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ELECTRODE SPACER

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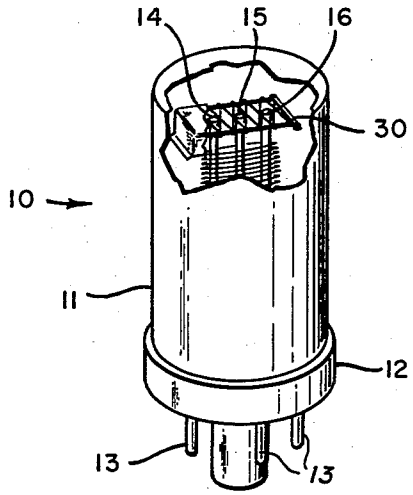
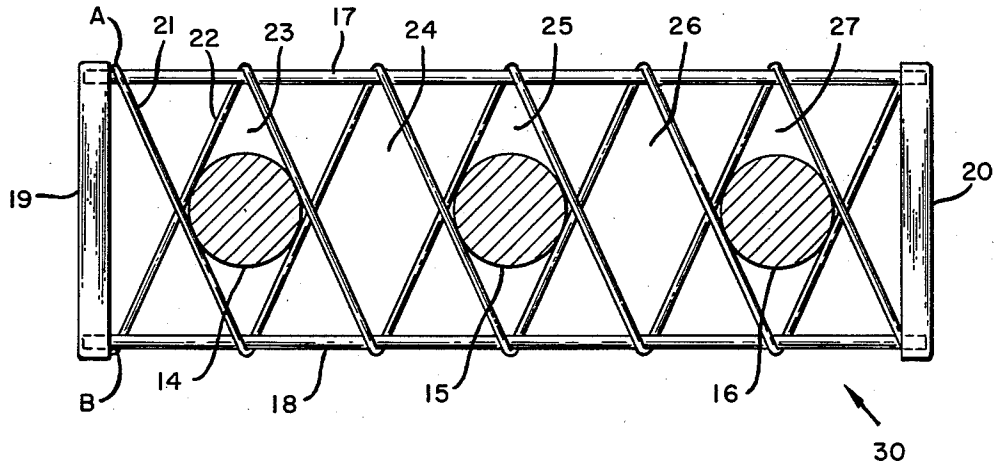


FIG-1

FIG-2



INVENTOR.

WALTER H. KOHL

BY

John F. Lawler

ATTORNEY

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ELECTRODE SPACER

Walter H. Kohl, Los Altos, Calif., assignor to Sylvania Electric Products Inc., a corporation of Delaware

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This invention relates to electron discharge devices, and more particularly to electrode spacing means for separating electrodes in such devices.

Electrode spacers of the type commonly used in receiving-type tubes are almost exclusively made of natural mica at the present time. Attempts to make synthetic mica available for the mass production of electron tubes have not been successful, so far. The disadvantages of natural mica spacers are many. High-grade mica is a strategic material not readily accessible to the domestic trade, especially in times of a national crisis. There is a limitation on the temperature at which mica can be operated because of bound water given off from its crystal lattice when a temperature of 940° C. is exceeded. It would not be safe to operate a tube containing mica spacers much above 300° C. for this reason. The accurate punching of holes in mica is an expensive operation, especially because the cost of the dies is high. Also, the brittleness of mica spacers contributes to enlargement of the supporting holes through a sawing action when the tube is subjected to vibration; this results in inaccurate spacing of electrodes over a period of time.

In accordance with my invention, these disadvantages are overcome by the use of an interlaced ceramic-thread-electrode spacer formed of two flattened, contra-wound ceramic thread helices. The ends of the electrodes are inserted into the interspaces of the resulting lattice, and the distance of the interspaces from each other is accurately determined by control of the pitch of the helix winding. The interlaced ceramic threads are mounted on a frame formed of ceramic or metallic rods or channels to which the ceramic thread comprising the lattice can be attached by means well-known in the art.

A general object of the invention is a provision of an electrode spacer which overcomes the disadvantages of mica spacers mentioned above.

The further object is the provision of an economical, accurate, and rugged electrode spacer capable of withstanding shock and vibration without deterioration of its structure.

These and other objects of my invention will become apparent from the following description of a preferred embodiment thereof, reference being had to the accompanying drawings in which:

FIGURE 1 is a perspective view of a conventional receiving tube with a portion of the outer envelope cut away to show the internal construction including ceramic spacers embodying my invention; and

FIGURE 2 is a plan view of a ceramic thread spacer, greatly enlarged, and showing the relative positions of the spaced electrodes inserted therein.

Referring now to the drawings, a preferred embodiment of my invention has utility in a receiving tube 10 having an outer envelope 11 and a base 12 with base prongs 13 extending therefrom for connection in a conventional tube socket, not shown. Prongs 13 are connected to electrodes 14, 15 and 16 forming part of the internal structure of the tube, the ends of these electrodes being supported and laterally spaced apart by a ceramic thread spacer assembly 30.

Assembly 30 is shown in detail in FIGURE 2 and comprises parallel, laterally spaced, preferably ceramic rods

17 and 18 connected at their ends to ceramic end members 19 and 20 to form a rectangular frame. The electrode supporting grid structure comprises two flexible ceramic threads 21 and 22 which are wound alternately around the rods 17 and 18 in the manner of contra-wound helices which are flattened into parallel planes along the sides of the rods. Thus thread 21 is wound clockwise from point A in a direction from left to right in FIGURE 2, and thread 22 is wound clockwise in the same axial direction from point B. The threads so wound define a lattice-like structure having interspaces 23, 24, 25, 26, and 27, the dimensions and location of which are selected simply by varying the pitch of the helically wound threads 21 and 22. Electrodes 14, 15 and 16 extend through selected interspaces 23, 25 and 27, respectively, transversely of the plane of the spacer assembly and are firmly held by the diagonal reaches of the threads as shown.

The ceramic threads 21 and 22, in addition to physically separating adjacent electrodes, provide a resilient support for these tube parts which renders the tube more resistant to shock and vibration. The threads may be made of alumina or other high-temperature ceramic, or may be metallic wire coated with such ceramic material. While two threads have been shown and described as constituting the supporting lattice, a single thread may be used when wound successively in opposite axial directions on rods 17 and 18.

Changes, modifications and improvements may be made to the above-described preferred embodiment of my invention without departing from the spirit and precept of the invention. The scope of the invention is defined in the appended claims.

I claim:

1. A spacer assembly for electron tube electrodes comprising a frame having a pair of laterally spaced parallel members, said members having sides lying in parallel planes, first ceramic thread means wound in one direction alternately over said members to form a helix flattened into the side planes of the members, and second ceramic thread means similarly wound in the opposite direction to form a second flattened helix, the portions of said first and second thread means extending between said members defining a plurality of diamond-shaped interspaces adapted to receive and laterally space said electrodes.

2. A spacer assembly for electron tube electrodes, comprising a frame having a pair of laterally spaced members having sides lying in closely spaced parallel planes, and a grid structure supported by said members comprising a first ceramic thread wound in one direction parallel to and alternately around said members to form a helix, said helix having a predetermined pitch and having sides flattened substantially into the side planes of said members, a second ceramic thread similarly wound in the opposite direction alternately around said members at points spaced from said first thread to form a flattened helix with a predetermined pitch, the reaches of the first thread between said members being crossed with and closely spaced from similar reaches of the second thread and defining therebetween a plurality of diamond-shaped interspaces, the dimensions of said interspaces being dependent upon the pitch of the first and second helices.

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