

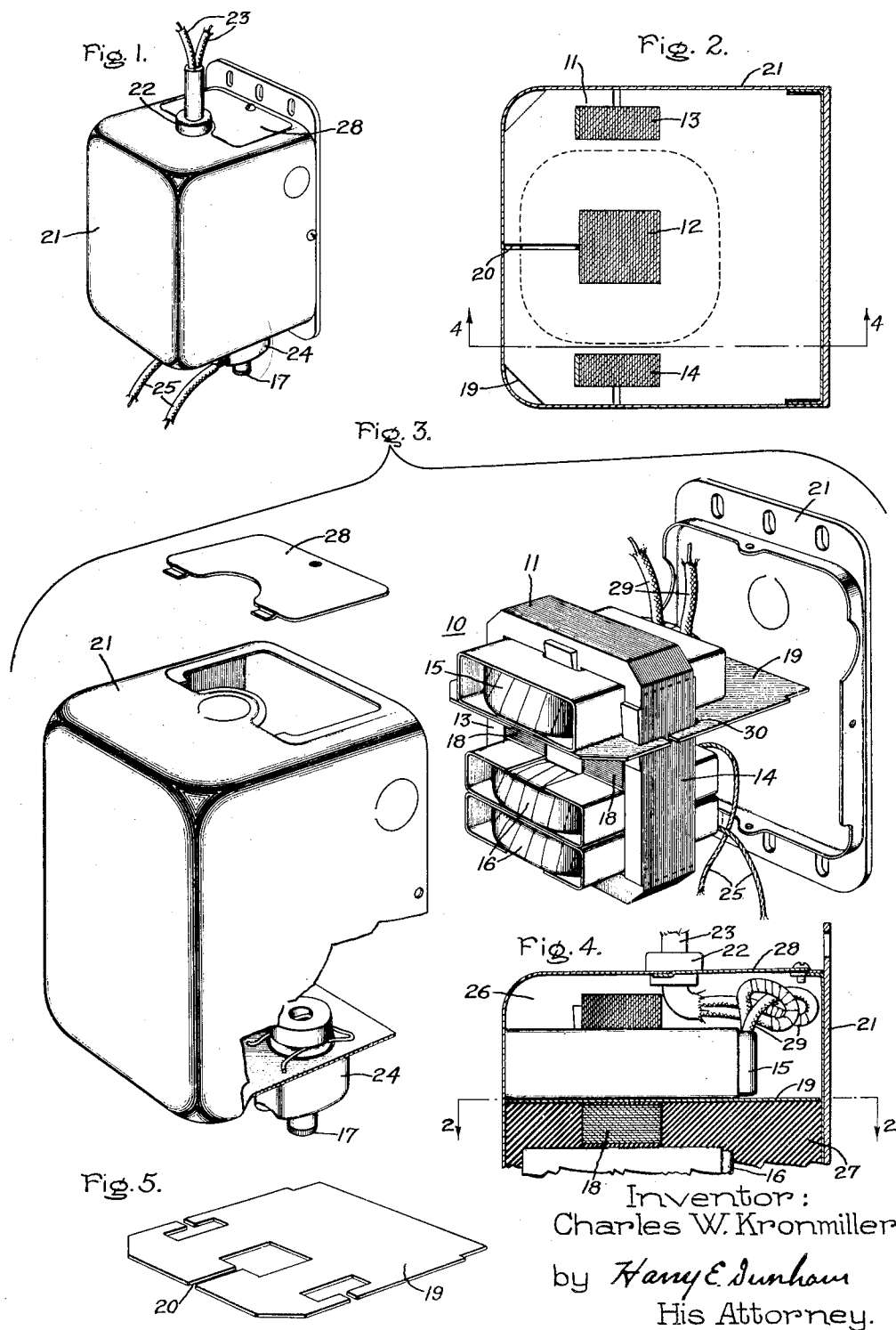
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TRANSFORMER

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TRANSFORMER

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My invention relates to transformers. The load circuit of a transformer is often of such character that the current supplied by the secondary winding of the transformer contains many high harmonics which may induce similar high harmonics in the primary circuit of the transformer through both the electromagnetic and electrostatic coupling between the two windings. These high harmonics in the primary circuit of the transformer are objectionable because they are apt to cause serious radio disturbances even at considerable distances from the transformer. A common example of transformer load in which these high harmonics appear is an ignition circuit for oil burners used in heating plants. The spark or arc which ignites the oil is responsible for the high harmonics in the secondary winding of the transformer and if these high harmonics are permitted to induce similar harmonics in the primary winding they will spread through the entire primary circuit and cause serious radio disturbances for considerable distances.

One object of the invention is to provide an improved conductive shield between the two windings of a transformer to protect the primary winding and primary circuit of the transformer from high frequency disturbances in the secondary winding. A further object of the invention is to provide the transformer with a protective casing and to arrange the conductive shield to form a partition within the casing and so to divide the interior of the casing into separate high voltage and low voltage compartments for the two windings.

The invention will be better understood from the following description taken in connection with the accompanying drawing in which Fig. 1 is a perspective view of an encased transformer constructed in accordance with the invention; Fig. 2 is a sectional view of the transformer on the line 2-2 of Fig. 4; Fig. 3 is an exploded view of the transformer and its casing; Fig. 4 is a sectional view of a portion of the transformer and its casing on the line 4-4 of Fig. 2; and Fig. 5 is a perspective view of the conductive shield which is used between the two windings of the transformer and which divides the casing into the two separate compartments.

The transformer 10, shown most clearly in Fig. 3, includes a magnetic core 11 having a winding leg 12 and two outer legs 13 and 14. The winding leg 12 is surrounded by a low voltage primary winding 15 and a high voltage secondary winding 16, the secondary winding being

shown as including two sections or coils which may be connected in series between the secondary terminals 17 of the transformer. The transformer is of the high reactance type and includes magnetic shunts 18 between the two windings to divert more and more of the primary magnetic flux from the secondary winding as the load increases so that a relatively high voltage is available to start the secondary current but so that the secondary voltage and current are limited to safe values after the current starts. A conductive shield 19 in the form of a flat metal plate or sheet is disposed between the primary winding 15 and the secondary winding 16 and magnetic shunts 18. This conductive plate is preferably formed of magnetic steel but may be of any suitable conductive metal such as copper or aluminum. The shield 19 is disposed around the winding leg 12 but is formed with a short gap 20 which is provided so that the shield cannot form a short-circuited turn around the winding leg 12 of the transformer.

The transformer 10 is enclosed in a suitable metallic casing 21 provided with an insulating bushing 22 for the primary connections 23 and insulating bushings 24 for the high voltage secondary leads 25, the secondary leads 25 being of course connected to the secondary terminals 17.

The shield 19 extends beyond the transformer 10 itself to fit substantially across the interior of the transformer casing 21 and form a partition dividing the interior of the casing into a low voltage compartment 26 and a high voltage compartment 27, the low voltage compartment 26 containing the low voltage primary winding 15 and its connections 23 and the high voltage compartment 27 containing the magnetic shunts 18 and the high voltage winding 16 with its connections 25. The high voltage compartment 27 may be filled with an insulating compound, as indicated in Fig. 4. The casing 21 may be provided with a removable cover plate 28 to permit convenient access to the low voltage compartment 26 wherein connections may be made between the low voltage leads 29 of the primary winding and the outside primary conductors 23. It is not necessary of course that the shield 19 fit tightly within the casing 21 but it should fit tightly enough to protect the low voltage winding 15 and its connections from the high voltage winding 16 and its connections and to confine the insulating compound surrounding the high voltage secondary parts to the high voltage compartment 27 in case such compound is provided. It has been found that a shield 19 formed of

magnetic material has some advantages over a shield formed of non-magnetic metal in that a magnetic shield acts as a magnetic shunt between the two windings 15 and 16 and so permits the use of a correspondingly smaller amount of magnetic material in the magnetic shunts 18. In order that it may act most effectively as a shield, the shield 19 should be connected conductively to ground, as indicated by the soldered connection 20 shown in Fig. 3, the core 11 and casing of course being usually grounded while the transformer is in service. The shield 19 which has been described is of particular advantage in that it effectively shields the primary winding 15 and its connections from high frequency disturbances in the secondary winding and further provides a useful partition within the casing so arranged that the low voltage parts of the transformer are effectively protected from the high voltage parts and any insulating compound surrounding the high voltage parts is confined to those parts and cannot reach the low voltage leads and interfere with their connection to the outside conductors 23.

The invention has been explained by describing and illustrating a particular arrangement of encased transformer and conductive shield, but it will be apparent that changes may be made without departing from the spirit of the invention and the scope of the appended claims.

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

1. A transformer including a magnetic core having a winding leg, primary and secondary windings surrounding the winding leg, a magnetic shunt between the windings for diverting magnetic flux from the secondary winding, a conductive shield disposed around the winding leg between the primary winding and said secondary winding and shunt, and a casing enclosing the transformer, the shield extending to form a partition dividing the casing into two compartments with the primary winding in one compartment and the secondary winding and shunt in the other compartment.

2. A transformer including a magnetic core having a winding leg, primary and secondary windings surrounding the winding leg, a magnetic shunt between the windings for diverting magnetic flux from the secondary winding, a shield of magnetic material disposed around the winding leg between the windings, and a casing enclosing the transformer, the shield extending to form a partition dividing the casing into two compartments with the primary winding in one compartment and the secondary winding in the other compartment.

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