Sept. 15, 1953 L. C. WESTPHAL 2,652,521

SHIELD FOR TRANSFORMER COILS

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FIG. 1

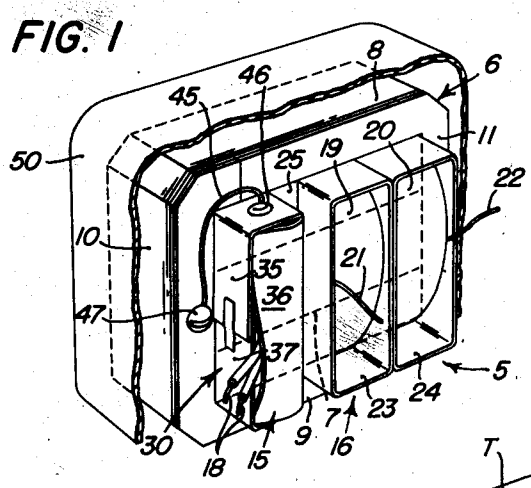
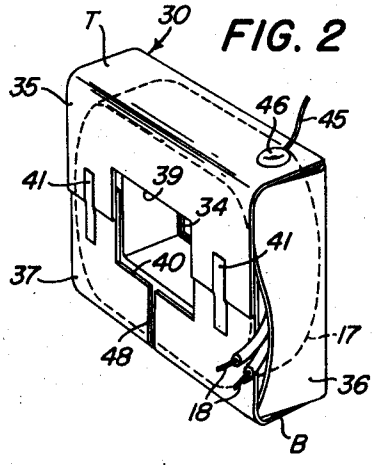


FIG. 2



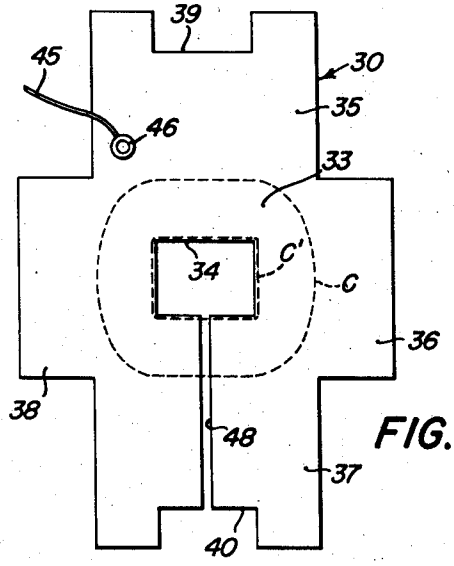


FIG. 3

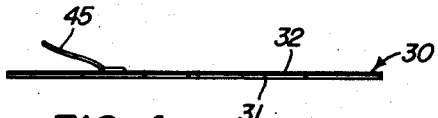


FIG. 4

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SHIELD FOR TRANSFORMER COILS

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6 Claims. (Cl. 317—206)

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The present invention relates generally to transformers, with particular reference to high tension transformers of the type known as ignition transformers and used for the purpose of providing an electrical spark for igniting fuel in a fuel burning device, although the invention is not limited to this type. It is well known to those skilled in the art that when an ignition arc is produced in a fuel burner, a high frequency electrical field is produced, which, if not properly shielded, interferes with radio reception in the vicinity. Although the arc itself is shielded by the metal walls of the heater itself and the transformer is enclosed in a metal case which also performs a shielding function, this does not eliminate the interference, for high frequency waves are emanated within the transformer case from the secondary coil and are picked up by the primary winding and transmitted through the primary coil leads to the power supply circuit in the building. Thus, the wiring in the building serves as an antenna to broadcast the high frequency oscillations which interfere with radio reception.

Therefore, it is the primary object of my invention to provide shielding between the primary and secondary coils of the transformer. A more particular object has to do with the provision of a novel and efficient shielding but which is very inexpensive and is easily installed during the manufacture of the transformer.

In the accomplishment of these objects, I have provided a shield comprising a single sheet of flexible conducting material which is shaped to easily fold around the primary coil of the transformer, enclosing and shielding it from the secondary winding without interfering with its function in the assembly. The shield is grounded to the transformer core to prevent induced voltage from building up between the shield and core.

These and other objects and advantages of my invention will be apparent to those skilled in the art after a consideration of the following description in which reference is had to the drawings appended hereto, in which

Figure 1 is a perspective view of a transformer, the case of which is broken away to expose the core and coils, one of which is shielded according to the principles of the invention.

Figure 2 is a perspective view of the transformer coil with shield installed.

Figure 3 is a plan view of the shield before it is wrapped upon the coil.

Figure 4 is an edgewise view of the shield.

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Referring now to the drawings, the transformer 5 comprises a magnetic laminated core 6 of conventional design having a horizontal central leg 7 and a pair of upper and lower legs 8, 9 disposed parallel to the central leg 7 in vertically spaced relation. The adjacent ends of the horizontal legs are interconnected by vertical legs 10, 11 in the usual manner.

Encircling the central leg 7 are two transformer windings, a primary winding 15 and a secondary winding 16. The primary winding 15 comprises a single coil 17 of wire, the two ends 18 of which are brought out for connection to the supply circuit (not shown). The secondary winding comprises two coils 19, 20, of wire, the inner ends (not shown) of which are connected together and preferably grounded on the core in a manner known to those skilled in the art and the outer ends 21, 22 are brought out for connection to the fuel igniter (not shown). The secondary coils are wrapped in sheets of insulating material 23, 24 to insulate them from the core. A magnetic shunt 25 is interposed between the primary and secondary windings in a well known manner.

The primary coil 17 is shielded from high frequency waves emanating from the secondary winding by means of an envelope of conducting material indicated by reference numeral 30. Although any suitable conducting material can be used which can be folded or wrapped around the coil, I prefer to use an insulating layer of cardboard or fibre 31 with a conducting layer of aluminum foil 32 adhered thereto.

The shield is cut in the shape illustrated in Figure 3, with a central portion 33 substantially coextensive with one side of the primary coil, the outline of which is indicated by the broken line C. The central portion 33 is provided with a centrally disposed rectangular aperture 34 through which the leg 7 of the core 6 extends when assembled. Two pairs of extensions 35, 36, 37, 38 project outwardly from the central portion 33. One pair of opposed extensions 35, 37 are longer than the other pair of opposed extensions 36, 38 and are provided with rectangular notches 39, 40 in the outer ends thereof, respectively.

The shield 30 is installed upon the coil 17 by placing the latter against the insulating layer 31 at the central portion 33 in the position indicated at C, with the aperture 34 in register with the open center of the coil 17, indicated by the broken line C^1. The two longer extensions 35, 37 are then folded over the adjacent edges of the coil

to form the top T and bottom B of the envelope as viewed in Figure 2. The ends of the extensions **35, 37** are then folded towards each other against the side of the coil opposite the central portion **33**, and the ends are secured by adhesive tape **41** or other suitable means, in overlapping relation. The two notches **39, 40** register with each other to define a rectangular aperture in alignment with the aperture **34** to receive the core leg **7**.

The two shorter extensions **36, 38** can then be folded over the corresponding opposed edges of the coil and secured by tucking the corners into the enclosure formed by the extensions **35, 37**, as illustrated in Figure 2. If desired, adhesive tape can be used to further secure the short extensions in this position. The coil ends **18** can be brought out over the edge of the extension **36** as shown.

It will now be evident that the one-piece shield **30** completely encloses the primary coil **17** to intercept any high frequency waves emanating from the secondary windings, but does not interfere with the leg **7** of the core which is assembled with the coils to extend therethrough.

A grounding wire **45** is connected with the shield **30** by a suitable rivet **46** which holds the wire **45** in contact with the conducting surface **32** of the shield. The wire **45** can be connected to the core **6** by a bolt **47** after assembly to maintain the shield at ground potential.

A slot or gap **43** is provided in the shield, extending from the central aperture **34** to the outer edge of the shield, preferably at the notch **40** as shown. This gap can be cut through the two layers **31, 32** of the sheet or merely through the conducting foil layer **32** if desired. The purpose of this gap is to prevent a circulating current from flowing around the aperture **34**, which current would be induced by the alternating field in the coil **17** and by the alternating magnetic flux in the core leg **7** if the circuit in the shield around the core **7** were complete. Such circulating current would result in heating of the shield and excess losses in the transformer.

The transformer core and coil assembly **5** is protected by a metal case **50**. Preferably, the case is filled with an insulating compound (not shown) after installation of the transformer, as is well known in the art.

I do not intend my invention to be limited to the particular details shown and described herein, except as set forth in the following claims.

I claim:

1. In combination with a magnetic core and a coil encircling said core, a shield comprising a flexible sheet of insulating material, one side of said sheet being covered with an electrically conductive material, said sheet including a central portion adapted to coincide with one side of the coil and having an aperture through which the core can extend, a pair of oppositely disposed extensions adapted to fold over opposite edge portions of said coil, and a second pair of oppositely disposed extensions adapted to fold over other opposite edge portions and over the other side of the coil and terminating in spaced relation to each other to receive the core therebetween, said conductive material having a gap extending from said aperture outwardly to one edge thereof.

2. A shielded coil for transformers and the like comprising a coil of wire having a central opening adapted to receive a magnetic core, a shield

comprising a sheet of flexible insulating material, one side of said sheet being covered with an electrically conductive material, said sheet including a central portion lying against one side of said coil and having an aperture in register with the coil opening, a pair of oppositely disposed extensions on said sheet folded over opposite edge portions of said coil, and a second pair of oppositely disposed extensions folded over other opposite edge portions and over the other side of the coil and terminating adjacent the opening therein, said conductive material having a gap extending from said aperture outwardly to one edge thereof.

3. A shield of the class described comprising a sheet of flexible insulating material, one side of said sheet being covered with an electrically conductive material, said sheet including a central portion having a rectangular aperture therein, four extensions extending outwardly from the four sides of said central portion so arranged and constructed as to form an enclosure with four ends perpendicular to said sides of said central portion when said extensions are folded inwardly, one opposed pair of said extensions being of sufficient length to fold inwardly parallel to said central portion in overlapping relation and having notches in their outer ends adapted to form a rectangular aperture substantially in register with said aperture in said central portion when said extensions are folded inwardly, said conductive material having a gap extending from said aperture outwardly to one edge thereof.

4. The combination set forth in claim 3, including the further provision that said gap in said conductive material extends from said central aperture outwardly to one of said notches.

5. In combination with a magnetic core and a coil encircling said core, a shield comprising a sheet of flexible insulating material, one side of said sheet being covered with an electrically conductive material, said sheet including a central portion adapted to coincide with one side of the coil and having an aperture through which the core can extend, a first pair of oppositely disposed extensions adapted to fold over opposite edge portions of said coil, and a second pair of oppositely disposed extensions adapted to fold over other opposite edge portions and over the other side of the coil with the ends in overlapping relation to each other, said overlapping ends having notches therein adapted to cooperate to define a core receiving aperture in register with the aperture in said central portion, said conductive material having a gap extending from said aperture outwardly to one edge thereof.

6. The combination set forth in claim 5, including the further provision that said gap in said conductive material extends from said central aperture outwardly to one of said notches.

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