Dec. 4, 1951 R. ANDERSON 2,577,177

SURGICAL TABLE

Filed Sept. 13, 1947 3 Sheets-Sheet 1

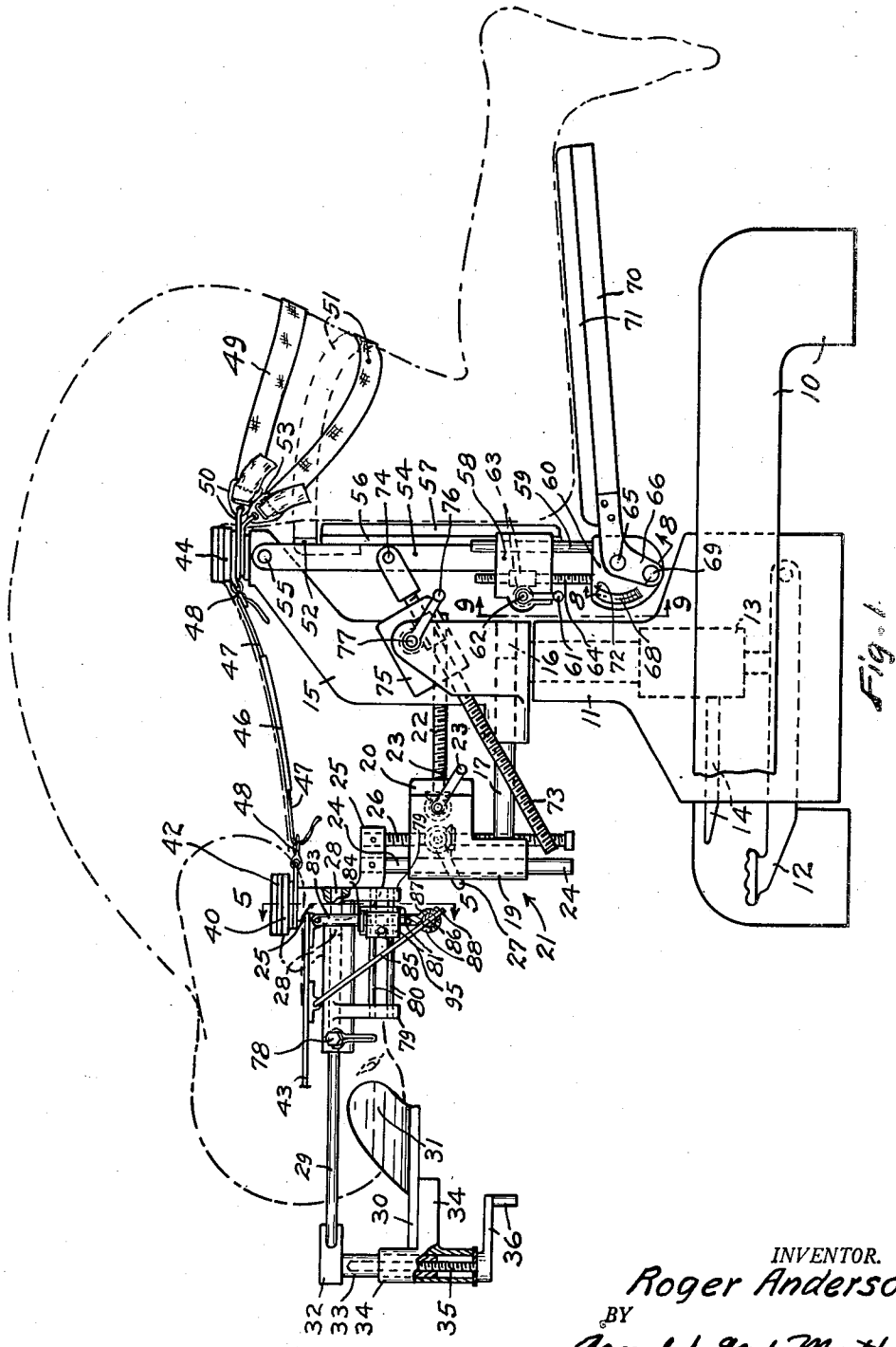


Fig. 1.

INVENTOR.
Roger Anderson
BY
Arnold and Mathis
ATTORNEYS

Dec. 4, 1951 R. ANDERSON 2,577,177

SURGICAL TABLE

Filed Sept. 13, 1947 3 Sheets-Sheet 2

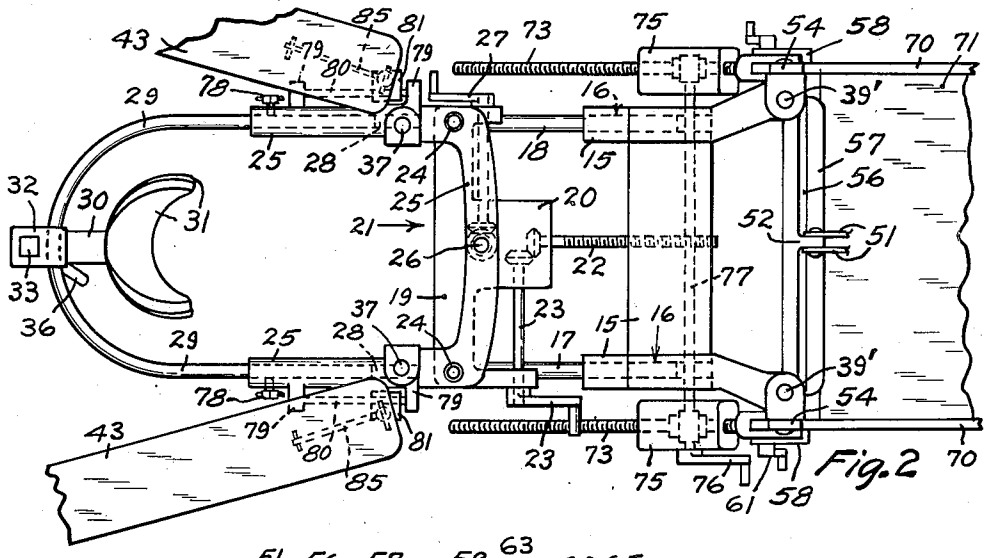


Fig. 2

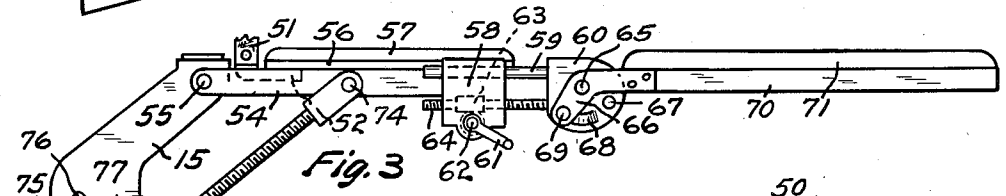


Fig. 3

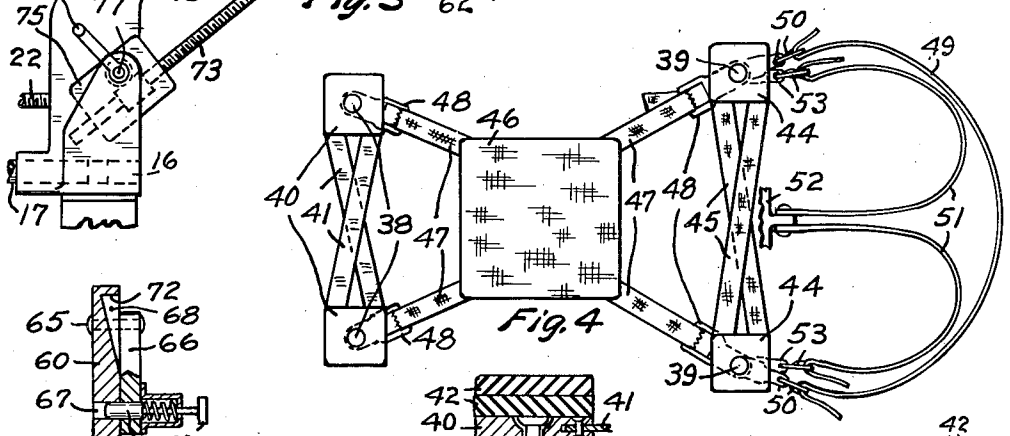


Fig. 4

Fig. 8

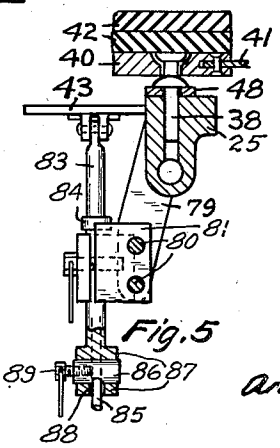


Fig. 5

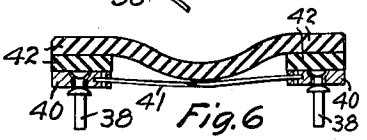


Fig. 6

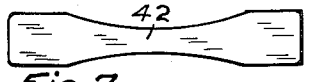


Fig. 7

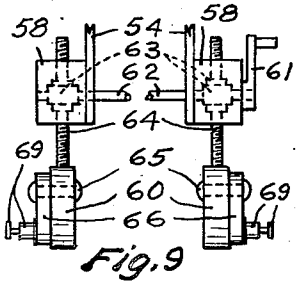


Fig. 9

INVENTOR.

Roger Anderson

BY

Arnold and Mathis

ATTORNEYS

Dec. 4, 1951 R. ANDERSON 2,577,177

SURGICAL TABLE

Filed Sept. 13, 1947 3 Sheets-Sheet 3

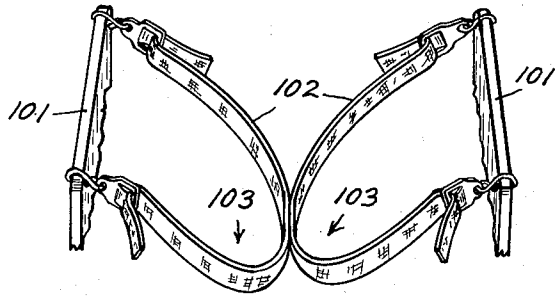


Fig. 15

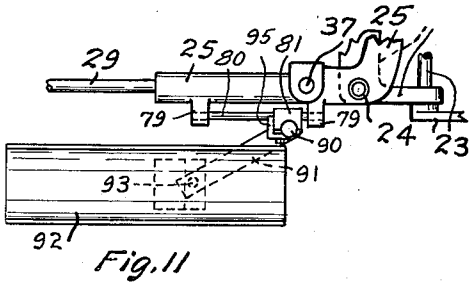


Fig. 11

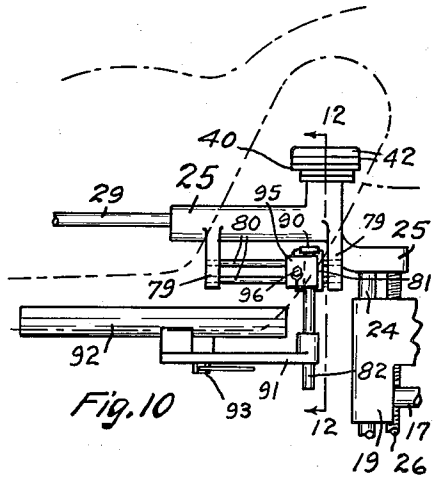


Fig. 10

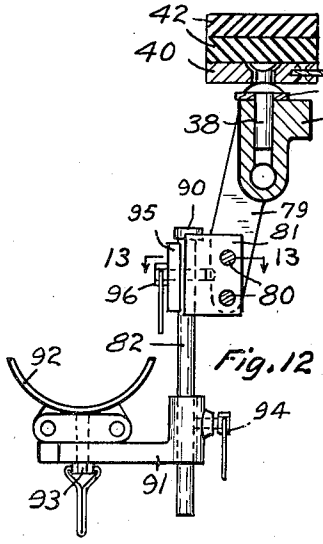


Fig. 12

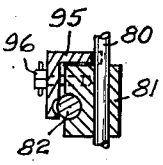


Fig. 13

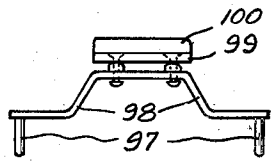


Fig. 14

INVENTOR.
Roger Anderson
BY
Arnold and Mathis
ATTORNEYS

Patented Dec. 4, 1951 2,577,177

UNITED STATES PATENT OFFICE

2,577,177

SURGICAL TABLE

Roger Anderson, Seattle, Wash.

Application September 13, 1947, Serial No. 773,772

5 Claims. (Cl. 311—5)

1

My invention relates to a surgical table and particularly to a surgical table on which a patient is supported in a prone position.

Typical operations which can be more conveniently and adequately performed on the surgical table of my invention comprise spinal operations, neck operations, lung operations, rectal operations, operations involving the posterior of the skull and other operations where the patient is placed in a prone position. These illustrations of operations for which my surgical table is suited are to be considered as illustrative and not as limitations.

When a patient is in a prone position and supported on a flat surface, there is added labor in breathing as the body of the patient rises and descends. As the abdomen and the chest are supported by the flat surface, they cannot move downwardly and hence the patient must raise or lower the body during breathing. Also, if the back of a patient is held still to aid the surgeon during an operation and the abdomen and the chest are supported by a flat surface, there is added labor to a patient in breathing. It is an object of my invention to provide means to suitably support a patient in a prone position, which means will not restrict the breathing of the patient and will leave the chest and abdomen free to move and not carry the weight of the patient.

Heretofore when patients were laid in a prone position, on a flat surface, the head of the patient was turned to one side so that the nose and mouth of the patient would be accessible. This caused discomfort to the patient to be maintained in this position for desired operative periods, and also made the nose and mouth of a patient not readily available to the anesthetist and the surgeon. It is an object of my invention to provide means to support the head of a patient from the forehead and with the face directly downward for the comfort of a patient and for the convenience and needs of the physician or operator. For example, with the face downward and supported from the forehead, so that the mouth and nose are readily accessible, anesthetists can more adequately perform their duties and it is much easier to insert tubes through the nose or mouth of a patient when they are needed.

Heretofore it was common practice, where it was desired to place a patient in a prone position, to lay the patient on flat tables and by sand bags, stretchers, kidney elevators and the like, to approach rather than reach a desired position, for a particular operation.

2

A shortcoming of these arrangements was the fact that a patient was not always maintained in a selected position and hence might be moved during the operation.

Another shortcoming was that external pressure or forces were required to place the spine of a patient in flexion or extension. Kidney elevators were not too satisfactory as they compressed the soft tissues and veins against the spinal structure and often impaired venous circulation and particularly as to blood return.

It is an object of my invention to overcome the foregoing and many other shortcomings in the prior art.

It is an object of my invention to support a patient about the pelvic area or about the crest of the ilia or about the groin as the center of support and to provide adjustable supporting means for other portions of the body remote from said center of support, and with the abdomen and lower chest of the patient substantially free of bearing weight.

It is a further object of my invention to provide such center of support for a patient and to provide means so that the legs and hips of a patient may function as a weight tending to control the degree of flexion or extension of a spine of a patient.

It is a further object of my invention to provide a support for the anterior shoulder and collar bone area which is relatively vertically adjustable as respects the center of support previously mentioned to thereby control the degree of flexion or extension of the spine of a patient and thus control the degree of separation of the vertabrae, all of which are accomplished by suitable disposition of the weight of a patient about a central support and without the need of external pressure means.

It is a further object of my invention to provide a structure wherein a patient is placed in a prone position, face downwardly, and with an arm raised forwardly and downwardly so that the shoulder blade is moved upwardly to permit operations in the area normally covered by the shoulder blade, for example, lung operations.

It is a further object of my invention to provide means wherein a patient may be supported in a prone position, face downwardly, and with the arms positioned and retained in adjusted positions.

It is a further object of my invention to provide a structure wherein a patient may be supported in a prone position with the face downwardly and means to angularly position the

thighs of the patient as respects the trunk and without removing the patient from the table. Such structure permits combination shin bone and spinal operations where the shin bone is employed in spinal bone grafting operations.

Other objects of my invention will appear from the detailed description of the mechanical structure as well as in the description of the mode of operation thereof.

The foregoing mentioned general objects of my invention, together with others inherent in the same, are attained by the devices illustrated in the accompanying drawings, throughout which like reference numerals indicate like parts.

Figure 1 is a view in elevation of a device embodying my invention, showing in dot and dash lines a representation of a human figure supported in a prone position and with the face downward;

Fig. 2 is a fragmentary view in plan of the structure shown in Fig. 1 and with parts removed;

Fig. 3 is a fragmentary elevational view illustrating parts shown in Fig. 1 in a different operative position than said parts are shown in Fig. 1;

Fig. 4 is a detached and somewhat diagrammatic view to illustrate parts shown in Fig. 1, but removed in Figs. 2 and 3;

Fig. 5 is a fragmentary sectional view taken substantially on broken line 5—5 of Fig. 1;

Fig. 6 is a detached view in elevation of one set of the cross supports shown in plan in Fig. 4 and having a pad thereon;

Fig. 7 is a top plan view of the structure shown in Fig. 6;

Fig. 8 is a fragmentary sectional view taken substantially on an arcuate broken line 8—8 of Fig. 1;

Fig. 9 is a fragmentary view taken substantially on broken line 9—9 of Fig. 1;

Fig. 10 is a fragmentary elevational view of a structure shown in previous figures with an accessory for holding the forearm (shown by dot and dash lines) of a patient;

Fig. 11 is a fragmentary plan view of parts shown in Fig. 10;

Fig. 12 is a view taken substantially on broken lines 12—12 of Fig. 10, and on a larger scale than Fig. 10;

Fig. 13 is a fragmentary sectional view taken substantially on broken line 13—13 of Fig. 12;

Fig. 14 is a detached view in elevation of an alternative form of collar bone area supporting means; and

Fig. 15 is a perspective fragmentary view of an alternative form of pelvic area supporting means.

Referring more particularly to the mechanical structures illustrated, and without particular reference to the various advantages of the device to surgeons, a base 10 is a conventional form and may or may not be provided with suitable rollers. If rollers are used, I prefer the type of rollers shown in my copending application, now Patent No. 2,477,562, issued August 2, 1949. In this connection, particular reference is made to figures such as Fig. 3 in said patent, which shows casters or rollers 71 mounted to be lowered so the device can be readily moved from place to place and which rollers may be retracted to make the device more stable when in use. The base 10 slidably supports a column 11 for vertical traveling movement. Means to raise and lower the column 11 as respects the base 10 are schematically shown and comprise a foot pump lever 12 connected with a fluid pressure means 13 which in turn is connected with the column 11. Foot pressure release lever 14 is connected with fluid pressure means 13. Thus, by pumping the foot pump lever 12, the column 11 is raised, and upon depressing the foot pressure release lever 14, the column 11 is lowered. As the column 11 is raised or lowered, parts connected therewith which comprise frame means 15 are raised or lowered.

Frame means 15 is provided with openings 16 (see Figs. 1 and 2) which openings slidably receive members 17 and 18 which may be of tubular construction. The members 17 and 18, cross frame means 19, which carries gear housing 20 comprise a carriage member, which is generally referred to as 21. This carriage member 21 is movable toward and away from the column 11. A means to accomplish the same comprises a screw 22 which is connected through suitable gearing in gear housing 20 with hand crank means 23.

Upon rotation of hand crank means 23 in one direction, said carriage 21 moves away from column 11 and upon rotation of said crank means 23 in the opposite direction, the carriage 21 is moved toward column 11.

The carriage 21 is provided with spaced openings to slidably receive guide means 24, which may be tubular. These guide rods 24 slidably move in a vertical plane as respects the carriage 21 and are rigidly connected with frame means 25. The frame means 25 carry screw 26, which in turn, is geared to hand crank means 27 by gears disposed in gear housing 20. The hand crank means 27 is shown in full lines in Fig. 2 and a portion thereof is dotted in Fig. 1. For convenience of manipulation and simplicity of design, I prefer that hand crank means 23 and 27 emerge from opposite sides of the gear housing 20, but obviously to obtain the desired functional results, they can emerge from the same side of said gear housing. Obviously, upon rotation of the hand crank means 27, in a suitable direction, the frame means 25 will be relatively raised or lowered as respect frame means 15 and parts or objects supported thereby.

Frame means 25 is preferably U-shaped in plan, as appears in Fig. 2, and the legs of the U are provided with openings 28, which preferably slidably and adjustably receive a U-shaped bracket 29. A head rest plate 30 is preferably secured to a concave head rest 31 to engage the forehead of a patient and together they are vertically adjustable as respects the U-shaped bracket 29. This may be accomplished by providing a block 32 carrying a rod 33. The rod 33 is preferably of a design to prevent turning, such as being square in section. The rod 33 is slidably mounted in a mating recess in a bracket 34. The rod 33 is internally recessed and threaded to receive a screw 35 which carries a crank means 36. The crank means 36 has a shoulder which limits downward movement of bracket 34. The bracket 34 carries plate 30. Thus, upon rotation of the crank means 36 in one direction, the head rest 31 will be moved toward the U-shaped bracket 29 and upon rotation in the other direction, the head rest 31 is permitted to move away from the U-shaped bracket 29.

The frame means 25 is provided to carry supports designed to support the anterior shoulder and collar bone area of a patient and at the same time preferably to provide a lesser support for the upper chest of a patient. This may be accomplished by providing openings 37 in bosses in the

frame means 25, into which pins or rods 38 are inserted. Pins or rods 38 are removed in Fig. 2 and are shown in Figs. 4 and 5. As the pins or rods 38, which comprise supports for the patient at the anterior shoulder and collar bone area, may be similar to the pins or rods 39 which comprise supports for the patient at the pelvic area, only a section through one of the pins 38 is shown in Fig. 5 of the drawings.

The pins 38, like the pins 39, are preferably removable as indicated in Fig. 5, and carry plates 40 in a manner so plates 40 can angularly move limited amounts in all directions to conform to fit a particular patient. The plates 40 support safety cross straps 41. Superimposed above and as a padding for the plates 40 and cross straps 41, is provided suitable cushioning material 42 which may be made of any suitable material, such as sponge rubber. As will appear in Fig. 6, the cushioning material is thicker in the area of the plates 40 than it is in the medial portion where it covers straps 41. This will provide for a substantially greater support at the anterior shoulder and collar bone area as will be hereinafter described than across the upper chest area. At this point, it is sufficient to note that on most patients, that the shoulder bones will hang over the outer end portions of the cushioning material 42. Such a position is generally indicated in Fig. 1 of the drawings by the dot and dash lines indicating a patient. Arm rests 43 (Fig. 2) are connected with the frame means 25 so the arms of a patient may be supported thereon and at the desired angle to the body of a patient. The preferable means to provide such connection will be hereinafter described.

The pins 39 are supported by openings 39' (Fig. 2) in the frame means 15 and are removable in the same manner as indicated in Fig. 5, in connection with the pins 38. The pins 39 (Fig. 4) carry plates 44 in the same manner as pins 38 (Fig. 5) carry plates 40. The safety cross straps 45 are supported by the plates 44. The straps 45 are covered with cushioning material 42 in the same manner as indicated in Fig. 6, as are the plates 40 and cross straps 41. The cushioning material 42 has been removed from Fig. 4 so as to better indicate the parts therebelow, and likewise the structure of Fig. 4 has been removed from Fig. 2 for similar purposes.

As the pelvic area of a patient is supported by the plates 44, and cushioning material 42 thereon, it will now readily appear that the crank means 23 may be rotated in the desired direction to move the unit comprising plates 40, cross straps 41, and the cushioning material 42 thereon, toward and away from the supported pelvic area of a patient. In the event that the abdomen support 46 and straps 47 connected therewith, and the buckles 48 on the end portions of straps 47 are employed, then of course the buckles 48 on the straps 47 can be adjusted to permit movement of plates 40 away from plates 44.

Also, as the pelvic area of a patient is supported from the pins 39, plates 44, and cushioning material 42 thereon, obviously by rotation of the crank means 27, the frame means 25 and parts carried thereby may be raised or lowered and thus the anterior shoulder and collar bone area of a patient may be vertically adjusted relative to the position of the pelvic area of the patient.

The head rest 31 will move up and down with the frame means 25 but may be adjusted relative to said frame means 25 by reason of the crank means 36.

In order to maintain the pelvic area of a patient on the cushioning material 42, on plates 44, one strap 49 encircles the buttocks of a patient and is connected to plate and eye means 50, carried by pins 39. Then other straps 51 connect with frame means 52 (which are connected with bars 54) at a location between the legs of a patient and each strap encircles a leg and then each strap is connected with a plate and eye means 53 connected to a pin 39. The straps 49 and 51 may be elastic or flexible material and of suitable width. Either or both said straps 49 and 51 may be employed. The cushioning material 42 on the straps 45 cross the lower abdomen of a patient and the cushioned plates 44 support the pelvic area. (The cushioned plates 44 supporting the weight of the patient and the straps 45 functioning as a safety device preventing inadvertent falling of the patient but not restricting the patient at the lower abdomen area.)

The bars 54 (Fig. 1) are pivoted by pivot means 55 to the frame means 15. These are interconnected by cross frame or plate 56 (Figs. 1 and 2), which is preferably padded by padding 57.

Referring now to Figs. 1, 3 and 9 of the drawings, each of the bars 54 carries a housing 58. Guide rods 59 are slidably mounted in housings 58 and guide rods 59 carry plates 60. Suitable gearing or worm wheel arrangements are provided in housings 58 so that guide rods 59 move toward and away from the housings 58 under control of a crank means, as crank means 61. In Fig. 9, the crank means 61 rotates shaft 62 and shaft 62 is connected with worm wheels 63. Worm wheels 63 engage screws 64 (also see Fig. 1). Thus, by rotation of crank means 61 in the desired direction, the plates 60 and parts connected therewith are moved toward and away from housings 58.

Parts are connected with the plates 60, so that a knee apron can be moved toward and away from the knees of a patient under control by crank means 61.

The plates 60 are pivoted to the plates 66 by pivots 65. Each of the plates 60 is provided with an opening 67, and an inclined trackway 68 (see Fig. 8). The inclined trackway 68 and the openings 67 lie in an arcuate path described about pivots 65, and Fig. 8 is a section on this arcuate path. A spring loaded pin 69 is in the arcuate path of each opening 67 in inclined trackways 68, and each is carried by a plate 66. In the position that the parts are shown in Fig. 1, each spring loaded pin 69 is in registration with an opening 67 and thus, the parts carried by the plates 66, which include leg rest 70 and padded covering 71 thereon, are angularly fixed relative to the bars 54. The angular relation between the padded covering 71 and the bars 57 (when pins 69 are in openings 67) is preferably slightly less than a right angle so there is a tendency to urge a patient forwardly when the knees are supporting weight. Also, if the leg rest in moved downwardly so the knees of a patient are not supporting weight, then the rest 70 may engage the shins of a patient and maintain a desired knee bending angle. When the spring loaded pins 69 are pulled and the plates 66 are permitted to angularly move as respects the plates 60, then the leg rest or apron 70 will angularly move downwardly. As the bars 54 are angularly moved in a counter clockwise direction as respects the showing in Fig. 1, by

means hereinafter described, then the spring loaded pins 69 move up the trackways 68 until they engage the ends or stops 72 and the parts may thus be moved into the position shown in Fig. 3 of the drawings. As the parts are moved from the position shown in Fig. 3 of the drawings toward and into the position shown in Fig. 1 of the drawings, then the pins 69 will move out of the trackways and there is no fear that the parts will be locked in the position shown in Fig. 3, so that the leg rest or apron 70 would be forced against the base 10, when bars 54 are moved clockwise and from the position shown in Fig. 3 toward the position shown in Fig. 1.

The means to move the bars 54 angularly about the pivot means 55 comprises a structure which is the same on each side of the device. The parts are mated for a left or right side, but are otherwise the same and are thus given similar numbers.

Such means comprise screws 73 pivoted to bars 54 by pivot means 74. Each gear housing 75 contains suitable gearing to inter-connect hand crank means 76 with screws 73. Upon rotation of the hand crank means 76 in one direction, the bars 54 will be angularly moved in a clockwise direction and upon movement of the hand crank means 76 in the other direction the bars 54 will move in a counter clockwise direction. Each gear housing 75 is pivotly supported to the frame means 15 by pivot means centered about the axis of the shaft 77 of the hand crank means 76. Thus, each gear housing 75 can pivot to maintain its alignment with its screw 73 as they are angularly moved in angularly moving bars 54.

In order that the forehead of a patient may be properly positioned longitudinally relative to head rest 31 regardless of the length between the forehead and the anterior collar bone area, the legs of bracket 29 (Figs. 1 and 2) are slidable in frame means 25 and locking screws 78 are threadedly mounted in frame means 25 and jointly can be turned to engage or disengage bracket 29.

When a patient is in the dot and dash line position shown in Fig. 1, and as the arms are moved forwardly, the shoulder will move forwardly. Hence, the arm rests 43 are preferably of a design to permit forward or proximal movement and also angular movement in a vertical direction as well as angular movement in a horizontal direction. A means to provide the preferred movements comprise two brackets 79 carried by frame means 25. Rods 80 are disposed between brackets 79 and slidably mount blocks 81. Each block 81 supports a shaft 83 in the same manner that each block 81 (shown in Fig. 13) supports a shaft 82, and the details of blocks 81 will be hereinafter described. At this point it is sufficient to point out that the blocks 81 are slidable longitudinally on rods 80 and may be locked at any desired location between brackets 79. Also, each block 81 rotatably mounts a shaft 83 and a shaft 83 can be locked in any desired angular position. The shafts 83 need not be vertically adjustable as the amounts that a shoulder bone will overhang a collar bone area supporting means, as 42, (Figs. 5 and 6) will not vary sufficiently with patients to require vertical adjustment. Hence, I have indicated a fixed collar 84 on each shaft 83, which seats against a block 81.

At its upper end, each shaft 83 pivotly mounts one end of an arm rest 43. At a location toward the other end of each arm rest 43, a rod 85 is pivoted to an arm rest 43. Each rod 85 is mounted for sliding movement in a bearing member 86 carried in an eye member 87 at the lower end portion of shaft 83. Each eye member 87 is preferably provided with enlarged slots 88 to permit angular movement of rods 85 as an arm rest 43 angularly moves in a vertical direction. In order to lock a rod 85, and in turn lock an arm rest against movement in a vertical direction, I have indicated a locking screw 89 (Fig. 5) which secures a bearing 86 to a rod 85.

Each block 81 may be locked or unlocked against a shaft 83 and rods 80 in the same manner as is shown in Fig. 13, and which will be hereinafter described.

In operation, the locking screw 89 and the locking means for a block 81 are preferably first loosened and an arm rest 83 is adjusted as to position as the arm of a patient is adjusted, so that the arm rest 43 can follow the arm of a patient as the arm is being suitably positioned. When the desired arm position is obtained, the locking screw 89 and the locking means for a block 81 can be tightened and an adjusted position maintained.

In the event that it is desired to move and maintain an arm extended proximal and downwardly and to thereby move the shoulder blade forwardly so that an operation to remove a lung by an incision at a location where the shoulder blade normally rests, the accessories shown in Figs. 10 to 13 inclusive may be employed. These accessories fit into blocks 81 and the shafts 83 and parts connected therewith are removed and a shaft 82 is inserted in place of a shaft 83. Shaft 82 is provided with a fixed collar 90 which functions to limit downward movement of shaft 82 in a similar manner as did fixed collar 84 limit downward movement of a shaft 83.

Shaft 82 slidably mounts a bracket 91 which in turn pivotly mounts forearm rest 92. Locking screw 93 permits pivotal movement of the forearm rest 92 and permits forearm rest 92 to be locked in any angular position relative to bracket 91. Bracket 91 is slidably mounted on shaft 82 and locking screw 94 is provided to determine the relative vertical position of bracket 91, and in turn, forearm rest 92. By having forearm rest 92 angularly movable as respects bracket 91, the same structure can be used on either side of the device and the relative angular position of a forearm can be determined.

The block 81 rotatably and adjustably supports either shaft 82 or 83. Also, the block 81 may be slidable on rods 80 and locked in any adjusted position thereon as will next appear. The block 81 is provided with a recess to receive shaft 82 or 83 and an angle bracket 95 is simultaneously movable toward and away from rods 80 and either shaft 82 or 83. A locking screw 96 is threaded in the block 81 to lock the angular bracket 95 simultaneously against rods 80 and shaft 82 or shaft 83.

The forearm rest 92 and parts connected therewith are preferably used rather than an arm rest 43 when a shoulder blade is to be moved forwardly, as the arm of a patient can be better secured when in the bent position than when lying flat. Thus, the arm and forearm of a patient can be secured to the arm rest 92 and proper extension or movement proximal of the shoulder blade can be obtained and maintained.

In the event that it is desired to support only the upper chest area and toward the mid-portion thereof, the accessory shown in Fig. 14 can be employed. This accessory is provided with pins 97 which will fit into the same openings 37

as do pins 38. Pins 97 carry a bracket 98 and bracket 98 mounts plate 99. Plate 99 is mounted for limited universal movement so as to better conform to the upper central chest area of different patients. The plate 99 carries a padding material 100 which may be similar to the padding material 42 shown in Fig. 6.

Referring now to the modified structure shown in Fig. 15, a frame means 101 is provided on either side of the device and the frame means 101 connects with the frame means 15. As will appear in Fig. 2, the side portions of the frame means 15 are spaced apart to leave a space therebetween. When a patient is supported on the structure of Figs. 1 to 9 inclusive, the pelvic area or the crests of the ilia are supported by the double padded portions 44 similar to the padded portions 42 of Fig. 6, and thus the lateral spacing is such as to take care of the span across the pelvic area of average or larger than average patients. If desired, different sizes of plates 40 can be employed to take care of different sizes of patients. If the modification shown in Fig. 15 is to be employed, the frame means 101 should be spaced sufficiently apart to permit a patient to rest between spaced frame means 101. Pliable straps 102 are secured to the frame means 101 and the forward portions (toward the top as viewed in Fig. 15) will pass from each side over the pelvic area and then along the groins of a patient. The straps 102 are preferably secured together and at a location which will be between the legs of a patient. Then the portions 103 of the straps 102 pass around the legs of a patient and to the outside thereof, and are detachably and adjustably secured to the frame means 101 and at a location to the rear from that where the straps 102 were initially connected to the frame means 101. Both end portions of the straps 102 are preferably adjustably connected with the frame means 101.

In the embodiment of my invention shown in Fig. 15, the pelvic area of a patient is supported by strap means which form a saddle passing from the sides of the patient downwardly and across the pelvic area, thence along the groins of a patient and thence between the legs and around the buttocks or back portions of the legs of a patient. In this form, the weight of a patient at the mid-portion is also carried at the pelvic area.

Referring now more particularly to Figs 1, 4 and 6 of the drawings, the pelvic area of a patient will be supported at spaced locations provided by double pads 42 of Fig. 6 and there will be little support afforded the patient at the lower abdominal area by cross straps 45 and the paddig 42 thereon. Sufficient sag is preferably provided in the straps 45 so that they will only afford a minor support at the lower abdominal area and they are, in effect, safety straps so that a patient cannot fall through the opening between double pads 42 when the position of a patient is being adjusted.

Also, the abdominal support 46 is preferably a safety structure and is adjusted to provide little, if any, support to the abdomen of a patient but it is very useful in the event of a small framed patient who might slide through and is useful regardless of the size of the frame of the patient to provide for initial support while the patient is being properly positioned. The double pads which are carried by the plates 40 adjacent the anterior shoulder and collar bone area permit the shoulders to hang over so that the arms can be supported on arm rests 43 and at a suitable angle, or by forearm rests 92.

It is important that the plates 40 or plate 99 and parts connected therewith can be moved relatively as respects plates 44 (supporting the pelvic area of a patient) both horizontally and vertically. The horizontal adjustment permits the table to be adjusted to fit patients having different sizes of frames. The vertical adjustment cooperates with the leg rest 70 so that the spine of a patient can be placed in flexion or extension and the weight of the patient, as distinguished from external pressure means, can be utilized for positioning the spine. For example, as the leg rest 70 is lowered, weight of the legs of a patient can be utilized as a weight distal of the fulcrum provided by plates 44 or straps 102. As the chest of a patient is lowered by lowering plates 40 or plate 99, the weight of the trunk of a patient can be utilized as a weight proximal of the same fulcrum. By proper control or distribution of such weights, the spine of a patient can be placed in extension or flexion as desired, and maintained in such position so that the desired relation between vertebrae, or ribs can be obtained and maintained as may be needed for a particular operation. A patient tends to assume the dot and dash line position shown in Fig. 1, with the back extensively arched, or the spine in flexion, when there is little weight on the knees and the collar bone area is well below the pelvis in elevation.

For spinal operations, the head rest 31 is suitably adjusted horizontally in view of the size of the head of a patient and then vertically. As the patient's forehead is lowered, the vertebrae of the spine, particularly at the neck area, are opened. Also, with the forehead of a patient well downwardly, blood or pus or other fluids can be readily removed through the mouth. This is particularly useful in lung operations, so that the fluids involved in removing a diseased lung are not drained to the well lung.

As the knee rest 70 is raised and more of the weight of the patient is supported thereby, then the spine of a patient tends to become flatter. Simultaneously, as the plates 40 are raised, the spine of a patient tends to become flatter. Thus, by having a relatively fixed and spaced support at the pelvic area of a patient, or so the pelvic area becomes a fulcrum, and by provision of adjustable means to distribute the weight of the body of a patient lying in each direction from such fulcrum, I am able to control and maintain desired arching of the spine.

Another important feature of my invention is the open area provided for the face of a patient when the patient has the forehead supported by head rest 31. This means that an anesthetist will not be hampered while administering an anesthetic by inhalation. Also, tubes for irrigation or drainage can be easily inserted, removed or used.

In my invention, I desire to provide suitable support for the pelvic area of a patient so that the major portion of the weight at the pelvic area is carried on the pelvic bones and not on the abdomen of a patient, and thus provide for a minimum of interference with the breathing of a patient. Patients labor more in breathing while under an anesthetic and still more while prone on conventional tables. It is a major purpose of my invention to reduce such labor to the patient as much more than mere inconvenience to the patient is involved. Preferably, the straps 41

pass across the upper chest portion of a patient. There is less movement in this area caused by breathing and hence the straps 41 can carry more weight than do straps 45 without unduly increasing the labor of a patient. Also, plate 99 may carry the weight of the trunk of a patient at the collar bone or upper chest area.

In some of its aspects, my invention may be likened to wrapping a patient around a central pelvic support insofar as the opening up of the vertebrae and arching of the spine is concerned, and distributing the weight of a patient so the components of the weight, rather than external forces, are employed to obtain and maintain desired positions. My invention is further characterized in having as the major supports, a pelvic support, which is preferably two spaced supports, and a collar bone area support, which is preferably two spaced supports. At the same time, I provide for relatively adjustable forehead and leg supports.

In my invention, I have shown the two spaced pelvic supports which comprise the plates 44 and padding thereon or the saddle shown in Fig. 15. The saddle of Fig. 15 will be adjustable to take care of patients having different spreads across the pelvis. While I can make the plates 44 adjustable in a horizontal plane toward and away from each other, this is more readily accomplished by using different sizes of plates 44 as they are removable.

I have not attempted to list all of the various uses of my table and have set forth such examples as will illustrate the utility of the adjustments of the mechanical apparatus described and illustrated.

In a general way, my invention contemplates spaced pelvic supporting means, as plates 44, for supporting a patient in a prone position. These plates 44 are preferably covered by padding 42 and provide upwardly projecting spaced supporting areas aligned with and supporting the large pelvic bone of a patient at their forwardly projecting portions. Thus the pelvic bones function as a fulcrum about which the remaining portions of the body of a patient can be angularly moved to adjust the curvature of the spinal column of a patient for surgical purposes. Next, I provide a support in the vicinity of the chest of a patient, preferably in the vicinity of the collar bone area of a patient. These supports 40 are preferably covered or padded, as indicated in Figs. 4, 5 and 6. Thus the abdomen of a patient is unrestricted by the spaced plates 44 and is similarly unrestricted by the supporting plates 40 in the chest area of a patient. The legs of the patient are supported by supports hinged to the pelvic support and thus the legs of the patient are suspendedly supported (as indicated in Fig. 1 of the drawings) with the upper legs flexed at the hips and the lower legs flexed at the knees. The support for the chest of the patient and the supports for the legs of a patient may be raised or lowered relative to the pelvic support and thus the curvature of the spinal column of the patient may be adjusted and an adjusted curvature may be maintained.

Obviously, changes may be made in the forms, dimensions and arrangement of the parts of my invention without departing from the principles thereof, the above setting forth only preferred forms of embodiment of my invention.

I claim:

1. In a surgical table for adjusting the curvature of the spinal column of a patient for surgical purposes, pelvic supporting means for supporting a patient in a prone position and having upwardly projecting spaced supporting areas aligned with and supporting the large pelvic bones of a patient at their forwardly projecting portions, whereby the central portion of the body of a patient is supported by the pelvic bones functioning as a fulcrum about which the remaining portions of the body of a patient can be angularly moved; and two spaced supporting means for the balance of the weight of the patient, at least one of said supporting means being relatively vertically adjustable as respects said pelvic supporting means, one of said supporting means being located in the vicinity of the collar bone area of the patient and beyond the abdomen to leave the same unrestricted, and the other of said supporting means being hinged to said pelvic supporting means to suspendedly support the legs of a patient with the upper legs flexed at the hips and the lower legs flexed at the knees, whereby upon relatively raising or lowering of a supported body portion of the patient toward the head or toward the feet from the pelvic area, the curvature of the spinal column of a patient is adjusted and maintained.

2. In a surgical table for adjusting the curvature of the spinal column of a patient for surgical purposes, pelvic supporting means for supporting a patient in a prone position and having upwardly projecting spaced supporting areas aligned with and supporting the large pelvic bones of a patient at their forwardly projecting portions, whereby the central portion of the body of a patient is supported by the pelvic bones functioning as a fulcrum about which the remaining portions of the body of a patient can be angularly moved; two spaced supporting means for the balance of the weight of the patient, at least one of said supporting means being relatively vertically adjustable as respects said pelvic supporting means, one of said supporting means being located in the vicinity of the chest of the patient and beyond the abdomen to leave the same unrestricted, and the other of said supporting means being hinged to said pelvic supporting means to suspendedly support the legs of a patient with the upper legs flexed at the hips and the lower legs flexed at the knees, whereby upon relatively raising or lowering of a supported body portion of the patient toward the head or toward the feet from the pelvic area, the curvature of the spinal column of a patient is adjusted and maintained; and means to secure the pelvis of the patient to said pelvic supporting means.

3. In a surgical table for adjusting the curvature of the spinal column of a patient for surgical purposes, pelvic supporting means for supporting a patient in a prone position and having upwardly projecting spaced supporting areas aligned with and supporting the large pelvic bones of a patient at their forwardly projecting portions, whereby the central portion of the body of a patient is supported by the pelvic bones functioning as a fulcrum about which the remaining portions of the body of a patient can be angularly moved; and two spaced supporting means for the balance of the weight of the patient, at least one of said supporting means being relatively vertically adjustable as respects said pelvic supporting means, one of said supporting means being located in the vicinity of the chest of the patient and beyond the abdomen to leave the same unrestricted, and the other of said supporting means being hinged to said pelvic

supporting means to suspendedly support the legs of a patient with the upper legs flexed at the hips and the lower legs flexed at the knees, whereby upon relatively raising or lowering of a supported body portion of the patient toward the head or toward the feet from the pelvic area, the curvature of the spinal column of a patient is adjusted and maintained, said other supporting means for supporting the upper legs of a patient flexed at the hips comprising an upper leg supporting means pivotally connected with said pelvic supporting means, and a lower leg supporting means pivotally and slidingly connected with said upper leg supporting means.

4. In a surgical table for adjusting the curvature of the spinal column of a patient for surgical purposes, two laterally spaced pelvic supporting means mounted for free angular movement and for supporting a patient in a prone position with the said pelvic supporting means aligned with and directly supporting the large pelvic bones of a patient at their forwardly projecting portions and at either side of the abdomen and with the abdomen free, whereby the central portion of the body of a patient is supported by the pelvic bones functioning as a fulcrum about which the remaining portions of the body of a patient can be angularly moved; and two spaced supporting means for the balance of the weight of the patient, at least one of said supporting means being relatively vertically adjustable as respects said pelvic supporting means, one of said supporting means being located in the vicinity of the chest of the patient and beyond the abdomen to leave the same unrestricted, and the other of said supporting means being hinged to said pelvic supporting means to suspendedly support the legs of a patient with the upper legs flexed at the hips and the lower legs flexed at the knees, whereby upon relatively raising or lowering of a supported body portion of the patient toward the head or toward the feet from the pelvic area, the curvature of the spinal column of a patient is adjusted and maintained.

5. In a surgical table for adjusting the curvature of the spinal column of a patient for surgical purposes, pelvic supporting means for supporting a patient in a prone position and having upwardly projecting spaced supporting areas aligned with and supporting the large pelvic bones of a patient at their forwardly projecting portions, whereby the central portion of the body of a patient is supported by the pelvic bones functioning as a fulcrum about which the remaining portions of the body of a patient can be angularly moved; and two spaced supporting means for the balance of the weight of the patient, at least one of said supporting means being relatively vertically adjustable as respects said pelvic supporting means, one of said supporting means being located in the vicinity of the chest of the patient and beyond the abdomen to leave the same unrestricted, and the other of said supporting means being hinged to said pelvic supporting means to suspendedly support the legs of a patient with the upper legs flexed at the hips and the lower legs flexed at the knees, whereby upon relatively raising or lowering of a supported body portion of the patient toward the head or toward the feet from the pelvic area, the curvature of the spinal column of a patient is adjusted and maintained, said one supporting means being mounted for movement toward and away from said pelvic supporting means.

ROGER ANDERSON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
490,090	Watkins	Jan. 17, 1893
541,863	Loomis	July 2, 1895
542,060	Lentz	July 2, 1895
1,145,503	Naysmith	July 6, 1915
1,170,119	Sefton	Feb. 1, 1916
1,194,112	Wood et al.	Aug. 8, 1916
1,282,580	Hosford et al.	Oct. 22, 1918
1,348,896	Riesland	Aug. 10, 1920
1,582,950	Weaver et al.	May 4, 1926
1,697,121	Knebel	Jan. 1, 1929
1,710,475	Gallowitz	Apr. 23, 1929
1,799,692	Knott	Apr. 7, 1931
2,381,922	Norris	Aug. 14, 1945
2,445,158	Sparhawk	July 13, 1948

FOREIGN PATENTS

Number	Country	Date
829,390	France	June 24, 1938