

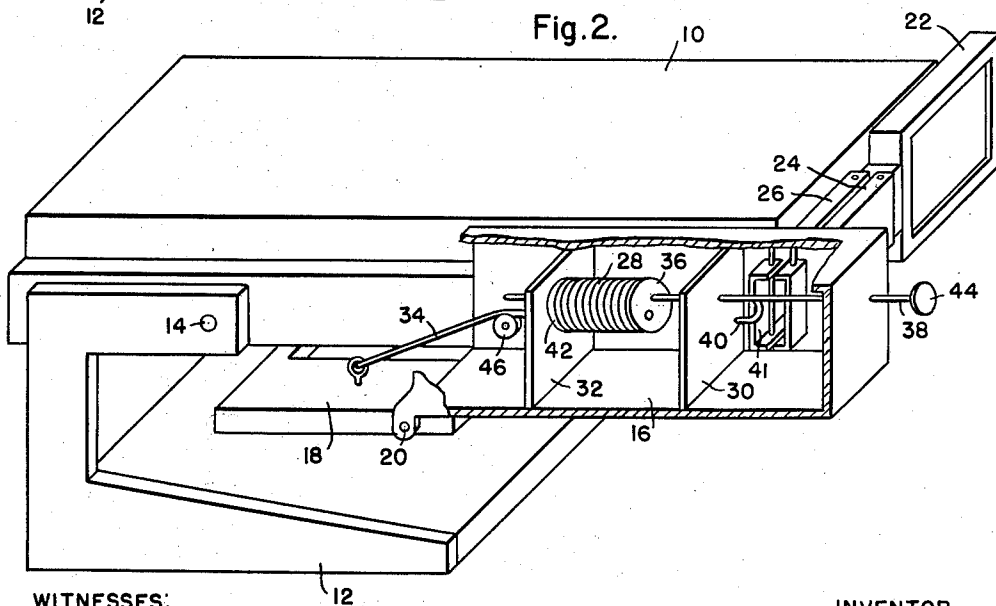
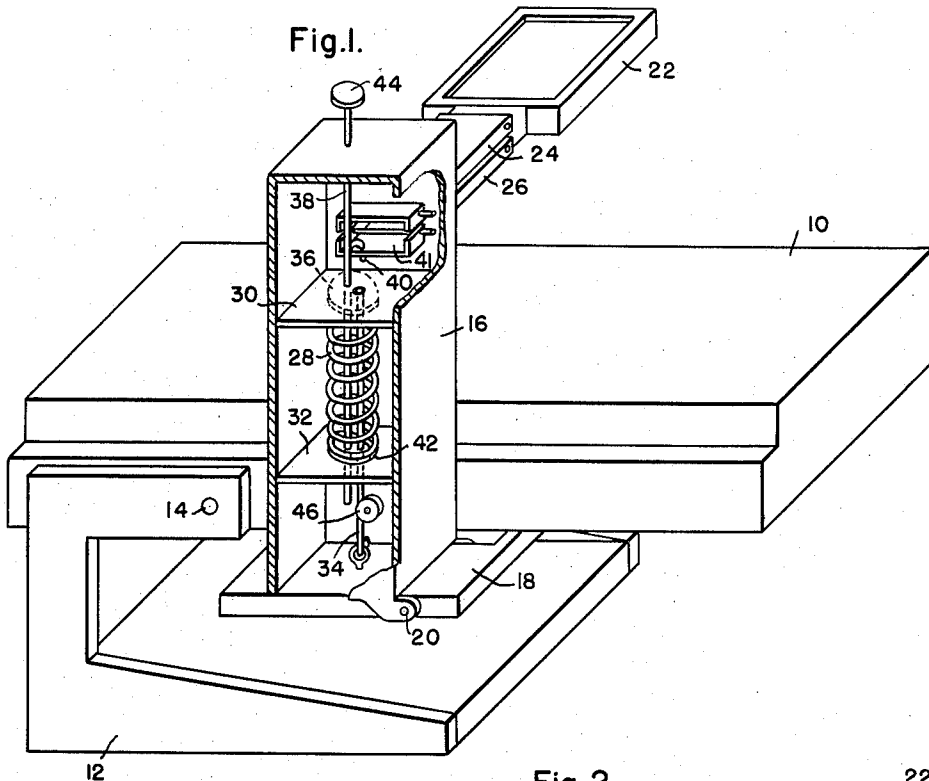
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X-RAY APPARATUS

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WITNESSES:

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1

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X-RAY APPARATUS

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The present invention relates to X-ray apparatus and, more particularly, to X-ray apparatus including a support structure for the fluoroscopic screen or like member which support structure may be in the form of a tower and pivotally supported relative to the X-ray table.

It is an object of the present invention to provide improved X-ray apparatus having a table provided with a balanced component support tower, which tower may be folded to a position such that radiographic operations over the table are not obstructed by it.

It is another object of the present invention to provide improved X-ray apparatus having a counterbalanced movable tower member for supporting the fluoroscopic screen or other component apparatus.

It is an additional object of this present invention to provide improved X-ray apparatus having a component support tower which is pivotally connected to the X-ray table and includes a weight counterbalancing arrangement to compensate for the weight of the tower.

It is a further object of the present invention to provide X-ray apparatus having an improved counterbalancing arrangement to compensate for the weight of a component supporting tower as the latter is moved relative to the X-ray table and further to compensate for the weight of the supported component as the latter is moved relative to the tower.

In accordance with the present invention, an X-ray table is provided having a folding support tower on which is mounted the fluoroscopic screen member. Since the fluoroscopic screen member is preferably mounted near the top of the support tower, the full weight of the screen member or assembly and the tower must be handled in moving the tower from an operative position at which the tower is substantially perpendicular to the top of the X-ray table, to an inoperative position at which the tower is substantially parallel to the top of the X-ray table. In addition, the fluoroscopic screen assembly is pivotally connected to the tower such that the screen assembly may be moved relative to the tower and the table top when the tower is in its operative position. A weight counterbalancing arrangement is provided to counterbalance the weight of the fluoroscopic screen member as it is moved relative to the support tower and further to counterbalance the weight of the support tower as the latter member is moved relative to the X-ray table. The weight counterbalancing arrangement in one form comprises a spring member which is stressed in a first direction by movement of the fluoroscopic screen assembly and is stressed in a second direction by movement of the support tower.

These and other objects of the invention are effected as will be apparent from the following description taken in accordance with the accompanying drawings, in which:

Figure 1 is a schematic diagram of apparatus in accordance with the present invention with the support tower in the operative position; and

Fig. 2 is a schematic diagram of apparatus in accord-

2

ance with the present invention with the support tower in the inoperative position.

In Fig. 1 there is shown an X-ray table 10 which is connected to a support base 12 at a pivotal connection 14. A component support tower 16 is shown pivotally connected to a tower support member 18 at pivotal connection 20. A fluoroscopic screen assembly 22 is pivotally connected to the support tower 16 by a parallelogram support structure including a first support arm 24 and a second support arm 26 which are pivotally connected between the fluoroscopic screen assembly 22 and the support tower 16.

A balancing spring member 28 is provided within the support tower 16 and between a first barrier member 30 and a second barrier member 32. A flexible cable or like connector member 34 is connected between the tower support member 18 and a suitable first end plate 36 positioned at one end of the balancing spring 28. A support pulley member 46 is provided as an idler or like member to guide the movement of the connecting cable member 34 through the balancing spring 28. A connecting rod or like member 38 is provided between a hook fastener 40 which is fastened to an end extension 41 of the second support arm 26 of the parallelogram support structure for the fluoroscopic screen assembly 22 and a second end plate 42 at the other end of the balancing spring member 28. A manual control knob 44 is provided at one end of the connecting rod member 38.

In Fig. 2 there is shown the component support tower 16 in its inoperative position, with the tower 16 being positioned substantially parallel to the top of the X-ray table 10. The components of Fig. 2 corresponding to similar components in Fig. 1 have been given like identifying numerals.

In the operation of the apparatus shown in Fig. 1, with the support tower 16 in its operative position, the fluoroscopic screen assembly 22 is adapted for movement in a direction substantially parallel to the extended direction of the support tower 16 and perpendicular to the top of the X-ray table 10. In the course of the movement of the fluoroscopic screen assembly 22, the connecting rod member 38 will be moved axially relative to the axis of the balancing spring member 28 to vary the stressing or compression force on the balancing spring 28 such that the latter member 28 is operative as a weight counterbalancing member to effectively counterbalance the weight of the fluoroscopic screen assembly 22 and the weight of the connecting parallelogram support structure including the first and second support arms 24 and 26 as desired. More specifically, as the fluoroscopic screen assembly 22 is lowered and moved closer to the top of the X-ray table 10, the balancing spring member 28 will be compressed due to the axial movement of the connecting rod member 38 in a direction opposite to the movement of the fluoroscopic screen assembly 22 such that the second end plate 42 will be moved in a direction toward the opposite first end plate 36.

As more clearly shown in Fig. 2, when the tower is moved to its inoperative position, such that the tower 16 is substantially parallel to the top of the X-ray table 10, the flexible cable 34 is operative in conjunction with the first end plate 36 to compress the weight balancing member 28 as illustrated in Fig. 2. In this respect, the balancing member 28 is operative to counterbalance the weight of the support tower 16 and its supported components as may be desired to assist in the folding or pivotal movement of the support tower 16 about the pivot connection 20.

Suitable fastening means, such as a lock or similar fastening member (not shown), may be provided as desired to lock the tower and its supported components in the inoperative position shown in Fig. 2, and similarly

3

suitable locking arrangements may be provided as desired to hold the support tower 16 in the operative position shown in Fig. 1.

The fluoroscopic screen assembly connecting member 38 may be disconnected from the supporting structure for the fluoroscopic screen assembly 22 by disengaging the connecting hook fastener 40 from the extension 41 of the second support arm 26 when the tower 16 is to be moved to the inoperative position shown in Fig. 2, if desired. The latter disengagement of the connecting member 38 from the fluoroscopic screen assembly may be desirable in that otherwise the operation of the balancing member 28 to operate as a counterbalance to compensate for the weight of support tower 16 may be objectionable in affecting movement of the fluoroscopic screen assembly 22. However, the latter disengagement of the connecting hook member 40 is not necessary if not otherwise desirable.

While the present invention has been shown, in particular, in one form only, it will be apparent to those skilled in the art that the invention is not so limited but may be varied without departing from the spirit thereof.

I claim as my invention:

1. In an X-ray table including a tiltable frame having a movable carriage, a tower supported on said carriage adjacent to one side of said frame, and a pivot member connecting the lower portion of said tower to said carriage, said table further including a fluoroscopic screen supporting member pivotally connected to said tower, the improvement which comprises a weight counterbalancing spring having a first end and a second end carried within said tower, an elongated connector member extending

4

from said first end of said spring to said carriage at a point horizontally spaced from said pivot member, whereby said spring is operative to counterbalance at least part of the weight of said tower as the latter is pivoted relative to said frame, and means connecting said second end of said spring to said screen supporting member whereby said spring counterbalances the weight of said member as the latter is pivoted relative to said tower.

2. In an X-ray apparatus assemblage including a tower support member, a normally upright tower supported on said member and pivotally connected thereto to permit tilting of said tower to a horizontal position, and a fluoroscopic-screen supporting member pivotally connected to said tower for movement in a vertical direction in the upright position of said tower, the improvement which comprises a weight counterbalancing spring disposed within said tower, first connector means anchored at one end to one end of said spring and at its opposite end to said tower support member at a point horizontally spaced from the point of pivotal connection of said tower thereto, second connector means anchored at one end to the opposite end of said spring and at its opposite end to said screen supporting member, whereby weight of said screen supporting member during pivotal movement of same relative to said tower when upright and weight of said tower during pivotal movement of same relative to said tower support member is counterbalanced by said spring.

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