Feb. 8, 1949. M. J. OBERT 2,461,230

DEFLECTING COIL

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Fig. 1

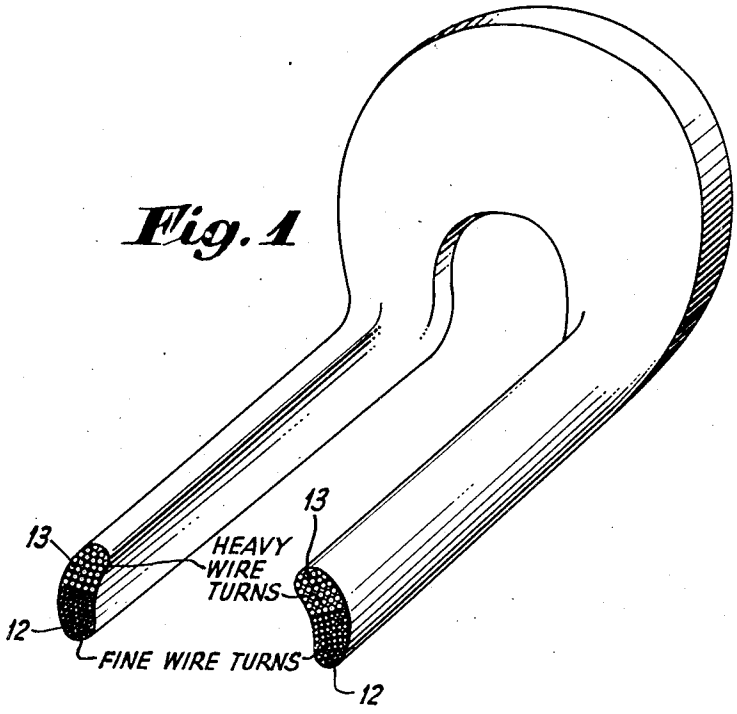
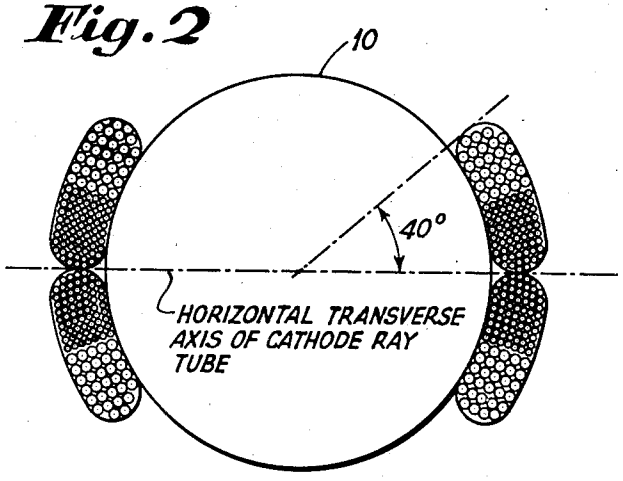


Fig. 2



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DEFLECTING COIL

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7 Claims. (Cl. 250—156)

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My invention relates in general to electromagnetic apparatus and, more particularly, to such apparatus as is used to accomplish the deflection of an electron beam.

It is common practice to wind electromagnetic coils for deflecting the cathode ray beam in a cathode ray tube with a particular size of conductor. Due to the configuration of the coil itself, and its position about the neck of the tube, the resultant deflecting effect is such that an equal focusing effect on the cathode ray beam is not maintained for all deflected positions thereof. It will be appreciated that in television apparatus the effect on the focus of the cathode ray beam reproducing the televised image, for instance, is important, and the beam should maintain a constant correct focus, or a desired focus, regardless of its point of impingement on the reproducing screen usually associated with this type of tube. Accordingly, it is one of the objects of my invention to provide a deflecting coil or yoke for deflecting a cathode ray beam and which has good deflecting properties and in which deleterious effects on the focusing of the beam during certain portions of its deflection are minimized.

It has been found that if a greater concentration of turns per unit of cross-sectional area of the deflecting coils is concentrated on the outer edge of the coils than the turns per unit cross-sectional area on the inner edge of the coil, the focusing characteristics of the coil will be improved, since, with present known kinescope types of tubes, the maximum flux should be concentrated at the outside edge of the coil. Accordingly, it is another of the objects of my invention to provide a deflecting coil for cathode ray apparatus wherein this will be accomplished.

It is a still further object of my invention to provide a deflecting coil which will have as equally a good design from the standpoint of size and shape as those that are used at present but which do not have the improved characteristics of the present invention.

My invention in general contemplates that the coil or yoke will be made by winding the coils with two or more differing sizes of wire, that is to say, wire having two or more differing cross-sectional areas. The larger sized wire may be used for the inner turns and the smaller sized wire may be spliced thereto and the coil wound to its finished form with the smaller sized wire. Presently known tools and techniques may be used to accomplish this end.

My invention will best be understood by referring to the drawings in which:

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Figure 1 shows one embodiment of my invention with a deflecting coil partially cut away; and

Figure 2 shows a cross-sectional view of the coil of Figure 1 contained between two cutting planes at right angles to the coil, and a similar section of a second coil co-operatively associated with the first.

Referring to Figure 1, there is shown one embodiment of my invention with the coil partially cut away for purposes of clarity and convenience. In this figure the cathode ray tube with which the coil is associated is omitted and the relative position of the coil and neck of the tube is indicated in Figure 2. Also for purposes of simplicity, only one coil has been shown in this figure. In this figure, there has been illustrated a coil using wire having two differing cross-sectional areas. The outer portion of the coil, or that is to say, the portion thereof that sits closest the horizontal transverse axis of the tube neck if the coil be the horizontal deflecting coil, is comprised of wire conductors 12 having a particular cross-sectional area which is relatively small. The inner turns of coil, that is to say the turns that are most remote from the horizontal transverse axis of the tube if the coil be the horizontal deflecting coil, and the vertical transverse axis if it be the vertical deflecting coil, are comprised of a conductor 13 having a cross-sectional area which is different from and some degree heavier than the cross-sectional area of the conductor 12. It will be appreciated that coils using several different sizes of wire might be used and that the invention is not limited to the use of merely two differing sizes of wire.

The coil so formed can be made to have a general shape such as that shown in the above cross-sectional showing. In practice, each coil has two arm-like members, the extreme edges of which are spaced approximately 180 degrees apart. Each arm has covered an arc of approximately 40 degrees. This may be varied as required to obtain a rectangular raster or picture on the particular kinescope used. In practice, the vertical deflecting coils would be arranged with the arms extending in the opening between the two arms of each coil.

The normal cross-section of the coil is similar to presently used coils and this particular shape lends itself to rapid production and easy and accurate assembly and spacing of interlocking sections. More turns per unit of cross-sectional area will appear on the outside section or edge of the coils than are contained on the inside edge of the coils, thus fulfilling the requirement for improved focus.

Referring to Figure 2, there is shown a cross-sectional view of a portion of the apparatus as contained within two cutting planes, each at right angles to the neck of the cathode ray tube and the coil, and spaced apart slightly and contained between the ends of the coil. In this view, the relative position of the deflecting coils and cathode ray tube neck 10 is shown as well as the relative position between the turns of the coil comprised of the fine wire and the turns of the coil comprised of the relatively heavy wire. The two coil assemblies forming the horizontal deflecting coil system are illustrated in this figure, and it will be seen that the finer wire sections of the coils are positioned immediately adjacent each other, and the heavier wire sections are positioned remotely from each other.

It will be appreciated that presently known methods and apparatus for coil winding may be used in winding the illustrated coil form. The coil is of the so-called "saddle" type of deflecting coil in which there are two active side members as illustrated which are separated by a space in between and into which another "saddle" type of coil may be fitted in order to deflect the cathode ray beam in another coordinate of its motion.

Coil winding, according to the teachings of U. S. Patent No. 2,448,672, issued September 7, 1948, by Harry V. Knauf, Jr., might be used or the teachings of U. S. Application Serial No. 631,734, filed November 29, 1945 by Gustave L. Grundmann, could be used, as well as other known forms of coil winding devices and methods.

Having now described the invention, what is claimed and desired to be secured by Letters Patent is the following:

What I claim is:

1. An electromagnetic deflecting means for cathode ray apparatus for deflecting the cathode ray beam in one co-ordinate of movement comprising coil means wound from a plurality of electrical conducting members and wherein at least one of said electrical conducting members has a cross-sectional area differing from that of the others of said conducting members.

2. Apparatus in accordance with claim 1 wherein the coil is wound from two conducting members having differing cross-sectional areas.

3. An electromagnetic deflecting yoke for cathode ray tubes for deflecting the cathode ray beam in one co-ordinate of movement comprising a coil having the inner turns thereof formed of a conductor having a different cross-sectional area than the conductors forming the outer turns thereof.

4. Apparatus in accordance with claim 3 wherein the inner turns of the coil are formed of a conductor having a cross-sectional area greater than the outer turns thereof.

5. An electromagnetic deflecting means for cathode ray tube apparatus for deflecting the cathode ray beam in one coordinate of its motion comprising a coil member formed of a plurality of conductors at least one of which has a cross-sectional area differing from the other conductors, and in which the conductors positioned nearest the axis of the tube corresponding to the coordinate of motion in which the cathode ray beam is deflected have a cross-sectional area smaller than the conductors positioned remotely from said axis.

6. An electromagnetic deflecting yoke for deflecting the cathode ray beam formed within a cathode ray tube in one co-ordinate of movement comprising a coil having a number of turns per unit of cross-sectional area in one portion thereof greater than the number of turns per unit of cross-sectional area in another portion thereof.

7. Apparatus in accordance with claim 6 wherein the number of turns per unit of cross-sectional area in the outer edges of the yoke is greater than the number of turns per unit of cross-sectional at the inner edges of the yoke.

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