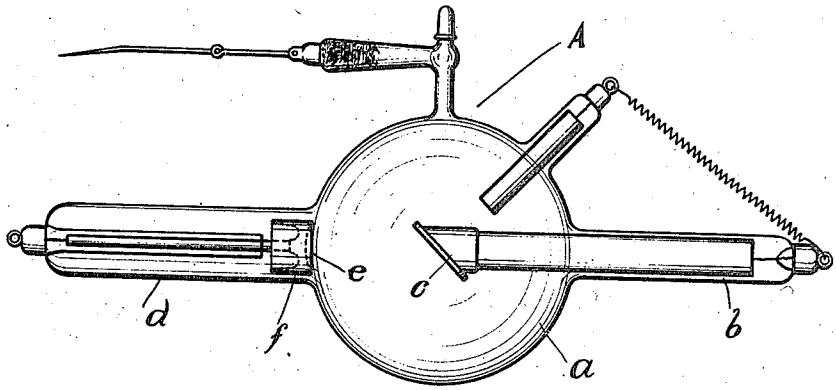
H. GREEN.

VACUUM TUBE.

APPLICATION FILED DEC. 21, 1912.

1,068,426.

Patented July 29, 1913.



WITNESSES

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VACUUM-TUBE.

1,068,426. Specification of Letters Patent. Patented July 29, 1913.

Application filed December 21, 1912. Serial No. 737,984.

To all whom it may concern:

Be it known that I, HENRY GREEN, a citizen of the United States, and resident of Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Vacuum-Tubes, of which the following is a specification.

This invention relates particularly to a novel form and construction of a cathode for use in vacuum tubes and especially in X-ray tubes.

The original form of cathode was a concave disk, the thickness at the edge being never more than one-eighth of an inch, and sometimes tapered down to nothing. It was found that this small body of metal became very hot during the operation of the tube and would be melted from its supporting stem. To avoid this the weight or body of the cathode was increased by forming a protuberance at the rear of the cathode face of conical or other irregular shape and usually starting at a point just inside the edge of the disk so as to leave a thin lip about the cathode face. While all cathodes have come to have these general characteristics there has been some slight variation in the shape of the rear protuberance. As a result some of the charged particles of the residual gas within the tube became trapped in the cathode neck back of this lip, becoming unduly heated and being discharged from the lip, which was nearest to the cathode neck, onto the glass wall, occasioning an excessive heating of the wall over a small localized area. Manufacturers and users of X-ray tubes well know that this radiation of heat to, and its concentration upon a small area of the glass wall results in frequent breakage of the tubes at this point. The tubes are very expensive and the loss to the manufacturer and user from this cause constitutes a very considerable item.

It is the purpose of this invention to provide a cathode of novel construction which will obviate this difficulty and render the operation of the tube more perfect by eliminating the variation of the focus heretofore occasioned by the trapped gases.

The drawing shows a tube in which my invention is embodied.

A denotes the complete tube, comprising the main bulb *a*, anode neck *b*, anode *c*, cathode neck *d*, cathode *e*. This cathode as illustrated, and as is the usual practice, is located within the end of the cathode neck which is joined to the main bulb.

In accordance with my invention a radiating wall *f* is extended rearwardly from the face of the cathode. This wall is of substantial length, and its surface is substantially uniform in shape and size. It is spaced slightly from the wall of the cathode neck and provides a surface of wide area from which the heat of the cathode is radiated to a correspondingly large surface of the wall of the tube, and specifically, of the cathode neck, from which it is rapidly dissipated, and overheating of the glass is thus avoided. Furthermore, since the heat will be radiated with equal ease and rapidity from all parts of the surface of this radiating wall, there is no possibility of the heat being concentrated at a small point or over a small area.

The radiating wall should conform approximately to the shape of the cathode neck, and for the best results should be of cylindrical form, as shown in the drawings. The body of the cathode should preferably be recessed to lighten its construction and avoid liability of its breaking from its anchorage in shipment, and in handling, the cathode stem being attached to the cathode within the recess, which gives a continuous and uninterrupted rear edge to the radiating wall. The radiating wall may or may not be made as an integral part of the cathode face, it being only important that it shall act as the radiating agency for the heat generated in the cathode by the action of the tube.

While I have described the invention in its embodiment in an X-ray tube, the device will have value in other vacuum tubes, as for instance what are called valve tubes.

I claim as my invention:—

1. A cathode for use in vacuum tubes provided with a cylindrical radiating wall extending rearwardly from the cathode face for a substantial distance.

2. A cathode for vacuum tubes comprising a cylindrical body having one end suitably concaved to form a cathode surface, and the

opposite end recessed, and a supporting stem attached to said cathode within said recess.

3. In an X-ray tube, the combination with the main bulb, anode and cathode necks, and anode and cathode supported within the anode and cathode necks respectively, of a cylindrical radiating wall extending rearwardly from the cathode face for a substantial distance, and spaced from the wall of the cathode neck.

HENRY GREEN.

Witnesses:
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