

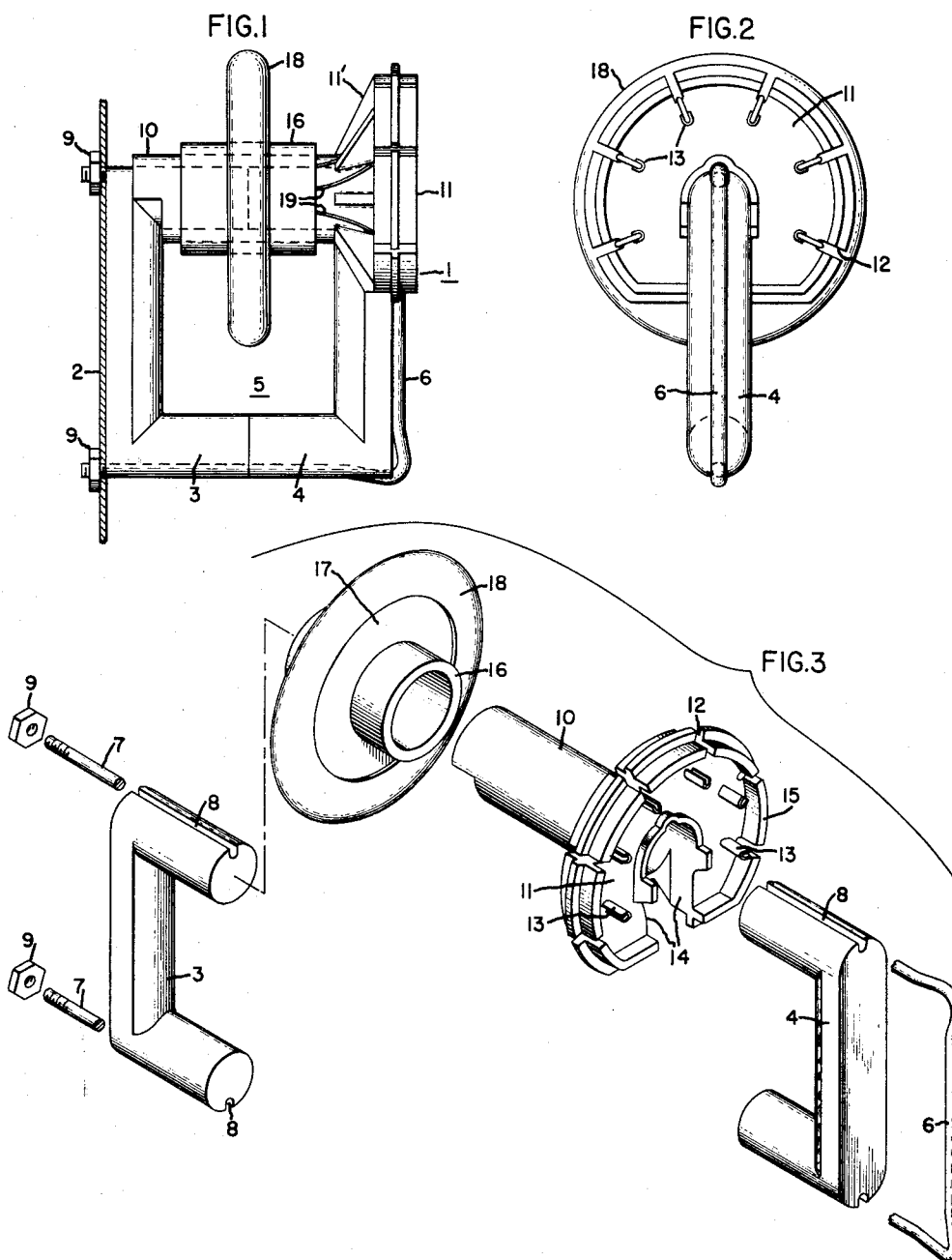
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D. H. HARSE

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HORIZONTAL SWEEP TRANSFORMER

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INVENTOR:
DOUGLAS H. HARSE,
BY *Donald N. Timbre*
HIS ATTORNEY.

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HORIZONTAL SWEEP TRANSFORMER

Douglas H. Harse, North Syracuse, N.Y., assignor to
General Electric Company, a corporation of New York

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This invention relates to the art of high voltage transformers suitable for use in television receivers to provide a high accelerating and deflection voltages required by such instruments.

Deflection transformers usually found in television receivers include a plurality of closely coupled coils superimposed one over the other. These coils are wound on a leg of a core which is generally rectangular in configuration and open at the center to provide a window. The coils in standard practice may number three. The first, a primary winding, is of the elongated solenoidal type and generally extends along almost the entire length of the leg on which it is placed. A secondary coil is closely coupled thereto and is in fact usually situated within the opening of the primary coil. These two coils are of similar configuration and are separated only by a suitable insulating material. A tertiary winding is provided around the primary, separated only by suitable insulation. The secondary coil, which may be a tapped winding of the primary, functions to supply voltage for the deflection yoke, encompassing the cathode ray tube, while the tertiary coil provides the accelerating voltage for the anode of the tube. The entire transformer is usually mounted in a rigid metal assembly for supporting and retaining purposes and terminals for the coil leads are provided on this supporting frame. In standard practice this unit, both the transformer and its frame, are mounted in a metallic container for shielding and fire-proofing purposes. Additional windings sometimes surround a portion of the core to provide a voltage for filament heating circuits. Such a construction is inherently difficult to adapt to mass production techniques as the assembly involves a considerable number of parts and steps. The terminals of the coils must be provided on the frame and, since there is a high voltage present, location and insulation of all of the coil elements is a problem.

An additional feature of those transformers used for this purpose has been the use of either a laminated iron core or a core formed from a ferrite material molded into a desired shape. The legs, forming a part of this core are rectangular in cross section. Since the coils wound thereon are, as pointed out, solenoidal or circular in cross section, the maximum effective coupling between the coils and the core has not been obtained. It would therefore be advantageous to provide a transformer which was inherently amenable to the application of mass production techniques, which provides facilities for the connection of all of the circuits associated with a television sweep transformer and which achieves the optimum coupling between the coils and the core thereof.

Therefore, it is an object of this invention to provide a novel high voltage transformer having a core which is relatively simple in construction and consequently may be easily assembled and disassembled.

It is another object of this invention to provide a novel transformer wherein means is provided for making connections to the windings thereof in such a manner

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that the insulating and locating problem associated with high voltage transformers is considerably diminished.

It is still another object of this invention to provide a novel transformer wherein the coil form on which the transformer windings are wound and the cooperating and supporting element of the core have the same cross-sectional configuration so that the optimum coupling is achieved between the coils and the core.

It is a further object of this invention to provide a novel transformer coil form and terminal holder or circuit element support means formed from a single piece of material so that the cost of these two components and their assembly to the transformer unit is reduced.

It is still a further object of this invention to provide a novel transformer including a core wherein the structure holding the transformer in its assembled position is considerably simplified so that a cumbersome, weighty means is not required to mount the transformer in its assembled position on the chassis of the television receiver utilizing such an element.

In carrying out my invention, in one form thereof, I provide a transformer core of ferrite magnetic material which consists of two substantially U shaped sections molded to the desired shape. The sections are placed in a position wherein the legs of the U's confront each other so that a rectangular structure is formed with a window. Encompassing one set of legs is a circuit element support formed of an insulating material. One portion of the circuit element support is formed as a tubular piece and substantially surrounds one set of legs. The required coils are wound thereon. The legs are circular in cross-section to match the tubular portion of the circuit element support whereby maximum coupling between the windings and the core can be achieved. The end portion of the circuit element support is formed as a disc greater in diameter than the tubular portion. Adjacent the outer periphery of the disc portion I provide electrical connectors to which the coil leads may be attached as desired. The U sections forming the transformer core each has a groove formed on the outer side of the legs thereof. When placed in an assembled position, the grooves of each set of legs match and a fastening means such as a U bolt encompassing the entire transformer may be passed through the grooves and the entire assembly thereby secured in its proper position. This unit when assembled may be attached to a suitable mounting means and placed in a metallic shield, or, if desired, the unit may be attached directly to the wall of such a shield. By the use of this construction, I achieve a reduction in the number of parts, simplicity in the assembly, and greater efficiency of operation.

Further objects and advantages of my invention will become apparent as the following description proceeds, reference being had to the accompanying drawing, and its scope will be pointed out in the appended claims.

Figure 1 is a side view of an assembled transformer embodying my invention;

Figure 2 is an end view of the transformer illustrated in Fig. 1; and

Figure 3 is an exploded view in perspective of the elements of the transformer embodying my invention.

Referring now to Figure 1 of the drawing there may be seen a transformer designated by reference numeral 1. The transformer is mounted on a portion of a shielding wall or other suitable support 2. A pair of U-shaped sections 3 and 4 which are molded out of a ferrite or other suitable magnetic material are assembled so that the legs of one U-shaped section confront and abut the legs of another U-shaped section. When so assembled they form a rectangular structure which presents a window 5. In order to hold the transformer in its assembled position, a U bolt 6 may be provided. The bolt has

a pair of legs 7 which are threaded at their ends and extend through matching grooves 8, shown in Figure 3, in the core legs 3 and 4. The legs 7 of the U bolt 6 may be passed through apertures provided in the support 2 and the entire transformer unit 1 retained in its assembled position by means of the nuts 9. A circuit element support which functions as a coil form and insulator encompasses one pair of core legs. A first or hollow tubular portion 10 of the circuit element support surrounds a pair of abutting core legs and formed integrally therewith is a second or enlarged disc portion 11. Reinforcing ridges 11' may be formed to extend from the tubular portion 10 to the disc 11 for strengthening purposes and to maintain separation of the coil leads. Formed in the periphery of the disc portion 11 are a plurality of slots 12 to receive the transformer coil leads in a manner to be described in greater detail hereinafter. Metallic electrical connectors or terminals such as shown as 13 may be mounted in the disc portion by being molded therein or retained by a suitable mechanical connection. The disc portion 11 is provided with a pair of downwardly depending portions 14 which when the circuit element support is assembled on the core legs overlie either side of a vertical section of the core section 4 so that relative movement between the circuit element support and the transformer core is prevented. If desired, suitable strengthening projections such as shown at 15 on the disc portion 11 may be provided.

Any desired windings may be provided on the tubular portion 10. The windings illustrated in the drawing are typical of those presently in use. They are constituted by a solenoidal-type winding 16 which has a pancake-type winding 17 superimposed directly thereover and separated therefrom by suitable electrical insulation (not shown). Further insulation which may be a molded rubber or wax cover 18 is provided around the periphery of the pancake winding 17. A plurality of leads 19 extend from the windings on the tubular portion 10 of the circuit element support between the ridges 11' and are passed through the slots 12 and connected to the electrical terminals 13. It is obvious that any number of slots 12, electrical terminals 13 and leads 19 may be provided.

In the assembly of the transformer, the tubular portion 10, after coils 16 and 17 are wound thereon, is inserted over one of the legs of the U-shaped core section. The other U-shaped core section 4 is now inserted into the open end of the tubular portion 10 so that the downwardly depending portions 14 of the disc 11 encompass each side of the vertical portion of the core section 4. The legs of the U-shaped bolt are passed through the matched grooves 8 of each pair of core legs and the entire unit is mounted on the support 2 by means of the nuts 9.

It may be seen that the above-described transformer is capable of rapid assembly. It may further be seen that the circuit element support which constitutes the coil insulator, may be fabricated rapidly and inexpensively out of any suitable insulating material; for instance, by molding a plastic. The electrical terminals 13 provided on the disc portion 11 are spaced a distance apart and the leads 19 extend between the ridges 11' so that the problem of insulating the leads is considerably lessened.

Further, the enlarged disc portion 11 increases the number of connectors and leads which can be handled on the terminal. The entire unit is capable of rapid assembly and is particularly adapted to take advantage of mass production techniques. The legs of the U-shaped core sections 3 and 4 which are circular in cross section, match the tubular portion 10 which is also circular in cross section and a much more effective electrical coupling is thereby achieved between the coils 16 and 17 and the core sections 3 and 4. While I have shown a particular embodiment of my invention, it will of course, be understood that I do not wish to be limited thereto since various modifications both in the circuit element support,

the means of mounting the unit may be made and I contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A transformer comprising a plurality of coils superimposed one over the other, a core having a leg extending through the opening of the inner-most coil, a circuit element support formed from an insulating material, said circuit element support including a tubular portion encompassing said leg and interposed between said leg and the inner-most coil, said circuit element support including a disc portion having a width greater than the width of said tubular portion, and electrical terminals mounted in said disc portion adjacent the periphery thereof and adapted to have leads extending from said coils coupled thereto.

2. A transformer as defined in claim 1 wherein said core is formed of two substantially U-shaped sections positioned so that one leg of each section abuts a leg of another section to present a substantially rectangular configuration.

3. A transformer as defined in claim 2 wherein the tubular portion of said circuit element support encompasses a pair of the abutting legs and the disc portion of the circuit element support has portions defining an opening encompassing a vertical portion of one of said core sections.

4. A transformer comprising a pair of U-shaped core sections, the legs of said sections being circular in cross section, one leg of each section being placed in confronting relationship to a leg of the other section so that a core having a rectangular configuration with a window therein is formed, a plurality of closely coupled coils superimposed one over the other surrounding one of said pairs of legs, a circuit element support including a tubular portion being circular in cross section surrounding said one pair of said legs and being interposed between the innermost coil and said one pair of legs, said tubular portion and said legs permitting close electrical coupling of said coils and said core, said circuit element support having enlarged disc portion formed integrally with said tubular portion, the largest diameter of said disc portion being greater than the diameter of said tubular portion, a plurality of electrical terminals mounted in said disc portion adjacent the outer periphery thereof, a plurality of coil leads attached to said electrical terminals and extending along said disc portion to said coils, said disc portion having a pair of depending portions formed thereon and spaced apart presenting a cut-out into which a vertical portion of one of said U-shaped core sections fits whereby the movement of said circuit element support and said coils relative to said core is limited.

5. A transformer comprising a hollow circuit element support having a body portion and an enlarged disc portion formed integrally with and having a greater diameter than said body portion, a plurality of electrical terminals mounted in said disc portion, a plurality of closely coupled coils superimposed one over the other mounted on the body portion of said hollow circuit element support, said coils between connected to said electrical terminals on said disc portion, a pair of U-shaped core sections having slotted legs, one leg of each core section aligned in confronting relationship to a leg of the other core section with the slots in said legs aligned to form a rectangular shaped core with a window therein, said circuit support element being mounted on one pair of said legs, a U-shaped bolt mounted in said slots, and means attached to said U-shaped bolt for holding the parts of said transformer together.

6. A transformer comprising a plurality of closely coupled coils, a first and second U-shaped core section, the legs of said core sections being circular in cross-

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section, one leg of one section disposed in confronting relationship to a leg of the other section whereby a substantially rectangle configuration is formed, each of said legs having a groove formed therein, the grooves in said legs being aligned when the aforesaid rectangle configuration is formed, fastening means passing through said grooves for holding said U-shaped core sections in their assembled positions, a circuit element support formed of an insulating material having a circular cross-section on at least a portion thereof, the circular cross-section of said circuit element support carrying said closely coupled coils and encompassing one of said legs of circular cross-section thereby providing close coupling between said coils and core.

7. A transformer comprising a core of magnetic material having a pair of U-shaped core sections with the legs of said core sections being circular in cross-section having grooves therein, the legs of said core sections positioned in confronting relationship with the grooves therein aligned to form a rectangular core, a circuit element sup-

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port having a portion thereof of circular cross-section mounted on one pair of abutting leg portions of said core, a plurality of coils mounted on the circular cross-section portion of said circuit element, support thereby providing close coupling between said coils and said core, a U-shaped element having the legs thereof positioned in the aligned grooves of said core, and means coupled to said U-shaped element for holding said transformer together.

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