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R. F. SHEA
RADIO RECEIVER
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Fig. 1.

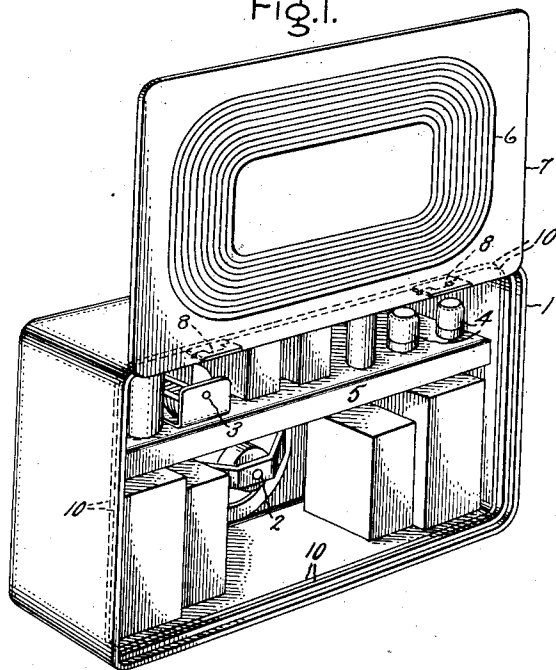
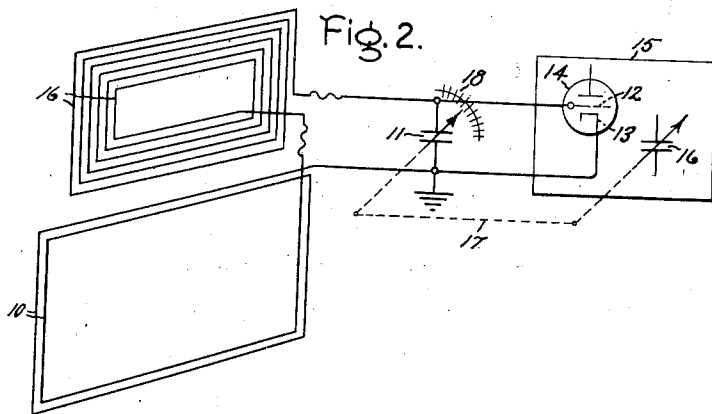


Fig. 2.



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RADIO RECEIVER

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4 Claims. (Cl. 250—20)

My invention relates to radio receivers employing loop antennae and particularly to the type of receiver in which the loop is movable with respect to the receiver assembly.

Frequently the loop antenna is arranged to be carried by the cabinet which houses the receiver but is provided with means whereby it may be moved to a position more distant from the metallic portions of the apparatus assembly of the receiver. This is desirable because the response of the loop to signals to be received is likely to be greater when it is removed from the influence of the conductive portions of the apparatus assembly comprising the receiver. It so happens, however, that the inductance of the loop, when in proximity to the apparatus assembly, is less than when removed from the influence thereof and the variation in inductance with such movement may be very considerable. This change in inductance may undesirably change the tuning of the loop circuit and if other variably tuned circuits be employed in the receiver, it may disturb the alignment of the tuning of the loop circuit with such other tuned circuits.

An object of my invention is to provide means whereby the variation in inductance with movement of the loop is reduced.

A further object of my invention is to provide means to compensate for the influence of the apparatus assembly upon the inductance of the movable loop as the loop is moved toward or from proximity to the apparatus assembly.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood from the following description taken in connection with the accompanying drawing, in which Fig. 1 represents an embodiment of my invention and Fig. 2 represents schematically the certain features of the receiving antenna circuit employed therein.

Referring to Fig. 1, I have illustrated therein at 1 the cabinet of a radio receiver, this cabinet having apparatus mounted therein such as a loud speaker 2, variable tuning condenser 3, discharge devices 4, and other apparatus units which make up the apparatus assembly comprising the receiver and constitute the circuit components of the electrical circuits employed. A portion of this apparatus, such as the tuning condenser 3, electron discharge devices 4, etc. may be mounted upon a metallic chassis 5 arranged within the

cabinet. The receiver may also be provided with a loop antenna which is indicated at 6 and which normally is housed within the cabinet but which may be moved to a distance from the apparatus assembly thereby to improve its response to signals to be received. To this end the loop 6 is shown as mounted upon a door 7 of the cabinet, this door being hinged to the cabinet at 8 whereby it may be swung downwardly to close the rear portion of the cabinet. The receiver may be in entirely operative condition to receive signals whether the door 7 be open or closed, but preferably during the reception of signals the door is open thereby to remove the loop 6 from the influence of the metallic portions of the apparatus assembly and particularly from the influence of the metallic chassis 5 upon which the apparatus is mounted.

When the loop is in proximity to the apparatus assembly of the receiver, its inductance is considerably reduced by reason of the effect of the conductive portion of the assembly, the chassis, etc. and thus, when the loop is moved upward, as by opening door 7, the inductance of the loop increases.

If the loop be tuned to a desired frequency when the door is closed, then it is tuned to a different frequency when the door is open.

Commonly, the loop is tuned by means of a variable condenser which is uncontrolled with one or more other condensers of the receiver, such as the tuning condenser of the local oscillator or the interstage tuning condensers of a tuned radio frequency amplifier. These uncontrolled condensers and the circuits in which they are connected are arranged to tune the receiver over a desired band of frequencies, such for example as the broadcast band, which may be considered to extend from 1500 kilocycles to 500 kilocycles for example. These various circuits must operate in alignment with each other to tune to definite corresponding frequencies throughout the range of variation of the uncontrolled condensers. Of course, only the antenna circuit is affected by movement of the loop and, accordingly, movement of the loop which varies the inductance of the loop may throw the various circuits out of alignment and thereby very objectionably disturb the operation of the receiver. The variation of antenna inductance with movement thereof is undesirable even if only the antenna circuit be tuned since the calibration of the condenser 11 by which it is tuned can not agree with the frequencies to which the antenna circuit tunes if the inductance varies

from the value existing when the calibration is made.

To reduce or obviate this effect in accordance with my invention, one or more additional turns of conductor indicated by the dotted lines 10 are arranged within the cabinet about the rear opening in proximity to the door 7, these additional turns being connected in series with the loop 6 and in aiding mutual relation thereto whereby, when the door is closed, the inductance of the whole loop comprising the portion 6 and the portion comprising conductors 10 is maintained substantially constant throughout movement of the loop.

Fig. 2 better represents the circuit employed. In Fig. 2 the loop 6, which is mounted on the door, is shown connected in series with the turns 10, which are mounted on the cabinet, the two coils being connected in series across the tuning condenser 11. When the door is open and the portion 6 is removed from the portion 10, the inductance of the portion 6 is of course at its highest value. When the door is closed, the inductance of the portion 6 reduces because of the effect of the conducting portions of the assembly within the cabinet such as the chassis. However, the aiding mutual relation with the coil 10 comes into effect and increases the combined inductance of the two portions 6 and 10 in series. The combined inductance of the two portions across condenser 11 may be substantially the same when the door is closed as the combined inductance when the door is open. In this way the circuit comprising the antenna 6, 10, the tuning condenser 11 connected in shunt thereto, plus any additional circuit elements not shown in the drawing, which may be required, may be adjusted to tune the receiver to the same frequency for any adjustment of the condenser 11 irrespective of whether the door 7 of Fig. 1 be open or closed.

In Fig. 2 the condenser 11 is shown as connected between the control electrode 12 and cathode 13 of the first discharge device 14 of the receiver, the receiver being represented by the rectangle 15. One other condenser 16 is shown within the receiver 15 as being uncontrolled with the condenser 11 as indicated by the line 17. This added condenser 16 may be the tuning condenser of the local oscillator or one of the interstage condensers if tuned interstage radio frequency circuits be employed. The alignment of the circuits comprising condenser 11 and 16 is not by reason of the operation of my invention disturbed by variation of the position of the loop. Condenser 11 may be calibrated in frequency if desired, as indicated at 18, and such calibration may be accurate in either position of door 7 if the portions 6 and 10 be properly

proportioned to maintain a fixed total inductance of the loop.

While I have shown a particular embodiment of my invention, it will of course be understood that I am not to be limited thereto since various modifications may be made both in the circuit arrangement and in the structure employed without departing from the spirit and scope of my invention, and I contemplate by the appended claims to cover any such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. In combination, a radio receiver comprising an apparatus assembly, a loop antenna movable with respect to said apparatus assembly, the inductance of said loop being reduced under influence of said apparatus assembly when said loop is in proximity to said assembly, an additional loop positioned near said assembly and connected in aiding mutual inductive relation with said first loop when said first loop is in proximity to said assembly, whereby the variation in combined inductance of said two loops with movement of said first loop is less than the variation of inductance of the first loop alone.

2. The combination, in a radio receiver having a metallic chassis, of a loop antenna movable with respect to said chassis whereby its inductance is varied under influence of said metallic chassis, and an inductance mounted in fixed relation with respect to said chassis and connected in aiding mutual inductive relation with said loop when said loop is moved into proximity to said chassis.

3. The combination, in a radio receiver, of a cabinet having a door, and a loop antenna having a portion mounted on said door for movement therewith and having a second portion fixedly mounted in said cabinet near said door, said two portions being in aiding mutual inductive relation when said door is closed.

4. The combination, in a radio receiver, of an apparatus assembly, a loop antenna having a portion movable with respect to said assembly and a portion fixed with respect thereto, said portions being in aiding mutual inductive relation when in proximity to each other, a condenser connected across said portions in series and variable to tune said loop over a range of frequencies, said portions being so proportioned with respect to each other that said condenser tunes said loop antenna to substantially the same frequency at each adjustment thereof irrespective of the position of said movable portion of said antenna.

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