

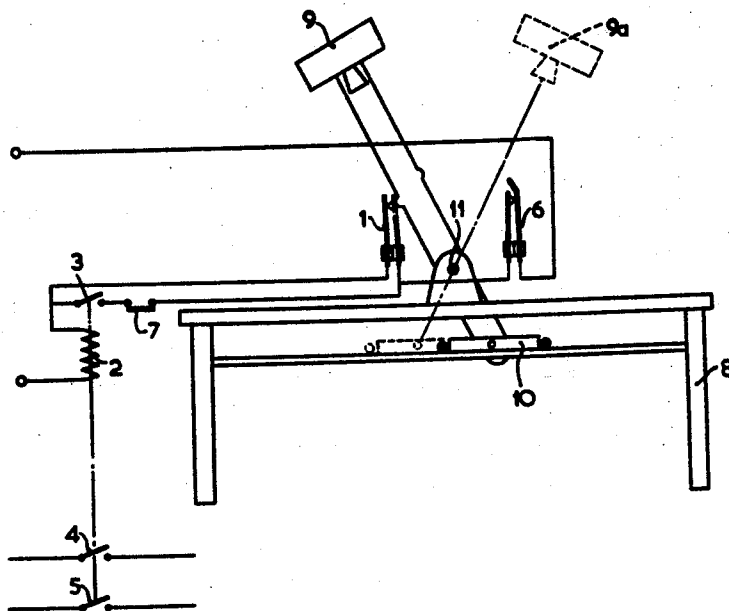
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TOMOGRAPH

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2,916,627

TOMOGRAPH

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6 Claims. (Cl. 250—93)

The present invention relates to X-ray apparatus for making radiographs of body sections.

In X-ray apparatus for making radiographs of body sections the X-ray source and the X-ray sensitive surface or image carrier during the exposure are swung so that X-rays passing through any point of the body section, an image of which is to be produced, always impinge at the same point of the image carrier. During its movement, the X-ray sensitive surface is kept parallel to the body section, for example, by means of guides. During the movement the tube voltage is switched on. This voltage is switched on and off by the system comprising the tube and the image carrier operating suitable switch contacts the positions of which can be adapted to the angular displacement chosen.

The present invention relates to an improvement in such apparatus and has for its purpose to automatize the adjustments which must be made at the switch board of the X-ray apparatus before the system comprising the tube and the image carrier starts to move. These adjustments comprise the selection of the circuit for the movement of the apparatus by means of a so-called auxiliary apparatus selector and furthermore the adjustment of the tube current required for making the radiograph.

According to the invention, for this purpose in a circuit arrangement for tomographs, when the system comprising the tube and the image carrier is placed in the initial position for the swinging movement, a contact is actuated which through a relay by means of a contact selects the circuit for the swinging movement. By means of a second contact the relay selects the tube current required for the tomographic exposure. The relay circuit is broken by another contact which is operated when the swinging movement is finished.

If the X-ray apparatus is not used for tomography the relay circuit can be interrupted by means of a push-button or the like.

In order that the invention may readily be carried into effect, it will now be described more fully with reference to the accompanying drawing, wherein the single figure is a schematic diagram of an embodiment of the arrangement of the present invention.

In the figure, reference numeral 8 designates a patient couch. For making tomographic exposures of body sections, an X-ray tube 9 and an X-ray sensitive surface or image carrier 10 are pivotally moved about an axis 11 which lies in the plane of the body section, an image of which is to be produced. The apparatus can also be used as a Bucky-couch for making normal radiographs, in which event the tube 9 is locked at any suitable point between the positions 9 and 9a shown in the drawing.

Before a body section radiograph is made, the system comprising the tube 9 and the image carrier 10 must be placed by hand or by means of electric equipment in the starting position shown in the figure for the swinging movement. Then a contact 1, which was open, is closed, so that a relay 2 is energized and closes contacts 3, 4 and 5. The contact 4 is connected in the apparatus cir-

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cuit and the contact 5 is connected in the tube circuit. The contact 3 causes the relay circuit to remain closed during the swinging movement. When the final position 9a, shown in dotted lines, is reached, a contact 6 is opened so that the relay circuit is opened. By means of a push-button 7, or the like, the relay circuit can be kept open when no radiograph is made. Thus the invention enables the apparatus selector to be operated and the tube current required for making the layer radiograph to be adjusted automatically by the tomograph.

While the invention has been described by means of a specific example and in a specific embodiment, I do not wish to be limited thereto, for obvious modifications will occur to those skilled in the art without departing from the spirit and scope of the invention.

What is claimed is:

1. A switching circuit arrangement for X-ray apparatus including an X-ray tube, means for moving said X-ray tube in a predetermined motion, an actuating circuit for controlling said moving means and a circuit for controlling the magnitude of the current in said X-ray tube, comprising a relay having an energizing winding, a first armature contact connected in said actuating circuit, said first contact being normally open and adapted to be closed by said winding in its energized condition, and a second armature contact connected in said current controlling circuit, said second contact being normally open and adapted to be closed by said winding in its energized condition, an energizing circuit for said winding, a first switch connected in said energizing circuit, said first switch being normally open and adapted to be closed by contact with said moving means, and a second switch connected in said energizing circuit in spaced relation from said first switch, said second switch being normally closed and adapted to be opened by contact with said moving means.

2. A switching circuit arrangement for X-ray apparatus including an X-ray tube, means for moving said X-ray tube in a predetermined substantially arcuate motion, an actuating circuit for controlling said moving means and a circuit for controlling the magnitude of the current in said X-ray tube, comprising a relay having an energizing winding, a first armature contact connected in said actuating circuit, said first contact being normally open and adapted to be closed by said winding in its energized condition, and a second armature contact connected in said current controlling circuit, said second contact being normally open and adapted to be closed by said winding in its energized condition, and a second armature contact connected in said current controlling circuit, said second contact being normally open and adapted to be closed by said winding in its energized condition, an energizing circuit for said winding, a first switch connected in said energizing circuit and positioned in operative proximity to the leading edge of the path of arcuate motion of said X-ray tube, said first switch being normally open and adapted to be closed by contact with said moving means at substantially said leading edge, and a second switch connected in said energizing circuit and positioned in operative proximity to the trailing edge of the path of arcuate motion of said X-ray tube in spaced relation from said first switch, said second switch being normally closed and adapted to be opened by contact with said moving means at substantially said trailing edge.

3. A switching circuit arrangement for X-ray apparatus including an X-ray tube, means for moving said X-ray tube in a predetermined motion, an actuating circuit for controlling said moving means and a circuit for controlling the magnitude of the current in said X-ray tube, comprising a relay having an energizing winding, a first armature contact connected in said actuating circuit, said first contact being normally open and adapted to be

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closed by said winding in its energized condition, a second armature contact connected in said current controlling circuit, said second contact being normally open and adapted to be closed by said winding in its energized condition and a third armature contact, an energizing circuit for said winding, a first switch connected in said energizing circuit, said first switch being normally open and adapted to be closed by contact with said moving means, a connection in said energizing circuit bypassing said first switch, said third contact being connected in said bypass connection and being normally open and adapted to be closed by said winding in its energized condition, and a second switch connected in said energizing circuit in spaced relation from said first switch, said second switch being normally closed and adapted to be opened by contact with said moving means.

4. A switching circuit arrangement for X-ray apparatus including an X-ray tube, means for moving said X-ray tube in a predetermined substantially arcuate motion, an actuating circuit for controlling said moving means and a circuit for controlling the magnitude of the current in said X-ray tube, comprising a relay having an energizing winding, a first armature contact connected in said actuating circuit, said first contact being normally open and adapted to be closed by said winding in its energized condition, a second armature contact connected in said current controlling circuit, said second contact being normally open and adapted to be closed by said winding in its energized condition and a third armature contact, an energizing circuit for said winding, a first switch connected in said energizing circuit and positioned in operative proximity to the leading edge of the path of arcuate motion of said X-ray tube, said first switch being normally open and adapted to be closed by contact with said moving means at substantially said leading edge, a connection in said energizing circuit bypassing said first switch, said third contact being connected in said bypass connection and being normally open and adapted to be closed by said winding in its energized condition, and a second switch connected in said energizing circuit and positioned in operative proximity to the trailing edge of the path of arcuate motion of said X-ray tube in spaced relation from said first switch, said second switch being normally closed and adapted to be opened by contact with said moving means at substantially said trailing edge.

5. A switching circuit arrangement for X-ray apparatus including an X-ray tube, means for moving said X-ray tube in a predetermined motion, an actuating circuit for controlling said moving means and a circuit for controlling the magnitude of the current in said X-ray tube, comprising a relay having an energizing winding, a first armature contact connected in said actuating circuit, said first contact being normally open and adapted to be closed by said winding in its energized condition, a sec-

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ond armature contact connected in said current controlling circuit, said second contact being normally open and adapted to be closed by said winding in its energized condition and a third armature contact, an energizing circuit for said winding, a first switch connected in said energizing circuit, said first switch being normally open and adapted to be closed by contact with said moving means, a connection in said energizing circuit bypassing said first switch, said third contact being connected in said bypass connection and being normally open and adapted to be closed by said winding in its energized condition, a second switch connected in said energizing circuit in spaced relation from said first switch, said second switch being normally closed and adapted to be opened by contact with said moving means, and a manually operated switch connected in said bypass connection.

6. A switching circuit arrangement for X-ray apparatus including an X-ray tube, means for moving said X-ray tube in a predetermined substantially arcuate motion, an actuating circuit for controlling said moving means and a circuit for controlling the magnitude of the current in said X-ray tube, comprising a relay having an energizing winding, a first armature contact connected in said actuating circuit, said first contact being normally open and adapted to be closed by said winding in its energized condition, a second armature contact connected in said current controlling circuit, said second contact being normally open and adapted to be closed by said winding in its energized condition and a third armature contact, an energizing circuit for said winding, a first switch connected in said energizing circuit and positioned in operative proximity to the leading edge of the path of arcuate motion of said X-ray tube, said first switch being normally open and adapted to be closed by contact with said moving means at substantially said leading edge, a connection in said energizing circuit bypassing said first switch, said third contact being connected in said bypass connection and being normally open and adapted to be closed by said winding in its energized condition, a second switch connected in said energizing circuit and positioned in operative proximity to the trailing edge of the path of arcuate motion of said X-ray tube in spaced relation from said first switch, said second switch being normally closed and adapted to be opened by contact with said moving means at substantially said trailing edge, and a manually operated switch connected in said bypass connection.

References Cited in the file of this patent

UNITED STATES PATENTS

2,000,497	Pohl	May 7, 1935
2,640,159	Gerneth	May 26, 1953
2,781,454	Green et al.	Feb. 12, 1957
2,798,958	Hudson et al.	July 9, 1957

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 2,916,627

December 8, 1959

Helmut Rölke

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

In the heading to the printed specification, between lines 6 and 7, insert -- Claims priority, application Germany June 15, 1957 --.

Signed and sealed this 14th day of June 1960.

(SEAL)

Attest:

KARL H. AXLINE

Attesting Officer

ROBERT C. WATSON
Commissioner of Patents