

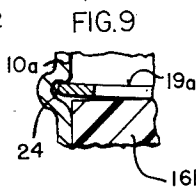
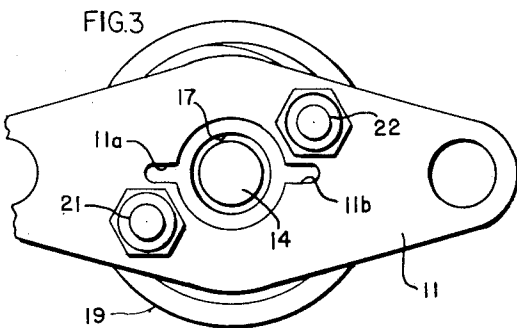
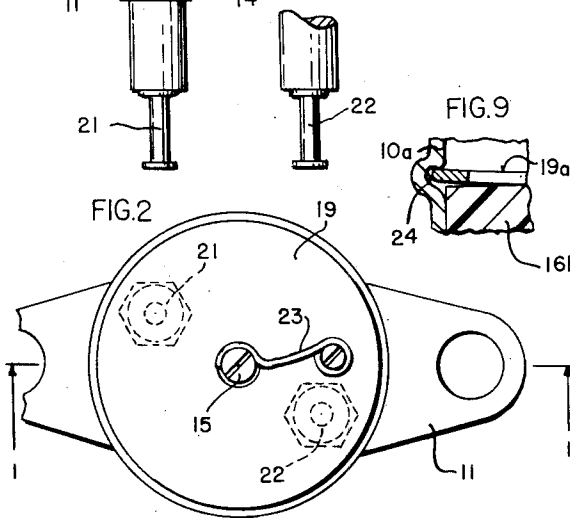
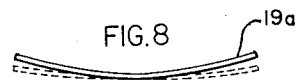
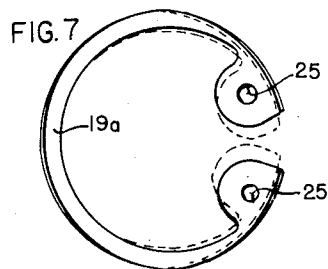
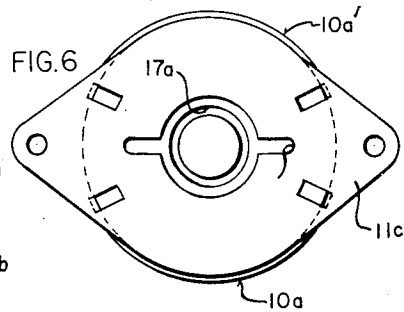
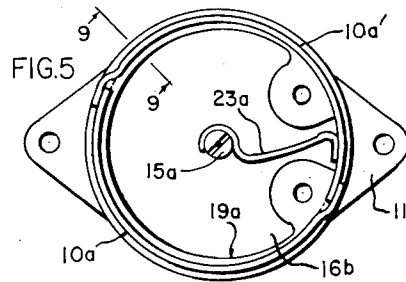
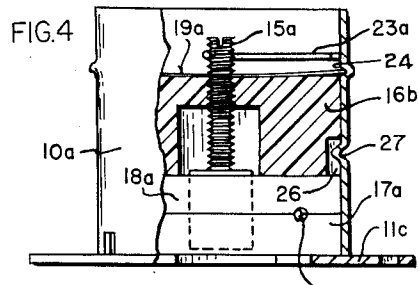
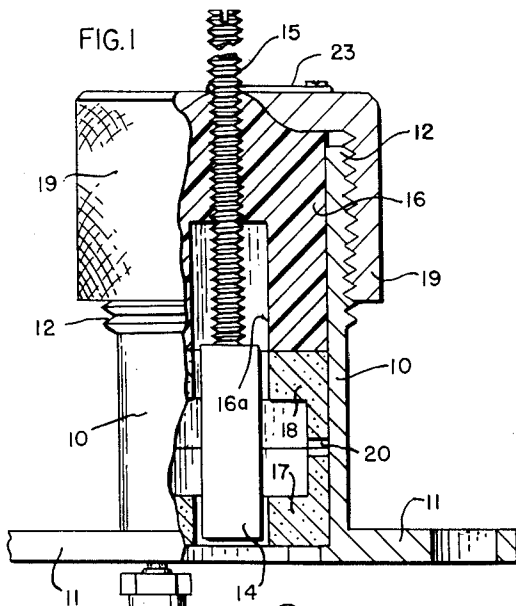
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2,669,700

CUP-CORE ASSEMBLY FOR INDUCTORS

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CUP-CORE ASSEMBLY FOR INDUCTORS

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The invention described herein may be manufactured and used by or for the Government for governmental purposes, without the payment of any royalty thereon.

This invention relates to improvements in cup-core inductors embodying an adjustable tuning slug, and more particularly to the associated locking or other structure for holding the cup cores and the slug against displacement from their respective positions in the inductor assembly.

To adjust the tuning slug of a conventional cup-core inductor for a given frequency of equipment for which it might be intended or in which it might be connected, it has been necessary, heretofore, first to loosen or to release an associated locknut or clamp, then to make the required setting by advancing or retracting the slug until the latter is in substantially the exact position for the frequency desired, and finally to apply or to tighten up on the locknut or clamp. While this procedure is satisfactory as far as any one inductor is concerned, the time consumed in mass production of a specific piece of equipment embodying several of these inductors has become an important factor. The assembly of some prior designs, furthermore, has required a separate step to make provision that the cup cores and the coil therebetween be fixed securely in the inductor housing and against any slight movement with respect to the latter under operating conditions involving rigorous mechanical shock or vibration.

The use of some form of locknut or clamp, as heretofore, to hold the tuning slug of an inductor in the position to which it is set for a required frequency, has another disadvantage in cases where two of the inductor units are combined as a pair and have a single locking or clamping part which is common to both slugs, in that such single part serves to hold the two slugs in their respective positions of adjustment. This disadvantage resides in the fact that in releasing the lock or clamp to adjust one tuning slug the other and adjacent slug, which might be adjusted perfectly at the time, is released also and therefore might become displaced.

With the foregoing in mind, it is one of the objects of the present invention to provide an improved design for a cup-core inductor of the character referred to wherein it is feasible to dispense with the prior locknuts or clamps, while still retaining the feature of a firm hold or grip on the threaded shank of the tuning slug sufficient to prevent displacement of the latter from

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its set position should the inductor component be subjected to severe mechanical shock or vibration.

Other objects reside in the provision of an improved cup-core inductor of the character referred to which has advantages over the various designs of the prior art in the way of its being easier to assemble or to fabricate, more economical to manufacture, and easier to adjust and keep adjusted.

Still other objects and advantages will hereinafter appear.

For the purpose of illustrating the present invention, an embodiment thereof is shown in the drawing, wherein

Fig. 1 is an enlarged view, partly in section, of a cup-core inductor constructed and operable in accordance with the present invention but with the coil removed from between the cup cores; the section being taken on the line 1—1 in Fig. 2;

Figs. 2 and 3 are top plan and bottom plan views, respectively, of Fig. 1;

Figs. 4, 5 and 6 are views showing a modification and corresponding, respectively, to Figs. 1, 2 and 3;

Fig. 7 is a plan view of one of the parts;

Fig. 8 is an elevational view looking upwardly, in Fig. 7; and

Fig. 9 is an enlarged, fragmentary, sectional view, the section being taken on the line 9—9 in Fig. 5.

In Figs. 1, 2 and 3 the improved inductor herein is shown as comprising a cylindrical housing 10 which may be die-cast from steel, aluminum, or other suitable material; which is provided at an end thereof with a base 11; and which is open at its other end 12 and is threaded thereat, as shown.

Disposed with its longitudinal axis coincident with the longitudinal axis of housing 10 is an adjustable tuning slug 14 having a threaded shank 15 which is at and extends outwardly and beyond the open end 12 of the housing.

Threaded on shank 15 with a relatively tight fit to grip the same about a substantial portion of its length, is a part or insert 16 of nylon, plastic or other suitable material. The part 16 is disposed as shown, adjacent to a pair of complementary cup cores 17 and 18 in housing 10 at the base end of the latter and between which is the usual coil (not shown). It is proposed to make the fit between shank 15 and part 16 sufficiently tight by first drilling through the latter with a drill less than the pitch diameter of the threads on the shank. With the latter held against rotation, part 16 is then forcibly turned and simul-

taneously forced axially onto the shank whereby the latter functions as a tap to form the thread in the material of part 16. A nut 19 is screwed tight on the threaded, open end 12 of the housing 10 to compress or squeeze the part or insert 16 between the nut and the cup cores 17 and 18. This serves a dual purpose because of the fact that while the molded nylon-plastic insert 16 has substantial body, it also has sufficient resiliency to be slightly deformable under pressure within the bounds of the elastic limit, and it retains such deformation over a relatively long period of time. With the insert 16 compressed between nut 19 and the cup cores 17 and 18, the latter are held firmly against the base 11 of housing 10.

The second purpose served by tightening up on nut 19 to exert on the top surface of insert 16 a substantial pressure directed downwardly, is to deform slightly or to squeeze the material of the insert into a more intimate contact with the thread-surface of shank 15. This contributes further to the grip of the insert or part 16 on shank 15, the latter being otherwise free to turn in either direction with respect to the former.

To make any desired adjustment of slug 14 with respect to the coil (not shown) which is disposed and held firmly between cup cores 17 and 18, shank 15 is turned by application of a screw-driver to the upper, slotted end of the shank, sufficient force being exerted to overcome the grip of part 16. The important operating feature of the improved construction and arrangement herein resides in the fact that when slug 14 has been advanced or retracted to the position for the particular frequency desired, the grip alone of part 16 on shank 15 is sufficient to hold slug 14 against displacement, even under operating conditions involving rigorous mechanical shock or vibration. By the present improved design, therefore, both an initial step of unlocking or releasing a bolt or clamp and a final step of again tightening or applying the latter after the adjustment for frequency has been made; are eliminated.

Shank 15 extends freely through the center of nut 19 and beyond the open end 12 of housing 10, as shown.

At the center and longitudinally of part 16 there is a cavity 16a of sufficient cross-sectional area to receive and to accommodate slug 14 in the fully-retarded position of the latter.

Registering notches in the edges of cup cores 17 and 18 provide an opening 20 for one end of the interposed coil to pass through and provide another opening (not shown) through which the other end of the coil passes. Sufficient clearance is allowed between housing 10 and cup cores 17 and 18 to accommodate the fine wire of the coil whose two ends pass, respectively, through slots 11a and 11b in base 11 and are soldered, respectively, to suitable terminals 21 and 22 fixed to and insulated from base 11.

To prevent capacitive coupling between the two shanks of adjacent inductor units, each is grounded. For this purpose a contact finger 23 of spring steel is fixed at one end thereof to nut 19 and at its other end presses against shank 15 to connect the latter electrically to housing 10.

In Figs. 4 to 9 the various parts which correspond to and serve the same structural and operational purposes as those in Figs. 1, 2 and 3 are designated by the same reference numerals which designate, respectively, the latter.

For economical reasons the inductor housing

in Figs. 4, 5 and 6 is made of two identical sheet-metal stampings 10a and 10a' spot-welded together at their crimped, adjacent edges and to which is fixed a base 11c. In the wall structure of this housing and completely around the same, there is a groove 24. The dual purpose of the nut 19 in Figs. 1 to 3 is served by a self-locking retaining ring 19a comprising an open-ended and substantially circular ring body stamped from spring metal and normally arched, as shown in Fig. 8, out of the plane in which it otherwise would be disposed if flat. The outside diameter of ring 19a is substantially greater than the inside diameter of the housing, at groove 24. In the final assembly step, the working points of pliers are inserted into holes 25 in the free ends of the ring body, and the latter is deformed radially to the dash-line configuration shown in Fig. 7. As so deformed, the ring is inserted into the open end of the housing and is pressed down upon the top surface of the nylon-plastic insert 16b so that the ring body is now sprung to lie more nearly in a plane, as shown in dash-line in Fig. 8. As so deformed and sprung the ring, when released, snaps into groove 24 which is only slightly above the top surface of insert 16b. The ring 19a is now interlocked with the wall structure of the housing and as so interlocked is held in the sprung position to press firmly against insert 16b for the same purposes that nut 19, in Figs. 1 to 3, is tightened up on housing 10, i. e., to hold the cup cores 17a and 18a firmly against base 11c and to contribute further to the grip of the part or insert 16b on the threaded shank 15a. A contact finger 23a of spring steel is fixed at one end thereof to the housing and at its other end presses against shank 15a to ground the latter, as in Figs. 1 to 3.

The condition of insert 16b being compressed between ring 19a and cup cores 17a and 18a is ordinarily sufficient to hold the insert against rotation when shank 15a is turned in making an adjustment for frequency. However, to insure against this occurring, the material of the housing part 10a' is punched inwardly to form a small dimple 27 with which a slot 28 in insert 16b is made to register during the assembly step of inserting the insert into the housing. For the same purpose, housing 10 in Figs. 1 to 3 may be provided with a small, inwardly directed piece received by a slot in insert 16 which would thereby be locked against rotation with respect to the housing.

Ring 19a has been shown and described as being the same as that disclosed in Patent No. 2,574,034 issued November 6, 1951 to Heinrich Heimann.

Nylon plastic for the material of inserts 16 and 16b has given satisfactory results, but any other suitable material such as wood or rubber may be used.

It will be understood by those skilled in the art that various other modifications such as in the size, shape and arrangement of the parts are possible without departing from the spirit of the present invention or from the scope of the claims.

What is claimed is:

1. In a cup-core inductor of the character described, a housing having a base at one end thereof and open at its other end, a pair of complementary cup cores disposed in said housing at the base end of the latter, an adjustable tuning slug having a threaded shank and disposed with its longitudinal axis substantially coincident with the longitudinal axis of said housing and with

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said shank substantially at the open end of said housing, a resilient insulator threaded on said shank with a relatively tight fit to grip the latter and disposed in said housing adjacent to said cup cores, and means interlocked with the wall structure of said housing and compressing said insulator between itself and said cup cores to hold the latter firmly against said base and to contribute further to the grip of said part on said threaded shank, said shank being otherwise free to turn in either direction with respect to said insulator, said insulator being provided at the center and longitudinally thereof with a cavity of sufficient cross-sectional area to receive and to accommodate said slug in the fully-retracted position of the latter.

2. In a cup-core inductor of the character described, a housing having a base at one end thereof and open at its other end, a pair of complementary cup cores disposed in said housing at the base end of the latter, an adjustable tuning slug having a threaded shank and disposed with its longitudinal axis substantially coincident with the longitudinal axis of said housing and with said shank substantially at the open end of said housing, a resilient insulator threaded on said shank with a relatively tight fit to grip the latter and disposed in said housing adjacent to said cup cores, and a cup-shaped nut screwed tight to the outside of said housing at said open end of the latter and compressing said insulator between itself and said cup cores to hold the latter firmly against said base and to contribute further to the grip of said insulator on said threaded shank, said shank being otherwise free to turn in either direction with respect to said insulator and extending freely through the center of said nut and beyond said open end of said housing, said insulator being provided at the center and longitudinally thereof with a cavity of sufficient cross-sectional area to receive and to accommodate said slug in the fully-retracted position of the latter.

3. In a cup-core inductor of the character described, a housing having a base at one end there-

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of and open at its other end, a pair of complementary cup cores disposed in said housing at the base end of the latter, an adjustable tuning slug having a threaded shank and disposed with its longitudinal axis substantially coincident with the longitudinal axis of said housing and with said shank substantially at the open end of said housing, a resilient insulator threaded on said shank with a relatively tight fit to grip the latter and disposed in said housing adjacent to said cup cores, said housing on the inner wall structure thereof being provided with a groove, and a self-locking retaining ring comprising a substantially circular ring body of spring material normally arched out of the plane in which it otherwise would be disposed if flat, the outside diameter of said ring being substantially greater than the inside diameter of said housing at said groove, said ring being deformed radially and as so deformed being disposed in said groove in interlocked relation with the wall structure of said housing, said ring body by reason of the interlocked relation of said ring with the wall structure of said housing being sprung to lie more nearly in said plane, said ring body as so sprung and as so disposed being effective to exert pressure on said insulator thereby to hold said cup cores firmly against said base and to contribute further to the grip of said insulator on said threaded shank, said shank being otherwise free to turn in either direction with respect to said insulator, said insulator being provided at the center and longitudinally thereof with a cavity of sufficient cross-sectional area to receive and to accommodate said slug in the fully-retracted position of the latter.

ALEXANDER RAUCH.

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