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[73] Assignee **General Electric Company**

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[54] **CATHODE-RAY TUBE DEFLECTION YOKE
MOUNTING MEANS**
10 Claims, 5 Drawing Figs.

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178/7.81
[51] Int. Cl. H01f 1/00
[50] Field of Search 335/210,
212; 178/7.8, 7.81; 313/75, 77

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ABSTRACT: Improved means for mounting a cathode-ray tube deflection yoke, wherein means are provided for achieving three-dimensional adjustment of the yoke relative to the long axes of both the tube neck portion and the yoke housing. A clamp is provided which engages the yoke and has a pair of diametrically opposing arms that are respectively received in a pair of diametrically opposing axially extending slots provided in the yoke housing to thus support the yoke therein. Fastener means are provided which can be inserted through each of the yoke housing slots and also through additional slots provided in the clamp arms and extending substantially orthogonally to the yoke long axis, whereby the yoke may be secured in a wide range of positions relative to the long axes of its housing and the tube neck portion.

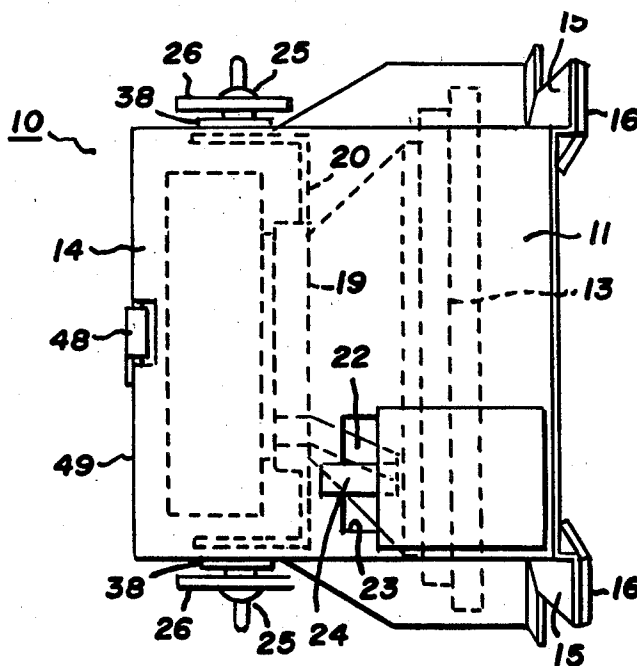


FIG. 1.

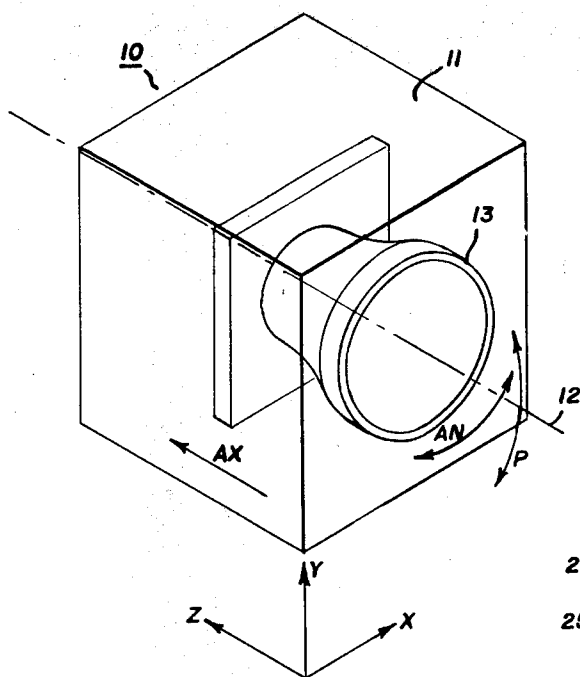


FIG. 2.

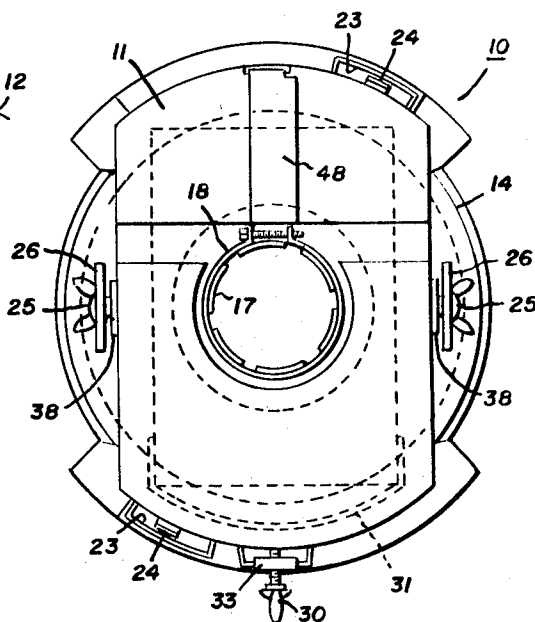
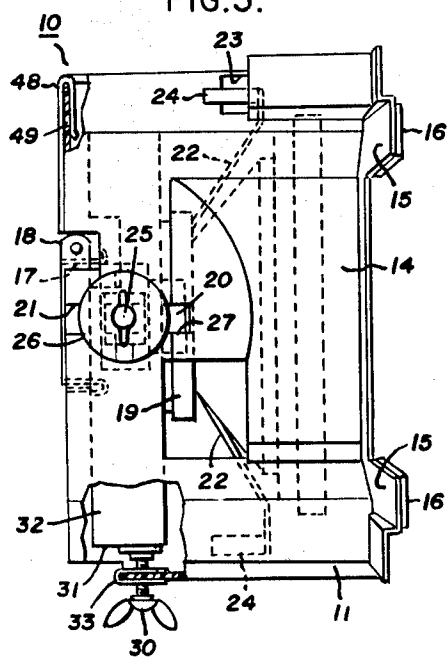


FIG. 3.



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FIG. 4.

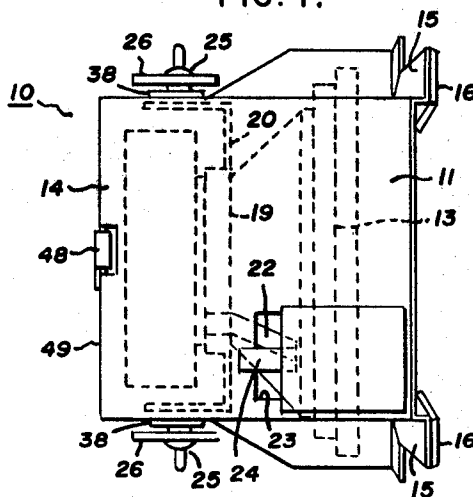
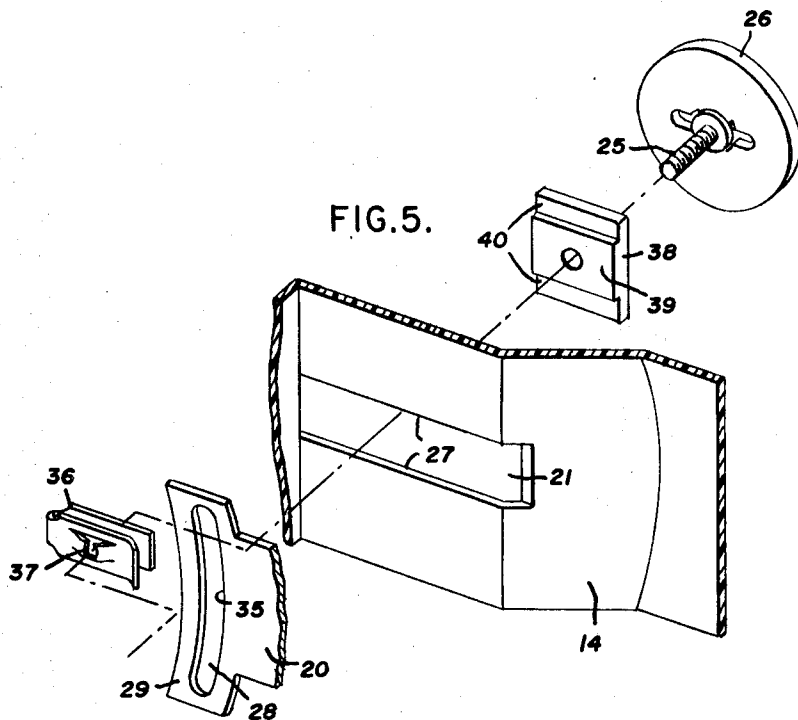


FIG. 5.



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CATHODE-RAY TUBE DEFLECTION YOKE MOUNTING MEANS

BACKGROUND OF THE INVENTION

This invention relates to mounting means for the deflection yoke of a cathode ray tube.

In producing displays with a cathode ray tube, it is necessary to scan a phosphorous screen with one or more electron beams in both the vertical and horizontal directions. The electron beams are commonly produced by electron guns mounted within the tube neck portion. This scanning is usually achieved through utilization of an electromagnetic deflection yoke that is mounted around the tube neck portion and is provided with vertical and horizontal deflection coils. Naturally, the accuracy with which a beam or beams strike the screen is quite important and is, to a degree, dependent upon the establishment and maintenance of certain relative positions among the elements of the cathode ray tube system, including the cathode ray tube itself and the deflection yoke. As may be apparent, these relative positions become even more critical in a color cathode ray tube wherein coincidence of the rasters produced by three electron beams is a necessity.

In order to reduce the hazards resulting from the high voltages associated with the deflection yoke and to provide more secure means for supporting the yoke, it has been found desirable to enclose the yoke within a housing. However, one is rarely fortunate enough to simply apply the housing with the yoke contained therein to the cathode ray tube neck portion and immediately achieve ideal positioning of the yoke with respect to the cathode ray tube. Therefore, the yoke should be permitted a considerable degree of movement relative to both the cathode ray tube and the yoke housing so as to provide an adjustable capability which permits the establishment and maintenance of the ideal relative positioning between the yoke and the tube following the application of the housing-yoke assembly on the tube neck portion. This adjustable capability is optimized when truly three-dimensional displacement of the yoke relative to the long axes of both the tube and the yoke housing is possible. Stated otherwise, adjustable capability of the yoke mounting means is optimized when the yoke can be displaced relative to the housing in a plurality of planes that are orthogonal to the long axis of the cathode ray tube neck portion and also in a plurality of planes that are parallel to the long axis of the cathode ray tube neck portion.

The various prior art means have been employed in an attempt to achieve optimum adjustable capability in a deflection yoke mounting assembly. In some instances a yoke housing was employed which permitted relative displacement of the yoke along the long axes of both yoke housing and the cathode ray tube neck portion, hereinafter referred to as axial displacement, and in addition permitted tilting of the yoke relative to the long axes of both the yoke housing and the cathode ray tube neck portion, hereinafter referred to as pitch displacement. However, these particular prior art yoke mounting means imposed rather severe restrictions on rotational displacement about the long axis of the cathode ray tube neck portion, hereinafter referred to as angular displacement. More specifically, relative angular movement between the yoke and the yoke housing was prohibited, and angular displacement of the entire yoke mounting assembly yoke and yoke housing, was required in order to establish the proper relative angular positioning with respect to the cathode ray tube neck portion. One particularly undesirable consequence of this prior art restriction was the displacement of the pitch adjustment from the vertical axis if the angular position of the yoke was at all faulty. As a result, blue raster width correction by pitch adjustment was rendered ineffective.

In other prior art yoke mounting assemblies, angular displacement of the yoke with respect to the yoke housing was provided, but only at the sacrifice of axial and/or pitch adjustments. Such prior art yoke mounting assemblies have also often failed to provide the yoke housings with adequate

fastening means for maintaining the appropriate relative positions, once achieved, and failed to facilitate the establishment of these positions. Furthermore, such prior art deflection yoke mounting means have not lent themselves to the fine adjustments which are frequently required when dealing with multibeam color cathode ray tubes. Certainly, displacement of the entire yoke mounting assembly, yoke and yoke housing, has been difficult to achieve in the fine degree that is necessary for satisfactory yoke alignment in a color cathode ray tube.

SUMMARY OF THE INVENTION

In accordance with the current invention, there is provided improved mounting means for a cathode ray tube deflection yoke, comprising a yoke housing and adjustable means for permitting relative displacement between both the yoke housing and the tube in a first group of planes orthogonal to the long axis of the cathode ray tube neck portion and also in a second group of planes parallel to the long axis of the cathode ray tube neck portion.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated in the accompanying drawings, wherein:

FIG. 1 is a three-dimensional schematic view of the improved cathode ray tube deflection yoke mounting assembly of the present invention;

FIG. 2 is a rear end elevational view of a presently preferred form of the improved cathode ray tube deflection yoke mounting assembly of the present invention;

FIG. 3 is a right side elevational view of the yoke mounting assembly of FIG. 2;

FIG. 4 is a top plan view of the yoke mounting assembly of FIG. 2; and

FIG. 5 is an exploded view of the adjustable means associated with the yoke mounting assembly of FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, there is shown a presently preferred form of an improved cathode ray tube deflection yoke mounting assembly constructed in accordance with the present invention. As schematically depicted in FIG. 1, the improved yoke mounting assembly 10 includes housing means 11 fixed relative to the long axis 12 of the neck portion of a cathode ray tube (not shown) and enclosing a generally conventional deflection yoke 13. While the mechanical structure providing support for and permitting displacement of the yoke 13 within the housing means 11 is not shown in schematic FIG. 1, three sets of arrows AN, AX, and P are provided to illustrate the freedom of movement of the yoke 13 with respect to the yoke housing means 11 and the cathode ray tube long axis 12. For purposes of this description, the housing means 11 is considered stationary in the fixed frame of reference depicted by the three-dimensional coordinates x, y, and z, wherein the z axis is aligned parallel to the cathode ray tube long axis 12.

The first set of directional arrows AN is shown as lying in a plane defined by axes x and y and illustrates the freedom of angular displacement of the yoke 13 with respect to the long axes of both the yoke housing means 11 and the cathode ray tube 12. The second set of arrows AX is shown as lying in a plane defined by the axes y and z and is illustrative of the freedom of axial displacement of the yoke 13 with respect to the long axes of both the yoke housing means 11 and the cathode ray tube 12. The third set of arrows P is also shown as lying in a plane defined by the axes y and z and represents the freedom of pitch displacement of the yoke 13 with respect to the long axes of both the yoke housing means 11 and the cathode ray tube 12.

In achieving displacement along the directions AN, AX, and P it can be seen that any given point on the yoke 13 can be moved through two groups of parallel planes. The first group of planes is orthogonal to the long axes of both the housing

means 11 and the cathode ray tube 12 and is represented by all of those planes parallel to the plane defined by the axes x and y (FIG. 1). Actually, any point on the yoke 13 may be axially displaced through any one of this first group of planes, if that point is appropriately positioned along the z axis corresponding to an appropriate axial displacement along the AX direction. Then, as the point is rotated in response to angular displacement of the yoke 13 along the direction AN, the point may be angularly displaced in any one of this first group of planes.

Similarly, the second group of planes comprises all of those planes arranged parallel to the plane defined by the axes y and z and the cathode ray tube long axis 12. Thus, for any given angular displacement of the deflection yoke 13 any given point on the yoke 13 can be moved in the AN direction (FIG. 1) through any plane in this second group of planes.

In order to better understand a particular form of the improved deflection yoke mounting that is provided in accordance with the present invention and is capable of the aforescribed three-dimensional displacement of any given point on the deflection yoke 13, reference is now made to FIGS. 2-4. As shown there, the deflection yoke assembly 10 comprises a housing means 11 which includes a cuplike shell 14 that is provided with means for gripping the cathode ray tube (not shown). Typically, these gripping means comprising a plurality of feet 15 which are provided on the outer periphery of the open front end of the housing means shell 14 and are adapted to engage the funnel portion of the cathode ray tube (not shown). A pad 16 is provided for each foot 15 to prevent slippage of the housing means 11 with respect to the cathode ray tube. The center of the rear end of the housing shell 14 is provided with a hollow cylindrical neck engaging portion 17 that is adapted to tightly engage the neck portion of the cathode ray tube (not shown) when a clamp 18 is applied thereto. The combination of the front gripper feet 15 and their associated pads 16 with the neck-engaging rear section 17 and its associated clamp 18 causes the housing means shell 14 to be suitably affixed to the cathode ray tube (not shown) so as to provide a frame of reference for adjustable displacement of the yoke 13, thereby assuring maintenance of the appropriate yoke position relative to the cathode ray tube long axis 12, once it is established.

In order to provide support for the yoke 13 within the "stationary" housing means 11, a yoke clamp 19 is provided which encircles the yoke 13. In addition to providing support for the yoke 13, the yoke clamp 19 also serves as a part of the adjustable means which are provided in accordance with the present invention for appropriately positioning the yoke 13 relative to the long axes of the yoke housing means 11 and the cathode ray tube neck portion 12. These adjustable means include a first pair of diametrically opposing arms 20 which radiate from the yoke clamp 19 and have their distal ends aligned with diametrically opposing elongate slots 21 that are provided in the left and right side walls of the housing means shell 14. The adjustable means further include a second pair of diametrically opposing arms 22 which radiate from the clamp 19 and have their distal ends received in diametrically opposed apertures 23 which are provided in the top and bottom walls respectively of the housing means shell 14. Each of these latter arms 22 has a handle 24 at its distal end which extends outwardly from the shell 14 through the aperture 23 for manipulation of the angular displacement of the yoke 13.

In order to adjust the position of the yoke 13 within the housing means shell 14, it is only necessary to loosen thumb wheels 26 provided outside of the slots 21. When this is done a threaded fastener 25 that extends inwardly from each thumb wheel 26 can be moved along the slot 21, which is provided with two parallel guiding surfaces 27 that are substantially parallel to the long axis 12 of the cathode ray tube neck portion. Furthermore, as is better shown in FIG. 5, each of the threaded fasteners 25 can also be slipped through a slot 28 which is located in an extension portion 29 that is provided at the distal end of each of the first pair of arms 20. By sliding the

threaded fastener 25 in the foregoing manner, the yoke 13 can be displaced in the direction shown by the arrows AX (FIG. 1) by movement of the threaded fasteners 25 through the housing shell side slots 21 and the yoke 13 can also be displaced in the direction indicated by the arrows AN (FIG. 1) by movement of the fasteners 25 through the slots 28 in the arm extensions 29 in response to pressure applied on the handles 24 which extend through apertures 23 in the top and bottom of the housing means shell 14.

Finally, the adjustable means provided in accordance with the illustrated form of the present invention includes a threaded pitch correction element 30 which is provided at the bottom of the housing means 11 and bears upon an arcuate surface 31 formed on a flange 32 provided on the lower rear portion of the yoke 13.

If the threaded fasteners 25 are loosened, inward threading of the pitch correction element 30 will apply force to the yoke arcuate surface 31 such as to control the pitch displacement (as indicated by the arrows P in FIG. 1) of the yoke 13. The pitch correction element 30 is fastened in its desired position by a threaded clip 33.

After the proper angular displacement AN, axial displacement AX, and pitch displacement P (FIG. 1) have been achieved, the threaded fasteners 25 can be tightened by rotation of the thumb wheels 26 to maintain the desired position of the yoke 13 with respect to the long axes of both the yoke housing means 11 and the cathode ray tube neck portion 12.

The exploded view of FIG. 5 is illustrative of a presently preferred form of the adjustable means which are provided in accordance with the present invention. The extension 29 of each of the first pair of clamp arms 20 is positioned on the interior of the yoke housing means shell 14. As shown, the slot 28 in each of the first pair of arms 20 is defined by two guiding surfaces 35 which lie in plane substantially orthogonal to the long axis of the yoke 13. A clip 36 straddles each of the two arm extensions 29 and is provided with apertures 37 overlying the slot 28.

A pair of guiding blocks 38 are positioned exteriorly of the shell 14 and each block includes a ridge 39 which can be inserted into one of the shell side slots 21. The ridge 39 includes opposing parallel surfaces 40 which are aligned parallel to the opposing long parallel surfaces 27 of the shell side slots 21, as well as the long axis of the cathode ray tube neck portion axis 12. Thus, axial displacement AX (FIG. 1) of the yoke 15 may be achieved when the blocks 38 slide along the long surfaces 27 of the shell side slots 21. Similarly, displacement of the yoke 13 is limited to angular displacement AN (FIG. 1) along the slot 28 when the clip 36 slides along the extension 29.

It is not intended that the present invention be limited to housing means 11 which includes means for adjusting the pitch of the yoke 13. As previously mentioned, pitch control is most important in color cathode ray tubes wherein it is desirable to adjust pitch in order to achieve coincidence of the blue raster with the red and green rasters. However, as indicated in copending, commonly assigned application, Ser. No. 687,268, filed Dec. 1, 1967, by Mr. R. M. Marvin, it is also possible to achieve such correction of the blue raster by using a ferromagnetic strip 48 at the rear of the yoke housing means 11 as shown in FIGS. 2-4. Such a ferromagnetic strip 48 may serve to correct the width of the blue raster by simply adjusting its position along the y axis with respect to the long axis 12 of the cathode ray tube. The strip 48 may be maintained in this adjusted position by bending over the end thereof, as shown in FIG. 3 and inserting it over the rear wall 49 of the shell 14. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the present invention.

What is claimed is:

1. Improved mounting means for a deflection yoke of a cathode ray tube comprising:
 - a. housing means enclosing the yoke and including means for supporting said housing on the cathode ray tube;
 - b. adjustable means connected to and supporting the yoke within said housing,

c. said adjustable means and housing means having intersecting slots defining substantially mutually orthogonal guiding surfaces permitting displacement of any point on the yoke through more than one plane with respect to said housing; and

d. fastener means extending through said slots at the intersection thereof, said fastener means being adapted to prevent relative movement between said adjustable means and said housing means.

2. The invention of claim 1, wherein said adjustable means permits displacement of said point with respect to said housing means in a first group of planes orthogonal to and in a second group of planes parallel to the long axis of the cathode ray tube neck portion.

3. The invention of claim 2, wherein said adjustable means permits rotational displacement of said point about said axis and in said first group of planes.

4. The invention of claim 3 wherein said adjustable means further includes an arm extending through an aperture in said shell and serving as a handle for rotating said yoke about said axis.

5. The invention of claim 3, wherein said adjustable means permits linear displacement of said point along said axis and in said second group of planes.

6. The invention of claim 5, wherein said adjustable means permits arcuate displacement of said point in said second group of planes.

7. An improved adjustable deflection yoke assembly for a cathode ray tube having a funnel portion and a neck portion, said assembly comprising:

a. a yoke encircling the tube neck portion;

b. housing means including a shell enclosing said yoke and further including front and rear means for engaging the cathode ray tube at the funnel portion and the neck portion respectively;

c. said housing means having a first slot defined by a first pair of opposing substantially parallel surfaces;

d. adjustable means secured to said yoke,

e. fastener means extending through said first and said second slots at the intersection thereof, said fastener means being adapted to prevent relative movement between said adjustable means and said housing means;

f. said first and second pairs of opposing substantially parallel surfaces permitting displacement of any point on the yoke with respect to said housing means in a first group of planes orthogonal to and in a second group of planes parallel to the long axis of the cathode ray tube neck portion.

8. The invention of claim 7 wherein said first pair of opposing substantially parallel surfaces are substantially parallel to said axis of the cathode ray tube and said second pair of opposing substantially parallel surfaces are substantially orthogonal to said axis.

9. The invention of claim 8 wherein said adjustable means includes fastening means extending through both said first and second slots.

10. The invention of claim 8 wherein said yoke has a rear flange portion including an arcuate surface and said adjustable means includes an adjustable pitch correction element secured to the lower portion of said shell and bearing upon said arcuate surface for achieving movement thereof.

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