United States Patent [19]

Hirmann

[11] **3,750,200**

[45] **Aug. 7, 1973**

[54] **BED SETTING DRIVE WITH LOW-PRESSURE HYDRAULIC SYSTEM**

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[73] Assignee: **Veenendaal & Co. Industriestrasse**, Affolten a.A., Switzerland

[22] Filed: **Apr. 18, 1972**

[21] Appl. No.: **245,081**

[30] **Foreign Application Priority Data**

Apr. 19, 1971 Switzerland 5415/71

[52] **U.S. Cl.** **5/66**, 5/68

[51] **Int. Cl.** **A61g 7/10**, A47c 3/32

[58] **Field of Search** ..... 5/62, 64, 66–69; 108/147; 254/93 HP, 124 X

[56] **References Cited**

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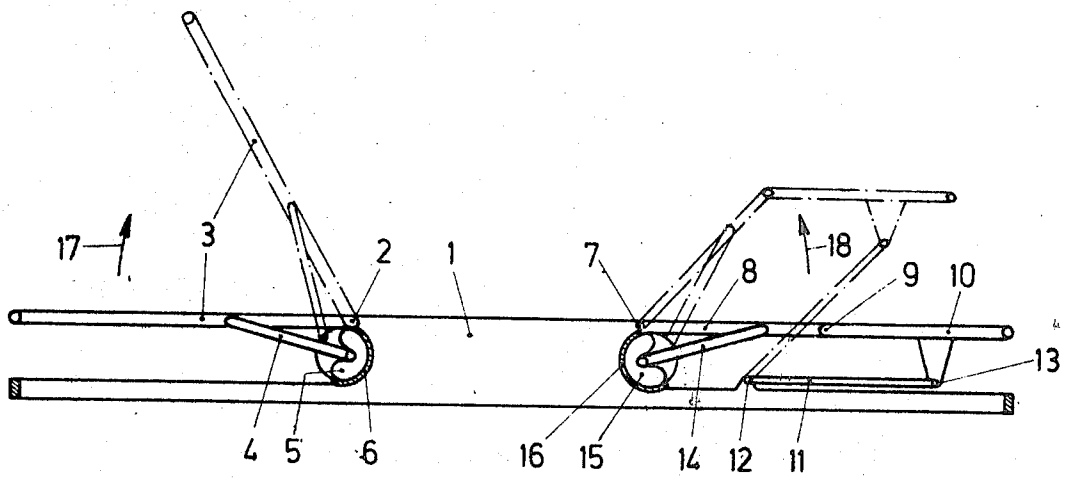
Attorney—Alvin Browdy et al.

[57] **ABSTRACT**

e.g. device for hydraulically setting the position of a bed which includes a large diameter inflatable hose to which is connected a source of low-pressure water, e.g., from the main water supply. Inflation of the hose serves to move an element in contact with the hose surface and this element controls the position of the bed.

9 Claims, 5 Drawing Figures



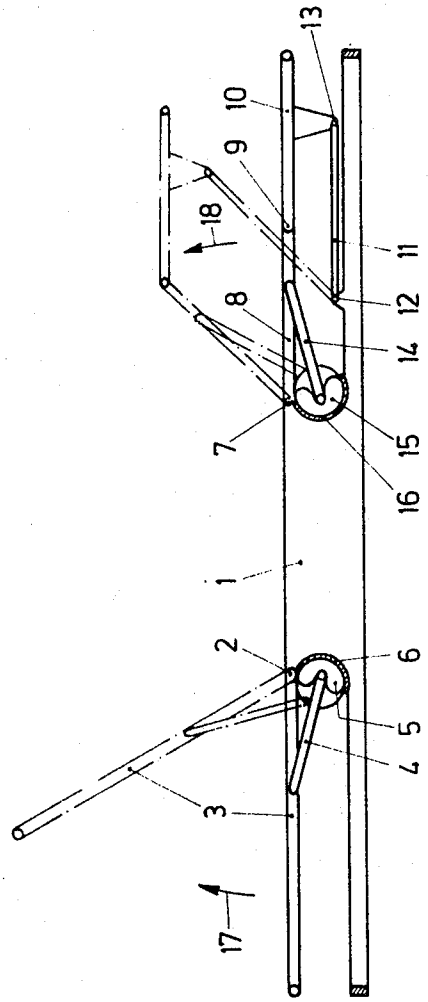


FIG.1

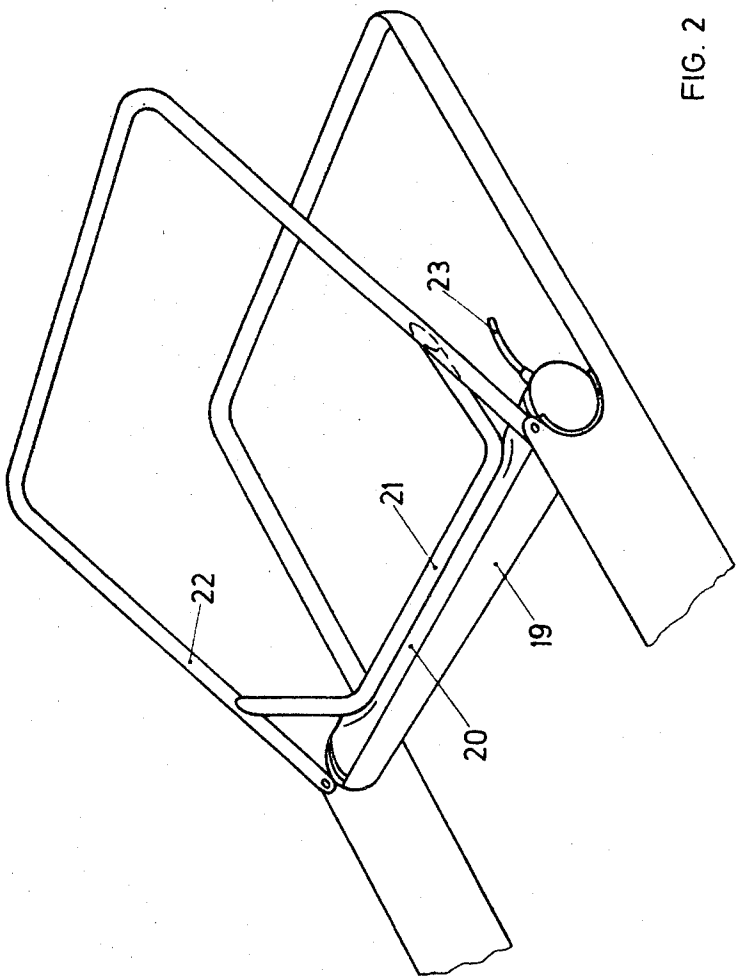


FIG. 2

FIG. 3

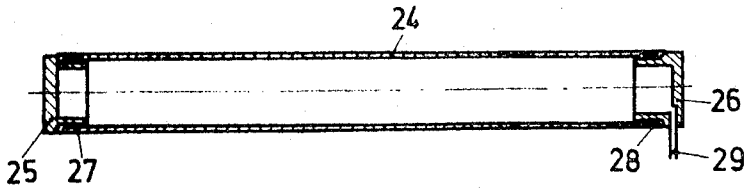


FIG. 4

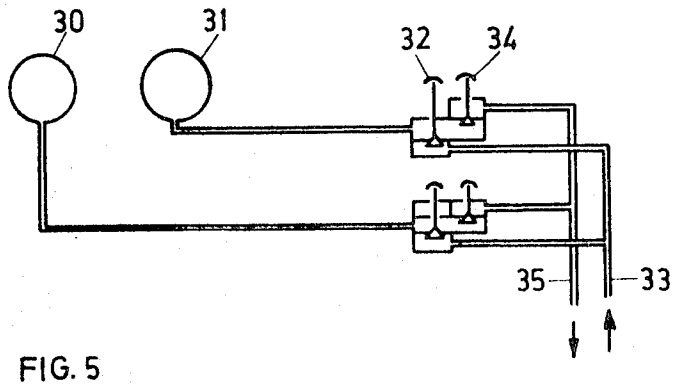
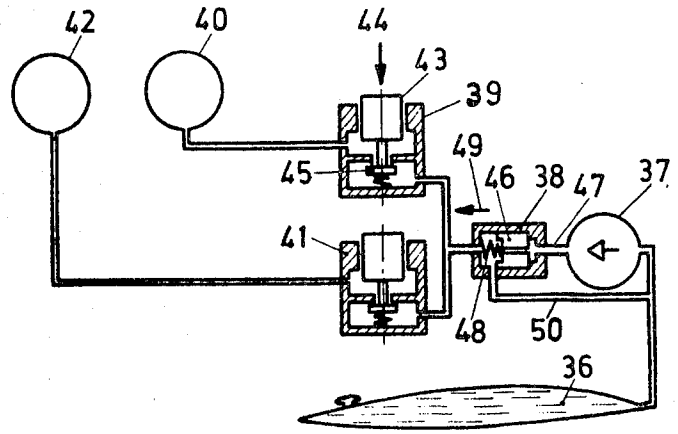


FIG. 5



BED SETTING DRIVE WITH LOW-PRESSURE HYDRAULIC SYSTEM

The present invention concerns a hydraulic low-pressure setting drive, in particular for the operation of adjustable beds.

The object of the present invention is to provide a setting drive which operates with very low hydraulic operating pressure and which can therefore be operated by an electro-hydraulic low-pressure pump or by the water supply system direct.

The main advantage of such a bed-setting drive operated by the water supply system is the outright elimination of any risk of explosion or fire in hospitals, where the care of patients often involves using ether, gasoline, etc., at the bedside, so that the sparking of a switch or a fault in electric leads may result in disaster. The purely hydraulic operation also rules out the danger of electrocution.

A cost advantage common to both operational versions exemplified is the exceptionally low manufacturing cost.

The low level of the operating pressure is ensured hereunder by the formation of exceptionally large active surfaces on the force generator of the setting position drive.

The present invention is now to be described by way of example with reference to the appended drawings, in which:

FIG. 1 shows an embodiment comprising a bed with two new-type position setting drives incorporated;

FIG. 2 shows a position setting drive in perspective;

FIG. 3 shows a force generator;

FIG. 4 shows an arrangement for operating the setting drive from the water supply system;

FIG. 5 shows an electro-hydraulic operation system for the setting drives.

FIG. 1 : Bed with two new-type position setting drives incorporated

A bedstead 1 is provided with two main pivot assemblies 2 and 7. The main pivot assembly 2 supports a pivoting part 3 provided with a U-shaped tube 4. This tube presses against a piece of hose 5 which serves as the force generator, and which is provided with closing covers and whose inside is filled with a pressure medium. The piece of hose 5 is supported by a channel 6 fixed to the bedstead 1. The other main pivot assembly 7 supports a pivoting part 8, as used for resting the feet in a raised position, for instance; and connected to the free end of the pivoting part 8 by a joint 9 is another pivoting part 10 which is guided parallel to the bedstead by a link 11 movably joined to the pivots 12 and 13. The two pivoting parts 8 and 10 are operated by a U-shaped tube 14 connected to the pivoting part 8 and by a piece of hose 15 serving as the force generator. The latter, filled with liquid, is supported by a channel 16 fixed to the bedstead. When the pressure medium e.g. water, is pumped into the piece of hose 5, the pivoting part 3 rises in the direction of the arrow 17. Similarly, when the pressure medium is pumped into the piece of hose 15, the pivoting parts 8 and 10 move in the direction of the arrow 18.

FIG. 2 : Position Setting Drive Shown in Perspective

This figure shows the essential functional parts, namely the hose supporting channel 19, the inflatable hose element 20, the U-shaped tube 21 resting on the hose element 20 and connected to the pivoting part 22. The hose element is supplied with inflating fluid through a line 23. The hose is cylindrical and has a large diameter when inflated.

FIG. 3 : Hose Element

This figure shows a hose element comprising a hose 24, an outlet closing end cap or cover 25, an inlet connection or end cap 26, clamps 27 and 28 to control inlet and outlet, and a supply line 29.

FIG. 4 : Operation of Position Setting Drives from Water Supply

This type of operation is extremely simple, cost-saving and safe. The figure shows components of the hydraulic assembly of a dual setting drive. A first hose element serving as a force generator is connected by a hydraulic line 31 to a valve group, which in this case consists of two manually controlled non-return valves 32, 34; the valve 32 when open admits the water flowing from a pressure line 33, while the valve 34 when open permits the water from the hose element to flow into the outgoing line 35. Control of the other position setting drive is effected analogously.

FIG. 5 : Electro-hydraulic Operation of Position Setting Drives

This type of operation again uses water, but the construction is such as to prevent any loss of water. To achieve this, a closed bag which is vented after being filled with water is used as a reservoir.

The components shown in FIG. 5 are : a bag 36, a pump 37, a dynamically controlled change-over valve 38, a manually operated differential valve 39, the hose element 40 of the setting drive, a differential valve 41 and a hose element 42.

Raising of the pivoting part is effected by starting the pump 37 and at the same time actuating the valve 39, e.g. by pressing the differential piston 43 in the direction 44, so that the valve disk 45 clears the access to the hose element 40.

Lowering is effected by actuating the valve 39, e.g. by pressing the differential piston 43, but without starting the pump 37.

The dynamically controlled change-over valve 38 consists of a piston 46 with a coaxial through-bore whose cross-section is reduced with respect to the line 47, and a compression spring 48.

When the pump 37 is started, the pressure of the liquid moves the piston in the direction 49 against the action of the spring 48 and closes the port leading to the line 50.

When the valve 39 or 41 is operated with the pump 37 switched off, the piston 46 clears the port leading to the line 50, and the liquid returns through the latter into the reservoir 36.

I claim:

1. A device for hydraulically setting the position of a bed using low fluid pressure comprising

at least one elongated, radially inflatable hose having a large hydraulically active surface,

pivot assembly means for positioning the bed in response to the inflation of said hose, said pivot assembly means including an element forming a concave deformation in the surface of said hose, through which movement of the surface of said hose is transferred to the bed, and

means to inflate and deflate said inflatable hose.

2. Bed-setting drive according to claim 1 wherein said element of said pivot assembly means comprises a U-shaped tube the top of which is connected to a pivoting part of said assembly means and the base of which

forms said concave deformation in the surface of said hose.

3. A device in accordance with claim 1 comprising two said inflatable hoses for controlling the positioning of two separate portions of the bed.

4. Bed-setting drive according to claim 3 wherein each said hose is supported by a channel-shaped component.

5. Bed-setting drive according to claim 8 wherein water is the fluid medium.

6. A device in accordance with claim 5 comprising means for connecting said means to inflate to main water supply.

7. Bed-setting drive according to claim 1 wherein said means to inflate and deflate said hose includes a low-pressure pump and a bladder-type reservoir.

8. Bed-setting drive according to claim 1, wherein said means to inflate and deflate comprises at least one differential valve.

9. In a device for setting the position of a bed using a low pressure medium wherein the bed includes a frame and pivotal portion, comprising

at least one elongated hose portion closed at both ends,

an elongated rigid concave support channel for said elongated hose, said support channel being rigidly affixed to the bed frame,

a transmission member in contact with and forming a concave deformation in the surface of said elongated hose and operatively connected to the pivotal portion of the bed, and

means to inflate and deflate said hose portion including a source of pressure medium and shutoff means.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,750,200 Dated August 7, 1973

Inventor(s) Georg HIRMANN

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the ABSTRACT, 1st line, delete "e.g." and insert --A--

Column 2, line 13, after "element" insert --30--

Column 3, line 9 (claim 5), delete "8" and insert --1--.

Signed and sealed this 20th day of November 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

RENE D. TEGTMEYER
Acting Commissioner of Patents

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