Sept. 11, 1951 E. POHLE ET AL 2,567,893

CATHODE RAY TUBE ELECTRODE

Filed May 6, 1949 2 Sheets-Sheet 1

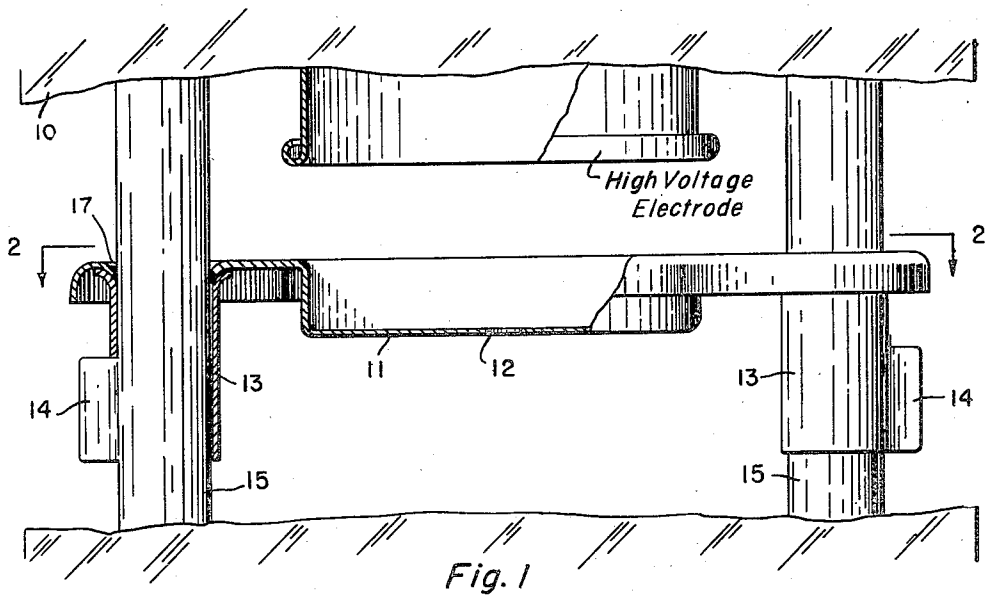



Fig. 1

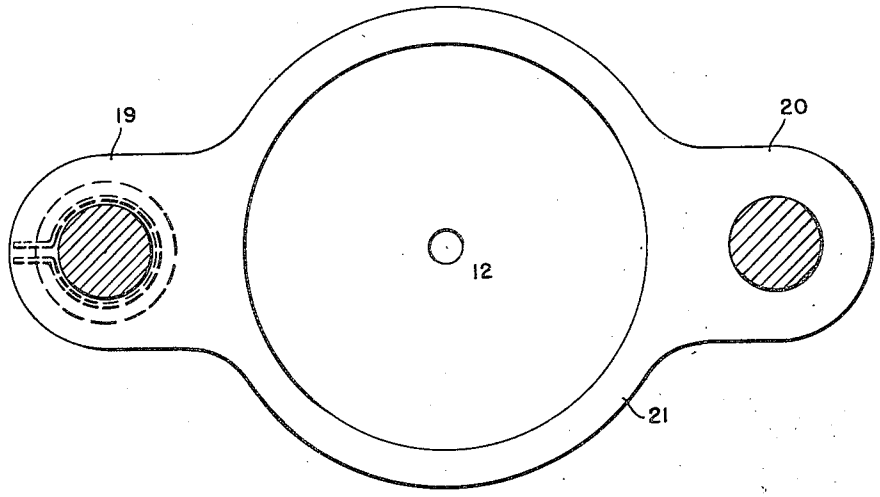



Fig. 2

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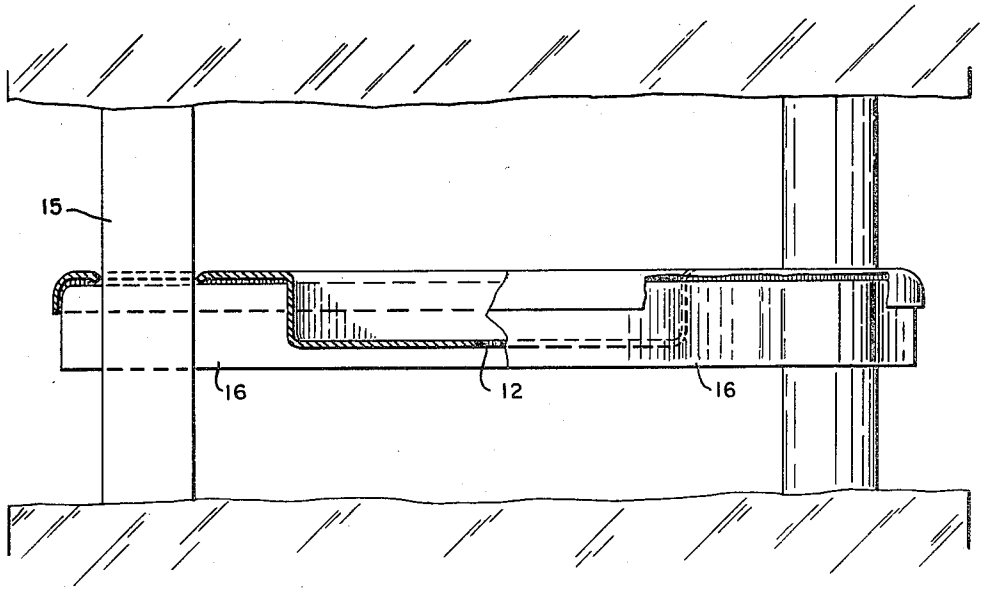



Fig.3

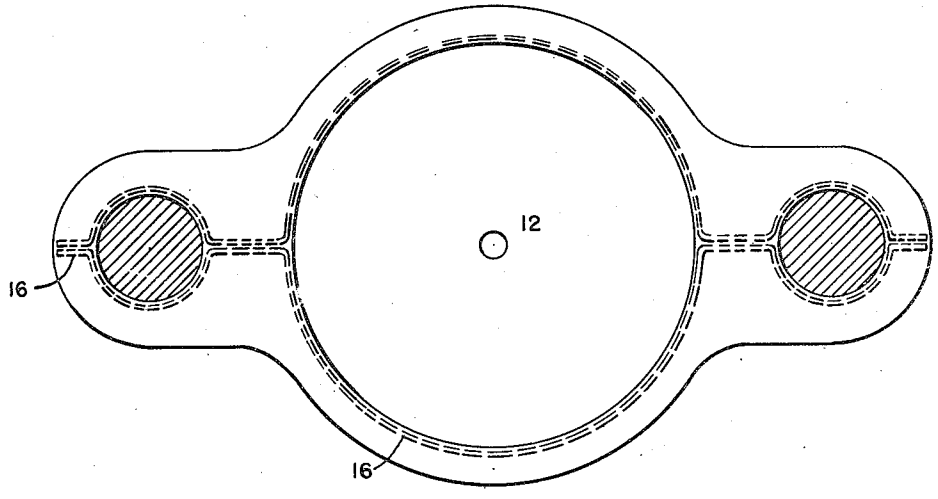



Fig.4

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## CATHODE-RAY TUBE ELECTRODE

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4 Claims. (Cl. 313—86)

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This invention relates to cathode ray tubes and particularly to the electrode structures therein.

In the utilization of higher voltages on the electrodes of cathode ray tubes, difficulties arise from corona discharges from any sharp edges on these electrodes adjacent the space across which high voltage exists. This often causes spurious emission of electrons from these points, which, accelerated by the higher potentials of the succeeding electrodes, are caused to impinge at random on the fluorescent screen. This causes an overall illumination of the screen which reduces contrast and is therefore objectionable.

Some of these spuriously emitted electrons impinge on the succeeding electrodes themselves, thus increasing the beam current by effectively adding a "leakage" current which is not necessarily constant and which effectively may cause fluctuations in the light output of the screen.

In addition, sharp edges very often produce distorted fields and result in defocussing of the beam.

Accordingly, an object of our invention is to provide an improved electrode and mounting for same.

Another object is to provide an electrode having rounded edges and which covers or shields all sharp edges or corners of the supporting member.

Still another object is to provide an electrode so shaped that high frequency currents are readily produced in the center of the electrode insuring proper de-gassing during processing without appreciable heating of the fastening members thereby reducing thermal expansion and eliminating possibilities of metal evaporation onto insulating members.

Using this invention, these objects may be achieved easily and economically.

The invention may be understood from the description in connection with the drawing, in which:

Figure 1 is a side view of a cathode ray tube partly in section and having one embodiment of the invention, and the relation of cooperating parts;

Figure 2 is a view through 2—2 of Figure 1;

Figure 3 is a side view, partly in section, of an alternative embodiment of the invention; and

Figure 4 is a plan view of the elements of Figure 3.

A preferred form of the invention is shown in Figure 1. A cathode ray tube 10 has as one electrode therein a flanged aperture cup 11 having an aperture 12 in the center thereof. For the

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purpose of mounting the cup 11 on supporting rods an opening 17 is formed such as by piercing in the elongated portions or tabs 19 and 20 extending from the flanged edge 21. The edges around the opening 17 are bent inwardly. Also, the edges of the flange 21 and the outer edges of the elongated portions 19 and 20 are bent back to present a rounded surface in the direction of the longitudinal axis of the cup.

Split eyelets 13 are secured to the aperture cup 11 on the underside of the elongated portions 19 and 20 and coaxial with the opening 17. As may be seen in Figure 1, the bent edges around the opening 17 extend inwardly into the upper open end of the eyelet 13 and the outer edge of the elongated portion 19 extends beyond and around the outer edge of the upper end of the eyelet 13. The eyelet 13 may be secured by any suitable means as by spot welding, for instance.

Supporting rods 15, which may be metallic or ceramic are inserted through the eyelet 13. The ears 14 of the eyelets are then squeezed together and welded, thus securely fastening the cup 11 to the rod 15.

In many gun designs, the second grid must be rather shallow to conserve space, and by means of the split eyelets extending below, sufficient bearing surface is made available for gripping the side rods to make a rigid structure. This is particularly important when the side or support rods 15 are of ceramic material, for during the subsequent processing of the tube, the metallic parts are heated by induced high frequency currents, and the unequal coefficients of thermal expansion may tend to loosen the metal parts from the ceramic unless a sufficient bearing surface is provided.

It will be noted that with all edges of the electrode bent back, rounded surfaces are presented. The edges of the adjacent or consecutive following electrodes in the tube may also be bent back so as to prevent a rounded edge. In this way, each electrode presents a rounded surface to the adjacent consecutive following electrodes. This, of course, reduces any discharge from sharp edged surfaces.

Further, it will be noted that with the structure provided the elongated portions of the aperture cup 11 form a complete shield over the split eyelet used for mounting the cup. Furthermore, no sharp edges are provided around the mounting or supporting means.

Referring to Figure 3, which shows another embodiment of the invention, the flanged aperture cup 11 is connected to support rods 15 by

means of half collars or straps 16 which grip the outside of the cup portion 11, and which also grip the support rods 15. As in the embodiment shown in Figure 1, the half collars extend around the rods 15 and are clamped thereto and spot welded to provide a rigid structure.

While this invention has been specifically described as applied to a second grid electrode of a cathode ray tube, where, because of the shallow construction, the problem has been particularly acute, it is by no means limited to this particular use. This method of construction may be applied to other electrodes operated at high voltages.

What is claimed is:

1. An electrode for a cathode ray tube which comprises a metallic disc with a saucer shaped depression therein and an aperture in the center thereof, the edges of said disc being bent back to present longitudinally a rounded end, a mounting tab having a hole therein, and located on the side of said disc with the edges of said tab bent back to extend in the same direction as the edges of said disc, a support rod extending through said hole, a split eyelet secured to said tab said eyelet surrounding said support rod and being clamped thereto, the edges around said hole being depressed to form a seat for said split eyelet and a rounded surface on the other side thereof, the rounded edge portions of said disc and said mounting tab covering and forming a shield over said split eyelet, there being a continuous smooth surface from said disc extending beyond and around said rod.

2. An electrode for a cathode ray tube which comprises a metallic disc with a saucer shaped depression therein, and an aperture in the center thereof, the edges of said disc being bent back forming a rounded end, a mounting tab extending from the edge of said disc and having an opening for a support rod, the inner and outer edges of said tab being bent back in the same direction as the edges of said disc, a support rod clamping means securing said disc to said support rod passing through said hole, the rounded edge portions of said disc and said tab covering and forming a complete shield over said clamping means, said tab being secured to said disc on the side thereof toward which said edges are bent, there being a continuous smooth surface from said disc extending outwardly beyond and around said opening.

3. In a cathode ray tube an electrode comprising a shallow circular dish portion having an aperture therein, a radial rim on said dish portion having two holes therein at diametrically opposite locations, all of the radially outermost edges of said rim being turned down in the same direction as the bottom of said dish, the edges of said holes being also turned down in the same direction, a pair of split eyelets attached to said rim adjacent said holes, each of said eyelets comprising a cylindrical body portion having a longitudinal slot therein, tabs extending substantially radially from said body portion adjacent said slot, and a flared end portion, said eyelets being welded to said electrode with the flared end portions thereof being adjacent the down-turned rims of said holes, said eyelets being covered and shielded by said rim, there being a continuous smooth surface extending from said dish portion beyond and around said holes.



4. In a cathode ray tube, an electrode comprising a shallow circular dish portion having an aperture therein, the edges of said dish portion being turned back to form smooth, rounded edges, an opening in the surfaces of said dish portion, the edges around said opening being turned back to form smooth, rounded edges, an annular clamp secured to said dish portion on the under side thereof and adjacent said opening, the surface of said dish portion covering and shielding said annular clamp, there being a continuous smooth surface from said dish portion extending beyond and around said opening.

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