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COIL POSITIONING TOOL

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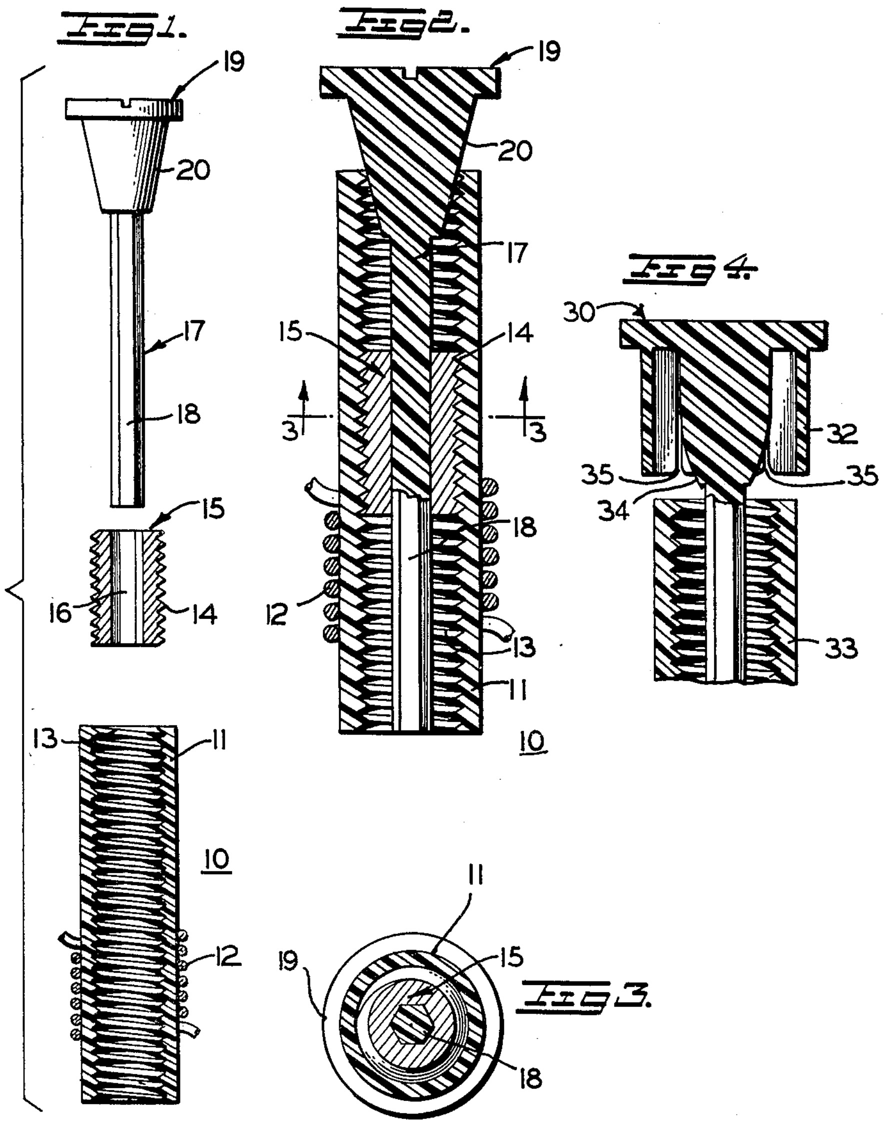

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COIL POSITIONING TOOL

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This invention relates to tunable variable inductive devices, and more particularly to one having a novel mechanical arrangement for securing the parts of the inductive device together and for precluding accidental displacement of its tuning slug or core.

Variable inductive devices are frequently used in environments, such as mobile radio equipment for example, where they are subject to extreme vibration. Any movement of the parts of the device due to vibration changes the inductance of the device and is, therefore, highly undesirable.

In some known prior art arrangements, the inductive devices are provided with adjustable threaded cores or slugs which are supported in a tubular coil support form. The cores are arranged to have an extremely loose fit which often results in the core vibrating out of tune. To overcome the tendency of the core to vibrate out of position, resort has been made to cores having an extremely tight fit. The latter arrangement, while solving one problem, has introduced an equally difficult one since binding between the core and tubular coil support form occurs frequently, making adjustments difficult to achieve. In addition, attempts at positioning of the core often result in breakage of the core, its threads, the shaft, or of the tubular coil support form.

Accordingly, it is an object of the present invention to provide a novel mechanical arrangement which precludes accidental movement of the moving parts of a variable inductor and yet can be easily adjusted.

Another object of the present invention is to provide an improved variable inductor having a novel mechanical arrangement for positively locking the tuning core in position.

In one form of the present invention, the novel mechanical arrangement for positively locking a threaded tuning core, in position, within tubular coil support form includes a core having an aperture which extends longitudinally therethrough. An adjusting element or core positioning tool, comprising a stem or shaft and a head member having a tapered surface, is arranged so that the shaft is positioned within the aperture for convenient adjustment thereof. When the core is properly adjusted within the tubular coil support form, the adjusting element is moved axially, and the tapered surface of the head member is wedged into the top of the tubular coil support form to positively lock the tuning core in place, thus precluding any random movement of the core due to vibration.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter regarding the invention, it is believed that the invention will be better understood from the following description taken in connection with the accompanying drawings.

FIG. 1 is an exploded view of the improved electronic tuner assembly, partially in cross section, embodying the invention.

FIG. 2 is a cross sectional view of the electronic tuner assembly with the core in position and locked.

FIG. 3 is a cross sectional view of FIG. 2 taken along line 3—3.

FIG. 4 is a cross sectional view of a portion of the electronic tuner illustrating an alternate embodiment of the shaft and head member used for locking the core in place.

FIGS. 1–3 show a variable inductive device 10, the general outline, function and operation of which are well known in the prior art. The assembly 10 includes an insulating cylindrical tubular coil support form 11, upon which a coil 12 is wound and affixed in a manner well known in the art. Coil form 11 is internally threaded, as indicated at 13, for coaction with the external threads 14 of core 15.

Core 15, which may be a metallic slug, ferrite core, or the like includes a hexagonal axial passage 16 which, in the preferred embodiment, extends entirely through the core 15.

An adjusting element or core positioning tool 17, in the form of an elongated stem or shaft 18 and a head or cap member 19, is provided for adjusting the position of core 15. Positioning tool 17 may be moved axially within core 15 since, as shown clearly in FIG. 3, the cross section of shaft 18 is also hexagonal. Rotation of core 15 is thus achieved by rotation of the adjusting element 17.

While FIG. 3 illustrates the core 15 as having a hexagonal shaped aperture 16 and the shaft 18 of the adjusting element 17 to be correspondingly shaped, it should be readily apparent that any non-circular arrangement may equally well be utilized. The aperture 16 may be, for example, in cross section, semi-circular, oval or polygonal, it only being necessary that the shaft 18 of the adjusting element 17 be shaped to provide for rotational engagement of the shaft 18 with the aperture 16, whereby the core 15 may be readily positioned by turning of the adjusting element 17, while allowing freedom of movement of the shaft 18 in an axial direction to permit locking of the core in position.

The head member 19 is tapered as at 20 to provide a suitable tapered surface which may be, for example, cone shaped. The smallest dimension of the tapered surface 20 is less than the internal dimension of the tubular coil form 11, while the largest dimension of the tapered surface 20 is greater than the internal dimension of the tubular coil form 11. This arrangement permits the tapered surface 20 to be freely inserted into the upper portion or end of the tubular coil form 11 until the upper portion of tapered surface 20 is reached. At this point, the tapered surface 20 engages the inner surface of the tubular coil form 11 with a wedging action to positively lock the core 15 in its adjusted position.

It should be apparent that the tapered surface 20 of the head member 19 may be other than cone-shaped or linear as shown in FIGS. 1 and 2, it only being necessary that the smaller dimension of the taper be such as to permit insertion past the upper rim of the tubular coil form 11, and the larger dimension of the taper be greater than the internal cross sectional dimension of the upper rim of the tubular coil form 11 to permit engagement therewith.

If desired, the upper surface of the head member may be provided with a keyway or slot for insertion of any suitable means or tool, to facilitate rotation of the shaft and positioning of the core.

The adjusting element 17 is made of a non-magnetic, insulating material, and preferably softer than that of the core 15, to permit free movement of the shaft within the aperture in an axial direction without excessive wear on the core 15. Plastic materials, such as nylon, have been found satisfactory; however, other materials, having the above mentioned properties, may also be utilized.

In operation of the device, the core 15 is generally positioned within the tubular coil form 11, and shaft 18 is inserted within the aperture 16 of the core 15. When the head member 19 of the adjusting element 17 is rotated, sufficient torque is produced to rotate core 15 into the desired position. It should be noted that the cross sectional shapes of aperture 16 and shaft 18 permit movement of the adjusting element 17 in an axial direction, while permitting sufficient torque to be developed to rotate and position the core 15 when the adjusting element 17 is rotated. After the core 15 is properly positioned, the adjusting element 17 is moved axially by exerting manual pressure on the head member 19, and the tapered surface 20 of the head member 19 is wedged into the end of the tubular coil form 11. The tapered surface 20 engages the rim of the tubular coil form 11, thereby frictionally locking the core 15 in position, and prevents accidental displacement of the core 15 due to vibration.

Referring to FIG. 4, there is shown an alternate embodiment of the adjusting element 17 in which there is provided a cup-shaped head or cap member 30. The head member 30 includes a flat disk shaped member 31 having an extending outer sleeve or flange 32 arranged to engage the outer surface of the tubular coil support form 33. The flange 32 is arranged concentrically with respect to the tapered surface 34 which extends downwardly from the disk member 31. The tapered surface 34 is dimensioned to fit snugly within and engage the tubular coil form 33 in a manner similar to that described in connection with FIGS. 1–3, while the flange 32 fits externally of the tubular coil form 33, both aiding each other to positively lock the core in operation. If desired, the flange 32 may be slotted in one or more places, as at 35, for greater flexibility and deformability to enhance the locking or gripping action of the flange and tapered surface as they engage the rim of the tubular coil support form.

In an alternative arrangement, the sleeve or flang 32 may be arranged for frictional engagement with the outer surface of the tubular coil support form 33 without coaction of the tapered surface 34. In this arrangement, since the locking action is achieved by frictional engagement of the flange 32 on the outer surface of the tubular coil support form 35, the tapered surface can be entirely eliminated. Although the gripping force of the head member 30 is reduced over the aforementioned arrangement wherein the flange 32 and tapered surface 34 coact, the gripping force is sufficient to lock the core in place and maintain the core locked in environments which are not subject to severe vibrations.

Although particular embodiments of the subject invention have been described, many modifications may be made, and it is intended by the appended claims to cover all such modifications which fall within the true spirit and scope of the invention.

What we claim as new and desire to secure by Letters Patent of the United States is:

1. A mechanical arrangement for adjusting an electronic tuner comprising:

(*a*) a tubular coil support form having internal threads thereon,

(*b*) a core positioned within said form and having external threads thereon in threaded engagement with said form,

(*c*) an adjusting element for rotating said core to

change the axial position thereof for adjusting the tuner,

(*d*) said adjusting element and core being axially movable relative to each other, and

(*e*) said adjusting element including means for engaging said form to lock said core in its adjusted position comprising a cap member having a tapered surface, a flange extending from said cap member, and concentric with respect to the tapered surface, said tapered surface being positioned within said form and in engagement therewith and said flange being positioned externally of said form and in frictional engagement therewith upon axial movement of said adjusting element.

2. The mechanical arrangement, as set forth in claim 1, wherein said flange is slotted to allow deformation of said flange upon engagement thereof with said support form.

3. A mechanical arrangement for adjusting an electronic tuner comprising:

(*a*) a tubular coil support having internal threads thereon,

(*b*) a core positioned within said form and having external threads thereon in threaded engagement with said form, said core having an axially extending noncircular aperture therethrough,

(*c*) an adjusting element for rotating said core to change the axial position thereof for adjusting the tuner,

(*d*) said adjusting element and said core being axially movable relative to each other, and

(*e*) said adjusting element including a shaft member and means for engaging said form, said shaft member being non-circular in cross section and positioned within said aperture to engage and rotate said core upon rotation of said adjusting element, said means locking said core in its adjusted position and including a cap member having a flange extending therefrom, said flange being positioned externally of said form and in frictional engagement therewith upon axial movement of said adjusting element.

4. The mechanical arrangement, as set forth in claim 3, wherein said aperture and shaft are correspondingly shaped in cross section.

5. The mechanical arrangement, as set forth in claim 3, wherein said means for engaging said form includes a tapered surface extending from said cap member and arranged concentrically with respect to the flange, said tapered surface positioned within said form and in engagement therewith.

6. The mechanical arrangement, as set forth in claim 5, wherein said flange is slotted to allow deformation of said flange upon engagement thereof with said support form.

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