 5—67)

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This invention relates to beds and has special reference to beds having adjustable bottoms such as are used for invalids and in hospitals.

More particularly the invention relates to beds with hydraulically adjustable bottoms.

One important object of the invention is to provide an improved general construction for beds of this description.

A second important object of the invention is to provide an improved and novel operating means for beds having adjustable bottoms, which means may be utilized in connection with the usual form of hospital beds.

A third important object of the invention is to provide a novel adjustable bed bottom structure and hydraulic means for operating the bed bottom associated with said structure, the whole being so arranged that it may be readily assembled with and removed from the ordinary hospital bed.

A fourth important object of the invention is to provide novel hydraulic operating means for adjusting the bottoms of beds of the foregoing character.

A fifth important object of the invention is to provide a novel hydraulic operating means whereby the head and foot sections of a bed bottom having independently adjustable sections may be selectively operated and simultaneously operated at the will of a nurse or other attendant.

A sixth important object of the invention is to provide a novel hydraulic operating means for the purpose set forth wherein a single pump cylinder is utilized for the supply of two pressure cylinders having selective conduit connections therewith.

With the above and other objects in view as will presently be apparent the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawing and particularly claimed.

In the accompanying drawings like characters of reference indicate like parts in the several views and—

Figure 1 is a side elevation of a bed having adjustable head and foot sections and showing the hydraulic adjusting means associated therewith.

Figure 2 is a plan view of the bed shown in Figure 1 but having the bed bottom removed to better show the operating parts.

Figure 3 is a view similar to Figure 2 but showing a modified form of the invention.

Figure 4 is a fragmentary section on the line 4—4 of Figure 3.

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Figure 5 is an enlarged fragmentary section on the line 5—5 of Figure 2.

Figure 6 is a longitudinal section taken through the hydraulic mechanism and substantially on the line 6—6 of Figure 7.

Figure 7 is a view partly in elevation and partly in section, the view being taken substantially on the line 7—7 of Figure 6.

Figure 8 is a detail elevation of certain valve handles used herein and illustrating the several control positions of the valves to which they are attached.

In the embodiment of the invention as herein disclosed there is shown a bed frame having end members each provided with a pair of legs 10 and side rails 11. These side rails are formed from angle irons which have horizontal legs directed toward each other and upstanding vertical legs so as to form confronting track members. Furthermore each pair of legs 10 has its legs connected by a cross bar 12. On the side rails 11 rests the bed bottom having a medially disposed portion 13 extending for a short distance longitudinally of the bed and spanning the space between the side rails. This portion 13 is suitably fixed in position by means not here shown but which may be of common character such as bolts or other equivalent means. To one of the transversely extending edges of the portion 13 there is hinged a back supporting portion 14 which may lie in the horizontal position shown in dotted lines in Figure 1 or may be swung upwardly as shown in full lines in that figure. To the other transverse edge of the portion 13 there is hinged a forward leg supporting portion 15 and to the rear edge of the latter there is hinged a rear leg supporting portion 16. As will also be seen from Figure 1 these leg supports may be moved between horizontal and upwardly inclined positions.

In the form of the device shown in Figures 2 and 5 there is provided at each end of the bed frame a carriage 17 of general U-shape the sides of which are connected by intersecting brace bars 18. The U-shaped frame is preferably made of angle iron with the sides fitting loosely in the angles of the bed rails 11. The horizontal legs of the carriage sides are slotted as at 19 so that small wheels or rollers 20 carried on stub shafts may project therethrough and support the carriage.

In the form shown in Figures 3 and 4 there is provided a pair of auxiliary rails 21 which lie close to but between the bed rails 11. The ends of the rails 21 rest on the cross bars 12 and may be suitably secured immovably thereto. Carriages

22 run on the rails 21 and are similar in all respects to the carriages 17 being provided with supporting wheels 23.

In each of these forms the sides of the head carriage are provided at their rear ends with brackets 24 which are connected by struts 25 with brackets 26 carried by the head end of the support 14. Similarly the other carriage has brackets 27 connected by struts 28 with brackets 29 carried by the rear part of the leg support 15. This construction is such that movement for elevation of a bed bottom portion is effected whenever the respective carriage is moved toward the adjacent bed end. Also each form has each carriage provided with a bracket 30 for purposes which will be presently set forth.

Extending transversely of the bed at about midway of its length is a pair of spaced carrier bars 31 in the form of angle irons or the like. In the form shown in Figure 2 the bars 31 are secured firmly to the bed rails 11 while the form shown in Figure 3 has these bars fixed to the auxiliary rails 21. These bars 31 support a casting 32 which forms the main part of the hydraulic mechanism proper. In the lower part of this casting there is bored a pump cylinder 33 having at one end a closure 34 resting against a packing ring or gasket 35. This closure is provided with a bore 36 for the passage of a piston rod 37 and the outer end of the bore 36 is enlarged and threaded for the reception of a gland 38 engaging packing 39 so as to ensure an oiltight fit for the piston rod 37. The inner end of the rod 37 is reduced to form a seat for a piston member 40. Fitted on said reduced end and bearing against the member 40 is an intermediate piston member 41 carrying a packing ring 42 to ensure a tight fit of the piston in the cylinder. A rear piston member 43 is mounted on rod 37 and is provided with a chamber 44 facing the member 41. The chamber 44 communicates with the rear end of the cylinder 33 through a passage 45 and with the front end of the cylinder through a passage 46 extending through the members 40 and 41. In the chamber 44 is a valve 47 controlling passage 46 and this valve is urged to close said passage by a spring 48. A nut 49 serves to hold the piston parts on the rod 37. At the bottom of the casting is a transverse bearing 50 wherein is journalled a shaft 51. Rock arms 52 have their lower ends pinned on the shaft 51 and extend up on each side of the casting 32. The upper ends of these arms are pivoted to the rear ends of links 53 which extend forwardly and have their forward ends connected to a cross-head 54 by means of a pin 55. The cross-head 54 is fixed on the forward end of the piston rod 37. Carried by the bars 31 is an outboard bearing plate 56 through which the shaft 51 extends. On the projecting portion of the shaft 51 is keyed or otherwise fixed a disk 57 having adjacent its periphery a plurality of pin receiving openings 58. Rotatably mounted on the shaft 51 and held on its outer end by a nut 59 is an operating lever 60 having a head end fitting the shaft and carrying a spring pressed pin 61 positioned for selective engagement in the pin receiving openings 58. This arrangement permits the lever to be adjusted to a convenient position for the use of a nurse or other operator. It may now be seen that oscillation of the lever 60 will rock the arms 53 which will effect oscillation of the links 53 and consequently will reciprocate the piston in the pump cylinder. At 62 is an oil reservoir and at one side of this reservoir is a valve casing 63 which communicates with the lower part thereof by a passage 64 which opens upwardly into a valve chamber 65. A ball check valve 66 is held in this chamber and opens upwardly to allow flow of oil from the tank. The upper end of the chamber 65 is closed by a suitable plug 67 and just below this plug a passage 68 leads laterally and then downwardly to open into the forward end of the cylinder 33 close behind the closure 34. Thus upon movement of the piston to the right from the position shown in Figure 6 oil will be drawn into the forward end of the cylinder but upon return movement of the piston the valve 47 will lift and the oil in the forward end will flow through passage 46, chamber 44 and passage 45 into the rear end of the cylinder.

Extending axially and then upwardly from the end of the cylinder opposite the closure 34 is a passage 70 which opens into a valve chamber 71 wherein is an upwardly opening check valve 72. The chamber 71 has its upper end closed by a plug 73 and from said chamber extends a manifold 74 which communicates by means of branches 75 with two frusto-conical valve chambers 76 in each of which is fitted a valve 77 having a passage with ends opening at right angles to each other as is common in three way valves. Passages 78 extend toward each other from these valve chambers but terminate in spaced relation. At the upper part of the casting 32 there is bored an alined pair of pressure cylinders 79 having their inner ends held from communication by a septum 80. These cylinders 79 have their remote ends closed by suitable closures 81 having the usual openings for the piston rods 82. On the inner ends of the rods 82 are mounted the pistons 83 and these pistons are provided with suitable packing means 84 similar to that used in the pump cylinder. The rods 82 form operative connections between the cylinders and carriages. Passages 85 connect the passages 78 with the cylinders 79. Also return passages 86 connect the valve chambers 76 with the upper part of the tank 62. Each valve 77 is provided with a stem 87 which projects through the bearing plate 56 and has on its outer end an operating handle 88. Referring to Figures 6 and 8 it is to be understood that with the valves themselves in the positions of Figure 6 the handles will be in the positions A and communication will exist between the pump cylinder and both pressure cylinders. If the valves be turned to connect the pressure cylinders with the return passages 86 the handles will be in the position B. Finally, if the handles be turned to the positions C the valves will have been turned so that no communication can exist between the valve chambers 76 and either the pump cylinder or the pressure cylinders. Obviously the valves 77 may be operated independently of each other.

By reference to Figure 6 it will be seen that the usual means embodying any device such as a nut, washer and spring shown at 89 may be used to prevent leakage at the control valves.

What is claimed, is:

1. In a bed including tiltably mounted head and leg supporting frames, a bed frame, a bottom supported by said bed frame, hydraulic means for vertically adjusting said supporting frames including a pump, a pair of cylinders having conduit communication with said pump, and an operative connection between each cylinder and a respective supporting frame, said operative connection including a travelling carriage for each

supporting frame, and links connecting the respective carriage and supporting frame.

2. In a bed having a pair of longitudinally extending rails and a bottom including a fixed central section, a head supporting section hinged to one edge of the central section, a leg supporting section hinged to the opposite edge of the central section, carriages running on said rails, links connecting the free edge portion of each supporting section with a respective carriage, and means to move said carriages along said rails, said means including a pair of hydraulic cylinders and an operative connection between each cylinder and a respective carriage.

3. In a bed having a pair of longitudinally extending rails and a bottom including a fixed central section, a head supporting section hinged to one edge of the central section, a leg supporting section hinged to the opposite edge of the central section, carriages running on said rails, links connecting the free edge portion of each supporting section with a respective carriage, and means to move said carriages along said rails, said means including a pair of hydraulic cylinders, an operative connection between each cylinder and a respective carriage, and means for supplying fluid under pressure selectively to said cylinders.

4. In a bed including tiltably mounted head and leg supporting frames, a bed frame, a bottom supported by said bed frame, hydraulic means for vertically adjusting said supporting frames including a pump, a pair of cylinders having conduit communication with said pump, and an operative connection between each cylinder and a respective supporting frame, said operative connection including a traveling carriage for each supporting frame, and means connecting the respective carriage and supporting frame.

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