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STABLE TUNING DEVICE FOR HIGH FREQUENCY RADIO CIRCUITS

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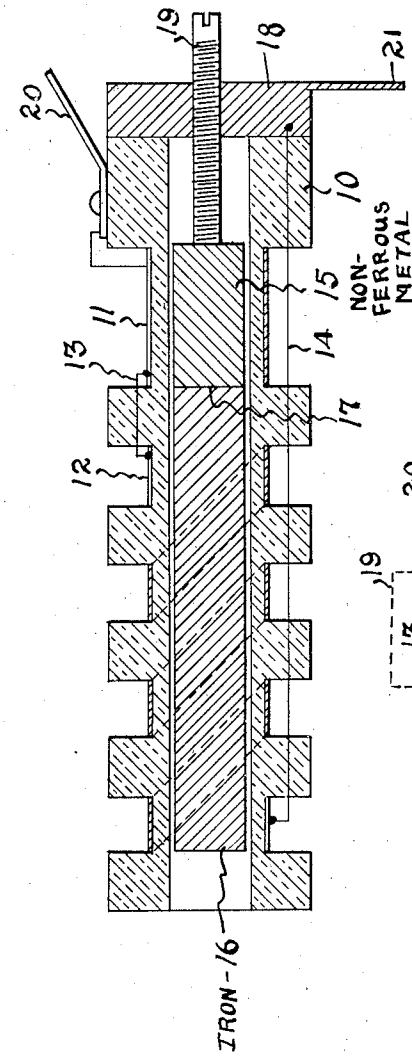


Fig. 1.

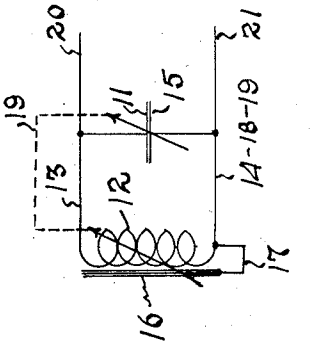


Fig. 2.

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STABLE TUNING DEVICE FOR HIGH-FREQUENCY RADIO CIRCUITS

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3 Claims. (Cl. 250—40)

This invention relates to a simple apparatus for providing an increased and specialized frequency range for permeability tuning circuits.

The primary object of this invention is to provide an inductor and a capacitor in a gang combination of which each unit is capable of variation in electrical properties.

Another object of this invention is to provide such a gang device to afford a completely stable tuning circuit for high frequency radio purposes which is adaptable to adjustment for a wide range of frequencies.

This invention resides substantially in the combination of parts as herein disclosed.

In the accompanying drawing,

Figure 1 is a cylindrical, cross-sectional view somewhat in diagrammatic form of a gang inductor-capacitor tuning device in accordance with this invention; and

Figure 2 is a diagrammatic circuit illustration of the device of Figure 1.

It is general practice to tune radio circuits by the use of a fixed inductor and a variable capacitor. This method, however, possesses the disadvantage of thermal instability among others. Some radio circuits have been designed using a variable inductor with a fixed capacitance generally furnished by the circuit itself. However, this arrangement is unsatisfactory primarily because of the limited tuning range so obtained. In accordance with this invention the variable inductor capacitor possesses a tuning range of 1.7 to 1 at high frequencies and an even larger tuning range at the lower broadcast frequencies (3.6 to 1).

The objects and advantages of this invention will be apparent by detailed reference to the structure illustrated in the drawing. The device consists of an inculating coil form made of some suitable material determined in part by the frequency range in which the device is to be used. For high frequency purposes this coil form 10 is preferably made of a Steatite ceramic formed with a central passage therethrough as shown and provided with a series of peripheral grooves. Proceeding from right to left the first groove is of larger axial extent and has mounted therein a single interrupted or incomplete turn 11 of some suitable metal such as silver or copper. The other groove is of helical form made by a series of helical turns each of which has a smaller axial extent than the first groove referred to. Mounted in this helical groove is a conductor in the form of a thin strip 12 of some suitable metal. This strip is open at the ends and has the adjacent end connected to the incomplete turn 11 by means of the conducting jumper 13.

The conductors 11 and 12 may be formed in the grooves by depositing a thin coat of silver or other metal therein, or in any other suitable manner. The chamber 13 is diagrammatically illustrated and it is apparent that this connection can be made in a number of different ways, and may for example be embedded in the coil form 10.

The far end of the conductor 12 is connected by the lead 14 which likewise could be embedded in the coil form to a metal plate 18 mounted on the end of the coil form. Threadedly mounted in this plate is a longitudinal adjustable screw 19 which extends into the coil form and is mechanically and electrically connected to a movable cup comprising the nonferrous portion 15 such as copper, for example, and the magnetic portion 16 such as soft iron. The two core portions are mechanically and electrically united together as shown at 17.

As a feature of relative unimportance it is noted that the free unsupported end of the core may be provided with some sort of guiding means to guide it centrally of the conductors 11 and 12. A permanent connection 20 is electrically connected to the conductor 12, as shown, and provides one terminal for the circuit combination formed by the device. The other terminal is provided by the lug 21 and the plate 18.

Figure 2 diagrammatically illustrates the circuit resulting from this combination of parts. The same reference numerals have been used on the respective parts so that the circuit provided by the device is clear from Figure 2.

As previously noted while the coil form 10 is preferably made of Steatite for use at high frequency, or some equivalent material, other insulating materials are available for use especially at lower frequencies, as for example many of the plastic materials now common in the electrical arts.

When the Steatite coil form is employed the device may be readily designed with a minimum of difficulty for a maximum of stability by balancing the temperature coefficient of the coil form against that of the coil components. The magnetic core 16 is preferably made of powdered iron under pressure and sintered in accordance with well known practice in the art to provide a powdered iron core especially suitable for high frequency operations. Steatite coil forms can be readily constructed with a thermo drift as low as six parts per million per degree centigrade, and can be balanced against the thermo drift of high

frequency powdered iron cores as low as two parts per million per degree centigrade. The thermo drift refers to the change in electrical properties of these devices with temperature changes. The effect on the electrical properties of the device by the thermo drift of the powdered core can be balanced by the thermo drift in an opposite sense and the Steatite coil form with temperature changes resulting in a minimization of the overall change in electrical properties of the device.

It will be apparent, as illustrated in Figure 1, that the inductance and the capacity of the device are at a maximum and that as the core is adjusted to the left by the screw 19 these forms may be correctly and scientifically brought to a minimum value.

From the above description it will be apparent to those skilled in the art that the subject matter of this invention is capable of considerable variation, and I do not, therefore, desire to be limited to the disclosure as given in an illustrative sense, but rather to the claims granted me.

What is claimed is:

1. A gang inductor-capacitor comprising an insulating support of Steatite having a passage therethrough, a condenser plate and an inductance winding surrounding said support, means for electrically connecting the plate to one terminal of said winding, a movable core lying in said passage composed of a ferrous and a nonferrous portion lying between said inductance winding and condenser plate respectively, a connection between the other end of the winding and said core, and means for longitudinally positioning said core.

2. In the combination of claim 1, said condenser plate comprising an incomplete turn on said form.

3. In the combination of claim 1, said condenser plate comprising an incomplete turn and said inductance winding comprising a plurality of helical turns.

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