

June 24, 1958

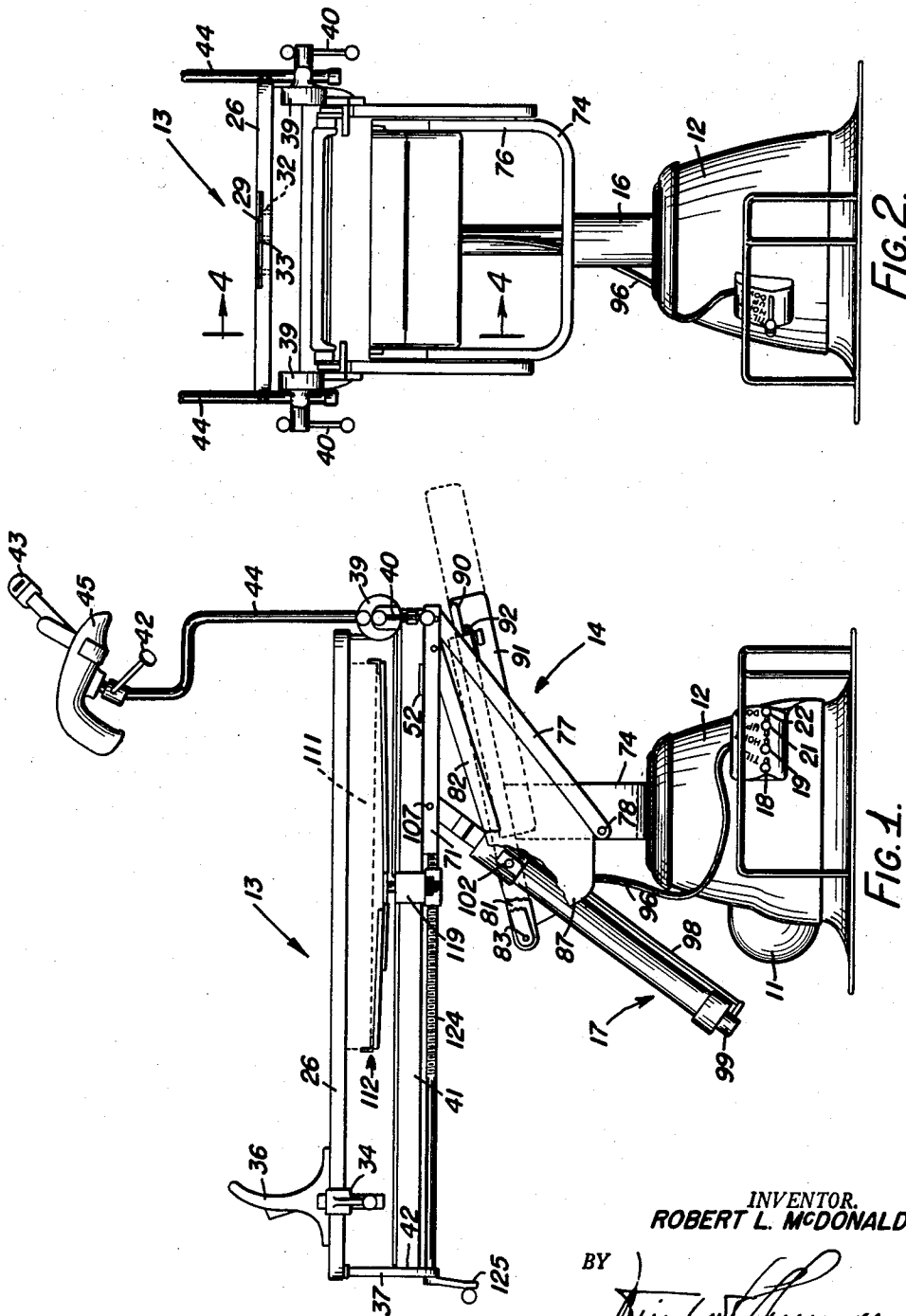
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2,840,429

MEDICAL EXAMINATION, OPERATING AND X-RAY TABLE

Filed Oct. 1, 1953

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

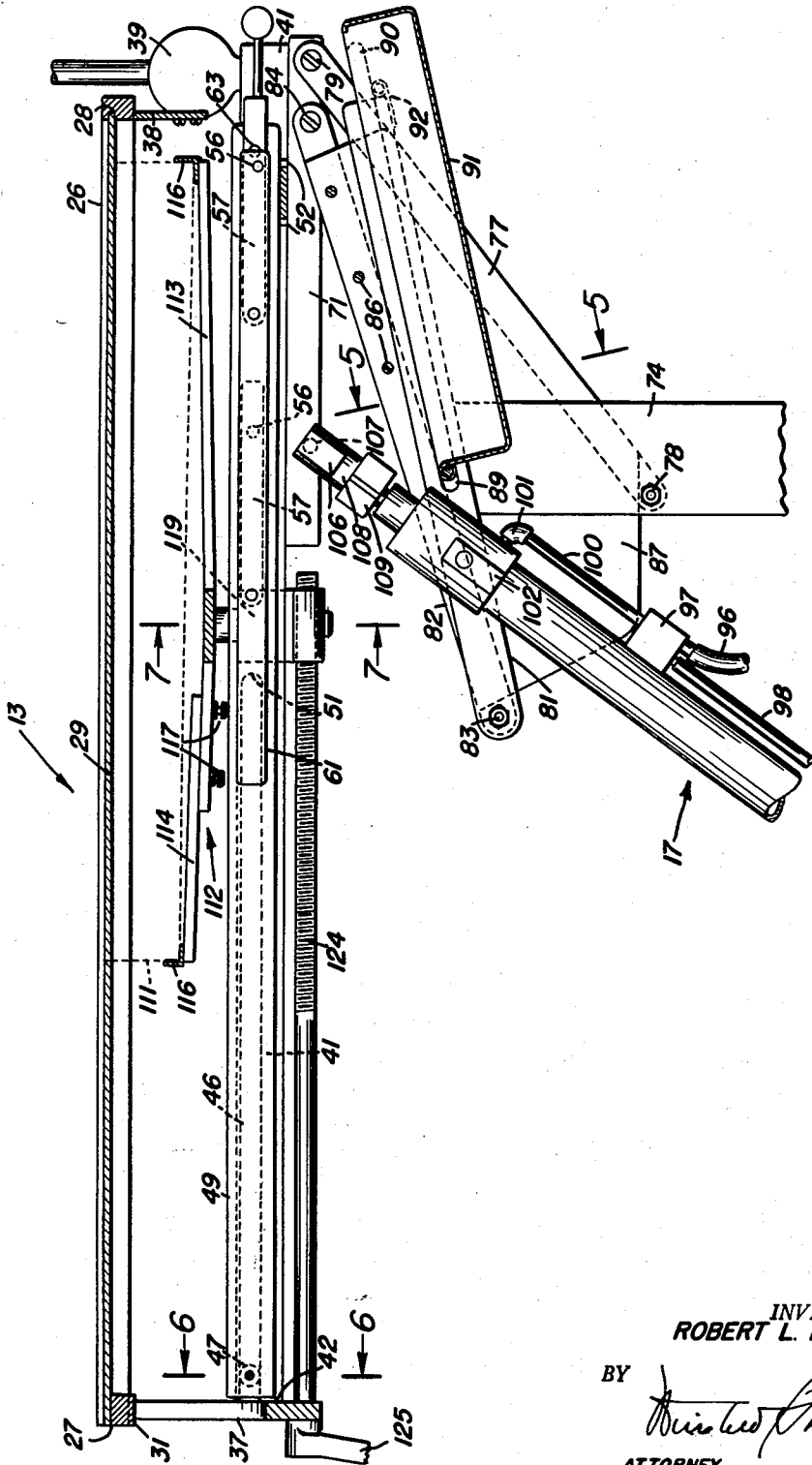


FIG. 4.

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3 Sheets-Sheet 3

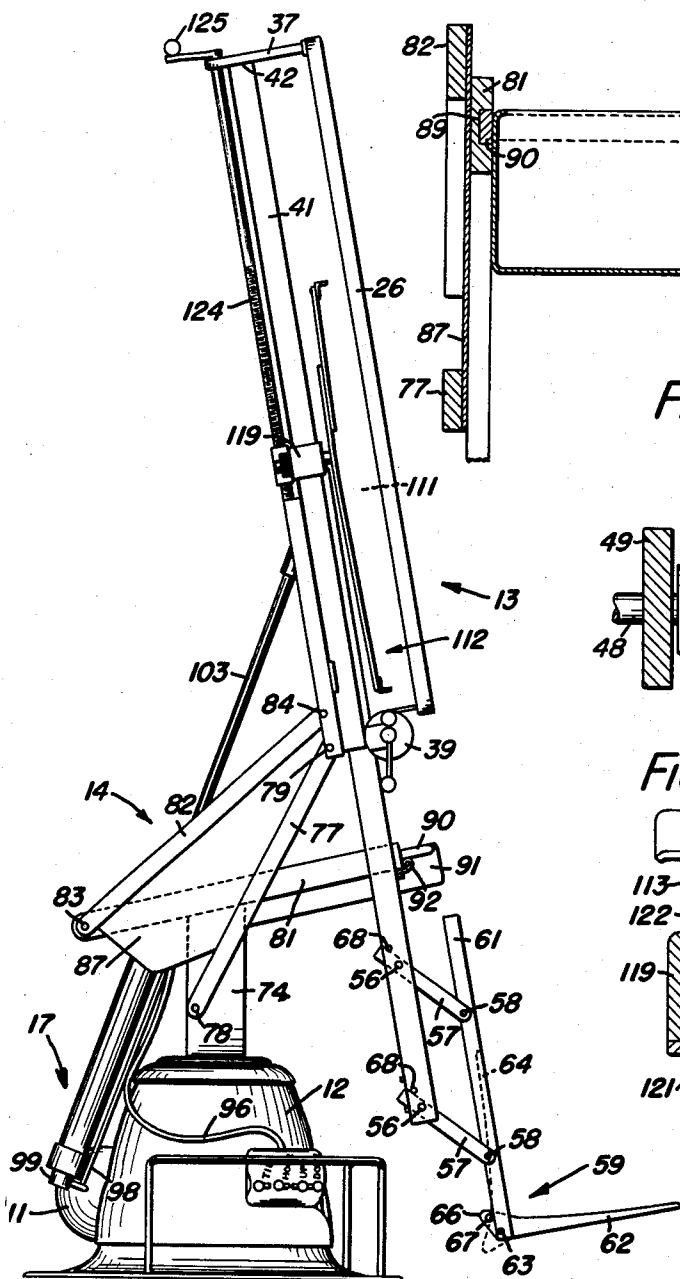


FIG. 3.

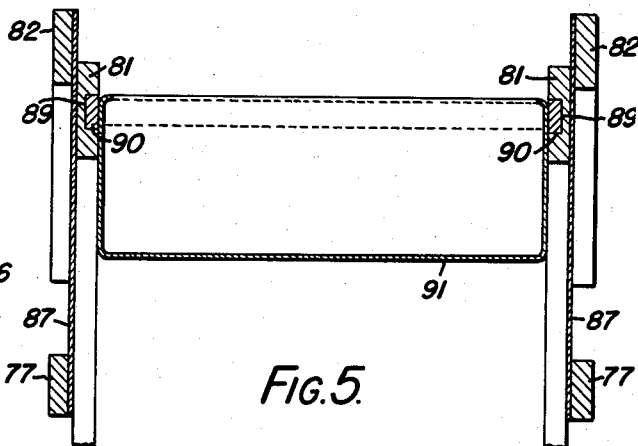


FIG. 5.

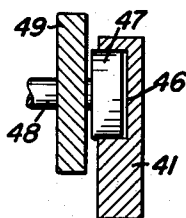


FIG. 6.

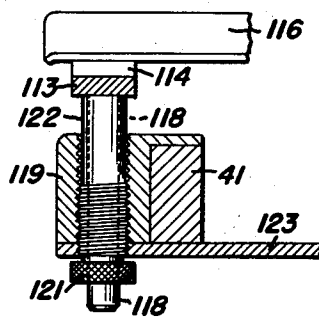


FIG. 7.

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2,840,429

MEDICAL EXAMINATION, OPERATING AND X-RAY TABLE

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Application October 1, 1953, Serial No. 383,518

9 Claims. (Cl. 311-6)

My invention relates to medical examination, operating and X-ray tables and more particularly to that type of table employed for the most part by urologists.

An object of my invention is to provide an examination, operating and X-ray table which is hydraulically controlled to either raise and lower the table or tilt the table longitudinally about a horizontal transverse axis to the end that maximum convenience of the urologist is secured in shifting the patient into various positions for radiography, pyelography and urological examination while maintaining utmost support and comfort for the patient.

Another object of my invention is to provide a hydraulically controlled and operated table wherein the table may be shifted from a horizontal position in which position various diagnostic examinations may be performed on a patient supported on the table, to a position approaching the vertical, the approved position for securing pyeloureterograms, without the necessity of the urologist first raising the table to an elevated position before it can be tilted to raise the patient to the essentially upright position.

Still another object of my invention is to provide a table, particularly for use by urologists, in which a mechanical set of linkages raise the table at the same time that it is hydraulically tilted from the horizontal to an essentially vertical position whereby when the table is in the horizontal position it is sufficiently low to enable the urologist to perform his work with maximum comfort while seated and when the table is shifted to the essentially vertical position the leg sections of the table do not strike the floor.

A further object of my invention is to provide a table, particularly for use by urologists, which includes a spring support for the conventional Bucky diaphragm to maintain a minimum subject to film distance which at the same time permits a deflection of the Bucky mounting caused by the weight of the patient on the table top whereby damage to the Bucky and its adjusting mechanism is unlikely.

My invention further contemplates simplified means for enabling the extension of the foot and leg rest portions of an urological table which at the same time enables these parts of the table when not in use to be hidden beneath and substantially enclosed by the main table section.

Other objects and advantages of my invention will be particularly set forth in the claims and will be apparent from the following description, when taken in connection with the accompanying drawings, in which:

Fig. 1 is a side elevation of the medical examination and operating X-ray table of my invention showing the table in a horizontal position;

Fig. 2 is a view looking from the right of Fig. 1 with the knee crutches omitted but their supporting rods shown;

Fig. 3 is a view similar to Fig. 1 with the foot rest

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and leg support sections extended and with the table in an essentially vertical position;

Fig. 4 is a sectional view taken substantially on the line 4-4 of Fig. 2 in the direction indicated by the arrows;

Fig. 5 is a sectional view taken substantially on the line 5-5 of Fig. 4 in the direction indicated by the arrows;

Fig. 6 is a sectional view taken substantially on the line 6-6 of Fig. 4 in the direction indicated by the arrows; and

Fig. 7 is a sectional view taken substantially on the line 7-7 of Fig. 1 in the direction indicated by the arrows.

The table of my invention, while of more general use, has been more particularly designed for use by urologists as a combined examination, operating and X-ray table. The examination, operating and X-ray table of my invention comprises an electric motor 11, a housing 12 which encloses suitable hydraulic mechanism, a table assembly generally indicated by the numeral 13, together with a novel arrangement of linkage, generally indicated by the numeral 14, between the table assembly 13 and the piston 16 of the hydraulic mechanism, the purpose of which will later appear.

Enclosed within the housing 12 and driven by the electric motor 11 is an oil pump which through suitable controls supplies oil under pressure to the cylinder in which the piston 16 operates and to a tilt cylinder generally indicated by the numeral 17. The hydraulic controls comprise a table tilting pedal 18, a horizontal table positioning pedal 19, a table raising or "up" pedal 21, and a table lowering or "down" pedal 22. The mechanism within the housing 12 and the hydraulic controls, together with the mechanism operated thereby, may be similar to that shown in my co-pending application Serial No. 331,771, filed January 19, 1953, and entitled "Medical Examination and Operating Tables." However, it will be obvious that other mechanism and controls may be employed to actuate the piston 16 and the piston within the tilt cylinder 17.

As shown most clearly in Fig. 4, the table 13 comprises a frame 26 which is essentially rectangular in section and U-shaped in plan with the U being open at the head end of the table as indicated at 27. The U-shaped frame has an internal recess 28, extending around its inner periphery for the reception of a flat sheet or table surface 29. The table surface 29 may be of any suitable material pervious to X-ray radiation such as Bakelite.

A cross-bar 31 (Fig. 4) fixed with respect to the frame 26 by screws supports the head end of the table surface 29. The forward edge of the table surface 29 has a tongue which fits in a recess 33 formed in the frame. Screws 32 are provided to hold the table surface in position but upon removal of these screws, the table surface may be readily removed by lifting it out of its recess 28.

As shown most clearly in Fig. 1, at least one side of the frame 26 serves as a rail for the reception of a releasable clamping device 34 which carries a pair of shoulder supports 36. Upon releasing the clamp 34, the shoulder support may be shifted along the table surface to any desired position to accommodate patients of various heights. The sides of the frame 26 may also serve as a support or guide rail for other appurtenances to the table such as an arm rest or wrist restraint.

Secured to the underside of the cross-bar 31 is a U-shaped bracket 37 which depends beneath the table surface 29 and constitutes part of a rigid frame for the support of the table surface framing above described.

The right hand end of the frame 29 (as viewed in

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Fig. 4) is supported by a transverse bar 38 which is attached to two fixtures 39, one on each side of the table. The fixtures 39 are mounted on and secured to two longitudinally extending bars 41 to which the U-shaped bracket 37 is also secured as shown at 42. The fixtures 39 constitute part of a knee crutch assembly which includes a hand operated locking device 40, a support rod 44 adjustably and pivotally mounted in the fixtures 39, and a knee crutch. The knee crutch is adjustable and may be releasably locked in a desired adjusted position by a hand locking member 42. A strap 43 is provided for the purpose of holding the patient's knees in the proper position. The knee crutch assembly constitutes no part of my present invention and will not be more particularly described. However, it will be apparent that by the adjustments mentioned, the knee crutches can be located as desired by the urologist for the purpose of facilitating examination of the patient.

As shown in Fig. 6 and as indicated in dotted lines in Fig. 4, the longitudinally extending bars 41 are provided with ways 46 for the reception of rollers 47 mounted on the ends of cross shaft 48. The cross shaft is supported by a pair of short longitudinal bars 49 which as will presently appear constitute a sliding frame. As indicated in Fig. 4, the ways 46 terminate at 51 and when the rollers 47 engage the ends 51 of the ways, outward movement of the bars 49 is arrested. The forward ends of the bars 49 rest upon and slide with respect to a pair of lugs 52 secured to the under sides of the bars 41. It will now be apparent from a comparison of Figs. 1 and 3 that the bars 49 may be shifted with respect to the bars 41 so as to bring the bars 49 into a relationship with the table such that the bars are substantially enclosed or encompassed by the table, as indicated in Fig. 1, or to an extended position with respect to the table as shown in Fig. 3.

The slide bars 49 have pivoted thereto as shown at 56 parallel motion links 57 which are pivotally connected as shown at 58 to a foot and leg rest assembly generally indicated by the numeral 59.

The foot and leg rest assembly 59 comprises a pair of side bars 61 constituting a frame across which sheet metal rests for the calves of the legs extend. The sheet metal leg rests are recessed below the top edges of the side bars 61 so that a foot rest 62 may be shifted around a pivot 63 to the dotted line position shown at 64 in which position the foot rest 62 lies wholly below the top edges of the side bars 61. The foot rest 62 is provided with angularly extending parts 66 having stop pins 67 to limit the foot rest 62 to the substantially right angle position with respect to the side bars 61 shown in Fig. 3. The parallel motion links are provided with stops 68 to limit the movement of the side bars 61 to the parallel relationship with respect to the slide bars 49 shown in Fig. 3.

It will now be apparent from a comparison of Figs. 1 and 3 that when the table is in the horizontal position shown in Fig. 1, the slide bars 49, together with the foot and leg rest assembly 59 are hidden beneath and substantially enclosed by the table 13 and its associated parts. However, as will presently appear, the table may be tilted as shown in Fig. 3 to substantially a vertical position. Prior to tilting the table the slide bars 49 are pulled outwardly and the parts of the foot and leg rest assembly 59 shifted to the position shown in Fig. 3. In this position of the table, the patient stands on the foot rest 62 with his back and shoulders resting or leaning against the table surface 29.

Secured to the underside of longitudinal bars 41 (Fig. 1) are short longitudinal bars 71. These bars 71, together with the longitudinal bars 41, are fixed with respect to the table frame 26. The table tilting mechanism is connected to these short longitudinal bars 71.

As shown most clearly in Fig. 2, a yoke 74 having upstanding arms 76 is rigidly secured to the plunger or pis-

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ton 16 which operates within the housing 12 to raise and lower the table. Pivot bars or links 77 are pivoted at 78 to the outer sides of the arms 76 of the yoke 74. The upper ends of the pivot bars 77 are pivoted to the short longitudinal bars 71 at 79 adjacent the forward edge of the table.

Rigidly secured to the upper ends of the arms 76 of the yoke 74 are a pair of bars 81. These bars 81 extend angularly with respect to the arm 76 of the yoke 74 and serve to slidably receive a drain pan as will presently appear. A pair of pivot bars or links 82 are pivoted to the fixed bars 81 at 83 and pivoted to the short longitudinal bars 71 at 84 (Fig. 4).

Secured to the inner side edges of the pivot bars 82 as shown at 86 (Fig. 4) are shields 87 which extend downward on the inside of the pivot links 77 (Fig. 5) and between these links and the rigid bars 81.

A pair of guides or ways 89 are provided on the inner faces of the fixed bars 81 in which members 90 are adapted to ride. The members 90 may be rollers but preferably are longitudinal slide members provided on the upper side edges of a drain pan 91. The drain pan is substantially rectangular in plan, closed at the bottom and sides and open at the top. The forward ends of the fixed bars 81 have spring elements 92 (Fig. 1) secured to their lower forward edges, the forward edges of the spring elements being turned upward and rolled. The slide members 90 on the upper side edges of the drain pan ride on the spring elements 92 which serve to hold the drain pan frictionally in any desired adjusted position with respect to the forward edge of the table as indicated by the solid and dotted lines in Fig. 1.

A flexible connection 96 extending from the hydraulic unit contains two flexible conduits which extend to a branch fitting 97. One of the conduits 98 is connected to the hydraulic cylinder at one end 99 while the other hydraulic conduit 100 is connected to the other end of the cylinder as shown at 101. As previously mentioned the hydraulic system may be similar to that shown in my co-pending application Serial No. 331,771.

The upper end of the hydraulic cylinder 17 is carried by a cross bar 102 which is pivoted with respect to the fixed bars 81. A piston rod 103 extends from the upper end of the cylinder and is rigidly connected to the piston (not shown) located within the hydraulic cylinder 17. A cross bar 106 is pivotally connected at 107 (Fig. 1) to the short longitudinal bars 71. The outer end of the piston rod 103 is enlarged as shown at 108 and bifurcated to straddle the pivoted bar 106. An adjustable nut 109 is clamped on the piston rod.

One of the disadvantages of the urological tables of the prior art is that when the table is in a horizontal position as shown in Fig. 4 and at the low level desired by the urologist, particularly when seated, it cannot be shifted to the position shown in Fig. 3 without first raising the level of the table so that the lower part of the foot and leg rest assembly 59 does not strike the floor. In Fig. 1, I have illustrated the approximate lowermost position of the table. With this table position, the table surface is at a level such that the urologist may wish to perform examinations when seated on a stool. With the table in this position, if it is desired to shift the table to the position shown in Fig. 3 for the purpose of making X-rays with the patient in substantially an erect posture to show the location of the kidneys or ureters, the urologist first extends the slide bars 49 to their outermost position and erects the foot and leg rest assembly 59. With the patient's feet resting on the foot rest 62 and his back and shoulders reclining on the table, the urologist depresses the tilt pedal 18 to supply oil under pressure to the connection 98 (Fig. 1) and enable discharge of oil from the upper end of the cylinder.

During the raising of the table the pivot points 79 and 84 swing upward and the pivot points 84 move around the pivot points 79. This is evident from a comparison

of Figs. 1 and 3. The raising action during the tilting of the table raises the foot and leg rest assembly 59 so that the table may be swung to the position shown in Fig. 3 without the foot and leg rest assembly striking the floor. Thus it is unnecessary for when the table is in the position shown in Fig. 1 to raise the table prior to tilting it.

One important fact that will be particularly noted is that when the table is in the horizontal position, as shown in Fig. 1, and the pan is extended to the dotted line position shown therein, it is in a position to receive drainage from the patient. When the table is moved to the tilted position, the drain pan remains stationary and still lies below the forward edge of the table in the proper position for receiving drainage.

One of the important aspects of my invention is the means by which the Bucky assembly is supported to prevent damage to the Bucky mechanism and its convenient repair and adjustment. In other urological tables with which I am familiar, the Bucky is fixed to the under side of the table and is rigidly mounted and can not be moved longitudinally of the table.

In the drawings I have indicated a Bucky by the numeral 111, the function of which is well understood in the art. The Bucky is supported on springs comprising a spring assembly, generally indicated by the numeral 112, located on each side of the table. Each Bucky spring support assembly includes a pair of spring elements 113 and 114 to the ends of which transverse angle bars 116 are rigidly secured. The spring elements 113 and 114 are connected together by means of screws 117. Each of spring elements 113 is riveted or welded to a depending pin 118. The depending pins 118 extend through threaded bores in slide blocks 119 which ride on longitudinal bars 41 (see Fig. 7). The bores in the slide blocks are threaded for the reception of a knurled threaded member 121. The threaded member has a sleeve part 122 which bears against the bottom of the spring 113 to apply pressure on the spring. The blocks are connected together by a transverse bar 123 through which the threaded members 121 extend. The transverse bar has a threaded boss at its center adapted to receive a threaded rod 124 which extends through the U-shaped frame member 42. The extended end of the threaded rod 124 has a hand crank 125 secured thereto.

It will now be appreciated that upon rotation of the crank 125, the threaded rod 124 is fed into or out of the threaded boss of the transverse bar and the guides 119 will ride on the longitudinal bars 41 to shift the Bucky forward or rearwardly with respect to the table surface. This arrangement enables the urologist to locate the Bucky in proper position with respect to a patient reclining or leaning (Fig. 3) on the table for obtaining the desired X-ray.

It will be particularly noted that the Bucky is spring pressed into engagement with the bottom of the table surface or sheet of Bakelite. This maintains a minimum subject to film distance while still allowing the Bucky mounting to deflect due to the weight of the patient. The weight of the patient may cause deflection of the table top due to the character of material of which it is preferably made. With my Bucky support, the weight of the patient does not rest solidly on the Bucky and damage to its mechanism is avoided. The Bucky frame may be lowered by backing off on the threaded members 121 and the Bucky assembly can then be slid sideways out from under the table for inspection, repairs or replacement.

While I have shown and described the preferred form of my invention, it will be apparent that various changes and modifications may be made therein, particularly in the form and relation of parts, without departing from the spirit of my invention as set forth in the appended claims.

I claim:

1. A medical examination table comprising, in combination, a table having a planar surface upon which the patient may recline, a leg and foot rest, means for slidably supporting said leg and foot rest, means for slidably supporting said leg and foot rest beneath said planar surface, said leg and foot rest being in an extended position when it is desired to place the patient in an essentially upright position, hydraulic means for raising and lowering said planar surface, means for tilting said planar surface about a movable horizontal transverse axis, and means independent of said hydraulic means for raising said planar surface simultaneously with its tilting so that the leg and foot rest does not strike the floor when in an extended position.

2. A medical examination table in accordance with claim 1 wherein said last mentioned means is a mechanical set of links pivotally connected to a fixed part of the table when it is tilted and pivoted with respect to a part of the table which is fixed relative to said planar surface.

3. A medical examination unit comprising, in combination, a table having an essentially planar surface, means including a hydraulic unit having a support which is fixed against any tilting movement but which is raised and lowered to shift said planar surface to a position parallel to its original position, a manually operated control, and means including a transverse pivot connected between said support and the table for imparting a compound movement to the table when said manually operated control is actuated, said compound movement including a raising of said transverse pivot and a bodily raising of the elevation of said planar surface accompanied by a change in the angle which said planar surface makes with the horizontal.

4. A medical examination unit in accordance with claim 3 in which the connecting means includes a pair of links one of the ends of each which is pivoted with respect to said support and the other of the ends of each which is pivoted on the table one of said latter ends being said transverse pivot.

5. A medical examination unit in accordance with claim 3 in which the connecting means includes a hydraulic cylinder assembly having a movable element and a pair of links, said hydraulic cylinder assembly being pivoted with respect to said support and said movable element being pivoted on the table and said links having one of their ends pivoted with respect to said support and the other of the ends pivoted on the table.

6. A medical examination unit comprising, in combination, a table, a slide, means carried on the under side of said table for enabling the slide to be positioned under the table or shifted forward to provide a table extension, a foot support, means for pivoting said foot support with respect to said slide so that the foot support may lie within the confines of the slide or extend substantially at right angles thereto, said extension and footrest when positioned to receive the feet and legs of a patient so that the patient may subsequently be supported in an approximately erect position presenting an elongated overhang with respect to the end of the table, means for raising and lowering the table, and means independent of said raising and lowering means for imparting a compound movement to the table including a longitudinal tilting of the table and its elongated overhang accompanying a bodily raising of the table whereby when the patient is to be shifted to an approximately erect position when the table is in its lowermost position said compound movement will enable the end of the elongated overhang to clear the floor without operating said raising and lowering means.

7. A medical examination unit in accordance with claim 6 in which the independent means includes a pair of links one end of each of which is pivoted to the table and the other end of each of which is pivoted to a part which is fixed when said independent means is operated

the table pivot ends of said links both rising when the table is tilted.

8. A medical examination unit comprising, in combination, a table having an essentially planar surface, means for raising and lowering the table to shift said planar surface to a position parallel to its original position, a manually operated control, and means including a pivoted hydraulic cylinder and piston connected between said manually operated control and the table and including a transverse pivot for imparting a compound movement to the table when said manually operated control is actuated, said compound movement including a raising of said transverse pivot and the general elevation of said planar surface accompanied by a change in the angle which said planar surface makes with the horizontal, a support fixed when said manually operated control is actuated and a part fixed with relation to the table, said connecting means including a pair of links the lower ends of which are pivoted in said fixed support and the upper ends of which are pivoted to said fixed part, one of said pivots being said transverse pivot.

9. A medical examination unit in accordance with claim 8 wherein one element of the hydraulic cylinder

and piston is pivoted on said fixed support and the other element is movable and pivoted on said fixed part.

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