Nov. 1, 1966 R. ANDERSON 3,282,584

ORTHOPEDIC TABLE

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Fig. 1

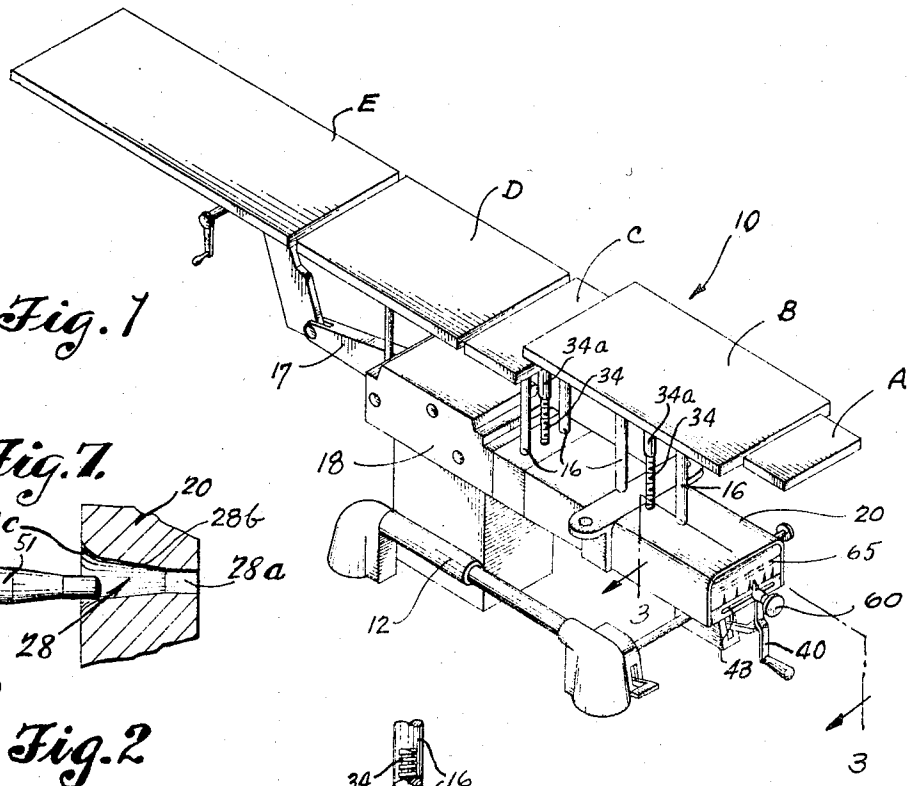


Fig. 2a

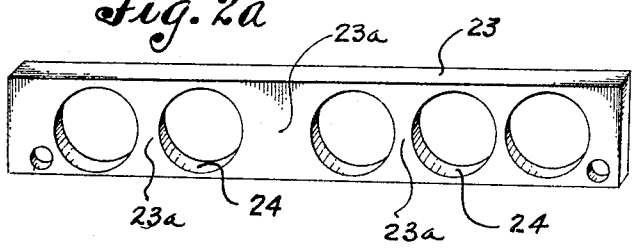


Fig. 2

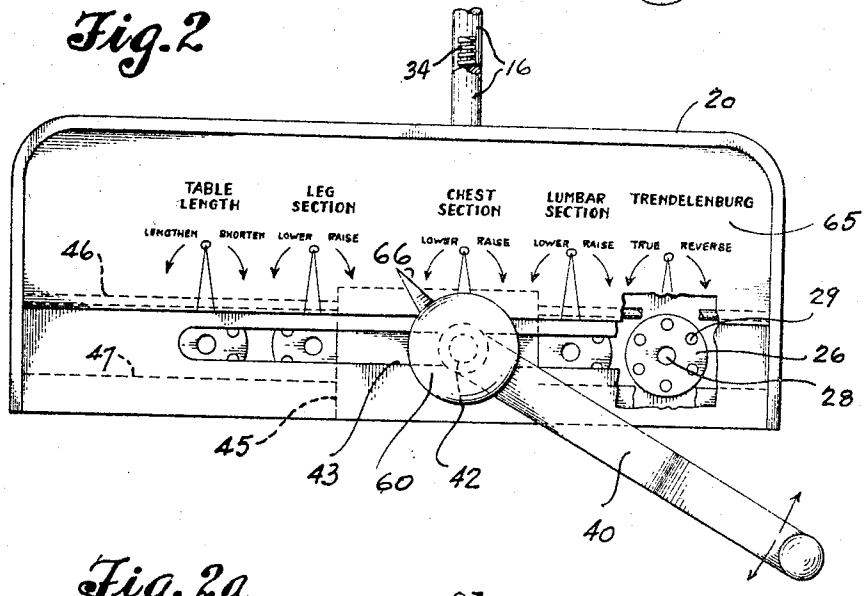


Fig. 7

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Fig. 3

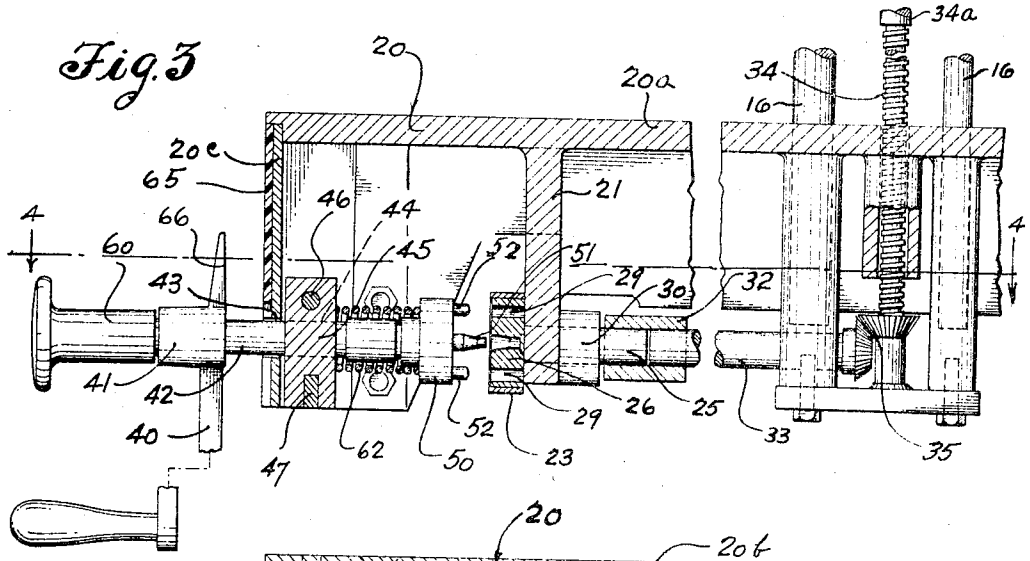


Fig. 4

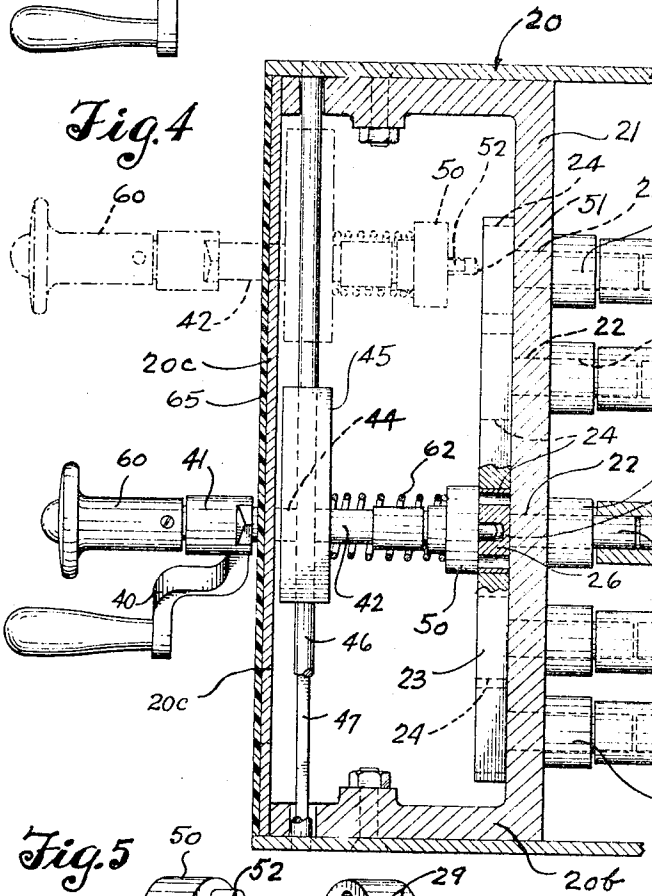


Fig. 6

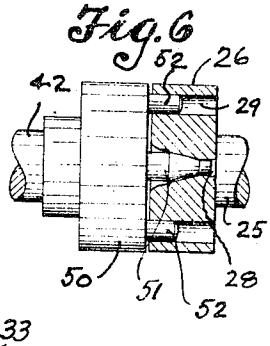
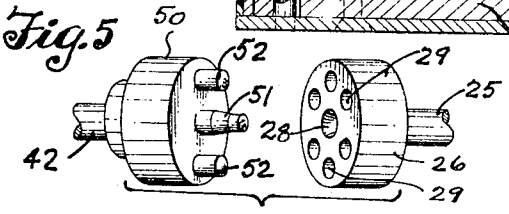


Fig. 5



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United States Patent Office

3,282,584

Patented Nov. 1, 1966

3,282,584

ORTHOPEDIC TABLE

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Filed July 22, 1963, Ser. No. 296,688
5 Claims. (Cl. 269—325)

This application is a continuation-in-part of my now abandoned application, Ser. No. 164,747, filed January 8, 1962.

This invention relates to what may be designated in the profession by which they are used as "orthopedic surgical tables" but which invention pertains to the general category of tables variously designated as "operating tables," "surgical tables," "orthopedic tables," and the like. More particularly, the present invention pertains to improvements in orthopedic surgical tables that have their tops made up of a plurality of adjustable sections on which a patient may be placed for treatment and which sections may be individually and independently adjusted as, for example, in elevation and inclination, or to such relative positions as may be required for comprehensive physiological positioning of the patient for any procedure for which the table may be employed.

Specifically stated, the present invention is directed to the provision of a single manually operable means for quickly and easily effecting, and for holding the adjustments of a plurality of the individual top sections of the table as made.

It is the principal object of this invention to provide an operating table of the charatcer of that which I have designated an "orthopedic surgical table" with a plurality of independently adjustable top forming sections, and to equip it with a single adjusting element, common to all sections; that is relatively simple in its construction and mode of use; that is comparatively inexpensive and which provides for the quick, easy and selective adjustment of any said table top sections.

It is a further object of the present invention to provide a table of the above stated character including manually operable means that provides for the adjustment from a single location of various top sections, as selected, with a saving of time and effort on the part of the surgeon, the anesthetist and the nurse, and with the maximum saftey to the patient.

Further objects and advantages of the invention reside in the details of construction of the novel parts of the present table top section adjusting means and in their combination and mode of use, as will hereinafter be fully described.

In accomplishing the above mentioned and other objects of this invention, I have provided the improved details of construction; the preferred forms of which are illustrated in the accompanying drawings, wherein:

FIGURE 1 is a perspective view of a surgical table embodying a plurality of independently adjustable top forming section as equipped with an adjusting means common to all sections in accordance with the objects of this invention.

FIGURE 2 is an enlarged end elevation of the housing containing the top sections adjusting means, as seen from the head or front end of the table, particularly showing the adjusting crank; a small section of the endwall of this housing being broken away to show one of the enclosed socketed rod adjusting heads.

FIGURE 2*a* is an isometric view of the enclosing plate for the turning heads of the several table section shafts.

FIGURE 3 is an enlarged vertical section, on line 3—3 in FIGURE 1, through the housing enclosing the table top section adjusting mechanism.

FIGURE 4 is a section taken in the horizontal plane of line 4—4 in FIGURE 3, showing the adjusting heads with rods as extended therefrom to the various table top section adjusting means, and showing the single hand crank for selective application to the several adjusting heads.

FIGURE 5 is a view showing in perspective, the formation of a socketed head of an adjusting shaft and the stud equipped head of the crank shaft, which is adapted to be selectively applied to the several socketed heads.

FIGURE 6 is a side view of the driving head of the crank shaft as interlocked with a shaft driving head of a table top section.

FIGURE 7 is an enlarged sectional detail showing the form of the pilot stud and locking pins of the crank shaft head and the receiving sockets of the head of an adjusting shaft.

Referring more in detail to the drawings:

In FIGURE 1, **10** designates in its entirety, a table which is typical of those of that particular category to which the present invention applied. As herein shown, the table comprises what may be a conventional supporting base structure **12** which mounts thereon a table having a top that is here shown to comprise a plurality of cooperatively arranged top forming sections which I have designated individually and respectively by reference characters A, B, C, D and E. These several top forming sections are individually adjustably supported from the base structure by various means and in various ways.

It is shown in FIGURE 1 that the several top sections of the table either have slidable guide tubes **16**, threaded adjusting rods **34** and internally threaded tubes **34***a* or lever mechanisms, such as at **17** in FIGURE 1, extending upwardly and forwardly from a housing or enclosure **18** that is located intermediate the base or pedestal structure **12** and the table top, and this enclosure includes, as a part thereof, at the head end of the table, a housing section **20** in which the selective table top adjusting mechanism of this invention is contained; these parts being best shown in FIGURES 3 and 4 and will now be described in detail.

The housing **20** is shown in FIGURES 1, 3 and 4 to be of boxlike form and to comprise a horizontal top wall **20***a*, opposite sidewalls **20***b*—**20***b* and a front end wall **20***c*. As seen in FIGURE 3, the bottom of the housing is open or uncovered. Formed in the housing **20** transversely thereof and in spaced, parallel relationship to its front end wall **20***c* is a flat vertical bar **21**. This is formed, in spaced relationship therealong and directly therethrough and in horizontal alignment with a plurality of bores **22**. Fixed to the front side of the bar **21** and extending horizontally across the several bores **22** is a flat bar **23** and this is formed in coaxial alignment with the bores **22** as formed in bar **21**, with substantially larger bores **24** as will be understood best by reference to FIGURE 4 and in the showing of bar **23** in FIGURE 2*a* wherein the flat front surfaces between bores **24** are designated as "lands" **23***a*.

Rotatably applied to each of the aligned bores **22** is a short cylindrical shaft **25** that is equipped at its forward end with a circular turning head **26**. These heads are rotatably fitted in the corresponding bores **24** of bar **23**. It is to be noted by reference to the showing of these parts in FIGURE 4 that the shaft turning heads **26** are of such thickness that their front faces are very slightly within the plane of the front face of bar **23** and that each head is formed centrally, as best shown in FIGURE 6 with a bore **28** and with a circular row of bores **29** of lesser diameter formed thereabout as will be best understood by reference to FIGURE 5. In their present use, the heads **26** are 1¼ inches in diameter and one-half inch thick. The central bores **28** are approximately 5/16 inch in diameter at their outer ends while the bores **29** are 3/16 inch in diameter and are spaced at 60° intervals in circles that are concentric of the heads **26**.

The shafts 25 extend through the bar 21 as shown in FIGURE 3 and each has a collar 30 press fitted thereon to retain the head 26 seated against bar 21. The inner end portions of the shafts 25 are joined through the mediacy of collars 32 to the ends of adjusting shafts 33 that extend, respectively, to the five table top sections. A gear driving connection between each shaft 33 and an adjusting screw 34 for a table top section has been shown at 35 in FIGURES 3 and 4, but it is to be understood that the type or form of any connection might be altered as required for the particular adjustment required and the particular top section to be adjusted.

It has been shown in FIGURE 4 that there are five adjusting shafts 33 for the accommodation of the five table top sections and that each shaft 33 has a turning head 26 at its forward end fitted rotatably in a bore 24 of plate 23. The number of adjusting shafts will vary depending upon the number of table sections.

For the selective turning of the heads 26 and shafts 33, I have provided a crank 40, shown in FIGURES 1 and 3. The crank handle is formed at one end with a hub portion 41, see FIGURE 3, that receives and is fixed on the outer end of a short crank shaft 42 that extends horizontally through a continuous horizontal slot 43 formed in the front wall plate 20c of housing 20. This shaft then continues inwardly through a bore 44 in a shaft mounting block 45 that is mounted for guided horizontal travel on a cross-rod 46 and guide bar 47 that are fixed in the front portion of housing 20, just within and parallel with the housing front wall 20c as seen in FIGURES 3 and 4.

At its inner end, the crankshaft 42 fixedly mounts a circular head 50 of substantially the same size as any of the rod turning heads 26. The head 50 is equipped on its inner face with a central projecting pilot stud or pin 51, best seen in FIGURES 5, 6 and 7, that is adapted to selectively enter the central bore 28 of any of the heads 26. At diametrically opposite sides of the pin 51, the head 50 is provided at evenly divided intervals with projecting pintles or studs 52 in diametric alignment and adapted to be received in any diametrically aligned pair of bores 29 of a head 26 in which the pilot stud 51 has been applied when the heads are properly aligned. This relationship provides the driving connection between the engaged heads 50 and 26 and in turn provides a driving connection between the crank 40 and the section adjusting shaft 33 with which it may be connected in this manner for table top section adjustment.

A feature of this combination of parts resides in the formation of the central bores 28 of the heads 26 and the pilot stud or central pin 51 of the crank head 50. It is to be observed best by reference to FIGURE 7, that the outer end portion of the pilot stud 51 of the crank head 50 is truly cylindrical and is of such diameter as to be snugly received in the inner end portion 28a of the central bore 28 of any head 26. The bores 28 of all heads 26 are slightly flared from the cylindrical inner end portion as at 28b then the walls round outwardly as at 28c to merge with the forward face of the head. The pin 51 is of such shape and diameter that it can be fully seated in the bore 28 of any head 26 so that the faces of head 50 and the engaged head 26 will come flatly together. It is also to be understood that the inner end periphery of the pilot pin 51 may be slightly rounded for easy entry and seating in bore 28.

A selective driving connection of the turning head 50 of the crankshaft with the head 26 of any adjusting shaft 33 may be made by manually moving the crankshaft 42 as mounted by the block 45 along the guide bar 47 and rod 46 as permitted by the slot 43 in front wall 20c. To facilitate this lateral manual adjustment of the crankshaft, a knob 60 is applied to the outer end of the crankshaft 42 and a coiled spring 62 is applied under compression between the block 45 and head 50 and this acts to yieldingly urge the head 50 into locking engagement with any of the heads 26 with which it may be brought into locking contact and alignment.

It is to be understood that extreme accuracy in the shifting and placement of the head 50 to effect a locking connection with a selected head 26 is not necessarily required. In making an adjustment of the locking head 50 from one of the heads 26 to another, it is only required that the operator release the existing interlocked connection by pulling outwardly on the knob 60 as for example to its dotted line position of FIGURE 4 and then while still holding the heads disengaged by means of knob 60 to shift the locking head 50 into approximate alignment with the head 26 with which a connection is desired, then to release the knob and allow the spring 62 to seat the inner end of the pilot stud 51 in the diametrically enlarged end of the bore 28. If the pilot stud and central bore of the head do not happen to be in exact alignment, the sloping taper of the bore 28 will guide the stud into the inner cylindrical portion 28a. If the pintles 52 are not exactly aligned for entry into the bores 29, this can be readily effected by slightly turning the crank 45, and the spring 62 will act to effect the complete interlock.

The ready, guided entry of the pilot stud 51 of head 50 into the central bore of any of the heads 26 is by reason of the fact that the crank shaft 42 is mounted at the same horizontal level as the mounting shafts 33 of the heads 26 and furthermore, by reason of a slight tapering or rounding of the outer end of the pilot stud 51 as shown in FIGURE 7. Likewise, the ends of the studs 52—52 are rounded for easy guidance and entry into the bores 29—29. Normally, if the crank lever arm 40 is released while held in an angular position as in FIGURE 2 with the pilot stud 51 just slightly entering the flared pilot stud bore 28 in a head 26, then the weight of the crank arm will cause the shaft 42 to turn the head 50 the distance required to register the pintles 52 thereof with the bores 29 to effect a complete interlock under influence of the coiled spring 62.

To aid the user of the table, surgeon or nurse, to quickly make a placement of the position of head 50 for any table section adjustment, a facing plate 65 is applied to the front wall 20c of housing 20, which has markings or notations thereon, as shown in FIGURE 2, with which a pointer 66 extended outwardly from the hub of the crank 40 may be aligned to establish the positon of adjustment of the head 50 for any particular table top section. Preferably, the pointer 66 will be disposed at an angle to the line of the crank arm as in FIGURE 2 so that in setting its position, the crank arm will be angularly disposed and will, by reason of its weight upon release, automatically effect the interlock if the pintles and bores 29 should not be in exact registration.

The raising and lowering of the top forming sections B, C, and D are accomplished by means of the rotation of adjusting screws such as 34 which adjustably support the respective sections. The top forming section E is tilted or inclined to and from the horizontal position as shown by means of a suitable gearing connection (not shown) which is interconnected to the lever mechanism 17. The adjustment of a section is accomplished by first interlocking the head 50 with a selected turning head 26. The rotation of the crankshaft 42 in one direction or the other will then raise or lower the selected top section B, C, or D or it will swing the section E to the desired position of inclination. These adjustments are accomplished through the interconnection of a given shaft 33 and gears 35 and adjusting screws 34. The threaded adjusting rods support the internally threaded tubes 34a which are secured to the bottom surface of the top forming sections. The rod 34 threads into or from the tube 34a incident to the rotation of the gear 35.

The mechanism as above described, and as illustrated in FIGURES 1 through 7, permits selections to be quickly and easily made for the various table top section ad-

justments. By rounding the end of the pilot stud **51** for easy entrance to the head bores **28** of heads **26**, connections may be made without the operator taking his view from the patient. The making of any connection is to a great extent automatically completed upon bringing the head **50** in approximate axial alignment with any head **26** and then allowing the spring **62** to complete the job. The use of a single crank, common to all heads **26**, simplifies the operation, lessens the expense of construction, reduces the weight of the table and greatly facilitates the work of the surgeon or doctor and his attendants.

As previously indicated, the several table sections are movable or adjustable in various ways to accommodate or adapt the position of the patient to that position desired or required for the most efficient administration of treatment or surgery. The movements of table top sections of a given table may be altered to perform various movements. For example, it may be desired to have one or more sections move vertically and tilt laterally from side to side. For a different use it may be desirable to have several sections which are tiltable in the longitudinal direction of the table. It is to be clearly understood that my invention embodies the unique and desirable provision of a single handle located at a convenient and desirable location whereby I provide means to alter a plurality of table top sections to various positions. The sections may be raised, lowered, tilted or separated in relationship to one another with the single crank means. I do not intend to imply that all adjustments or alterations are made by the single handle or crank mechanism. It may be desirable or necessary to provide one or more adjusting means at other locations on the table.

It will also be appreciated that the mounting and movement of the crank mechanism and clutching or interconnecting mechanism may be altered or modified without departing from my invention. I have illustrated that the crank movement is in a horizontal plane or straight line. The crank could move in a complete circular path or in an arc to the various engageable elements if such is desired. I have illustrated what I believe to be a simple and preferred construction to permit quick and easy engagement or disengagement of crank mechanism with a given table section adjusting mechanism but I do not intend that the scope of my invention is limited to the specific disclosure.

What I claim as new is:

1. A surgical table comprising a supporting housing, a plurality of table top adjusting rods positioned in and extending from said housing, a table top section interconnected to one end of each of said adjusting rods, adjusting means for selectively and independently functionally moving said adjusting rods and thereby altering the position of the table top section interconnected therewith, said adjusting means including a crankshaft, a mounting means on said housing for movably mounting said crankshaft, a plurality of interconnecting means for selectively interconnecting said crankshaft with said adjusting rods, each of said interconnecting means including a rotatable connecting rod, means on one end of each of the connecting rods to releasably join the selected connecting rod to said crankshaft and means on the opposite end of the selected connecting rod interconnecting a respective connecting rod with a respective adjusting rod whereby the joining of said crankshaft with a respective connecting rod provides means for altering the position of a respective table top section incident to the actuation of said crankshaft.

2. A surgical table as in claim 1 including resilient means on said crankshaft for urging said crankshaft into joining relationship with the connecting rods.

3. A surgical table as in claim 1 wherein the mounting means for said crankshaft includes a horizontal guide bar, a block slidably mounted on said bar and said crankshaft is mounted by said block and extends from opposite sides thereof.

4. A surgical table comprising a supporting housing, a plurality of vertically disposed and adjustably mounted supporting rods positioned in longitudinally spaced relationship in said housing, a table top section mounted on the upper end of each of said supporting rods, adjusting means for selectively and independently vertically adjusting said supporting rods and the respective table top section mounted thereon; said adjusting means including a crankshaft, a horizontally disposed mounting means on said housing for movably mounting said crankshaft in a horizontal plane, a plurality of interconnecting means including a horizontally disposed and rotatable connecting rod, means on one end of each of said connecting rods to releasably join the connecting rods to said crankshaft and means on the opposite ends of each connecting rod interconnecting a respective connecting rod with a respective supporting rod whereby the joining of said crankshaft with a respective connecting rod provides means for raising or lowering a respective table top section incident to the actuation of said crankshaft.

5. A surgical table as in claim 1 wherein said adjusting rods are threaded and a gear is fixed on the lower end of each threaded adjusting rod and an intermeshing gear is fixed on the adjacent end of the respective connecting rod.

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