Nov. 22, 1927. 1,650,327

I. CONRAD

OPERATING TABLE

Filed April 25, 1923 3 Sheets-Sheet 1

Fig. 2.

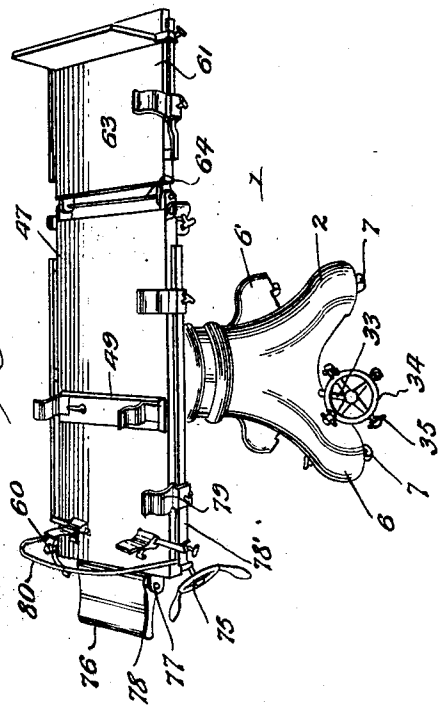


Fig. 1.

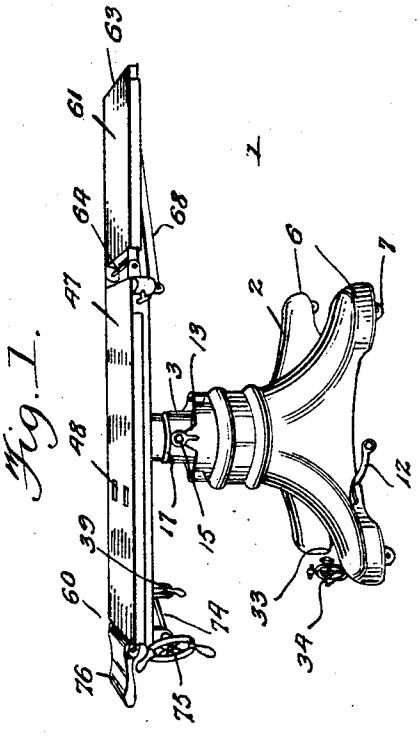
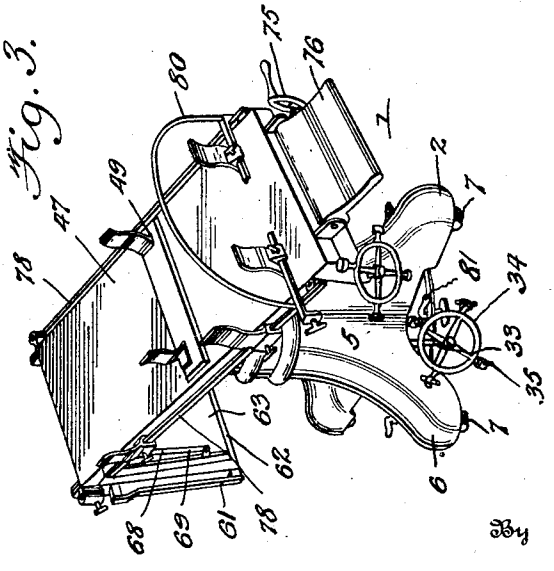


Fig. 3.



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Nov. 22, 1927. 1,650,327

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OPERATING TABLE

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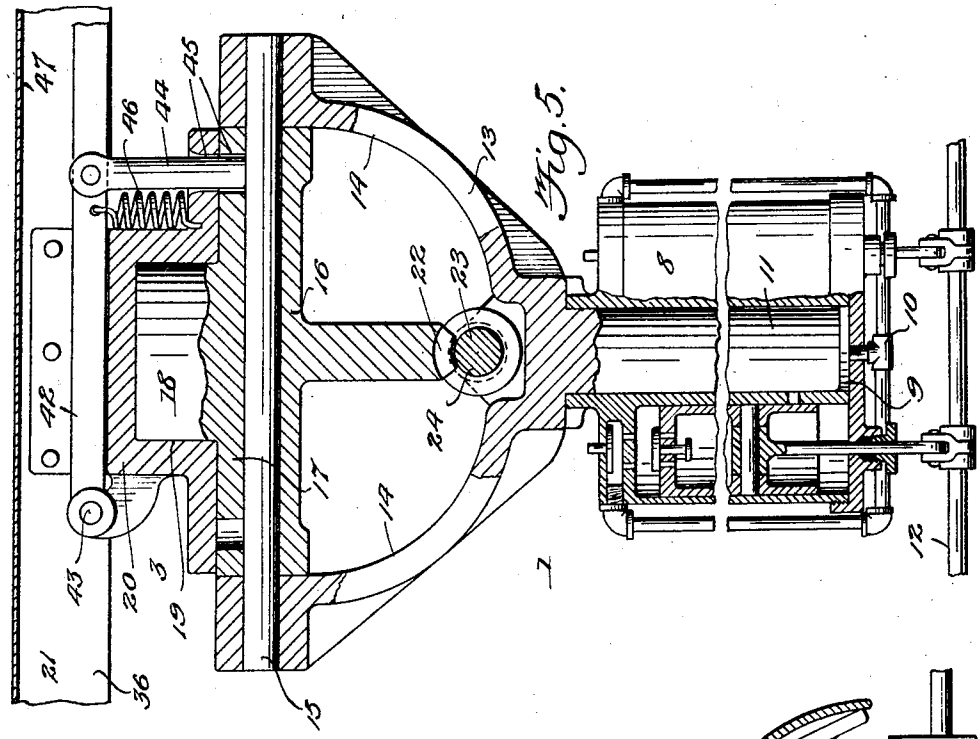


Fig. 5.

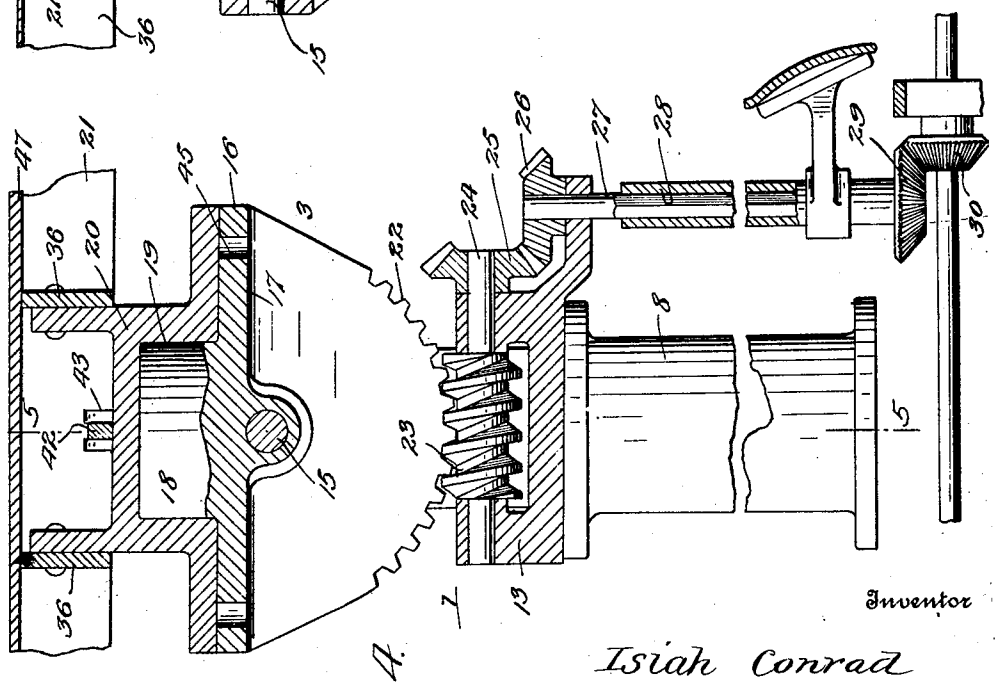


Fig. 4.

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I. CONRAD

OPERATING TABLE

Filed April 25, 1923 3 Sheets-Sheet 3

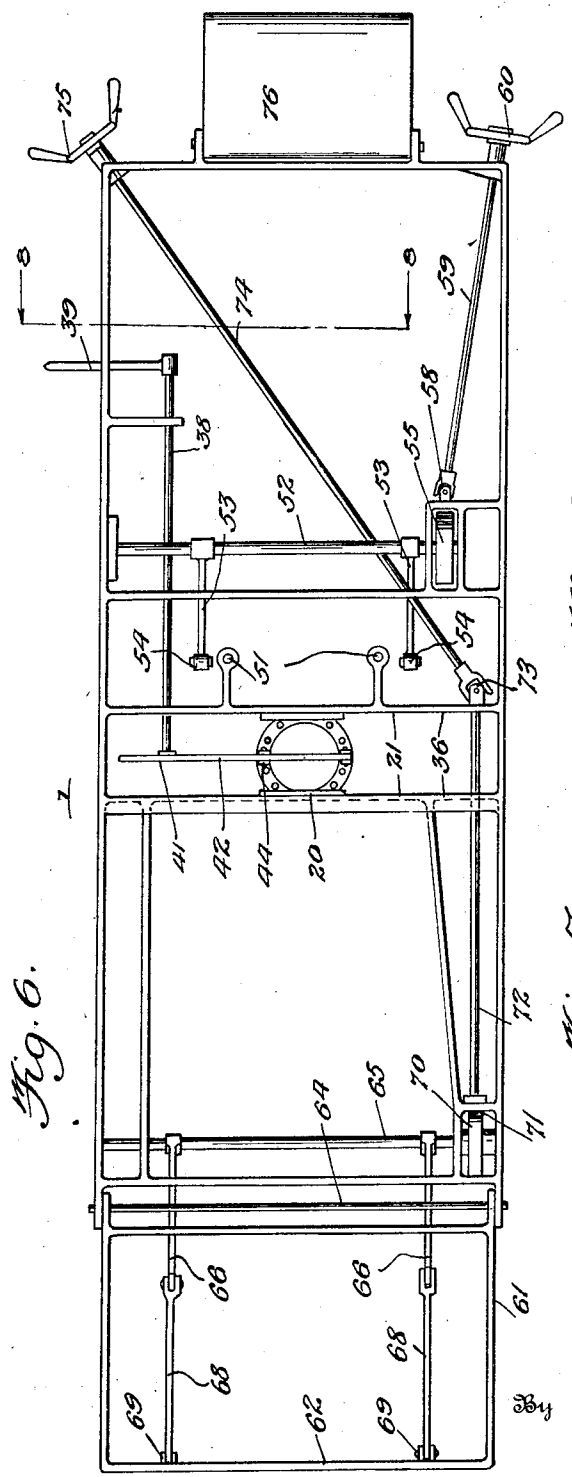


Fig. 6.

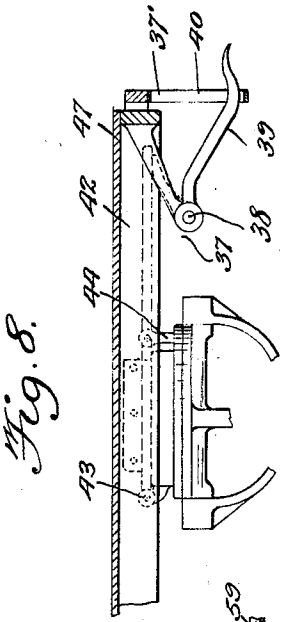


Fig. 8.

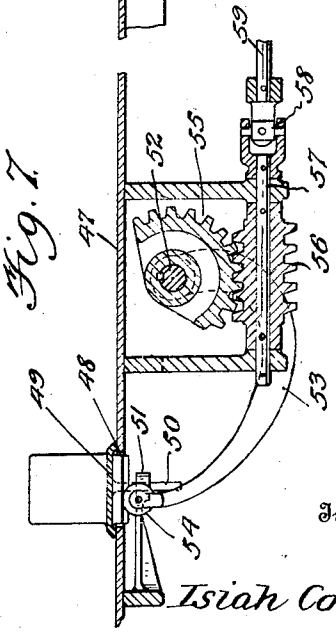


Fig. 7.

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Patented Nov. 22, 1927. 1,650,327

UNITED STATES PATENT OFFICE.

ISIAH CONRAD, OF COLUMBUS, OHIO.

OPERATING TABLE.

Application filed April 25, 1923. Serial No. 634,622.

This invention relates to improvements in hospital and surgical appliances and equipment, and has particular reference to an improved operating table, possessing features of construction and design, to be hereinafter specifically pointed out, by means of which the table may be flexed and adjusted and conveniently adapted to the requirements of a surgeon in procuring the most advantageous and efficient positions for assisting the surgeon in carrying out his work.

In accordance with the invention, there is provided an operating table consisting primarily of a base having mounted thereon in a peculiarly adjustable manner, a table structure proper, which is supported by means of a compound joint, including both vertical and horizontal pivots by means of which the table structure may be adjusted to assume the various "Trendelenburg" positions and various lateral tilted modifications thereof.

Among the objects of the invention are:

The provision of an operating table wherein substantially all of the controls for effecting the adjustments thereof are positioned adjacent to the head end of the table to revolve in unison and as a unit with the table structure whereby the controls are located at all times within convenient reach of the anæsthetist, in order that there are no controls in the surgeon's way, which would tend to break the continuity of the operation even though a change of position might be necessary; in constructing the table structure proper to include flexibly connected body and leg sections and in the provision of controls therefor by means of which the leg section can be raised to the same angle as the body section, or assume other relatively angular positions, by a control located at the head end of the table; in constructing the table structure to embody a vertically adjustable kidney lifting device which is adapted to be raised and lowered by a control situated contiguous to the head end of the table; in the provision of a control, situated at the head end of the table for locking the table in various positions of adjustment which the same assumes when rotated about the vertical pivotal axis thereof; in the provision of a novel and improved foot control for laterally tilting the table structure and locking the same in any of its laterally tilted positions; and in various other improvements which will be in part obvious and in part specifically pointed out hereinafter.

For a further understanding of the invention reference is to be had to the accompanying drawing, forming a part of this specification and wherein similar characters of reference denote like and corresponding parts throughout the several views thereof.

In said drawings:

Figure 1 is a side elevation of the improved operating table comprising the present invention.

Figure 2 is a vertical longitudinal sectional view taken through the table.

Figure 3 is a transverse vertical sectional view taken substantially on the line 3—3 of Figure 1.

Figure 4 is a top plan view of the frame of the table structure and associated controls.

Figure 5 is a detail section on the line 5—5 of Figure 4.

Figure 6 is a similar view on the line 6—6 of Figure 4.

Figure 7 is a detail section on the line 7—7 of Figure 4.

Fig. 8 is a detail sectional view on line 8—8 of Fig. 6.

Referring more particularly to the details of the invention, the numeral 1 designates the operating table comprising the present invention in its entirety. This table is composed broadly of a base 2 of substantial metallic construction and formed to provide a substantial foundation for the table to preclude undue shifting or tilting movements thereof when actively employed. Mounted upon the base and substantially carried thereby is a universal or compound mounting 3 which serves as an adjustable support for the table structure 4, the latter being so mounted and supported that the same is enabled to rotate about vertical and horizontal axes and also adjustable laterally to assume various angular positions with respect to the horizontal, by the provision of improved means in the mounting 3, for shifting the horizontal axis laterally or in a vertical plane.

The base structure in this instance is formed from cast iron into which porcelain enamel has been fused at relatively high temperatures, and is constructed to provide a hollow body portion 5 having the lower end thereof terminated in a plurality of radiating feet 6, which carry at their outer ends, if desired, rollers 7 by means of which the table as a whole is rendered mobile. The

radiating feet are constructed so as to enable the base to extend over a comparatively wide area and thus affords stability to the greatest possible extent without interference with the movements of the surgeon. Disposed within the hollow body portion 5 of the base is an oil or hydraulic pump 8 of any suitable construction, the said pump in this instance including a cylinder 9 and valved by-passes 10, the cylinder 9 containing a vertically reciprocating piston 11, which is adapted to be raised and lowered, in the usual manner, by the admission or ejection of liquid to and from the cylinder 9. Foot pedals 12 project from the base 2 for controlling the operation of the pump 8.

Attached to the upper end of the piston 11, or to that part which projects above the body portion 5 of the base 2 is the yoke shaped casting 13 of the universal mounting 3. This casting is formed to include upwardly and outwardly flaring arms 14 which have their ends formed with registering horizontal bores for the reception of a transversely extending substantially horizontal rod 15 which latter constitutes the horizontal axis for affording lateral tilting on the part of the table structure 4.

Supported for rotation upon the rod 15 is a vertically swinging section 16 of the mounting 3. This section includes a flat circular top 17, which terminates in an upwardly projecting boss 18, which constitutes the vertical axis about which the table structure 4 is adapted to revolve. The boss 18 is disposed to be received within a socket 19 formed in the casting 20 rigidly carried by the rectangular frame 21 of the table 4. By this construction, it will be observed that the table is capable of rotating in a horizontal plane about the vertical axis provided by the boss 18, and may be tilted vertically by means of the pivot provided by the horizontal axis of the rod 15. These adjustments enable the table to assume the so called "Trendelenburg", "semi-Trendelenburg" and "reverse Trendelenburg" positions. To enable the table structure to be tilted laterally from the horizontal or vertically inclined positions thereof, the section 16 has the lower periphery thereof formed with worm gear teeth 22, arranged to mesh with a worm 23, journaled for rotation within the upper part of the casting 13 upon a shaft 24. The outer end of this shaft is equipped with a beveled gear 25, arranged to mesh with a similar gear 26, mounted upon a shaft 27 which is movable in unison in vertical directions with the mounting 3. The lower end of the shaft 27 is arranged to telescope within and rotate at all times with a tubular shaft section 28, carried by and located within the base 2, and the lower end of the section 28 is equipped with a beveled gear 29, meshing with a gear 30, having integrally formed therewith a spur gear 31, the latter being disposed and mounted to mesh with a similar gear 32 carried upon an operating shaft 33. This shaft extends through the base 2, and has its opposite ends equipped with operating wheels 34, which wheels are formed with foot pedals 35, enabling the shaft 33 to be turned by foot manipulations. Obviously, by rotating the shaft 33, motion will be imparted to the worm 23, which rocks the section 16 in a vertical plane, and thereby tilts the boss 18 from true vertical positions to various angular positions and enables the table structure proper to be tilted toward the surgeon so that he is directly over his work without having to lean far over the table in a strained position. By means of this construction, the table may be tilted laterally to either side at any angle and automatically and securely locked in any position. The telescopic shaft construction 27 and 28 is provided to take care of the raising and lowering of the table effected through the medium of the pump 8.

The table structure 4 is constructed to include the rectangular frame 21 which constitutes what may be termed the body section of the table 4. This frame is preferably of solid integral construction and is formed contiguous to the intermediate portion thereof with spaced transversely extending bars 36, between which the casting 20 is positioned and secured. In this instance, one of the longitudinally extending side bars of the frame 21 is provided with a bracket 37, which supports a longitudinally extending shaft 38, having one end thereof equipped with an operating crank 39, arranged to oscillate through a slot 40 provided in the bracket 37'. The inner end of the shaft 38 is formed with a cam 41, which is arranged to engage with the under portion of an operating lever 42 pivotally mounted and carried as at 43 upon the upper surface of the casting 20, and which lever is disposed between the transverse bars 36. Carried by the lever 42 is a pivoted depending pin 44, which is arranged to engage with pairs of registering openings 45 provided in the casting 20 and in the top 17 of the vertical section 16 of the mounting 3, a spring 46 serving normally to maintain the pin in registration or engagement with the openings 45. Manifestly, by operating the crank 39, the cam 41 may be operated to raise the lever 42, thereby withdrawing the pin 44 from its locking position in connection with the openings 45. When this has been effected, it will be apparent that the table structure 4 may be rotated about the boss 18, and that when the table has been rotated to the desired position, the crank 39 is released, and the spring 46 will then automatically project the pin 44 into the next registering set of openings 45, retaining the table in its fixed position of adjustment.

The frame 21 may be suitably covered by a sheet metal top 47 upon which a patient may be placed, and the top is formed intermediate of its length with a slot 48, in which is positioned a transversely extending bar 49, constituting a kidney lifting device. The bar 49 is formed with depending posts 50, which are arranged to be received for sliding movement within eyes or sockets 51 provided in connection with one of the bars 36. To raise and lower the bar 49 from the head end of the table, there is journaled in the frame a transversely extending rock shaft 52, which carries a plurality of curved crank arms 53 carrying at their outer ends rollers 54, which are disposed for engagement with the under side of the bar 49 so that upon the rotation of the shaft 52, the said bar may be raised or lowered.

To rotate the shaft 52 and retain the same in various positions of rotation, I provide one end of the same with a worm gear 55, which meshes with a worm 56 mounted upon a short shaft section 57, journaled in connection with the frame 21. The section 57 has its outer end equipped with a universal joint 58, to which is flexibly connected thereby an angularly extending operating shaft 59, which extends toward one of the corners of the frame 21, and has its outer end equipped with a hand wheel 60. The rotation of the wheel 60, which is at the head end of the table, results in the rotation of the rock shaft 52, and the consequent raising or lowering of the kidney lift 49. The worm gearing employed will of course lock the rock shaft in any of its rotated positions.

To the lower end of the frame 21, there is pivotally attached the leg section 61 of the table 4. The section 61 includes a rectangular frame 62 suitably covered by a sheet metal top 63, and a pivot rod 64 extends transversely of the table 4 and pivotally unites the frame 21 with the frame 62. To permit of the swinging of the section 61 independently of the body section of the table, I provide a rock shaft 65 situated at the lower end of the frame 21 and formed with a pair of crank arms 66, which terminate at their outer ends in upwardly turned extremities 67. Pivotally connected to these extremities is a pair of links 68, which in turn have their upper ends pivotally connected as at 69 to the extreme outer end of the frame 62. Manifestly, by rotating the rock shaft 65, the leg section may be raised or lowered independently of the body section of the table.

The rock shaft 65 is operated by means of a worm gear 70 suitably fixed to one end thereof and disposed to mesh with a worm gear 71 carried upon a longitudinally extending shaft 72 journaled in connection with the frame 21. The other end of the shaft 72, opposite the gear 71, is connected with a universal joint 73, by means of said joint to an angularly extending operating shaft 74, which is terminated contiguous to one corner of the frame 21 opposite to the operating shaft 59, the outer end of the shaft 74 being equipped with a hand wheel 75 to permit of its convenient rotation. It will be noted in connection with this construction that the operating shafts 59 and 74 terminate contiguous to the head corners of the frame 21 and are thus out of the way of the anæsthetist but are within convenient reach and are at all times carried by the revolving or tilting table structure. It will be noted particularly that the controls are out of the way of the surgeon and will not interfere in any way with his movements or with the progress of an operation, even when an adjustment in the position of the table structure is desired or effected. To the best of my knowledge, it is novel in the art to provide controls of this character carried by the swinging table structure and at one end thereof.

The frame 21 at the head end of the table pivotally carries a head section 76, which is adapted to turn about a rod 77 carried in connection with lugs 78 projecting from the frame 21. The table section may be raised or lowered as desired independently of the body section of the table and suitably locked in any of its adjusted positions. When not in use, the table section may be folded under the top 47 of the frame 21. Longitudinally extending side bars 78 are formed with the frames 21 and 62 and carry longitudinally adjustable body clamps 79, the bars 78 on the frame 21 also carry an adjustable anæsthesia screen 80. If desired floor clamps 81 may be carried by the base 2 for the purpose of securing the table in any fixed position in connection with the floor.

By means of the construction described, it will be seen that the present invention provides an operating table by means of which the table structure proper may be quickly, positively and conveniently adjusted to assume a variety of positions best adapted for the needs of the surgeon. By means of the lateral tilting feature thereof, the table is inclined so that the patient thereon is turned toward the surgeon so that the latter may operate when standing in an upright comfortable position without physical strain and without touching any part of the table. Moreover, all of the controls on the table are either attached to the head end of the table or located in the base within convenient reach of the anæsthetist; there are no controls in the surgeon's way which will tend in any manner to interfere with his freedom of movement. By the peculiar mounting, the table may be tilted toward the surgeon from a true horizontal position, and from the various "Trendelenburg" posi-

tions so that the surgeon is directly over his work, without having to lean far over the table in a cramped or strained manner. The various adjustments are effected through the medium of worm gearing, which has the advantage of being both positive and convenient to operate and furthermore serves to automatically retain any set position of the unit or part governed thereby.

What is claimed is:

1. In an operating table, a base structure including a substantially vertically disposed stud, a top having a recess formed in the under side thereof for the reception of said stud, and about the axis of which stud said top is adapted to revolve, locking means including a spring pressed pin arranged to engage with registering openings formed in connection with said top and stud to preclude rotation on the part of said top, and operating mechanism carried in connection with said top for controlling the registration of said pin with said openings.

2. In an operating table, a frame including a body section and a leg section, a hinge connection between said sections, a rock shaft carried by said body section, arms projecting from said rock shaft and cooperative with said leg section for raising and lowering the latter, worm gearing for operating said rock shaft, and operating means extending from the head end of said body section to said worm gearing.

In testimony whereof I have signed my name to this specification.

ISIAH CONRAD.