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CATHODE-RAY TUBE
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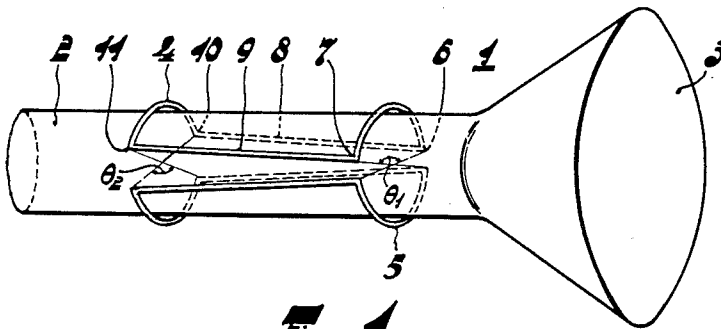


Fig. 1.

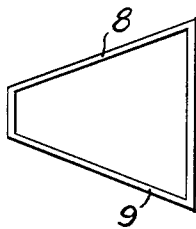


Fig. 2.

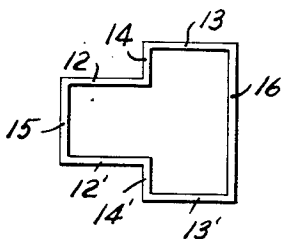


Fig. 3

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CATHODE-RAY TUBE

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3 Claims. (Cl. 313—75)

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This invention relates to a magnetic deflection system for a cathode-ray tube.

In cathode-ray tubes employing a magnetic deflection system projecting errors occur among which the third degree errors of raster distortion, astigmatism and coma are the most important. The raster distortion is proportional to a^3 , the astigmatism to a^2b and the coma to ab^2 , where a represents the angle of deflection of the electron beam and b the diameter or the opening angle of the beam. In accordance with the nature of the tube and the value of the desired angle of deflection of the electron beam, one or more of these errors will be more manifest.

The object of the present invention is to provide a deflection system which is free or substantially free from distortion and astigmatism.

According to the invention the deflection system comprises two arcuate coils symmetrically disposed to each other with respect to a plane passing through a longitudinal axis of the cathode-ray tube and surrounding the said axis. The ends of the coils nearest the screen of the tube are separated by an angle which is greater than 120° while the ends of the coils furthest removed from the screen are separated by an angle which is less than 120° .

In order to avoid raster distortion, it has been found that coils are required, which surround the tube over a considerable part of its circumference, whereas, in order to avoid astigmatism, the coils should surround the tube over a smaller part of its circumference.

Moreover, in avoiding raster distortion by means of coils surrounding the tube over a considerable part, it is the coil part nearest to the screen which is most effective, whereas in removing astigmatism by means of coils surrounding the tube to a lesser degree it is the part remotest from the screen which contributes most to the correction effect.

Experiments have revealed that both distortion and astigmatism are practically avoided if the coil halves surround the tube in the proximity of the screen over more than 120° and at the other side over less than 120° .

The invention will now be described in detail with reference to the accompanying drawing, in which:

Fig. 1 shows diagrammatically a cathode-ray tube comprising a deflection system according to one embodiment of the invention,

Fig. 2 shows a view of one coil half as shown in Fig. 1 developed on a plane and;

Fig. 3 shows a second embodiment of the coil

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system which has been developed into a plane.

The cathode-ray tube 1 shown diagrammatically in Fig. 1 comprises a cylindrical portion 2 and a luminescent screen 3 and may, for example, be used in a television reproducing device of the type projecting the image onto the screen 3 in an enlarged manner by means of a projection device.

In such a reproducing device it is often found that the coma is practically not troublesome, so that only elimination of raster distortion and astigmatism are required.

The cylindrical part 2 of the tube is surrounded by a deflection system consisting of two coil halves 4 and 5. The two coil halves have the same shape, are arranged diametrically opposite to each other, are curved about the cylindrical wall of the tube or a cylindrical former surrounding it and may consist of one or more turns.

The ends 6 and 7 of conductors 8 and 9 extending substantially in a longitudinal direction along the tube embrace an angle θ_1 of more than 120° , viewed from the axis of the tube. The ends 10 and 11 remotest from the screen 3 enclose an angle θ_2 smaller than 120° .

Fig. 2 shows, partly in broken lines, the coil half as shown in Fig. 1, developed into a plane.

This trapezoidal shape is usually to be preferred to the shape of the coil shown in Fig. 3, since the shape of the latter is more difficult to reduce to practice.

Fig. 3 shows one coil of a coil system developed into a plane, in which raster distortion and astigmatism are eliminated.

In this case, the conductors extending in a longitudinal direction of the tube consist of two parts 12, 13 and 12', 13' respectively. In a coil curved around the tube these parts extend substantially parallel to the axis of the tube, but the parts 12, 13 and 12', 13' are displaced in a tangential direction with respect to each other. These offset parts are interconnected through parts 14, and 14' respectively extending substantially at right angles to the axis of the tube. The parts 15 and 16 of the coil half are smaller and larger respectively than $\frac{1}{2}$ of the circumference of the cylindrical wall surrounded by them.

It is evident that, in order to deflect the electron beam in two directions at an angle to each other, the cylindrical part of the tube may be surrounded by two deflection systems of the aforesaid nature.

While the invention has thus been described with specific examples and applications, other modifications thereof will be apparent to those

skilled in the art without departing from the spirit and scope of the invention.

What I claim is:

1. A magnetic deflecting system for a cathode-ray tube having means directing an electron beam along a longitudinal axis and having an electron beam receiving means at one end thereof comprising two arcuate deflecting coils surrounding the axis, each coil being symmetrical to the other with respect to a plane through said axis, and each coil having a first end portion closer to said electron beam receiving means and a second end portion remoter from said electron beam receiving means, said first end portions each encompassing an arc having an angle of more than 120° and said second end portions each encompassing an arc having an angle of less than 120° .

2. A magnetic deflecting system for a cathode-ray tube having means directing an electron beam along a longitudinal axis and having an electron beam receiving means at one end thereof comprising two arcuate deflecting coils each having a substantially trapezoidal shape when developed into a plane surrounding the axis, each coil being symmetrical to the other with respect to a plane through said axis, and each coil having a first end portion closer to said electron beam receiving means and a second end portion remoter from said electron beam receiving means, said first end portions each encompassing an arc having an angle of more than 120° and said sec-

ond end portions each encompassing an arc having an angle of less than 120° .

3. A magnetic deflecting system for a cathode-ray tube having means directing an electron beam along a longitudinal axis and having an electron beam receiving means at one end thereof comprising two arcuate deflecting coils surrounding the axis, each coil being symmetrical to the other with respect to a plane through said axis, each coil having a conductor extending substantially parallel to said longitudinal axis, said conductor comprising two portions which are displaced tangentially from one another and are interconnected through a conductor extending substantially perpendicular to the said axis, and each coil having a first end portion closer to said electron beam receiving means and a second end portion remoter from said electron beam receiving means, said first end portions encompassing an arc having an angle of more than 120° and said second end portions encompassing an arc having an angle of less than 120° .

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