

July 28, 1953

H. R. SHAMPAINE

2,647,026

SECTIONAL TOP OPERATING TABLE WITH ADJUSTMENT MECHANISM

Filed Aug. 3, 1951

5 Sheets-Sheet 1

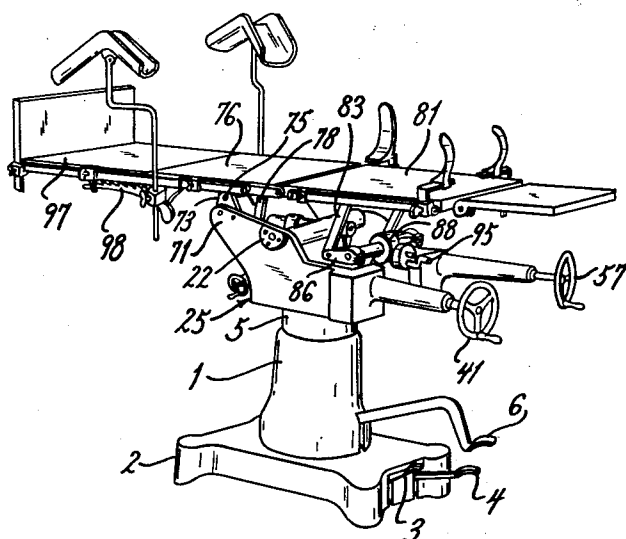


FIG. 1.

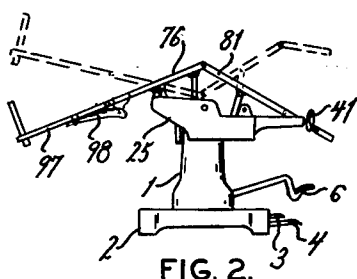


FIG. 2.

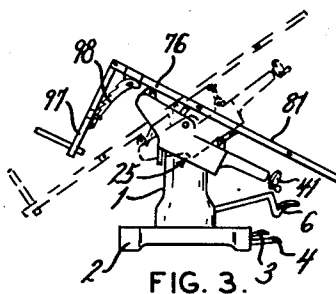


FIG. 3.

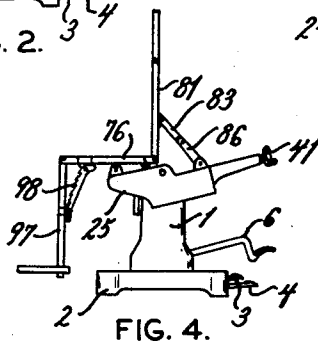


FIG. 4.

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5 Sheets-Sheet 2

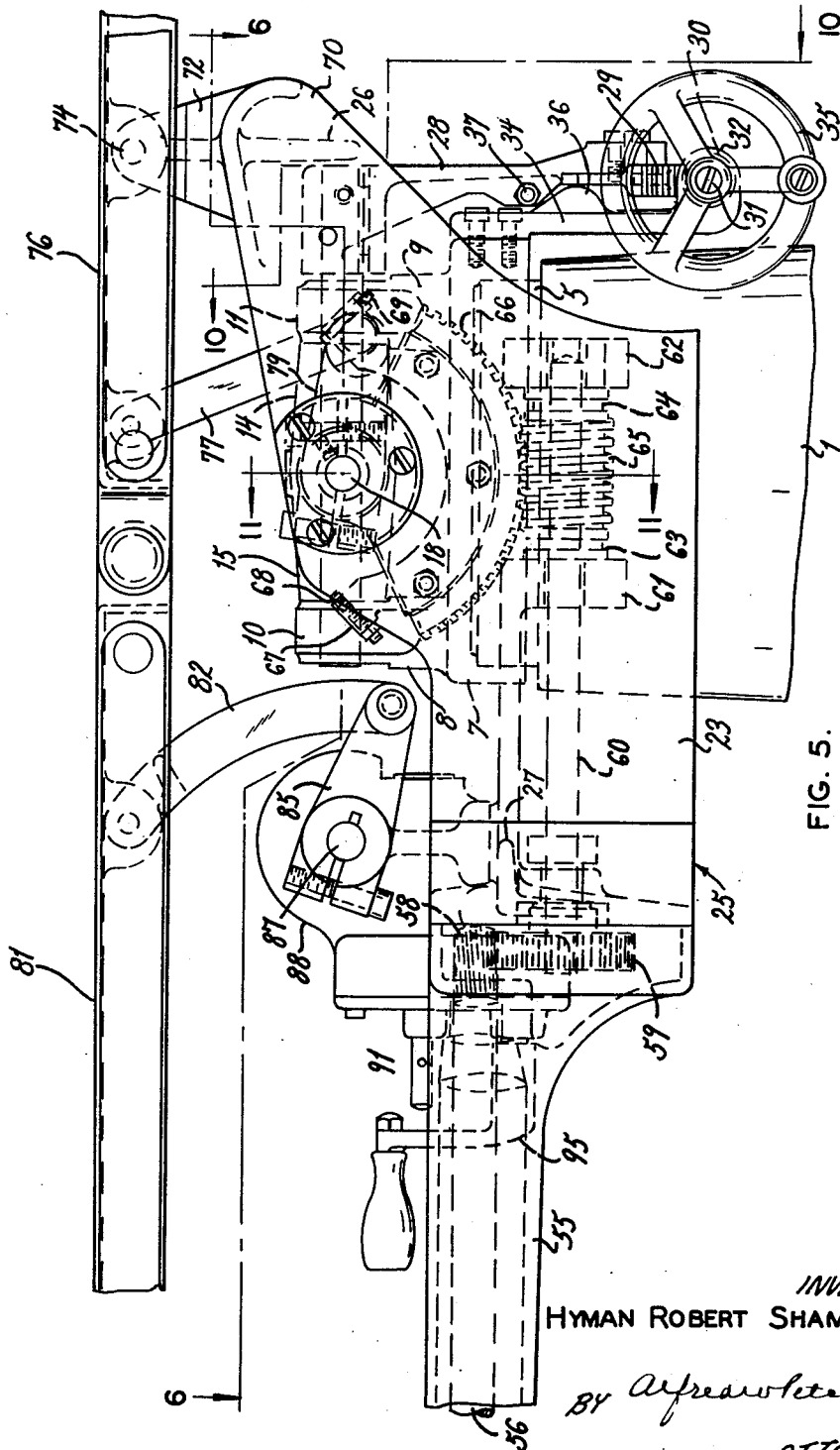


FIG. 5.

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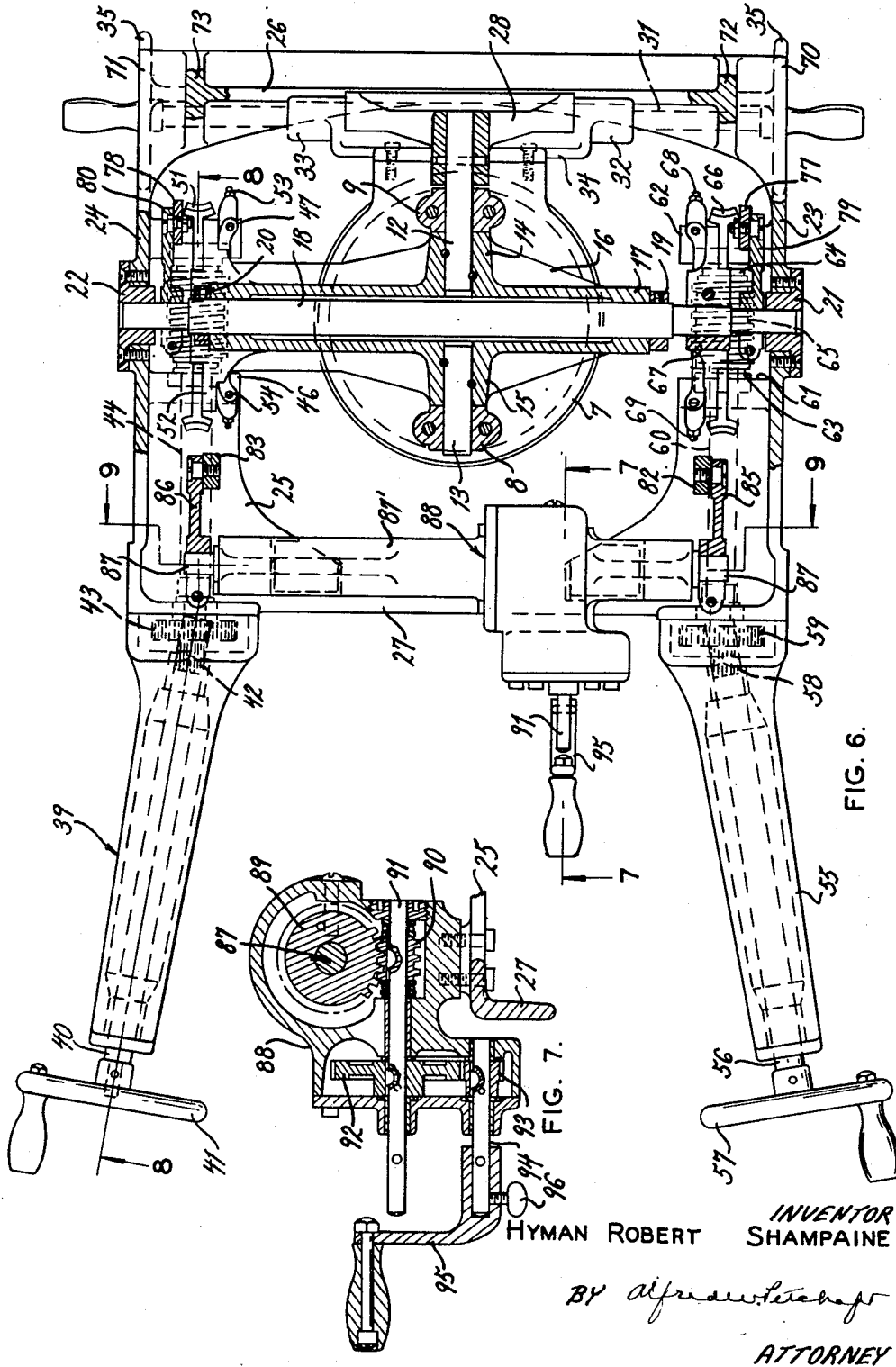
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SECTIONAL TOP OPERATING TABLE WITH ADJUSTMENT MECHANISM

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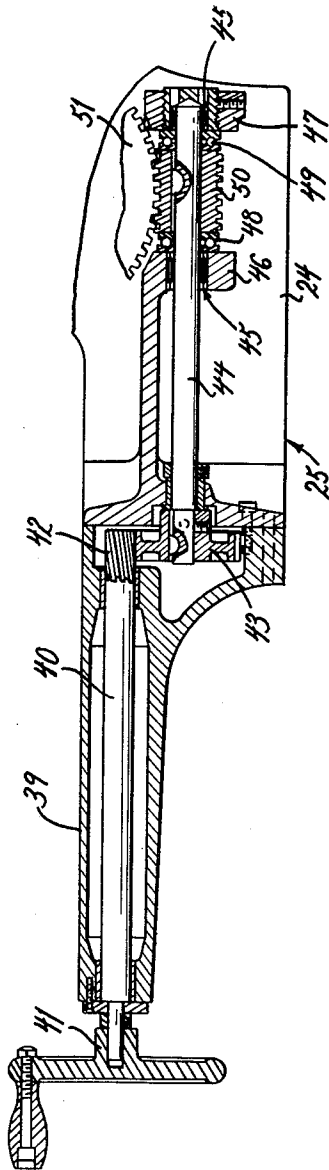


FIG. 8.

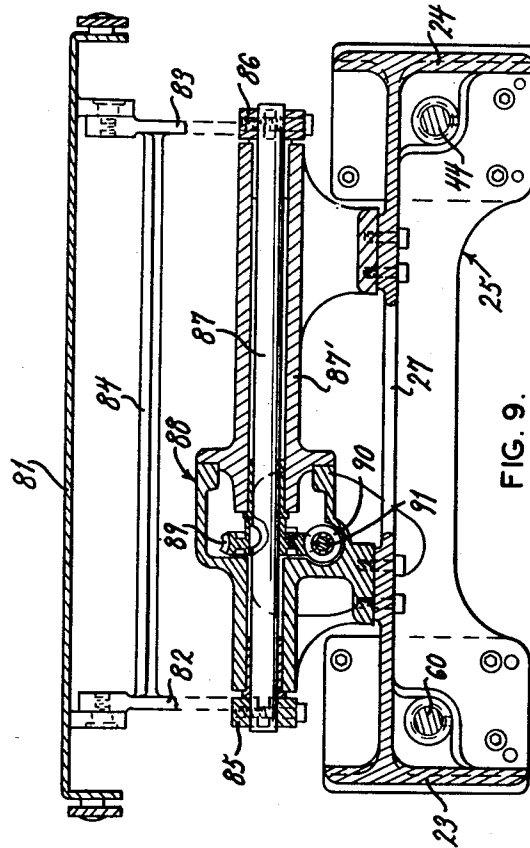


FIG. 9.

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SECTIONAL TOP OPERATING TABLE WITH ADJUSTMENT MECHANISM

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5 Sheets-Sheet 5

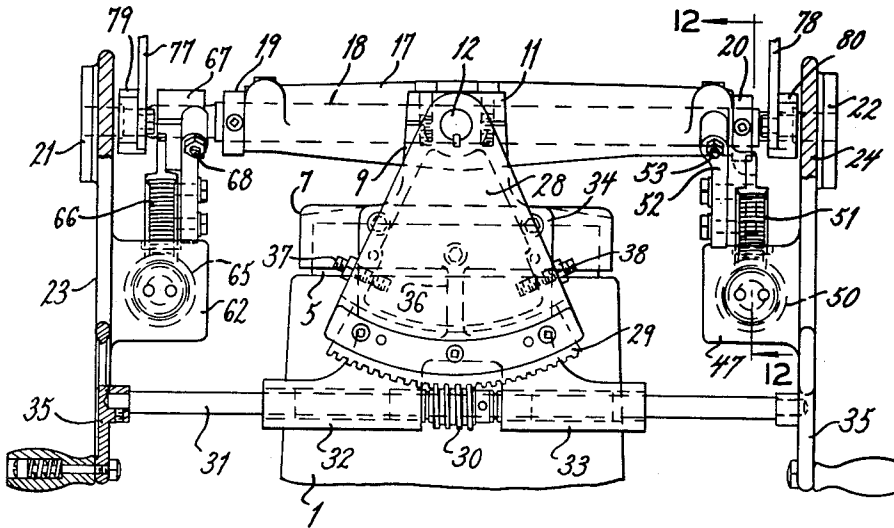


FIG. 10.

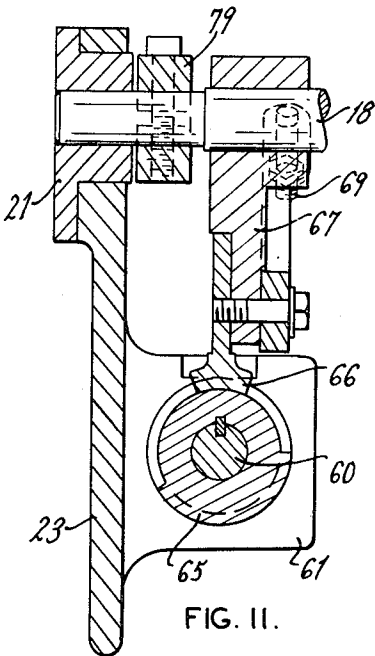


FIG. 11.

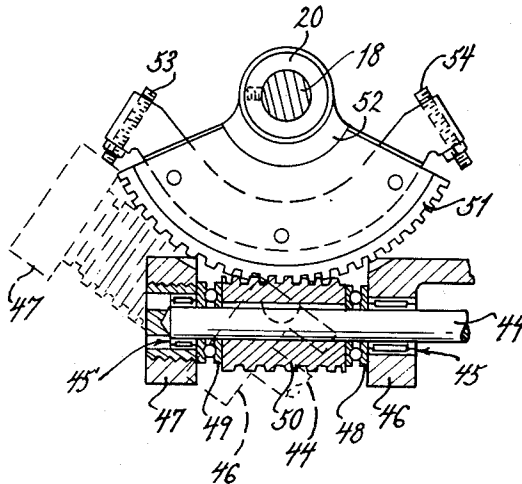


FIG. 12.

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SECTIONAL TOP OPERATING TABLE WITH
ADJUSTMENT MECHANISM

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Application August 3, 1951, Serial No. 240,074

4 Claims. (Cl. 311-7)

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This invention relates generally to sectional top operating table with adjustment mechanism, and, more particularly, to a certain new and useful improvement in surgical operating tables of the type commonly used in performing major surgery.

This invention has for its principal object the provision of an operating table having an articulated top which, as a unit, may be laterally and longitudinally tilted and may be adjusted so that its top-forming sections will assume a number of various positions required by surgeons in the performing of different types of surgical operations.

It is another object of the present invention to provide an operating table of the type stated in which the principal controls by which the table may be adjusted to its various positions are located near the head end of the table and are thus conveniently accessible to the anesthetist, technician, or other operator to whom is normally assigned the duty of manipulating and positioning the operating table in a surgical operating room during the course of a surgical operation.

It is another object of the present invention to provide an operating table of the type stated which is extremely compact and can be lowered from a relatively low position to a relatively high position with respect to the floor through a range which has hitherto been considered impossible in surgical operating tables.

It is a further object of the present invention to provide an operating table of the type stated which is capable of being adjusted to a so-called exaggerated kidney position for performing renal surgery.

An additional object of the present invention is the provision of improved compact operating mechanism which is especially well adapted for enclosure in a housing of relatively small dimensions.

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 pointed out in the claims.

In the accompanying drawings—

Figure 1 is a perspective view of an operating table constructed in accordance with and embodying the present invention;

Figure 2 is a side elevational view of the operating table with the top adjusted in the extreme kidney position, the reflex abdominal position being shown in dotted lines;

Figure 3 is a side elevational view of the operating table with the top adjusted to the

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Trendelenburg position with the reverse Trendelenburg position being shown in dotted lines;

Figure 4 is a side elevational view of the operating table with the top adjusted to chair position;

Figure 5 is an enlarged fragmentary side elevational view of the top portion of the operating table;

Figure 6 is a fragmentary sectional view taken along line 6-6 of Figure 5;

Figures 7, 8, and 9 are fragmentary sectional views taken along lines 7-7, 8-8, and 9-9, respectively, of Figure 6;

Figures 10 and 11 are fragmentary sectional views taken along lines 10-10 and 11-11, respectively, of Figure 5; and

Figure 12 is a fragmentary sectional view taken along line 12-12 of Figure 10.

Referring now in more detail and by reference characters to the drawings the operating table, as best appears in Figure 1, comprises generally a pedestal 1 and base 2 adapted to rest upon the floor of the usual operating room, the latter being conventionally equipped with casters (not shown) adapted to be lifted upwardly out of operative position by manipulation of a foot lever 3 when the table is to be disposed in a stationary position. Another foot lever 4 may be conventionally provided for locking the table in such stationary position. Similarly, the pedestal 1 is conventionally provided with a hydraulic piston 5 adapted for upward and downward movement responsive to actuation of the foot pedal 6, which is, in turn, operatively connected interiorly of the pedestal 1 to any conventional type of hydraulic mechanism commonly associated with such structures. Since the present invention in no way relates to the pumping mechanism by which the piston 5 is elevated this structure is not shown or described in detail.

Rigidly mounted on the upper end of the piston 5 is a cap-casting or saddle 7, integrally provided on its upper face with two pillow blocks 8, 9, arranged in longitudinal alignment with each other along the longitudinal center line of the operating table, and being provided with bearing caps 10, 11, for rotatably supporting axially aligned pivot shafts 12, 13, which are, in turn, pinned within the forwardly and rearwardly presented sleeves 14, 15, respectively, of a unitary bridge casting 16.

The bridge casting 16 is thus arranged to rock laterally about the longitudinal axis of the shafts 12, 13, and integrally includes a transversely extending tubular quill 17, which rotatably supports a concentric or coaxial cross-

shaft 18, which projects at its opposite end outwardly therefrom and is secured against axial shifting movement by set-collars 19, 20, and at its outer end is turned down diametrically for rotative disposition within bearings collars 21, 22, which are, in turn, mounted in the side plates 23, 24, of the main-frame casting 25. As will be seen from Figure 6, the main-frame 25 is essentially rectangular in horizontal cross-sectional shape and integrally includes forward and rearward cross-beams 26, 27, by which the side plates 23, 24, are connected together. Thus, it will be seen that the main-frame 25 of the operating table is capable of being tilted laterally about the axis of the shafts 12, 13, and longitudinally upon the cross-shaft 18. It should be specifically noted in this connection that the main-frame 25 rotates upon, but not with, the cross-shaft 18. Thus, when the main-frame 25 is held stationary the cross-shaft 18 is still free to rotate and, contrariwise, irrespective of whether the shaft 18 is rotating or stationary, the main-frame 25 may be rocked about the ends thereof as bearings.

The shaft 12 projects at its forward end beyond the pillow-block 9 and pinned to such projecting end is a depending plate 23 provided on its lower margin with a downwardly presented worm-gear segment 29, which, in turn, meshes with a worm-gear 30 pinned upon a control shaft 31 journaled in bearing sleeves 32, 33, formed integrally with a bracket-plate 34, folded or otherwise rigidly secured upon a forwardly presented surface of the saddle 7. Pinned or otherwise rigidly mounted upon the outer ends of the shaft 31 are conventional hand wheels 35 by which the shaft 31 may be rotated from either side of the operating table. The bracket-plate 34 is centrally provided with a forwardly projecting integral bass 36 for stop-forming engagement alternately on one or the other of its laterally presented faces with stop-screws 37, 38, adjustably mounted in the plate 23. Thus, when the shaft 31 is rotated the worm-gear 30 will drive the segment 29 and the plate 23 to which it is attached arcuately to one side or the other depending upon the direction in which the shaft 31 is rotated. This rocking movement will be transmitted to the shaft 12 and thence to the bridge 16 and main-frame 25, carried thereby, so that the entire main-frame and all supported structure will tilt laterally from one side to the other within limits determined by the setting of the stop-screws 37, 38. Rigidly mounted on and extending rearwardly from the main-frame 25 at the corner between the rear cross-beam 27 and the side plate 24, is a first control shaft housing 39 adapted for rotatably supporting a control shaft 40 which projects therethrough and at its rearward end is rigidly provided with a conventional hand wheel 41. At its other or forward end the control shaft 40 is milled to provide an annular series of oblique teeth 42 which mesh with a spur-gear 43 pinned upon the rearward end of a counter-shaft 44 which is appropriately bearinged in the main-frame 25 and extends lengthwise therein in spaced parallel proximity to the inner face of the side plate 24, being journaled at its forward end in suitable needle bearings 45, 45', which are, in turn, operatively mounted in bearing bosses 46, 47, formed integrally with and projecting laterally inwardly from the inner face of the side plate 24. Keyed to the counter-shaft 44 on that portion of its length which extends between the bosses 46, 47, and held between conventional ball thrust bearings 48, 49, is a worm-gear 50, which

meshes with a worm-gear segment 51, rigidly bolted to the lateral face of a bracket-plate 52, which is formed integrally with and depends from the end of the bridge 16. The bracket-plate 52 is somewhat arcuately shaped to conform to the shape of the segment 51 and at its extremities is provided with stop-screws 53, 54, which are, in turn, adapted to abut alternately against the upwardly presented faces of the bosses 46, 47.

By appropriate rotation of the control shaft 40, the worm-gear 50 is rotated and moves along the relatively stationary segment 51 to cause the entire main-frame 25 to tilt longitudinally around the axis of the cross-shaft 18. In this connection it may be well to point out that, since the segment 51 is rigidly bolted to and is, in effect, a part of the bridge 16, it is stationary with reference to the main-frame 25 so far as longitudinal position of the segment 51 is relative, so to speak, tilting movement is concerned. This stationary since the entire bridge 16 can be tilted laterally and, of course, the segment 51 will move with the bridge 16 in this particular direction. It will, however, be clearly apparent from reference to Figure 8 that, by appropriate rotation of the hand wheel 41, the main-frame 25 and all structure carried thereby may be tilted from front to rear about the axis of the cross-shaft 18 within limits of movement permitted by the settings of the stop-screws 53, 54.

Similarly mounted upon the opposite corner of the main-frame 25, that is to say the corner formed between the side plate 23 and the cross-beam 27, is a second control shaft housing 55 for rotatably supporting a second control shaft 56 which is also rigidly provided on its rearwardly projecting end with a second hand wheel 57. The control shaft 56 is also milled at its forward end in the provision of an annular series of oblique teeth 58 for meshing with a spur-gear 59 pinned upon the rearwardly projecting end of a counter shaft 60, which is, in turn, journaled at its forward end between bosses 61, 62, formed integrally with and projecting laterally inwardly from the inner face of the side plate 23. Keyed to the counter shaft 60 along that portion of its length which extends between the bosses 61, 62, and conventionally held between ball thrust bearings 63, 64, is a worm-gear 65, which meshes with a worm segment 66 rigidly bolted upon the lateral face of an arcuate plate 67, which is, in turn, pinned to the cross-shaft 18 and is provided on its opposite extremities with stop-screws 68, 69, for alternate engagement against the upwardly presented faces of the bosses 61, 62. It will thus be evident that by appropriate rotation of the hand wheel 57 the worm 65 will be rotated and the worm segment 66 correspondingly rotated to produce rotational or rocking movement of the shaft 18 within and relative to the bridge-quill 17 and independent of the longitudinal tilting movement of the main-frame 25, all for purposes presently more fully appearing.

The side plates 23, 24, are extended upwardly and forwardly in the provision of integral shoulders 70, 71, respectively, and, upon such shoulders, are integrally provided with upstanding pivot bosses 72, 73. Rockably supported between the pivot bosses 72, 73, by means of pivot pins 74, 75, is a flat seat panel 76, the top surface of which is preferably, though not necessarily, covered with a sheet of stainless steel or other suitable sanitary and corrosion-proof material. As will be seen by reference to Figures 1

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and 5, the seat panel 76 is fulcrumed relatively close to its rearward margin and on its opposite lateral side, adjacent such rearward margin, is rockably provided with depending links 77, 78, which are, in turn, pivotally engaged at their lower ends to the forward ends of rock arms 79, 80, the latter being rigidly fixed to and rotatable with the cross-shaft 18. Thus, it will be seen that as the cross-shaft 18 is rotated the seat panel 76 will be swung up and down about a transverse axis extending through the center lines of the pivot pins 74, 75, and such movement will be relative to the main-frame 25 so that the seat panel 76 can be tilted longitudinally with and as a part of the main-frame 25 and can be additionally tilted longitudinally even when the main-frame 25 is stationary. It is this additional longitudinal tilting movement which makes it possible to achieve an extreme or exaggerated kidney position hitherto not attainable on major operating tables and thereby makes it possible to eliminate the so-called kidney elevator or kidney bridge.

Pivotally jointed to the seat panel 76 across the rearward transverse margin thereof and extending rearwardly therefrom is a back panel 81 also covered or clad in stainless steel or any other suitable material and pivotally connected along its lateral margins with depending links 82, 83, which, for structural rigidity, are integrally cross-connected by a transverse bar 84 and are, in turn, pivotally connected at their lower ends to the forward ends of crank arms 85, 86, the latter being, in turn, rigidly secured upon the laterally projecting ends of a jackshaft 87, journaled in and extending transversely through a jackshaft housing 87' rigidly bolted upon and extending in upwardly spaced parallel relation to the rear cross-beam 27 of the main-frame 25. Intermediate at its ends, the jackshaft housing 87' is diametrically enlarged to provide a gear box 88 for enclosing a wormgear 89, which is keyed upon the jackshaft 87 and meshes with a worm 90, which is, in turn, keyed upon a drive shaft 91 journaled in and extending lengthwise through the gear box 88. Also keyed upon the drive shaft 91 and housed within the gear box 88 is a spur-gear 92 meshing with a small pinion 93, keyed upon an auxiliary drive shaft 94 also journaled in and extending longitudinally rearwardly from the gear-box 88, as best seen in Figure 7. Provided for optional disposition upon the rearwardly projecting end of either of the drive shafts 91, 94, is a conventional crank handle 95 having a thumb screw 96 by which it may be securely locked in place. By securing the handle 95 to the shaft 94 the worm 90 will be driven through the pinion 93 and the spur-gear 92 at comparatively reduced speed and increased mechanical advantage. On the other hand, if the handle 95 is mounted upon the drive shaft 91 the rotational movement is transmitted directly to the worm 90 with resulting increased speed and lowered mechanical advantage. In either case, this rotational movement is transmitted through the counter-shaft 60 and the rock arms 85, 86, to the links 82, 83, and, in turn, elevate or lower the back panel 81 depending, of course, upon the direction of rotation of the handle 95. It will be understood in this connection that the alternate shafts 91, 94, make it possible to raise or lower the back panel 81 either rapidly or slowly as circumstances may require.

Pivotally jointed to the seat panel 76 along the

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forward margin thereof and carried thereby is a leg panel 97 conventionally provided on its under face with ratchet links 98 by which the relative position of the leg panel 97 with respect to the seat panel 76 may be adjusted and maintained. Inasmuch as the leg panel 97 and ratchet links 98 are conventional they have not been separately illustrated or described in detail.

The operating surface or top of the operating table comprising conjunctively the back panel 81, the seat panel 76, and the leg panel 97, may be adjusted from a 35° Trendelenburg position to a 30° reversed Trendelenburg position by appropriate rotation of the hand wheel 41, as shown in Figure 3. The back panel 81 is adjustable by rotation of the crank handle 95, from a 90° chair position, as shown in Figure 4, to an extreme kidney reverse angle of 130°, as shown in Figure 2. It is one of the unique features of the operating table of the present invention that the single hand wheel or control 57 serves to adjust the top from the extreme kidney position to the reflex abdominal position and vice versa without use of the other controls.

By reason of the fact that the bridge 16 and the cross-shaft 18 carried thereby is located in a high position relative to the side plates 23, 24, and the remainder of the table controls are underslung, so to speak, it is possible to drop the piston 5 to its lowermost position and thus dispose the operating table in an extreme kidney position with the peak of the angle at a minimum height of approximately thirty-two inches above the floor, thereby avoiding the use of a foot stool for the surgeon. Furthermore, the ideal kidney position with a reverse angle of 130° can readily be achieved on the operating table of the present invention without the use of a kidney elevator or inserted elevating pads or bridges. This position results in complete support of the patient's body from the apex of the kidney angle to the extremities. This exaggerated kidney position, furthermore, affords optimum space between the costal margin and the iliac crest providing maximum exposure for renal surgery.

It is also possible to adjust the operating table of the present invention to a vertical or so-called 90° chair position with the seat panel 76 at an extremely low minimum height of approximately twenty-six inches from the floor. This minimum height is highly desirable for certain types of brain surgery and ear-nose-and-throat surgery.

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

1. A surgical operating table comprising a pedestal, a hydraulically actuated piston operatively mounted on the pedestal, a main-frame operatively mounted on the upper end of the piston, said main-frame having a forward end and a rearward end, a seat panel having a forward end and rearward end, said seat panel being pivotally mounted on the main-frame adjacent the forward end thereof for tilting movement about an axis extending transversely across the main-frame, a leg panel pivotally mounted on the forward end of the seat panel, a back panel pivotally mounted on the rearward end of the seat panel, first and second rotary driving means operatively mounted in the main-frame, a first link operatively connected to the first rotary driving means and pivotally connected to the seat panel rearwardly of its point of pivoted connection to the main-frame for tilting the seat panel up and down around its axis, a second link operatively connected to the second rotary driving

means and pivotally connected to the back panel rearwardly of the point of pivotal connection between the back panel and the seat panel for causing the back panel to articulate with respect to the seat panel, and means for mechanically tilting the main-frame with respect to the piston.

2. A surgical operating table comprising a pedestal, a hydraulically actuated piston operatively mounted on the pedestal, a main-frame tiltably mounted on the upper end of the piston, said main-frame having a forward end and a rearward end, a seat panel having a forward end and rearward end, said seat panel being pivotally mounted on the main-frame adjacent the forward end thereof for tilting movement about an axis extending transversely across the main-frame, a leg panel pivotally mounted on the forward end of the seat panel, manually releasable ratchet means operatively disposed between the seat panel and the leg panel for permitting the leg panel to be shifted to any one of a series of selected positions of adjustment, a back panel pivotally mounted on the rearward end of the seat panel, first and second rotary driving means operatively mounted in the main-frame, a first link operatively connected to the first rotary driving means and pivotally connected to the seat panel rearwardly of its point of pivoted connection to the main-frame for tilting the seat panel up and down around its axis, a second link operatively connected to the second rotary driving means and pivotally connected to the back panel rearwardly of the point of pivotal connection between the back panel and the seat panel for causing the back panel to articulate with respect to the seat panel, and means for mechanically tilting the main-frame with respect to the piston.

3. A surgical operating table comprising a pedestal, a hydraulically actuated piston operatively mounted on the pedestal, a saddle rigidly mounted on the upper end of the piston, a bridge member mounted in the saddle for lateral tilting movement thereon about a longitudinally extending axis, said bridge member including a

transverse quill extending perpendicularly across said axis, a shaft rotatably mounted in and projecting at its ends from the quill, a main-frame operatively mounted on the upper end of the projecting ends of the shaft, a seat panel pivotally mounted on the main-frame for tilting movement about an axis extending transversely across the main-frame, and means for mechanically tilting the seat panel about said axis.

4. A surgical operating table comprising a pedestal, a hydraulically actuated piston operatively mounted on the pedestal, a saddle rigidly mounted on the upper end of the piston, a bridge member mounted in the saddle for lateral tilting movement thereon about a longitudinally extending axis, said bridge member including a transverse quill extending perpendicularly across said axis, a shaft rotatably mounted in and projecting at its ends from the quill, a main-frame operatively mounted on the upper end of the projecting ends of the shaft, a seat panel pivotally mounted on the main-frame for tilting movement about an axis extending transversely across the main-frame, rock arms pinned to the shaft, links operatively connecting the rock arms and the seat panel, and means for rotating the shaft and thereby tilting the seat panel about said transversely extending axis.

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