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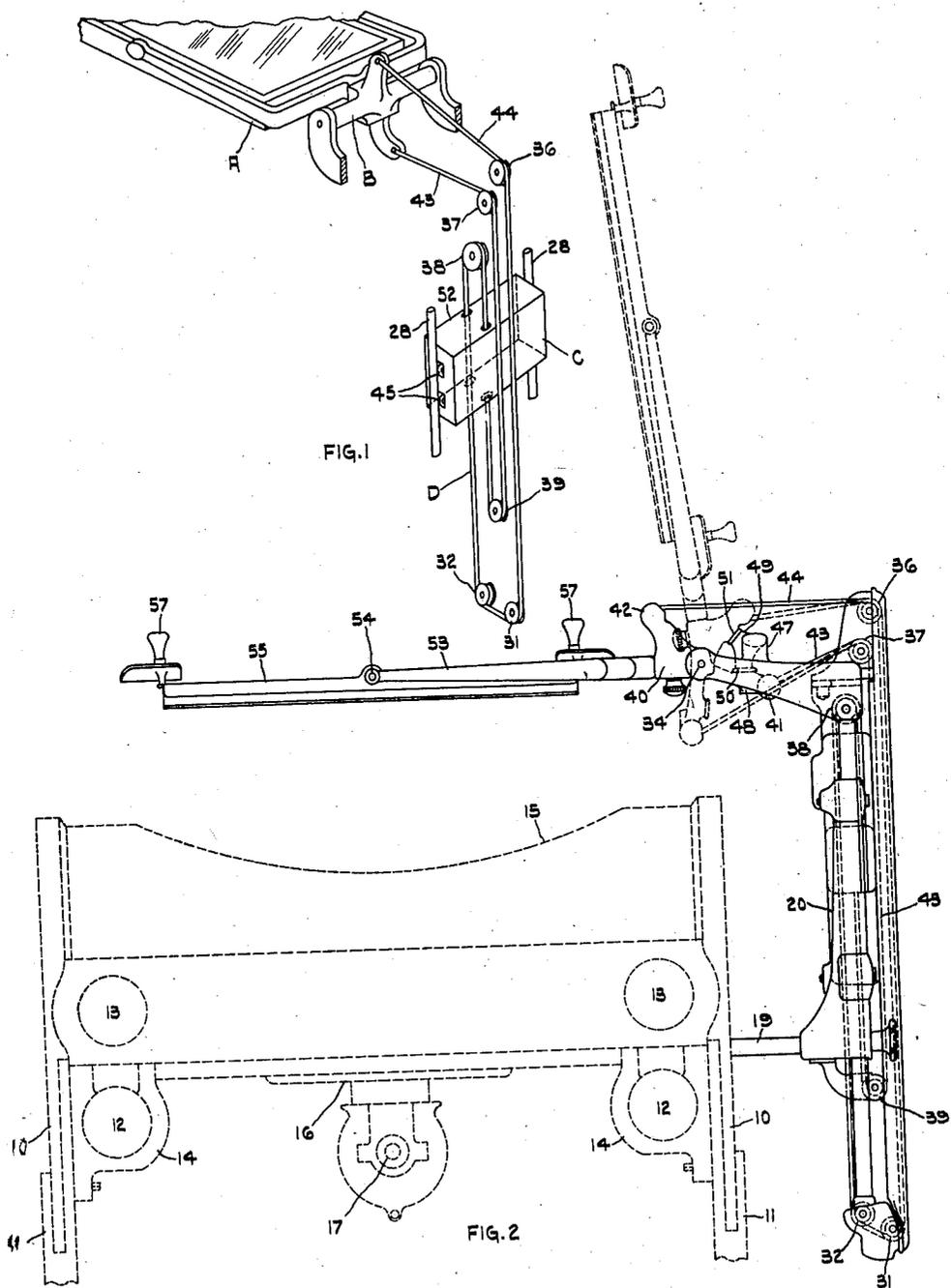
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FLUOROSCOPIC SCREEN HOLDER

Filed Aug. 30, 1930

3 Sheets-Sheet 1



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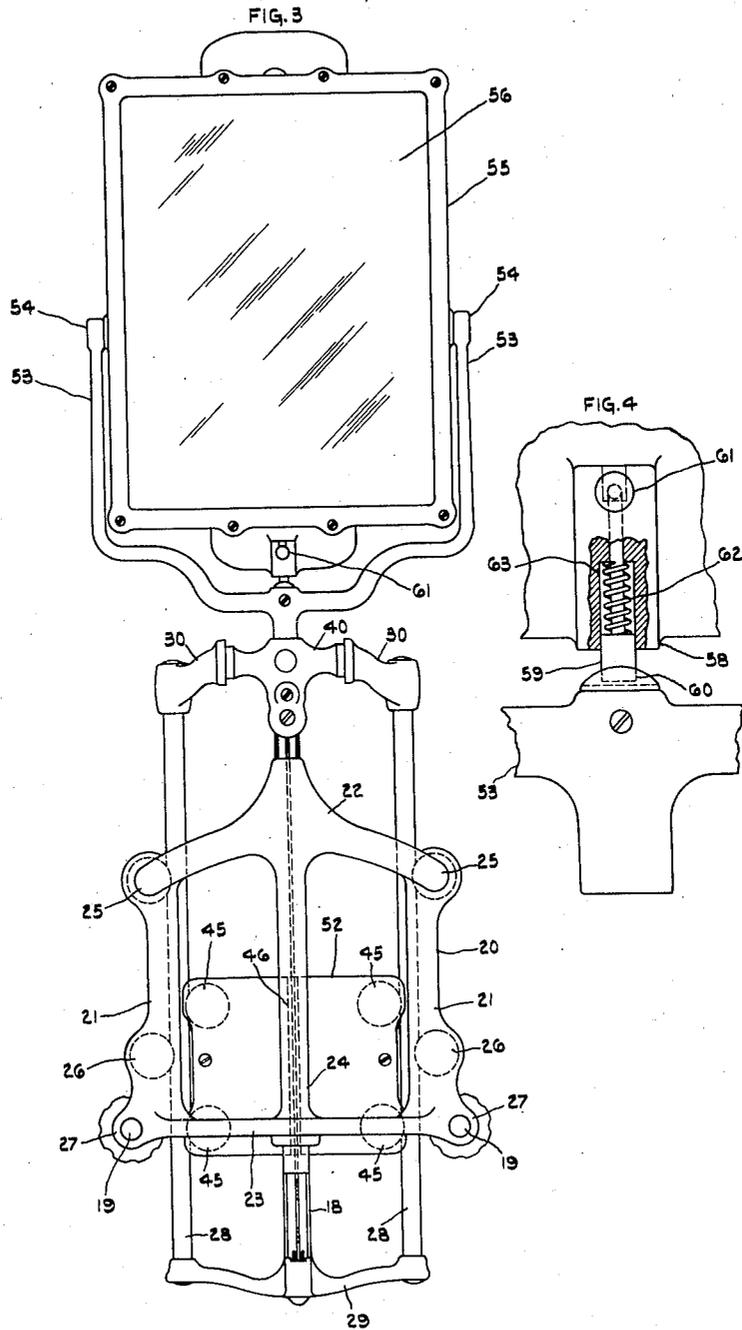
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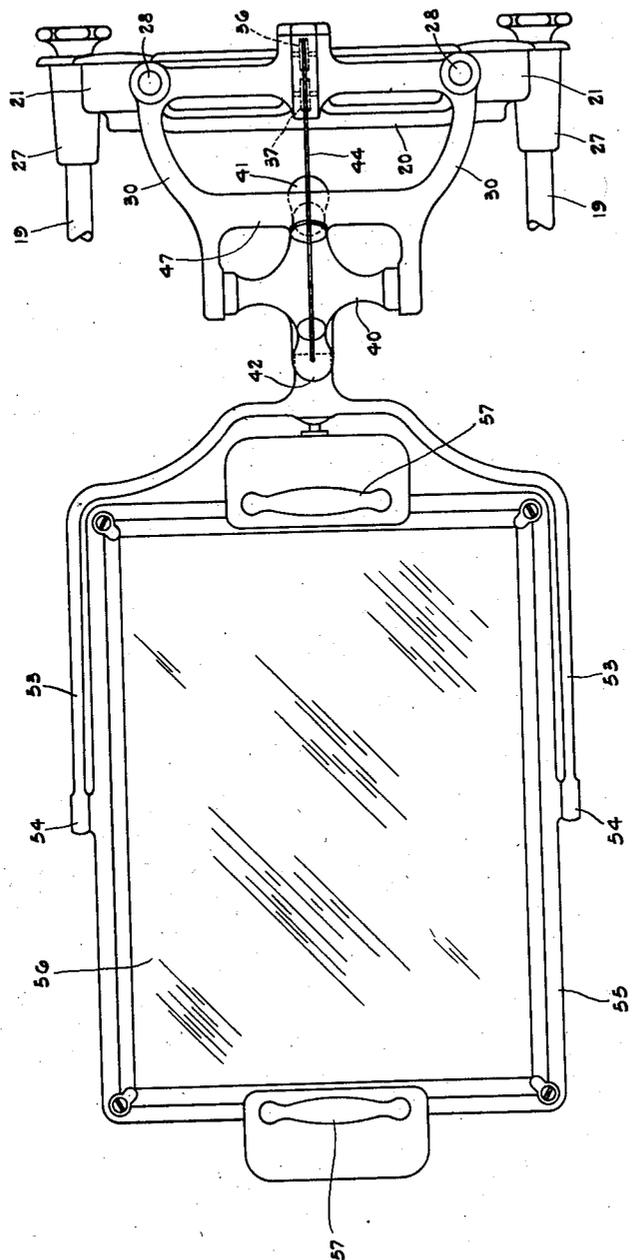


FIG. 5

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# UNITED STATES PATENT OFFICE

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## FLUOROSCOPIC SCREEN HOLDER

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11 Claims. (Cl. 250—34)

The present invention relates to a fluoroscopic screen holder and particularly has to do with means for counterbalancing such a screen and with the construction of the screen support.

5 In X-ray apparatus, a fluoroscopic screen is an invaluable accessory. To have flexible manipulation of such a screen is highly desirable. It is one of the primary objects of the present invention to provide easy manipulation of a fluoroscopic screen. To obtain such flexible operation, a unique system of counterweighting has been devised and the structure of the holding parts has been vastly improved. It is a further object of the invention to provide a new and novel system of applying a counterweight to a screen or the like.

A factor in the ease of operating a screen resides in the design of the structure or holding parts upon which such screen is mounted. An improved screen support has been provided in connection with the present invention. Such design of screen support has as its object the provision of a unique means for supporting a fluoroscopic screen and for attaching it to an X-ray table or the like.

25 These objects, and such others as may hereinafter appear, are obtained by the unique arrangement, improved combination, and novel construction of the various parts assembled into a single embodiment of the present invention illustrated in the accompanying drawings comprising three sheets, hereby made a part of this specification, and in which:

35 Figure 1 is a schematic perspective view of the system of screen support and counterweighting employed;

40 Figure 2 is a side elevation of a physical embodiment of the device as applied to an X-ray table, the full lines disclosing the device in operable position across a table, and the dotted lines, the position of the screen when thrown back out of use;

45 Figure 3 is a front elevation of the device shown in Figure 2, the table and supporting structure being removed and the screen upright;

50 Figure 4 is a detail, partly in plan and partly in section showing the means whereby the screen is locked within its bifurcated supporting frame; and

55 Figure 5 is a plan view of the device illustrated in side and end elevations in Figures 2 and 3.

Like reference characters are used to designate similar parts in the drawings and in the description of the invention which follows.

The device comprises primarily a screen and

frame, designated A, a pivoted support B therefor, a counterweight C, and cables D. These members are shown in Figure 1 in simple form. Each is more completely illustrated in the succeeding figures, now to be fully described.

In Figure 2, the numerals 10, 11, 12, 13, 14, 15, 16, and 17, represent, respectively, the sides (10) of an X-ray table, the supports (11) therefor, the bottom rails (12) therein, the top rails (13) thereof, supports (14) for said rails, a dished top (15) for the table, a carriage (16) for an X-ray tube, and a tube (17) carried thereby, the carriage 16 riding intermediate the paired rails 12 and 13. The construction illustrated is conventional in that such illustration is taken from a table now being built by an X-ray table manufacturing company of national reputation, the table itself being the subject matter of an application for Letters Patent now pending in the United States Patent Office.

From the side of the carriage 16, parallel rod supports 19 project for the attachment of the present apparatus. Such projection is usually at the far side of the table, or at what may be called its rear. Secured to the rods 19 in any suitable manner, and preferably freely detachable therefrom, is a frame 20 comprising a pair of side members 21, cross members 22 and 23, and a central supporting member 24.

Members 21 are identical but opposed. In each are bearings 25 and 26 journaled for free rotation therein. The frame members 21 are each enlarged to cover said bearings and are also enlarged to provide bosses 27 about the rods 19.

The shape of the frame 20 or of its several parts is one of choice, and the particular arrangement disclosed is selected for symmetry of outline as well as utility. The member 22 terminates in an upwardly pointed section while the section 24 is primarily a U-shaped trough to provide a casing for the cables (D) later to be further mentioned.

Within the frame 20 which is bowed, as is shown in Figure 2, is a rectangular frame comprising side members 28 and transverse members 29 and 30. The members 28 are tubes or rods riding on the bearings 25 and 26 between which they may be raised and lowered, (conjointly of course), to raise and lower a screen (A) and screen support (B) later to be more completely described.

Member 29 maintains the members 28 in spaced relation at the bottom of the frame and has as its center bearings for two pulleys 31 and 32. Members 30 project forwardly to the edge of the table to provide end bearings for a member 40. Jour-

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nalled in member 30 are two pulleys 36 and 37. Projecting upwardly from member 29 there may be cable housing 18, which housing extends over pulleys 36 and 37. In the member 22, there is disposed a pulley 38, and another pulley 39 is secured in member 24 adjacent member 23.

Member 40 includes a rearwardly projecting arm 41, and an upwardly or forwardly extending arm 42. Each of said arms has an end of a cable secured thereto. That extending from member 41 is designated 43, and passes over pulley 37, downwardly beneath pulley 39, and is anchored in counterweight 52.

From member 42, a cable extends over pulley 36, around pulleys 31 and 32, through the counterweight 52, over pulley 38 and is then anchored in the opposite side of said counterweight 52. The counterweight 52 comprises a rectangular member having bearings 45 at each corner, said bearings riding on the inside of parallel tubes 28. There is an aperture 46 through the counterweight 52 to allow the cable 44 to ride therethrough and suitable cable anchors therein for both cables 43 and 44.

Upon the members 30 is a two ended boss 47 which has bumper cushions, 48 and 49, at each end, which bumpers are adapted to be impinged by cushions 50 and 51 secured respectively to arms 41 and 42 of frame member 40.

Frame member 40 also has a bifurcated section 53 at the ends of which are pivot supports 54 for a rectangular screen frame 55. Within the frame 55 is a fluoroscopic screen 56, and at its ends are handles 57. It also has a boss 58 at its inner end in which there is disposed a locking member comprising a plunger 59 having a locking end 60. Said plunger 59 is mounted for reciprocal motion in a suitable aperture in boss 58 and which closely engages one section of the shank of said plunger from which projects a knob 61 whereby the plunger may be moved manually.

About another section of the plunger 59, not closely engaged by the material of boss 58, is a coiled spring 62 which urges the head 60 outwardly, the end of the enlarged open section of the boss 58 surrounding said spring forming a seat 63 for the said spring. In this manner, the frame 55 may be locked in position in alignment with the bifurcated section 53, or it may be released therefrom for pivotal movement from supporting parts 54.

The fluoroscopic screen as a whole, including its frame and the rectangular supports 28, 29 and 30, may be moved as a unit. When lifted, the counterweight 52 moves downwardly. The cables 43 and 44 are so arranged, by reason of movable pulleys 36-37 and 31-32 and fixed pulleys 38 and 39, that they exert a down pulling influence upon counterweight 52. When the screen is forced downwardly, the weight 52 goes up because of the same arrangement.

When screen 56 and support 53 are tilted, as is shown in Figure 1 from horizontal to vertical, the latter position being assumed for many reasons, for example, to allow the positioning or removal of a patient from the X-ray table, or because the screen is not required, then cable 43 passing over draws the weight 52 downwardly. At the same time, cable 44 on the opposite arm of the frame 40, and threaded over pulleys 36, 31, 32 and 38 and then anchored in weight 52, releases the counterweight a distance equal to the pull thereon. When the screen is pulled to the horizontal, then the movement of the weight 52 is reversed, the pull being through cable 44.

Thus one counterweight 52 is made to balance the vertical movement of the screen and its appendages to render the screen freely adjustable, and is also made to facilitate the movement of the screen from one extreme movement to its other extreme position. When vertical, the counterweight maintains the screen in upright position. Likewise, it facilitates the maintenance of the screen in horizontal position when so disposed, permitting ready manipulation up and down and upon the axes 54. The arrangement described lends unusual flexibility to the screen.

I claim:

1. In combination, a stationary frame, a screen, a holding member for said screen and having upwardly and downwardly projecting arms, a second frame movable vertically on said stationary frame, said screen holding member being pivotally connected to said movable frame to admit of said screen being tiltable on an axis external to the body of said screen from a substantially horizontal position to a substantially vertical position, a single counterweight, cables between said arms and said counterweight, and pulleys for guiding said cables, said counterweight being moved with tiltable adjustments of said screen holding member and being adapted to maintain said movable frame in a selected vertical position.

2. In combination, a screen holding member, a fluoroscopic screen in said member, a movable frame on which said screen holding member is pivotally connected, a stationary frame for said movable frame and along which it is movable, a counterweight for said screen holding member, said screen and said movable frame, opposed connecting means intermediate said counterweight and said screen holding member and secured to the latter at opposite sides of the pivotal connection therefor, and means for guiding said connecting means.

3. In combination, a stationary frame having side members, a movable frame reciprocable on said side members, a screen holding member pivotally connected to said movable frame, a screen in said screen holding member, a counterweight for said movable frame, screen holding member and screen, anchoring means on said screen holding member at opposite sides of the pivotal connection of said screen holding member, flexible connecting means between said anchoring means and opposite sides of said counterweight, and means for guiding said flexible connecting means.

4. In combination, a stationary frame having side members, a movable frame reciprocable in said stationary frame, a screen holding member pivotally connected to said movable frame and having arms above and below such pivotal connection, a fluoroscopic screen in said screen holding member, a counterweight, opposed cables from the top and bottom of said counterweight to the top and bottom arms on said screen holding member, and stationary pulleys and pulleys movable with said movable frame for guiding said cables.

5. In combination, a stationary frame, a movable frame reciprocable on said stationary frame, a screen holding member pivotally connected to said movable frame, a fluoroscopic screen in said screen holding member, a counterweight for said movable frame, screen holding member, and screen, and reciprocable in said movable frame, flexible connecting means between said screen holding member and said counterweight, and means on said stationary and on said movable

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frame for guiding said flexible connecting means.

6. In combination, a stationary frame, a movable frame reciprocable in said stationary frame, a screen holding member pivotally connected to said movable frame and having arms above and below such pivotal connection, a screen in said screen holding member, a counterweight for said movable frame, screen holding member, and said screen and reciprocable in said movable frame, cable guiding pulleys upon and movable with said movable frame, other cable guiding pulleys on said stationary frame and cables from the top and bottom of said counterweight to the top and bottom arms on said holding member and guided by said several pulleys.

7. In combination, a stationary frame, a movable frame reciprocable in said stationary frame, a member for holding a fluoroscopic screen pivotally connected to said movable frame, a fluoroscopic screen in said screen holding member, a counterweight for said movable frame, screen holding member, and screen and reciprocable in said movable frame, and connecting means comprising flexible cables between said counterweight and said screen holding member, and fixed and movable pulleys to guide said cables to cause said counterweight to reciprocate in said movable frame when said movable frame is reciprocated in said stationary frame and said screen holding member is moved about its pivotal connection.

8. In combination, a vertically movable frame, a stationary frame for said movable frame and in which it reciprocates, a counterweight reciprocable in said vertically movable frame, a screen holding part pivotally connected to said vertically movable frame, a fluoroscopic screen in said screen holding part, cables upon said screen holding part at opposite sides of said screen and connected to said counterweight at opposite sides thereof, and means for guiding said cables comprising fixed and movable pulleys.

9. In combination, a stationary frame, a movable frame in said stationary frame and vertically

reciprocable therein, a screen holding member pivotally connected to said movable frame and having an axis of movement transverse of said movable frame, a screen in said screen holding member, a counterweight reciprocable in said movable frame, and a system of connections from said screen holding member to said counterweight comprising cables at opposite sides of said screen holding member and said counterweight and guide pulleys for said cables whereby said counterweight is reciprocated in said movable frame coincidentally with either angular movements of said screen holding member or reciprocable movements of said movable frame.

10. In combination, a stationary frame having side members, a movable frame reciprocable on said side members, a screen holding member pivotally connected to said movable frame transversely thereof, said screen holding member having arms above and below its pivotal connection to said movable frame, a fluoroscopic screen in said screen holding member, a counterweight in said movable frame and reciprocable therein, cables between said arms and opposite sides of said counterweight, and stationary pulleys and pulleys movable with said movable frame for guiding said cables to reciprocate said counterweight in said movable frame upon angular movement of said screen holding member and upon reciprocation of said movable frame.

11. A stationary substantially rectangular frame member, bearings at the corners of said frame member, a carriage comprising rails, a counterweight, the rails of said carriage riding in the bearings in said frame and providing a track for said counterweight, a screen holding member pivotally connected to said carriage and having cable receiving arms at opposite sides thereof, a fluorescent screen in said screen holding member, pulleys on said carriage, other pulleys on said stationary frame, and cables from said arms to opposite sides of said counterweight and guided by said pulleys.

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