Sept. 27, 1949. M. P. HERRICK 2,483,047

LOOP ANTENNA CIRCUIT

Filed Dec. 24, 1946

FIG. 1.

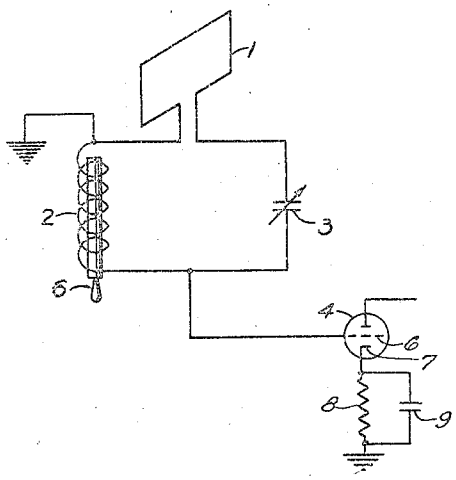
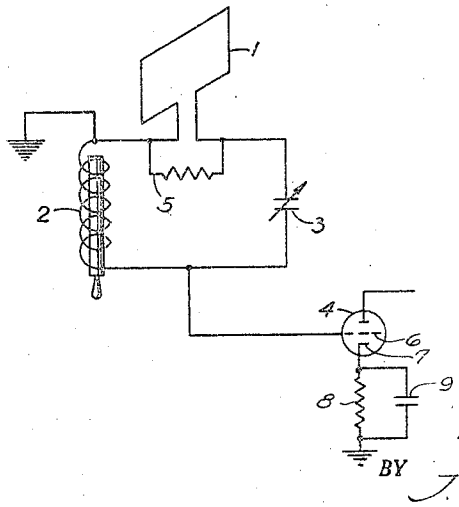


FIG. 2.



INVENTOR.
MALCOLM P. HERRICK

BY J. L. Bowers

ATTORNEY

Patented Sept. 27, 1949 2,483,047

UNITED STATES PATENT OFFICE

2,483,047

LOOP ANTENNA CIRCUIT

Malcolm P. Herrick, Rochester, N. Y., assignor to Stromberg-Carlson Company, a corporation of New York

Application December 24, 1946, Serial No. 718,162

5 Claims. (Cl. 250—40)

1

This invention relates to antenna circuits for use in radio receivers and more particularly to means for coupling low impedance loop antennas to permeability tuned radio receiving systems.

Antenna circuits have been proposed heretofore in which a permeability tuned inductance coil and a loop antenna have been connected in series between the input to the R. F. section of a radio receiving set and ground, and the series combination is shunted by a variable capacitor. With this arrangement, the signal voltage induced in the loop is in series with the antenna tank circuit. The loop antenna appears as an inductance in series with the tuning inductance. The ratio of maximum to minimum inductance of the coil is L_1/L_2 and the maximum to minimum frequency ratio is $(L_2/L_1)^2$. If the loop inductance L_3, is considered, the inductance ratio becomes

$$\frac{L_1+L_3}{L_2+L_3}$$

and the frequency ratio becomes

$$\left[\frac{L_2+L_3}{L_1+L_3}\right]^2$$

which is less than before. Because of the change in frequency ratio, the increased inductance renders difficult the obtaining of satisfactory tracking with other circuits.

An object of my invention is to provide a new and improved antenna circuit in which the effect of the antenna loop inductance is utilized in a manner to improve tracking with other tuned circuits.

ther objects and advantages of my invention will be apparent from a reading of the following description. The features of my invention which I believe to be novel are set forth with particularity in the appended claims. My invention itself, both as to its organization and manner of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawing in which Fig. 1 is a schematic diagram illustrating one form of my invention and Fig. 2 is a modification of the circuit of Fig. 1.

Referring to Fig. 1, there is shown a suitable loop antenna 1, preferably of low impedance, connected in series with a suitable variable capacitor 3 between the input electrode element, such as the control grid 6, of an electron discharge device 4 which may be part of an R. F. amplifier, for example, and ground. A variable inductance coil 2 is also connected between the input electrode

2

or connection and ground, i. e., in shunt with the loop 1 and capacitor 3. The coil 2 may be tuned by a suitable ferromagnetic element 6 reciprocably arranged. The signal voltage induced in the loop 1 is in series with the tuning capacitor 3 of the resonant antenna circuit and satisfactory tracking with other circuits, such as the oscillator circuit, is readily obtained. The cathode 7 of device 4 is connected to ground through a conventional bias resistor 8 shunted by a capacitor 9.

It has been found that if a resistor 5 of proper value is connected across the terminals of the loop when used with receivers of the superheterodyne type, as shown in Fig. 2, the image interference ratio is improved because any tendency of the loop and distributed circuit capacitance to resonate in the image region of the system is damped out. Tracking is improved by thus shunting the reactance of the loop.

Because the circuits of Figs. 1 and 2 are essentially low impedance circuits, some reduction in gain is obtained as compared with conventional circuits. This loss is more than made up, however, by the improvement in tracking due to the shift of the stray capacitance.

While I have shown and described a particular embodiment of my invention, it will be obvious to those skilled in the art that changes and modifications may be made without departing from my invention in its broader aspects. I, therefore, aim in the appended claims to cover all such changes and modifications as fall within the true spirit and scope of my invention.

What I claim is:

1. In a radio receiver having an electron discharge device comprising input terminals, an antenna circuit comprising a capacitor, a loop antenna and an inductance coil, a ferromagnetic element reciprocably arranged within said inductance coil for tuning said circuit over a desired frequency range, said antenna and said capacitor in series being connected across said input terminals and said coil being connected in parallel with said series-connected antenna and capacitor.

2. In a radio receiver having an antenna circuit as defined in claim 1, resistance means shunting said loop antenna for damping out any tendency of said loop and any distributed circuit capacitance to resonate in the image region and for shunting the reactance of said loop antenna.

3. In a radio receiver having an antenna circuit as defined in claim 1, the loop antenna being of a low impedance type.

4. In a radio receiver, an input system com-

prising: a variable inductance device adapted for tuning said input system over a range of frequencies, said device having first and second terminals; a series network comprising a tuning capacitor and a loop antenna connected between said terminals; and a utilization circuit connected between said terminals.

5. In a radio receiver, an input system comprising: a variable inductance device adapted for tuning said input system over a range of frequencies, said device having a high-potential terminal and a low-potential terminal; a series network comprising a tuning capacitor and a loop antenna connected between said terminals, said

loop antenna being adjacent said low-potential terminal; and a utilization circuit connected between said terminals.

MALCOLM P. HERRICK.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
2,267,173	Schaper	Dec. 23, 1941
2,290,825	Landon	July 21, 1942
2,335,969	Schaper	Dec. 7, 1943