May 19, 1959 A. G. ROBEER ET AL 2,887,666

COIL SYSTEM COMPRISING A SLIDABLE-CORE COIL

Filed Oct. 22, 1953 2 Sheets-Sheet 1

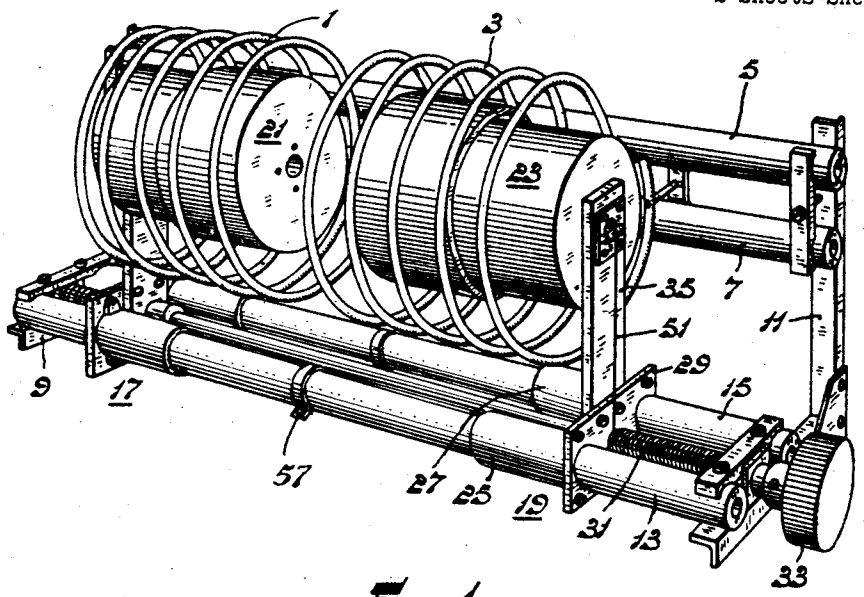


Fig. 1

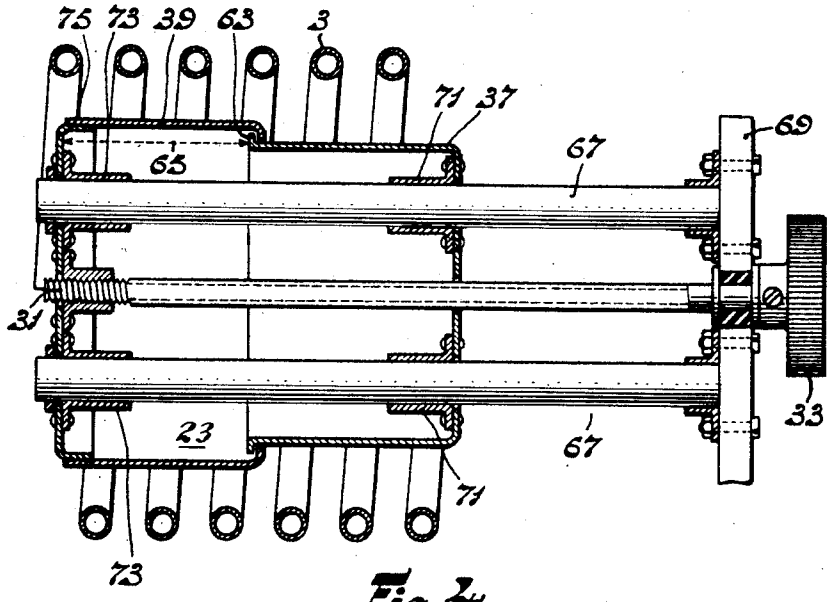


Fig. 2

INVENTORS

ANDRIES GERRIT ROBEER
TOBIAS DE JONG

BY Thea M Vogel

AGENT

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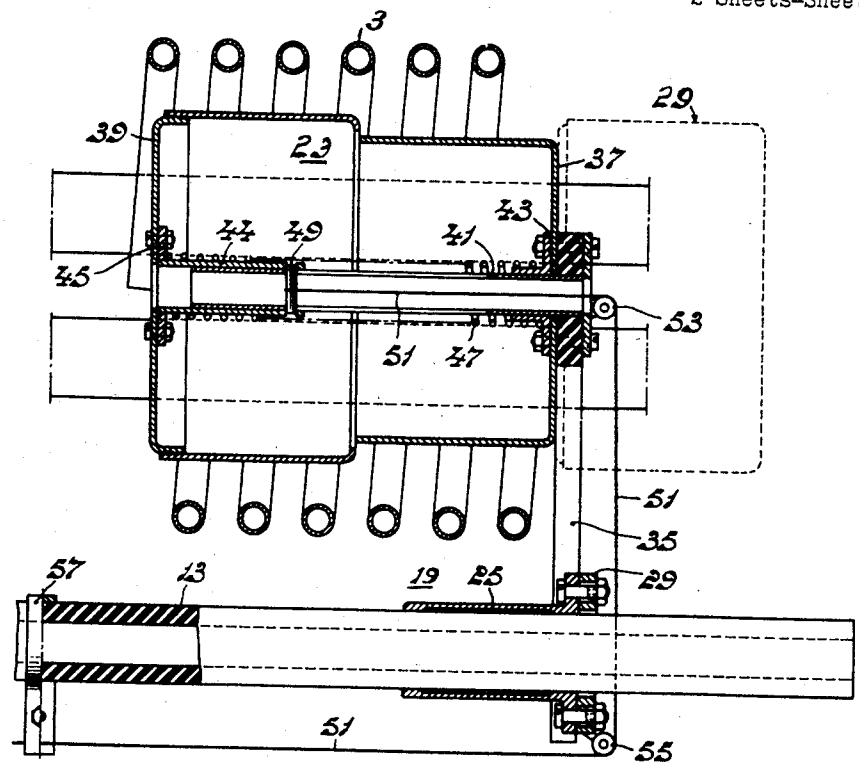


Fig. 2

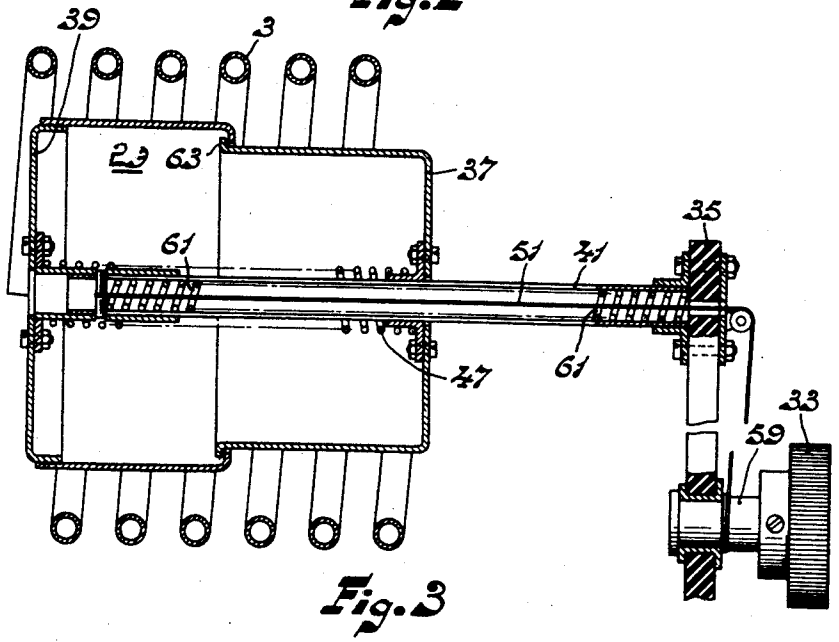


Fig. 3

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COIL SYSTEM COMPRISING A SLIDABLE-CORE COIL

Andries Gerrit Robeer and Tobias de Jong, Hilversum, Netherlands, assignors, by mesne assignments, to North American Philips Company, Inc., New York, N.Y., a corporation of Delaware

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8 Claims. (Cl. 336—75)

This invention relates to coil systems comprising at least one coil adapted to be tuned by means of a slidable core preferably consisting of conductive material, more especially for use in transmitters.

A limitation prohibiting the use of slidable-core coils for transmitters is the considerable length of the coil with extended core. Particularly in the case of the usual push-pull coil systems, which comprise two aligned coils, the length of slidable cores for the continuous tuning of the coils attains an undue value.

The present invention has for its object to mitigate this disadvantage by building up the slidable core of at least two telescoping parts which are automatically moved into and out of each other in tuning. In this case, the extended core occupies at most only one half of the space required for a normal slidable core. In a particularly simple construction, the two parts of the slidable core are subjected to the force of a spring which tends to urge them away from each other, a rope associated with the driving means for the slidable core permitting of moving the core parts into each other against the force of said spring.

In order that the invention may be readily carried into effect, it will now be described in detail with reference to the accompanying drawings, given by way of example, in which:

Fig. 1 is a perspective view of one embodiment of the invention.

Fig. 2 shows in axial section details of part of the device shown in Fig. 1.

Figs. 3 and 4 are sectional views of the main portion of two variants.

The coil system shown in Fig. 1 comprises two aligned coils 1 and 3 consisting of copper tubing and supported by two rods of ceramic material 5 and 7. The supporting rods 5 and 7 are secured to the ends of two L-shaped metal supports 9 and 11 having secured to them two further supporting rods 13 and 15 consisting of ceramic material and extending parallel to the rods 5 and 7. The rods 13 and 15 serve as guides for two slides 17 and 19 each carrying a copper slidable core 21 and 23 respectively for tuning the coils 1 and 3. The two coils 1 and 3 with the associated slidable cores and conveying means are entirely identical. For the sake of simplicity, only the righthand part of the device shown in Fig. 1 will be described hereinafter.

The slide 19 mainly consists of two copper bushings 25 and 27 provided on the rods 13 and 15 respectively and adapted to slide over them, said bushings being soldered to a connecting plate 29 which extends at right angles to the axes of the bushings. The slide 19 is movable along the rods 13 and 15 by means of a driving shaft 31 situated between said rods. This shaft is so supported as to be rotatable but not slidable and comprises a control knob 33. The driving shaft 31 is partly threaded, the threaded part passing through a tapped opening of plate 29.

Secured to the connecting plate 29 is a vertical strip-shaped stay 35, the upper end of which carries the slidable core 23. This core (Fig. 2) mainly comprises two cylindrical cup-shaped copper parts 37 and 39, the first part having a slightly smaller diameter than the other part and being adapted to move into it. During the sliding motion the two core parts are guided by a coaxial metal tube 41 secured to the stay 35. The core part 37 is also secured to the tube 41 and the stay 35 by means of a tube furnished with a flange 43, the core part 39 being provided with an internal tube 44 having a flange 45 and adapted to slide freely over the tube 41.

The tube 41 carries a helical spring 47 urging the two core parts 37 and 39 away from each other. The tube 44 is provided with a traverse pin 49 which passes through two diametrically opposite axial slots of the tube 41, this pin having secured to it the end of a rope 51. This rope passes through tube 41 over a roller 53 secured to the stay 35, whence it descends over a roller 55 secured to the lower end of this stay. After the said change of direction of approximately 180° in all, the other end of the rope is secured to a fixed strap 57 situated about at the middle of the guide bar 13.

When operating the control knob 33 (Fig. 1), the screw thread of the spindle 31 displaces the slide 19 for example to the right in Fig. 2. From this figure it is seen that the core part 37 is directly driven, and the core part 39 is pulled to the right by the rope 51 at a speed twice as great as that of the core part 37. At the end of the displacement, the two core parts 37 and 39 are in the full-in position and the slidable core 23 extends entirely outside the winding in the position shown in dashlines in Fig. 2.

The knob 33 consequently permits the self-inductance of coil 3 to be controlled by moving in or out a core of electrically conductive material by which the magnetic field is partly displaced on moving in coil 3. Since in the out-position of the core 23 the two parts 37 and 39 are in the in-position, the total axial dimension is reduced by half the core length with respect to that of the normal construction.

Fig. 3 shows a variant closely resembling the construction shown in Figs. 1 and 2 and having the same reference numerals. In this instance, however, the stay 35 is stationary and the tube 41 is longer than that shown in Fig. 2. The spindle 59 of the control knob 33 acts as a windlass for the rope 51, which is kept taut by means of a second helical spring 61 within the tube 41. The free edge of the core part 37 is bent outwards and forms a flange 63 whose outer diameter is larger than the inner diameter of the inwardly bent edge of the cup-shaped core part 39, thus preventing the spring 47 from moving the two core parts too far away from each other.

On turning the control knob 33, the rope 51 pulls the slidable core 23 out of the coil 3 against the force of spring 61. After the slidable core has been pulled over half of its length out of the coil, the part 37 abuts against the stay 35. When turning the knob further, the core part 37 maintains its position and the part 39 is entirely pulled out of the coil so that the two core parts resume the in-position.

It will be evident that, as an alternative, the slidable core may be made up of three or more parts instead of two, provided the core parts comprise stopping means, for example of the type of the flange 63 shown in Fig. 3, to prevent the core parts from being moved too far away from each other by the spring within the slidable core. Thus, the length of the construction is slightly further reduced.

In the example shown in Fig. 3 the spring 47 may, if desired, be dispensed with. Fig 4 shows an embodiment of the invention in which this is the case and in

which the rope is also omitted. In this instance, the driving shaft 31 acts directly on the core part 39, the construction being such that both in the full-in position and in the full-out position of the core part the flange 63 abuts against an inwardly bent edge of the core part 39, as indicated by dash-line 65. For guiding the core parts, provision is made of two ceramic rods 67 which extend parallel to the shaft 31 and are secured at one end in a stationary wall 69, the core parts 37 and 39 being provided with guide bushings 71 and 73 adapted to slide over the rods 67.

When the core part 39 is moved from the position shown in the drawing to the right by means of the knob 33 and the screw spindle 31, the core part 37 maintains its position due to friction between the bushes 71 and the rod 67 until the core parts are in the full-in position and the flange 63 abuts against the inwardly bent edge 75 of the core part 39. Upon the further displacement the core part 37 is carried along by part 39 until the two parts have entirely been pulled out of coil 3.

When the core 23 is moved into the coil, the core 3 part 37 provisionally maintains its position. Halfway along the sliding motion, the core part 37 is carried along by the part 39 owing to the stopping means consisting of the flange 63 and the inwardly bent free edge of the core part 39 until resuming the position shown in the drawing.

What is claimed is:

1. A coil system comprising a coil, a supporting post mounted at right angles to said coil axis, a hollow tubular member secured to said post and extending through said coil along the axis thereof, a core of conductive material mounted on said tubular member, said core comprising at least two telescoping parts, the telescoping part more remote from said post being slidable along said tubular member, spring means urging said telescoping parts away from each other, rope means extending through said tubular member and secured at one end to said more remote telescoping part, and rotating means associated with said post for controlling the position of the core within the coil, said rope means being coupled at its other end to said rotating means, whereby rotation of the latter causes the core to move in and out of the coil and also to telescope.

2. A coil system as claimed in claim 1 wherein the post is fixed.

3. A coil system as claimed in claim 1 wherein the post is movable.

4. A coil system as claimed in claim 1 wherein the post is fixed, and the rotating means is rotatably mounted on the post.

5. A coil system as claimed in claim 1 wherein a second spring urges the more remote telescoping part away from said post, said post being spaced a predetermined distance away from the end of said coil.

6. A coil system as claimed in claim 5 wherein the first spring means is mounted on the outside of said tubular member, and the second spring is mounted on the inside of said tubular member.

7. A coil system comprising a hollow coil portion, a core member mounted for movement in and out of said coil portion for changing the inductance thereof, said core comprising plural telescoping sections each movable with respect to the coil, means for moving all of said plural core sections in and out of said coil portion from only one end of the coil portion comprising means for moving one of said sections, and means on said one section co-acting with means on another section for moving the other section and for telescoping said plural sections whereby in one position the plural core sections are fully extended within the coil and in another position the plural sections are telescoped and lie adjacent said one end of the coil.

8. A coil system comprising a hollow coil, a core member mounted for movement in and out of said coil for changing the inductance thereof, said core comprising plural telescoping electrically-conductive sections each movable with respect to the coil, and means for moving all of said plural core sections in and out of said coil from only one end of said coil, said moving means comprising single control means coupled to one of said core sections for moving it in and out of the coil, and stop means associated with one of said core sections and co-acting with means associated with another core section for telescoping said plural sections while the said one core section is moving out of the coil.

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