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P. C. RUGGLES
MESH WITH RASTER-SIZE APERTURE FOR DAMPENING
VIBRATIONS OF CAMERA TUBE MESH
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3,320,465

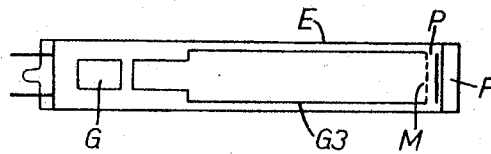


FIG. 1. PRIOR ART

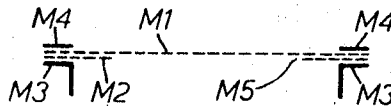


FIG. 2.

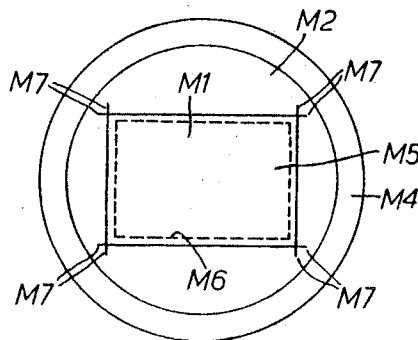


FIG. 3.

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MESH WITH RASTER-SIZE APERTURE FOR DAMPENING VIBRATIONS OF CAMERA TUBE MESH

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6 Claims. (Cl. 313-269)

This invention relates to television and like camera cathode ray tubes and though not limited to its application thereto, is very advantageously applicable to and was primarily made for application to so-called Vidicons.

A serious defect which has long been experienced in Vidicons, image orthicons and other camera tubes is that known as microphony of the mesh which, in such tubes, is near the scanned target of the tube. In a Vidicon the scanned target is, of course a layer of photo-conductive material and the mesh—the so-called field mesh—is a short distance (usually about 2 mm.) on the electron gun side of the target. In an image orthicon the scanned target is a secondary electron emitting layer and the mesh is very closely adjacent thereto on the side thereof remote from the electron gun. If, as a result of shock or external vibration forces, the mesh vibrates, as it is prone to do in known camera tubes, the result is to break up a picture reconstructed from the output signals of the tube or interrupt it by interference bands. This effect, which is that known as microphony, can become very objectionable, especially in the case of Vidicons operated at high voltages on the grid in the end of which the mesh is located (usually the so-called third grid) e.g. in the case of a Vidicon for operation with a voltage of about 750 volts on the third grid. Numerous expedients, some of them difficult and expensive from the tube manufacturer's point of view, have been resorted to in order to reduce or eliminate mesh microphony but, so far as the present applicants are aware, none of them has been entirely satisfactory. The present invention seeks substantially to reduce or eliminate mesh microphony in a camera tube in a simple, satisfactory and reliable manner which will result in a rugged tube presenting no serious manufacturing difficulties.

According to this invention a television or like camera tube includes, adjacent the scanned target of said tube, a mesh structure consisting of two meshes in contact with one another one of which is more lightly tensioned than the other and has an aperture of such size and shape as to accommodate the intended scanning raster of the tube so that when the tube target is scanned in the intended manner the scanning cathode ray encounters only the other mesh.

The apertured mesh may be on either side of the other mesh but is preferably on the side thereof remote from the target.

Preferably the two meshes are carried by a common supporting surround being sandwiched between said surround and a surrounding shim, the meshes, supporting surround and shim being fixed together at and near the outer edge. Preferably, in the manufacture of such a structure, the two meshes, the supporting surround and the shim are assembled, welded together at and near the outer edge, and then as a unit, heat treated manner known per se to tension the two meshes, the required lesser tensioning of the apertured mesh being obtained by consuiting said mesh of slightly heavier material than the other mesh and/or (if the aperture is rectangular (including square) in shape—the usual case) by slightly slitting the apertured mesh at the corners. In the pre-

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ferred embodiments of the invention the aperture is square or rectangular—preferably the latter—and the two meshes are supported by a surrounding circular support. For best results the diagonal of the aperture should be less than the inner diameter of the circular support in order to reduce liability to the production of standing vibration waves due to vibration wave reflections from the circular support at the corners of the aperture.

Examples of suitable materials for the meshes are copper and nickel and, for the support, Nichrome.

The invention, simple as it is to practice, provides a high degree of immunity from mesh microphony, the apertured mesh providing outwardly of the aperture therein, points of vibration damping contact with the other mesh thus to a large extent, if not entirely, preventing vibration and oscillatory movement of said other mesh under shock or external vibratory forces.

The invention is illustrated in the accompanying simplified schematic drawings and which show the invention as applied to a Vidicon. In the drawings, FIG. 1, which is provided for purposes of explanation and does not itself show the invention, is a simplified representation of a Vidicon, and FIGS. 2 and 3, which are to a much larger scale than FIG. 1, are mutually perpendicular views showing schematically a mesh structure in accordance with the invention.

Referring to FIG. 1 the Vidicon therein represented includes, within the usual evacuated envelope E, a photo-conductive layer P on the inside of the end face plate F of the envelope, a mesh M parallel to and adjacent the layer P, an electrode system including a third grid G3 and an electron gun system G. In the usual known constructions the mesh M is a simple single mesh supported by a flanged support ring (not separately shown in FIG. 1) in which it is tensioned and the flange of which is fitted into the adjacent open end of G3. Such a tube is liable to mesh microphony.

In accordance with this invention there is employed in place of the simple single mesh M of FIG. 1, a mesh structure as shown in FIGS. 2 and 3. This comprises two mesh M1 and M2 in contact with one another and sandwiched between a flanged supporting ring M3 and a ring shim M4. The mesh M2 has a central aperture M5—preferably as shown a rectangular aperture—cut out of it, this aperture being so dimensioned and shaped as to accommodate fairly closely within it the area through which the cathode ray passes when scanning the target. This area is indicated in FIG. 3 by the broken line rectangle M6. The meshes M2 and M1 are laid flat across the support ring M3 and the shim M4 then put in place to sandwich the meshes between itself and the ring M3. The parts M3, M2, M1 and M4 are then welded together at and near the edges to form a united structure. This structure is then heat treated in manner known per se to tension the meshes, with mesh M2 rather less tensioned than mesh M1. This lesser tensioning can be assured making M2 slightly thicker than M1 and/or by slitting it slightly at the corners as indicated by slits M7.

With the construction illustrated the mesh M1 will be slightly nearer the layer P (when the structure is mounted in the tube) than the mesh M2. This, though not essential, is preferred but, if desired, the mesh M2 would be nearer the layer P than the mesh M1.

The invention is also applicable to the target meshes of image orthicon tubes to reduce or eliminate microphony therein.

I claim:

1. A television or like camera tube having adjacent the scanned target of said tube, a mesh structure consisting of two meshes in contact with one another, one of which is more lightly tensioned than the other and has an aperture of such size and shape as to accommodate

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the intended scanning raster of the tube and supporting means for supporting the meshes so that when the tube target is scanned in the intended manner the scanning cathode ray encounters only the other mesh.

2. A tube as claimed in claim 1 wherein the apertured mesh is on the side of the other mesh remote from the target.

3. A tube as claimed in claim 2 wherein said supporting means comprises a common supporting surround, said two meshes being sandwiched between said surround and a surrounding shim, the meshes, supporting surround and shim being fixed together at or near the outer edges of the meshes.

4. A tube as claimed in claim 1 wherein the aperture in the apertured mesh is rectangular and said supporting means comprising a surrounding circular support the di-

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agonal of the aperture being less than the inner diameter of the circular support.

5. A tube as claimed in claim 1 wherein said one mesh is heavier than said other mesh.

6. A tube as claimed in claim 1 wherein said one mesh has slits formed therein extending from said aperture toward the edges of said one mesh.

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