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MEANS FOR PREVENTING EDDY CURRENT DISTORTION OF THE MAGNETICALLY DEFLECTED SCANNED PATTERN IN CATHODE RAY TUBES

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FIG. 2

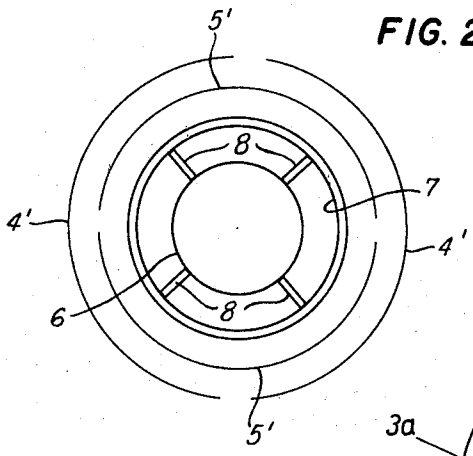


FIG. 1

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MEANS FOR PREVENTING EDDY CURRENT DISTORTION OF THE MAGNETICALLY DEFLECTED SCANNED PATTERN IN CATHODE RAY TUBES

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ABSTRACT OF THE DISCLOSURE

A cathode ray tube having a target electrode scanned by an electron beam. The electron beam is deflected along a set of orthogonal coordinate axes so as to scan the area of a target electrode. An inner wall coating of the cathode ray tube surrounds the electron beam, and is electrically connected to an electrode of different diameter also surrounding the electron beam. The inner wall coating is connected to the electrode through means of a plurality of contact springs equally spaced from each other about the axis of the cathode ray tube. The connecting contact springs are, moreover, spaced so that each makes an angle of 45 degrees with one of the coordinate axes. The arrangement maintains at a minimum the distortion of the scanned pattern realized from the deflections of the electron beam.

In cathode ray tubes such as those used for television pickup, which contain a fluorescent screen or a storage electrode that is scanned by an electron beam under the influence of two magnetic deflection fields disposed perpendicular to one another there exists the problem of keeping the pattern produced on the scanned member by the electron beam as undistorted as possible, in order that the portion of the picture scanned by the scanning pattern shall be reproduced true to shape. The geometrically accurate reproduction of the portion of the picture to be transmitted depends in the first instance upon the careful formation of the deflection field, that is, upon the geometrical forms of the magnetic fields which are produced in the interior of the tube by the deflection coils. The forms of these fields are dependent not only upon the accurate positioning of the wires forming the coil windings, but also upon the relative arrangement of the two coil systems for the horizontal and the vertical components of deflection, so that with inaccurate orthogonality, for example, disturbances of the picture geometry result from coupling between the two coil systems.

It is true that it is possible to measure and adjust the orthogonality of the coils even without making use of an electron beam; but it has also been found that even in an exactly adjusted system disturbances of the picture geometry are observed, of which the origin cannot be immediately discerned.

It has now been found that these geometrical disturbances are connected with particular constructional characteristics of the cathode ray tube, and in particular result from eddy currents which may be set up in circuits connecting different groups of electrodes in the tube by way of mountings, auxiliary contacts and wall coatings.

In cathode ray tubes of the kind to which the present invention relates there is disposed on the inner wall of the tube a wall coating to which a predetermining potential is applied from another electrode by way of a contact spring extending in the radial direction. Electrodes other than the wall coating may also receive their potentials

through contact springs from further electrodes. The disturbances produced by eddy currents' effects in the tube can now be abolished in accordance with the invention by arranging that the contact springs extend in radial directions which make angles of plus or minus 45 degrees with the directions of deflection. It is preferable for four contact springs to be employed, all of which are arranged in the directions specified and are thus disposed in pairs, in each of the two perpendicular directions.

Further features and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawing, in which FIG. 1 is a diagrammatic perspective representation, given by way of example only, of part of a television pickup tube of the image-orithicon type, and FIG. 2 is a diagrammatic cross-section of the end of the tube showing the connection for abolishing eddy currents between the electrodes. In the drawing reference **1** denotes the envelope of the tube, within which is located a face plate provided with a photocathode **2**, upon which an optical image of a scene to be transmitted is projected by means of a conventional optical system (not shown). This optical image is transferred in known manner with the help of electromagnetic means (not shown) as an electron image which impinges upon a target electrode **3**. The reverse side of target **3** is scanned with a beam of slow electrons moving under the influence of the magnetic deflection fields indicated by the arrows **4**, **5** which are produced by a conventional coil system **12**. The fields are produced in two directions perpendicular to one another. As a result of these deflections there is produced on the electrode **3** a line pattern with its edges aligned perpendicular to one another.

Chain lines parallel to the axis of the tube are shown at the points of incidence of the field-representing arrows **4**, **5** for purposes of orientation. Target electrode **3** is often constructed with a rectangular, conductive frame or border **3***a*, through which are directions necessary for the deflection fields are intrinsically determined. The electron beam proceeds from an electron beam generating system **11** of conventional type and disposed to the left of electrode **6** and, after passing through the aperture in electrode **6**, traverses a field-free space which is defined by the potential of the wall coating **7**. Wall coating **7** is connected with the electrode **6** through contact springs **8**. It has been found that unexplained disturbances of the geometry of the scanning pattern traced on electrode **3** by the electron beam occur if the contact springs **8** are arranged in random directions in relation to the directions of the deflection fields.

If, on the other hand, the contact springs are arranged at angles of 45 degrees to the directions of deflection in accordance with the teaching of the invention, then the geometrical disturbances become a minimum. This effect may be explained in that for the selected positions of the contact springs the eddy currents which flow in the loop formed by the wall coating, the contact springs and the electrode carrying these springs are balanced, so that practically no eddy currents flow in the contact springs. In this case no coupling occurs between the horizontal and vertical deflection fields and geometrical distortion of the scanning pattern from this cause becomes a minimum.

The alignment of the contact springs may also be effected with reference to a fiducial contact pin, such as pin **9** which is conventionally employed for aligning the tube with respect to the associated coil system, instead of from the frame **3***a*.

It should be remarked that the invention can be employed not only in television pickup tubes of the image-orthicon type, but also in any other cathode ray tubes

required to provide scanning patterns with small geometrical distortion and in which radial electrode leads lie within the fields of the deflection coils.

In addition to the selected positioning of the radially directed contact springs, such as spring **8**, it is advantageous also to arrange leads to electrodes disposed within the deflection field also in planes lying at 45 degrees to the directions of deflection, as is shown by the example of lead **10** in the drawing.

What is claimed and desired to be secured by Letters Patent is:

1. A cathode ray tube comprising, in combination, an evacuated envelope housing; an electron beam source within said housing for directing an electron beam substantially along the longitudinal axis of said housing; a target electrode within said housing and in the path of the electrode beam to be scanned by said electron beam; magnetic deflecting means acting on said electron beam for deflecting the same along orthogonal coordinate axes at said target electrode so as to scan said target electrode; a first electrode within said housing and surrounding said electron beam; a second electrode within said housing and surrounding said electron beam; and a plurality of contact members connecting said first and second electrodes and equally spaced about said longitudinal axis so that each contact member forms an angle of substantially 45 degrees with said coordinate axes, whereby geometrical distortion of the scanning pattern is minimized.

2. The cathode ray tube as defined in claim **1**, wherein said plurality of contact members are four members arranged in diametrically opposite pairs.

3. The cathode ray tube as defined in claim **1**, including a reference member having a conductive frame structure surrounding a predetermined area of said target electrode.

4. The cathode ray tube as defined in claim **1**, including a reference member having an external contact pin electrically connected to an electrode within said tube.

5. The cathode ray tube as defined in claim **1**, wherein said first electrode is a conductive coating on the internal surface of said envelope housing.

6. The cathode ray tube as defined in claim **5**, wherein said first electrode is spaced from said second electrode along said longitudinal axis toward said target electrode, said second electrode being located within the region of said electron beam source.

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