June 22, 1948. H. C. HALL 2,443,822

SELF-ADJUSTING BEARING

Filed Jan. 24, 1944

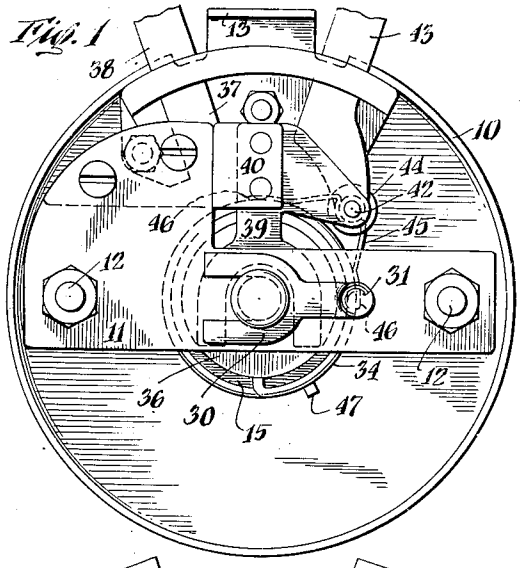


Fig. 1

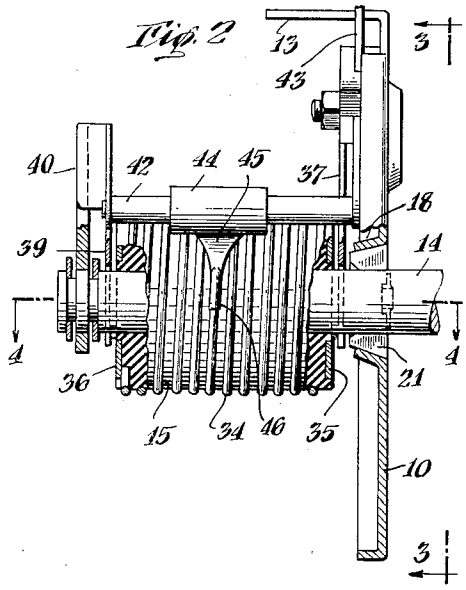


Fig. 2

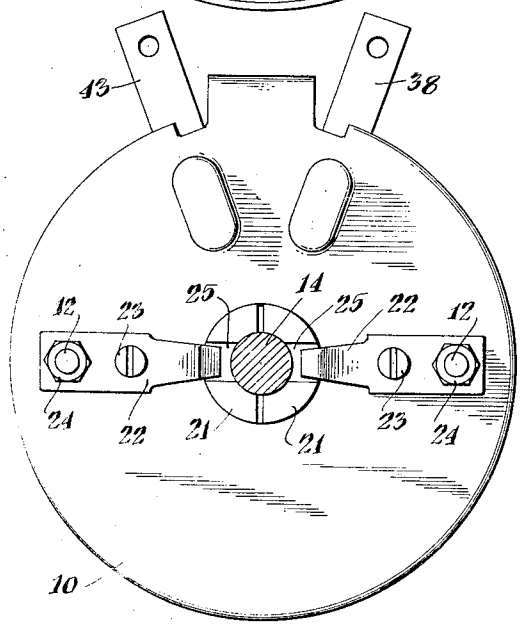


Fig. 3

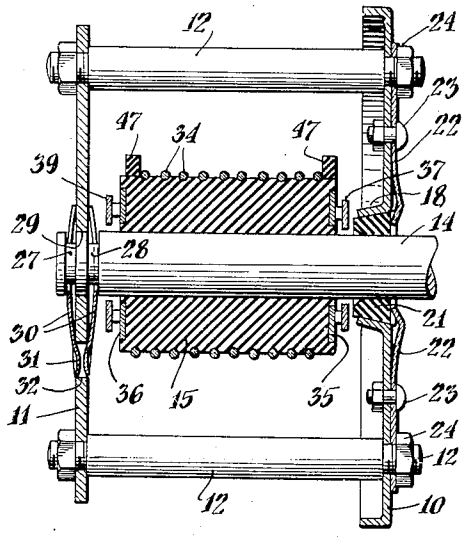


Fig. 4

INVENTOR.
Harry C. Hall
BY
Robbins & Carlson
ATTORNEYS

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SELF-ADJUSTING BEARING

Harry C. Hall, Phoenix, Ariz., assignor to P. R. Mallory & Co., Inc., Indianapolis, Ind., a corporation of Delaware

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1 Claim. (Cl. 308—71)

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This invention relates to continuously variable slide-wire inductance devices and has for its object to provide an improved device of this type which is simple in construction and efficient in operation under all conditions of use.

Another object of the invention is to provide a novel carriage structure for an inductive tuner of the above type, including an improved self-adjusting oil-less bearing and associated resilient retaining means for insuring faithful operation under all conditions including extremes of temperature.

Another object of the invention is to provide an inductive tuning device of the type specified having novel and improved details of construction and features of operation.

Various other objects and advantages will be apparent as the nature of the invention is more fully disclosed.

Slide-wire variable inductance devices are used for tuning radio receivers, oscillators and various other electric and electronic instruments and devices. Generally, they comprise a bare wire coil wound on a suitable insulating form which is mounted on a shaft so as to rotate about its axis. Circuit connection is made to one end of the coil by a contact brush sliding on a suitable slip ring mounted on the end of the coil form and by a sliding contact which slides along the wire of the coil as it is rotated and simultaneously engages a stationary trolley rod mounted alongside the coil form.

The present invention provides an improved mounting for the rotatable coil form of an inductive tuning device of the foregoing type. This novel mounting comprises a self-adjusting oil-less bearing for the shaft of the coil form and a special resilient retaining means which permits automatic adjustment of the shaft to compensate for normal wear as well as for variations in the parts due to temperature changes. This improved mounting, in combination with other details of construction hereinafter described, simplifies the construction and maintenance of the inductance device and insures its faithful operation under all conditions of use.

Although the novel features which are characteristic of the invention are set forth more in detail in the claim appended hereto, the nature and scope of the invention may be better understood by referring to the following description, taken in connection with the accompanying drawing forming a part thereof, in which a specific embodiment has been set forth for purposes of illustration.

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In the drawing:

Fig. 1 is an end view of a slide-wire variable inductance device embodying the invention, showing the resilient retaining means for the shaft mounting, and other details of construction;

Fig. 2 is a side elevation, partly in section, showing the mounting of the coil form and associated elements;

Fig. 3 is an end view opposite to that shown in Fig. 2, illustrating the construction and mounting of the self-adjusting bearing; and

Fig. 4 is a longitudinal sectional view taken on the line 4—4 of Fig. 2.

In the following description certain specific terms are used for convenience in referring to the various details of the invention. These terms, however, are to be interpreted in accordance with the state of the art.

The slide-wire variable inductance device shown in the drawing comprises a pair of spaced parallel end plates 10 and 11 held in spaced parallel relation by longitudinal spacer rods 12. The unit is customarily enclosed in a suitable metal can shield which is omitted from the drawing in order to simplify the showing. An upstanding mounting flange 13 is formed integrally with the end plate 10 for securing the unit to the panel or apparatus in which it is to be used.

A rotatable control shaft 14 extends axially through end plate 10 and through end plate 11, and is adapted to be rotated by a suitable control knob on the end which projects through plate 10. The shaft carries a coil form 15 of tubular insulating material such as resin impregnated fiber.

The end plate 10 has a central circular hole formed by an inwardly sloping wall or dish 18 in the shape of a truncated cone, with the small end projecting inwardly and being of a diameter substantially larger than that of the rotatable shaft 14. The opposite end plate 11 has a circular hole which is in axial alignment with the hole in plate 10 but is only slightly larger in diameter than the shaft 14 so as to make a close running fit with said shaft.

The bearing for the shaft 14 in end plate 10 comprises a pair of complementary bearing blocks 21 having semi-cylindrical holes which mate, when said blocks are disposed as an annulus about the shaft 14, to form a cylindrical bearing surface for said shaft. The outer walls of the bearing blocks 21 are tapered to the same pitch as the conical wall 18 of the opening in end plate 10, so that, when the two halves of the split bearing are seated edge to edge in the cone-shaped wall

18, they cooperate to form a bearing for the shaft 14. Clearance is provided between the adjacent surfaces of the two blocks 21 to permit self-adjustment to compensate for wear.

Leaf springs 22 are secured to the end plate 10 by screws 23 and by nuts 24 which hold the spacer rods 12 in place. The springs 22 are mounted in alignment on opposite sides of the respective bearing blocks 21, and the free ends of said springs are flexed to engage in grooves 25 in the outer flat faces of the blocks 21. It will thus be observed that the springs 22, which need exert but slight pressure, urge the bearing blocks 21 inwardly upon their conical seats and insure a close running fit between the mating bearing surfaces of the blocks and the rotatable shaft 14 under all operating conditions. The bearing blocks 21 are preferably made of a suitable insulating material, such as graphitized Bakelite, exerting a minimum friction.

The rotatable shaft 14 extends through the circular hole in end plate 11, in axial alignment with the bearing in end plate 10, and makes a close running fit with said hole. In the embodiment illustrated, the shaft 14 is provided with annular grooves 27 and 28 on opposite sides of the actual bearing surface 29 of the shaft and therefore on opposite sides of end plate 11. A pair of bifurcated or forked retaining springs 30 are provided with their forks engaging in the respective grooves 27 and 28 of shaft 14 while the free ends of the forks bear against opposite sides of end plate 11 and the single bars of said springs have small protuberances or bosses 31 seated in a hole 32 in the plate 11.

The bifurcated retaining springs 30 are identical, and are both flexed outwardly in the same manner, but, since these springs are mounted on opposite sides of end plate 11 with their ends bearing against said plate, the two springs act oppositely and equally upon the shaft 14. That is, one spring 30 tends to urge the shaft 14 axially toward the left as viewed in Fig. 4, while the other spring 30 tends equally to urge said shaft toward the right, with the result that the bearing surface 29 of the shaft maintains the proper running fit in the hole of end plate 11 while permitting slight end play. This construction insures automatic adjustment of the shaft under all operating conditions and prevents freezing even at extremely low temperatures.

A bare wire coil 34 is wound on the surface of the tubular coil form 15. If desired, the form may be provided with a shallow groove in which the wire 34 is wound. Coil 34 may suitably be made of hard drawn copper wire plated with silver, and, if desired, coated with a protective lubricant. The ends of the coil 34 are soldered to metal discs or rings 35 and 36 secured to the respective ends of the coil form. The contact ring 35 is engaged by a contact spring 37 which is connected to a terminal 38 to provide an external circuit connection. Contact ring 36 is engaged by a fork-shaped contact spring 39 secured to a bracket 40 of conducting material. A trolley rod 42 of conducting material is secured to the bracket 40 and to the inner end of a terminal 43 which extends outwardly for an external connection.

A tubular stop member 44 is slidably mounted on the trolley rod 42, and a sliding contact member 45 is mounted on said trolley rod beneath the stop member 44 so as to slide therewith. The sliding contact member 45 has two longitudinally grooved nibs 46 resting upon the wire of coil 34 at two spaced points thereon with the grooves of said nibs engaging said wire. The contact member 45 is originally bent sufficiently to provide the necessary spring pressure on the nibs 46 when the member is interposed between the rod 42 and the coil. As the shaft 14 rotates the coil form 15, the nibs 46 slide along the wire 34 and move the contact member 45 and the stop member 44 along rod 42. In the embodiment illustrated, the portion of coil 34 to the left of contact member 45, as viewed in Fig. 2 is short circuited by the contact member 45, trolley rod 42, bracket 40, spring 39 and disc 36. Suitable stop members 47 may be provided adjacent opposite ends of the coil form 15 for engagement with the sliding stop member 44 to arrest the movement of the coil form before the contact member 45 reaches either end of the coil 34.

While the present invention, as to its objects and advantages, has been described herein as carried out in specific embodiments thereof, it is not to be limited thereby but is only to be restricted in accordance with the spirit and scope of the appended claim.

What is claimed is:

A bearing for a variable inductance device comprising a support having an inwardly sloping tapered wall portion defining a frustro-conical passage, a shaft extending through said passage, a pair of complementary bearing blocks disposed within said passage, the inner walls of said bearing blocks forming a cylindrical bearing surface for said shaft, the outer walls of the bearing blocks being tapered to the same pitch as the inwardly protruding wall portion on said support, each of said bearing blocks having a groove in the outer flat surface thereof, and a pair of leaf springs mounted on said support, the free ends of said springs protruding into the respective grooves on said bearing blocks to urge them inwardly against their respective conical seats and to prevent rotation of said bearing blocks during rotation of said shaft.

HARRY C. HALL.

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