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CATHODE RAY TUBE DEFLECTION SYSTEMS

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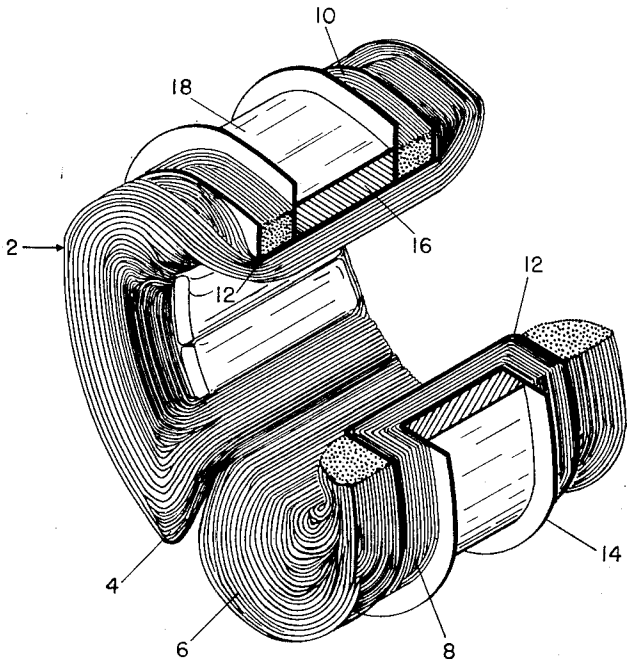


Fig. 1

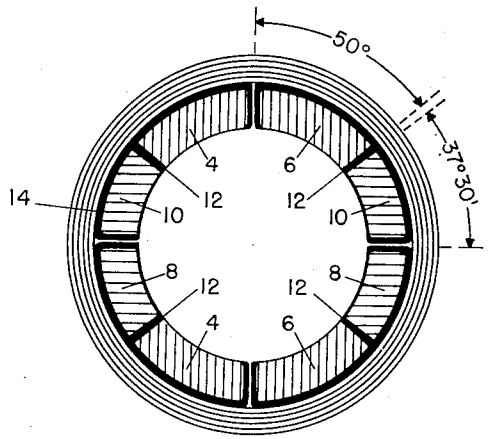


Fig. 2

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CATHODE RAY TUBE DEFLECTION SYSTEMS

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2 Claims. (Cl. 317—200)

The present invention relates to cathode ray tube deflection systems and particularly to electromagnetic deflection coils for such systems.

It has become standard practice in cathode ray tube picture or image projection to form on the cathode ray tube screen, a picture pattern or image on a raster having an aspect or width to height ratio of 4:3. Heretofore, in systems utilizing electromagnetic coils surrounding the neck of the cathode ray tube for beam deflection, the coil has been formed in a uniform assembly with perpendicularly displaced pole windings of substantially the same perimetrical dimension. With such an arrangement of pole windings, it has been found that beam spot distortion adjacent the side or vertically extending edges of the raster is considerably greater than adjacent the bottom and top or horizontally extending edges of the raster. Such distortion results in non-uniform resolution of the image throughout the areas adjacent the horizontal and vertical edges and is undesirable.

Accordingly, it is an object of the present invention to provide an electromagnetic deflection coil with pole windings so arranged as to substantially eliminate the non-uniformity of resolution of the image throughout the edge area of the picture raster of a cathode ray tube.

This and other desirable objects are attained in accordance with the present invention by providing an electromagnetic deflection coil with wire sizes and perimetrically distributed pole windings in accordance with the raster aspect ratio of a cathode ray tube screen.

For a better understanding of the invention, reference may be had to the drawing in which Fig. 1 is a perspective view with parts broken away of a deflection coil embodying the present invention and Fig. 2 is a schematic view of the cross-section of the coil of Fig. 1 taken substantially midway between the axial extremities of the coil.

Referring now to the drawing and particularly to Fig. 1 there is illustrated a cathode ray tube deflection coil or yoke **2** embodying the present invention. The yoke comprises two pairs of semi-cylindrical coil windings **4**, **6**, **8** and **10** arranged in a unitary cylindrical structure to provide pole windings of opposite polarity along axes perpendicularly displaced. As shown, each of the coil windings **4**, **6**, **8** and **10** is formed of a plurality of turns of wire with the axially extending portions of the coils serving as the pole portions of the windings.

To obtain beam deflection in accordance with the aspect ratio of the conventional cathode ray tube, the size of the wire in the coil windings and the perimetrical distribution of the pole portions is related to the 4:3 aspect ratio of the raster of the standard tube.

To accomplish this end, coils **4** and **6**, and **8** and **10** respectively are formed of wire having a size corresponding to the ratio 4:3 and the perimetrical distribution of the pole portions of the respective pairs of coils is likewise in accordance with the ratio 4:3. With the respective coils **4**, **6**, **8** and **10** formed, coils **4** and **6** are positioned with the pole portions adjacent each other to form a cylindrical structure. Thereafter coils **8** and **10** are positioned around coils **4** and **6** with their pole windings adjacent and fitted in the openings of coils **4** and **6**. An insulating material **12** preferably in the form of a flexible sheet is interposed between the respective coils **4** and **6**, and **8** and **10** to avoid electrical short circuiting between these coils. With the coil windings arranged in the positions described, the pole portions of the respective pairs of windings are centered on axes perpendicularly displaced.

Thereafter the unitary assembly of coils **4**, **6**, **8** and **10** is surrounded by a second insulating material **14**, preferably in the form of a flexible sheet and a pair of semi-cylindrical core members **16** of suitable magnetic flux conducting material are positioned around the coils to complete the unitary coil structure. To secure the core members in place, the external surface of the core members is wrapped with a continuous adhesive tape **18**.

Referring now to Figure 2, there is illustrated the perimetrical distribution of the pole portions of the coil windings to provide perpendicular fields of magnetic force having cross-sectional areas related to the raster aspect ratio. As shown in Figure 2, each of the pole portions of the coil windings **4** and **6** have a perimetrical distribution corresponding to that portion of a circle intercepted by an angle of 50 degrees. Likewise, each of the pole portions of the coil windings **8** and **10** have a perimetrical distribution corresponding to that portion of a circle intercepted by an angle of 37 degrees, 30 minutes. Accordingly, it will be obvious that the perimetrical distribution of the pole windings of the respective coils **4** and **6**, and **6** and **8** will correspond with the raster aspect ratio of 4:3.

In utilizing the deflection coil of the present invention, the structure is arranged so that the pole portions of greater perimetrical distribution are aligned on the horizontal axis of the deflection system of a cathode ray tube and the pole portions of the lesser perimetrical distribution are aligned along the vertical axis of the system.

With a deflection yoke arrangement such as I have described, the overall temperature rise and consequent power loss in the yoke is decreased and the average picture or image definition on a cathode ray tube screen is improved throughout the horizontal and vertical edge area of the raster.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A deflection yoke for producing a raster having a given aspect ratio, said yoke comprising a generally hollow cylindrical assembly of four electromagnetic coils of wire, each of said coils being wound in a rectangular form having four sides and being fitted into said cylindrical assembly, said assembly comprising pole portions formed by two of said sides being straight and substantially parallel to the axis of said cylindrical assembly, and traversed portions formed by the remaining two sides being shaped into arcuate form to define the opening of said hollow cylindrical assembly, said two pole portions and two traverse portions of each of said coils defining an open portion of each coil, said four coils being located around said cylindrical assembly in two diametrically opposed pairs with the open portions of one of said pairs being arcuately displaced in said assembly substantially 90° from the open portions of the other of said pairs, the wire forming the straight sides of one of said pairs of coils lying within and substantially filling the open portions of the other of said pairs, and the perimetrical distribution of the pole portions of one of said pairs of coils being greater than the perimetrical distribution of the pole portions of the other of said pairs of coils, the ratio between the perimetrical distribution of the pole portions of said one pair of coils and the perimetrical distribution of the pole portions of said other pair of coils being di-

rectly proportional to said aspect ratio, the wire size of said one pair of coils and the wire size of said other pair of coils having the same relationship as said given aspect ratio.

2. The deflection yoke according to claim 1 for use in deflecting an electron beam over a substantially rectangular area having an aspect ratio of 4:3, said pole portions of one of said pairs of coils having a perimetrical distribution ratio with respect to the pole portions of the other of said pairs of 4:3, the wire size of said first pair of coils having a 4:3 ratio to the wire size of said second pair of coils.

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