March 29, 1927. 1,622,389

B. F. MIESSNER

RADIO COMMUNICATION DEVICE

Filed Nov. 6, 1922

Fig. 1.

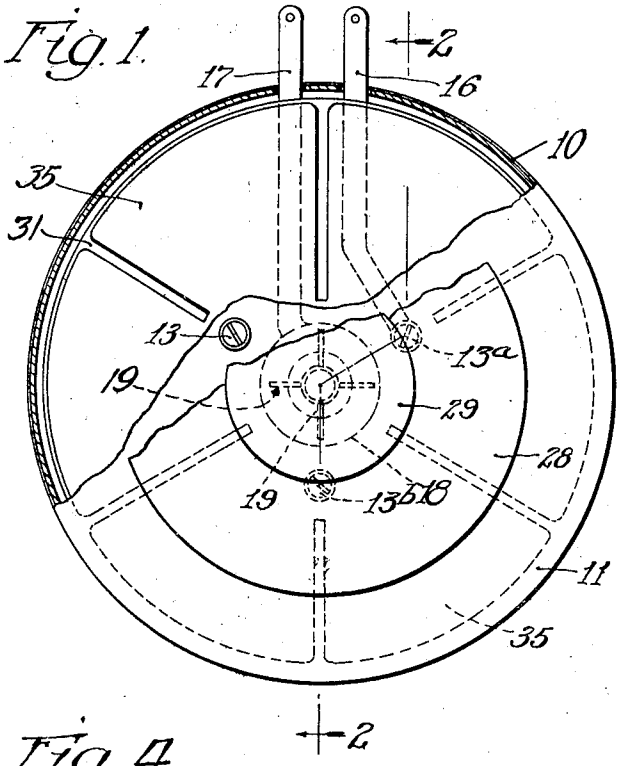


Fig. 2.

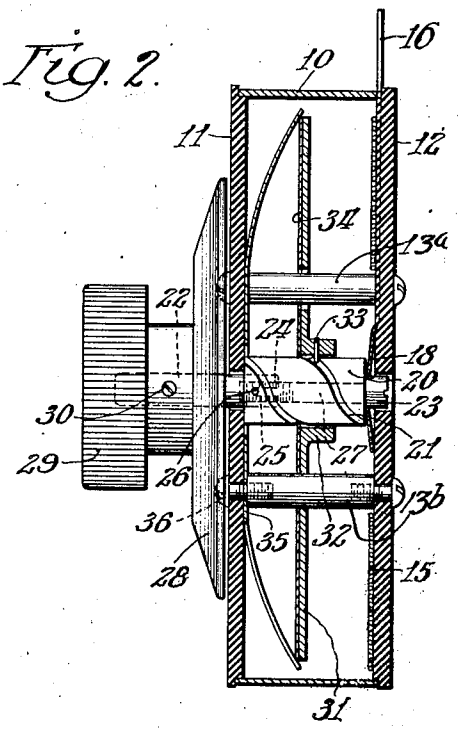


Fig. 4.

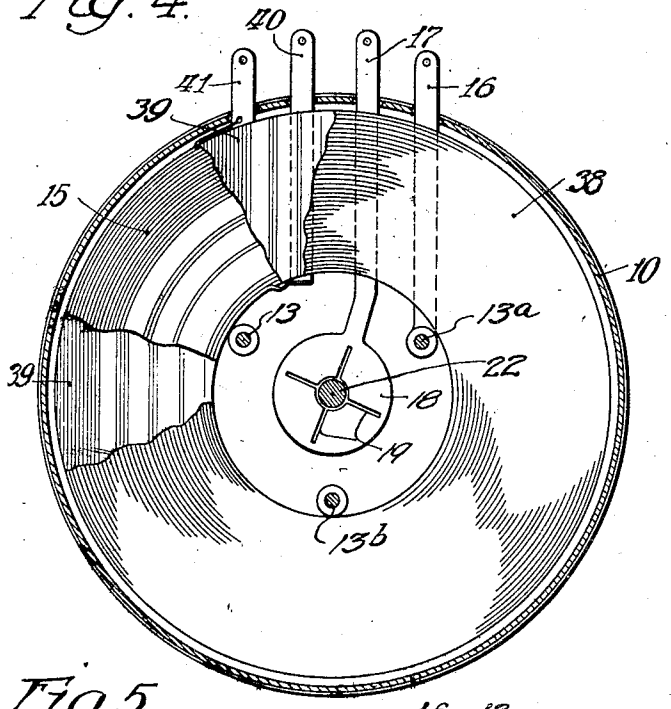


Fig. 3.

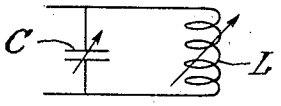


Fig. 6.

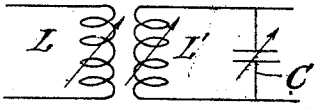
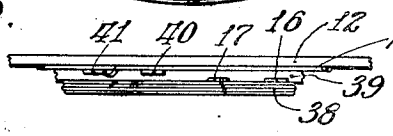


Fig. 5.



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Patented Mar. 29, 1927. 1,622,389

UNITED STATES PATENT OFFICE.

BENJAMIN F. MIESSNER, OF CHICAGO, ILLINOIS.

RADIO COMMUNICATION DEVICE.

Application filed November 6, 1922. Serial No. 599,203.

My invention relates to improvements in radio communication devices, and is particularly concerned with the provision of novel means whereby the electrical characteristics of any desired circuit may be varied within certain limits.

Other objects of my invention are:

First: To provide a device comprising an inductance and means whereby the inductance may be varied between wide limits;

Second: To provide a device comprising an inductance and a capacity, and means whereby the impedance of the circuit in which the device is located can be varied;

Third: To provide a device of the character described, in which there is a common means for varying the impedance and the capacity of the circuit;

Fourth: To provide a device comprising an inductance and a capacity, and common means for varying the induction and the capacity in the same sense, that is, if the device is adjusted to lessen its inductance, its capacity is also lessened, and if it is adjusted to increase its inductance its capacity is also increased;

Fifth: To provide a transformer having a tuned secondary, and

Finally: To provide a device of the character described, which is simple in construction, rugged, and economical to manufacture.

Other objects of this invention will appear as this description progresses, reference being had to the accompanying drawings, in which—

Figure 1 is a plan view of my improved device, portions thereof being broken away;

Figure 2 is a transverse section taken on line 2—2 of Figure 1;

Figure 3 is a diagram showing the electrical characteristics of the device illustrated in Figures 1 and 2;

Figure 4 is a view similar to Figure 1, showing the transformer having a tuned secondary;

Figure 5 is a fragmentary side elevation showing the relation of the two windings of the transformer, and

Figure 6 is a diagram indicating the electrical characteristics of the construction shown in Figures 4 and 5.

Throughout the several views, similar reference characters will be used for referring to similar parts.

Referring for the present to Figures 1 to 3 inclusive, the embodiment of my invention disclosed therein comprises a cylindrical container 10, having the end disks or plates 11 and 12 respectively, all these parts preferably being made of some good insulating material. The two end plates are spaced by a plurality of posts, 13, 13^a and 13^b respectively. One of these posts, here illustrated as being post 13^a, is made of conductive material. The remaining posts may be made from any suitable or desired material. Secured to the inner or bottom plate 12 is a flat spiral coil or inductance 15, one terminal of which is connected, with the terminal strip 16 which extends outwardly in a suitable groove formed in the inside of the plate 12 to provide an exterior terminal. This terminal strip is also connected with the post 13^a. The other terminal of the coil 15 is connected with the terminal strip 17, which likewise extends outwardly through a groove formed in the inside of the plate 12 to form an exterior terminal. The terminal strip 17 is connected with a spring metal washer 18 which is convexed inwardly as shown in Figure 2, and provided with radially extending slots 19 (see Figure 1) extending from the central opening thereof to a point adjacent the outer edge thereof.

A sleeve 20 having a helical groove 21 formed in the outer side thereof is journaled in the end plates 11 and 12 by means of the rod 22 projecting from one end thereof, and the screw head 23 projecting from the other end thereof. The rod 22 is provided at its inner end with a screw threaded bore 24, and is slotted as shown at 25 to receive the crosspin 26 extending across the bore of the sleeve 20. The inner end of the screw 27 is threaded into the bore of the rod 22 and thus serves to clamp this rod and the head 23 of the screw to the sleeve 20, thereby forming in effect a shaft having the external groove 21. The only purpose in making this shaft of several parts is to facilitate the manufacture thereof, and to expedite the removal of the device as a whole from a panel or other support where it is impossible to effect such removal by moving the container 10 and the parts therein in a direction parallel with the axis of the shaft. It will be clear from the above description that by loosening the screw 27 and remov-

ing the rod 22 the container can be removed by moving it in a direction at right angles to its shaft.

The usual dial 28 and knob 29 may be secured to the outer end of the rod 22 by means of a set screw 30, so as to provide means whereby the shaft may be rotated and its position indicated.

Slidably mounted upon the threaded shaft described above is a metal disk 31 which has a central opening provided with the hub 32. A pin 33 extends inwardly from the hub and into the groove 21 of the shaft. The opening in the disk 31 surrounding the post 13^a is made sufficiently large so that the edges thereof will not contact with this post. A thin layer 34 of mica or other suitable dielectrical material is secured to the side of the disk 31 remote from the coil 15. From the above description, it will be apparent that the posts 13 and 13^b hold the disk 31 against rotation so that if the shaft is rotated the engagement of the sides of the groove 21 with the pin 33 will cause the disk 31 to move in a direction parallel with the axis of the shaft. If the shaft is rotated in one direction, the disk 31 will move toward the end plate 12, and if rotated in the opposite direction this disk will move toward the end plate 11.

A disk 35 is clamped between the end disk or plate 11 and the adjacent ends of the posts 13, 13^a and 13^b by means of the screws 36. This disk is preferably made of brass or some other suitable spring metal, and is concaved or dished inwardly toward the disk 31 so that when the disk 31 is moved toward the disk 35 the periphery of the insulating sheet or cover 34 contacts with the disk 35 adjacent its outer edge. As the disk 31 continues to move toward the disk 35 the two disks will continue to approach each other from their outer edges inwardly until they are in contact with each other throughout their entire extent. In this manner, the capacity between the two disks 31 and 35 can be gradually increased from practically zero to the maximum value.

When the disk 31 is in the neighborhood of the coil 15, it acts as a short-circuited secondary winding thereby neutralizing the counterelectromotive force set up by any current flowing in the coil 15, and reduces the inductance of the coil 15 substantially to zero. By turning the knob 29 the disk 31 can be moved away from the coil 15, as heretofore described, and as it moves away its reaction upon the counterelectromotive force induced in the coil 15 decreases so that in this manner the inductance of the coil 15 can be gradually increased or decreased as desired.

It will be noticed that the device which I have thus far described is constructed so that the inductance of the coil 15 increases or decreases as the capacity of the condenser formed by the plates 31 and 35 and the dielectric 34 increases or decreases.

From the above description, it will be clear that I have provided a device which will perform the functions of the variable condenser C and the variable inductance L of Figure 3. It will also be apparent that either the condenser element or the inductance element of the device described above could be omitted leaving the other element to function in its usual manner.

The construction shown in Figures 4 and 5 differs from that illustrated in Figures 1 and 2 in that a second flat spiral coil 38 is superimposed upon the coil 15, being separated therefrom by an insulating disk 39. The coil 38 can thus be made to form the secondary of a transformer in which the coil 12 acts as the primary, but in this case the terminals of the coil 38 will be connected with the terminal strips 16 and 17, and the terminals of the primary coil 15 will be connected with the terminal strips 40 and 41 respectively. The terminal strips 16 and 17 then extend outwardly through suitable grooves formed in the inside of the disk 39, and the terminals 40 and 41 may extend outwardly through corresponding grooves formed in the outside of the disk 39. It will of course be understood that the wall 10 of the container has suitable openings formed therein through which the terminal strips may project.

The construction described above provides means having the same electrical characteristics as the two coupled variable inductances L and L′ and the variable condenser C of Figure 6, this condenser ordinarily being connected across the terminals of the secondary winding.

While I have described the details of construction of the preferred embodiments of my invention, it is to be clearly understood that my invention is not limited to these details, but is capable of other adaptations and modifications within the scope of the appended claims.

Having thus described my invention, what I claim is:

1. In combination a combination electrical inductive and capacitive element comprising a concentrated flat spiral winding, means for varying the inductance of said winding comprising a disk of conducting material parallel to said winding and means adapted to alter the parallel distance between said disk and winding, a second element of conducting material adjacent said disk but insulated therefrom so as to form with said disk the two electrodes of a condenser, the capacity of which is altered as the position of said disk is altered.

2. In combination a combination electrical inductive and capacitive element com

prising a concentrated coil winding, a rotatable shaft in axial extension of said winding, and means for varying the inductance of said winding comprising a disk of conducting material mounted on said shaft parallel to the plane of said winding and adapted to alter the parallel distance between said winding and disk as said shaft is rotated, and a second element of conducting material adjacent said disk but insulated therefrom adapted to form with said disk the two electrodes of a condenser.

3. In combination a combination variable electrical inductive and capacitive element comprising a coil winding, a co-axially positioned disk of conducting material, a second and flexibly concave element of conducting material adjacent said disk adapted to form with said disk the two electrodes of a condenser, and means whereby said disk may be moved to simultaneously alter the inductance of said winding through variable absorption of its energy and the capacity of said condenser through variation of the degree of concavity of said second element of conducting material.

In witness whereof, I hereunto subscribe my name this 2d day of November, 1922.

BENJAMIN F. MIESSNER.