S. TOUSEY.

X-RAY TUBE.

APPLICATION FILED FEB. 23, 1911.

1,100,037.

Patented June 16, 1914

Fig. 1.

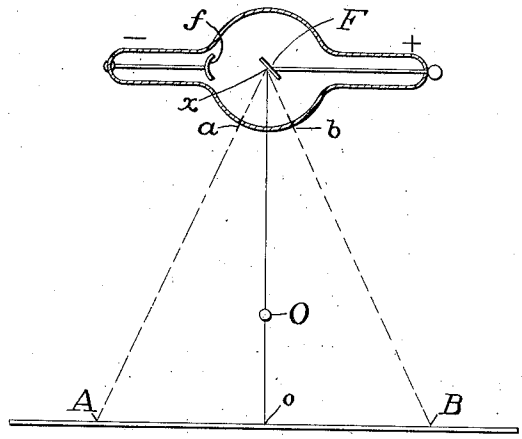
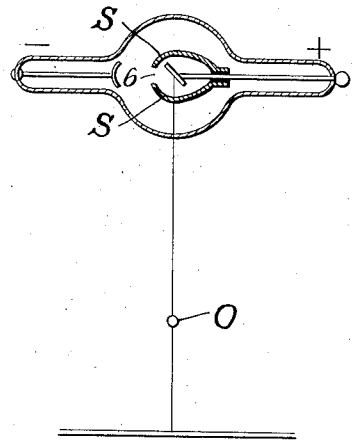


Fig. 2



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UNITED STATES PATENT OFFICE.

SINCLAIR TOUSEY, OF NEW YORK, N. Y.

X-RAY TUBE.

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To all whom it may concern:

Be it known that I, SINCLAIR TOUSEY, citizen of the United States, residing at New York, N. Y., have invented certain new and useful Improvements in X-Ray Tubes, of which the following is a specification.

My invention has reference to X-ray tubes and its object is to secure better definition of the object being viewed or photographed. This is accomplished by utilizing only the direct rays coming from a very small point on the anode (anticathode) but without restricting the area of illumination while at the same time avoiding the action of secondary rays which, in X-ray tubes as ordinarily constructed blur the image by producing a penumbra.

The invention will be best understood from a consideration of the following detailed description taken in connection with the accompanying drawings forming a part of this specification, with the understanding, however, that the drawings are largely indicative and that the invention is not limited to the exact showing of the drawings.

In the drawings: Figure 1 is a longitudinal section of an X-ray tube in which the wall is made of a material giving rise to few secondary rays. Fig. 2 is a similar view showing one form and arrangement of screens.

Referring to the drawings there is shown a common form of X-ray tube provided with a cathode *f* and an anode or anticathode F, of which latter the focus point is indicated by *x*. Generally the cathode and anode may be constructed in the usual manner and a regulator of the degree of vacuum may be provided as is customary.

In the form shown in Fig. 1 the wall outside an area *a*, *b*, may be made of lead-glass or of any suitable material sufficiently opaque to X-rays whether primary or secondary to reduce the amount transmitted to a negligible quantity. The area *a*, *b*, however, is made of a material transparent to X-rays and gives rise to so few secondary rays that they will not appreciably blur the image. The area *a*—*b* on the wall of the tube may be of any desired size and shape.

The lines *x*—A and *x*—B in Fig. 1, indicate the outline of a cone of active rays passing through the area *a*—*b* of the wall of the tube and O indicates the object to be photographed or observed, lying within the cone of X-rays.

If A—B be assumed to be the photographic plate and A—*x*—B the cone of rays acting on the object O properly positioned with reference to the plate A—B, then the image *o* of the object O will be projected upon the plate without apparent penumbra. The same effect may be produced by coating the tube, except at the area *a*—*b*, with a material opaque to X-rays or by a diaphragm placed near the walls of the tube.

In Fig. 2, the screen S, S, is extended so as to almost completely cover the front surface of the anode to interrupt all radiations except the utilized X-rays to which it is transparent. It is provided with an opening 6 toward the cathode for the passage of the cathode stream and may be open at the edges for the escape of heat. This screen may be supported by and insulated from the anode supporting stem or may be otherwise supported. In the structure of Fig. 2, no diaphragm is needed.

The screen S may be made of aluminum or other suitable substance transparent to the direct X-rays from the focus point of the anode but is resistant to other radiations from the front surface of the anode, which other radiations cause secondary rays by their impact with the glass wall of the tube. The only portion of such undesirable rays which escape with full force are those directed toward the cathode where they are of little effect. The result is a maximum area of illumination by direct X-rays radiating from the focus point on the anode and such area is practically unblurred by secondary rays.

What is claimed is:—

In an X-ray tube having two inwardly projecting stems, the cathode supported on one and the anode on the other, a curved screen composed of material transparent to X-rays supported by and insulated from the

said anode stem, said screen having an aperture therein toward the cathode for the passage of the cathode stream and being so positioned around the anode as to intercept secondary radiations from the front face thereof, substantially as described.

In testimony whereof, I affix my signature in presence of two witnesses.

SINCLAIR TOUSEY.

Witnesses:

W. C. HUTTON,

T. NULSEN.