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FERROMAGNETIC POT-CORE ASSEMBLIES

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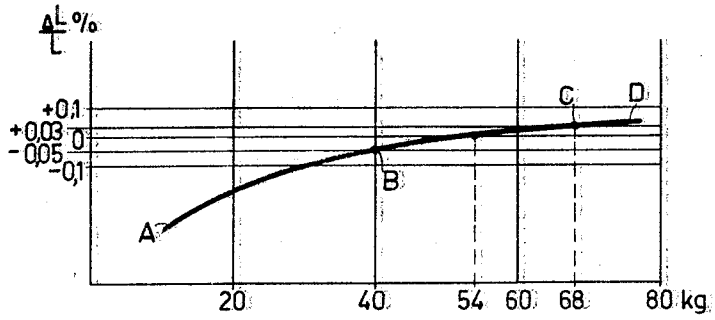


FIG. 1

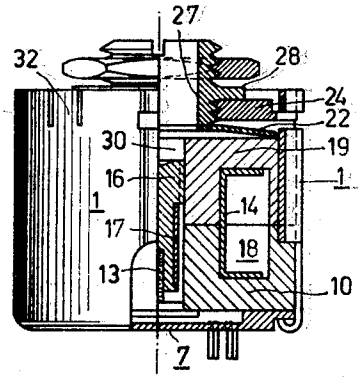


FIG. 3

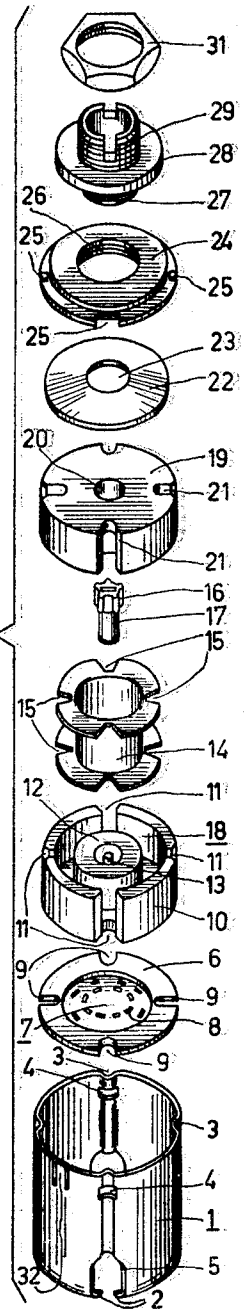


FIG. 2

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FERROMAGNETIC POT-CORE ASSEMBLIES

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The present invention relates to an improved assembly for ferromagnetic pot-cores.

Ferromagnetic pot-cores are used to provide, in combination with a winding, or windings, an inductive or transformer component in electrical circuits and usually comprise ferromagnetic material shaped to form an inner core part surrounded by the winding or windings and further ferromagnetic parts to form an enclosure for the windings. In order to facilitate manufacture, the windings are usually wound on a coil former in and around which the ferromagnetic parts are assembled to form a pot-core.

In order to ensure close adherence to any precalculated electrical characteristics of the pot-core component, it is necessary for the assembled parts to be carefully aligned and clamped at an even and constant pressure. Any variation on the physical contact of the various ferromagnetic parts will affect the reluctance of magnetic paths and hence the inductance of the winding within the core parts and it is of the utmost importance, particularly when a quantity of matched pot-core components are to be manufactured, to ensure that any precalculated electrical characteristics are maintained to close tolerances by carefully controlling the alignment and standardising the clamping pressure of the parts.

Prior to the present invention it has been proposed to provide an assembly for a pot-core which can be assembled by hand without the use of tools in which a container adapted to receive the pot-core parts, includes a closure plate having lugs adapted to lock bayonet fashion with the housing and a spring member which serves the dual purpose of locking the bayonet fastening and holding the pot-core parts together by exerting a pressure on the outer parts of the core.

This known assembly suffers from the disadvantage that the pressure load exerted by the spring is limited to that which could be exerted by hand and it can be shown that for the attainment of close electrical tolerances the loads required to hold the core parts together are quite considerable. In this known assembly it is usual to cement the core parts together to obtain stability. This is a relatively expensive operation and great care is necessary to ensure long term stability of the components.

In arriving at a desired pressure load for particular pot-core size it is convenient to plot a curve showing inductance variation against variation of the applied pressure load to the core parts.

Reference to FIGURE 1 of the accompanying drawings shows a typical curve A–D obtained for a pot-core having a diameter of 30 mms. and for which the desired inductance L is obtained at a load of 54 kgs. It will be noticed that in this case the relative flat portion B–C of the curve A–D corresponds to a load variation from 40 kgs. to 66 kgs. and this will bring about a change in inductance of only −0.05% and +0.03% of the precalculated desired inductance.

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Typical loads for different pot-core diameters are given in the following table:

Pot-core diameter in mm.:	Pressure load—in kgs.
14	12
16	14
18	20
21	27
25	40
30	54
35	70

From the foregoing it will be appreciated that in order to obtain an assembly having clear electrical tolerances the desired pressure load to the core parts is greater than can be readily applied by hand without the use of tools.

The object of the present invention is to provide a pot-core assembly which can be readily assembled solely by hand and to which a desired pressure is applied to the pot-core parts after assembly.

In one embodiment of the present invention there is provided a pot-core assembly comprising a substantially tubular container, two or more ferromagnetic pot-core parts enclosed by the container, an internal abutment provided at one end of the container and lockable retaining means at the opposite end including a resilient member, characterized in that means are provided for stressing the resilient member to urge and hold the pot-core parts together and against said abutment after locking the retaining means. The stressing of the resilient member, which may be in the form of a Bellville spring washer, can be effected by a screw member inserted through the retaining means. The screw member co-acts with the spring washer to compress it and thus urge the pot-core parts together. The stressing of this spring washer is effected after the core parts have been assembled and locked in the container. This assembly in the unstressed condition may be easily carried out by hand without the use of tools and the screw member may be provided with a slot so that a screwdriver, which may be a rudimentary screwdriver such as the edge of a coin, can be used to screw the member against the spring washer.

An abutment may be positioned along the screw member to limit to a predetermined distance, the compression of the spring washer. The compression is selected so that the desired load is applied to the core parts irrespective of dimensional variations of the various parts of the assembly within their respective tolerances.

One embodiment of the present invention will now be described with reference to the accompanying diagrammatic drawings in which:

FIGURE 2 is an exploded view of a complete pot-core assembly and

FIGURE 3 shows a part sectional view of the assembled pot-core shown in FIGURE 2.

The complete pot-core assembly as shown will now be described in the order in which the various component parts are assembled. Referring to FIGURE 2 a pot-core container 1, which may for example be of brass tubing, is provided with inwardly disposed longitudinal ribs 3 the upper ends of which have been cut out to form slots 4 whereas an abutment comprising inwardly turned edges 2 is provided at the lower end. Apertures 5 are also provided at the lower edge which may be used for the passage of leads from an inner coil winding. An insulating terminal base 6 which when inserted in the con-

tainer 1 rests against the turned in edge 2 is provided with keyways 9 which engage the ribs 3 and an inner recessed portion 7 is provided with terminals 8.

Reference numeral 10 indicates one half of a ferromagnetic pot-core having an inner ring core 12 the central hollow portion having a threaded spigot 13 for the insertion of a trimmer plug 16. Keyways 11 are provided on the outer shell of the pot-core 10 which are adapted to engage the ribs 3 when inserted in the container 1 and also to provide access for terminal leads. A coil former 14, which may for example be made of moulded plastic, is adapted to fit into the inner recess 18 of the pot-core half 10, and slots 15 are provided to allow terminal leads to be taken from a winding to be wound round the coil former 14. The trimmer plug 16 may also for example be made of plastic material and have a sleeve of ferromagnetic material 17, adjustment of the trimmer plug 16 being effected by screwing it in or out of the inner ring core 12. The second half of the ferromagnetic pot-core 19 is substantially the same as that of the first half 10 with the exception that a through central aperture 20 is provided for the insertion of the trimmer plug 16 and keyways 21 are provided to engage the container ribs 3.

A Bellville spring washer 22 having a central aperture 23 is positioned on top of the second half of the pot-core 19. The aperture 23 allows for the insertion of a trimming tool for adjustment of the trimmer plug 16. A retaining plate 24 having cut outs corresponding to the container ribs 3 is adapted to be inserted at a level of the container height which will permit the cut outs 25 to be rotated through the container slots 4. A pair of slots in the container wall allows the locking of the plate 24 by bending the tab 32 thus formed inwardly into one of the cut outs 25 in the retaining plate 24. The retaining plate 24 is provided with a central threaded aperture 26 which receives a screw member 27. In order to apply pressure to the assembly the screw member 27 is screwed into the retaining plate aperture 26 so that the screw member 27 depresses the Bellville spring washer 22 until an abutment 28 prevents further insertion by coacting against the retaining plate 24. By location of the screw abutment 28 a precalculated pressure may be applied to the whole assembly and it has been found, for example, that an assembly having a pot-core of about 30 mm. diameter a force of about 54 kgs. is desirable and at that load the tolerance in electrical characteristics is much improved over other known assemblies. A secondary screw thread 29 on the opposite end of screw member 27 provides, together with nut 31, a means for mounting the assembly on a chassis.

In FIGURE 3 a pot-core assembly having the same component reference as in FIGURE 2 is shown where the container 1 has been partly cut away to show the internal disposition of the winding coil former 14 and the two halves of the pot-core 19 and 10 clamped together under the depressed Bellville spring washer 22, the screw member 27 having been screwed in until the abutment 28 abuts against the retaining plate 24. The trimmer plug 16 having the ferromagnetic sleeve 17 is shown inserted in the central column 30 and adjustment being obtained by screwing the trimmer plug 16 coaxially along the threaded spigot 13. Although the assembly shown in FIGURES 1 and 2 has provision for the termination of internal leads by use of the terminals

8 fixed to the depressed portion 7 of the insulated base 6, the assembly is readily adaptable for use with "flying leads" in that leads emanating from the coil former 14 may be passed through the bobbin slots 15, core keyways 11 and out through the aperture 5 in the container 1. It may be envisaged that the assembly is also readily adaptable to form a plug-in unit where terminals 8 may protrude externally in the form of pins adapted to plug into a suitable socket.

What is claimed is:

1. A ferromagnetic pot core assembly comprising a tubular housing member having a plurality of inwardly directed longitudinal ribs and an inwardly turned edge at one end thereof, a terminal plate supported on said edge and closing said one end of said housing member, a plurality of pot core parts include core halves within said housing, each said core half having a plurality of keyways for receiving said longitudinal ribs to prevent relative rotational displacement of said pot core halves, a retainer plate having a central threaded bore secured within said housing at the other end of said member, means for securing said retainer plate, a resilient member intermediate said retainer plate and the adjacent pot core half, a threaded screw member within said bore having a flange engaging said retainer plate for limiting relative inward movement of said rod, said rod engaging and stresssing said spring washer and said flange limiting the stress imposed on said washer whereby said pot core parts are assembled in alignment under predetermined pressure.

2. A ferromagnetic pot core assembly according to claim 1 wherein said means for securing said retainer plate within said housing member comprises a plurality of peripheral cut outs in said retainer plate corresponding with said longitudinal ribs, means defining a slot in each said longitudinal rib for receiving the peripheral edge of said retainer plate upon rotation thereof for misaligning said cut-outs and said ribs, and a pair of slots in said housing member adjacent said other end defining a tab engaging one of said cut-outs for locking said retainer plate against rotation.

3. A ferromagnetic pot core assembly according to claim 1 wherein said terminal plate includes pins for connecting said assembly with a suitable socket.

4. A ferromagnetic pot core assembly according to claim 3 wherein said resilient member comprises a Bellville washer.

5. A ferromagnetic pot core assembly according to claim 3 wherein said threaded member has a secondary screw thread at the end thereof remote from said resilient member for securing said assembly to a chassis.

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