

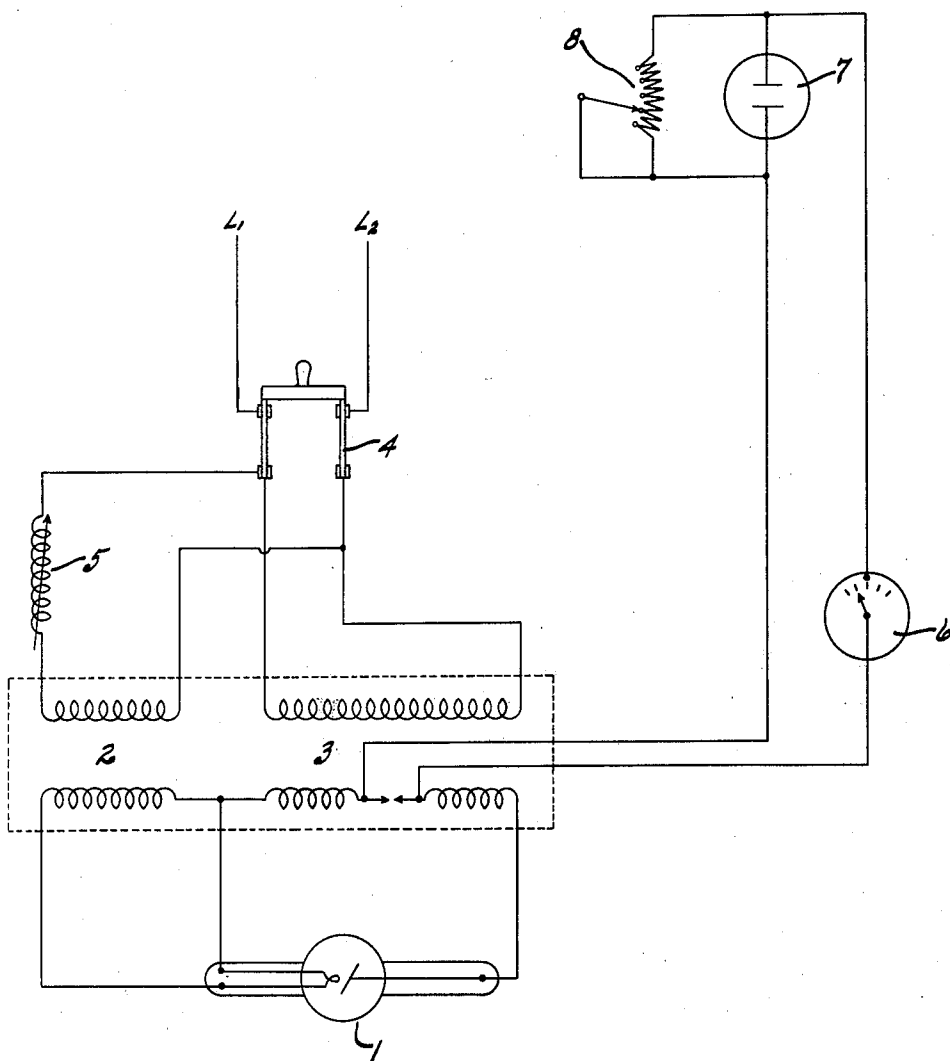
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X-RAY APPARATUS

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X-RAY APPARATUS

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1 Claim. (Cl. 250—34)

This invention relates to roentgen-ray or so-called X-ray apparatus including an X-ray tube and its operating means.

The immediate object of the invention is to provide a visual indication of X-ray tube current exceeding a predetermined value, an indication which will be unmistakable and which is sure to be noted by the operator.

Briefly I accomplish this by so associating a neon lamp with the high tension circuit of the X-ray tube that the lamp will be responsive to current fluctuations in the circuit; so that the lamp will either be markedly illuminated or will have no illumination dependent upon whether or not the predetermined current value is exceeded. This arrangement takes advantage of the known characteristic of the neon lamp to glow brilliantly when supplied with voltage at or beyond a predetermined value, but to have no illumination whenever said voltage is below said value.

A further object therefore is to provide for the described purpose very stable means, sure to function, requiring no attention, and having no moving parts.

It will be obvious that the ultimate objects of the invention are protection of the X-ray tube from excessive currents, and protection of the patient as well as the operator from excessive exposure to X-rays.

The exact nature of this invention together with further objects and advantages thereof will be apparent from the following description taken in connection with the accompanying drawing, which is an elementary diagrammatic showing of pertinent parts of an X-ray apparatus wherein my invention is incorporated.

With reference now to the drawing, 1 is the X-ray tube and 2 and 3 are the usual filament and high tension transformers serving the same, the transformers being supplied with current from the line L1, L2, through the line switch 4, and the X-ray tube being served by the transformers—all through the connections indicated. The input to the filament transformer 2, and consequently the output of the X-ray tube, is regulated by adjustment of the filament control 5 as usual.

A milliammeter 6 may be arranged in the high tension circuit as indicated.

What has thus far been described is old and well known, as will be appreciated by one familiar with the art.

According to my invention, I provide a neon lamp 7 which may be also arranged in series in the high tension circuit, and associate a variable resistance 8 as in shunt relation with the lamp.

It will be seen that by this arrangement the lamp 7 as is the milliammeter 6, will be responsive to X-ray tube current. The method of response of the neon lamp, however, is quite different from that of the milliammeter. The milliammeter merely indicates current flow by the position of its small needle, so that the milliammeter to a casual glance always presents the same appearance. The lamp, on the other hand, will either be totally dark or noticeably illuminated, dependent upon current flow through resistance 8 below or above the value necessary to cause a sufficient voltage drop across the resistance to cause the lamp to function.

Operation will be as follows: The operator adjusts the current through the X-ray tube to a predetermined value, which may be read by the milliammeter, by adjusting the filament control 5. Then the rheostat 8 is adjusted until the neon lamp 7 just lights at this condition throughout the circuit. Thereafter, as the control 5 is manipulated, the lamp 7 will remain dark whenever the X-ray current is below this predetermined value; but as this value is attained or exceeded the neon lamp will immediately be illuminated.

Thus, the operator, after the initial adjustment, need no longer attempt to maintain close observation of the milliammeter, since he will have ample warning, which he cannot but notice, through the signal provided by the neon lamp, as soon as the predetermined X-ray current value is exceeded.

What I claim is:

In combination with an X-ray tube and its operating means including a high tension circuit, variable resistance means arranged in said circuit to provide an adjustable voltage drop in its portion thereof, and a neon tube arranged in shunt relation with said resistance means to indicate by illumination X-ray tube currents exceeding a predetermined value, said current value being adjustable by adjustment of said resistance means.

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