ABSTRACT OF THE DISCLOSURE

A deflection yoke for a television picture tube. The yoke liner is formed from two half-cone shaped sections adapted to mate and receive coils and an iron core. Terminal boards mate with slots on a flange at the rear end of the liner. A protective cover fits over the flange to protect the terminal boards and hold the liner halves together.

This invention relates to an improvement in the construction of magnetic deflection yokes. In conventional television receivers, a deflection yoke is used in conjunction with the cathode-ray tube to produce a fluctuating magnetic field within the neck of the tube. This fluctuating field deflects the electron beam to vary the position of the luminous spot produced on the tube's face. The yoke itself normally comprises a generally horn-shaped yoke liner which is sandwiched between two pairs of deflection coils. The liner serves to insulate the deflection coils from one another and also provides structural support for the coils. An annular, ferrite core in the form of a split, flared ring surrounds the outer yoke coils and provides a magnetic path of low reluctance surrounding the region of the tube which is to be subjected to the magnetic field.

Sawtoothed-shaped current waveforms are applied to both the vertical and horizontal deflection coils to create the magnetic field fluctuations. Accordingly, means associated with the yoke must be provided for interconnecting these coils with the associated electronic sweep circuitry. This is commonly accomplished by including a terminal board as part of the yoke construction. The terminal board provides points of connection between the coils, a wiring harness, and various circuit components included with the yoke. The connections on the terminal board are normally hand soldered and, due to the fact that the wiring harness and the rather cumbersome yoke must be manipulated by the manufacturing personnel, this portion of the yoke construction process involves substantial labor.

It is accordingly a general object of this invention to facilitate the construction of magnetic deflection yokes of the type used in television receivers. In accordance with this aspect of the present invention, the terminal boards are produced separately from the remainder of the yoke and are first connected to the wiring harness and associated circuit components by high volume techniques (such as dip soldering). To complete the construction, the circuit board and the yoke liner are adapted to be readily attached together whereupon the deflection coils may be connected to the terminal board without extensive hand soldering being required.

It is also desirable to protect the yoke and particularly the terminal board and the components mounted thereon against damage due to impact during handling. In addition, it is desirable that testing and repair personnel who must work around the yoke while it is in operation be protected against contact with the potentially dangerous voltages existing at the yoke terminals.

It is accordingly a further object of the invention to provide an easily assembled deflection yoke of rugged, safe construction.

In accordance with this aspect of the invention, a novel yoke cover is employed which is adapted to mate with and attach to the yoke liner to cover essentially the entire exterior of the deflection yoke. The yoke cover preferably buts against a shoulder defined at the larger open end of the liner and latching means are provided for preventing axial movement away from this position of abutment. A small opening in the rear end of the cover provides an entryway for the neck of the cathode-ray tube. The cover contemplated by the present invention includes distributed openings to provide ventilation to the coils while effectively enclosing the circuit terminal board to eliminate electrical shock hazard. In addition, the yoke cover serves to protect the component parts of the yoke against possible impact damage.

These and other objects, features and advantages of the present invention may be more clearly understood through a consideration of the following detailed description of a specific embodiment of the invention. In the course of this description, reference will frequently be made to the attached drawings in which:

FIGURE 1 is an exploded perspective view of a deflection yoke construction embodying the principles of the invention;

FIGURE 2 is a sectional view of the yoke liner, terminal boards, and yoke cover in assembled position;

FIGURE 3 is a rear, end view of a single yoke liner half shown with a circuit terminal board affixed thereto;

FIGURE 4 is an edge view of the circuit terminal board shown in FIGURE 3 illustrating its mounting on the rear, circular flange of the yoke liner; and

FIGURE 5 is an enlarged cross-sectional view illustrating the latching arrangement employed to interconnect the yoke liner and cover.

The exploded perspective view of FIGURE 1 shows a yoke liner indicated generally at 11 sandwiched between a pair of vertical deflection coils indicated at 13 and a pair of horizontal deflection coils indicated at 15. Each of these coils is "saddle-wound" such that they conform to the horn-shaped liner 11 and to the exterior walls and neck of the cathode-ray tube (not shown) over which the yoke is placed. A ferrite core made up of core halves 17 and 19 surrounds the deflection coils 13 and provides a magnetic path of low reluctance around that area of the cathode-ray tube which is to be subjected to the magnetic field. The core halves 17 and 19 are held in place by a clamping band indicated generally at 21.

The yoke liner 11 is made up of two liner halves indicated generally at 23 and 25 which together form a flared, horn-shaped unit having an enlarged opening at its forward flared end and a smaller opening at its rearward end. Liner halves 23 and 25 are preferably molded from flame-retardant polypropylene or an equivalent.

Both liner halves 23 and 25 include flange portions which extend radially outward from their rearward ends, these flange portions together forming the circular flange indicated generally at 30. A smaller, rearwardly extending flange indicated at 31 surrounds the periphery of circular flange 30 to add structural rigidity to the unit.

The opposing sides of the circular flange 30 are recessed to provide a seat for terminal boards 33 and 35 (terminal board 33 is shown in place and terminal board 35 is shown detached). The terminal board 35 fits into and is retained by the recess 37 in the circular flange 30. As seen in FIGURES 2 and 3, the circuit boards 33 and 35 fit into notches or channels defined in the rearwardly extending flanges defining the recesses. As seen in FIGURE 1, recess 37 is provided with apertures 38 and 39 at each end thereof.
into which tabs 41 and 42 respectively on terminal board 35 are inserted. The circular flange 30 flexes with respect to the circuit board 35 sufficiently to allow the tabs 41 and 42 to snap into place within the apertures 38 and 39, firmly holding circuit board 35 in position. Circuit board 33 is similarly adapted to mate with and attach to the opposite recess in circular flange 30.

The circuit boards 33 and 35 illustrated in FIGURE 1 are each provided with seven dip-soldered terminal studs as shown at 45. As shown in FIGURE 4 of the drawings, the terminals 45 include a hollow, conical portion which extends downwardly from the terminal board 33. This conical portion includes slits which extend upwardly from the tip of the conical section to permit a wire, when pushed downwardly into the hollow conical section, to force the conical section apart, permitting the wire to pass therethrough. As illustrated in FIGURE 1, resistors, capacitors, or other circuit elements may be attached to the terminals 45 by inserting their leads through the conical portion of the terminals 45. In addition, the conductors of a wiring harness indicated generally at 50 may be inserted into the conical, dip-soldered portions of the terminals 45. Accordingly, the wiring harness 50 and the associated electronic components may be preaffixed to the terminal boards 33 and 35 before these terminals are attached to the yoke liner 11.

To complete construction of the yoke, it is merely necessary to insert the terminal boards 33 and 35 into the recesses in the circular flange 30 and to then connect the leads of the magnetizing windings to the rearwardly extending, apertured lugs which form part of the terminals 45.

With the wiring thus completed, the yoke cover indicated generally at 60 is placed over the assembled yoke. Yoke cover 60 is generally frusto-conical in shape and has a closed rearward end which defines a smaller opening at 61 to receive the neck of the tube. Opening 61 is surrounded by a series of resilient, bowed bands forming scallops as indicated at 62. The resilient bands 62 serve to centralize the yoke with respect to the neck of the tube and provide intake passages for cooling air around the tube neck. The cover 60 at its enlarged, flared end bears against the flared end of the yoke liner 11 as illustrated in FIGURE 2 of the drawings.

The yoke is held in place by four latching members shown at 63 through 66 in FIGURE 1 which project rearwardly from the outer edge of circular flange 30. As illustrated by the latch member 65 shown in FIGURE 5 of the drawings, a beveled surface 71 is provided at the outward end of each latch member in order to cam the latch member around a recessed shoulder member indicated at 72 defined in the cover 60. As the cover is inserted, therefore, the latching member is cammed radially outward and then snaps inward to bear against the shoulder member 72 and prevent rearward, axial motion of the cover 60 with respect to the liner 11.

The side walls of the cover 60 are provided with circumferentially distributed, elongated openings 75 which provide ventilation for the yoke components. The opening 76 is enlarged to provide an exitway for the plug at the end of the wiring harness 50.

It is to be understood that the embodiment of the invention which has been described is merely illustrative of one application of the principles of the invention. Numerous modifications may be made by those skilled in the art without departing from the true spirit and scope of the invention.

What is claimed is:

1. An improved deflection yoke liner with cover for use in combination with electromagnetic coils and a ferromagnetic core to produce a fluctuating magnetic field which deflects an electron beam when operably connected to a cathode ray tube comprising, in combination, first and second horn-shaped liner halves, each half having a flared forward end and a narrow rear end, said halves fitted together to define a symmetrical axis of rotation, said halves being substantially mirror images of each other through a plane coincident with said axis, said narrow end including a semi-annular flange of flexible material circumferentially surrounding said narrow end, at least a part of said flange being in a plane substantially perpendicular to said axis, each of said flanges including at least two spaced recesses defined on the rearward facing side of said flanges, each of said flanges also including at least two latch members extending in a normal, rearwardly direction from said flanges,
at least one circuit board adapted to receive a plurality of wire connections and including first and second spaced tabs adapted to mate and lock into one pair of spaced recesses whenever said flange is flexed to position said tabs into proper locking relation with said recesses, said circuit board being held in a plane substantially perpendicular to said axis by flexure biasing force of said flange material which causes said tabs to remain locked in said recesses;
a circular cover having a circumferential side and a top, said top having a central opening generally coincident with said axis to receive a neck of a cathode ray tube, said top also including an opening for each of said latch members, each opening having a shoulder member adapted to mate with one of said latch members passing through said opening and hold said cover in tight, protective communication with said liner halves, said latched cover also serving to hold said halves together, said side of said cover mating with said halves to protect and insulate said terminal boards and having means extending to said flared forward end.

References Cited

UNITED STATES PATENTS
2,563,116 8/1951 Hultgren 313—76
2,787,743 4/1957 Hultgren 335—213
3,136,931 6/1964 Harten et al. 335—210

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