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TRANSFORMER CORE MOUNTING

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FIG. 1

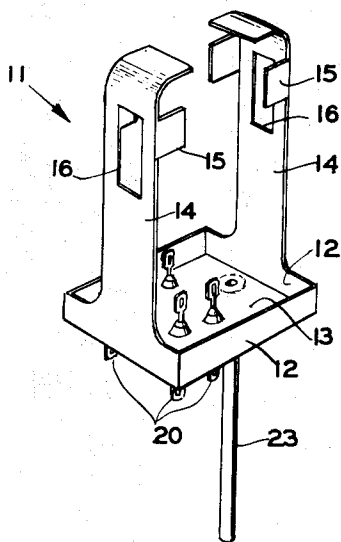


FIG. 2

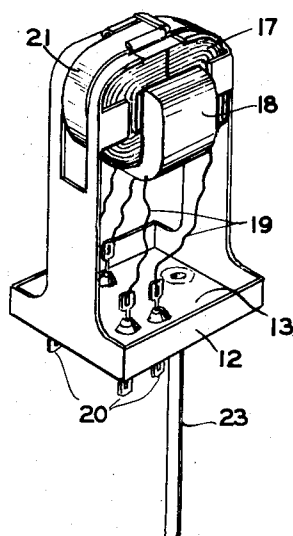


FIG. 3

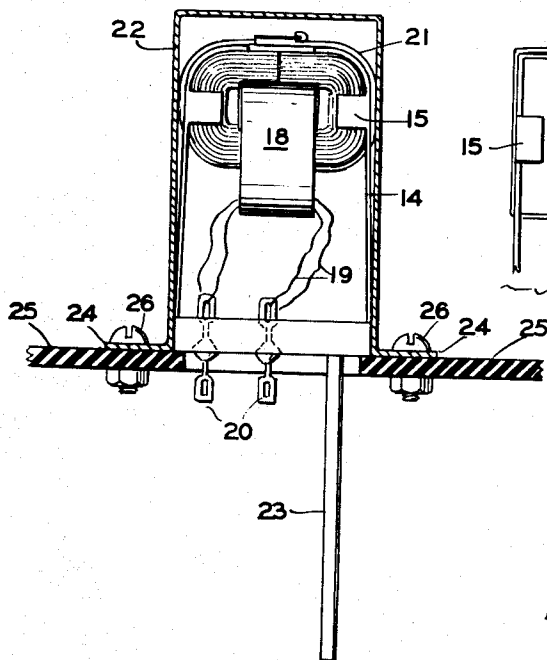
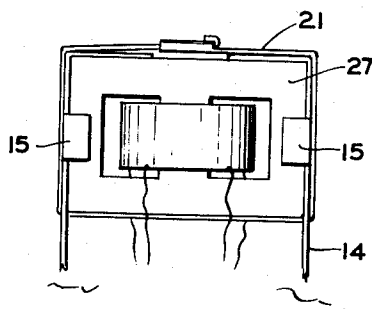


FIG. 4



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7 Claims. (Cl. 336—92)

This invention relates to transformers and, more particularly, to mountings for transformer cores.

In mounting transformer cores in a casing, it is customary to secure the core of the laminated type to a bracket by screws or rivets and then secure the bracket to the casing by bolts, or other similar fastening means. In practice, this manner of assembly is time consuming and increases the work and cost of the individual transformer units by increasing the number of operations expended thereon. A second method of assembly has been proposed wherein the transformer core is fitted into a flanged bracket and the bracket itself is secured to the walls of a casing by means of tongues or depressions formed in the casing. This last method of assembly is also disadvantageous because each casing must be specially constructed and fitted within close tolerances to the individual transformer cores, ultimately increasing the costs of manufacture.

In cases where the size and weight of the transformer unit is an important factor, present transformers are disadvantageous insofar as they are bulky and heavy. Weight is important when transformers are used on aircraft. Where a plurality of transformers are to be used, the elimination of an additional five or ten pounds is highly desirable as will be readily understood by those skilled in the art. In addition, since space is also at a premium in aircraft, the utilization of a small and compact transformer unit will be of great advantage.

The instant invention, therefore, contemplates a novel and improved transformer mounting means which is of simple construction and provides a minimum number of operations in manufacture. The present invention embodies a substantially U-shaped bracket having a pair of flexible arms which secure a transformer core thereto by a flexible strap laced through openings formed in the arms to engage portions of the core. The assembled unit may be impregnated with suitable impregnating material and used in that manner, and/or it may be enclosed by a casing or cover which is fastened to the bracket and hermetically sealed.

An object of the present invention is to provide a novel and improved means for mounting transformer cores in a simple and efficient manner.

Another object of the present invention is to provide novel means for mounting transformer cores whereby the use of bolts and screws is eliminated.

A further object of the present invention is to provide a novel transformer which is compact and light in weight.

Still another object of the present invention is to provide novel means for readily mounting transformer cores of varying physical dimensions.

Still another object of the present invention is to provide a highly improved and novel mounting for transformer cores of the character described which shall be relatively inexpensive to manufacture, positive in its operation, and practical and efficient to a high degree in use.

Still another object is to provide a novel and improved method of mounting transformer cores.

The above and other objects and advantages of the present invention will appear more fully hereinafter from a consideration of the detailed description which follows, taken together with the accompanying drawing wherein two embodiments of the invention are illustrated.

In the drawing wherein like reference characters refer to like parts in the several views:

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Figure 1 is a perspective view of the novel transformer core mounting bracket forming a part of the instant invention,

Figure 2 is a perspective view of the transformer core mounting bracket particularly showing means for securing the core to the bracket,

Figure 3 is a sectional view of the subject matter of the instant invention enclosed in a hermetically sealed can, and

Figure 4 is a modification of the transformer mounting shown in Figures 2 and 3.

Referring now to the drawing for a more detailed description of the present invention and more particularly to Figure 1 thereof, the instant invention is shown as embodying a substantially U-shaped bracket generally designated by the reference character 11. Bracket 11 is constructed from aluminum or any other similar material which is light in weight, and is provided with four turned up flanges 12 extending along a rectangular-shaped base or bight portion 13. Formed integrally with a pair of opposite and parallel flanges 12 are a pair of arms 14 which are flexible in nature. The arms 14 are each arcuate shaped adjacent their free ends. However, it is to be understood that they may be shaped otherwise, as shown in Figure 4. A pair of extension members 15 are formed on each arm 14 and extend at right angles to the arms. Each arm 14 has cut therein a slot 16 for a purpose to be described presently.

As mentioned previously, the arms 14 are flexible and may accommodate a substantially rectangular-shaped split Hypersil type RC core 17 having rounded sides (Figure 2). The arms 14 are formed so that upon assembly of the core 17 to the bracket 11 the arms are flexed to allow the core to be centered therebetween. Extension members 15 position the core and prevent transverse movement thereof relative to the arms, while the arcuate portions of arms 14 embrace and contact the core 17 to also aid in the positioning thereof. In order to facilitate the manufacture of transformer units, the Hypersil cores are split into two sections so that a transformer coil winding 18 consisting of a primary coil and a secondary coil can be positioned on the core simply by inserting a leg of each half of the core into a central opening formed in the coil. It is apparent that if the cores had straight sides, the arcuate portions of the arms 14 may be formed accordingly, to provide for the straight edges. A plurality of connecting wires 19 lead from the primary and secondary windings of coil 18 to their respective terminals 20 mounted on the base portion 13.

The core 17 is secured to the arms 14 by a flexible strap 21 which is laced through the slots 16 to engage the underside of the core, and portions of the arms. The free ends of strap 21 are tightened to the proper tension and then crimped and soldered, or fastened in any other suitable manner, at the top of the core to securely hold the halves of the core together and to the bracket, as a single unit. The flexible nature of arms 14 allows the arms to be wrapped about the core 17 by strap 21 to provide for varying physical dimensions of the individual cores and to insure a properly mounted core. Thus, the core 17 is rigidly fastened to the bracket 11 and is ready to be mounted within a transformer cover or casing 22.

The casing 22 is rectangularly shaped and is open at one side, or bottom thereof, to engage the flanges 12. Upon assembly of the casing 22 to the bracket 11, the casing is soldered along its bottom edges to the flanges 12 to provide an air tight seal. Air is then drawn out of the casing by attaching suction means to an exhaust tube 23 mounted on the base 13. When all of the air in the casing 22 is exhausted, tube 23 is pinched and closed to prevent entry of air into the casing and to provide a hermetically sealed transformer. It has been found advisable to add inert gases such as helium or nitrogen to transfer heat from the coil 18 to the casing 22. In such a case, the inert gases are added to the casing after the air has been exhausted, after which the tube 23 is pinched. Casing 22 may be provided with integrally formed and projecting lugs 24 which secure the casing to the chassis 25 (a fragmentary portion thereof being

shown in Figure 3) of an electrical apparatus by means of threaded screws 26. This method of fastening by means of lugs 24 and screws 26 may be eliminated if desired, by spinning studs in the base 13. In this manner, additional transformers may be mounted closer together to effect greater savings in space.

The aforementioned bracket construction may be changed slightly to be readily adapted for different size and shape transformer cores. This is best illustrated in Figure 4 wherein an E-shaped laminated transformer core 27 is secured to the flexible arms 14 by the strap 21. It is to be noted that in this embodiment of the invention, the free ends of the arms 14 are straight or meet at right angles with respect to the remaining portion of its respective arm. The position of the extension members 15 and slots 16 are located closer to the base 13 to accommodate for the greater length of the E-shaped core 27 as distinguished from the smaller core 17. The core 27 in this embodiment of the invention is composed of laminated sheets which are pressed together or clamped by the members 15; the members 15 acting in this case to both clamp and position the core between the arms 14. Thus, it is readily apparent that a variety of different shaped and size transformer cores other than shown in the drawing may be mounted by means of the instant invention.

By reason of the foregoing construction in which threaded members are not utilized for securing the core to the casing, the mechanical life of the unit is lengthened inasmuch as there is no danger of rivets or screws becoming loose due to vibration. It is to be understood that the instant invention may be used with or without the transformer casing 22. The use of a transformer casing has been disclosed herein to accommodate cases where there is danger of corrosion due to fungus or excessive humidity. It may be readily appreciated that the casing is unnecessary where such conditions do not exist, the core and coil being impregnated with suitable impregnating compounds for use in temperate climates.

Although two embodiments of the invention have been illustrated and described in detail, various changes and modifications in the form and relative arrangement of parts which will now appear to those skilled in the art may be made without departing from the scope of the invention.

I claim:

1. A method of manufacturing hermetically sealed transformers having substantially rectangular shaped transformer core structures, comprising the steps of forming a bracket with two arms from a flexible material, punching cut-outs in each arm, bending the arms until they are substantially parallel and a U-shaped member is formed having a bight portion normal to the arms, positioning a substantially rectangular shaped core structure between the arms and spaced from said bight portion, pressing the outer ends of the arms toward each other and into intimate contact with the core structure so that the contacting end portions of the arms assume the same contour as the portions of the core structure they contact, lacing a flexible strap through the cut outs in the arms and about portions of the core structure and arms, securing together the two ends of the strap to fixedly mount the core structure to the arms, enclosing the arms and core structure in a casing having an open end, sealing the open end of the casing to the bight portion, and exhausting the air within the casing.

2. In a transformer assembly of the class described, a transformer core having four sides, two of which are oppositely disposed, a substantially U-shaped member made from a single piece of material and comprising a bight portion, and a pair of arms engaging said oppositely disposed sides of said core, said bight portion being spaced from a third side of said core, and each of said arms having a portion arranged parallel to said bight portion and engaging a fourth side of said core, an aperture formed in each arm, and a strap extending through each aperture and engaging said arms and said third side of said core, said strap having ends connected together for securing said core to said arms.

3. In a transformer assembly of the class described, a rectangular shaped transformer core, a member having a pair of parallel arms engaging opposite sides of said core, each of said arms having a portion at right angles to their respective arms and engaging a third side of said

core, an aperture in each arm, and a strap extending through each aperture and bearing against said arms and the fourth side of said core, said strap having ends connected together, arranged to secure said core to said arms.

4. In a hermetically sealed transformer of the class described, a transformer core having oppositely disposed sides, a substantially U-shaped member comprising a bight portion, and a pair of arms engaging said opposite sides, an aperture formed in each arm, a strap extending through each aperture and bearing against said arms and core, said strap having ends connected together arranged to secure said core to said arms, and a casing having an open end and enclosing said core and said U-shaped member, the open end of said casing being sealed to said bight portion.

5. In a transformer assembly of the class described, a transformer core having oppositely disposed sides and carrying a coil structure, a substantially U-shaped member comprising a base, and a pair of arms engaging said opposite sides, terminals carried by said base for connection to said coil structure, an aperture formed in each arm, and a strap extending through each aperture and bearing against said arms and said core, said strap having ends connected together, arranged to secure said core to said arms.

6. A method of manufacturing a hermetically sealed transformer having a substantially rectangular shaped transformer core, comprising the steps of forming a bracket with two arms from a flexible material, punching an aperture in each arm, bending the arms until they are substantially parallel and a U-shaped member is formed having a bight portion normal to the arms, punching an aperture in the bight portion, securing an exhaust tube to the bight portion and communicating with said last-mentioned aperture, positioning a substantially rectangular shaped transformer core between the arms and spaced from said bight portion, pressing the ends of the arms toward each other and into intimate contact with the core so that the contacting end portions of the arms assume the same contour as the portions of the core they contact, lacing a flexible strap through the apertures in the arms and about portions of the core and arms, securing together the two ends of the strap to mount the core to the arms, enclosing the arms and core in a casing having an open end, sealing the open end of the casing to the bight portion, and exhausting the air from said casing through the exhaust tube.

7. A method of manufacturing a transformer assembly having a substantially rectangular shaped transformer core including a substantially rectangular shaped window with a coil structure arranged to extend through said window and about the front and rear faces and one side of the core, comprising the steps of forming a bracket with two arms from a single piece of flexible material, punching an aperture in each arm, bending the arms until they are substantially parallel and a U-shaped member is formed having a bight portion normal to the arms, positioning said core between the arms with said one side adjacent to said bight portion but spaced therefrom so that the coil structure does not contact said bight portion, pressing said arms into contact with oppositely disposed second and third sides of said core, pressing the ends of said arms into contact with the fourth side of said core until said ends assume the same contour as the portions of the core they contact, lacing a strap through said apertures and between said one side and said coil structure and about said arms, and connecting together the ends of said strap adjacent said fourth side for securing said core and said coil structure to the bracket.

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