Aug. 29, 1950 J. S. CLACHKO 2,520,455

SURGICAL TABLE WITH HYDRAULIC ADJUSTING SYSTEM

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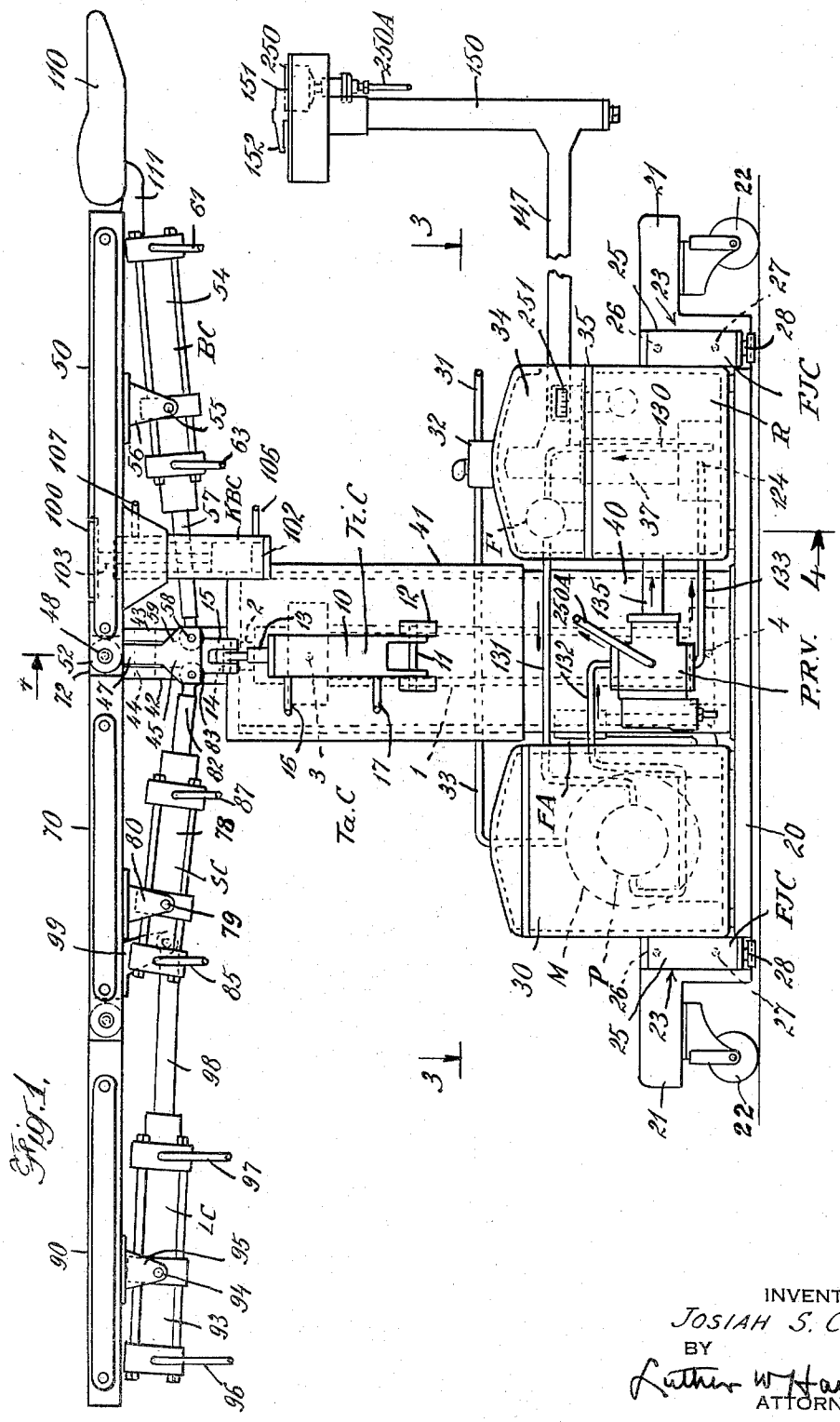


Fig. 1.

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SURGICAL TABLE WITH HYDRAULIC ADJUSTING SYSTEM

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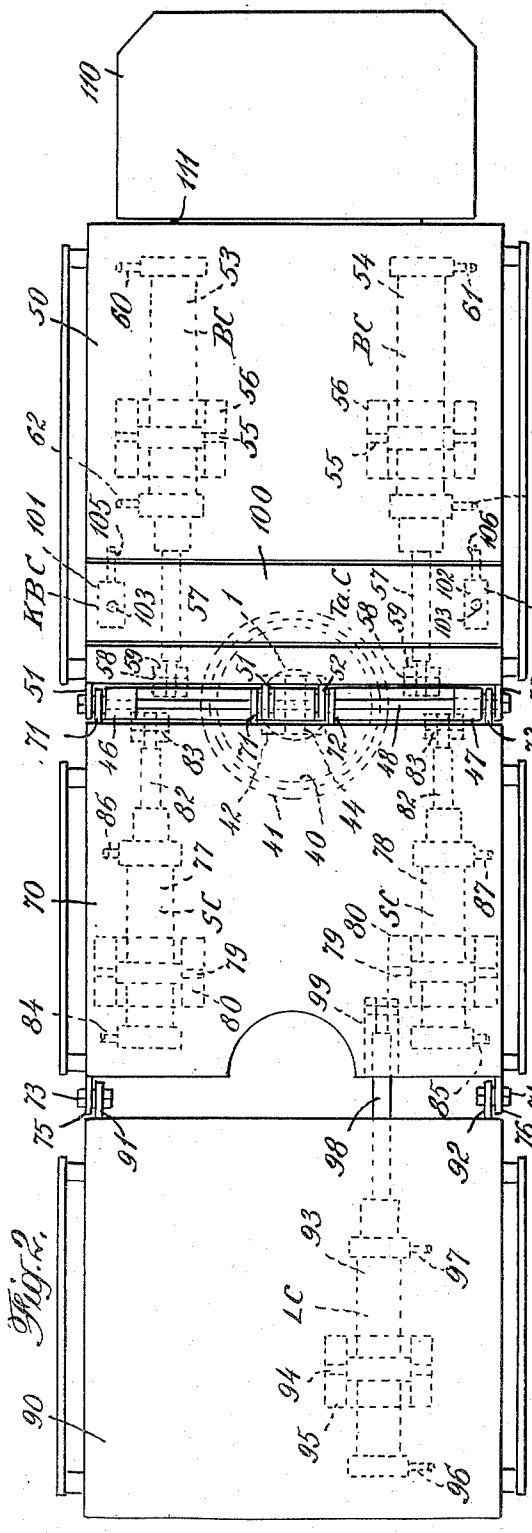


Fig. 2.

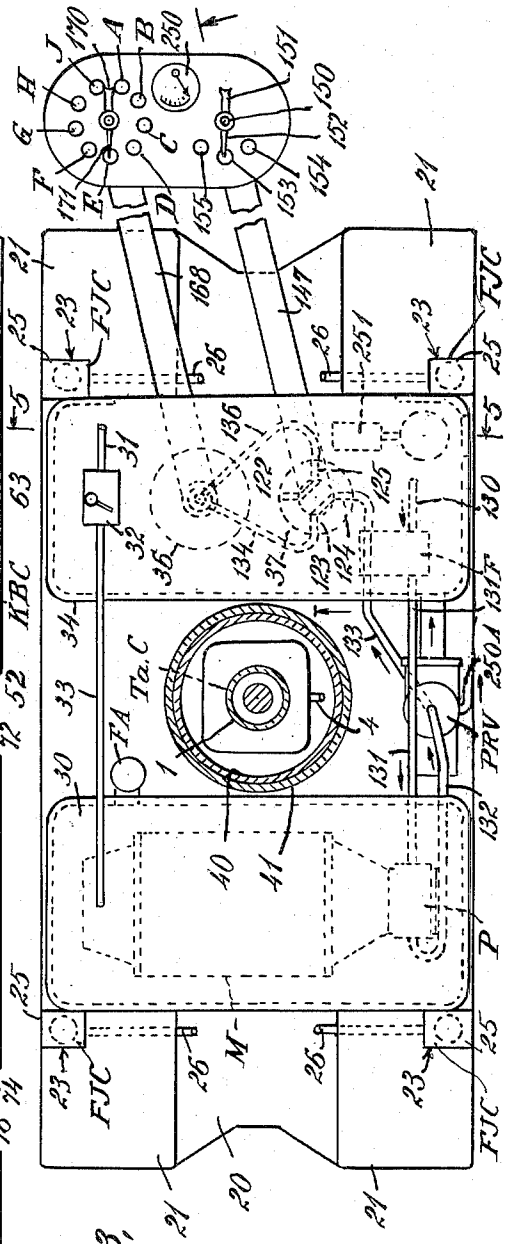


Fig. 3.

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SURGICAL TABLE WITH HYDRAULIC ADJUSTING SYSTEM

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Fig. 4,

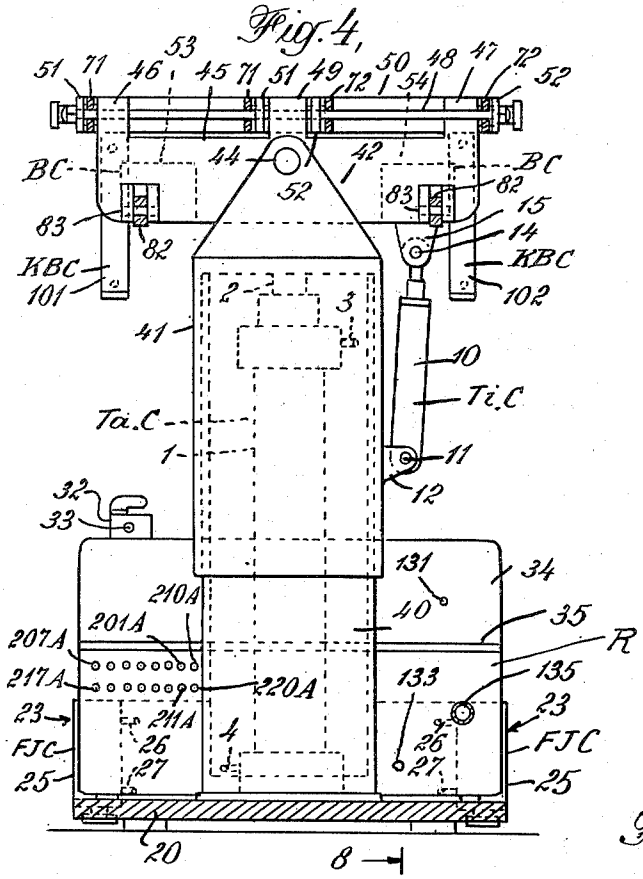
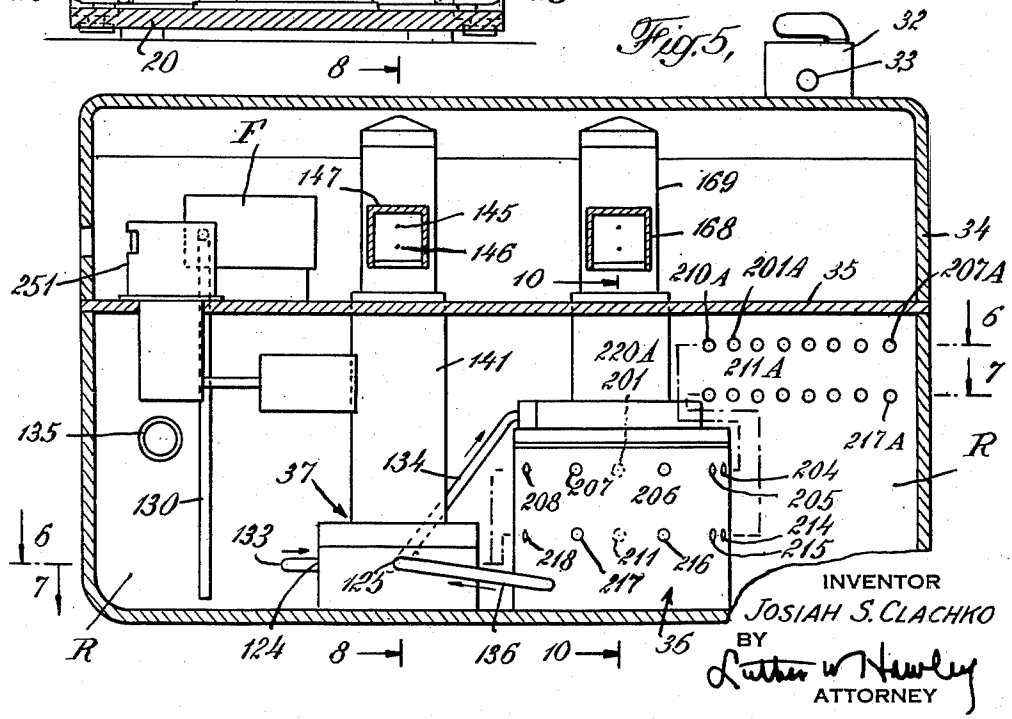


Fig. 5,

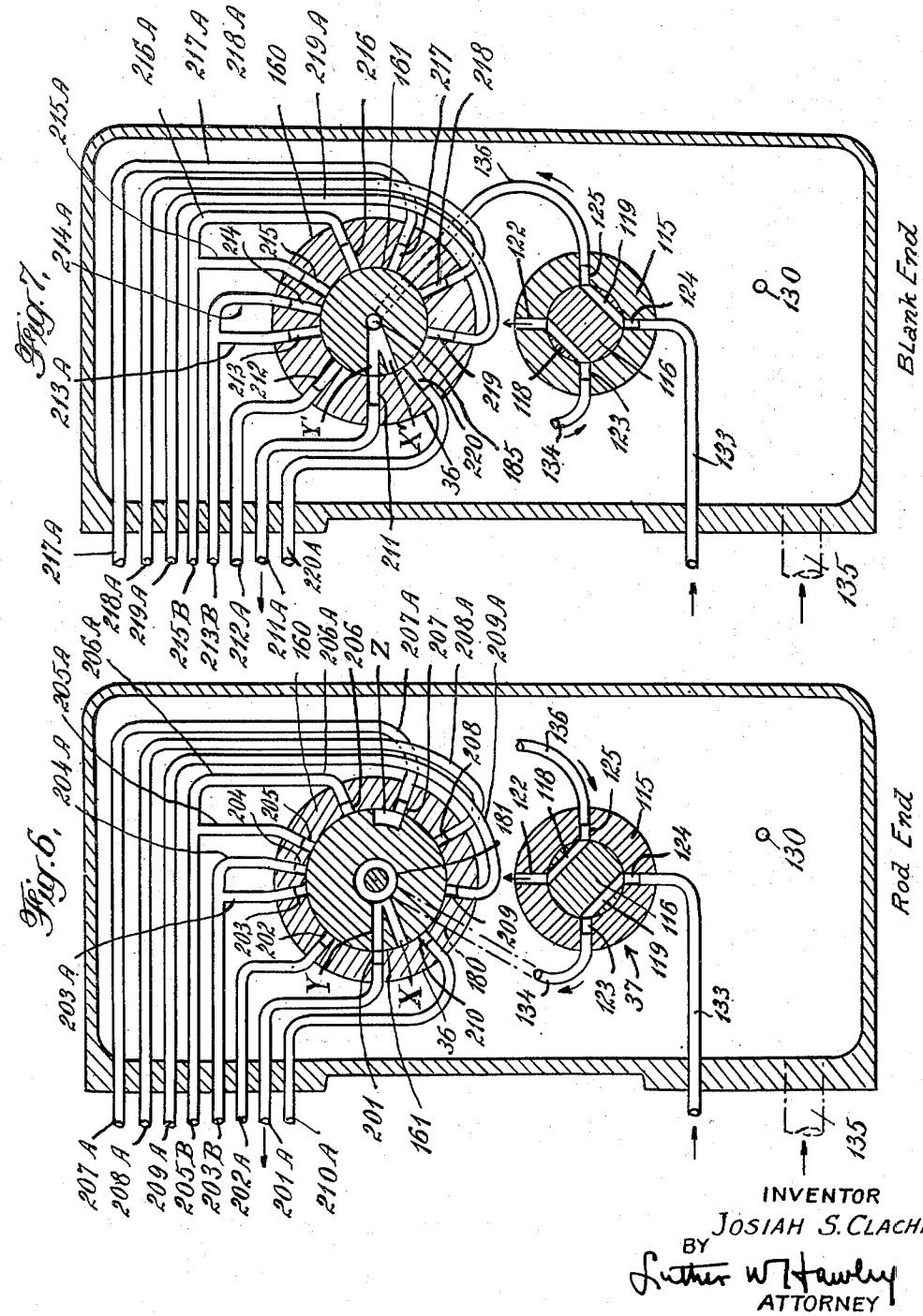


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SURGICAL TABLE WITH HYDRAULIC ADJUSTING SYSTEM

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SURGICAL TABLE WITH HYDRAULIC ADJUSTING SYSTEM

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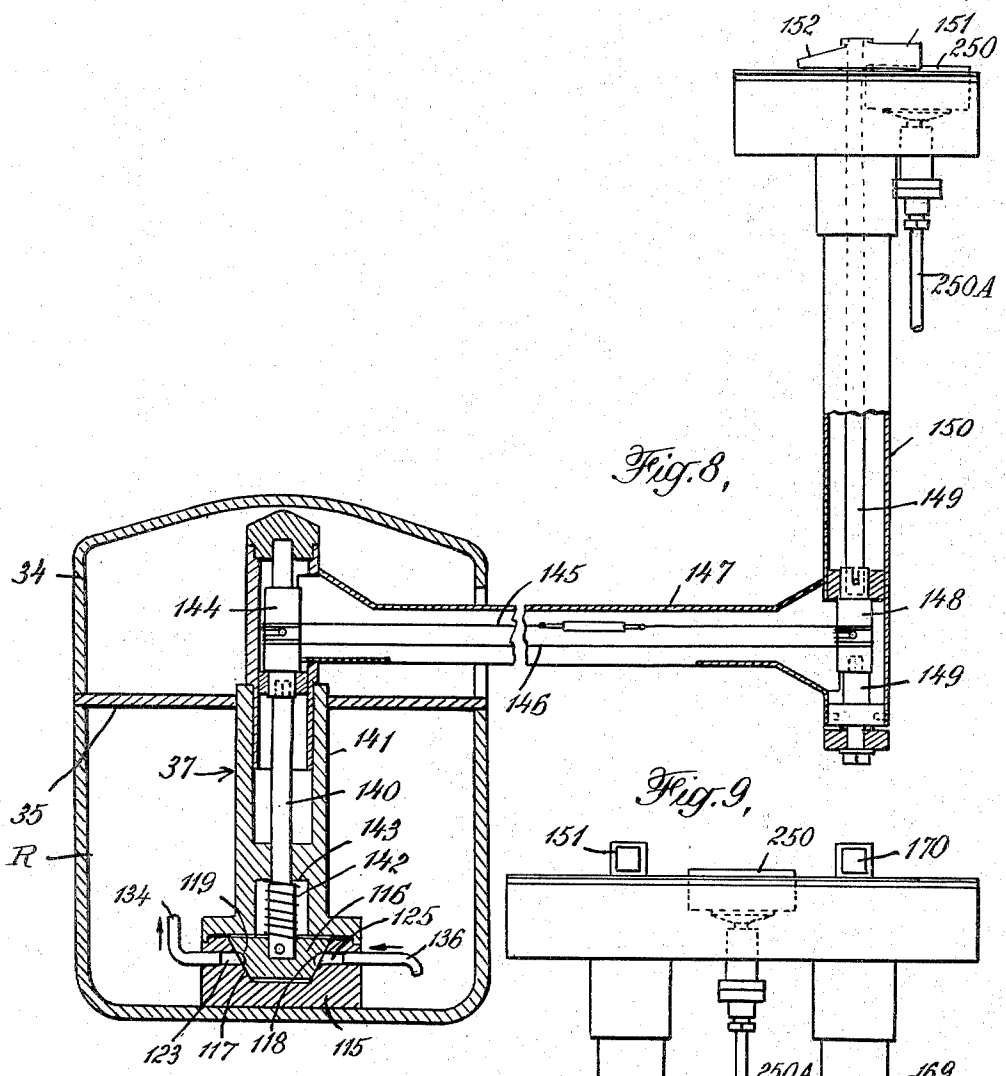


Fig. 8,

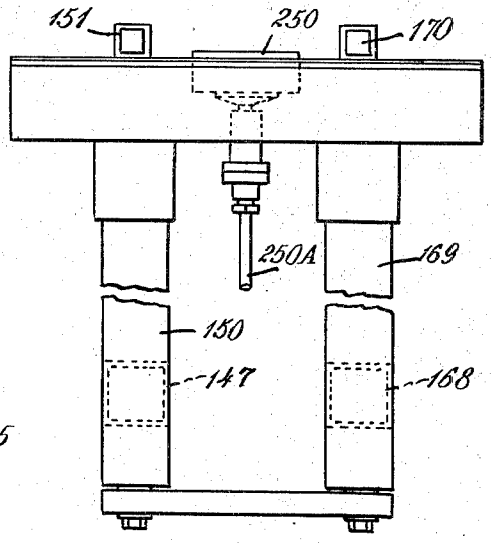


Fig. 9,

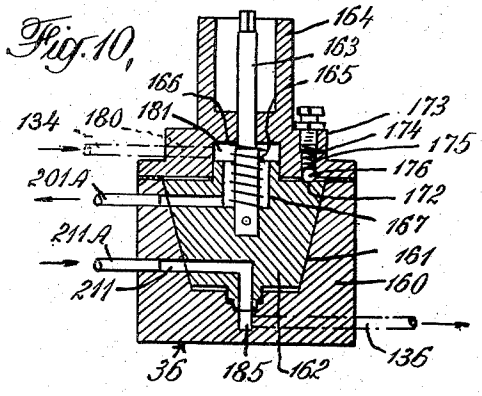


Fig. 10,

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SURGICAL TABLE WITH HYDRAULIC ADJUSTING SYSTEM

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Fig. 11,

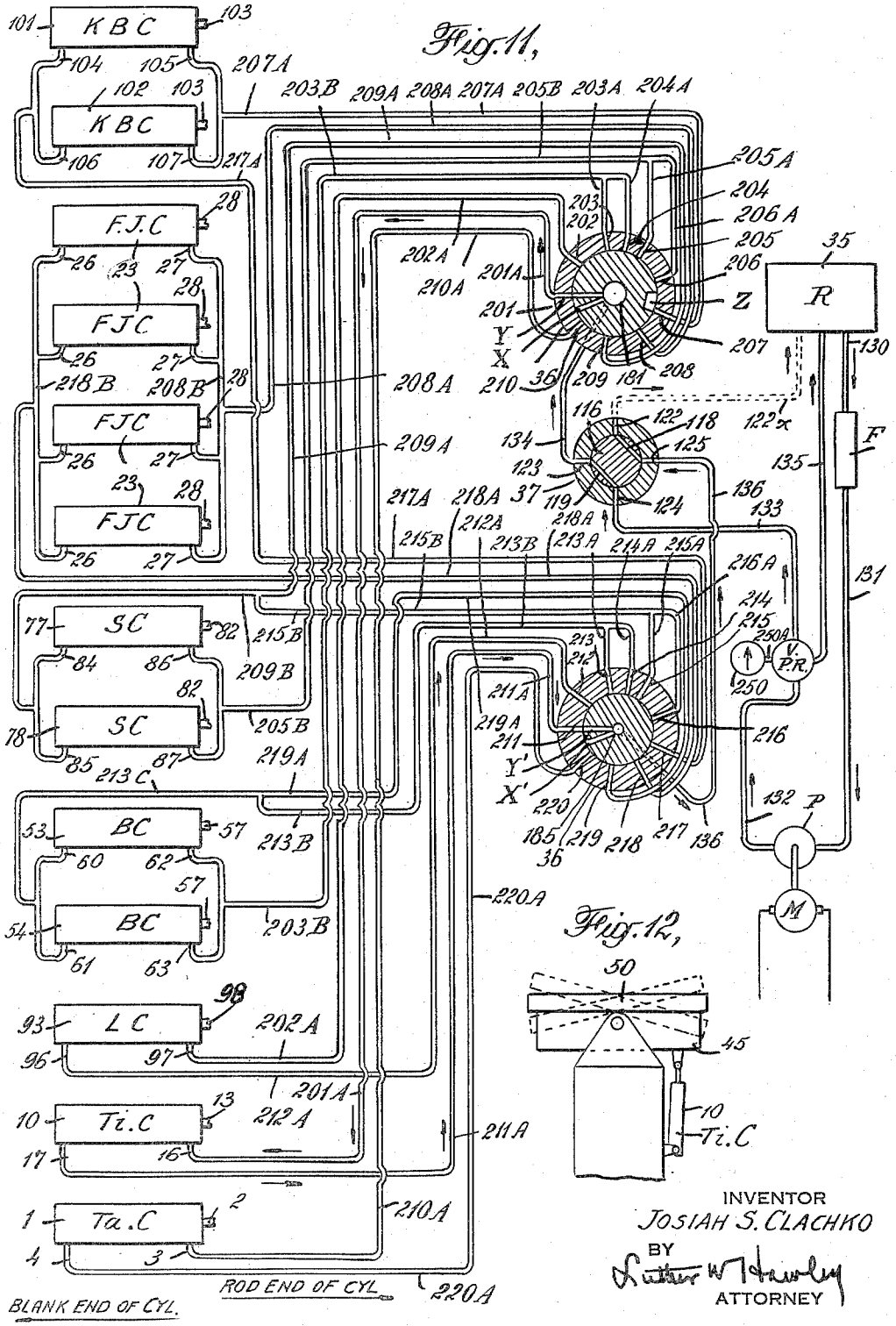


Fig. 12,

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SURGICAL TABLE WITH HYDRAULIC ADJUSTING SYSTEM

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Fig. 13,

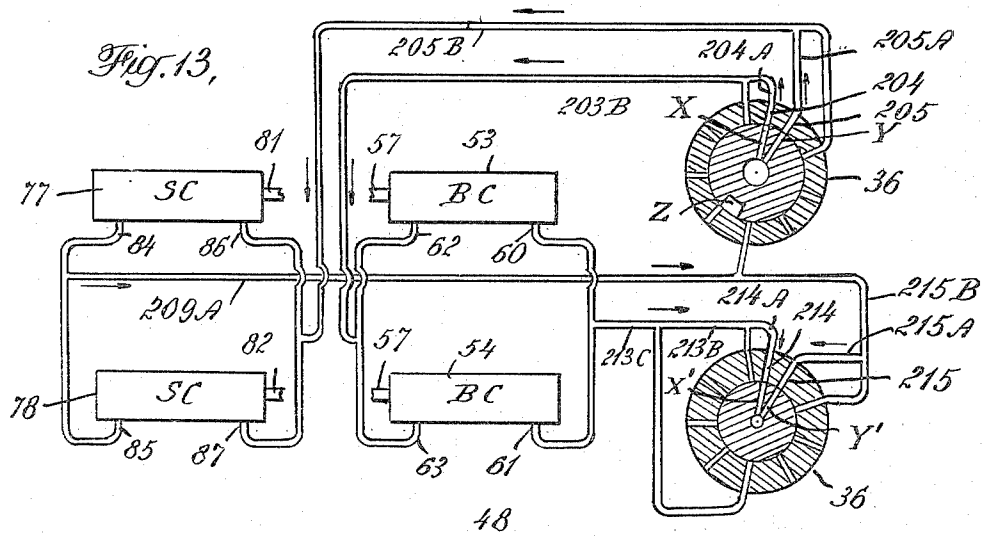


Fig. 14,

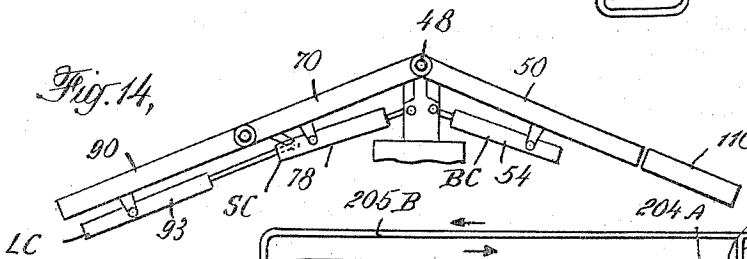


Fig. 15,

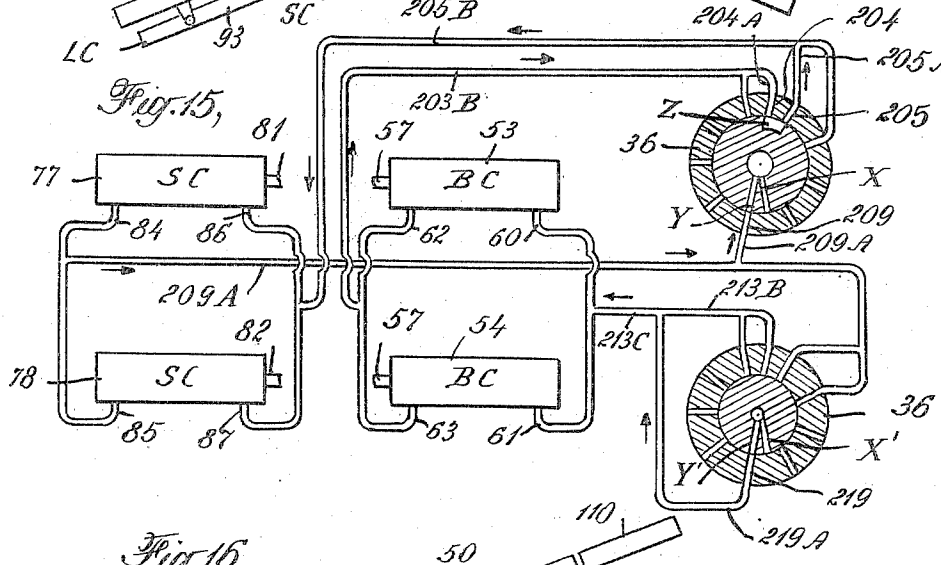
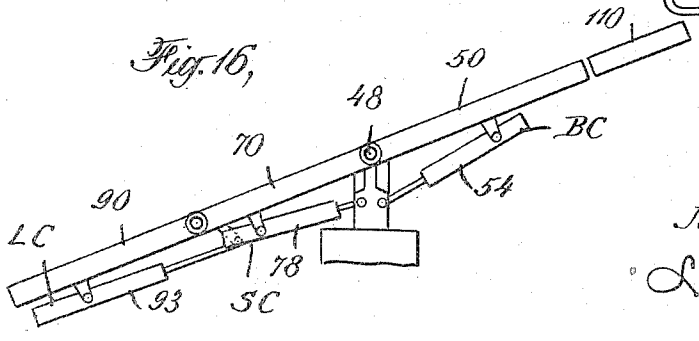


Fig. 16,



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Patented Aug. 29, 1950 2,520,455

UNITED STATES PATENT OFFICE

2,520,455

SURGICAL TABLE WITH HYDRAULIC ADJUSTING SYSTEM

Josiah S. Clachko, Ridgefield Park, N. J., assignor, by mesne assignments, to Ritter Company, Inc., Rochester, N. Y., a corporation of Delaware

Application June 20, 1945, Serial No. 600,427

8 Claims. (Cl. 311—7)

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This invention relates to surgical operating tables.

Surgical operating tables as now made are provided with a plurality of sections such as the head, back, seat and leg sections, which can be adjusted to various positions depending upon the operation to be performed. These adjustments are made by manual manipulation and actuation by the anesthetist or nurse. If the adjustments are made by a nurse an extra nurse is required since the nurse assisting the surgeon must not contaminate the instruments and for this reason could not operate a hand wheel or otherwise manually manipulate the operative connections for the desired adjustments. Furthermore, any such activity on her part would divert her from her primary duties of assisting the surgeon. If the adjustments are made by the anesthetist, her attention is diverted from her primary duty of watching the patient.

This invention has for its salient object to simplify the operating table adjustments and to eliminate manual manipulation of the table adjusting mechanism.

Another object of the invention is to provide fluid operated mechanism for moving the table sections and simple control mechanism whereby the table and table sections can be raised, lowered, or tilted, as desired.

Another object of the invention is to provide fluid operated mechanism for selectively adjusting the table sections of an operating table and control mechanism whereby a plurality of sections can be simultaneously adjusted in either direction by one setting of the selector valve and the proper setting of the control valve.

Further objects of the invention will appear from the following specification taken in connection with the drawings which form a part of this application, and in which

Fig. 1 is a side elevation of an operating table having adjusting and control mechanism constructed in accordance with the invention;

Fig. 2 is a top plan view of the table shown in Fig. 1;

Fig. 3 is a plan view, partly in section, taken substantially on line 3—3 of Fig. 1, looking in the direction of the arrows;

Fig. 4 is a vertical sectional elevation taken substantially on line 4—4 of Fig. 1, looking in the direction of the arrows;

Fig. 5 is a sectional elevation on an enlarged scale taken substantially on line 5—5 of Fig. 3, looking in the direction of the arrows;

Fig. 6 is a sectional elevation taken substantially on line 6—6 of Fig. 5, looking in the direction of the arrows;

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Fig. 7 is a sectional elevation taken substantially on line 7—7 of Fig. 5, looking in the direction of the arrows;

Fig. 8 is an elevational view, partly in section, taken substantially on line 8—8 of Fig. 5, looking in the direction of the arrows;

Fig. 9 is an elevational view taken at right angles to Fig. 8, looking toward the left in said figure;

Fig. 10 is a vertical sectional elevation of the selective control mecahnism taken substantially on line 10—10 of Fig. 5, looking in the direction of the arrows;

Fig. 11 is a diagrammatic view illustrating the control cylinders for the different parts of the operating table, connections thereto, control mechanism therefor and, diagrammatically, the circuits involved in the control system;

Fig. 12 is a diagrammatic view illustrating the tilting adjustment of the table accomplished by the selector valve settings and cylinder connections shown in Figs. 6, 7 and 11;

Fig. 13 is a diagrammatic view showing the selector valve settings and cylinder connections for the Mayo kidney table adjustment shown in Fig. 14;

Fig. 14 is a diagrammatic view showing the table adjusted for the Mayo kidney operation;

Fig. 15 is a diagrammatic view showing the selector valve settings and cylinder connections for the Trendelenburg positions of the table shown in Fig. 16; and

Fig. 16 shows the table adjusted to Trendelenburg position.

The invention briefly described consists of an operating table comprising a plurality of relatively adjustable, pivoted sections, including the head, back, kidney bridge, seat and leg sections. The sections, with the exception of the head, have connected thereto cylinders and pistons which are so constructed and arranged that the admission of fluid to one end of the cylinder and the exhaust of the fluid from the other end will cause the section to be raised or lowered about its pivot, as the case may be. Furthermore, cylinders are connected to raise or lower the operating table and to tilt the table about an axis longitudinally thereof. Cylinders are also provided for the kidney bridge whereby this bridge can be raised or lowered, as desired, and floor jacks are provided to support the operating table and to raise the table from the casters.

Selective control mechanism is provided where-

by the setting of a dial or indicator will determine the part to be adjusted and a second control valve is provided for determining the direction of the adjustment to be made, that is, whether a part is to be swung or adjusted upwardly or downwardly. Thus by two simple dial or indicator adjustments the desired adjustments of the operating table sections is accomplished without any manual manipulation or operation of the adjusting mechanism, such as the operation of the cranks, hand wheels, etc. The selector valve and the connections to the cylinders are so arranged that a plurality of sections can be adjusted simultaneously and in either direction.

Further details of the invention will appear from the following specification.

In the particular embodiment of the invention illustrated, the operating table is supported on a wheeled truck or base having a platform 20 provided with end flanges 21 beneath which are disposed casters 22.

In order to fix and firmly hold the operating table in the desired position after it has been wheeled on the casters to the desired location, four floor jacks 23 are provided, these jacks being disposed as illustrated at the four corners of the wheel truck or platform 20. For convenience in the diagrammatic illustration in Fig. 11, the floor jack cylinders are designated FJC. Each of the floor jacks comprises a floor jack cylinder 25 having conduits 26 and 27 for conducting the pressure fluid to or from the cylinder, depending on the operation to be performed by the floor jack plunger or piston rod 28. If the jacks are to be lowered, conduit 26 is connected to the pressure line and conduit 27 is connected to the exhaust line or return line in a manner hereinafter described. If the jacks are to be raised, the connections are reversed and conduit 27 is connected to the pressure line and conduit 26 to the return line. These connections are all controlled by the selector control which can be set to connect the floor jack cylinders in the circuit and operate the jacks either upwardly or downwardly, as desired. These details will be described later in the specification.

The platform or base 20 supports a casing 30 which houses a motor M to which is connected a pump P. A power line 31 is connected through a switch 32 to the motor feed line 33.

A second casing 34 is also supported on the platform or base 20 at the other end thereof and casing 34 has a partition 35 below which is a reservoir R which houses a selector valve casing 36 and a control valve casing 37, the construction and operation of which will be hereinafter described.

Intermediate the casings 30 and 34 there is supported on the base or platform 20 a cylindrical pedestal or support 40 on which is mounted a cylindrical cap or casing 41 which supports the operating table. On the upper end of the cylindrical casing 41 are formed a pair of upwardly extending lugs 42 and 43 to which is pivoted at 44 a transverse frame 45. At the ends of the frame 45 are upwardly extending brackets or lugs 46 and 47 through which extends a rod 48. The frame 45 also has extending upwardly intermediate its ends, a lug 49 alined with the lugs 46 and 47 and through which the rod 48 also extends.

The operating table comprises a back section 50, a seat section 70, a leg section 90, a kidney bridge section 100, and a head section 110.

The table is vertically adjusted as a unit by means of hydraulic mechanism including a cylinder 1 which is mounted in the casing 40 and extends upwardly into the casing or cap 41. A piston is mounted in the cylinder 1 and is connected to a piston rod 2 which extends downwardly from the upper surface of the cylindrical casing or cap 41. Fluid for controlling the operation of the piston is admitted to the cylinder 1 through conduits 3 or 4, conduit 4 being located at the blank or bottom end thereof. As pressure fluid is admitted through the conduit 4, the rod 2 will move out of the cylinder 1 and raise the table. During this movement the fluid will be exhausted from or pass out of the cylinder through the conduit 3. The reverse movement is accomplished by connecting the conduits 3 and 4 respectively to the pressure and exhaust conduits in the hydraulic system.

In addition to the vertical adjustment of the table, hydraulic mechanism is provided for tilting the table about the pivot 44. This is accomplished by hydraulic mechanism including a cylinder 10 which is mounted on a pivot 11 on a bracket 12 fixed to the casing 41 and a piston within the cylinder having a piston rod 13 pivoted at 14 to a bracket 15 secured to the frame member 45. Conduits 16 and 17 communicate with the rod end and blank end of the cylinder 10 and the passage of the pressure fluid into the cylinder through the conduit 16 will shorten the piston rod and tilt the table downwardly to the right, viewing Fig. 4. During this movement the conduit 17 is connected to the return side of the system. When the connections are reversed, the piston rod will be forced out of the cylinder, tilting the frame 45 and table in an anti-clockwise direction about the pivot 44, thus raising the right hand side and lowering the left hand side of the table, viewing Fig. 4.

The vertical movement control cylinder 1 is designated in a diagrammatic showing in Fig. 11 as *Ta.* C and the cylinder 10 for controlling the tilting movement is designated on the same figure as *Ti.* C. The passage of the pressure fluid is controlled by a selector valve and control valve in a manner hereinafter described.

The back section 50 is pivoted on the rod 48 by lugs 51 and 52.

The seat section 70 is pivoted on the rod 48 by lugs 71 and 72.

The leg section 90 is pivoted to the outer end of the seat section 70 by pivot bolts 73 and 74 which extend through lugs 75 and 76 on the seat section 70 and lugs 91 and 92 on the leg section 90.

The head section 110 is connected to the back section 50 in any suitable manner, as by brackets or posts 111 which can be adjustably mounted on the back section.

Kidney bridge section

The kidney bridge section 100 seats in a recess in the back section 50 when not in use but can be vertically raised by means of hydraulically operated mechanism, including cylinders 101 and 102 carried by the back section 50 and extending below said section. The kidney bridge 100 is mounted on the upper ends of piston rods or plunger rods 103 having on the lower ends pistons disposed in the cylinders 101 and 102. The pressure fluid is conducted to and from the cylinders through conduits 104, 105 and 106, 107. Conduits 104 and 106 are connected to the blank ends of the cylinders and conduits 105 and 107 are connected to the rod ends thereof. If the

kidney bridge is to be elevated the selector valve for the control valve is adjusted to permit pressure fluid to the blank or bottom ends of the cylinders 101 and 102, whereupon the piston rods will be forced upwardly in the cylinders, thus elevating the kidney bridge. The control mechanism whereby this adjustment is made will be hereinafter described. The cylinders for controlling the position of the kidney bridge are designated in the diagrammatic view in Fig. 11 as KBC.

Back section

The back section 50, as above described, is pivoted on the rod 48. The position of adjustment of the back section can be varied at will and to accomplish this two cylinders and piston rods are mounted below the back section. The cylinders indicated at 53 and 54 are mounted on pivots 55 in brackets 56. The piston rods 57 are pivoted at 58 in lugs 59 formed on the frame member 45.

The cylinders 53 and 54 have connected thereto at the blank end and at the rod end respectively, conduits 60 and 61 and conduits 62 and 63. When the rods 57 are to be moved into the cylinders 53 and 54 and thus the back section 50 is to be tilted downwardly on the axis of the rod 48, pressure fluid is admitted to the cylinders 53 and 54 through the conduits 62 and 63. When the back section is to be swung upwardly about the axis of the rod 48, the pressure fluid is admitted to the blank ends of the cylinders 53 and 54 through the conduits 60 and 61, thus causing the piston rods 57 to move out of the cylinders. The control mechanism by means of which the adjustment of the back section is controlled will be hereinafter described. The cylinders for controlling the position of the back section are designated in the diagrammatic view in Fig. 11 as BC.

Seat section

The seat section 70, as above explained, is also pivoted on the rod 48. This section is adjusted hydraulically by means of hydraulic cylinders 77 and 78 which are pivoted at 79 in brackets 80 which are secured to the under surface of the seat section 70. Plunger rods or piston rods 82 are pivoted at 83 in lugs carried by the frame member 45.

The cylinders 77 and 78 are provided with conduits 84 and 85 at the blank ends thereof and with conduits 86 and 87 at the rod ends thereof by means of which the pressure fluid can be admitted to one end or the other end of the cylinders as desired, to effect the actuation of the piston rod into or out of the cylinder, thus causing the seat section to be lowered or raised, as desired. For instance, if the conduits 86 and 87 are connected to the pressure fluid, the rods 82 move into the cylinders and lower the seat section about the axis of the rod 48. On the other hand, when the fluid is admitted through the conduits 84 and 85, the piston rods are forced out of the cylinders, thus raising the seat section about the axis of the rod 48. The operation of the piston rods and the passage of the pressure fluid into or out of the cylinders is controlled by a selector valve and a control valve in a manner hereinafter described. For convenience of reference on the diagrammatic view in Fig. 11, the cylinder for controlling the seat section is designated SC.

Leg section

The leg section 90 is pivoted on the pivot bolts 73 and 74 to the outer end of the seat section 70,

as above explained. The movement of this leg section is accomplished by means of an hydraulic cylinder 93 which is pivoted at 94 in brackets 95 secured to and depending from the leg section 90. Conduits 96 and 97 control the passage of the pressure fluid into or out of the cylinder 93 and thus control the operation of the piston rod 98 which is pivoted to a bracket 99 secured to and depending from the seat section 70. As pressure fluid is passed into the cylinder 93 through the conduit 97, the piston rod will be forced into the cylinder, thus lowering the leg section 90 about the axis of the pivot bolts 73 and 74. During this movement the fluid in the cylinder is exhausted through the conduit 96. When the leg section is to be raised, fluid is admitted through the conduit 96 and is removed from the cylinder through the conduit 97. For convenience of reference on the diagrammatic view in Fig. 11, the leg section cylinder is designated LC.

Hydraulic control mechanism

The control mechanism for controlling the circulation of the pressure fluid to accomplish the adjustments of the various sections of the operating table includes the selector valve 36 and the control valve 37 which, as hereinbefore stated, are disposed in the housing 34.

Control valve

The control valve 37 is illustrated in section in Fig. 8. This valve comprises a valve casing 115 which is stationary and a valve 116 which seats on a valve seat 117 in the casing 115 and is rotatable thereon to control the passage of fluid therethrough. The rotatable valve 116 has conduits 118 and 119 through which fluid is conducted and the valve casing has valve ports 122, 123, 124 and 125 (Fig. 11) which are disposed 90° apart and radially of the axis of rotation of the valve 116.

Reservoir R discharges through a conduit 130 to a filter F which communicates through conduit 131 with the intake of pump P (Fig. 11). The pump delivers the fluid under pressure through conduit 132 and through pressure relief valve PRV to conduit 133 which is connected to port 124 of the control valve 37. The pressure relief valve PRV has a relief conduit 135 communicating with reservoir R.

If, as shown in Fig. 7 and as hereinafter explained, the pressure line is connected by the lower half of the selector valve to the blank end of the cylinder, the rod end thereof is connected by the upper half of the selector valve to the return line 134 which communicates with the valve conduit 118 and port 122. The port 122 discharges into the reservoir.

In the diagrammatic showing in Fig. 11 an imaginary conduit 122x has been shown in dotted lines to indicate that the return fluid passes from port 122 to the reservoir R.

The control valve rotor 116 is mounted on the lower end of a spindle 140 which is rotatably mounted in a casing 141 (Fig. 8). The valve 116 is maintained in proper seating condition on the valve seat 117 by means of a spring 142 which seats against a shoulder 143 in the casing 141 and against the top of the valve 116.

On the upper end of the spindle 140 is mounted a sleeve 144 which is fixed to the spindle and has secured thereto one end of a cable 145 and one end of a cable 146. These cables are wound around the sleeve 144 in opposite directions. In other words, one is wound clockwise and the

other counterclockwise. The cables 145 and 146 extend through a tubular casing 147 and are connected at their opposite ends to a sleeve 148 which is fixed to a vertical spindle or shaft 149. The ends of the cables secured to the sleeve 148 are also oppositely wound in the same manner as that above described.

The shaft 149 is rotatably mounted in suitable bearings in a vertical tubular casing 150 and on the upper end of the shaft is secured a handle 151 having a pointer 152. In Fig. 3 the pointer 152 registers with a neutral index mark 153 and to the right and left of this mark, viewing Fig. 3, are two positions indicated at 154 and 155. The adjustment of the pointer 152 to register with 155 position connects the pressure line to the blank ends of the cylinders, whereby the raising of certain of the sections is accomplished. This setting also causes the floor jacks to be lowered when the selector valve is set for this adjustment and when the selector valve is set for table tilting adjustment, as in Fig. 7, the table will be tilted down at the left and up at the right, viewing Fig. 12. When the pointer is swung to register with the position indicated at 154, or, as shown in Fig. 6, the pressure line will be connected to the rod ends of the cylinders, thereby lowering the various parts operated by the cylinders.

Selector valve

This valve is illustrated in Figs. 3, 6, 7 and 10. The valve comprises a valve casing 160 having a conical valve seat 161 and a rotatable valve 162 which is mounted on the bottom of a spindle 163 rotatably mounted in a casing 164. The valve is held in seating relation by a spring 165 which seats against a shoulder 166 and is disposed in a recess 167 formed in the valve 162.

The spindle 163 is rotated by mechanism exactly similar to that shown in Fig. 8 for the spindle 140 and, therefore, it has not been deemed necessary to illustrate this operating mechanism in detail. The cables for operating the spindle 163 extend through a tubular casing 168 to a vertically disposed tubular casing 169 having an operating shaft therein similar to the shaft 149 and provided on its upper end with a handle 170 having a pointer 171. The dial for the selector valve has nine positions designated thereon which are indicated in Fig. 3 as A, B, C, D, E, F, G, H and J.

In order to non-positively hold the valve 162 in adjusted position, the upper surface of the valve is provided with indentations 172 which are peripherally disposed and correspond to the positions indicated on the selector valve dial. The casing 164 has a flange 173 having a vertical bore or opening 174 in which is disposed a spring 175 which bears on a ball 176 which is adapted to seat in the selected indentation 172.

The selector valve casing 160 is provided with two sets of ports disposed one above the other and the valve 162 is provided with two sets of conduits adapted respectively to register with the two sets of ports. The sections in Figs. 6 and 7 are taken respectively through the upper and lower sets of ports in the selector valve, as indicated by the section lines on Fig. 5. The lower ports shown in Fig. 7 are connected to the blank ends of the cylinders in a manner described below. The upper ports, illustrated in Fig. 6, are, with one exception hereinafter noted, connected to the rod ends of the cylinders. With the adjustment of the control valve 37 illustrated

in Fig. 6, the pressure conduit 124 communicates through conduit 119 with conduit 123 which conducts the pressure fluid through conduit 134 to a conduit 180 in the casing of the valve 162. The conduit 180 leads to a chamber 181 formed in the lower end of the casing 164 and communicating with the recess 167.

The pressure fluid is returned through the conduit 125, valve conduit 118, port 122, and to the reservoir R.

The upper end of the valve casing 160 has ten ports therein designated 201, 202, 203, 204, 205, 206, 207, 208, 209 and 210.

The lower portion of the valve casing has a corresponding series and similarly located, disposed ports which are designated 211, 212, 213, 214, 215, 216, 217, 218, 219 and 220.

In order to conduct the fluid to and from the various ports, the valve 162 is provided with conduits disposed in the planes of the two sets of ports shown in Figs. 6 and 7. The upper portion of the valve 162 has conduits X and Y which communicate at their inner ends with the chamber formed by the recess 167 and at their outer ends are adapted to communicate with the ports in the casing 160. It will be noted that the conduits X and Y are angularly disposed relative to each other and the outer ends of these conduits are so spaced that they can be placed in communication with ports communicating with the cylinders for adjusting two different sections of the operating table. For instance, as shown in Fig. 13, the conduits X and Y are disposed in communication with ports 204 and 205 which are connected respectively in the manner hereinafter described to the rod ends of the back cylinders and the rod ends of the seat cylinders. This connection is made to adjust the table for the Mayo kidney position in which both ends of the table extend downwardly from the center thereof. In the same plane as the conduits X and Y, but at the opposite side of the valve 162, the valve rotor is recessed, as shown at Z, for a purpose hereinafter described.

The valve or valve rotor 162 has also formed therein in the plane of the ports 211 to 220 shown in Fig. 7, a pair of conduits X′ and Y′ which correspond to and are alined with the conduits X and Y shown in Fig. 6. The lower portion of the valve casing 160 has formed at the bottom thereof a vertically extending chamber 185 which communicates with the conduit 186 which leads from port 125 in control valve 37.

Hydraulic control circuits

Fig. 11 illustrates diagrammatically the control circuits for the hydraulic system leading from the selector valve ports to the hydraulic cylinders. The circuits shown at the top of this figure lead to the rod ends of the cylinders and the circuits at the bottom of the figure lead to the blank ends of the cylinders.

Referring first to the portion of the figure at the top of the sheet, the ports at the upper portion of the selector valve are illustrated, these ports being numbered respectively 201 to 210 inclusive. These ports are connected respectively to conduits 201A, 202A, 203A, 204A, 205A, 206A, 207A, 208A, 209A and 210A.

Conduit 201A is connected to conduit 16 at the rod end of the tilting cylinder 10 which tilts the table on the axis of the pivot 44. Conduit 202A is connected to the rod end of the leg cylinder 93.

Conduits 203A and 204A are connected to a common conduit 203B which, at its other end,

communicates with conduits 62 and 63 which are connected to the rod ends of the back section cylinders 53 and 54.

Conduits 205A and 206A are connected to a common conduit 205B and this conduit at its opposite end is connected to conduits 86 and 87 connected to the rod ends of the seat section cylinders 77 and 78.

Conduit 207A is connected at its opposite end to conduits 105 and 107 which lead to the rod ends of the kidney bridge control cylinders 101 and 102.

Conduit 208A is connected at its opposite end to a conduit 208B, which in turn is connected to conduits 27 which communicate with the rod ends of the four foot jack cylinders 23.

The conduit 209A is connected at its opposite end to a conduit 209B, which in turn has its ends connected to the blank ends of the seat control cylinders 77 and 78.

Conduit 210A has its opposite end connected to conduit 3 at the rod end of the table control cylinder 1.

The ports 211 to 220 inclusive, shown in Fig. 7 and in the bottom portion of Fig. 11, are connected to the blank ends of the various control cylinders in the following manner. Port 211 is connected by conduit 211A to the conduit 17 at the blank end of the tilting control cylinder 10. Port 212 is connected by conduit 212A to the conduit 96 at the blank end of the leg control cylinder 93. Ports 213 and 214 are connected by conduits 213A and 214A to a conduit 213B which is connected to a conduit 213C, which communicates with conduits 60 and 61 connected to the blank ends of the back control cylinders 53 and 54. Ports 215 and 216 are connected by conduits 215A and 216A to a conduit 215B which is connected at its opposite end to the conduit 209A which, as above explained, leads to the conduit 209B which communicates at its end with conduits 84 and 85 at the blank ends of the seat control cylinders 77 and 78. Port 217 is connected by a conduit 217A to the conduits 104 and 106 which communicate with the blank ends of the kidney bridge control cylinders 101 and 102. Port 218 has connected thereto a conduit 218A which is connected at its opposite end to a conduit 218B, which in turn communicates with conduits 26 which, as hereinbefore explained, are connected to the blank ends of the four foot jack control cylinders 23. Port 219 is connected by conduit 219A to the conduit 213C which communicates at its opposite end with the conduits 60 and 61 connected to the blank ends of the control cylinders 53 and 54. Port 220 is connected to a conduit 220A, the other end of which is connected to the blank end of the cylinder 1 which controls the raising and lowering of the table.

Referring particularly to Figs. 1, 3 and 11, the circuits through which the hydraulic fluid is circulated from the pump P and back through the return line to the pump are briefly as follows. From the pump P the fluid is forced through conduit 132, through a pressure relief valve designated on Fig. 11 as PRV, and through conduit 133 to the control valve 37 from which the fluid is conducted through conduit 134 to the upper section of the selector valve. With the setting in Fig. 11 the fluid passes through port 201 and conduit 201A to the conduit 16 at the rod end of the tilting control cylinder 10. From the blank end of the tilting control cylinder the return fluid passes through conduit 17, conduit 211A to port 211, and thence through the valve rotor 162 and conduit Y' therein to the outlet conduit 136. This conduit conducts the fluid through port 125, conduit 118 and port 122 through the control valve 37 to the reservoir R. From the reservoir the fluid passes through the return conduit 130 and filter F to conduit 131 and the return side of the pump P. A pressure indicator, shown at 250, is connected to the pressure line by a conduit 250A connected to the pressure regulator valve. This pressure indicator is mounted on the same base as the selector valve dial and the control valve dial, as illustrated in Fig. 3.

In addition to the various devices hereinbefore described, the casing 30 has a flame arrester designated FA (Fig. 3) and the casing 34 has a float valve 251 for indicating and regulating the fuel level (Figs. 1 and 5).

Although many different adjustments of the table sections can be made, only a few of them have been illustrated in the drawings. These are shown particularly in Figs. 12 to 16 inclusive.

The selector valve settings in Figs. 6, 7 and 11 accomplish the adjustments of the table illustrated in dotted lines in Fig. 12, in which the table is tilted about an axis longitudinal of the table.

Figs. 13 and 14 illustrate diagrammatically the selector valve settings for the Mayo kidney operation for simultaneously operating the seat cylinder and back cylinder so that the back and seat of the table will be swung downwardly, as shown in Fig. 14.

Referring to Fig. 13, the rotor of the selector valve is moved to a position in which the conduits X and Y register with the ports 204 and 205. In this position the port 204 is connected through conduit 203B to the rod ends of the back cylinders 53 and 54 and, more specifically, to the conduits 62 and 63 at the rod ends of the cylinders.

Port 205 is connected through conduit 205B to conduits 86 and 87 at the rod ends of the seat cylinders 77 and 78.

The blank ends of the back cylinders 53 and 54 are connected by conduits 60 and 61 to conduit 213C which leads to conduit 213B which communicates through conduit 214A with port 214 and the rotor conduit X'.

The blank ends of the seat cylinders 77 and 78 have their conduits 84 and 85 connected to conduit 209A which joins conduit 215B and is connected through 215A to port 215 which communicates with the rotor conduit Y'.

Figs. 15 and 16 show the selector valve settings for adjusting the table to the Trendelenburg position shown in Fig. 16 in which the back section 50 of the table is swung upwardly about the axis of the shaft 48 and the seat section 70 is swung downwardly about this axis. These adjustments are accomplished simultaneously in the following manner, as shown in Fig. 15. The rotor conduit Y' communicates with port 219 which is connected through conduits 219A and 213C to conduits 60 and 61 at the blank ends of the back cylinders 53 and 54, respectively. The exhaust line from conduits 62 and 63 at the rod ends of said cylinders, respectively, is connected through conduits 203B and 204A to port 204, which in turn is connected through the by-pass Z to port 205 which communicates with conduit 205B which in turn leads to conduits 86 and 87 at the rod ends of the seat cylinders 77 and 78, respectively. The exhaust line from conduits 84 and 85 at the blank ends of cylinders 77 and 78,

respectively, is connected to conduit 209A which communicates with port 209. This port in the setting in Fig. 15 communicates with conduit Y in the rotor of the selector valve.

In this manner the back cylinders and seat cylinders are operated to raise the back and lower the seat about the axis of the shaft 48.

For the reverse Trendelenburg position in which the back is lowered and the seat is raised, the selector valve connections are the same but the control valve is moved to the left or to the position indicated in Fig. 3 at 154 instead of to the position indicated at 155.

From the foregoing specification it will be seen that the back, seat and leg sections and the kidney bridge of the table can be adjusted at will upwardly or downwardly by proper settings of the control valve and selector valve and, furthermore, that the foot jack cylinders can be raised or lowered in a similar manner and the table can be tilted about its longitudinal axis. Moreover, by reason of the locations of the ports in the selector valve controlling the seat and back cylinders, and by reason of the rotor conduits X' and Y' and their relatiive locations, simultaneous adjustments can be made of the seat and back sections of the table, to adjust the table to the Mayo kidney position shown in Fig. 14. Moreover, through the seat and back cylinder ports located as described, and the by-pass Z, the back and seat sections can be simultaneously adjusted to the Trendelenburg (Fig. 16) and reverse Trendelenburg positions.

All of the adjustments can be easily and quickly made by simply setting the control valve and selector valve to the desired positions. The hydraulic mechanism then operates automatically without requiring any manual labor or manipulation on the part of the attendant.

Although one specific embodiment of the invention has been particularly shown and described it will be understood that the invention is capable of modification and that changes in the arrangement and in the construction of the various cooperating parts may be made without departing from the spirit or scope of the invention, as expressed in the following claims.

What I claim is:

1. A surgical table comprising a plurality of relatively adjustable sections interconnected by pivot means, double acting fluid motors each comprising a cylinder and a double acting piston therein, one or more of said double acting fluid motors connected to each of said relatively adjustable sections for moving selected ones of said adjustable sections about said pivot means, a fluid pump and a driving means therefor, said fluid pump having a high pressure side and a low pressure side and being connected to each of said fluid motors by separate fluid pressure lines to the said cylinders on opposite sides of said double acting pistons, a single selector valve for controlling the application of fluid to selected ones of the fluid motors for moving one or more of the corresponding adjustable table sections, said selector valve being connected to each of the said separate fluid pressure lines, a control valve in series with each of said separate fluid pressure lines and with said single selector valve and with said fluid pump to selectively control the application of high fluid pressure and low fluid pressure from said pump to said cylinders on opposite sides of said double acting pistons to control the direction of movement of one or more of the adjustable table sections previously selected by said selector valve.

2. A surgical table comprising an adjustable support, back and seat sections adjustably interconnected with said support by pivot means, and a leg section adjustably pivoted on said back section, double acting fluid motors each comprising a cylinder and a double acting piston therein, one or more of said double acting fluid motors connected to each of said relatively adjustable sections for moving selected ones of said adjustable sections about said pivot means, a fluid pump and a driving means therefor, said fluid pump having a high pressure side and a low pressure side and being connected to each of said fluid motors by separate fluid pressure lines to the said cylinders on opposite sides of said double acting pistons, a single selector valve for controlling the application of fluid to selected ones of the fluid motors for moving one or more of the corresponding adjustable table sections, said selector valve being connected to each of the said separate fluid pressure lines, a control valve in series with each of said separate fluid pressure lines and with said single selector valve and with said fluid pump to selectively control the application of high fluid pressure and low fluid pressure from said pump to said cylinders on opposite sides of said double acting pistons to control the direction of movement of one or more of the adjustable table sections previously selected by said selector valve.

3. A surgical table comprising a plurality of relatively adjustable sections interconnected by pivot means, double acting fluid motors each comprising a cylinder and a double acting piston therein, one or more of said double acting fluid motors connected to each of said relatively adjustable sections for moving selected ones of said adjustable sections about said pivot means, a fluid pump having a driving means therefor, said fluid pump having a high pressure side and a low pressure side and being connected to each of said fluid motors by separate fluid pressure lines to the said cylinders on opposite sides of said double acting pistons, a single selector valve for controlling the application of fluid to selected ones of the fluid motors for moving one or more of the corresponding adjustable table sections, said selector valve being connected to each of said separate fluid pressure lines and having means whereby a plurality of sections can be selected for simultaneous adjustment, a control valve in series with each of said separate fluid pressure lines and with said single selector valve and with said fluid pump to selectively control the application of high fluid pressure and low fluid pressure from said pump to said cylinders on opposite sides of said double acting pistons to control the direction of movement of one or more of the adjustable table sections previously selected by said selector valve.

4. A surgical table comprising a plurality of relatively adjustable sections interconnected by pivot means, double acting fluid motors each comprising a cylinder and a double acting piston therein, one or more of said double acting fluid motors connected to each of said relatively adjustable sections for moving selected ones of said adjustable sections about said pivot means, a fluid pump and a driving means therefor, said fluid pump having a high pressure side and a low pressure side and being connected to each of said fluid motors by separate fluid pressure lines to the said cylinders on opposite sides of said double acting pistons, a single selector valve for controlling the application of fluid to selected ones

of the fluid motors for moving one or more of the corresponding adjustable table sections, said selector valve being connected to each of the said separate fluid pressure lines and having a rotor means for connecting the fluid pump with selected ones of said fluid pressure lines, a control valve in series with each of said separate fluid pressure lines and with said single selector valve and with said fluid pump to selectively control the application of high fluid pressure and low fluid pressure from said pump to said cylinders on opposite sides of said double acting pistons to control the direction of movement of one or more of the adjustable table sections previously selected by said selector valve.

5. A surgical table comprising an adjustable support, back and seat sections adjustably interconnected with said support by pivot means, and a leg section adjustably pivoted on said back section, double acting fluid motors each comprising a cylinder and a double acting piston therein, one or more of said double acting fluid motors connected to each of said relatively adjustable sections for moving selected ones of said adjustable sections about said pivot means, a fluid pump and a driving means therefor, said fluid pump having a high pressure side and a low pressure side and being connected to each of said fluid motors by separate fluid pressure lines to the said cylinders on opposite sides of said double acting pistons, a single selector valve for controlling the application of fluid to selected ones of the fluid motors for moving one or more of the corresponding adjustable table sections, said selector valve being connected to each of the said separate fluid pressure lines and having a rotor means for connecting the fluid pumps with selected ones of said fluid pressure lines, a control valve in series with each of said separate fluid pressure lines and with said single selector valve and with said fluid pump to selectively control the application of high fluid pressure and low fluid pressure from said pump to said cylinders on opposite sides of said double acting pistons to control the direction of movement of one or more of the adjustable table sections previously selected by said selector valve.

6. A surgical table comprising a plurality of relatively adjustable sections interconnected by pivot means, double acting fluid motors each comprising a cylinder and a double acting piston therein, one or more of said double acting fluid motors connected to each of said relatively adjustable sections for moving selected ones of said adjustable sections about said pivot means, a fluid pump and a driving means therefor, said fluid pump having a high pressure side and a low pressure side and being connected to each of said fluid motors by separate fluid pressure lines to the said cylinders on opposite sides of said double acting pistons, a single selector valve for controlling the application of fluid to selected ones of the fluid motors for moving one or more of the corresponding adjustable table sections, said selector valve being connected to each of the said separate fluid pressure lines and having a rotor means with a pair of chambers for connecting, respectively, the high pressure side of said pump with selected ones of said high pressure lines connected to one end of said cylinders and for connecting the low pressure side of said pump with selected ones of said low pressure lines connected to the opposite end of said cylinders, a control valve in series with each of said separate fluid pressure lines and with said single selector valve and with said fluid pump to selectively control the application of high fluid pressure and low fluid pressure from said pump to said cylinders on opposite sides of said double acting pistons to control the direction of movement of one or more of the adjustable table sections previously selected by said selector valve.

7. A surgical table comprising an adjustable support, back and seat sections adjustably interconnected with said support by pivot means, and a leg section adjustably pivoted on said back section, double acting fluid motors each comprising a cylinder and a double acting piston therein, one or more of said double acting fluid motors connected to each of said relatively adjustable sections for moving selected ones of said adjustable sections about said pivot means, a fluid pump and a driving means therefor, said fluid pump having a high pressure side and a low pressure side and being connected to each of said fluid motors by separate fluid pressure lines to the said cylinders on opposite sides of said double acting pistons, a single selector valve for controlling the application of fluid to selected ones of the fluid motors for moving one or more of the corresponding adjustable table sections, said selector valve being connected to each of the said separate fluid pressure lines and having a rotor means with a pair of chambers for connecting, respectively, the high pressure side of said pump with selected ones of said high pressure lines connected to one end of said cylinders and for connecting the low pressure side of said pump with selected ones of said low pressure lines connected to the opposite end of said cylinders, a control valve in series with each of said separate fluid pressure lines, and with said single selector valve and with said fluid pump to selectively control the application of high fluid pressure and low fluid pressure from said pump to said cylinders on opposite sides of said double acting pistons to control the direction of movement of one or more of the adjustable table sections previously selected by said selector valve.

8. A surgical table comprising an adjustable support, back and seat sections adjustably interconnected with said support by pivot means, a leg section adjustably pivoted on said back section, and a kidney bridge mounted on and adjustable perpendicularly relative to said back section, double acting fluid motors each comprising a cylinder and a double acting piston therein, one or more of said double acting fluid motors connected to each of said relatively adjustable sections for moving selected ones of said adjustable sections about said pivot means, a fluid pump having a driving means therefor, said fluid pump having a high pressure side and a low pressure side and being connected to each of said fluid motors by separate fluid pressure lines to the said cylinders on opposite sides of said double acting pistons, a single selector valve for controlling the application of fluid to selected ones of the fluid motors for moving one or more of the corresponding adjustable table sections, said selector valve being connected to each of the said separate fluid pressure lines and having means whereby a plurality of sections can be selected for simultaneous adjustment, a control valve in series with each of said separate fluid pressure lines and with said single selector valve and with said fluid pump to selectively control the application of high fluid pressure and low fluid pressure from said pump to said cylinders on opposite sides of said double

acting pistons to control the direction of movement of one or more of the adjustable table sections previously selected by said selector valve.

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