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COIL FORM

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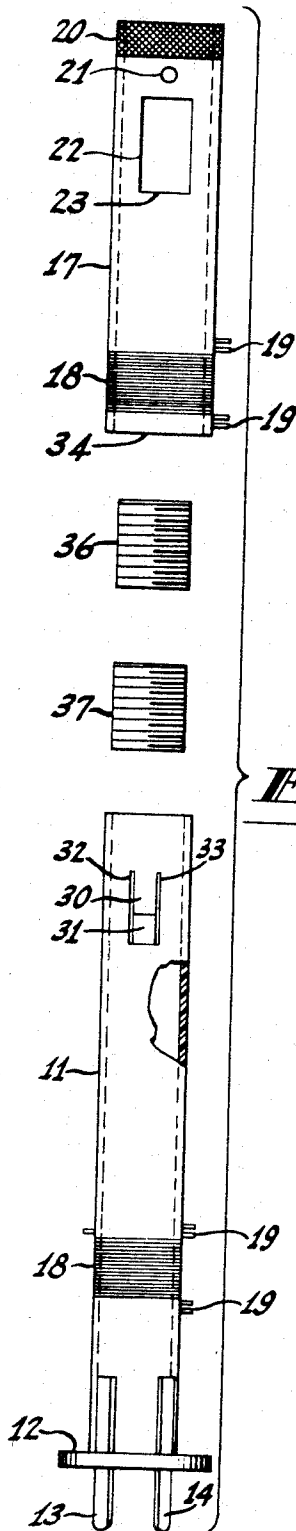


Fig. 1.

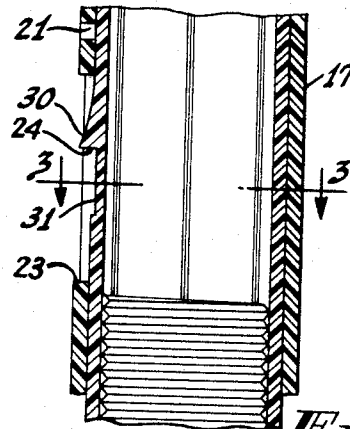


Fig. 2.

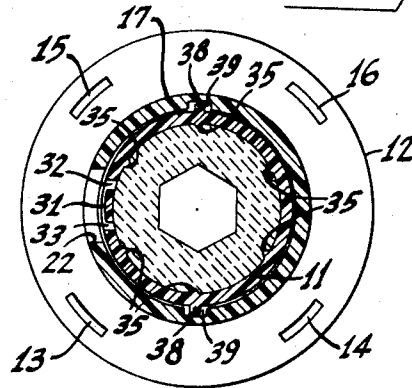


Fig. 3.

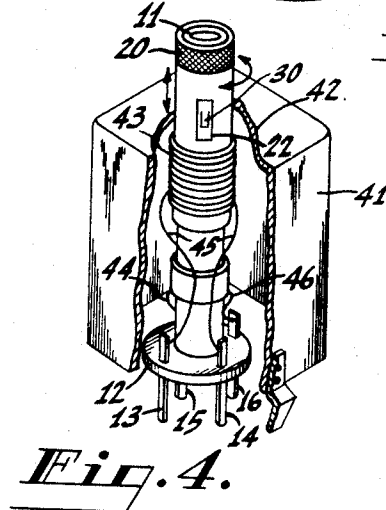


Fig. 4.

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8 Claims

ABSTRACT OF THE DISCLOSURE

A coil form for transformer assembly having adjustable coupling consisting of two telescoping cylindrical members. An interfitting projection and window are respectively provided on the members to limit the relative axial and rotational movement therebetween. Additional projections on one member ride within axial slots in the other to permit axial movement for adjusting the transformer coupling and for providing a temporary locking of such movement upon relative rotation of the members to cause the projection to frictionally engage the wall of the other member. Final locking of the coupling adjustment is achieved by fusing the telescoping members with a soldering iron or adhesive material.

This invention relates to a transformer assembly and in particular to the form on which the windings of the transformer are wound.

For many applications it has been common practice to specify the range of tolerance of the various parts of a transformer assembly that determine the degree of magnetic coupling between two windings and to make the transformer in accordance therewith. In some circumstances, however, it is difficult to specify a precise range of tolerance because of variation in the electrical characteristics produced in the manufacture of the circuits with which the transformer is to cooperate, but even when a satisfactory range can be specified, it is often so narrow as to make the mass manufacture of the transformer assembly difficult.

These problems can be overcome by provision of a transformer assembly in which the degree of magnetic coupling can be readily adjusted after the transformer has been incorporated into the electrical circuit with which it is to cooperate. During the assembly and alignment of the electrical circuit it is often necessary to temporarily lock the coupling adjustment while performing other operations and to permanently lock the coupling when all operations have been completed. Accordingly it is desirable that the transformer assembly be provided with easily operated means for temporarily holding the parts in an adjusted position, and means for providing a permanent locking of the parts.

An object of this invention is to provide an improved coil form having means to adjust the coupling between the coils to be wound thereon.

Another object of this invention is to provide a coil form with means to adjustably couple coils wound thereon and having means to respectively temporarily and permanently lock the coupling during and after the adjustment thereof.

Another object is to provide a coil form with means to vary the coupling between coils mounted thereon wherein such adjustment may be made from the exterior of a shield can surrounding said coil form.

A coil form assembly embodying the invention includes an inner tubular member, an outer tubular member, both of said members having exterior bobbin portions thereon, wherein said outer member is adapted to slidably receive said inner member. One of the members has a window portion therein, and the other of said

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members has a wedge-like radial projection which is positioned to engage the window portion so as to limit the relative rotational and axial movement between said two members and prevent their accidental separation.

These members may also be provided with axially extending radial ridges on the interior portions thereof for retaining threaded tuning slugs. Also interfitting projections and depressions may be provided on the members on contiguous surfaces thereof to allow relative and axial motion therebetween, and to produce a binding action when one member is rotated with respect to the other.

Other objects, features and advantages will appear from the drawings and descriptions hereinafter given. Referring to the drawings:

FIGURE 1 is an exploded front view of a coil form embodying the invention;

FIGURE 2 is an enlarged cross section of part of an assembled coil form of the type shown in FIGURE 1;

FIGURE 3 is an enlarged section of FIGURE 2 taken along line 3—3; and

FIGURE 4 is a perspective view of a shield can cut away to show a coil form embodying the present invention with coils wound thereon.

A coil form usable in a double tuned transformer is shown in FIGURE 1. It is molded in two parts from a resilient material such as polypropylene. The parts comprise an inner tubular member 11 with a base portion 12 molded thereon and an outer tubular member 17. Affixed to the base portion are terminals 13, 14, 15, and 16 to which the coil windings may be attached. The outer tubular member 17 consists of a tubular sleeve which is slidable over the inner tubular member 11. Each of these sections have bobbin portions 18 molded thereon which contain spiral grooves into which coils may be wound. Pairs of outwardly extending closely spaced projections 19 are molded into the respective sections at both ends of said bobbin portion 18 serve to grip the wire at each end of the coils wound onto said spiral bobbin portions 18. On the exterior of the outer tubular member 17 at the top thereof is a roughened surface 20 which provides a means to securely grip the outer portion for producing axial and rotational movement thereof during an alignment procedure. An aperture 21 and a window 22 are located on the upper portion of member 17. The aperture 21 provides a place wherein adhesive or bonding material may be inserted, in order to permanently lock the relative positions of coil form members 11 and 17. The window 22 cooperates with a wedge-shaped projection 30 extending from the inner tubular member 11, as will be described in conjunction with FIGURE 2.

FIGURE 2 is a cross section taken through the wedge-shaped projection portion of an assembled coil form of the type shown in FIGURE 1. From this section it can be seen that the radial wedge-shaped projection 30 protrudes beyond the outer circumference of the inner member 11. The area 31 immediately below the wedge-shaped projection 30 is made thinner and, as shown in FIGURES 1 and 3, axial slots 32 and 33 are positioned on each side of the projection 30, extending from the top of said projection to the bottom of said thinned portion 31, so as to permit inward and outward motion of the projection 30 with respect to the surrounding wall area of inner tubular member 11. Because of this, and the fact that the coil form is molded from resilient material, the projection 30 will move inwardly upon the insertion of the inner member 11 into the outer member 17 and then flex outwardly when the projection 30 is positioned within the window portion 22.

The projection 30 may be designed with other shapes

depending upon the amount of relative motion desired between the members; in this embodiment a wedge-shape was chosen to facilitate the assembly of the two coil form members 11 and 17 and thereafter to limit the amount of relative axial travel of the outer member 17 with respect to the inner member 11. It can be seen from FIGURES 1 and 2 that the bottom 24 of said wedge-shaped projection will abut the ledge 23 of said window portion 22 when the outer member 17 is in its extreme upper, or uncoupled position. In this embodiment the maximum coupled position is limited by the abutting of the bottom end 34 of outer member 17 with the top projection 19 on the inner member 11. Relative rotational movement is limited when vertical sides of the wedge-shaped projection bears against the vertical walls of the window 22. The amount of permissible rotational movement is great enough to allow a locking of the two coil portions as described below.

Further coupling may be provided for by increasing the diameter of the outer tubular member 17 so that the bobbin portions 18 of the respective tubular members overlap; further, the projection and stop members would be eliminated at the top of the inner tubular member.

FIGURE 3 is a cross section of FIGURE 2 taken along lines 3—3. Running axially along the inside of the inner tubular member 11 are radial projections 35 so arranged as to grip and support threaded tuning slugs of conventional design. Such slugs are self-tapping into the resilient material forming the projections. Six projections are shown, however, any number may be employed so long as they provide support for the tuning slugs. Normally two tuning slugs 36 and 37, shown in FIGURE 2, will be used, one underlying each of the respective bobbin portions 18 on said inner and outer members. As in conventional double tuned coil assemblies, adjustment of the respective slugs is made through the top and bottom of the coil form.

Also shown in FIGURE 3 are two axially running outward radial projections 38. During alignment of a receiver incorporating these coil forms this projection 38 is straddled by a corresponding axially running indentation 39 in the inner wall of the outer member 17. By the rotational movement of one member with respect to the other, the projection 38 can be made to engage said inner wall of outer tubular member 17 rather than said depression 39. This will provide a temporary friction type locking of the two members. This locking feature is especially useful to prevent any parameter changes during other alignment operations before the element are permanently locked as described below.

FIGURE 4 illustrates a coil form as above described as it would appear in an actual assembly. It is shown positioned inside a shield can 41, and projecting through an aperture 42 in the top thereof. Coils 43 and 44 are respectively shown wound on the top and bottom portions of said form. The two leads 45 from coil 43 extend outwardly from the outer tubular member 17, overlie the lower coil 44, and then are connected to terminals 13 and 14. These leads are given enough slack to allow full axial movement between the inner and outer sections of said coil form. A piece of tape 46 is used to secure the leads 45 to the bottom portion of said form to provide uniform positioning of these leads over the manufacture of several of such said assemblies. The leads from the lower coil 44 are connected to terminals 15 and 16. The complete assembly is readily insertable into a printed circuit or a socket member during the construction of an actual receiver.

Once this coil assembly is incorporated into radio or television receiver alignment thereof is relatively easy. Because of the construction of the coil form the coupling between the two coils thereon is continuously adjustable, and such adjustment may be easily made after the coil is located inside the shield can 41 by gripping and axially positioning the outer member. Once the coupling adjust-

ment is made it may be temporarily locked by merely twisting the outer member 17. Then the inductance of the individual coils may be varied by positioning the tuning slugs with respect to each coil in a conventional manner. Such adjustment may require a further change in coupling. This is easily rectified by unlocking the outer member and changing its axial position. After the final adjustments are made the coupling adjustment may be permanently locked by passing a hot solder iron tip through the two coil form members. Alternately, an adhesive or bonding material, or even a wax like substance may be inserted into aperture 19 in order to achieve a bonding of two sections. Even this "permanent" locking may be changed by unbonding the coil form with an adhesive solvent or with the application of heat to defuse the two sections, depending upon which locking method is used.

Other construction details than those described may be employed to practice the invention herein disclosed. For example, the respective locations of the motion limiting window and projection means disclosed, as well as the axially oriented radial projection and depression locking means may be interchanged between the two members. Further, only one part of the locking means need extend axially on either the inner or outer member; for example, the projection 38 on the outer surface of the inner member FIGURE 3 need not extend at all in an axial direction, or the depression 39 might take the form of two projections on the inner surface of the outer member which would engage the ridge 38 upon relative rotation between the two members.

What is claimed is:

1. A coil form of resilient material for providing adjustable coupling between two or more coils comprising: an outer tubular member having a bobbin portion thereon, an inner tubular member having a bobbin portion thereon, said member being adapted to telescope within said outer member to provide rotational and axial movement therebetween; one of said members having a window portion therein; a radial projection on the other of said members adapted to engage said window portion, so as to limit the relative rotational and axial movement between said two members, the window portion and the radial projection being respectively dimensioned so as to permit both axial and rotational movement of the tubular members.
2. A coil form as recited in claim 1 wherein one of said members has at least one axially oriented elongated radial projection thereon, and wherein said other member has a corresponding number of axially oriented elongated radial depressions so arranged as to engage said elongated radial projections and allow free axial movement between said members, whereby rotational movement of one of said members with respect to the other causes the radial projection on said one member to frictionally engage the abutting surface of said other member to provide a locking action.
3. A coil form as claimed in claim 1 wherein said tubular members are made from a plastic-like thermal moldable material, and the outer tubular member has an aperture positioned with respect to the inner tubular member such that local heat applied thereto will fuse said two members to provide locking action.
4. A coil form as claimed in claim 3 wherein said plastic-like members are molded with helical threads and radial projections to facilitate the winding of coils thereon, and the maintaining of parameter uniformity between the coils wound thereon.
5. A coil form as claimed in claim 2 wherein said inner member is provided with a plurality of axial ridges on its interior surface so that metallic slugs having screw threads thereon may be easily inserted into the interior

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of each of said portions whereby said ridges will engage said threads.

6. A tubular coil form of resilient material for providing adjustable coupling between two or more coils comprising:

an inner tubular member having an exterior bobbin portion;

an outer tubular member having an exterior bobbin portion, said outer member being adapted to slidably receive said inner member, and having a window portion;

a resilient radial projection mounted on said inner member positioned to engage said window portion, the window portion and the radial projection being respectively dimensioned so as to permit adjustment of both the relative axial and relative rotational position of the tubular members and so as to limit the relative rotational and axial movement between said two members, and prevent the accidental separation of the two members.

7. A coil form as claimed in claim 6 wherein said outer member is provided with an aperture on a portion thereof overlying said inner member, whereby relative motion between said members may be arrested by the insertion of a bonding material in said aperture to fuse said two members.

8. A coil form of resilient material for providing adjustable coupling between two or more coils comprising:

an outer tubular member having a bobbin portion thereon,

an inner tubular member having a bobbin portion thereon, said member being adapted to telescope within

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said outer member to provide rotational and axial movement therebetween,

one of said members having at least one radial projection thereon, and the other of said members having a corresponding number of radial depressions so dimensioned as to engage said radial projections to permit both axial and rotational movement and allow free axial movement between said members, whereby a predetermined rotational movement of one of said members with respect to the other causes the radial projection on said one member to frictionally engage the abutting surface of said other member to provide a locking action.

9. A coil form as recited in claim 8 wherein the radial projection on at least one of the members is elongated and axially oriented, and wherein the depression on the other member is elongated and axially oriented, to increase the frictional engagement of the two members upon relative rotation while providing relatively free axial movement between the members.

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