

[54] **WINDING CROWN FOR INLINE GUN DEFLECTION YOKE**

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[51] Int. Cl. **H01f 7/00**

[58] Field of Search **335/210, 213; 313/76**

[56] **References Cited**

UNITED STATES PATENTS

3,111,609	11/1963	Webb.....	335/213
3,569,881	3/1971	Torsch.....	335/210
3,721,930	3/1973	Barkow.....	335/210 X
3,757,224	9/1973	Fedorko et al.	335/210

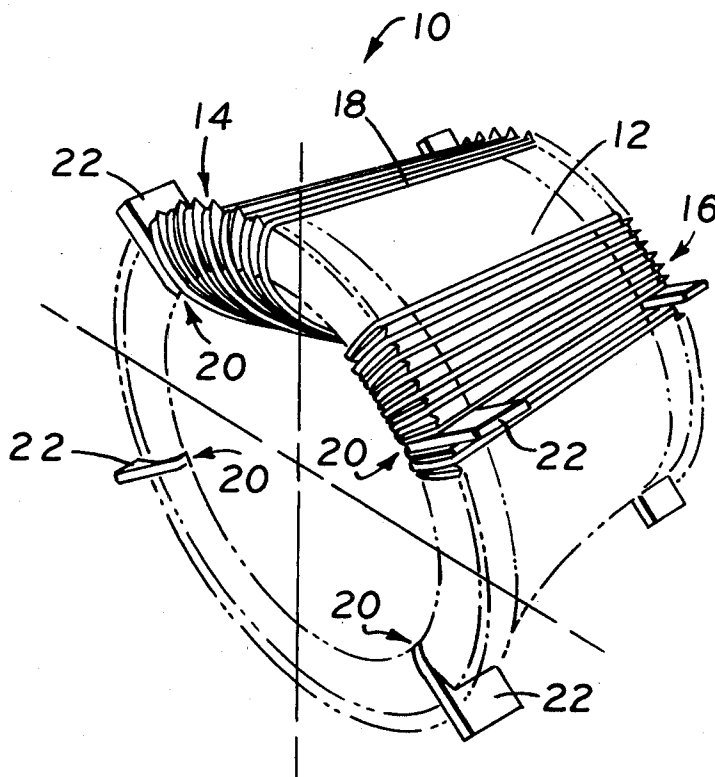
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[57] **ABSTRACT**

A toroidal deflection yoke for a color cathode ray tube comprises a hollow substantially frusto-conical core having a plurality of turns of wire toroidally wound thereabout to form a pair of horizontal deflection coils and a pair of vertical deflection coils. A front winding crown having a radial circumferential plurality of grooves for engaging the coil wires is also provided. The front crown has a plurality of voids within the coils. These predetermined voids are provided with projecting ears or tabs useful as engaging points while the coil is being wound. A similar but smaller rear winding crown is also provided at the opposite end of the core and it is also provided with a similar number of ears which are substantially coincident with the ears on the front crown.

5 Claims, 4 Drawing Figures



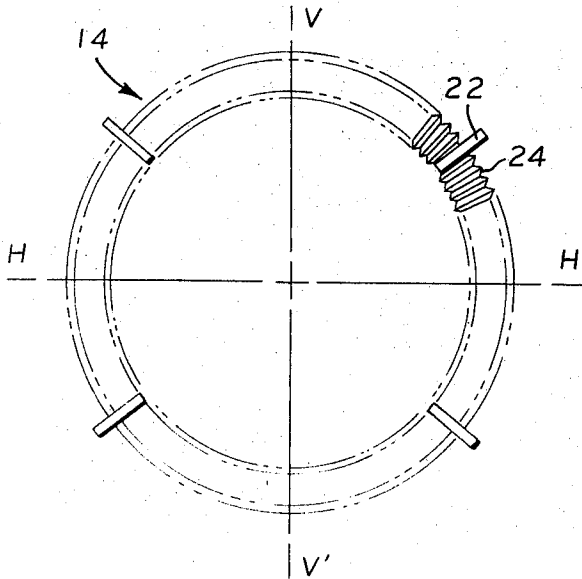


Fig. 2

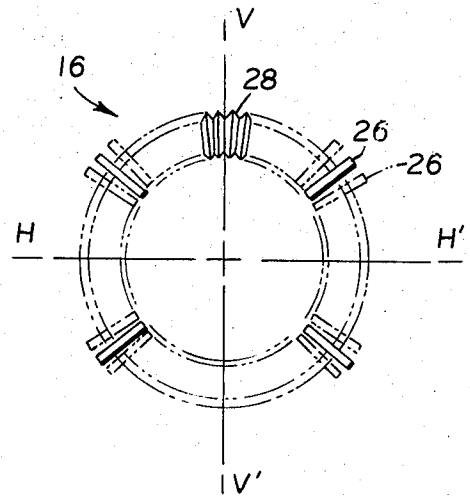


Fig. 3

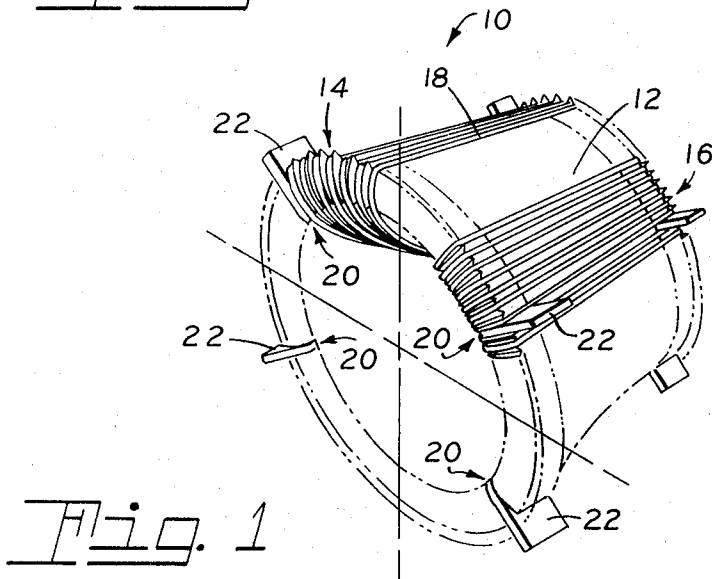


Fig. 1

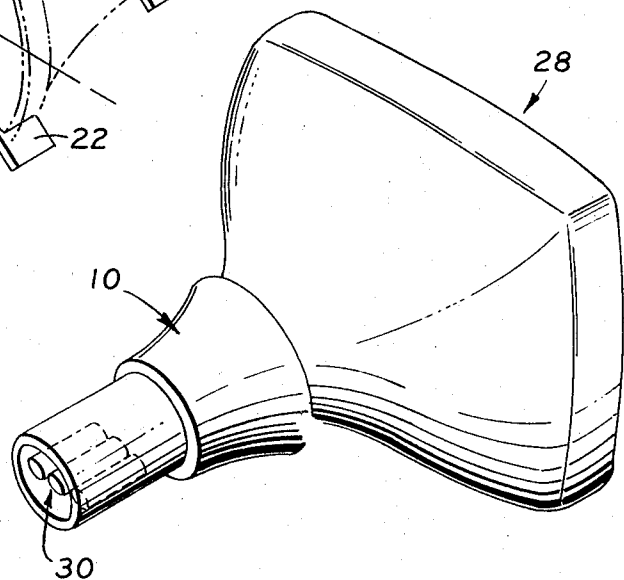


Fig. 4

WINDING CROWN FOR INLINE GUN DEFLECTION YOKE

BACKGROUND OF THE INVENTION

This invention relates to deflection yokes for color cathode ray tubes and particularly to toroidally wound deflection yokes especially suitable for use with inline gun, color cathode ray tubes.

Color cathode ray tubes as well as other black and white cathode ray tubes employ deflection yokes positioned astride the various electron beams to horizontally and vertically deflect the beam or beams so that they properly scan the screen of the cathode ray tube. There are generally two types of yokes in use, one being known as a saddle yoke and the other a toroidal yoke. This invention, as noted above, relates particularly to toroidally wound yokes. These yokes comprise a substantially frusto-conical core having wound thereabout a plurality of turns of wire in the form of pairs of horizontal and vertical deflection coils. As an aid in aligning the various turns of the coil the yokes are generally provided with front and rear crowns. These crowns consist of a substantially circumferential piece of electrically insulating material provided with radial circumferential grooves for engaging and maintaining proper separation between various turns of wire. The front crown engages the widest part of the frusto-conical core and the rear winding crown is positioned at the narrow end. Originally, toroidal yokes had winding crowns with no projecting elements. These yokes were very difficult to position and wind. Later improvements provided projecting ears or tabs on the crowns on both the horizontal and vertical axes of the yoke as an aid to the gripping arms on winding machines. An example of such ears can be found in U.S. Pat. No. 3,569,881. The yoke provided for in the above-named patent is a toroidal yoke designed specifically for operation with delta gun color cathode ray tubes. In a delta gun cathode ray tube the guns are aligned at the apices of an equilateral triangle. When such yokes are designed for inline gun color cathode ray tubes, that is, one in which all three guns are in a horizontal line, it is found that the projecting ears hinder the necessary winding operations.

OBJECTS AND SUMMARY OF THE INVENTION

It is, therefore, an object of this invention to obviate the disadvantages of the prior art.

It is another object of the invention to enhance the winding of toroidal yokes for inline color cathode ray tubes.

These and other objects of the invention are provided in a deflection yoke for an inline, multiple electron gun, color cathode ray tube by the provision of a yoke which comprises a hollow substantially frusto-conical core having a plurality of turns of wire toroidally wound thereabout to form a pair of horizontal deflection coils and a pair of vertical deflection coils. These coils are provided with predetermined voids therebetween. The front and rear crowns which are provided respectively at the front or wide end of the core and the rear or narrow end of the core are provided with a plurality of wire receiving grooves. These grooves extend radially circumferentially about the crown except for a plurality of areas which are provided with a plurality of projecting ears. The ears on the front crown are positioned in said predetermined voids. The ears on the rear crown

are positioned substantially coincident with the ears on the front crown.

Since for an inline gun tube the voids in the yoke do not appear on the horizontal and vertical axes, the ears of the crown of the instant invention will be displaced from both the horizontal and vertical axes. The positioning of the ears in the predetermined void areas greatly enhances and simplifies the necessary winding operations. This results in a much more efficient and more economical deflection yoke.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective illustration of a toroidal yoke prepared in accordance with this invention;

FIG. 2 is a plan view of the front crown employed with the yoke of FIG. 1;

FIG. 3 is a plan view of the rear crown employed with the yoke of FIG. 1; and

FIG. 4 is a diagrammatic perspective view of the yoke employed with an inline gun cathode ray tube.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

For a better understanding of the present invention, together with other and further objects, advantages and capabilities thereof, reference is made to the following disclosure and appended claims in connection with the above-described drawings.

Referring now to the invention with greater particularity, there is shown in FIG. 1 a toroidally wound deflection yoke 10 embodying the principles of the invention. The deflection yoke 10 comprises a substantially frusto-conical core 12 of a magnetic permeable material and is provided with a front crown 14 and a rear crown 16. While the winding grooves can be provided within the core material itself they are generally formed in a separate piece of electrically insulating material. The material is in the form of an annular ring and the winding grooves extend radially circumferentially thereabout. The toroidally wound turns of wire 18 form horizontal and vertical deflection coils, there being a pair of each. Predetermined voids 20 exist within the respective horizontal and vertical deflection coils. In this case there are four such voids. Positioned within the voids are projecting ears or tabs 22, these generally being formed of the same material as the crown, although this is not necessarily so.

Referring now to FIG. 2, it will be seen in the plan view of front crown 14 that the tabs or ears 22 are offset from both the vertical axis, labeled V-V', and the horizontal axis, labeled H-H'. The area between any two ears 22 is provided with a plurality of wire receiving grooves 24. These grooves act to engage and separate the turns of the coils and maintain the proper spacing therebetween. The voids are angularly determined from the yoke configuration and will generally be between 35° and 40° off the vertical axis V-V', where the inline guns are grouped in a horizontal line along the major screen axis.

The rear winding crown 16 is illustrated in plan view in FIG. 3. Herein the areas between the tabs or ears 26 are also provided with a plurality of wire receiving grooves 28. The ears on the rear piece, however, will not necessarily be exactly coincident with the ears 22 on front crown 14. This lack of coincidence can occur because of the difference in diameter between the pieces and winding gap asymmetry relative to the ears.

That is, all of the windings find an appropriate slot or groove on front crown 14. Only a single layer of windings normally appears. However, on rear crown 16 its smaller diameter as well as some winding characteristics dictate that more than one layer of winding will appear. Because of this, it can be necessary to offset the ears 26; however, this offset should not be great, and preferably should be no more than several wire grooves in either direction from a coincident position with ears 22 of front crown 14. The variability of the ears on the rear crown is illustrated by the phantom positions thereof in the drawing.

Referring now to FIG. 4, the yoke 10 is shown in its approximate position upon the neck of a color cathode ray tube 28. It will be seen that the electron gun configuration of the tube shown at 30 is inline; that is, all three guns of the tube are arrayed on a single horizontal line.

The yoke provided by this invention, with the ears located in predetermined void areas, provides a simple and economical solution to an inherent problem associated with the winding of such yokes.

While there have been shown and described what are at present considered the preferred embodiments of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the scope of the invention as defined by the appended claims.

What is claimed is:

1. A deflection yoke for an inline, multiple electron gun color cathode ray tube, said yoke comprising: a hollow substantially frusto-conical core having a plurality of turns of wire toroidally wound thereabout to form a pair of horizontal deflection coils and a pair of vertical deflection coils, said coils being provided with predetermined voids; and front and rear crowns formed respectively at the front and rear of said yoke core, said crowns each being provided with a plurality of wire receiving grooves extending radially circumferentially thereabout and having a plurality of projecting ears, said ears on said front crown being positioned in said predetermined voids and said ears on said rear crown being substantially coincident with said ears on said front crown.

2. The yoke of claim 1 wherein said voids are displaced from the vertical and horizontal axes of said core.

3. The yoke of claim 2 wherein said crowns are formed from an electrically insulating material and are cemented to said core.

4. The yoke of claim 3 wherein said voids are displaced from said vertical axis by an angle of between 35° and 40°.

5. The yoke of claim 4 wherein said angle of displacement is 38.96°.

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