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CATHODE RAY TUBE ELECTRODE ASSEMBLY

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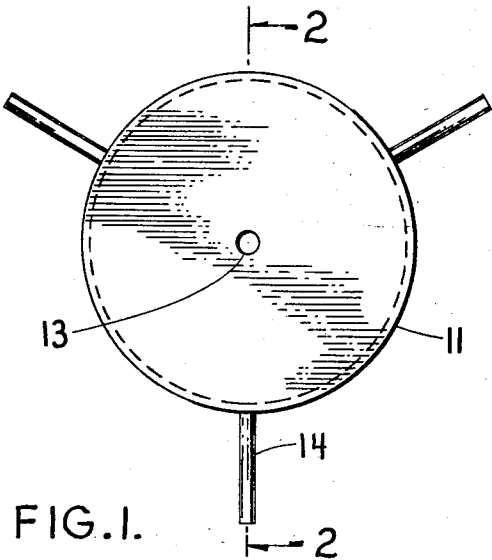
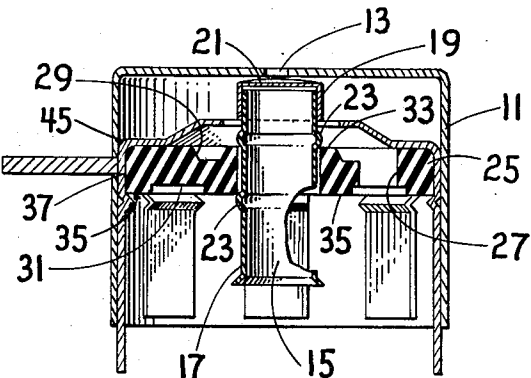


FIG. 2.

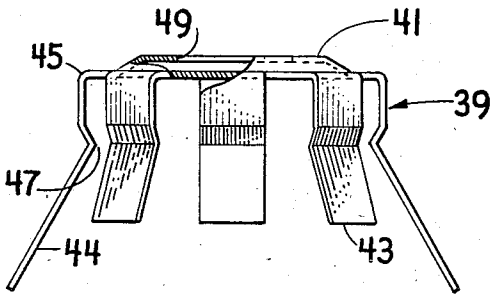


FIG. 3.

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CATHODE RAY TUBE ELECTRODE ASSEMBLY

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2 Claims. (Cl. 313—250)

This invention relates to an electron discharge device and more particularly to a cathode and first grid sub-assembly for a cathode ray tube.

Cathode ray tubes conventionally employ an assembly of electrodes which provide the source, acceleration, and modulation of the electron stream utilized in producing the image on the screen of the tube. A portion of this assembly includes the cathode and first grid sub-assembly which generally comprises a cylindrical capped grid having an electron aperture formed in the cap and an indirectly heated cathode positioned inside the grid cylinder. This cathode is placed upon a ceramic disc which is mounted inside the first grid cylinder by means of two sleeves which serve to position the cathode relative to the grid aperture. One sleeve is placed intermediate the grid plate and the disc to provide the cathode to grid spacing while the other sleeve is employed on the opposite side of the disc for holding the disc relative to the grid cylinder. Due to the number of elements included in the sub-assembly, the manufacturing cost is high and the dimensions of the component parts must be restricted to very small tolerances, since the cathode to grid spacing is critical.

It is therefore an object of the invention to reduce the aforementioned economic and structural disadvantages.

A further object is the provision of an electron discharge device sub-assembly which employs fewer elements than has previously been required.

A still further object is the provision of a sub-assembly wherein the elements need not be held to the previously required dimensional tolerances.

Another object is to provide a sub-assembly which is adaptable for production line testing of the cathode to grid spacing.

The aforementioned objects are achieved in one aspect of the invention by the provision of a cathode and first grid sub-assembly which employs an improved retaining member for positioning and securing the cathode relative to the grid electrode.

Other objects of the invention will be apparent after reading the following description taken in conjunction with the accompanying drawings in which:

Fig. 1 is a top view of a cathode and grid sub-assembly;

Fig. 2 is a section of Fig. 1 taken along line 2—2; and

Fig. 3 is a plan view of one embodiment of the retaining member employed in the electrode sub-assembly.

Referring to the drawings, a tubular grid 11 is shown having several integral mounting bars 14 which cooperate with ceramic rods to support the electrode sub-assembly relative to other electrodes of the cathode ray tube in a manner well known in the art. Grid 11 is a tubular metallic member formed to provide an electron aperture 13 through which the electrons travel toward the screen of the tube. Mounted within grid 11 is a cathode 15 which comprises a sleeve 17 and a cathode cap 19. Deposited on the base of cap 19 is an electron

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emissive coating 21, which provides the source of electrons for the tube. Sleeve 17 has upper and lower annular swages 23 which engage insulating support structure 25 to effectively lock and position sleeve 17 with respect to support 25. Several apertures 27 are formed in support structure 25 and annular recesses 29 and 31 are provided on the upper and lower support structure surfaces. Support 25 is preferably disc-like in shape, with an upper surface 33, lower surface 35 and a rim 37. However, the configuration of the support member 25 may be altered so long as it provides a rim portion formed to conform with the shape of the internal wall of grid 11.

Engaging support structure 25 is a metallic retainer 39 having a central raised portion 41 and a plurality of depending resilient appendages 43 and 44. Each appendage has an offset portion formed by shoulder 45 and a rib 47. The rib may be in the form of a V as shown in Fig. 2 or indented as shown in Fig. 3. Raised portion 41 has an aperture 49 centrally located therein through which the cathode 15 is threaded. The raised portion provides stiffening for the retainer member 39 in addition to providing adequate spacing from cathode cap 19 and swages 23 to prevent arc-over during operation of the tube. Two appendages 44 are shown longer in length than the remaining appendages 43 to provide means for grasping and manipulating retainer 39 and for affixing the retainer to grid 11. Although eight appendages are shown, two of which extend beyond grid 11, the number may be altered as desired. A preferred structure would embody at least six appendages, two of which may be long enough to extend sufficiently close to the bottom of grid 11 to facilitate welding retainer 39 to the grid.

The structure of retainer 39 shown in Fig. 3 enables the sub-assembly to be efficiently and accurately constructed. Cathode 15, which is attached to support structure 25 by means of annular swages 23, is positioned on retainer 39 by threading the cathode through aperture 49 and snapping the support member over rib 47 of retainer 39. The rib engages the lower surface 35 of support member 25, thereby providing the means for holding these parts together. The retainer is then slid into grid 11 until cathode 29 is correctly spaced from electron aperture 13. This spacing may be accomplished by any convenient method such as a mechanical or electrical gage. As retainer 39 slides into grid 11, appendages 43 and 44 are forced inwardly by the grid walls, thereby locking support member 25 in position upon the retainer. Appendages 44 are then welded or otherwise affixed to the walls of grid 11. The appendages of the retainers shown in Figs. 2 and 3 are sufficiently depressed by the grid walls to assure an abutting relationship at the lower portion of the appendages so that an adequate weld may be made. As shown in Fig. 2, when the cathode and first grid sub-assembly is completely constructed, shoulder 45 of the retainer engages upper surface 33 and rim 37 of insulating support member 25, while rib 47 engages the lower surface 35 of the support member.

A cathode ray tube sub-assembly constructed in the manner described herein requires a smaller number of parts than was previously needed, and the sliding retainer eliminates the necessity of making a number of different sized spacers as is required for the various cathode ray tube constructions commonly used today. In addition, the dimensions of the parts are not critical since the movable retainer and its resilient appendages effectively accommodate dimensional variations in the parts.

Although one specific embodiment of the invention has been shown and described, it will be apparent to those skilled in the art that other modifications and variations may be made therein without departing from the scope of the invention as defined by the appended claims.

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What is claimed is:

1. An electron tube sub-assembly comprising a tubular electrode having a longitudinal axis and a base formed with an electron aperture, an insulating support structure having a rim disposed within the electrode, a cathode mounted upon said support structure, and a retainer formed to provide a central portion terminating in a shoulder and having a plurality of resilient appendages depending from said shoulder formed to pivot about said shoulder transversely of said longitudinal axis for engagement with and affixation to the internal wall of said electrode, said shoulder contacting the upper portion of the support structure and said appendages having an offset portion contacting said support structure rim to provide positioning of said cathode relative to the electron aperture.

2. An electron tube sub-assembly comprising a tubular electrode having a longitudinal axis and a base formed with an electrode aperture, an insulating support struc-

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ture having a rim with upper and lower edges disposed within the electrode, a cathode mounted upon said support structure, and a retainer formed to provide a central portion terminating in a shoulder and having a plurality of resilient appendages formed with a rib spaced from said shoulder, said appendages depending from said shoulder and formed to pivot about the shoulder and flex transversely of said longitudinal axis for engagement with and affixation to the internal wall of said electrode, the shoulder contacting the upper edge of said rim and the rib contacting the lower edge of said rim to position said cathode relative to the electron aperture.

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