June 16, 1953 H. M. VISCH 2,642,559

INDUCTANCE COIL OF THE SLIDING CORE TYPE

Filed Dec. 8, 1949

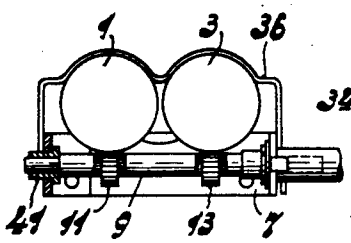


Fig. 2.

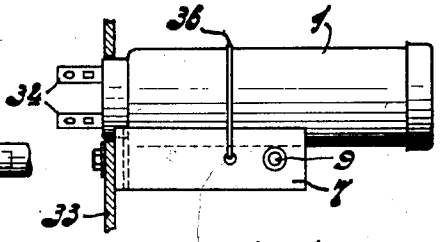


Fig. 1.

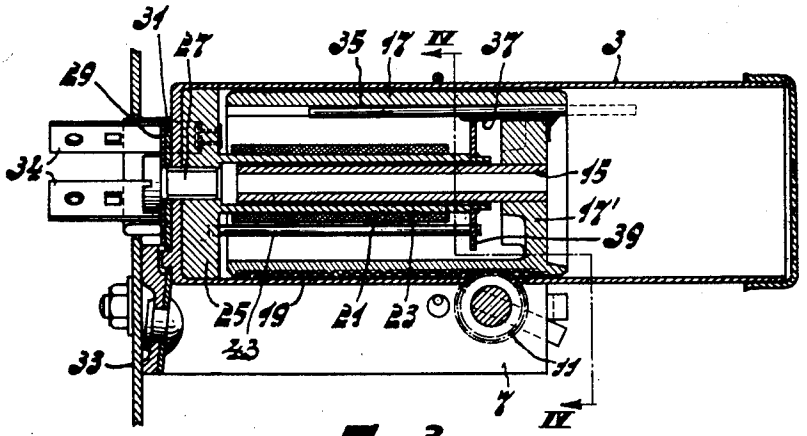


Fig. 3.

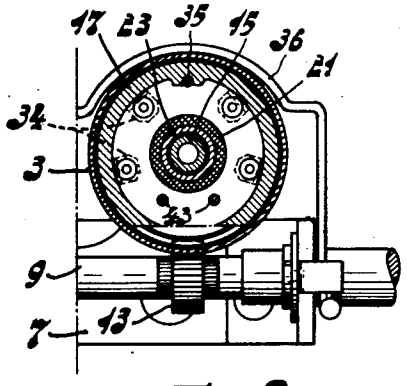


Fig. 4.

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Patented June 16, 1953 2,642,559

UNITED STATES PATENT OFFICE

2,642,559

INDUCTANCE COIL OF THE SLIDING CORE TYPE

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Application December 8, 1949, Serial No. 131,719
In the Netherlands December 11, 1948

7 Claims. (Cl. 336—80)

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This invention relates to inductance coils of the sliding-core type.

If, for example in radio receivers, use is made of two or more sliding-core inductance coils actuated by the same driving member, particular correction means are required to ensure a corresponding variation of the inductances of the two coils as a function of the position of the tuning member (tuning curve). Even when using one coil only it may be desirable to alter the tuning curve in accordance with that of a different element or component, for example to accord with the indication given by a tuning dial.

It is usually endeavoured to act upon the tuning curve separately at the two ends and centrally. For this purpose several means are known.

In French patent specification No. 895,839 is described an inductance coil of the sliding-core type comprising a ferromagnetic correction body, arranged near the rear end of the sliding core (i. e. the end that enters the coil last) and which follows the movement of this core, the correction body being shaped in the form of a disc or cup and being adapted to be screwed over a bolt secured at the end of the core in line therewith. The spacing between the correction body and the end of the core acts upon the tuning curve primarily at the end which corresponds to the maximum inductance.

The present invention relates to an inductance coil of the sliding-core type comprising a ferromagnetic correction body arranged in a similar manner and has for its object to provide a simple and cheap construction.

According to the invention, an inductance coil of the sliding-core type comprising a ferromagnetic correction body which is arranged near the rear end of the sliding core and which follows the movement of this core, is characterized in that the correction body is constituted by at least one rod or strip of sintered, ceramic, ferromagnetic material having a permeability of at least 100, the correction body and the core being secured to a common non-magnetic support so that the correction body is slidable substantially parallel to and axially of the core. Said ferromagnetic material may be of the kind which is primarily constituted by a magnetic ferrite and will be referred to hereinafter as ferrite.

The high permeability of the ferrite ensures a sufficient margin of correction even when using a small, and thus cheap, rod-shaped correction body. Without the use of a screw-thread such a rod may be arranged in a very simple manner

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so as to be slidable with some friction in the non-magnetic support. The part of the rod which projects beyond the coil winding after correction and with the core entirely within the coil winding does not substantially affect the tuning curve and may be severed, so as to minimize the length of the coil construction.

In order that the invention may be more clearly understood and readily carried into effect, it will now be described more fully with reference to the accompanying diagrammatic drawing, given by way of example, in which

Figs. 1 and 2 are front and side views of an embodiment of the invention comprising two coils;

Fig. 3 is a sectional view taken on the vertical axis of one of the coils, and

Fig. 4 is a cross-sectional view taken on the line IV—IV of Fig. 3 and which shows one of the coils in greater detail.

Referring now to the drawing, Figs. 1 and 2 show the arrangement of the two coils. Each coil is enclosed in a metal screening can 1 and 3, respectively, which cans are secured to a U-shaped frame 7 made of sheet material. The drive is effected with the use of a common shaft 9 on which are seated two gear wheels 11 and 13.

Fig. 3 is a sectional view of the rear coil of Fig. 1. The hollow sliding core 15, which is preferably made of ferrite, is secured to a transverse partition 17' of a substantially tubular insulating support 17 made of plastic material and adapted to slide in and be guided by the screening can 3. The core 15 is driven by a gear wheel 11 which, through an aperture in the can 3, engages a toothed rack 19 provided externally of the support 17. In the position shown, the core 15 is within a coil winding 21 almost to the maximum possible extent. The coil winding 21 surrounds an insulating cylinder 23. The latter forms a unit preferably of plastic material comprising an insulating base 25, which is secured in the screening can 3 with the use of a bolt 27 which also secures an insulating plate 29 and one end of a spring 31 which can be in the form of a bent flat steel strip as shown. The other end of the spring 31 is secured to the bottom of the U-shaped frame 7. The resilience of the strip 31 holds the toothed rack 19 of the support 17 in engagement with the gear wheel 11. A rigid wire strap 36 prevents the toothed rack disengaging from the gear wheel.

The coil system is mounted on a chassis plate 33 with the use of several bolts. Several soldering tags 34 are secured to the base 25 by flanging, which tags 34 extend outwardly through

apertures provided in the front surface of the can 3. The chassis plate 33 is provided with similar apertures to allow the soldering tags to pass.

At and adjacent the position of maximum insertion of the core into the coil winding, the inductance of the coil may be re-adjusted with the use of a smooth rod or stud 35 of ferrite. The material of the stud may be of the kind described in British patent specification No. 626,946 with a permeability of approximately 400.

The stud 35 is taken through an aperture in the transverse partition 17' and is adapted to move therein with a certain amount of friction, the stud being urged by a small spring 37 into a slot provided on the inner surface of the tubular support 17 (Fig. 4).

By moving the stud 35 further into the support 17, the inductance of the coil is increased, but primarily only at or near the final position of maximum insertion of the core 15, since in the initial positions other than that of maximum insertion of the core 15, the stud is substantially completely outside the coil field. Even in the position in which about half the core is inserted in the coil 21, the effect of the stud 35 is still small. Subsequent to re-adjustment, the stud is secured with the use of lacquer and the part extending beyond the support 17, that is to say, the part extending beyond the coil winding, with complete insertion (shown in broken lines in Fig. 3) is cut off.

It will be noted that in the coil thus finally adjusted the stud 35 is no longer slidable relatively to the support 17 and the term "slidable" is to be understood to mean that the stud is initially slidable, even though subsequent measures are taken to secure the stud in position.

Instead of having a smooth surface, the stud 35 may be threaded. This facilitates re-adjustment, but detracts from the simplicity of construction.

Two ferrite rods or studs 43 are arranged parallel to the core 15 and on the side of the core 15 remote from the stud 35, however, these rods 43 are rigidly secured to the coil winding 21 and are supported by the base 25 and an insulating flange 39 secured to the end of the cylinder 23 and constitute a magnetic screening between the coil winding 21 and the screening can 3. Owing to the high permeability of the rods, the greater part of the lines of force of the coil complete their circuit through these rods. The remaining part strikes the screening can 3 and results in eddy current losses therein. However, owing to the presence of the rods 43, this part is small so that the said losses are not troublesome.

Similar rods may be arranged on the side of the coil 21 adjacent the stud 35. It should, however, be considered that these rods attenuate the effect of the stud 35 on the inductance of the coil, so that the effect of this stud is reduced.

One of the ends of the shaft 9 is journalled in an insulating bearing 41 (Fig. 2) so as to prevent the frame 7 from forming, together with the shaft 9, a closed circuit, which would result in undue coupling between the two coils by way of the leakage fields emanating from the screening cans 3 across the apertures for the gear wheels 11.

What I claim is:

1. An inductance coil system suitable for use in radio receivers and the like comprising a plurality of tubular enclosures of non-magnetic material, each of said enclosures having a longitudinal axis, a U-shaped frame, a resilient plate secured to said U-shaped frame and supporting said enclosures in parallel axial alignment, each of said enclosures housing a coil wound on a hollow tubular form of insulating material, a core having a given axis parallel to the axis of the enclosure slideable within the form, a transverse member slideable within the enclosure supporting the core, a rod of ferrite material having a magnetic permeability of at least 100 adjustably secured to said transverse member and movable therewith, said rod of ferrite material being mounted parallel to the axis of the core and at the end of said core remote from the end which enters the tubular form, and means to conjointly move the respective transverse members in each enclosure comprising a driving member journalled in the ends of the limbs of the U-shaped member, a gearing wheel mounted on said driving member for each transverse member, and a toothed rack secured to each transverse member and engaging one of said gear wheels for transmitting movement of said gear wheel to said transverse member thereby moving the latter.

2. An inductance assembly as claimed in claim 1 in which the driving member is journalled in a bearing of insulating material.

3. An inductance coil suitable for use in radio receivers and the like comprising a tubular enclosure of non-magnetic material, a coil wound on a hollow tubular form of insulating material within said enclosure, a core having a given axis slideable within said form, a tubular member of non-magnetic material surrounding said form and moveable within said enclosure, a transverse member of non-magnetic material secured to said tubular member for movement therewith and supporting said core at an end thereof remote from the end which enters said tubular form, and a rod of ferrite material having a magnetic permeability of at least 100 slideably secured to said transverse member and moveable therewith, said rod of ferrite material being mounted approximately parallel to the axis of said core adjacent the inner wall of said tubular member.

4. An inductance coil suitable for use in radio receivers and the like comprising a tubular enclosure of non-magnetic material, a coil wound on a hollow tubular form of insulating material within said enclosure, a core having a given axis slideable within said form, a tubular member of non-magnetic material surrounding said form and moveable within said enclosure, a transverse member of non-magnetic material secured to said tubular member for movement therewith and supporting said core at an end thereof remote from the end which enters said tubular form, and a rod of ferrite material having a magnetic permeability of at least 100 slideably fitting in an opening of said transverse member and moveable therewith, said rod of ferrite material being mounted approximately parallel to the axis of said core adjacent the inner wall of said tubular member.

5. An inductance coil suitable for use in radio receivers and the like comprising a tubular enclosure of non-magnetic material, a coil wound on a hollow tubular form of insulating material within said enclosure, a core having a given axis moveable within said form, a tubular member of non-magnetic material surrounding said form and being moveably arranged within said enclosure, of non-magnetic material secured to a transverse wall portion of said slideable tubular member for movement therewith and supporting said core at the end remote from the end which

enters the tubular form, a rod of ferrite material having a magnetic permeability of at least 100 extending through an aperture in said transverse wall portion adjacent the inner wall of said tubular member, and a resilient member urging said rod against the inner wall of said tubular member.

6. An inductance coil suitable for use in radio receivers and the like comprising a tubular enclosure of non-magnetic material, a coil wound on a hollow tubular form of insulating material within said enclosure, a core having a given axis moveable within said form, a tubular member of non-magnetic material surrounding said form and slideable within said enclosure, a transverse member of non-magnetic material secured to said tubular member for movement therewith and supporting said core at an end thereof remote from the end of said core which enters said tubular form, a rod of ferrite material having a magnetic permeability of at least 100 moveably secured to said transverse member and moveable therewith, said rod of ferrite material being mounted approximately parallel to the axis of said core adjacent to the inner wall of said tubular member, and a rod of ferrite material on the side of said core remote from said movable rod and extending approximately parallel to said core for magnetically shielding said coil.

7. An inductance coil suitable for use in radio receivers and the like comprising a tubular enclosure of non-magnetic material, a coil wound

on a hollow tubular form of insulating material within said enclosure, a core having a given axis slideable within said form, a tubular member of non-magnetic surrounding said form and being slideably arranged within said enclosure, a transverse wall portion of said slideable tubular member supporting said core for movement therewith at the end of said core remote from the end of the core which enters the tubular form, a rod of ferrite material having a magnetic permeability of at least 100 slideably secured to and extending through an aperture in said transverse wall portion adjacent the inner wall of said tubular member and moveable therewith, and a plurality of spaced rods of ferrite material on the side of said core remote from said movable rod and extending approximately parallel to said core for magnetically shielding said coil.

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