June 26, 1945. E. H. FAUST ET AL 2,379,071

MANUAL TILT TABLE

Filed Nov. 27, 1941 2 Sheets-Sheet 1

Fig. 1.

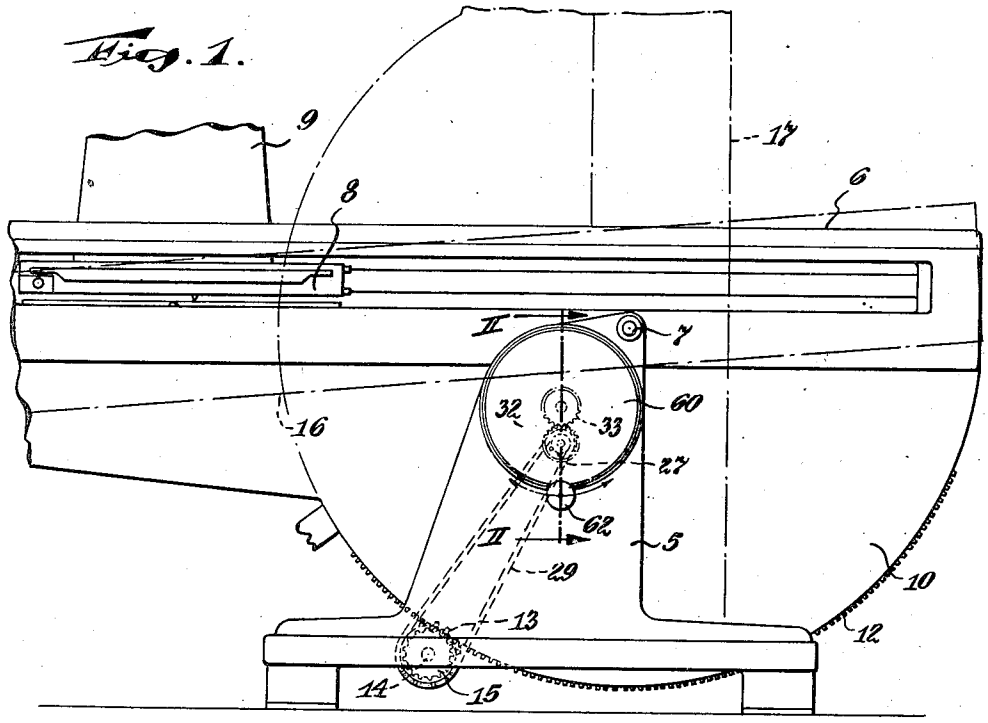
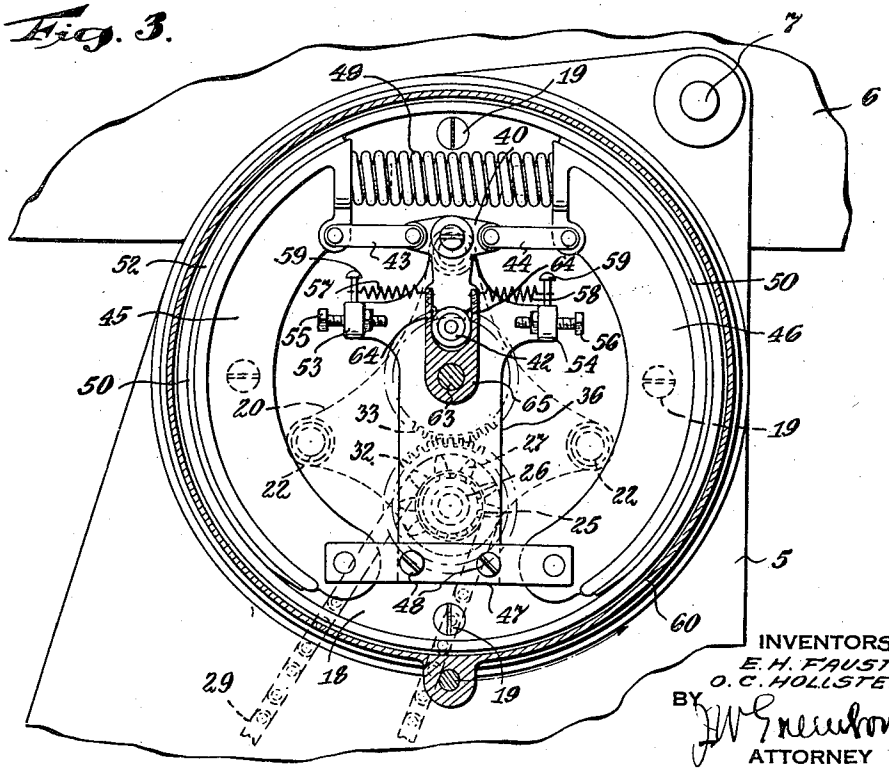


Fig. 3.



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Fig. 4.

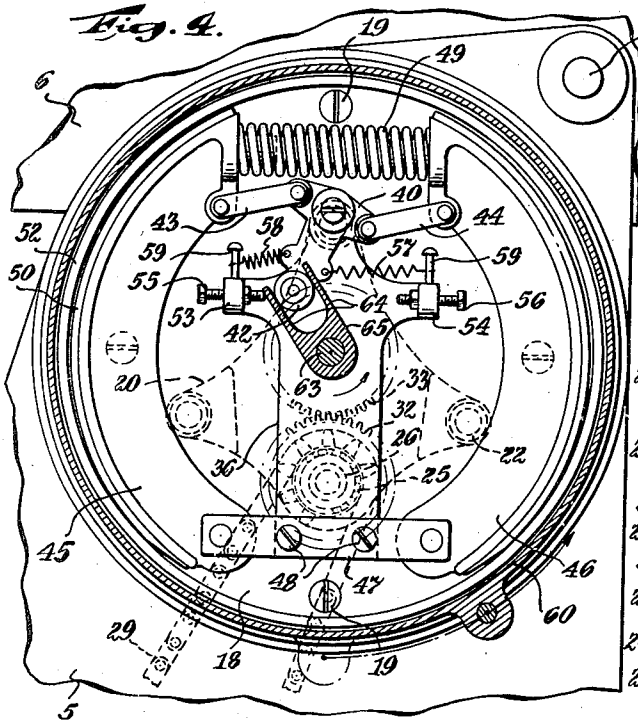


Fig. 2.

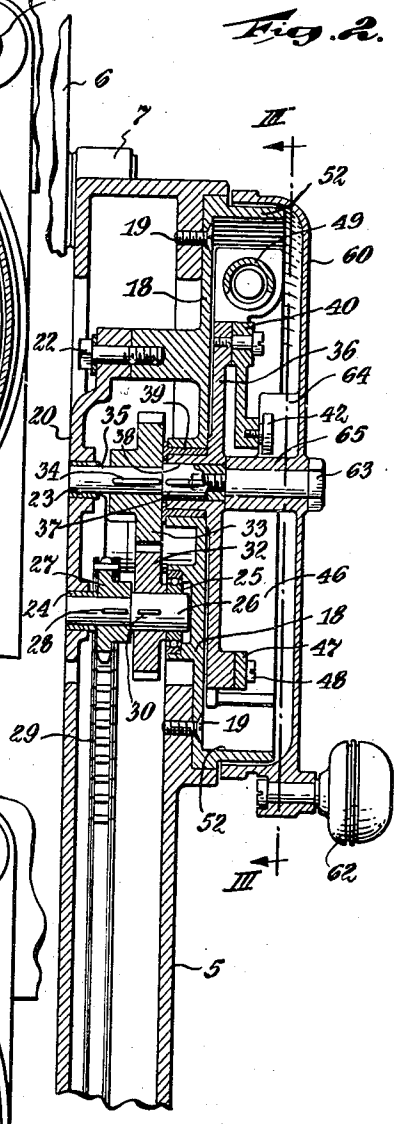
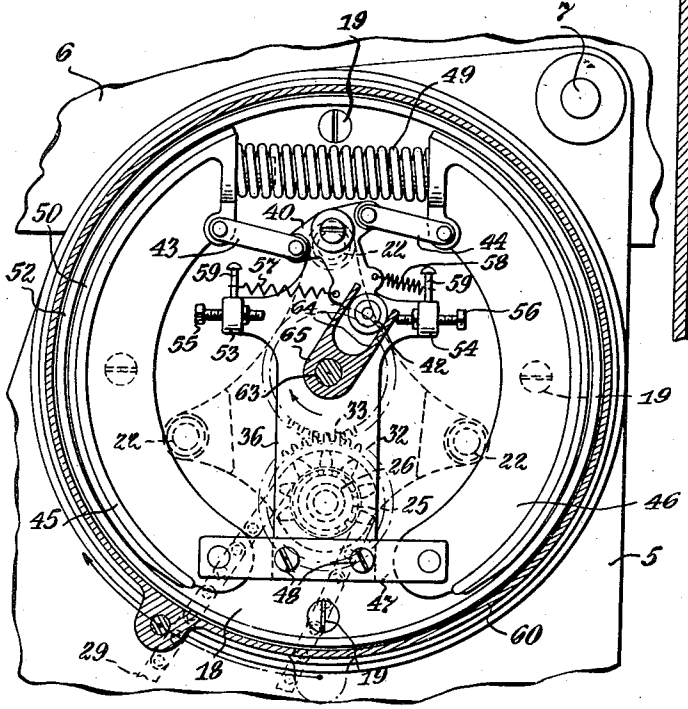


Fig. 5.



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UNITED STATES PATENT OFFICE

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MANUAL TILT TABLE

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Application November 27, 1941, Serial No. 420,668

2 Claims. (Cl. 311—38)

The present invention relates to X-ray apparatus and has particular reference to X-ray tilt tables employed by the roentgenologists for the making of radiographic and fluoroscopic examinations wherein the table top may assume any desired position from below the horizontal or Trendelenburg position, to a full vertical position.

Examination tables known to the art are usually constructed to be operated by hand or by means of a motor drive and are counterbalanced so as to facilitate their movement about the pivot. In the case of motor driven tables it has not been difficult to retain the same in practically any position from the Trendelenburg to the vertical due to the reduction gears or raising mechanism acting as a lock to retain the table top in any desired position. Such, however, has not been the case heretofore with hand-operated tables and they have consequently required latching in more or less fixed positions.

It is accordingly an object of the present invention to provide a hand-operated X-ray examination table which can be rotated about its pivot from below the horizontal to a vertical position and automatically retain in any position throughout its length of travel.

Another object of the present invention is the provision of an X-ray table for the making of radiographic and fluoroscopic examinations wherein the table top is rotated by hand about its pivot, and a brake is provided which is automatically released upon initial actuation of the raising mechanism and similarly set when the mechanism is no longer in actual operation, thus retaining the table top in any desired position.

Another object of the present invention is the provision of a raising mechanism for an X-ray examination table wherein a self-energizing brake is provided for automatically retaining the pivoted table top in any desired position.

Still further objects of the present invention will become obvious to those skilled in the art by reference to the accompanying drawings wherein:

Fig. 1 is a fragmentary elevational view of an X-ray examination table provided with a hand-operated mechanism in accordance with the present invention for raising and lowering the table top about its pivot.

Fig. 2 is a sectional view of the raising and lowering mechanism of the present invention, taken on the line II—II of Fig. 1.

Fig. 3 is a front sectional view taken on the line III—III of Fig. 2 showing the mechanism in the braking position when not in operation.

Fig. 4 is a view similar to Fig. 3, but showing the brake in the released position during lowering of the table top to the Trendelenburg position, and

Fig. 5 is identical to Fig. 4 except that it shows the position of the brake releasing mechanism in the table-raising position.

Referring now to the drawings in detail, an X-ray examination table is shown in Fig. 1 which comprises a pair of standards or uprights 5 to which the table 6 is pivotally connected at 7. As is customary, the table 6 supports a radiographic-fluoroscopic carriage 8 which is movable longitudinally and transversely of the table and having a column 9 forming a support for the X-ray tube and fluorescent screen (not shown). Since these elements per se form no part of the present invention, it is believed unnecessary that they be further described herein.

The table 6 is provided with a segmental side member 10 having a notched or geared surface 12 which is engaged by a gear 13 carried by a shaft 14 and to the latter of which is secured a sprocket gear 15. For the purpose of lowering the table top 6 to the Trendelenburg position, as shown by the dotted line 16 in Fig. 1, or to the vertical position as shown by the dotted line 17, and for retaining the table top in any desired intermediate position, a hand-operated mechanism is provided as shown more in detail in Figs. 2 to 5.

By reference to these latter figures, it will be noted that the standard 5 is shown as hollow and is provided with an annular opening into which the operating mechanism fits so as to render the latter readily movable. This mechanism, as can be more readily seen from Fig. 2, comprises a flanged plate 18 secured to the standard 5 by suitable means, such as set screws 19, and provided with a supporting member 20 secured thereto by a cap-screw 22 with this latter member carrying a pair of bearings 23 and 24.

Diametrically opposite the bearing 24 is a roller bearing 25 and a shaft 26 is journalled in these bearings. A sprocket gear 27 is secured to this shaft 26, such as by a key 28, and is connected to the sprocket gear 15 at the bottom of the standard by a chain 29. Also secured to the shaft 26, as by a key 30, is a gear 32 which meshes with another gear 33, keyed at 34 to a shaft 35, the latter of which is journalled at one end to the bearing 23. The other end of this shaft 35 has a brake shoe supporting plate 36 secured thereto, as by a key 37, and such plate is journalled at a flanged portion 38 to a bearing 39 coaxially positioned relative to the bearing 23.

Pivotally secured to this brake shoe plate 36 is a T-shaped arm 40 carrying a roller 42 at one end and pivotally connected to a pair of links 43 and 44, the latter of which in turn are also pivotally connected to a pair of segmental brake shoes 45 and 46. Referring now more particularly to Figs. 3, 4, and 5, it will be noted that these brake shoes are pivoted at one end to a bar 47 in turn secured to the brake shoe plate 36 by screws or the like 48, and the opposite end of the brake shoes 45 and 46 are biased apart by a coil spring 49 so that the brake lining, which may be of leather or the like 50, in the rest position bears against a flanged portion 52 of the flanged plate 18, which thus forms a brake drum.

A pair of studs 53 and 54 project from the brake shoe plate 36 which are engaged by a pair of adjustable stop pins 55 and 56 for a purpose to be hereinafter mentioned. Coil springs 57 and 58 extend from pins 59 secured to the studs 53 and 54 to each side of the T-shaped arm 40 for the purpose of normally holding this member in the position shown in Fig. 3 when the mechanism is at rest. In order to operate the mechanism to raise or lower the table top 6, a drum 60 having a pivoted knob 62 is provided which is secured to the shaft 35 by a cap screw 63. The underside of the drum 60 is provided with a pair of cast webs 64, which thus forms a bifurcated member 65 rotatable about the same axis as the shaft 35 and cap screw 63 and engageable with the roller 42.

When it is desired to raise or lower the table top 6, the operator grasps the knob 62 and rotates the drum 60. Assuming the table is in the horizontal position, as shown by the full lines in Fig. 1, and the mechanism is in the at rest position, as shown in Fig. 3, and it is desired to lower the table to the Trendelenburg position shown by the dotted line 16 in Fig. 1, the operator turns the drum 60 in a counter-clockwise direction as shown in Fig. 4. Since the drum 60 rotates freely on the stud 63 and the roller 42 engages the bifurcated member 65, the T-shaped member 40 is moved about its pivot until one of the webs 64 of the bifurcated member strikes the adjustable stop pin 55. The distance which the handle 62 moves before driving engagement is established between the web 64 and the adjustable stop is only an inch or two, as can be appreciated from Figs. 4 and 5. Movement of the T-shaped member 40 about its pivot thus expands the spring 58 while compressing the spring 57, and at the same time the links 43 and 44 are pulled toward each other, thus compressing the coil spring 49 and releasing the brake lining 50 carried by the brake shoes 45 and 46 from engagement with the flanged portion 52 of the flanged plate 18.

Inasmuch as the stop pin 55 is secured to the stud 53 forming an integral part of the rotatable brake shoe supporting plate 36, continued rotation of the drum 60 by the operator causes similar counter-clockwise rotation of the brake shoe supporting plate 36 about the bearing 39, due to engagement of the bifurcated member 65 with the adjustable stop pin 55. This rotation of the brake shoe supporting plate 36 carries with it the entire brake shoe assembly and at the same time causes rotation of the shaft 35 since the rotatable brake shoe supporting plate 36 is secured thereto by the key 37. Counterclockwise rotation (as viewed from Fig. 4) of the gear 33 likewise occurs, and since this gear meshes with the gear 32, the latter, together with the shaft 26 and sprocket gear 27, are rotated in a clockwise direction. The driving chain 29 is accordingly moved, causing clockwise movement of the lower sprocket gear 15 as well as the shaft 14 and gear 13. Engagement of this gear 13 with the geared surface 12 carried by the segmental side member 10 of the table in turn causes counter-clockwise rotation of the table top 6 about its pivot 7 until the table is lowered to the Trendelenburg position, as shown by the dotted line 16 in Fig. 1.

The operator then ceases rotation of the drum 60 by removing his hands from the knob 62. Upon the release of this force, the coil spring 49, together with the compressed and expanded springs 57 and 58, force the brake shoes 45 and 46 into their at rest position, with the lining 50 again engaging the brake drum or flanged portion 52, regardless of the axial position of the brake shoe assembly, to thus retain the table top 6 in the desired position; and simultaneously the springs 49, 57, and 58 return the roller together with the bifurcated member 65 in the at rest position, as shown in Fig. 3, which means that after release of the knob 62 by the operator, there is a very slight counter-rotation of the drum 60 by the potential energy stored in the various springs.

When the operator desires to raise the table top 6 to the vertical position shown by the dotted line 17 in Fig. 1, or to any intermediate position from the Trendelenburg to the vertical, he merely rotates the drum 60 in the opposite or clockwise direction as shown more specifically in Fig. 5. This causes the bifurcated member 40 to strike the adjustable stop pin 56 secured to the stud 54 after which the rotatable brake shoe supporting plate 36, as well as the various gears and chain drive 29, operate in the same manner as previously described in connection with lowering of the table top except that they all rotate in an opposite direction.

It can thus be readily seen that a simple hand-operated examination table is herein provided in which the table can be readily moved by an operator from the Trendelenburg or below the horizontal to the extreme vertical. Moreover, the table is readily and automatically maintained in any intermediate position between its limits of travel upon removal of the operator's hands from the raising mechanism by the application of equalizing brake shoes engaging the driving drum.

Although one specific embodiment of the present invention has been shown and described, it is to be understood that other modifications thereof may be made without departing from the spirit and scope of the appended claims.

We claim:

1. Operating mechanism for moving an X-ray examination table about its pivot, comprising a flanged plate forming a brake drum portion carried by a stationary portion of said table, a manually-operable member forming a cover for said flanged plate and pivoted thereto, a pair of webs projecting from the inner surface of said manually-operable member, a member carrying stop elements, pivoted with respect to said brake drum portion, a pair of brake shoes within said drum, means pivoting two adjacent ends of said shoes to said stop-element-carrying member, a spring normally urging the other two adjacent ends of said shoes into braking engagement with said drum, a linkage-operating device also pivoted to said stop-element-carrying member for movement between said stops, resilient means normally holding said operating device in neutral position, an actuating link extending from said device to a free portion of each shoe, and a part of said device normally received between said webs

for actuation to release the shoes upon movement of the manually-operable member in either direction, until one of said webs engages one of said stops to cause turning of the stop-element-carrying member and corresponding movement of the table.

2. Operating mechanism for moving an X-ray examination table about its pivot, comprising a brake drum device carried by a stationary portion of said table, a manually-operable member, a member carrying stop elements, pivoted with respect to said brake drum portion, a pair of brake shoes within said drum, means pivoting said shoes to said stop-element-carrying member, a spring normally urging two adjacent ends of said shoes into braking engagement with said drum, an actuating link extending from a free portion of each shoe, a linkage-operating device to which the other ends of said links are connected, also pivoted to said stop-element-carrying member, resilient means normally holding said operating device in neutral position to allow the shoes to be in braking positions, and means on said manually-operable member for moving said device to release the shoes, until said means engages one of said stops to cause turning of the stop-element-carrying member and corresponding movement of the table.

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