

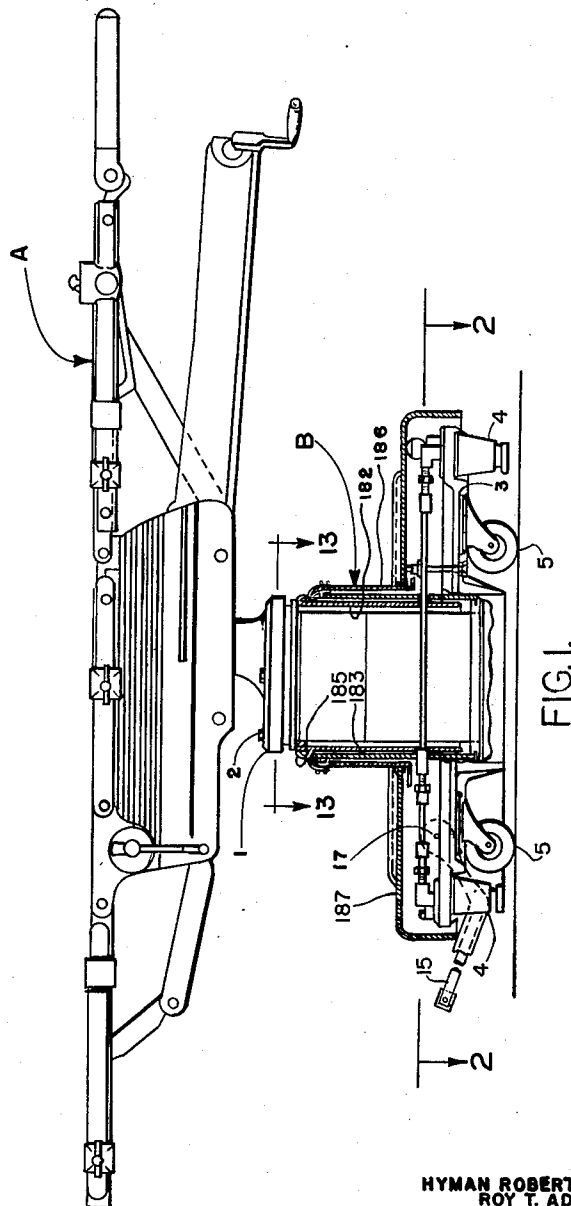
April 10, 1962

H. R. SHAMPAINE ET AL
HYDRAULICALLY OPERATED ELEVATING MECHANISMS
FOR OPERATING TABLES AND THE LIKE

3,028,732

Filed July 24, 1958

7 Sheets-Sheet 1



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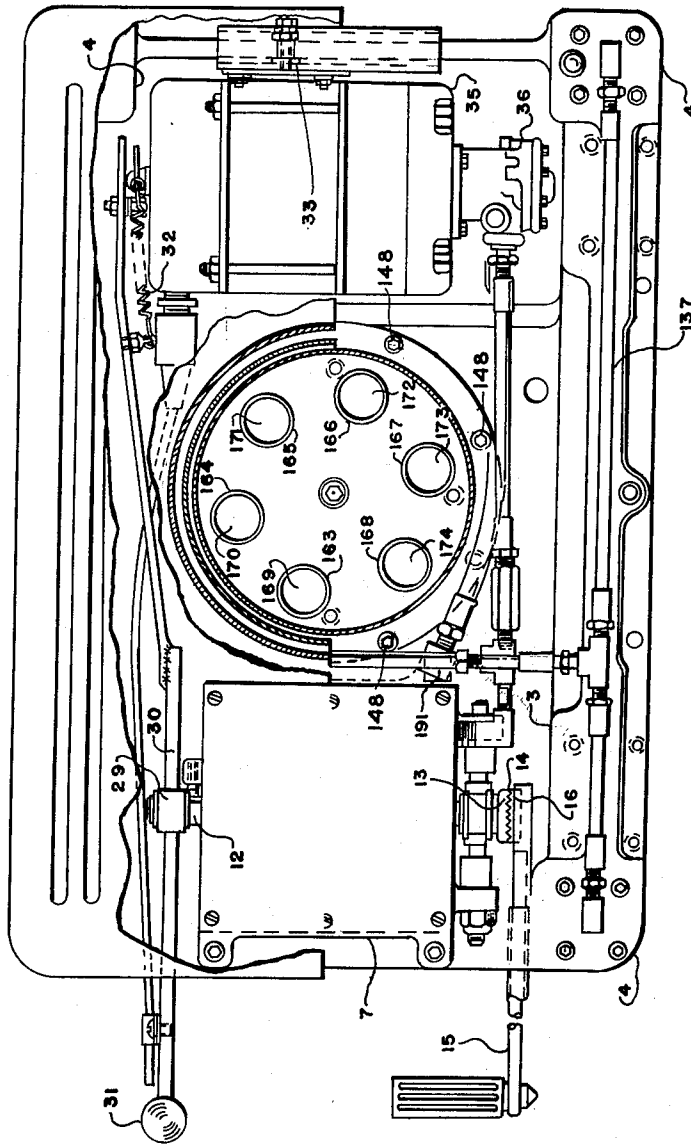
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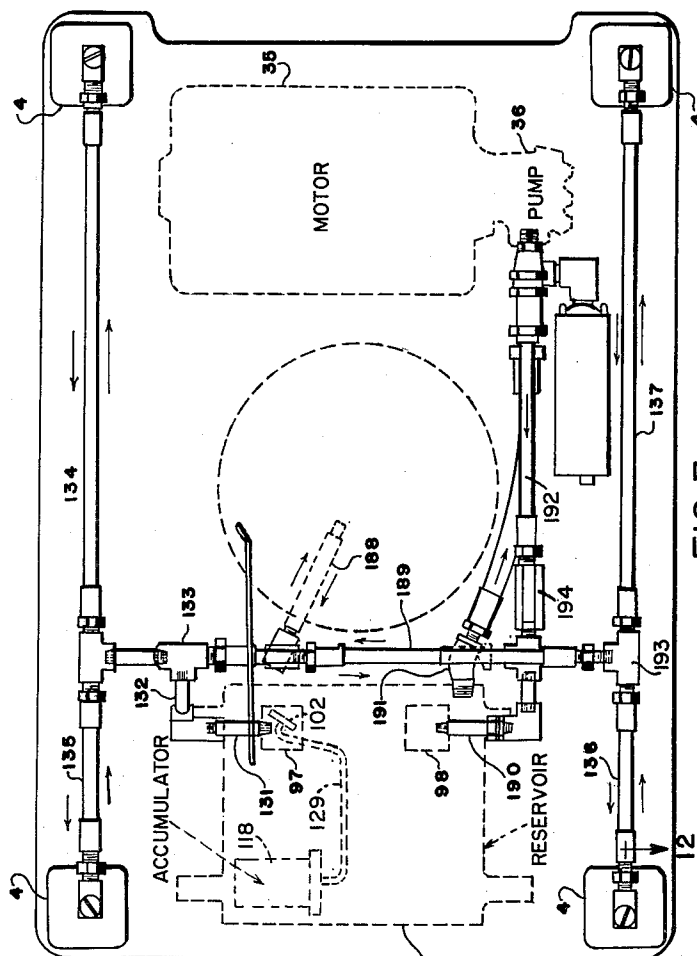


FIG. 3.

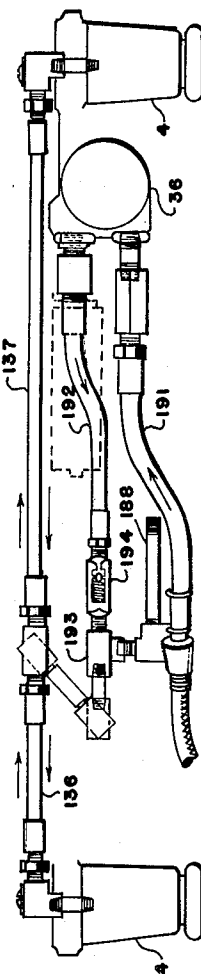


FIG. 4.

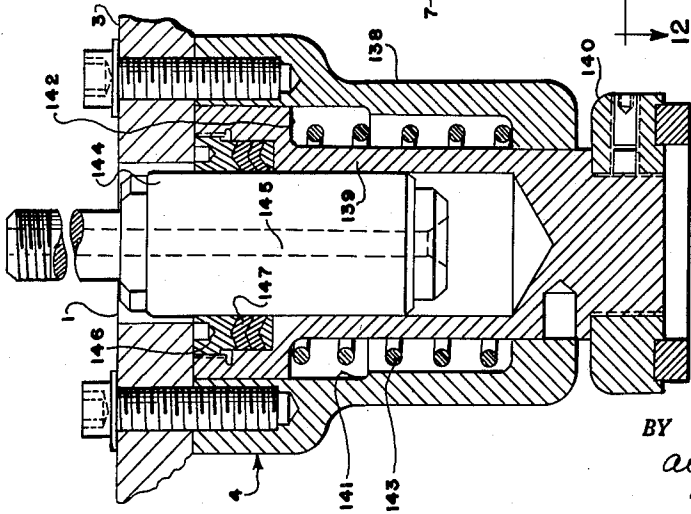


FIG. 12.

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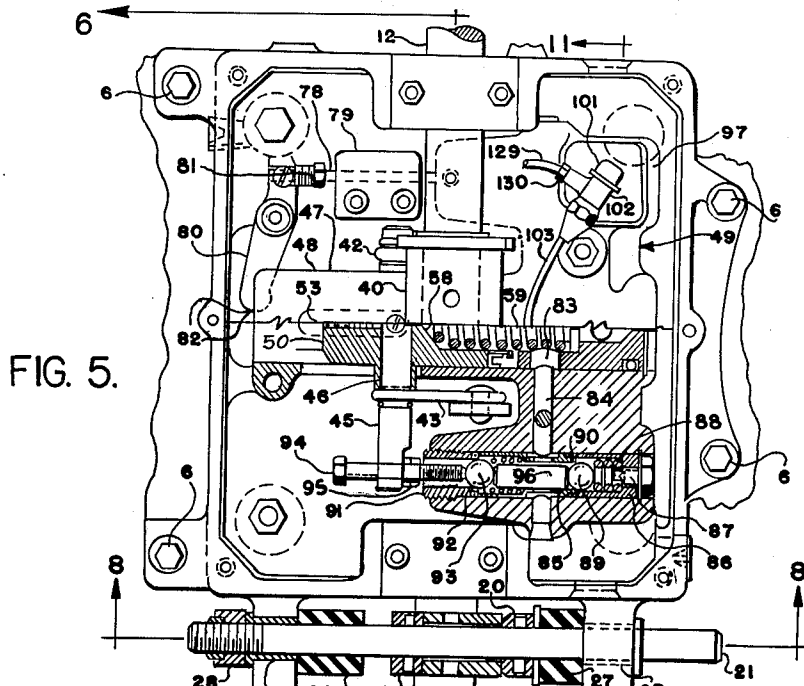


FIG. 5.

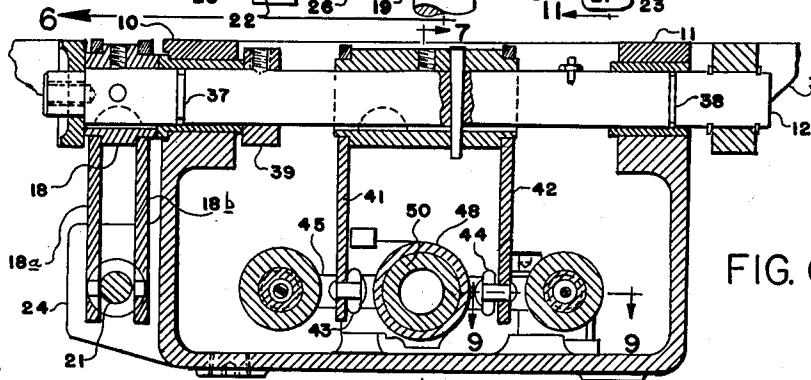


FIG. 6.

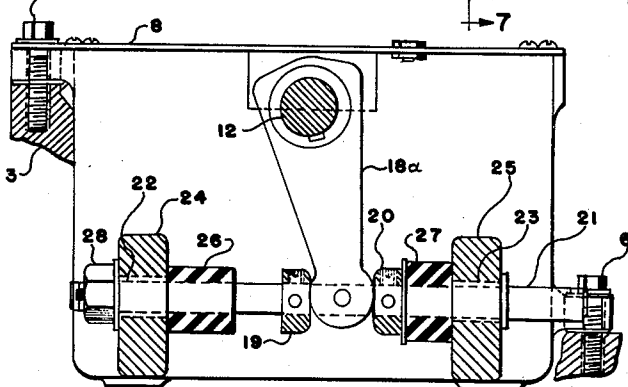


FIG. 8.

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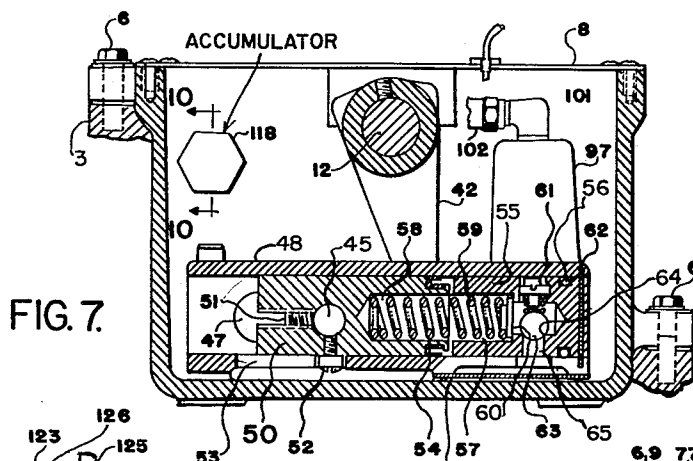


FIG. 7.

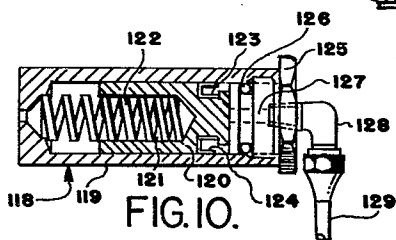


FIG. 10.

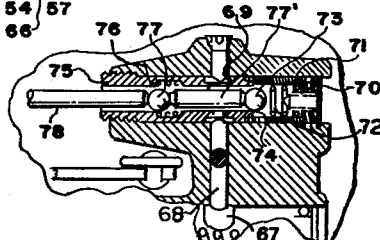


FIG. 9.

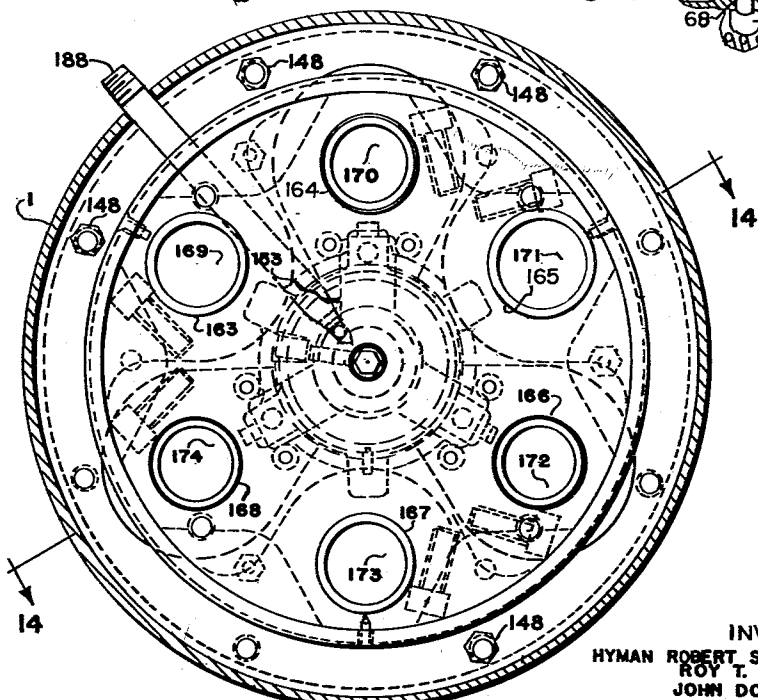


FIG. 13.

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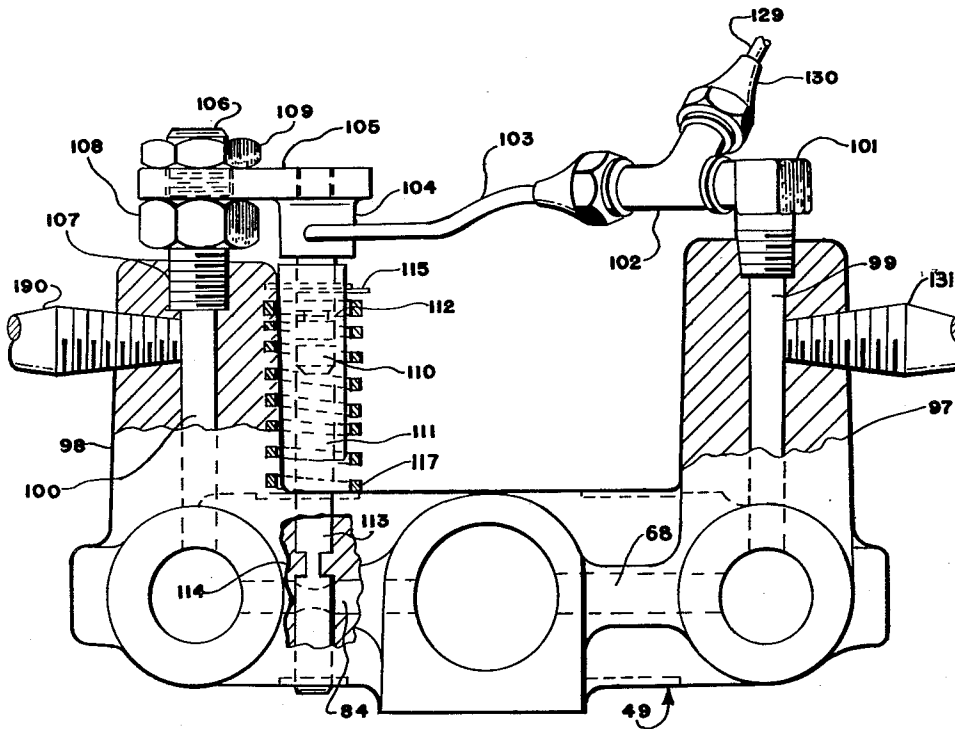


FIG. II.

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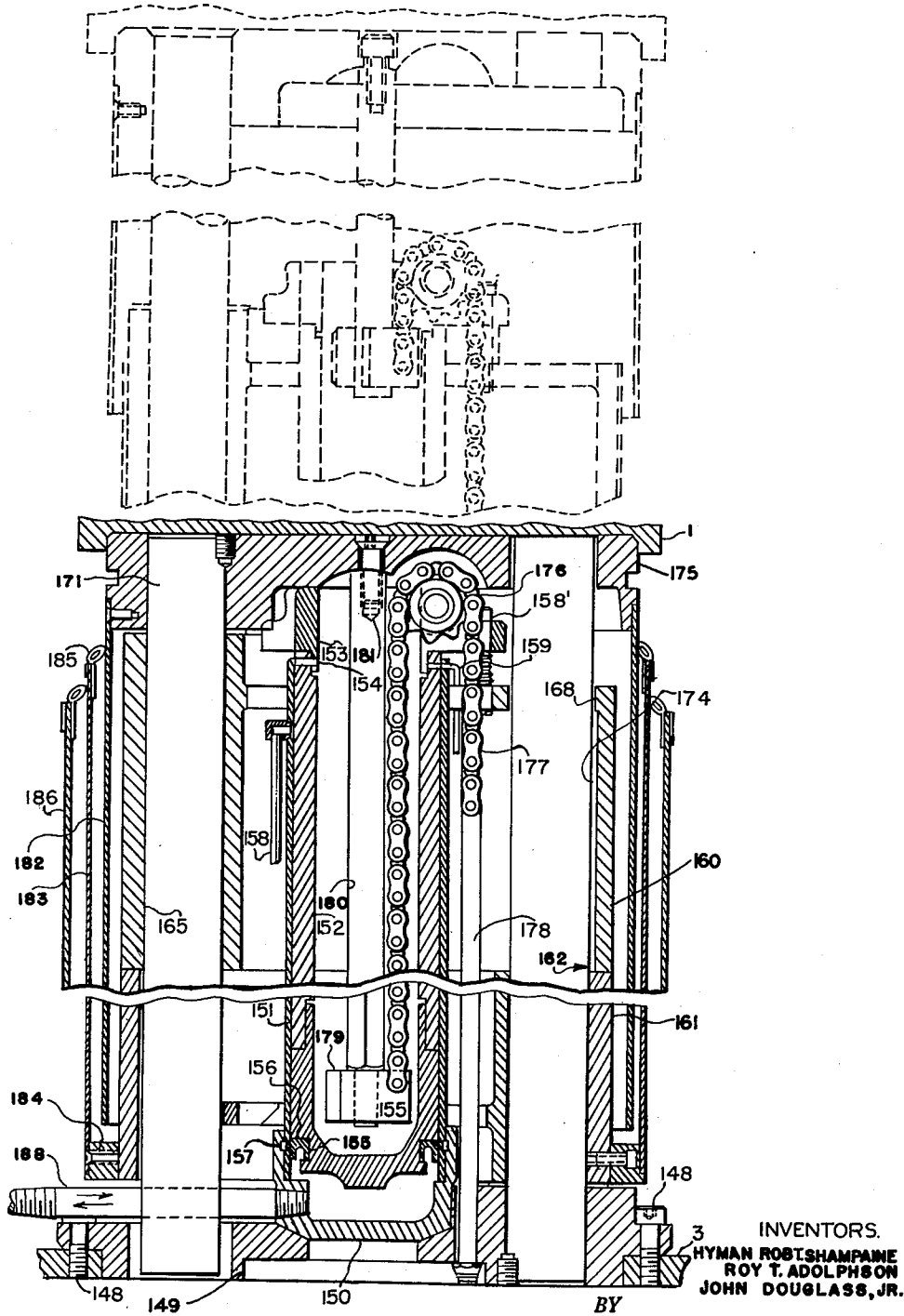


FIG. 14.

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HYDRAULICALLY OPERATED ELEVATING MECHANISMS FOR OPERATING TABLES AND THE LIKE

Hyman Robert Shampaine, 00 Dromara Road, La Due, Mo., Roy T. Adolphson, Webster Groves, and John Douglass, Jr., St. Louis, Mo.; said Adolphson and said Douglass assignors to said Shampaine
Filed July 24, 1958, Ser. No. 750,712
5 Claims. (Cl. 60—51)

This invention relates to certain new and useful improvements in hydraulically operated elevating mechanisms for operating tables and the like.

It is the primary object of the present invention to provide a hydraulically operated elevating mechanism particularly adaptable for use with major surgical operating tables, which mechanism provides a highly stable support for the table when the latter is elevated thereby.

It is also an object of the present invention to provide an elevating mechanism of the type stated which is relatively compact and, at the same time, permits elevation of the operating table to sufficient heights necessary for performing all types of surgical operations.

It is an additional object of the present invention to provide an elevating mechanism of the type stated which includes a plurality of floor contacting jacks and a main elevating cylinder, all of which can be controlled by a single foot pedal.

It is a further object of the present invention to provide an elevating mechanism of the type stated which permits the table to remain in an elevated position while, at the same time, allowing it to be supported on casters so that the table can be readily moved about with a patient thereon.

It is another object of the present invention to provide an elevating mechanism of the type stated in which the main elevating cylinder can, if desired, be operated by a motorized hydraulic pump.

It is still another object of the present invention to provide an elevating mechanism of the type stated which effectively prevents contamination of the hydraulic fluid or component parts therein.

With the above and other objects in view, my invention resides in the novel features of form, construction, arrangement, and combination of parts presently described and point out in the claims.

In the accompanying drawings—

FIG. 1 is a side elevational view, partly broken away and in section, and showing an operating table embodying the elevating mechanism of the present invention;

FIG. 2 is a fragmentary sectional view taken along line 2—2 of FIG. 1;

FIGS. 3 and 4 are diagrammatic views showing the piping connections between the several components of the elevating mechanism;

FIG. 5 is a fragmentary horizontal sectional view taken through the oil reservoir which forms part of the present invention;

FIG. 6 is a fragmentary sectional view taken along line 6—6 of FIG. 5;

FIG. 7 is a fragmentary sectional view taken along line 7—7 of FIG. 6;

FIG. 8 is a fragmentary sectional view taken along line 8—8 of FIG. 5;

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FIG. 9 is a fragmentary sectional view taken along line 9—9 of FIG. 6;

FIG. 10 is a fragmentary sectional view taken along line 10—10 of FIG. 7;

FIG. 11 is a fragmentary sectional view taken approximately along line 11—11 of FIG. 5;

FIG. 12 is a fragmentary sectional view taken along line 12—12 of FIG. 3 and showing one of the jacks forming a part of the present invention;

FIG. 13 is a fragmentary sectional view taken along line 13—13 of FIG. 1; and

FIG. 14 is a fragmentary sectional view taken along line 14—14 of FIG. 13.

Referring now in more detail and by reference characters to the drawings, which illustrate a practical embodiment of the present invention, "A" designates an operating table provided with a cap casting or saddle 1 which is secured to the upper end of a hydraulic mechanism B by means of bolts 2. Since the present invention does not relate to the operating table A, it is not shown or described in detail.

The hydraulic mechanism B comprises a base casting 3, the four corners of which are provided with retractable jacks 4 and also mounted on, and depending from, the base casting 3 are a plurality of casters 5 which contact the floor when the jacks 4 are in the retracted position.

Mounted within the base casting 3 by means of bolts 6 is an oil reservoir 7 provided with a removable cover plate 8, and journaled in the oil reservoir 7, by means of bearings 10, 11, is a shaft 12, which projects outwardly on opposite sides of the oil reservoir 7 and is provided on one end with a collar 13 which terminates in a toothed flange 14. Also mounted on the shaft 12 is a lengthwise adjustable pedal 15 which extends outwardly from the base casting 3, the pedal 15 being provided on its inner end with a toothed collar 16 which locks with the flange 14 and is secured therewith in any one of a plurality of positions by means of a bolt 17. Keyed or otherwise rigidly secured to the shaft 12 outwardly of the oil reservoir 7 is a sleeve 18 provided with spaced rocker arms 18a, 18b, which project downwardly for engagement with spaced collars 19, 20, rigidly mounted on a shiftable stop rod 21. As best seen by reference to FIGS. 5 and 8, the stop rod 21 is slidable in bearings 22, 23, mounted in bosses 24, 25, which are formed on, and project outwardly from, the oil reservoir 7. Also operatively mounted on the stop rod 21 adjacent the bosses 24, 25, are rubber bumpers 26, 27, and one end of the rod 21 is threaded for receiving an adjustable stop nut 28.

Rockably mounted on the other end of the shaft 12 is a collar 29 having a motor-switch lever 30 rigidly connected thereto and extending outwardly from the base casting 3, as best seen in FIG. 2. The switch lever 30 includes a foot pedal 31 and the lever 30 is normally biased in the "off" position by means of a spring 32. Secured to the base 3 by means of a bracket 33 is an electric motor 35, the latter being suitably provided with a hydraulic pump 36. In connection with the present invention, it should be noted that the construction of the motor 35 and pump 36 is well known and is, therefore, not shown or described in detail.

Referring now to FIGS. 5, 6, and 7, it will be seen that the shaft 12 is provided, adjacent the ends thereof, with sealing rings 37, 38, and a stop collar 39 located

adjacent the bearing 10. Rigidly mounted on the shaft 12, somewhat centrally thereof, is a sleeve 40 provided at its opposite ends with spaced parallel rocker arms 41, 42, the lower ends of which are pivotally secured to connecting links 43, 44, and links 43, 44, in turn, being operatively connected to a foot pump-actuating rod 45. The foot pump actuating rod 45 projects through aligned guide slots 46, 47, formed in a foot pump cylinder 48, the latter forming part of a valve housing 49. The pump-actuating rod 45 also projects through a foot pump piston 50 which is mounted for reciprocating movement within the cylinder 48 and the rod 45 is secured to the piston 50 by means of set screws 51, 52, the latter being adapted to ride in a slot 53 formed in the cylinder 48. The piston 50 is, furthermore, provided with a cup-like seal 54 which forms a hydraulic seal between the piston 50 and cylinder 48. Also mounted within the cylinder 48 is a plug 55 which is grooved for receiving an annular sealing ring 56, and formed centrally of the plug 55 is a bore 57 which is in alignment with a central bore 58 formed in the piston 50. Disposed in the bores 57, 58, is a return spring 59 which bears at one end against the piston 50 and at its other end against a shoulder-forming washer 60 in the plug 55. Threaded into the plug 55 is a retaining nut 61 which forms an abutment for one end of a check valve spring 62 for biasing a ball check valve 63 against a valve seat 64. Communicating with the valve 63 is an intake passage 65, and disposed across the intake passage in downwardly spaced relation thereto is an oil filter screen 66.

Formed in the plug 55 is an aperture 67 which is in alignment with a passageway 68, and the passageway 68 communicates with a bore 69 which is also formed in the valve housing 49. Mounted in the bore 69 at one end thereof is a block 70 provided with a spring abutment 71 for receiving one end of a check valve spring 72, the other end of which bears against and biases a ball check valve 73 against a valve seat 74. Threaded into the bore 69 at one end thereof is a sleeve 75 which is provided with a valve seat 76 for receiving a ball check valve 77 and extending between the ball check valves 73, 77, is a rod 77'. Disposed in, and extending outwardly from, the sleeve 75 is a release rod 78 which is shiftable in a guide sleeve 79 mounted in the oil reservoir 7. Rockably mounted in the oil reservoir 7 is a release trigger 80 provided on one end with an adjustable bolt 81 which is adapted to contact the release rod 78 and on its other end with an abutment 82 for contacting the piston 50, all for purposes presently more fully appearing.

Also formed in the plug 55 is an aperture 83 which communicates with a passageway 84 which, in turn, communicates with a bore 85 also formed in the valve housing 49. Mounted in the bore 85 at one end thereof is a block 86 provided with a spring abutment 87 for receiving one end of a check valve spring 88, the other end of which bears against and biases a ball check valve 89 against a valve seat 90. Threaded into the bore 85 at one end thereof is a sleeve 91 which is provided with a valve seat 92 for receiving a ball check valve 93. Threaded into the pump actuating rod 45 at one end thereof is a stud 94 which projects into the sleeve 91 and is adjustable by means of a nut 95, and extending between the ball check valves 89, 93, is a rod 96.

Formed on the valve housing 49 are spaced upstanding members 97, 98, provided with vertical bores 99, 100, which are adapted to communicate with the bores 69, 85, respectively, when the ball check valves 73, 89, are in the opened position. Threaded into the upper end of the upstanding member 97 is a fitting 101 which is connected to a T 102, the latter, in turn, being connected to a hydraulic line 103. The line 103 is connected to a fixed hollow piston 104 which is secured to a mounting arm 105, and the mounting arm 105 is secured to the threaded end 106 of a plug 107 by means of nuts 108, 109. The piston 104 projects into the bore 110 of a restrictor valve

cylinder 111 and is, furthermore, provided with a sealing ring 112 which bears against the walls of the bore 110. The cylinder 111 is provided with a downwardly extending valve rod 113 which slidably projects through the valve housing 49, so as to extend across the passageway 84. The valve rod 113 is, furthermore, formed with a diametrically reduced restrictor valve portion 114 which is adapted to open and close the passageway 84 as will presently more fully appear. Mounted on one end of the cylinder 111 is a spring abutment ring 115 for receiving one end of a compression spring 117 which encircles the cylinder 111 and bears at its other end against the valve housing 49.

Secured to one wall of the oil reservoir 7 is an accumulator 118 which comprises a fixed cylindrical housing 119, the interior of which is bored for receiving a piston 120. The piston 120 is provided with a central bore 121 for receiving a compression spring 122 which abuts at its opposite ends, respectively, against the piston 120 and cylinder 119. Formed in the piston 120 at one end thereof is an annular groove 123 for receiving a hydraulic seal 124. Threaded into one end of the cylinder 119 is a cap 125 provided with an O-ring 126 so as to form a fluid-tight seal against the cylinder 119 and centrally thereof the cap 125 has a passageway 127. Threaded into the end of the cap 125 is an elbow 128 which is connected to a tube 129, the latter, in turn, being connected to the T fitting 102 by means of a nut 130.

Threaded into the upstanding member 97 and communicating with the vertical bore 99 is a pipe 131 which is suitably connected to supply lines 132, 133, 134, 135, 136, 137, by conventional pipe fittings, the supply lines 134, 135, 136, 137, being connected to the jacks 4. As seen by reference to FIG. 12, each of the jacks 4 comprises a fixed cylinder 138 which slidably receives a piston 139 having a floor contacting foot member 140 rigidly mounted at the lower end thereof. The cylinder 138 is, furthermore, provided with an annular stop-forming shoulder 141 which is adapted to receive the diametrically enlarged upper end 142 of the piston 139, and interposed between the end wall of the cylinder 138 and the diametrically enlarged portion 142 is a return spring 143. Secured to the base casting 3 and projecting into the piston 39 is a spindle 144 having a central passageway 145 for receiving hydraulic fluid from the supply lines 132, 133, 134, 135, 136, 137, and threaded into the diametrically enlarged portion 142 is a collar 146 having a hydraulic seal 147.

Rigidly mounted on the base casting 3 somewhat centrally thereof by means of a plurality of bolts 148 is a bottom plate 149 which supports a bottom cup 150 of an upstanding hydraulic cylinder 151. Slidably mounted within the cylinder 151 is a hollow piston 152, the upper end of which has a journal block 153 rigidly mounted thereon by means of a plurality of pins 154. The lower end of the piston 152 is provided with an annular recess 155 for receiving a hydraulic seal 156, and, furthermore, the bottom cup 150 is sealed with respect to the cylinder 151 by means of a soldered joint 157. Adjacent its upper end, the cylinder 151 is provided with an overflow tube 158 which extends downwardly and is disposed at its opposite end in the oil reservoir 7. Upwardly of the overflow tube 158, the cylinder 151 is provided with a return tube 159 so as to permit any leakage past the piston 152 to flow back into the oil reservoir 7. Secured to the journal block 153 by means of bolts 158' is an upper member 160 which is bolted to a lower member 161 in the provision of a slide 162. It should be understood, however, that the slide 162 may, if desired, be fabricated as one piece. The slide 162 is, furthermore, provided with six spaced parallel vertical bores 163, 164, 165, 166, 167, 168, which are adapted to slidably receive six vertical posts 169, 170, 171, 172, 173, 174. The posts 169, 171, 173 are rigidly attached to a top plate 175 upon which

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the cap casting 1 is bolted, while the posts 170, 172, 174 are rigidly attached to the bottom plate 149. Rotatably mounted on the journal block 153 are three equally spaced sprockets 176, each of which has a roller chain 177 trained there around, one end of the roller chains 177 being rigidly secured to an anchor rod 178, the latter, in turn, being rigidly secured in the bottom plate 149. The other ends of each of the roller chains 177 extend downwardly into the piston 152 and are rigidly secured to a block 179 which is mounted on the lower end of a depending rod 180 which is fixed at its upper end to the top plate 175 by means of a screw 181.

Bolted at its upper end to the top plate 175 is an inner shield 182 and encircling the inner shield 182 is an intermediate shield 183 which is secured to a mounting ring 184, and the mounting ring 184 is, in turn, bolted to the slide 162. The upper end of the intermediate shield 183 is provided with a sealing gasket 185, which effectively seals out dirt and other foreign matter from the interior of the base B. If desired, an additional shield 186 may be secured to a cover member 187 which is disposed over and conceals the mechanism within the base casting 3.

Hydraulic fluid for the cylinder 151 is supplied through a pipe 188 which is connected through a supply line 189 to a pipe 190 threaded into the upstanding member 98 so as to communicate with the vertical bore 100 therein. Fluid to the cylinder 151 may also be optionally supplied from the hydraulic pump 36 which receives fluid from the oil reservoir 7 by a suction line 191 and discharges through a discharge line 192, the discharge line being connected to the supply line 189 by means of a T fitting 193. Preferably, a check valve 194 is provided in the discharge line 192.

In mobile position, the casters 5 normally rest on the floor and the piston 152 is in its lowermost position, as shown in FIG. 1 and in full lines in FIG. 14. To immobilize the table A, the pedal 15 is depressed so as to rock the shaft 12 and operate the piston 50. As the pedal 15 is repeatedly operated, the stop collar 20 will press against the rubber bumper 27, each time the pedal 15 is depressed with the result that the rubber bumped 27 acts a resilient cushioning resistance to normal manipulation of the pedal 15. As the piston 50 moves away from the plug 55, the suction created within the cylinder 48 will open the ball check valve 63 and draw oil through the screen 66 and into the passageway 65. As the piston moves toward the plug 55, the ball check valve 63 will close and oil under pressure will pass through the opening 83 and into the passageway 84. However, oil will not pass into the bore 85 since the valve rod 113 blocks the oil flow thereto. Oil will also flow through the aperture 67 and passageway 68 and open the ball check valve 73, allowing oil to enter the central bore 99 and pipe 131 for delivery to the jacks 4. As the oil pressure builds up within the jack pistons 139, the pistons will slide downwardly until the diametrically enlarged upper ends 142 abut the stop shoulders 141, causing the operating table A to be elevated off of the casters 5 and rest firmly on the floor. Furthermore, as the jacks are being lowered, pressure will build up in the jack supply lines, and this pressure will be transmitted to the restrictor valve piston 111. The spring 117 is so constructed that it will prevent movement of the restrictor valve piston 111 until the pressure in the jack lines and bore 110 are built up sufficiently to lower the jacks into their final position on the floor. However, when sufficient pressure has thus built up in the bore 110, the pressure will urge the restrictor valve rod 113 downwardly and allow the restrictor valve 114 to open the passageway 84. Continued movement of the pedal 15 will then cause oil to open the check valve 89 and permit oil to flow through the bore 100 and into the pipe 190 for delivery to the cylinder 151. Thus, by manipulating the single pedal 15, the jacks 4 are first lowered while cutting off oil flow to the cylinder 151, but

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when the jacks are in their final position, oil under pressure can be automatically delivered to the cylinder 151.

As the piston 152 moves upwardly within the cylinder 151, the sprockets 176 and slide 162 are carried therewith. Since the chains 177 are fixed at one end to the rod 178, the chains will exert an upward force on the rod 180 to elevate the top plate 175 and thereby lift the operating table. As the piston 152 and slide 162 are elevated, they will move upwardly only one-half of the distance traveled by the top plate 175, with the result that only a relatively short piston stroke is necessary to raise the operating table to the necessary heights required for surgical operation. As the top plate 175 moves upwardly, the posts 169, 171, 173, will move within the slide 162, while, at the same time, the slide 162 will ride upwardly on the fixed vertical posts 170, 172, 174. Consequently, the operating table is guided and supported on the three rigid vertical posts 170, 172, 174, which will effectively absorb any thrust on the table when it is elevated and the cylinder 151 is not required to serve as the guide for upward and downward movement of the operating table. When the lower end of the piston 152 moves upwardly past the upper end of the overflow tube 158, the piston will cease its upward travel since further admission of oil to the cylinder 151 will merely cause the excess oil in the cylinder 151 to flow into the overflow tube 158 and return to the oil reservoir 7. When it is desired to lower the piston 152 the foot pedal 15 is depressed downwardly to its fullest extent against the resilient bumper 27 which will yield sufficiently to permit the stud 94 to open the ball check valves 89, 93 allowing weight of the table to force oil back into the reservoir 7.

When it is desired to retract the jacks 4 the pedal 15 is lifted upwardly to its fullest extent causing the pump piston 50 to contact the abutment 82 and operate the release trigger 80. The release trigger 80 will shift the release rod 78 and open the ball check valves 73, 77, causing oil to flow out of the jacks 4 and into the oil reservoir 7, thus permitting the operating table to be lowered onto the casters 5. It will, therefore, be apparent that the jacks 4 can be retracted so as to lower the operating table on the casters 5 without disturbing the position of the piston 152. Consequently, it is possible to change the location of the operating table during surgery without jolting or otherwise altering the vertical position of the table.

If desired, the foot switch 30 may be depressed to operate the motor 35 and hydraulic pump 36 so as to supply oil under pressure to the cylinder 151. Thus, the motor pump unit provides an independent auxiliary power operated means for elevating the piston 152.

When the jacks 4 are lowered, oil pressure in the jack lines will be transmitted to the accumulator piston 120 so as to compress the spring 122. If, however, the oil pressure should change as a result of temperature variations or other conditions, any decrease in oil pressure will cause the spring 122 to expand and move the piston 120, thereby maintaining the oil pressure. Similarly, if an increase in oil pressure should occur, the spring 122 will be further compressed so as to compensate for the excess oil pressure.

As will be seen from the foregoing, operating tables constructed in accordance with the present invention employ a single pedal for elevating the table, lowering the table, immobilizing the table by lowering the foot jacks, and rendering the table mobile by lifting the floor jacks so as to lower the base and bring the casters into contact with the floor. This single-pedal type of construction contributes very materially to the ease and simplicity of operation of the entire table and simplifies its use by the nurses, doctors, and attendants using the table. Moreover, the single-pedal type of construction provides greater foot room and clearance around the base of the table.

Another advantage which is inherent in the structure

of the present invention results from the greater stability achieved through the unique telescoping support mechanism which affords support at the greatest possible diameter throughout the total height to which the pedestal may be elevated and, at the same time, eliminates the use of key-ways and similar structure. This results in a much more friction-free, easily moving device and achieves an unusually high degree of stability in the fully extended or fully elevated position.

It should be understood that changes and modifications in the form, construction, arrangement, and combination of the several parts of the hydraulically operated elevating mechanisms for operating tables and the like may be made and substituted for those herein shown and described without departing from the nature and principle of our invention.

Having thus described our invention, what we claim and desire to secure by Letters Patent is:

1. Elevating mechanism for use with operating tables and the like, said mechanism comprising a base, a plurality of hydraulically operated jacks operatively mounted on said base, hydraulically operated extensible means mounted on said base and projecting upwardly therefrom, means for providing a source of hydraulic fluid under progressively increasing pressure, a hydraulic supply line interconnecting the jacks, first flow-directing means including a first valve for controlling and delivering fluid from said source to the supply line interconnecting the jacks, means including a second valve for controlling and delivering fluid under pressure from said source to the extensible means, normally closed third valve means operatively interposed between the source and second valve means for opening when the pressure of the fluid within said first-directing means reaches a predetermined value, whereby to open said second valve and permit delivery of fluid from the source to said extensible means, and accumulator means interposed between the third valve means and the supply line to the jacks for maintaining pressure in the jacks notwithstanding a tendency for pressure-drop when the extensible means is placed under pressure.

2. Elevating mechanism for use with operating tables and the like, said mechanism comprising a base, a plurality of hydraulically operated jacks operatively mounted on said base, hydraulically operated extensible means mounted on said base and projecting upwardly therefrom, means for providing a source of hydraulic fluid under progressively increasing pressure, a hydraulic supply line interconnecting the jacks, first flow-directing means including a first valve for controlling and delivering fluid from said source to the supply line interconnecting the jacks, means including a second valve for controlling and delivering fluid under pressure from said source to the extensible means, normally closed third valve means operatively interposed between the source and second valve means and being operatively connected to the first flow-directing means, said third valve means being responsive to the pressure in the first flow-directing means and adapted to open when the pressure of the fluid in the first flow-directing means reaches a predetermined value whereby the pump means is directly connected to the second valve, said predetermined value being substantially in excess of the pressure required to open said first and second valves, whereby to open said second valve and permit delivery of fluid to said extensible means, and accumulator means interposed between the third valve means and the supply line to the jacks for maintaining pressure in the jacks notwithstanding a tendency for pressure-drop when the extensible means is placed under pressure.

3. Elevating mechanism for use with operating tables and the like, said mechanism comprising a base, a plurality of hydraulically operated jacks operatively mounted on said base, hydraulically operated extensible means mounted on said base and projecting upwardly there-

from, a manually operable pump for providing a source of hydraulic fluid under progressively increasing pressure, a hydraulic supply line interconnecting the jacks, first flow-directing means including a first valve for controlling and delivering fluid from said source to the supply line interconnecting the jacks, means including a second valve for controlling and delivering fluid under pressure from said source to the extensible means, normally closed third valve means operatively interposed between the source and second valve means, said third valve means being operatively connected to the first flow-directing means in such manner as to open when the pressure in the first flow-directing means reaches a predetermined value, said predetermined value being substantially in excess of the pressure required to open said first and second valves, whereby to open said second valve and permit delivery of fluid to said extensible means, and accumulator means interposed between the third valve means and the supply line to the jacks for maintaining pressure in the jacks notwithstanding a tendency for pressure-drop when the extensible means is placed under pressure.

4. Elevating mechanism for use with operating tables and the like, said mechanism comprising a base, a plurality of hydraulically operated jacks operatively mounted on said base, hydraulically operated extensible means mounted on said base and projecting upwardly therefrom, means for providing a source of hydraulic fluid under progressively increasing pressure, a hydraulic supply line interconnecting the jacks, first flow-directing means including a first valve for controlling and delivering fluid from said source to the supply line interconnecting the jacks, means including a second valve for controlling and delivering fluid under pressure from said source to the extensible means, normally closed third valve means operatively interposed between the source and second valve means, said third valve means being operatively connected to the first flow-directing means in such manner as to open when the pressure in the first flow-directing means reaches a predetermined value, whereby to open said second valve and permit delivery of fluid to said extensible means, means for withdrawing fluid from said jacks while at the same time maintaining fluid under pressure in said extensible means, and accumulator means interposed between the third valve means and the supply line to the jacks for maintaining pressure in the jacks notwithstanding a tendency for pressure-drop when the extensible means is placed under pressure.

5. Elevating mechanism for use with operating tables and the like, said mechanism comprising a base, a plurality of hydraulically operated jacks operatively mounted on said base, hydraulically operated extensible means mounted on said base and projecting upwardly therefrom, a pump having an inlet connected to a source of hydraulic fluid and also having a discharge port, a housing having first and second passageways each being connected to the discharge port for receiving fluid under pressure therefrom, first and second valve means operatively connected to the first and second passageways respectively, each of said valves being normally closed and adapted to open when fluid under pressure is discharged by the pump, a flowpipe directly coupled to all of the hydraulic jacks and to said first valve means whereby when fluid passes through said first valve means said fluid is simultaneously applied to all of the jacks, normally closed passage-blocking means operatively mounted in said second passageway between the discharge port and the second valve means, pressure responsive hydraulic means operatively connected to the flowpipe for opening the passage-blocking means when the jacks are fully extended and the pump is subsequently operated whereby fluid under pressure is passed from the discharge port to the second valve means, and accumulator means interposed between the normally closed passage-blocking means and said flowpipe to the jacks for maintaining pressure to the jacks notwithstanding

ing a tendency for pressure drop when the extensible means is placed under pressure.

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