July 31, 1951 K. A. HOAGLAND ET AL 2,562,236

SUPPORT STRAP FOR CATHODE-RAY TUBE GUN PARTS

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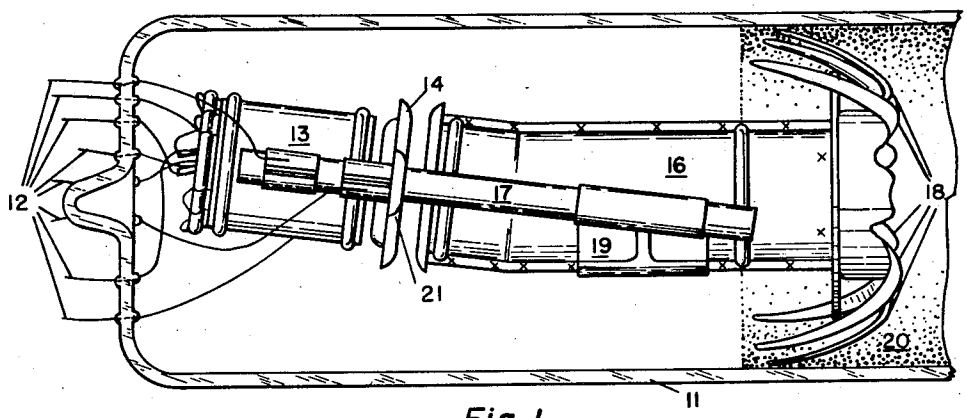


Fig. 1

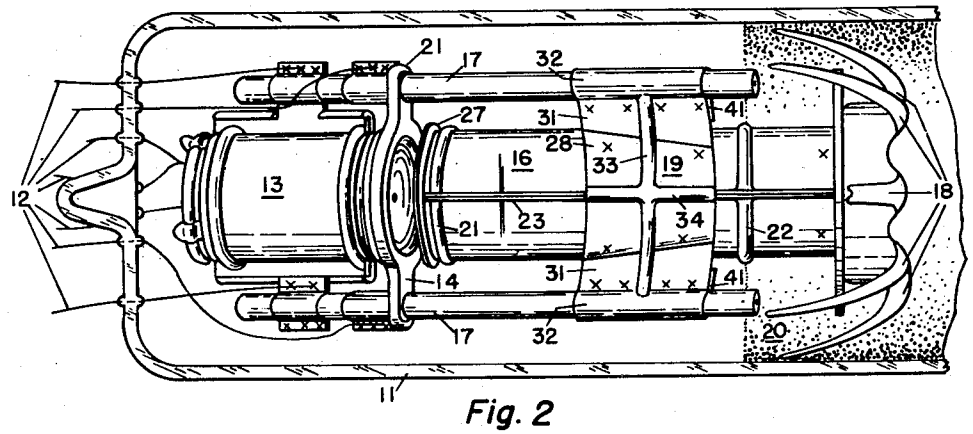


Fig. 2

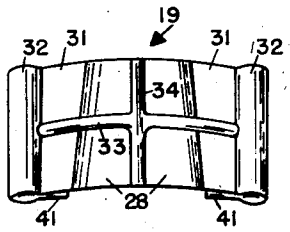


Fig. 3

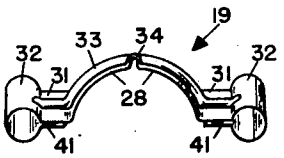


Fig. 4

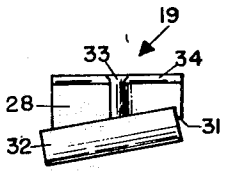


Fig. 5

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SUPPORT STRAP FOR CATHODE-RAY TUBE GUN PARTS

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8 Claims. (Cl. 313—83)

1

This invention relates to cathode ray tubes and more particularly to a support strap in the electron gun portion of cathode ray tubes.

In cathode ray tubes having an electrode or electrodes which must be rotationally fixed with respect to a given axis, such as ion trap tubes of the type described in copending application, Serial No. 129,260, by Kenneth A. Hoagland, assigned to the same assignee, one of the principal problems is to devise a rigid electron gun structure. This problem is complicated by a number of factors, one of which, in tubes of the type mentioned above, is the fact that the electrode to be supported operates at a potential vastly different from that of the electrodes mounted in the same structure and precautions must be taken, therefore, to prevent corona breakdown. Another factor is shipment which may cause misalignment of any but the most rigid structures. These problems are further complicated by the economic necessity of translating the gun structure design into a set of simple, easily fabricated parts that may be rapidly assembled.

Consequently one object of this invention is to provide an improved cathode ray tube gun structure.

Other objects are to provide an easily assembled ion trap type cathode ray tube, and to provide an electrode support strap for an electron gun of a type that is easily fabricated and provide an easily assembled rigid structure, properly aligned, which will remain aligned for the life of the tube.

Another object is to provide apparatus for mounting electrodes at an angle with respect to other electrodes of an electron gun.

Other objects will be apparent after a study of the specification and drawings, in which:

Figure 1 is a side elevational view of an electron gun structure embodying this invention and mounted in the neck of a cathode ray tube;

Figure 2 is a plan view of the gun structure of Figure 1; and

Figures 3, 4 and 5 are plan, end and side views showing details of the anode supporting strap in accordance with the invention.

In Figure 1 an electron gun is shown located within the neck 11 of a cathode ray tube and attached thereto by the lead in and support wires 12. The electron gun comprises a thimble shaped control grid 13, a dish shaped second grid 14, and a tubular anode 16 all secured to a pair of insulating support rods 17. The tubular anode 16 having a portion bent to extend axially at an angle to the remaining body portion as shown, is

2

partially supported at one end by a centering device 18, known as a spider, having metal legs which contact the side wall of the tube 11, for mechanical support and electrical contact to a conductive coating 20 on the wall of tube 11. The anode 16 is secured to the support rods by means of a strap 19 having constructional features which form the subject matter of the present invention. It is desirable that the anode 16 be supported by the strap 19 at a point somewhere near the center of the anode. If the strap 19 were moved further forward toward the spider 18, the rear end of the anode 16 would be able to move with respect to the second grid 14, thus causing an undesired misalignment of the electron gun. On the other hand, if the support strap 19 were moved back along the anode 16, the distance between the strap 19 and the tab 21, which holds the second grid 14 onto the rods 17, would be decreased and the possibility of breakdown by excessive leakage along the surface of the rods 17 would be encountered. Placing the strap 19 approximately at the center of the anode 16 has the still further advantage that the rods 17 are sufficiently long to insure an accurate alignment in the manufacture of the electron gun prior to the time that the gun is inserted into the tube 11.

Figures 3, 4 and 5 illustrate in detail one embodiment of the mounting strap 19 comprising a body portion 28 and laterally extending end portions which are turned back onto themselves to form the loops 32. The axes of the loops 32 are at the same acute angle with respect to the body portion 28 as the angle which the rear part of the tubular anode 16 makes with the forward part. The laterally extending flat portions 31 formed between the body portion 28 of the strap and the loops 32 are reinforced in double thickness by the ends 41 of the strap when in the manufacturing process the rods 17 are inserted into the loops 32 and the ends 41 are spot welded to the flat portions 31 as indicated by the crosses in Figure 2. A rib 33 is embossed on the strap 19 transversely through the body portion 28 and flat portions 31 for stiffening the strap.

Another raised rib 34 extends longitudinally along the body portion 28. This rib 34 allows clearance for the flange 23 where a two piece anode is used as shown in Figure 2 and provides a certain resiliency circumferentially to permit the semi-cylindrical portion 28 to conform to the tubular anode 16 relieving strain in mass production particularly in welding.

The strap 19 in Figure 4 may be a complete,

one piece unit, readily adaptable to methods of mass production. The gaps between the flat portions 31 and the ends 41 are preferably closed by pressure and spot welded to grip firmly the support rods 17, when the electron gun is being assembled. The strap 19 is preferably spot welded to the anode 16 as shown in Figures 1 and 2,

Although this invention has been illustrated by specific examples, it will be obvious to those skilled in the art that modifications may be made without departing from the scope thereof.

What is claimed is:

1. A supporting strap for a cathode ray gun comprising a central semi-cylindrical portion, lateral portions extending outwardly therefrom, and cylindrical loop portions at the outer extremities of said lateral portions, the axes of said loop portions being parallel to one another and at an acute angle with the axis of said central portion.

2. A supporting strap for a cathode ray gun comprising a central semi-cylindrical portion, lateral portions extending outwardly therefrom, and cylindrical loop portions at the outer extremities of said lateral portions, the ends of said strap being extended from said loops contiguous with said lateral portions, and secured thereto the axes of said loop portions being parallel to one another and at an angle with respect to the axis of said central portion.

3. A supporting strap for a cathode ray gun comprising a central semi-cylindrical body portion having an outwardly extending longitudinally disposed rib formed therein, lateral portions extending outwardly from said body portion, and cylindrical loop portions at the outer extremities of said lateral portions the axes of said loop portions being parallel to one another and at an angle with respect to the axis of said central portion.

4. A supporting strap for a cathode ray gun comprising a central semi-cylindrical portion, lateral portions extending outwardly therefrom, and cylindrical loop portions at the outer extremities of said lateral portions, a transverse rib formed in and extending through said central and lateral portions from one to the other of said loop portions, said rib extending outwardly from said central portions the axes of said loop portions being parallel to one another and at an angle with respect to the axis of said central portion.

5. A supporting strap for a cathode ray gun comprising a central semi-cylindrical body portion having an outwardly extending longitudinally axially disposed rib formed therein, lateral portions extending outwardly from said body portion, and cylindrical loop portions at the outer extremities of said lateral portions, a transverse rib formed in and extending through said central and lateral portions from one to the other of said loop portions, said rib extending outwardly from said central portion the axes of said loop portions being parallel to one another and at an angle with respect to the axis of said central portion.

6. In the gun structure for a cathode ray tube, a longitudinally bent tubular anode having two portions respectively on either side of the bend therein and a supporting strap therefor, said strap comprising a semi-cylindrical portion secured to said anode, lateral portions extending outwardly therefrom, and cylindrical loop portions at the extremities of said lateral portions, the longitudinal axes of said loop portions being at an angle with respect to the longitudinal axis of one said portion and parallel to the longitudinal axis of the other said portion of said anode.

7. In the gun structure for a cathode ray tube having a longitudinally bent cylindrical anode having two portions respectively on either side of the bend therein, a supporting strap secured to said anode comprising a central semi-cylindrical portion, lateral portions extending outwardly therefrom, and cylindrical loop portions at the extremities of said lateral portions, supporting rods for said gun structure, said rods passing through said loop portions and frictionally secured thereto, the axes of said rods and said loop portions being at an angle with respect to the axis of one said portion and parallel to the longitudinal axis of the other said portion of said anode.

8. In combination with support rods for a cathode ray gun having a longitudinally bent tubular anode having two portions respectively on either side of the bend therein, a supporting strap comprising a central semi-cylindrical portion, lateral portions extending outwardly therefrom, and cylindrical loop portions at the outer extremities of said lateral portions, the ends of said strap being extended around said rods, contiguously along said lateral portions and secured thereto the axes of said rods and said loop portions being parallel to the longitudinal axis of one said portion and at an angle with respect to the longitudinal axis of the other said portion of said anode.

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