

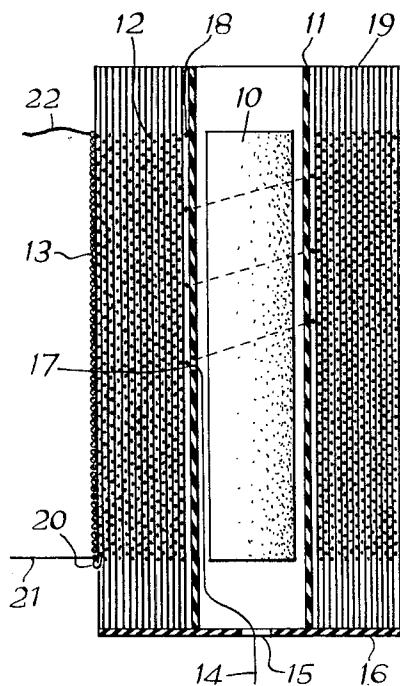
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STEP-UP VOLTAGE TRANSFORMER HAVING HIGH TENSION LEAD

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STEP-UP VOLTAGE TRANSFORMER HAVING HIGH TENSION LEAD

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2 Claims. (Cl. 336—192)

The present invention relates to transformers suitable for use as voltage step-up transformers in ignition systems of the type comprising a capacitor connected to be charged from a source of electrical energy, and the primary winding of a voltage step-up transformer connected in a discharge circuit of the capacitor through make-and-break contacts, the voltage appearing across the secondary winding of the transformer being suitable for application to a sparking plug of an internal combustion engine to effect ignition.

According to the present invention, a transformer suitable for use as a voltage step-up transformer in an ignition system of the type specified, comprises a low-loss ferro-magnetic core mounted in a former of electrically-insulating material, the former being longer than the core and being arranged with its ends projecting beyond the ends of the core, a multi-layer secondary winding being wound on the former, and over the secondary winding a single-layer primary winding connected end-to-end with the secondary winding at the outermost layer of the latter, the axial lengths of the primary and secondary windings being substantially equal to one another and equal to or less than the length of the core and the windings being disposed with the centre of the windings and the centre of the core substantially coincident whereby the ends of the former project beyond the ends of the windings, and a high-tension connection to the secondary winding passing between the core and the former and through an aperture in the central region of the former to the innermost layer of the secondary winding. A low-loss, ferro-magnetic core is, for the purpose of this specification, a core of ferrite material, particles of ferro-magnetic material in a binder, or the like.

The invention will now be described, by way of example, with reference to the accompanying drawing which is a schematic, longitudinal cross-section of a transformer.

The transformer shown comprises a cylindrical ferrite core 10, 0.5625 inch long and 0.124 inch diameter. This is inside a cylindrical tube or former 11 of insulating material 0.75 inch long, 0.13 inch internal diameter and 0.15 inch external diameter, the ends of the core being equidistant from the corresponding ends of the tube 11. Wound over the tube 11 there is a multi-layer secondary winding 12 and a single-layer primary winding 13 lying over the secondary winding 12.

The secondary winding is provided with a lead-out wire 14 which passes through a central aperture 15 in a disc-shaped, insulating end-plate 16. The connecting wire 14 passes between the core 10 and the tube 11 for about half the length of the tube 11 and then through an aperture 17 in the center of the tube 11 to the secondary winding 12.

The secondary winding 12 is of 47 S.W.G. enameled copper wire and apart from the first layer directly on the tube 11 has 15 layers as shown each layer containing 193 turns. The first layer 18 has only a few turns, say three,

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which are widely spaced. The primary winding and each layer of the secondary winding are shown to be of the same axial length as the core 10 but could be somewhat shorter than the core.

Over each layer of the secondary winding there is provided a layer of insulating paper and these layers extend to the end of the tube 11 as shown at 19.

The outermost end 20 of the secondary winding is connected to one end of the primary winding which has 33 turns of 36 S.W.G. enameled copper wire.

A lead-in wire 21 is provided to the junction of the two windings and a further lead-in wire 22 is provided to the other end of the primary winding.

The transformer described although of simple and cheap construction has proved, when impregnated with solvent less varnish, to give reliable and effective service in an ignition system of the type hereinbefore specified. Many forms of such an ignition system have been proposed but none have proved to be a commercial success. One of the factors in their lack of success has been the provision of a reliable transformer of simple and cheap construction. The present invention has been found to meet this need.

I claim:

1. A transformer suitable for use as a voltage step-up transformer in an ignition system of the type specified, comprising a low-loss, ferro-magnetic core mounted in a former of electrically-insulating material, the former being longer than the core and being arranged with its ends projecting beyond the ends of the core, a multi-layer secondary winding being wound on the former, and over the secondary winding a single-layer primary winding having one end connected with the end of the secondary winding at the outermost layer of the latter, the axial lengths of the primary and secondary windings being substantially equal to one another and at most equal to the length of the core and the windings being disposed with the centres of the windings and the centres of the core substantially coincident whereby the ends of the former project beyond the ends of the windings, and a high-tension connection to the secondary winding passing between the core and the former and through an aperture in the former substantially equidistant from the ends of the former to the innermost layer of the secondary winding.

2. A transformer suitable for use as a voltage step-up transformer in an ignition system of the type specified, comprising a low-loss, ferro-magnetic core mounted in a former of electrically-insulating material, the former being longer than the core and being arranged with its ends projecting beyond the ends of the core, a multi-layer secondary winding being wound on the former, an insulating layer axially coextensive with said former over each layer of said secondary winding and over the secondary winding a single-layer primary winding having one end connected with the end of the secondary winding at the outermost layer of the latter, the axial lengths of the primary and secondary windings being substantially equal to one another and at most equal to the length of the core and the windings being disposed with the centres of the windings and the centre of the core substantially coincident whereby the ends of the former project beyond the ends of the windings, and a high-tension connection to the secondary winding passing adjacent to the core within the former and through an aperture in the former to the innermost layer of the secondary winding and a disc-shaped

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insulating end plate overlying the ends of said former and said insulating layers and having a central aperture through which said high-tension connection extends.

References Cited by the Examiner

UNITED STATES PATENTS

649,086	5/00	Varley	-----	336—208
1,268,468	6/18	Jacobson	-----	336—198

4

1,303,162	5/19	Cavanagh	-----	317—157.62
1,657,003	1/28	Cragg	-----	317—157.6
1,702,072	2/29	Carbenay	-----	336—198
2,575,099	11/51	Crowley	-----	336—233

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