Oct. 15, 1940. W. D. BELL 2,217,783

OPERATING TABLE

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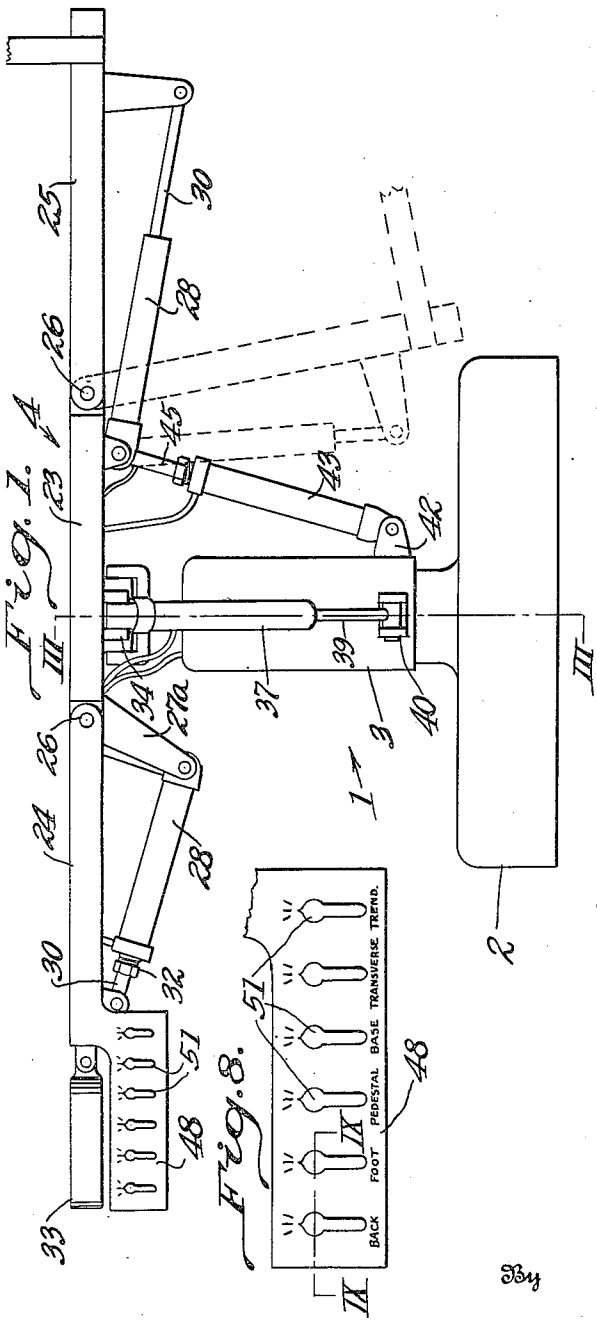


Fig. 1.

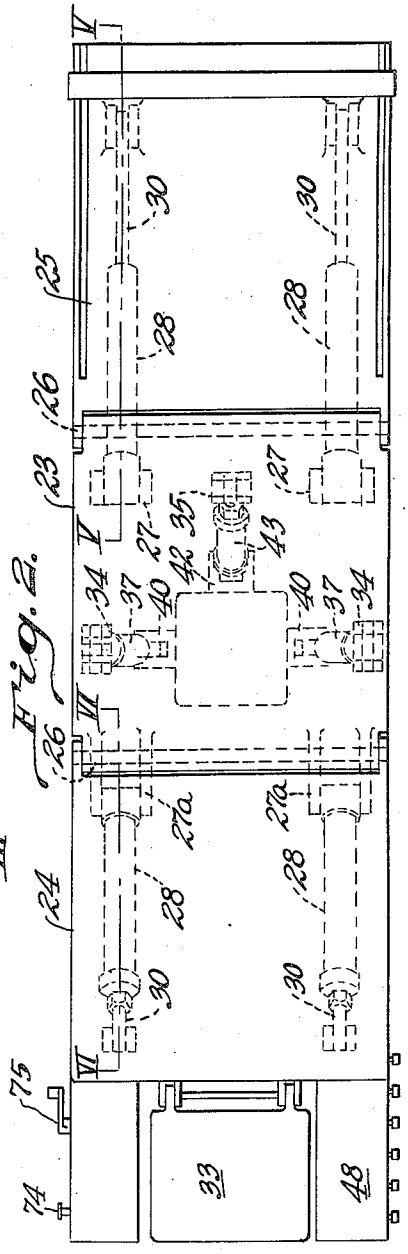


Fig. 2.

Fig. 8.

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Fig. 3.

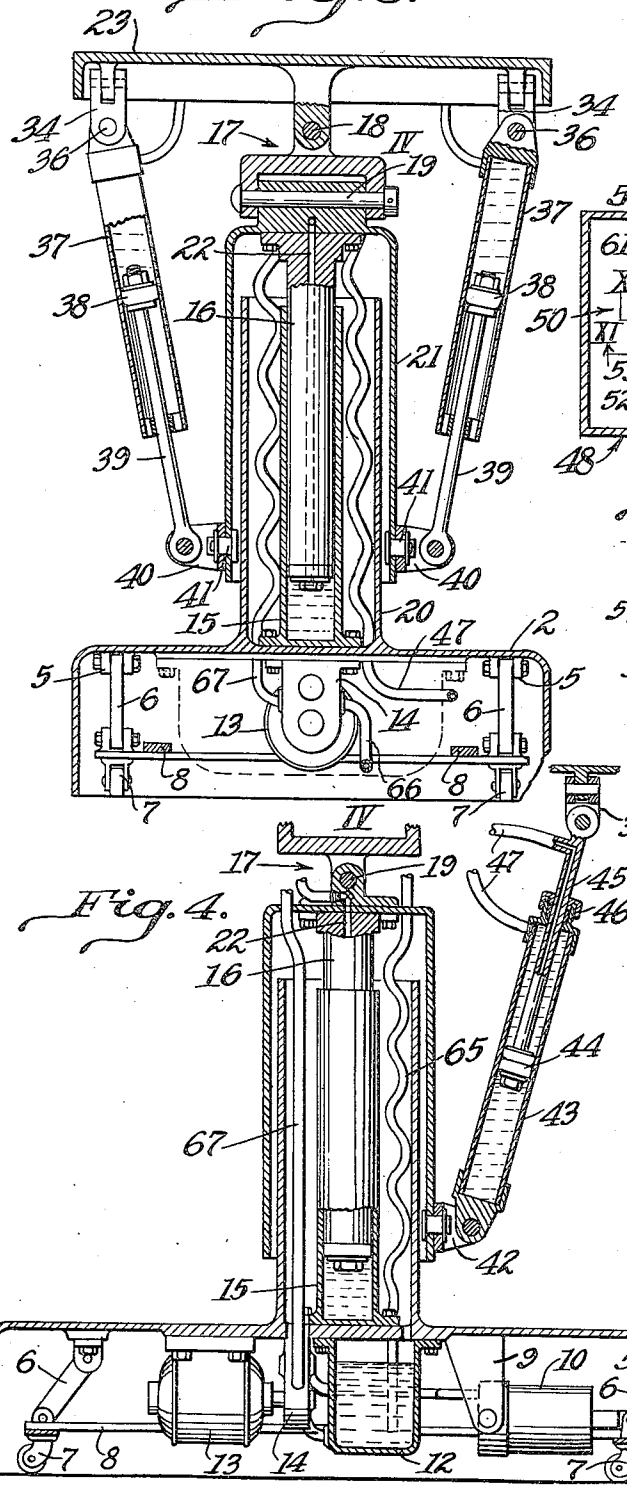


Fig. 4.

Fig. 9.

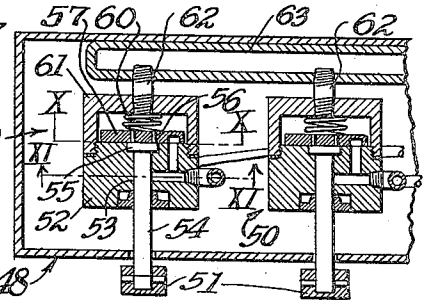


Fig. 10.

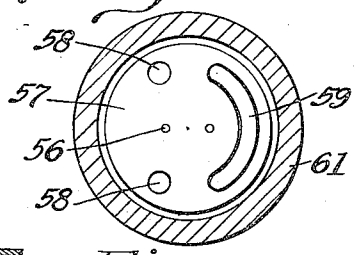
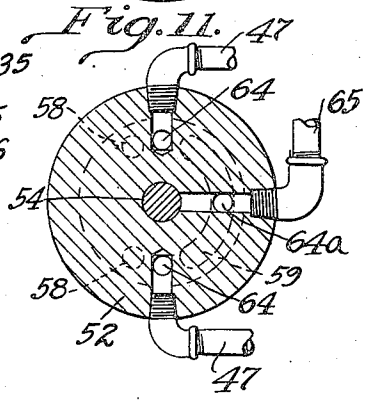


Fig. 11.



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Fig. 5.

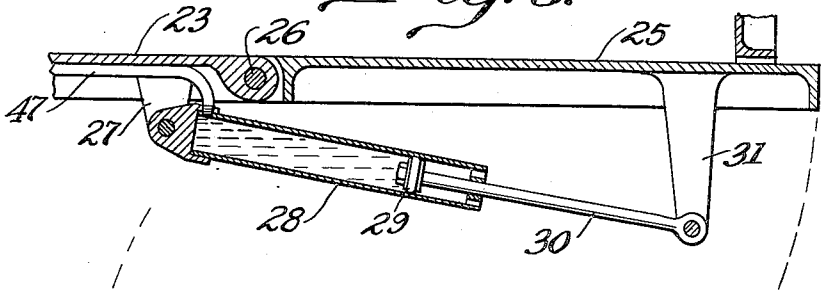


Fig. 6.

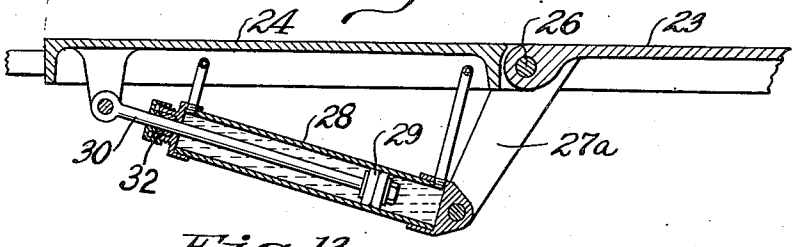


Fig. 13.

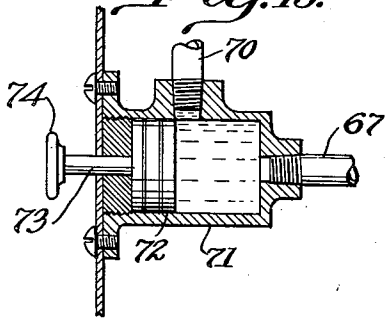
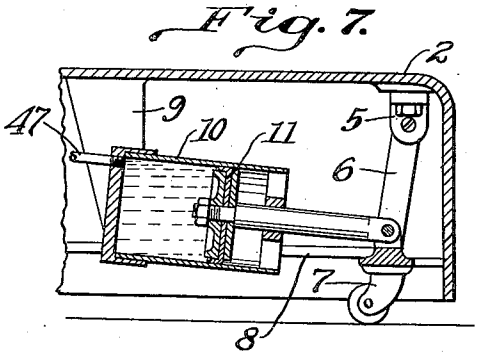


Fig. 7.



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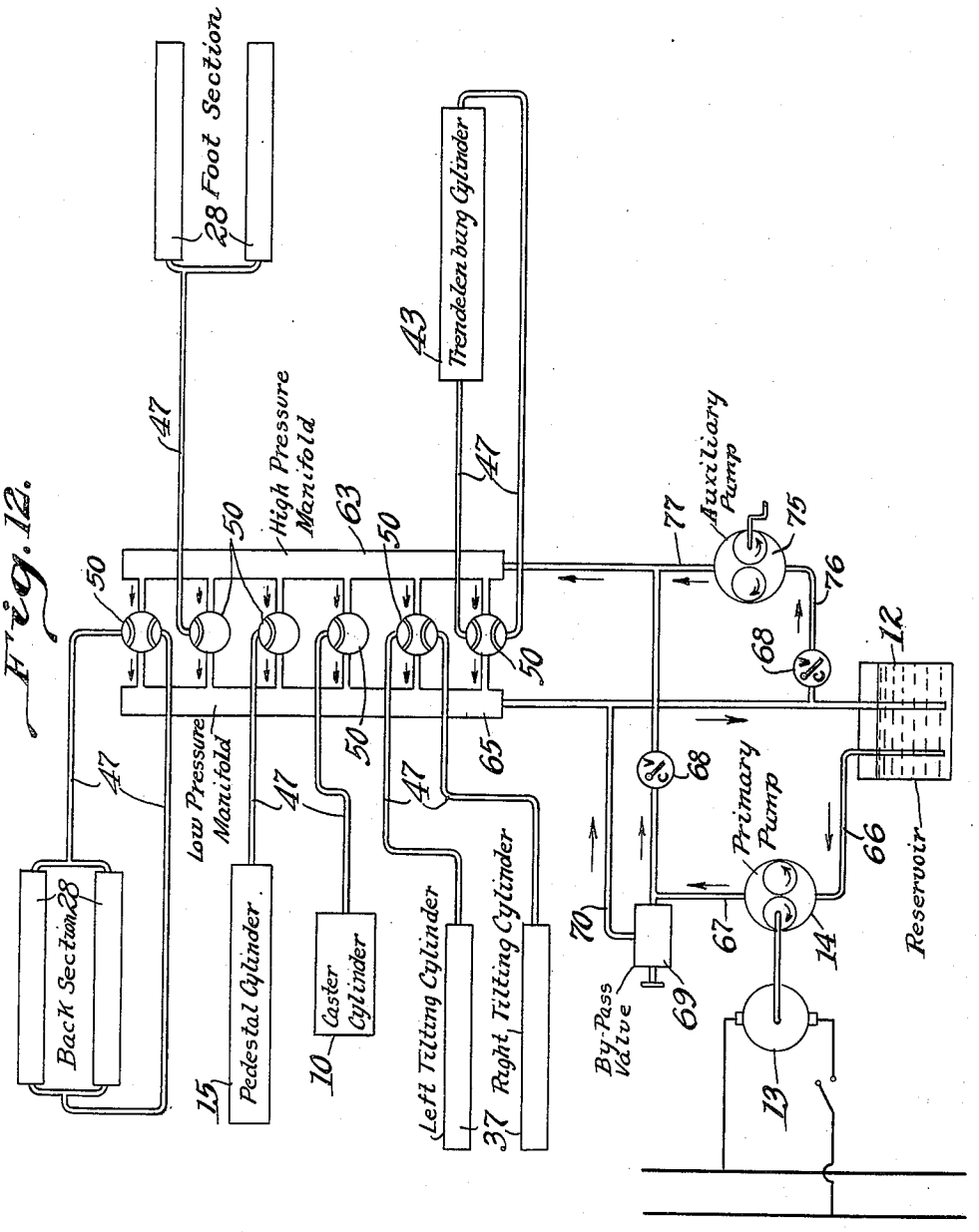
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Fig. 12.



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Patented Oct. 15, 1940

2,217,783

UNITED STATES PATENT OFFICE

2,217,783

OPERATING TABLE

William D. Bell, Columbus, Ohio, assignor to F. O. Schoedinger, Columbus, Ohio

Application June 9, 1938, Serial No. 212,768

4 Claims. (Cl. 311—7)

This invention relates generally to hospital equipment and is particularly directed to a new and improved operating table. Operating tables hitherto have been provided with a pedestal base and a supporting column arising therefrom, the upper end of the latter carrying a sectional table. In tables of this type, the supporting column is usually adjustable vertically with respect to the base and the table adjustable relative to the column, the various sections of the table being movable relative to each other. Prior to this time, all of these adjusting operations have been effected through the actuation of one or more hand wheels, cranks or pedals and screws or gears connected therewith. This method of adjustment is slow and laborious and frequently results in sharp jerks or jolts being transmitted to the table.

The primary object of the present invention resides in the provision of an operating table having all the features of adjustment of prior tables, the adjustments being performed automatically by hydraulic means and with minimum effort on the part of the operator.

It is also an object of the invention to provide means in connection with the table for controlling the adjustments thereof from a central point, the said means also providing for the simultaneous operation of two or more parts of the table according to the desires of the operator or as occasion demands.

A further object of the invention rests in the provision of an operating table having a motor driven pump, a fluid supply source connected with the pump and power cylinders to receive fluid from the pump under pressure to effect the adjustment of the various parts of the table and maintain them in rigid position.

Additional objects will be apparent from the following detailed description of one form of operating table constructed in accordance with the invention and illustrated in the accompanying drawings.

In the drawings:

Fig. 1 is a view in side elevation of an operating table constructed in accordance with the present invention;

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

Fig. 3 is a vertical transverse sectional view of the table taken on the plane indicated by the line III—III of Fig. 1;

Fig. 4 is a vertical longitudinal sectional view taken through the base of the machine on the plane indicated by the line IV—IV of Fig. 3;

Fig. 5 is a detail vertical longitudinal sectional view taken through the leg section of the table and the operating mechanism therefor, the plane of this section being indicated by the line V—V of Fig. 2;

Fig. 6 is a similar view of the back section of the table, the plane of this section being indicated by the line VI—VI of Fig. 2;

Fig. 7 is a detail vertical longitudinal sectional view taken through the base elevating mechanism of the machine shown in Fig. 1;

Fig. 8 is a front elevation of the control panel of the machine;

Fig. 9 is a horizontal sectional view through the control mechanism on the plane indicated by the line IX—IX of Fig. 8;

Fig. 10 is a detail sectional view through one of the valves used in controlling a portion of the table, the plane of this section being indicated by the line X—X of Fig. 9;

Fig. 11 is a similar view on the line XI—XI of Fig. 9;

Fig. 12 is a diagrammatic view of the piping arrangement employed in the table shown in Fig. 1;

Fig. 13 is a detail longitudinal sectional view of a by-pass valve used in the piping system.

Referring more particularly to the drawings, the numeral 1 designates the entire operating table. This table is similar to tables already manufactured in that it is provided with a base 2, a vertically extending column 3 and a sectional platform 4. The various parts of the machine and the platform are movable relative to one another. The base 2 is preferably formed of a metallic casting and is provided on its under side with a plurality of spaced lugs 5. These lugs form the point of attachment of a plurality of links 6, to the lower or free ends of which are secured caster members 7. A pair of these casters is arranged at the forward end of the base and a pair at the rear end thereof. These pairs of casters are connected by means of rods or similar devices 8 in order that all will move simultaneously. The base is also provided with a bracket 9 to which is fulcrumed a fluid receiving cylinder 10. A piston 11 is mounted for sliding movement in the cylinder and a rod is rigidly secured to the piston at one end and at the opposite end is pivotally secured to the frame formed by the members 6 and 8.

As illustrated in Fig. 7, when the piston moves toward the open end of the cylinder 10, the frame which carries the casters is swung on the links 6 and the casters will move downward relative to the base and causes the latter to be raised from the floor or other supporting surface. When in

this position, the base can be moved in any desired manner depending upon the wishes of the operator or other attendant. The under side of the base is also provided with a reservoir 12 for the reception of oil or other fluid used to operate the table. A motor 13 is positioned in the base to drive a gear pump 14 by means of which the fluid is pumped from the reservoir 12 to the cylinder 10 and other fluid pressure responsive devices to be hereinafter described. It may be found desirable to enclose the motor and the pump in a gas proof housing to minimize the danger of explosions.

Secured to the upper side of the base is a tubular member 15 in which is slidably positioned a piston 16. This piston constitutes a column on which the weight of the platform 4 is supported and between the end of the column 16 and the under side of the table, there is provided a universal mounting 17. This mounting is formed to include longitudinally and transversely extending pivots 18 and 19. The column and the base each carry shields 20 and 21 which are in telescopic relation and serve to hide the member 15 and any other mechanism extending between the platform and the base. The column 16 is formed with a central opening 22 through which the operating fluid is passed to the interior of the cylinder 15 below the piston. When fluid is introduced into the cylinder, the piston will be moved outward and the platform will be raised in accordance with the quantity of fluid introduced.

The platform is formed to include three sections 23, 24 and 25. The section 23 is used as a seat section, the section 24 as a back section and the section 25 as a foot section. The latter two sections are hinged as at 26 to the former section and this section is hinged by means of the pin 19 to the universal mounting. The hinging of these sections provides for relative adjustment between each of the sections as well as between the platform and the column. The under side of the section 23 is provided near its front and rear edges with a plurality of pairs of spaced lugs 27 and 27a and fluid receiving cylinders 28 are pivotally secured between the spaced lugs of each pair. These cylinders constitute part of the fluid motors used to move the foot and back sections of the platform relative to the seat section 23. Each of the cylinders is provided with a longitudinally extending piston 29 and piston rods 30 extend from the piston to ears 31 provided on the under sides of the sections 24 and 25. The cylinders at the forward end of the seat section are single acting cylinders while those at the rear which serve to move the back section are double acting cylinders. The open ends of the former cylinders are provided with guides to prevent lateral movement on the part of the piston rod while the latter cylinders are provided with stuffing boxes 32 to prevent the escape of fluid around the piston rods. Double acting cylinders are provided at this location to prevent the back section from moving too far when it is raised to an elevated position. As is usual with tables of this character, the upper edge of the back section is provided with an adjustable head rest 33.

To provide power to move the section 23 and consequently the entire platform relative to the column, the under side of the section 23 is provided at the sides and front with additional ears to which are pivotally connected small universal connections 34 and 35, the connections 34 having secured thereto by means of pivots 36 a plurality of motor cylinders 37. The pistons 38 in these motor cylinders are connected by means of piston rods 39 to brackets 40 pivotally secured by means of studs 41 to the shield 21. The connection between the piston rods 39 and the shield 21 provides for rocking movement on the part of this mechanism in two directions when the platform is tilted either longitudinally or transversely. A similar connection 42 is provided between the lower end of another motor cylinder 43 which provides power to tilt the platform in a longitudinal direction. This form of tilting is known in the art as the Trendelenburg movement. The piston 44 in the cylinder 43 is connected by means of the piston rod 45 with the connection 35. This cylinder is similar to the cylinders at the back of the table in that it is of the double acting type to provide for forward and rearward tilting on the part of the platform. The piston rod 45 is tubular in form and fluid is fed through this tube to the under side of the piston 44 when the piston is to be moved toward the upper end of the cylinder. A stuffing box 46 is provided around the piston 45 to prevent the escape of the fluid when pressure is introduced into the upper end of the cylinder.

The piston motors connected to the sides of the section 23 and the shield 21 are single acting cylinders, one of them serving to move the platform in one direction and the other to move it in the opposite direction. Fluid lines 47 lead to the ends of the cylinders for the purpose of introducing fluid under pressure to the chambers between the ends of the cylinders and the pistons in order to cause the operation of the various parts of the table.

To control the flow of fluid under pressure to the cylinders, there has been provided a control box 48. This box includes a panel 49 on which any desirable indicia may be printed or otherwise applied to indicate which of the various sections will be operated by any particular valve handle. In the particular form of the invention illustrated, six valves 50 have been provided within the control box and handles 51 are secured to the outer ends of the valve stems at the front of the panel 49. The valves 50 are identical in construction and a description of one is believed to be sufficient for all. These valves each include a body 52 formed with a central opening 53 through which the valve stem 54 extends. The inner end of the valve stem is provided with a head 55 having a pair of pins 56 projecting therefrom. These pins are received within openings formed in a valve disk 57. This valve disk is shown in elevation in Fig. 10 of the drawings.

The disks are provded with a pair of spaced perforations 58 and an arcuate pocket 59 between these perforations. A coil spring 60 is positioned between the disk 57 and a cover 61 and serves to hold the former in fluid-tight relationship with the inner end of the body 52. The cover 61 is formed with a central opening for the reception of a tube 62 leading from a high pressure manifold 63. The body of the valve is provided with three ports 64 and 64a spaced 90 degrees apart, two of the diametrically opposed ports 64 being connected by means of the pipes 47 with the ends of the power cylinders. In instances where the power cylinders are of the single acting type, one of the ports 64 is closed by means of a plug and only the other port is employed. The port 64a constitutes the outlet of the valve and is connected by means of a tube 65 with the reservoir 12 disposed in the

base. The tube 65 constitutes a low pressure line and conveys all the fluid from the power cylinders to the reservoir.

When a valve handle is turned to one extreme of its movement, one of the perforations 58 in the valve disk will be positioned in registration with one of the ports 64. This movement will also connect the other port 64 with the port 64a through the arcuate pocket 59. If the cylinder to which the valve is connected is a double acting cylinder, one of the lines 47 will then become an exhaust line from the end of the cylinder opposite to that which is receiving the fluid under pressure and the piston will move toward this end. If the motor cylinder happens to be a single acting cylinder, there will be no need to vent the opposite end and the valve handle will be moved in the opposite direction to move the port 58 in the valve disk out of registration with the active port 64 and continued movement will cause the pocket 59 to connect this active port with the exhaust port 64a.

In the piping arrangement illustrated in Fig. 12, there is shown the various connections between the pump, the power cylinders and the valves. As illustrated, the inlet side of the pump is connected with the reservoir 12 by means of a tube 66. The outlet side of the pump is connected by means of a tube 67 with the high pressure manifold 63. A check valve 68 is positioned in the line 67 to prevent back flow of the fluid toward the pump 14. The control valves 50 are positioned between the high pressure manifold 63 and a low pressure manifold or line 65, this member communicating with the reservoir 12. A by-pass valve 69 is positioned in a line 70 which connects the high pressure line 67 with the low pressure line 65. This by-pass valve is illustrated in Fig. 13 and includes a casing 71 having a piston valve 72 slidably positioned therein.

The piston 72 is provided with a plunger 73 which extends exteriorly of the casing 71 and is provided with a button 74 on its outer end. When the valve is in the position shown in Fig. 13, fluid may pass without obstruction from the line 67 to the line 70. When the piston is moved into the cylinder by the application of pressure to the button 74, this flow will be prevented and pressure will be applied by means of the pump to the fluid in the line 67 and the manifold 63. This operation is performed when one or more of the valves are turned to connect one or more of the power cylinders with the high pressure manifold.

In the event the power supplying energy to rotate the motor 13 fails, or it is desirable to operate the table by hand power, there is provided an auxiliary pump 75. This pump may be rotated by hand wheel, and is connected by means of a tube 76 to the low pressure line 65. A second tube 77 connects the outlet of this pump with the high pressure line. A second check valve 68 is positioned in the line 76, the valves 68 being provided to prevent the loss of pressure through either of the pumps when the other is in operation.

Inasmuch as relative movement is possible between the platform and the base, the lines 65 and 67 must be provided with a certain amount of extra length to prevent their rupture when the platform is elevated. All of the fluid lines must possess some flexibility at the points between the various parts of the table where relative movement takes place.

From the foregoing, it will be seen that an operating table has been provided in which the various adjustments are performed at least semi-automatically through the use of fluid under pressure. The attendant may control the operation of the table without performing any difficult movements and may through the actuation of a plurality of valves provide for the simultaneous adjustment of a plurality of the parts of the table. All of the adjustments may be controlled from a position adjacent the control panel and the attendant will not be required to move from this location.

While I have shown and described the invention in one of its forms, it will be understood that many changes may be made in the construction and arrangement of the various parts provided they are within the scope of the invention as defined in the claims.

What is claimed is:

1. An operating table comprising a base, a column provided on said base and having stationary and movable sections, a platform having pivotally connected seat, back and foot sections, a universal joint disposed between said seat section and the movable section of said column, a fluid-pressure operated power unit disposed at the sides and in front of said column, universal joint means connecting the ends of said power units with said seat and the movable section of said column, additional fluid pressure operated power units connected at their ends with said back, seat and foot sections, and means for selectively introducing fluid under pressure to said power units to adjust said seat section about longitudinal and transverse axes and said foot and back sections relative to said seat section.

2. In an operating table of the type having a base, a vertically movable column, and a platform mounted for longitudinal and transverse tilting movement on said column, said platform having pivotally joined seat, back and foot sections, a plurality of power units of the piston and cylinder type connected at one end with the seat section of said platform, the other ends being connected with the back or foot section of said platform or said column, means providing for the controlled operation of said power units comprising a reservoir for fluid at substantially atmospheric pressure, a power driven pump for supplying fluid under pressure, a high pressure manifold in communication with said pump, a low pressure manifold communicating with said fluid reservoir, and a separate control valve for selectively connecting each power unit with the high and low pressure manifolds.

3. In an operating table, a base, a vertically arranged cylinder carried by said base, a piston positioned for longitudinal movement in said cylinder, a platform supported on the upper end of said piston for movement about a horizontal axis, a shield member carried by said piston and extending downwardly along the sides of said cylinder, said platform and member being movable with said piston, means for moving said piston in said cylinder, a power unit of the piston and cylinder type disposed on each side of the horizontal axis of movement of said platform, universal joint means connecting the ends of said power units with said platform and shield member, means for supplying fluid under pressure to the power units to vary the effective length thereof and move the platform relative to the supporting piston, and control means disposed between said fluid supply means and said

power units, said control means being adjustable to selectively connect the power units with the fluid supply means, said control means also providing for the flow of fluid from either cylinder when the other is connected with said supply means.

4. In an operating table, a base, a vertically arranged cylinder carried by said base, a piston positioned for longitudinal movement in said cylinder, a platform supported on the upper end of said piston for movement about horizontal axes disposed at right angles, a shield member carried by said piston and extending downwardly along the sides of said cylinder, said platform and member being movable with said piston relative to the cylinder, means for moving said piston in said cylinder, a plurality of power units of the piston and cylinder type disposed in vertical planes arranged at right angles, universal joint means connecting the ends of said power units with the platform and said shield member, power operated means for supplying fluid under pressure to said power units to vary the effective length thereof and move said platform about the horizontal axes, and control means disposed between said power units and said fluid supply means.

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