Jan. 27, 1931. E. POHL 1,790,073

RÖNTGEN TUBE

Filed Oct. 25, 1927

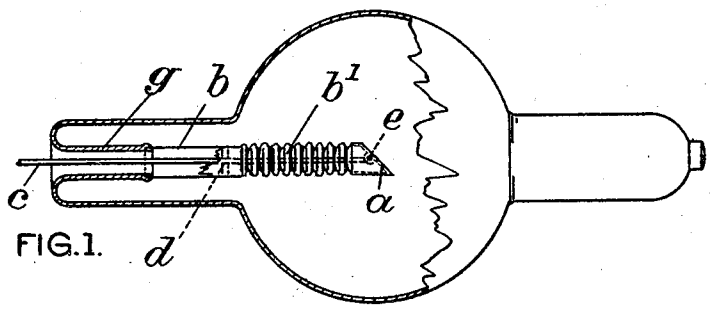


FIG. 1.

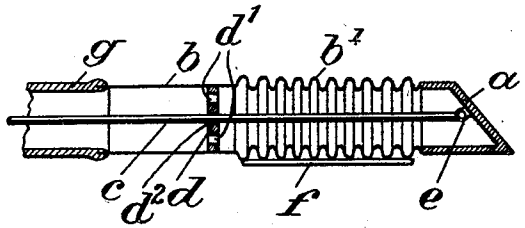


FIG. 2.

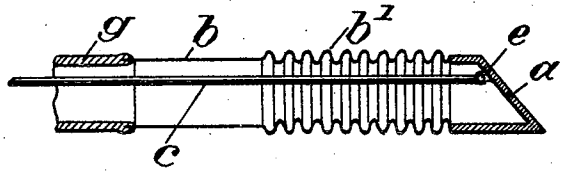


FIG. 3.

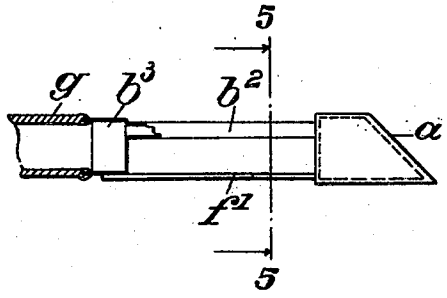


FIG. 4.

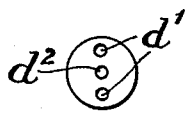


FIG. 7.

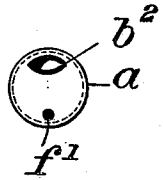


FIG. 5.

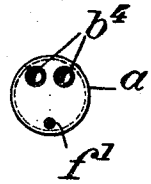


FIG. 6.

Inventor:
E. Pohl

by: Marbury Clarke
Attys.

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UNITED STATES PATENT OFFICE

ERNST POHL, OF KIEL, GERMANY

RÖNTGEN TUBE

Application filed October 25, 1927, Serial No. 228,663, and in Germany July 2, 1927.

My invention relates to improvements in Röntgen tubes, and more particularly in Röntgen tubes of the type in which provision is made for displacing the position of the point of emission of rays in case of high load of the tube such as occurs particularly when using the same for therapeutic purposes, in order to prevent injury to the anticathode by excessive heating at the point of emission of rays. The object of the improvements is to provide a tube of this class in which such displacing of the position of the point of emission of rays can be effected in a simple way, and with this object in view my invention consists in mounting the anticathode on a yielding carrier.

For the purpose of explaining the invention an example embodying the same has been shown in the accompanying drawing in which the same reference characters have been used in all the views to indicate corresponding parts. In said drawing,

Fig. 1, is an elevation partly in section showing the Röntgen tube,

Fig. 2, is a sectional elevation on an enlarged scale showing the tubular carrier of the anticathode, the said figure illustrating a modification,

Figs. 3 and 4, are similar sectional elevations showing other modifications,

Fig. 5, is a cross-section taken on the line 5—5 of Fig. 4, and

Fig. 6, is a similar cross-section showing a modification.

Fig. 7 is an end view of the disk shown in Figs. 1 and 2.

In the example shown in Fig. 1, the anticathode a is mounted on a tubular carrier b fused to a tubular portion g of the Röntgen tube. The said tubular carrier b is provided with a flexible portion b^1, the wall of the said carrier being formed with wavelike circumferential corrugations. Within the smooth portion of the carrier b there is a disk d having perforations d^1 permitting the passage of cooling water therethrough, and in a central bore d^2 of the said disk a rod c is guided which is passed inwardly to the bottom of the anticathode to which it is connected by an eye e. To the said rod oscillating or circular movement can be imparted by hand or mechanical means, and the said movement is transmitted by reason of the flexibility of the portion b^1 to the anticathode, so that the position of the point of emission of rays is variable.

In Fig. 2 I have shown a modification in which the anticathode is displaced by longitudinal movement of the rod c, the portion b^1 of the carrier being flexible at one side only and rigid at the opposite side. As shown a rigid rod f is fixed to one side of the portion b^1.

In the modification shown in Fig. 3 the portion b^1 is flexible all around its circumference, and the rod c is located eccentrically within the carrier. Thus, when moving the rod c in axial direction the flexible part b^1 is bent in lateral direction.

In the construction shown in Fig. 2 rocking movement may also be imparted to the flexible portion b^1 by varying the pressure of the cooling liquid supplied to the anticathode, the variation of pressure within the carrier tending to change the length of the flexible part thereof at one side only.

In the modification shown in Figs. 4 and 5 the carrier of the anticathode a comprises a smooth pipe b^2 having thin walls and a flat cross-section, the said pipe being fixed respectively to the anticathode and to a cap b^3 fused to the tubular portion g. Further, the said carrier comprises the rod f^1 which is likewise fixed to the anticathode a and the cap b^3. Through the pipe b^2 cooling water is supplied, so that the said pipe is constantly maintained at low temperature. However, the rod f^1 is expanded by heat by being connected to the anticathode, so that the pipe b^2 is bent laterally and the anticathode a is displaced accordingly. Also in this construction the tube may be provided with a corrugated wall.

For improving the circulation of the cooling water, I may provide two narrow pipes b^4 in lieu of a single pipe b^2, as has been shown in Fig. 6. The pipes b^4 may be circular in cross-section, as shown, or they may be made with flat cross-sections. If corrugated pipes are used in the examples illus-

trated in Figs. 4 to 6, the displacement of the anticathode can be brought about by varying the pressure of the cooling water, in which case the expansion of the rod f^1 by heat is irrelevant.

I claim:

1. A Röntgen tube, comprising a bulb, a cathode, an anticathode, a flexible tubular carrier for the anticathode, and an actuating rod passed through said carrier and joined to the anticathode for imparting to the anticathode a transverse movement relative to the cathode during emission of X-rays.

2. A Röntgen tube, comprising a bulb, a cathode, an anticathode, a yielding carrier for one of these electrodes, and means for bending the said yielding carrier during emission of X-rays to produce a transverse movement of the anticathode relative to the cathode.

3. A Röntgen tube, comprising a bulb, a cathode, an anticathode, a flexible tubular carrier for the anticathode, and means for bending said tubular carrier during emission of X-rays to produce a transverse movement of the anticathode relative to the cathode.

4. A Röntgen tube, comprising a bulb, a cathode, an anticathode, a circumferentially corrugated tubular carrier for the anticathode, and means for bending said tubular carrier during emission of X-rays to produce a transverse movement of the anticathode relative to the cathode.

In testimony whereof I affix my signature.

ERNST POHL.