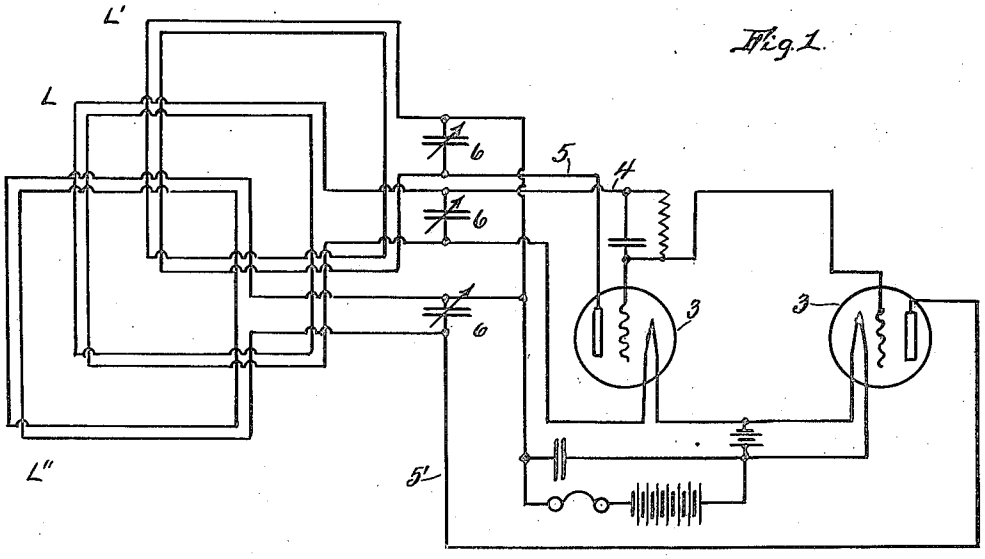
Jan. 1, 1924 1,479,638

V. K. ZWORYKIN

MULTIPLE REGENERATIVE LOOP ANTENNA AND CIRCUIT

Filed Aug. 28, 1922

Fig. 1.



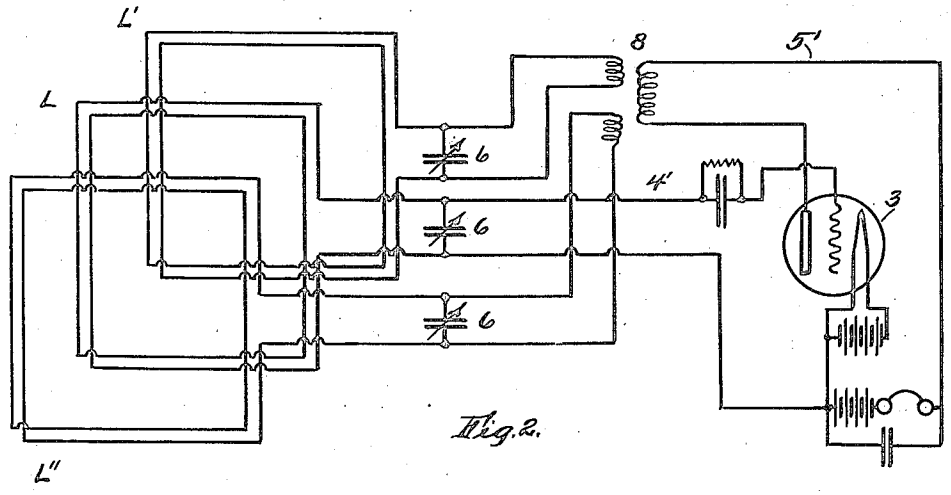


Fig. 2.

Witness:

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his Attorneys.

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UNITED STATES PATENT OFFICE.

VLADIMIR K. ZWORYKIN, OF KANSAS CITY, MISSOURI.

MULTIPLE REGENERATIVE LOOP ANTENNA AND CIRCUIT.

Application filed August 28, 1922. Serial No. 584,717.

To all whom it may concern:

Be it known that I, VLADIMIR K. ZWORYKIN, a citizen of the Republic of Russia, and resident of Kansas City, county of Jackson, State of Missouri, have invented a certain new and useful Improvement in Multiple Regenerative Loop Antennæ and Circuits, of which the following is a complete specification.

The present invention relates to radio receiving apparatus, and aims to devise a novel multiple receiving loop construction adapted to produce a regenerative effect and also to afford a simpler and more convenient means for tuning.

To this end I provide a plurality of antenna loops, all designed to act as receiving loops and so arranged as to mutually influence each other for creating a multiple regenerative effect. The arrangement of the loops is also designed to enable the tuning of the receiving circuit to be carried out without affecting the directional properties of the loops or interfering with each of them receiving the maximum energy of the signals.

With this general object in view, the invention will now be described by reference to the accompanying drawing illustrating certain practical forms of embodiment of the proposed multiple loop construction, after which those features deemed to be novel will be particularly set forth and claimed.

In the drawing—

Figure 1 is a diagrammatic view showing the circuit of a receiving apparatus, including a multiple receiving loop structure embodying the present invention; and

Figure 2 is a similar view illustrating a modified arrangement of the receiving loop connections.

Referring now to the drawing in detail, this illustrates a receiving circuit including a pair of vacuum tubes 3 and a set of three receiving loops, namely a main receiving loop L, in the grid circuit 4 of said tubes, and two loops L′ and L″ in the plate circuits 5 and 5′ respectively, all three loops being permanently coupled in proper relation, the shape and particular relative mounting of the loops being immaterial so long as each loop is properly tuned and directed to the signals being received. For this purpose each loop may be provided with a variable condenser 6, although a single variable condenser can be used in connection with the main receiving loop L and constant condensers in connection with the loops L′ and L″, the loop L being permanently close-coupled with the two other loops and all three mutually influencing each other.

By means of this circuit a novel regenerative effect is produced in a manner which is not simply a modification of the well-known regenerative circuit. In the ordinary circuit the energy received is fed back to the main circuit for producing the regenerative and heterodyne effect, while in the present case the energy is received by all the loops, respectively, and these influence each other and produce multiple regenerative actions, according to the number of loops employed. By the circuit just described, the two-tube connection provides a double regenerative effect, and by the use of a single variable condenser 6 for the loop L the tuning of the entire apparatus may be properly carried out without interfering with the directional property of the entire set of receiving loops.

Referring now to Figure 2, this illustrates a single vacuum tube arrangement with the plate circuit 5′ inductively coupled, as indicated at 8, with the receiving loops L′ and L″, and these latter being, as before, coupled with the main receiving loop L of the grid circuit 4′. As in the previously described circuit, all the loops receive the signals, and mutually influence each other with the result of producing a multiple regenerative effect; and by employing a single variable condenser 6 in the circuit of the main receiving loop L with constant condensers in connection with the other loops, the entire receiving apparatus may be tuned without affecting the directional property of the loop set or the efficiency of each loop for responding with maximum effect to the full strength of the signals.

While the foregoing shows representative circuit arrangements for embodying the proposed features of improvement, I desire to reserve the right to make all such changes and modifications as may fairly and properly fall within the scope of the appended claims.

What I claim is:

1. In a radio receiving apparatus, a vacuum tube, and a multiple loop antenna structure having one of its loops connected with the grid circuit of said tube and

coupled with two or more loops in the plate circuit of said tube.

2. In a radio receiving apparatus, a vacuum tube, and a plurality of antenna loops each operating to receive the signals and all permanently coupled for mutual regenerative effect, one of said loops being connected in the grid circuit of said tube and the remainder of said loops being coupled with the plate circuit of said tube.

3. In a radio receiving apparatus, a vacuum tube, and a plurality of antenna loops each operating to receive the signals and all permanently coupled for mutual regenerative effect, one of said loops being connected in the grid circuit of said tube and the remainder of said loops being inductively coupled with the plate circuit of said tubes.

4. In a radio receiving apparatus, a vacuum tube, and a plurality of antenna loops each operating to receive the signals and all permanently coupled for mutual regenerative effect, one of said loops being connected in the grid circuit of said tube and the remainder of said loops being coupled with the plate circuit of said tubes, and a single variable condenser associated with one of said loops for the tuning of the apparatus.

In witness whereof I hereunto affix my signature.

VLADIMIR K. ZWORYKIN.