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DEFLECTION YOKE CORE FOR CATHODE RAY TUBES

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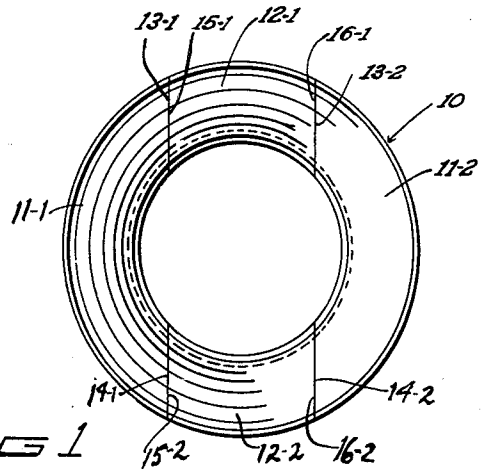


FIG 1

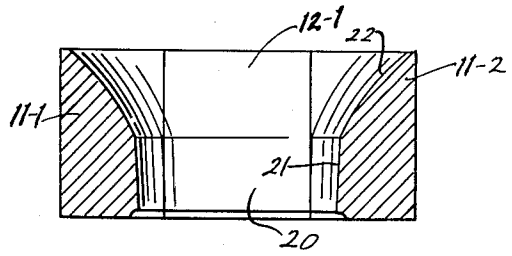


FIG 2

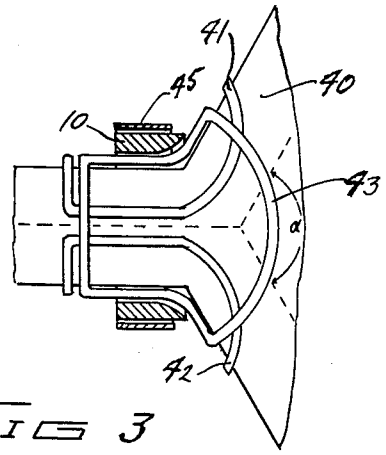


FIG 3

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DEFLECTION YOKE CORE FOR CATHODE RAY TUBES

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2 Claims. (Cl. 317—200)

This invention relates to a ferromagnetic deflection yoke core for high efficiency deflection circuits for cathode ray tubes such as TV or oscilloscope applications and particularly color television applications.

Cores made of ferromagnetic material are fitted about the neck portion of cathode ray tubes such as color television picture tubes to provide for the deflection of cathode rays within the tube. Heretofore, deflections of 70° to 90° for the rays has been considered adequate but deflections of up to 110° are sometimes desired. The cores are usually made in four parts, each part comprising a 90° sector of the complete toroid so that they may be clamped about the magnetizing coils. To obtain the wider deflections required by the more efficient cathode ray tubes the parts of the yoke core must be fitted and maintained together very accurately.

Among the objects of the invention is to provide a yoke core device which can be accurately fitted about such cathode ray tubes and which is less subject to be rendered inoperative by poor workmanship, variations in size of the neck of the picture tube and accidental dislodging.

The objects of the invention are attained by providing a yoke structure in four parts with the assembled core having two parallel mating surfaces. Thus, each of the first two opposite parts of the yoke core have two mating surfaces in the same plane while each of the second two opposite parts have two parallel mating surfaces, one at each side thereof. Thus, the mating surfaces of each of the four parts may be readily ground to close tolerances on conventional grinding equipment, the parts may be moved laterally for a limited distance with respect to each other without changing the spacing between the parts, and the parts are more readily positioned in contacting relationship by the clamping device.

The core parts may be made of any type of ferromagnetic material such as soft iron, ferrous alloys, etc. Very satisfactory ferromagnetic materials for forming the parts are the class of ceramic products known as the ferrites. These materials have the general formula $x(MO).yFe_2O_3$ in which MO is one or more bivalent oxides, in which x and y represent the mol proportions of the MO and the Fe_2O_3 respectively and in which $x:y$ is approximately 1:1.

In the drawing:

FIG. 1 is a top plan view of the core toroid assembled from the four parts thereof.

FIG. 2 is a cross sectional view taken on line 2—2 of FIG. 1.

FIG. 3 is a perspective view illustrating how the core may be applied to a television picture tube.

The assembled core **10** comprises a first pair of parts **11–1** and **11–2** which are identical in shape and a second pair of parts **12–1** and **12–2** which are also identical in shape. For the molding of the separate parts of the core therefore only two shapes of mold cavities or similar molding devices are required. Each of the first pair of parts **11–1** and **11–2** has two flat contact or mating surfaces **13–1** and **14–1** or **13–2** and **14–2** which are in the same plane and are separated by a portion of the inner circumference of the toroid. In the production of these parts from ferrite materials the powdered metal oxide components or precalcined ferrite powders are molded and sintered or fired at 1800° F. to 2400° F. or more. During the firing some shrinkage or alteration in form takes place so that the mating surfaces **13–1**, **14–1**, etc. are not flat. Furthermore, the two faces **13–1** and **14–1** or **13–2** and **14–2** are no longer in exactly the same plane after firing. The two mating surfaces of the particular piece **11–1** or **11–2** are simultaneously ground flat in a single plane to the tolerance required on conventional grinding equipment. Sintered metal core parts may be made in a similar way.

Each of the second pair of parts **12–1** and **12–2** has two parallel mating surfaces **15–1** and **16–1**, or **15–2** and **16–2**. Since the surfaces **15–1** and **16–1** are parallel, both surfaces can be ground simultaneously in appropriately spaced grinding means or a first ground surface may be employed to properly align the other surface for parallel grinding. A slight excess or deficiency in grinding any one of surfaces **13–1**, **13–2**, **14–1**, **14–2**, **15–1**, **15–2**, **16–1** or **16–2** does not result in any great change in the mating of the surfaces as is the case with radially aligned mating surfaces of the conventional core. Also, it will be noticed that parts **12–1**, **12–2** may be moved up or down as shown in FIG. 1, with respect to parts **11–1** or **11–2** without producing any increase in spacing between the mating surfaces. Thus, small differences in diameter of the neck part of a television tube may be compensated and small accidental dislocations of the parts do not produce any change in their effective permeability.

The opening **20** in the assembled toroid may be shaped to conform generally to the shape of that region of the cathode ray tube **40** which it is to surround. Thus, opening **20** may include an approximately tubular portion **21** and an outwardly flaring portion **22**.

In operation, the core bodies are fitted about a cathode ray tube **40** as illustrated somewhat diagrammatically in FIG. 3. The pair of vertically deflection coils **41** and **42** are curved gently to fit upon the conical portion of the tube **40**. The horizontally deflecting coils **43** (only one shown) are shaped similarly to coils **41** and **42**. The horizontally and vertically deflecting coils are suitably insulated from each other by thin insulating sheet material (not shown). The four pieces of the yoke core **10** completely surround the deflecting coils **41**, **42**, **43**, etc. and provide a return path for magnetic flux. The angle α indicates a deflection greater than 90° which may be obtained by such a device. The parts of the core **10** are held in place by the clamp **45**.

The features and principles underlying the invention described above in connection with specific exemplifications will suggest to those skilled in the art many other modifications thereof. It is accordingly desired that the appended claims shall not be limited to any specific feature or details thereof.

I claim:

1. In a four part ferromagnetic toroidal deflecting yoke core for cathode ray tubes, a first pair of parts each comprising two mating surfaces extending across the ring

portion of the complete toroid, said two mating surfaces being in the same plane and being separated by a portion of the inner circumference of the toroid, a second pair of parts, each having two parallel mating surfaces, one at each end of said part, each part of a pair being opposite its similar part whereby the air gap at the mating surfaces of said parts may be reduced to a minimum and the inside diameter at the centers of said second pair of parts may be adjusted without disturbing said air gap.

2. In a four part ferromagnetic toroidal deflecting yoke core as claimed in claim 1, said mating surfaces of each of said parts being ground to fit precisely upon the adjacent mating surface of the adjoining part.

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