

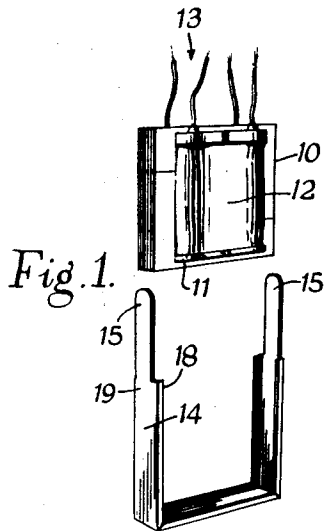
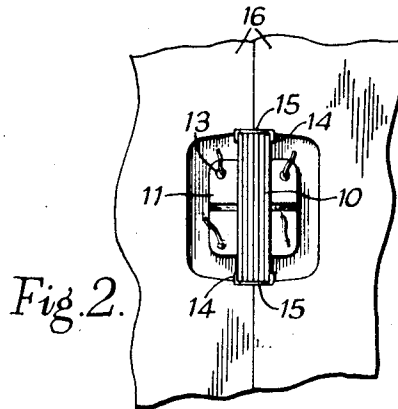
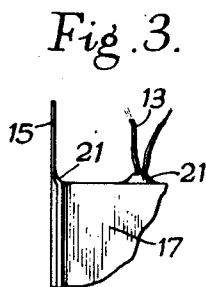
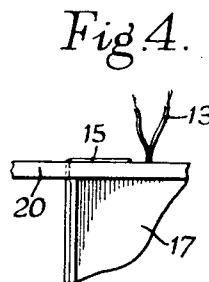
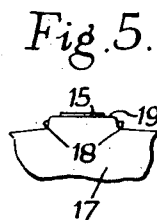
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D. L. JOHNSTON

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MINIATURE TRANSFORMERS AND CHOKES

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INVENTOR
Dennis L. Johnston
BY *Ralph B. Stewart*
ATTORNEY

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MINIATURE TRANSFORMERS AND CHOKES

Denis Lionel Johnston, Aldenham, England, assignor to Fortiphone Limited, London, England

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4 Claims. (Cl. 336-96)

The present invention relates to miniature transformers and chokes. By a "miniature" component is meant one whose maximum external dimension does not exceed about $\frac{1}{2}$ inch.

It is often desirable to encase miniature transformers and chokes in a synthetic resin, the process being known as "potting" or "encapsulation." This gives mechanical protection and resistance to the penetration of moisture which would result in failure of the fine wires owing to corrosion.

It is necessary to avoid, so far as possible, a concentration of stresses in the synthetic resin, which may arise because of different coefficients of thermal expansion of the resin and the other materials used in the construction of the component. This means that variations in the thickness of the resin should be as small as possible and abrupt variations in the thickness should be avoided.

If, in the course of manufacture, a component, such as a transformer, has to be embedded in a block of resin, it is necessary to specify a minimum thickness of the resin covering, and in a very small component this results in a disproportionate increase in volume when it is potted. For example a particular miniature transformer has the overall dimensions $\frac{1}{4}$ " x $\frac{3}{8}$ " x $\frac{3}{8}$ ", and it may be considered that the minimum wall thickness of the encasing resin should be $\frac{1}{16}$ ". Accordingly, the overall dimensions after potting become $\frac{3}{8}$ " x $\frac{1}{2}$ " x $\frac{1}{2}$ ": this is 2.7 times the original volume.

The present invention has for its object to provide an improved component in the form of a miniature transformer or choke in which this increase in dimensions is minimised and in which the component can be provided with convenient means for the mounting thereof. The component can also readily be given an attractive appearance.

According to the present invention a miniature transformer or choke having a core of magnetic material comprises a U-shaped metal member of channel section partly embracing the core, at least part of the outer surface of the said member being coated with a thin layer of resin, and the transformer or choke being embedded in a resin block, which extends up to but not over the said member, the arrangement being such that the resin layer seals to the resin block and forms therewith a continuous coating enveloping the transformer or choke. The core is usually laminated and the said member clamps the laminations thereof.

The invention will be described by way of example with reference to the accompanying drawing in which:

Fig. 1 is an exploded perspective view, much enlarged, of a transformer and a channel section U-shaped member before assembly,

Fig. 2 is a plan view of the assembled parts in Fig. 1 arranged in a mould.

Fig. 3 is a fragmentary view of the finished component,

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Fig. 4 is a fragmentary view of the finished component mounted on a panel, and

Fig. 5 is a plan view, still further enlarged, of a fragment of the finished component.

Referring to Fig. 1, the transformer shown has a laminated core 10 with a square periphery. A bobbin 11 carries the transformer windings 12 and is mounted upon the central limb of the core. Leads 13 connect with these windings. A metal clamp 14, for instance of thin brass, bent to a channel section is bent into U-shape so as to enclose three sides of the core, the laminations being tightly clamped in the channel. The parts 15 of the two limbs of the U, from which the sides of the channel have been removed, form mounting arms or lugs extending beyond the core to serve as mounting means as will be described later.

Before placing the clamp 14 in position, and if desired before forming it from sheet material, it is given a hot surface coating of an epoxy resin of the surface-coating type, which has been found to adhere well to the metal. After the clamp 14 has been coated, it is pressed into position over the core 10 and the assembly is then set in a split mould 16 of moderately hard rubber as shown in Fig. 2. The assembly is then potted using a similar resin of the "cold-setting" type, this serving to encase the windings and extending up to but not over the metal clamp. Thus, as shown in Fig. 5, the potting resin 17 extends up to and overlies and seals to the coating resin on at least a marginal portion of the side or flange surfaces 18 of the clamp but does not extend over the outer web surfaces 19 of the clamp which are protected by contact with the surface of the mould.

As shown in Fig. 4 the transformer may be mounted on a panel 20, the lugs 15 passing through slots in the panel and being bent over.

It is found that in this way good adhesion is obtained between the potting resin 17 and the resin coating on the clamp 14 which together form a sealed casing for the component. The outer surface of the metal clamp 14 may be arranged to be flush with the outer surface of the potting resin or the clamp may, as shown, project beyond the potting resin.

When, as described, the potting is carried out with the lugs 15 and connecting leads 13 projecting upward, a meniscus 21 forms on each of these projections as shown in Fig. 3 and provides a useful degree of reinforcement.

Since the potting resin does not extend over the core, the invention enables a substantial saving in volume to be made.

Suitable resins are those usually known as epoxy, epoxide or ethoxylene resins. These are prepared by reaction between a polyhydric phenol and a chlorhydrin, subsequently cured with a suitable crosslinking agent.

I claim:

1. A miniature electric component comprising a core of magnetic material, a winding on said core, a U-shaped metal member of channel section partly embracing said core with said core projecting into said channel section, a relatively thin coating of resin on the outer surfaces of said U-shaped member, and a relatively thick potted coating of resin enveloping said core and winding and extending up to and overlying at least a marginal portion of the outer surfaces of the flanges of said U-shaped member, but not over the web portion of the channels of the said U-shaped member, said potted resin being formed in situ and being sealed to the portions of the thin resin coating which it overlies, whereby the thin coating of resin on the web portion of said U-shaped member forms part of a continuous coating enveloping the component.

2. A component according to claim 1, wherein said

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core is laminated and said U-shaped member is disposed to clamp the laminations of said core.

3. A component according to claim 1, wherein said resin is an epoxy resin.

4. A miniature electric component comprising a core of magnetic material having two side and at least one end surface exposed, a winding on the core, a combined clamp and mounting member for said component comprising a U-shaped metal member of channel section having bendable extensions on the legs thereof, embracing said core with said core projecting into said channel section, a relatively thin coating of resin on the outer surfaces of said U-shaped member, and a relatively thick potted coating of resin enveloping said core and winding and extending up to and overlying at least at marginal portion of the outer surfaces of the flanges of said U-shaped member, but not over the web portion of the channels of the said U-shaped member, said potted resin

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being formed in situ and being sealed to the portions of the thin resin coating which it overlies, whereby the thin coating of resin on the web portion of said U-shaped member forms part of a continuous coating enveloping the component, and the leg members may extend through openings in a panel for supporting the component.

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