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A. ETZRODT

2,222,021

OXIDE CATHODE

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Fig. 1.

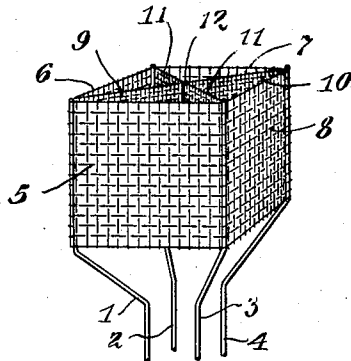


Fig. 2.

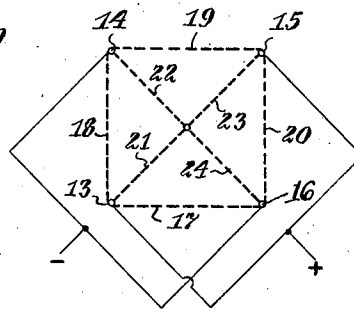


Fig. 3.

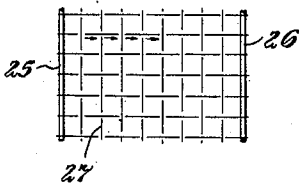


Fig. 4.

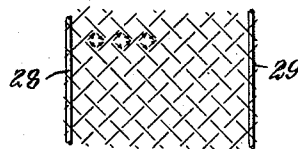


Fig. 5.

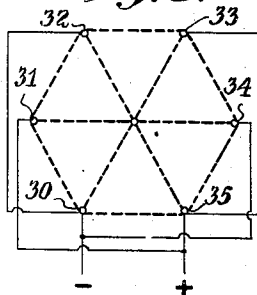
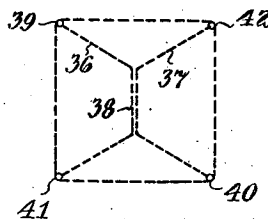


Fig. 6.



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OXIDE CATHODE

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2 Claims. (Cl. 250—27.5)

The invention relates to a heated oxide coated cathode for electric discharge tubes and particularly to the metallic wire support for such an oxide coated cathode.

5 An object of the invention is to produce a cathode construction which has a high electron current supply and very great mechanical strength and rigidity against vibrations.

10 Another object is to provide a cathode, especially for gas or vapor filled discharge vessels which are subject to various shocks, which cathode does not lose its form through mechanical strain.

15 Other objects and advantages of the invention will be apparent from the following description and drawing, in which:

Fig. 1 is a perspective view of a preferred embodiment of the supporting and conductive metal framework for the oxide coated cathode.

20 Fig. 2 is a diagrammatic view of the electrical connections to Fig. 1.

Figs. 3 and 4 are enlarged diagrammatic views of portions of the wire mesh illustrating various arrangements between supporting standards.

25 Figs. 5 and 6 are diagrammatic views illustrating still further modifications in the form of the wire supporting structure.

30 The directly heated oxide coated cathode, according to the invention, consists of band-formed parts for carrying the oxide coating and these band-formed parts preferably consist of a netting or interweaved wire mesh arranged to correspond to the side surfaces and diagonal surfaces of a prism, preferably a regular prism. The metal thickness or mesh width of the individual mesh parts or the manner of their connection to the support rods is selected so that all surface parts of the cathode have a practically uniform specific power output.

40 In Fig. 1, is disclosed a preferred embodiment of the invention. The support rods 1, 2, 3, and 4 carry both the mesh surfaces 5, 6, 7, and 8 which form the side surfaces of a parallelepiped and the surfaces 9 and 10 which form the diagonal surface of the prism. The mesh parts are welded or otherwise secured to the support rods. The diagonal surfaces are preferably made in the manner shown in the figure, as two rectangular mesh strips, bent together, along their edges 11 and having a wire clamp 12 slipped thereover and preferably welded to both edges.

50 The invention has the specific advantage that the power given by the individual surface parts per unit area can be made practically uniform. 55 If the temperature of the various parts of the

cathode, which is closely related to the power output of these individual parts, is not fairly equal throughout the cathode, then these individual parts of the cathode are loaded at different strengths which reduces the life of the cathode.

5 In Fig. 2 are disclosed the electrical connections in proportions that permit a uniform loading of the cathode throughout its construction. The support rods are indicated by 13, 14, 15, 16; the side surfaces by 17, 18, 19, 20; and the diagonal surfaces by 21, 22, 23, and 24. One pole of the filament battery or other source of power is connected at points 13 and 15 and the other, at points 14 and 16. The resistance of the side surfaces should preferably be increased in the ratio 10 of the square root of two to one in order that heating on all surface parts of the cathode be equally great. Various means can be utilized to accomplish this result. The wire mesh of the side surfaces may be made with a larger mesh width. The desired increase of resistance of the side surfaces is thereby obtained. Also certain individual wires, approximately one-third, may be uniformly withdrawn or pulled out from the original homogeneous mesh and utilized for the side surfaces. Another possibility is to use a metal of high specific resistance or a wire cloth with equal mesh width whose individual wires have a smaller thickness. Another method is disclosed in Figs. 3 and 4.

30 The resistance of a band of wire cloth is determined by the angle to which the band is cut off and connected with the lead-in rods. Fig. 3 shows a gauze band on which the current lead wires 25 and 26, welded with the band, are arranged parallel to wires 27 of one group of wires forming the mesh. In Fig. 4 the lead wires 28 and 29 are at an angle of 45° to the wires of the gauze band. The resistance of an equally long band in the case of Fig. 4 is approximately one and a half times greater than in the case of Fig. 3. The desired resistance ratio can be produced quite simply by cutting the mesh bands for the preparation of the diagonal surfaces parallel to the wires of the net and the bands for the preparation of the side surfaces at an angle of 45° to these wires.

45 A further modification of the invention is disclosed in Fig. 5. The emitting surfaces here correspond to the side and diagonal surfaces of a regular hexagon. The mesh parts are supported by the support rods 30, 31, 32, 33, 34, and 35. Here, also, by suitable choice of resistance, the desired uniformity of power distribution and therefore, the strain of the individual parts, can 55

be produced by the invention. The described cathode at the same time has very great strength.

Fig. 6 shows another possibility for connection of the cathode diagonal surfaces of Fig. 1 or 2.

- 5 The mesh bands 36 and 37 which form the diagonal surfaces are bent in the manner shown in Fig. 6 and are welded together along the surface 38. The joining together can be made advantageously similar to that of Fig. 2 and both points 10 39 and 40 are connected to one pole and points 41 and 42 to the other pole of the filament voltage source. This type of cathode construction has very great strength.

- 15 The cathode disclosed in Fig. 6 also offers the possibility of varying the necessary filament voltage by alternately parallel connection of points 39, 40, 41, and 42. Instead of the described type of connection, points 39 and 41 or 40 and 42, for example, can be connected parallel or points 39 and 42 to one pole and points 20 40 and 41 to the other pole of the filament voltage source. The ratio previously mentioned of the sides and diagonals is changed by the last arrangement because the diagonal surfaces 36 and 25 37 do not contact one another in the center but have the bridge 38.

- The cloth of metal wires is used as a support for the oxide layer because oxide adheres to such a mesh cloth better than on smooth or roughened 30 metal surfaces. It is possible, however, to use solid metal or sheet bands instead of a mesh cloth. In this case, the preferred selection of

resistances of the various parts of the cathode is accomplished by choice of different materials or different thicknesses for the bands forming the support for the individual surface parts. The new cathode construction represents a simple, as well as advantageous solution, if it is desired to construct a cathode which has simultaneously the advantages of high emission, long life, and complete security against strains from mechanical shocks. 5 10

Further modifications may be made in the form, arrangement, and number of the various parts illustrated in the preferred embodiment without departing from the invention. 15

I claim:

1. A metal conductive portion for an oxide coated cathode comprising a band-shaped mesh forming the flat sides of a prism and band-shaped mesh members extending from the corners of said prism towards the center thereof, 20 the mesh of said flat sides of the prism being different from the mesh of the members extending from the corners of said prism towards the center.

2. A cathode comprising a mesh ribbon forming the lateral surface of an enclosing geometrical figure and mesh ribbon in the interior of said geometrical figure connected to the lateral surface thereof, the interior ribbon being of different mesh than the mesh of the lateral surface. 25 30

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