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CATHODE RAY TUBES

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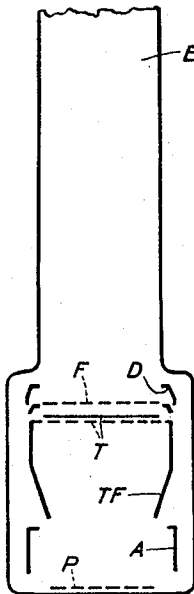


FIG. 1

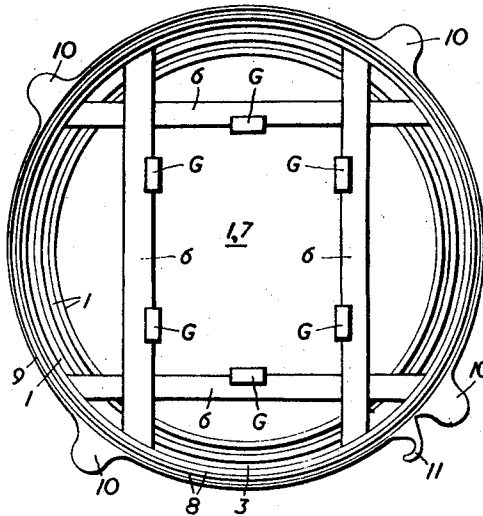


FIG. 2

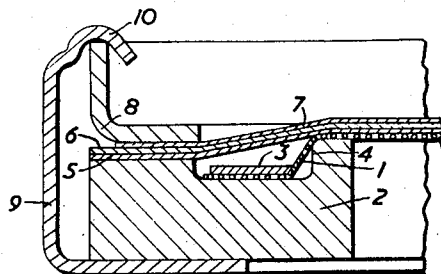


FIG. 3

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1

2,909,687

CATHODE RAY TUBES

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2 Claims. (Cl. 313—67)

This invention relates to cathode ray tubes and more specifically to video signal generating tubes of the kind in which video signals are obtained by scanning with a cathode ray a target structure in which a high resistance electric charge storing plate is mounted in close juxtaposition to but spaced and insulated from a grid or mesh. Well known examples of tubes of this kind are television camera tubes such as the well known image orthicon tube.

A trouble frequently encountered with image orthicon and other tubes of the kind referred to is that of microphony caused by relative movement between the storage plate and the adjacent mesh. Such relative movement produces variation of effective capacitance with corresponding variation in picture signal output level. The movement is commonly of the resonant type and resonant vibrations are often excited by relatively small shocks or vibrations. The effect is similar to microphony in thermionic valves.

Microphony in cathode ray tubes of the kind referred to may occur in any of the tubes in practical use today, but it is obviously most apt to occur in tubes having larger diameter target structures than in others. In such tubes as at present commonly constructed, the storage plate, which is normally a thin membrane-like member of glass, is spaced from the mesh by an annular spacer or washer at the edge and between the two, the three parts—plate, spacer and mesh, being clamped together with the spacer the middle of the "Sandwich." The invention contained in our co-pending specification Serial No. 727,889 provides a substantial improvement as respects microphony by replacing the annular spacer by spacer means (which may take the form of a pair of strip spacers arranged as chords with respect to the target structure) extending across the target structure and fixed to a member which also serves as the support member for the grid or mesh and to which said grid or mesh is also fixed. However, in spite of the improvement effected by the invention in the said co-pending specification, there still remains some liability to microphony.

The present invention seeks to provide improved tubes of the kind referred to which shall have good anti-microphonic qualities and which shall, moreover, attain this advantage by means which are simple and economical to manufacture. The invention may be applied to target structures in which the mesh is spaced from the glass membrane or other storage plate by means of strip spacers extending across the target and it is also applicable to target structures in which the mesh and storage plate are spaced in other, known, ways, e.g. by an annular washer.

According to this invention the high resistance charge storage plate and the mesh or grid of the target structure of a tube of the kind referred to are cemented together by non-shrinking cement at least at a plurality of places distributed around and just outside the useful picture area of said structure. There may be a plurality of points distributed round the picture area where the plate and grid are cemented together by "blobs" of cement; or there

2

may be a plurality of places distributed round the useful picture area where the plate and grid are cemented together by strips of cement. These strips may be short or long. In the limit they may be long enough to be continuous all round the picture area so that the plate and grid, instead of being cemented together at a plurality of separated places distributed round the periphery of the picture area, are cemented together continuously all round the said periphery. It is important, in carrying out the invention, that the cement shall be practically non-shrinking otherwise it may strain, deform, weaken or even damage the plate and/or grid when it dries.

Where cementing at separate distributed places is resorted to the number of places is not critical but good results have been achieved with six such places. They do not need to be located with precision and, in fact, they should not be exactly equally spaced around the picture area since the anti-microphonic qualities are obtained as the result of the destruction of circular symmetry achieved by the cementing. In the preferred practice the cementing is effected at only approximately equally spaced distributed places.

Preferably the target structure has strip spacers which extend across it between the mesh or grid and the storage plate and are so located that their inner edges lie just outside the picture area and, in effect, "frame" that area, and the said mesh, plate and the spacers are all stuck together by the cement. However, the use of strip spacers is not essential and, where they are not provided, the mesh and plate are cemented together at least at places distributed round and just outside the useful picture area. In such cases a template is used to assist in applying the cement.

A good form of cement to use is that known in the United Kingdom under the trade designation "Aquadag 660B" but, of course, other suitable practically non-shrinking cements may be employed.

The invention is illustrated in and further explained in connection with the accompanying drawings which illustrate the said invention as applied to a tube having a circular target structure with four spacers arranged as chords thereto. In the drawings Fig. 1 is a purely schematic representation of an image orthicon tube as a whole; Fig. 2 is a face view of a preferred form of target structure in accordance with this invention; and Fig. 3 is a sectional elevation showing, to a considerably larger scale than is used in Fig. 2, the detailed construction used to anchor the edge of the target structure. This edge anchoring arrangement is not per se part of the present invention.

Referring to Fig. 1 the tube therein represented is of well known general kind and comprises within the bulbous end of an evacuated envelope E (shown broken away) a photo-cathode P on the end wall of the tube, an accelerator electrode A, a target structure T carried in the customary cylindro-conical frame TF, a field mesh electrode F which serves, when the tube is in use, to ensure a uniform electro-static field, and a decelerator electrode D. The present invention is concerned with the construction of the target structure T which is purely schematically represented in Fig. 1.

Referring now to Figs. 2 and 3, the target structure comprises a fine wire mesh or grid 1, which is stretched across the aperture of a mesh support ring 2, the edge of the circle of mesh being held in a recess in the support ring 2 by means of a flat ring 3 which is welded to the face of the recess and holds the edge of the circle of mesh firmly in place. The mesh is strained flat across the aperture of the support ring 2 by being tensioned over the corner 4 of that ring as clearly shown in Fig. 3. Parallel to and spaced from the mesh 1 is a high resistance glass charge plate 7 which is fixed at its circular edge to a so-called target sealing cranked ring 8 to which the glass is

3

sealed. The mesh 1 and the target plate 7 are spaced apart by means of four strip-like spacers arranged as chords to the target structure (see Fig. 2) and each of double construction comprising two layers of low thermal expansion material one on top of the other. The two layers composing each strip are shown at 5 and 6 in Fig. 3 and are welded at their ends to one another, the lower layer 5 (or both layers 5 and 6) being welded to a flat annular surface provided on the support ring 2 outwardly of the clamp ring 3. The inner edges of the four spaces constitute a rectangular "frame" lying just outside the edges of the useful picture area which is a rectangle similar to but a little smaller than the rectangular "frame" thus constituted.

In accordance with this invention the mesh 1 and the charge plate 7 are cemented together at a plurality of places approximately equally distributed round, and just outside of, the useful picture area. As shown there are six such places, at which there are short strips of cement represented by the black areas and applied to Cr. This cements the mesh, the plate and the strip all together at these places. The cement strips G are not shown in Fig. 3.

In Fig. 2, for the sake of simplicity and clarity of drawing, the mesh and glass, which of course extend right across the central aperture of the target structure, are treated as though one could see through them both, and the references 1 and 7 are both applied to the central aperture of the target structure while the inner edge of the mesh support ring and the corner 4 of that ring are both shown as circles. It will be noted that the backing ring 9 is also formed with a pair of hooks 11 (not shown in

4

Fig. 3) which serve the usual purpose of facilitating support of the target structure in position in the tube.

We claim:

1. A video signal generating tube of the kind in which video signals are obtained by scanning a target structure with a cathode ray, an electric charge storage plate of dielectric material having high transverse resistivity, said plate being mounted in close juxtaposition to but spaced and insulated from a grid or mesh, said storage plate and the mesh or grid of the target structure being cemented together by non-shrinking cement at least at a plurality of places distributed at unequally spaced positions around and just outside the useful picture area of said structure.

2. A video signal generating tube of the kind in which video signals are obtained by scanning a target structure with a cathode ray, an electric charge storage plate of dielectric material of high transverse resistivity, said plate being mounted in close juxtaposition to but spaced and insulated from a grid or mesh, said storage plate and the mesh or grid of the target structure being cemented together by non-shrinking cement at least at a plurality of positions distributed around and just outside the useful picture area of said structure, said target structure having strip spacers which extend across it between the mesh or grid and the storage plate and so located that their inner edges lie just outside the picture area so as, in effect, to "frame" said area, the mesh, plate, and spacers being all cemented to one another.

References Cited in the file of this patent

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