June 28, 1955 H. E. KOERNER ET AL 2,712,080

HIGH TENSION CABLE SUPPORT FOR X-RAY TABLES

Filed Nov. 28, 1952 2 Sheets-Sheet 1

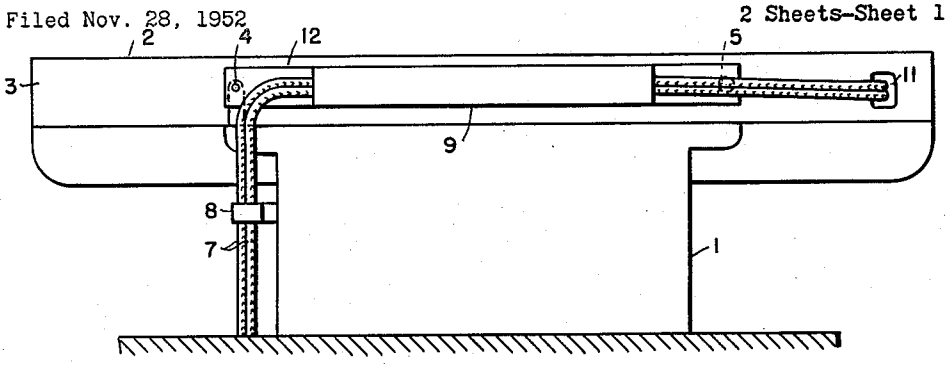


Fig.1.

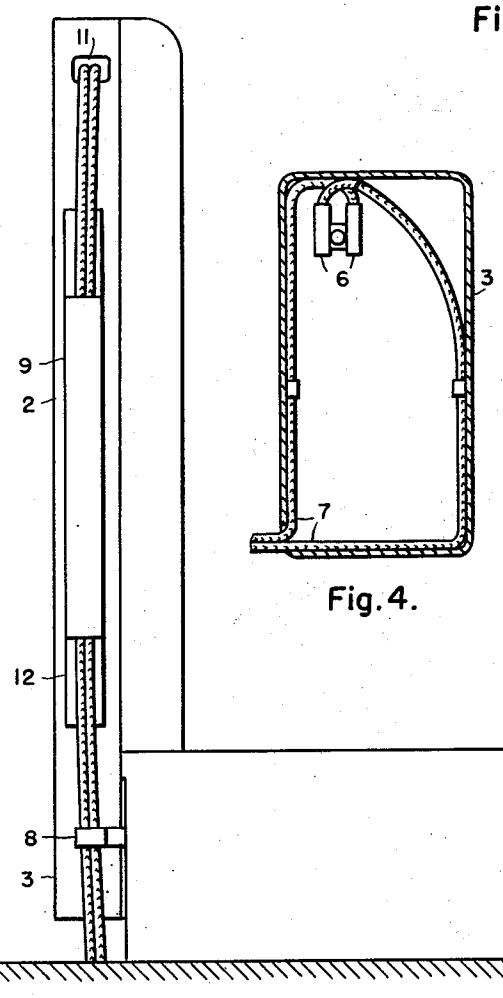


Fig.2.

Fig.4.

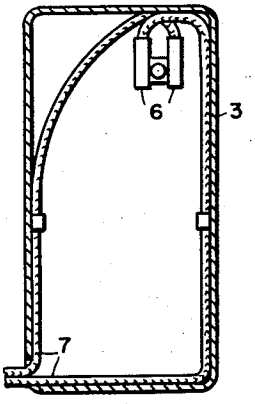


Fig.5.

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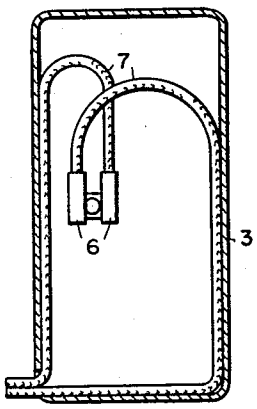


Fig.6.

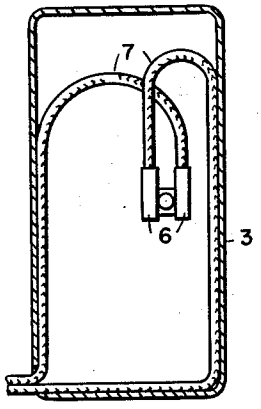


Fig.7.

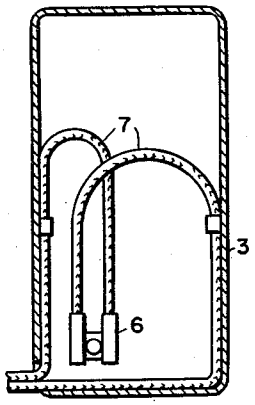


Fig.8.

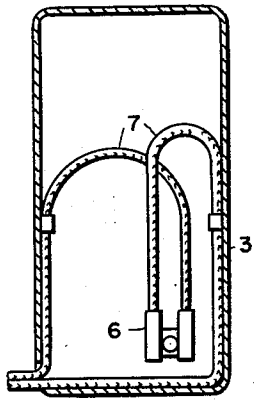


Fig.9.

Fig.3.

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HIGH TENSION CABLE SUPPORT FOR X-RAY TABLES

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Application November 28, 1952, Serial No. 322,992

9 Claims. (Cl. 250—55)

Our invention relates to X-ray examination tables and, in particular, relates to an arrangement for supporting high-voltage cables supplying power to X-ray tubes which are carried by X-ray examination tables which are tiltable through wide angles relative to the horizontal in accordance with present day medical practice.

Modern practice in medical X-ray examination requires a table on which the patient can recline and which can be tilted through any angle up to 90 degrees relative to the horizontal in either direction, so that the patient's head may be higher than his feet when desired, and also so that, in what is known as the Trendelenberg position, his feet are above his head. It is also universal practice to attach the X-ray tube to the under side of this tiltable table so that its position relative to the patient is not disturbed when the table tilt is altered. The X-ray tubes themselves are relatively high-voltage devices and it is accordingly necessary to supply power to them from a stationary high-voltage transformer through flexible cables covered with such high-voltage insulation that they are of relatively large size.

In prior art arrangements, these large cables were made long enough to provide the needed flexibility and looped through the space between the supply transformer and the table where they were much in the way of the X-ray technicians, were "dirt-catchers," subject to physical damage and generally a nuisance.

It is accordingly an object of our invention to provide an arrangement for supporting the cables running to an X-ray tube carried by an X-ray examination table.

Another object of our invention is to provide means for removing the high-voltage conductors carrying current from a stationary transformer to a tilting-type X-ray examination table to positions where they will be out of the way of the operators.

Another object is to provide an X-ray examination table of a novel type which shall require less floor-space than tables of similar capacity in the prior art.

Still another object is to provide a new and improved type of X-ray examination table.

Other objects of our invention will become evident upon reading the following description taken in connection with the drawings, in which:

Figure 1 is a side elevation of an X-ray table embodying the principles of our invention, the table-top being in its horizontal position;

Fig. 2 is a similar view of the same table with the table in one of its 90 degree tilt positions;

Fig. 3 is a similar view of the same table with its table tilted 90 degrees from horizontal in the other direction; and

Figs. 4 through 9 are diagrammatic showings of the way in which the portions of the cables inside the tiltable table top frame, or chassis, arrange themselves for four extreme positions which the X-ray tube can take.

Referring in detail to the drawings, the X-ray examination table comprises a base 1 supporting in horizontal position the table top 2 on which the patient undergoing

examination lies. The top 2 is supported by a box-like frame, or chassis 3, which may be tilted, at the will of the operator, about either of two releasable pivots fixed to the base 1 at points 4 and 5. The base 1 is hollow and contains motor and mechanical linkages (not shown) by which an upward push can be exerted at the mid-point of chassis 3 thereby tilting the chassis 3 and table top 2 about the one of the two pivot-points 4, 5 which the operator has selected. The tilt may be made at any angle up to 90 degrees at either end. Since the motors, linkage, and arrangement for selecting the end to be tilted are no part of our present invention, they will not be described or shown in detail here, but if detailed information is desired reference may be had to the Koerner and Bantz application entitled "Tilting Mechanism for X-Ray Examination Table" filed on or about December 2, 1952, Serial No. 323,650.

The X-ray tube 6 is supported within the chassis 3 and as is conventional is provided with means by which the operator may move it both crosswise and lengthwise of table 2 to irradiate any desired portion of the patent's body.

Electric current for the X-ray tube is conducted from a stationary transformer (not shown) positioned on the floor far enough away from the table 2 to be out of the way of operators and patient by cables 7 which are insulated thickly enough to withstand the voltage they supply. The cables may run through a duct under or in the floor to the base and up through a holder 8 supported on the latter. They then curve through 90 degrees and run through a duct 9 affixed to a side-bar 12 which is spaced a few inches from the side of chassis 3, and are bent to pass through an opening 11 in the wall of chassis 3.

The duct 9 is a hollow tube of rectangular section extending over only a portion of the length of side-bar 12. The end of side-bar 12 adjacent the portions of cables 7 which rise from the floor is pivoted to a portion of base 1, this pivot being coaxial with the point 4 at which a releasable pivot for chassis 3 is located as previously stated. The end of side-bar 12 at the other end of duct 9 is pivoted to chassis 3 at point 5 where the other releasable pivot, about which chassis 3 may be tilted, is located.

On the inside of chassis 3, the cables 7 are clamped to the inside walls of chassis 3, as shown in Figs. 4 through 9 for about half the length of the latter. Free ends beyond the clamps, long enough to reach the X-ray tube 6 easily in its most extreme position, are connected to a carriage which bears the X-ray tube 6 and may be moved both crosswise and lengthwise of the table so as to irradiate any desired portion of the patient's body. The cables are crossed in being attached to the X-ray tubes, that which runs along the left wall of the chassis being affixed to the right side of the tube carriage, and vice versa. This minimizes the bend radius to which the cables are subjected. Figs. 4 through 9 show the tube in various positions and the manner in which the cables bend to reach them. Since arrangements for movably supporting the X-ray tube and for connecting the cables to the latter are well known in the art, they will not be described in detail here.

When the table 2 is tilted so that its right end is raised (as shown in its extreme position in Fig. 2) the bend in the cables, which is located approximately over the fulcrum on which the table tilts, is straightened out as shown, the duct 9 and side-bar 12 tilting with chassis 3. When, on the other hand, the table 2 is tilted so that its left end is raised (as shown in Fig. 3), the duct 9 and side-bar 12 remain in this horizontal position. The tilting of chassis 3 about the fulcrum at point 5 carries the opening 11 and the portion of cables 7 which pass through it downward bending the cables near point 5.

The cables 7 are thus kept within a well-defined limited region out of the way of the patient and the operator of the table.

We claim as our invention:

1. In combination with an X-ray examination table comprising a stationary base and a chassis, and means for tilting the chassis about either a first or a second axis fixed relative to said base, an X-ray tube carried by said chassis, a source of power for said tube which is stationary relative to said base, a cable connecting said source to said tube, and support means for said cable comprising a member pivoted to said base at said first axis and to said chassis at a point lying on said second axis.

2. In combination with an X-ray examination table comprising a stationary base and means for tilting a chassis about either a first or a second axis fixed relative to said base, said chassis having an inside wall, an X-ray tube carried by said chassis, a source of power for said tube which is stationary relative to said base, a cable connecting said source to said tube, support means for said cable comprising a member pivoted to said base at said first axis and to said chassis at a point lying on said second axis, and means to affix a portion of said cable to the inside wall of said chassis.

3. In apparatus including an X-ray examination table comprising a stationary base and a table chassis, with means for tilting the chassis about either a first or a second axis fixed relative to said base, the combination of an X-ray tube carried by said chassis, a source of power for said tube which is stationary relative to said base, a flexible conductor connecting said source to said tube, and support means for said conductor comprising a member pivoted to said base at said first axis and to said chassis at a point lying on said second axis.

4. In apparatus including an X-ray examination table comprising a stationary base and a chassis having an inside wall, with means for tilting the chassis about either a first or a second axis fixed relative to said base, the combination of an X-ray tube carried by said chassis, a source of power for said tube which is stationary relative to said base, a flexible conductor connecting said source to said tube, support means for said conductor comprising a member pivoted to said base at said first axis and to said chassis at a point lying on said second axis, and means to affix a portion of said conductor to the inside wall of said chassis.

5. In combination with an X-ray examination table comprising a stationary base and a chassis, with means for tilting the chassis about either a first or a second releasable pivot fixed to said base, an X-ray tube carried inside said chassis, a source of power for said tube stationary relative to said base, a cable connecting said source to said tube, and a tubular duct through which said cable runs and having a support member pivoted at one end to said base coaxially with said first releasable pivot and pivoted to said chassis at a point which lies on the axis of said second releasable pivot when said chassis is in its untilted position.

6. In combination with an X-ray examination table comprising a stationary base and a chassis, with means for tilting the chassis about either a first or a second releasable pivot fixed to said base, said chassis having an inside wall, an X-ray tube carried inside said chassis, a source of power for said tube stationary relative to said bases, a cable connecting said source to said tube, and a tubular duct through which said cable runs and having a support member pivoted at one end to said base coaxially with said first releasable pivot and pivoted to said chassis at a point which lies on the axis of said second releasable pivot when said chassis is in its untilted position, an opening near one end of said chassis through which said cable passes, and means to fasten to the inside wall of said chassis a portion of said cable which lies inside said chassis.

7. In combination with an X-ray examination table comprising a stationary base and a chassis having a wall with an opening in said wall, and means for tilting said chassis about either a first or a second axis fixed relative to said base, an X-ray tube carried by said chassis, a source of power for said tube which is stationary relative to said base, an electrical conductor connecting said source to said tube and having a portion passing along said chassis and through said opening in the wall of said chassis, means for supporting said conductor pivoted to said base at said first axis and pivoted to said chassis at a point substantially on said second axis, said conductor being flexible in the regions near both said axes.

8. In combination with an X-ray examination table comprising a stationary base and a chassis, with means for tilting the chassis about either a first or a second releasable pivot fixed to said base, an X-ray tube carried inside said chassis, a source of power for said tube stationary relative to said base, a cable connecting said source to said tube, and a tubular duct through which said cable runs and having a support member pivoted at one end to said base coaxially with said first releasable pivot and pivoted to said chassis at a point which lies on the axis of said second releasable pivot.

9. In combination with an X-ray examination table comprising a stationary base and a chassis, with means for tilting the chassis about either a first or a second releasable pivot fixed to said base, said chassis having an inside wall, an X-ray tube carried inside said chassis, a source of power for said tube stationary relative to said bases, a cable connecting said source to said tube, and a tubular duct through which said cable runs and having a support member pivoted at one end to said base coaxially with said first releasable pivot and pivoted to said chassis at a point which lies on the axis of said second releasable pivot, an opening near one end of said chassis through which said cable passes, and means to fasten to the inside wall of said chassis a portion of said cable which lies inside said chassis.

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