

Jan. 7, 1930.

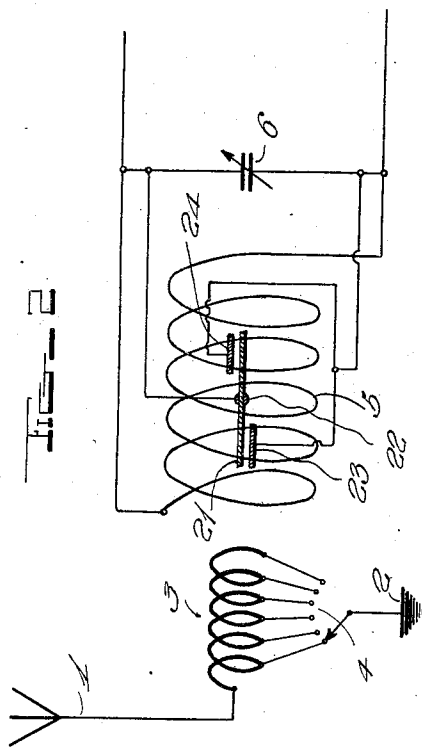
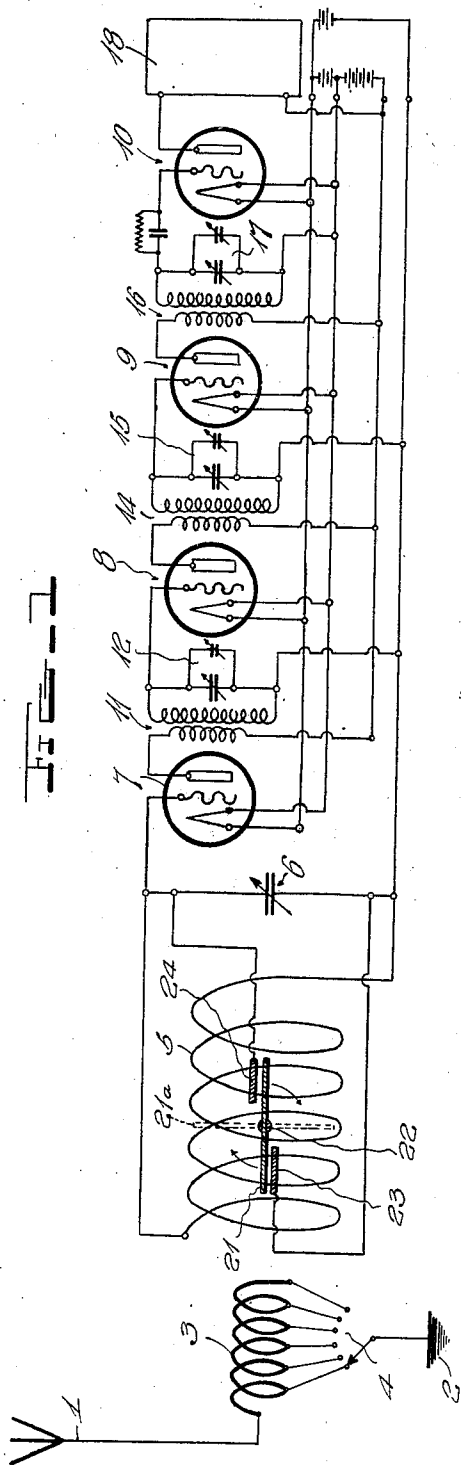
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1,743,039

ELECTRICAL TUNING SYSTEM

Filed Feb. 28, 1927

2 Sheets-Sheet 1



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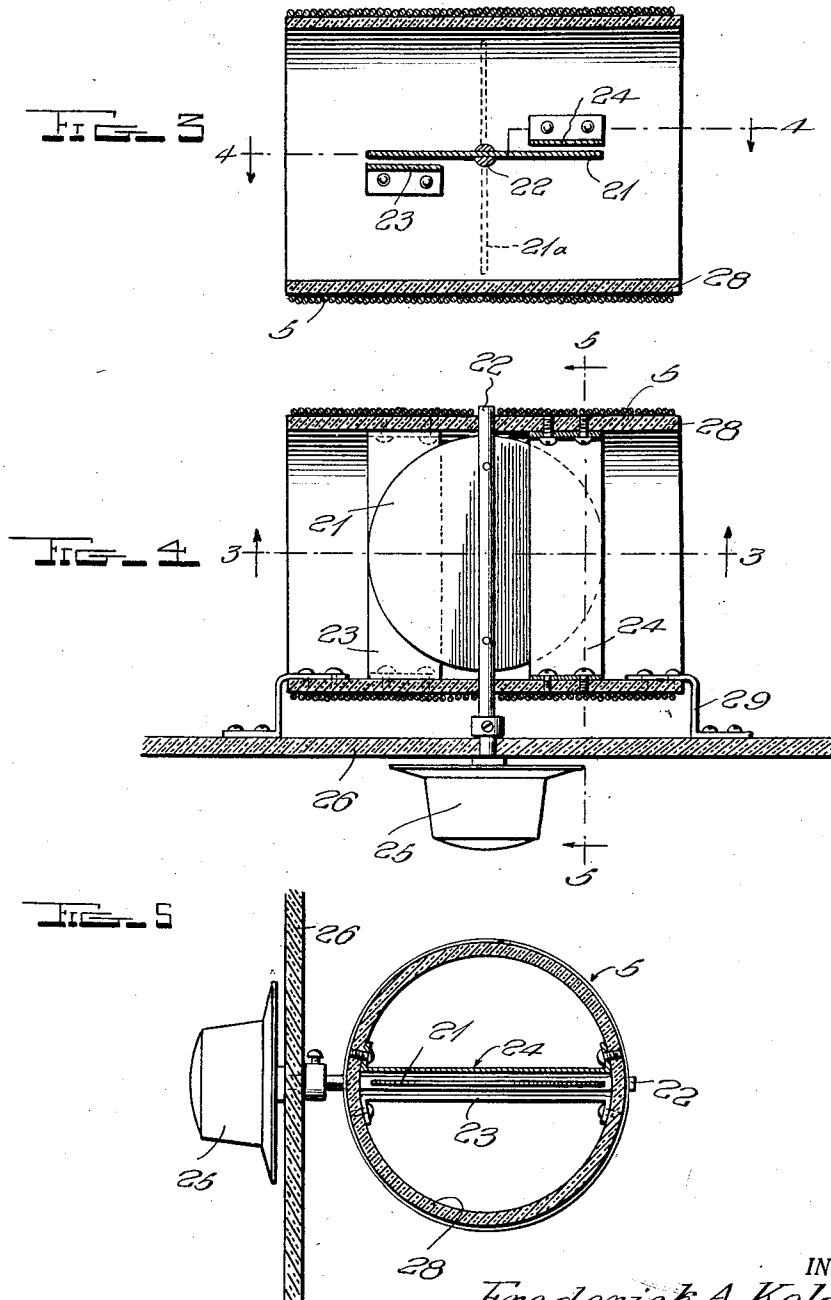
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ELECTRICAL TUNING SYSTEM

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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ELECTRICAL TUNING SYSTEM

Application filed February 28, 1927. Serial No. 171,630.

My invention relates broadly to signal receiving apparatus and more particularly to a system of tuning in signal receiving circuits.

One of the objects of my invention is to provide a simplified tuning system for signal receiving circuits wherein micrometer adjustments in tuning may be effected with a minimum number of adjustable controls.

Another object of my invention is to provide an arrangement of variable capacity system in association with a tuning inductance wherein adjustments in inductance values may be made simultaneously with an adjustment in capacity values for accurately tuning an electrical circuit to resonance at a selected frequency.

Another object of my invention is to provide a mounting of tuning inductor within an inductance coil where a pair of independent capacity areas are associated with the tuning inductor within the inductance coil in such position that for a shift in position of the inductor a change in the inductance and capacity values may be effected in a circuit associated with the several elements.

Another object of my invention is to provide a construction of coupling system for high frequency signal receiving circuits wherein a rotatable inductor may be shifted in position between a pair of stationary capacity areas located within one of the coupling inductances for effecting a change in the inductance and capacity values in an electrical circuit associated with the several elements for accurately tuning the circuit to a selected signaling frequency.

Other and further objects of my invention will be understood from the specification hereinafter following by reference to the accompanying drawings wherein:

Figure 1 diagrammatically illustrates my invention as applied to a radio receiving system; Fig. 2 shows a modified circuit arrangement for a radio receiving system embodying the principles of my invention; Fig. 3 illustrates a cross-sectional view of a tuning inductance having the rotatable inductor and auxiliary capacity areas of my invention in association therewith; Fig. 4 is a longitudinal

cross-sectional view taken through the tuning apparatus on line 4—4 of Fig. 3; and Fig. 5 is a cross-sectional view through the tuning control mechanism on line 5—5 of Fig. 4.

For the accurate adjustment of signal receiving circuits for a selected signaling frequency it has been proposed heretofore to employ an auxiliary variometer in the tuning circuit for minutely adjusting the frequency to which the circuit responds. The employment of the auxiliary variometer requires an additional control which is mechanically undesirable. The variometer is an added item of expense in a production program which must be taken into account. By my present circuit arrangement and apparatus I provide a tuning inductor associated with a winding disposed in the input circuit of a radio frequency amplification system. The winding is normally broadly tuned by a shunt connected variable condenser. The apparatus of my invention permits a fine adjustment in tuning after the circuits have been adjusted for a particular signaling frequency. I provide a tuning inductor pivotally mounted within an inductance winding with auxiliary capacity areas which may be connected in various ways with the main variable capacity element for cooperation with the tuning inductor for minutely increasing and decreasing the inductance or capacity values in the tuning circuit.

Referring to the drawings in detail, reference character 1 designates an antenna system having a ground connection 2 with a primary system including primary inductance 3 adjustable by means of a plurality of taps and cooperating switch 4. Secondary inductance 5 is coupled with the primary inductance 3 and is tuned by means of variable condenser 6, the inductance 5 and condenser 6 constituting the input circuit of a radio frequency amplifier and a detector system including electron tubes 7, 8, 9 and 10. A coupling transformer 11 is disposed between the output circuit of tube 7 and the input circuit of tube 8. The input circuit of tube 8 is tuned by means of variable condenser system 12. The output circuit of tube 8 and the input circuit of tube 9 are coupled by means of a

transformer 14. The input circuit of tube 9 is tuned by means of condenser system 15. The last stage of radio frequency amplification is coupled to the electron tube detector circuit 10 through transformer system 16. The input circuit of the detector 10 is tuned by means of variable condenser 17. The detector 10 may connect to any suitable arrangement of audio frequency amplification apparatus and loud speaker system designated generally at 18. Condensers 6, 12, 15 and 17 may be geared for simultaneous operation from a single control. The inductance 5 is supported by the insulated frame structure 28 carried by brackets 29 from the panel structure 26. A shaft 22 is journaled within the supporting structure 28 and carries a rotatable disc or inductor 21 which may be moved from full line position to the dotted line position 21^a for effecting adjustments in both the inductance and capacity values of the input circuit constituted between winding 5 and variable condenser 6. Auxiliary plates or capacity areas 23 and 24 are mounted within the frame structure 28 on opposite sides of rotatable shaft 22 with one of the capacity areas disposed in a plane above a longitudinal plane passing through the axis of the frame structure 28 and the other of said capacity areas located in a plane below a central plane passing through the axis of the winding. The inductor may be moved to selected positions under control of adjustable knob 25. I have shown the full line position of the inductor for illustrating the position for maximum inductance and maximum capacity in the tuning circuit. When the inductor is moved to the dotted line position 21^a a position of minimum inductance and minimum capacity is obtained. Intermediate positions effect different values of inductance and capacity in the tuning circuit. The eddy currents induced in the inductor 21 vary with the position of the inductor, and in that way provide a micrometer system and control for the inductance in the tuned circuit. The capacity is dependent upon the spacial relation between inductor 21 and capacity areas 23 and 24, the capacity being large for the full line position and relatively small for the dotted line position of the inductor illustrated at 21^a. The inductor may form one side of an auxiliary condenser system in shunt to the main condenser 6, as illustrated in Fig. 2, while the auxiliary plates 23 and 24 are bonded together and comprise the opposite side of the auxiliary capacity system. The inductor 21 may provide merely a third plate for the auxiliary capacity system and bridge the gap between capacity areas 23 and 24, as illustrated in Fig. 1, for securing the desired changes in capacity.

While I have described my invention in certain of its preferred embodiments, I desire that it be understood that modifications may

be made and that no limitations upon my invention are intended other than are imposed by the scope of the appended claims.

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

1. A tuning control system comprising a pair of coupled windings, a rotatable metallic disc member journaled on a diametrical axis within one of said windings, and a pair of fixed capacity areas positioned within said winding in planes parallel to the longitudinal axis thereof on opposite sides of said rotatable metallic disc member, said rotatable metallic disc member being arranged to be varied in spacial relation with respect to said capacity areas for varying the effective capacity therebetween.

2. A tuning control system comprising a pair of coupled windings, a tuned circuit connected with one of said windings, a rotatable metallic disc member journaled on a diametrical axis within one of said windings, a pair of fixed capacity areas disposed within said last mentioned winding in planes parallel to the longitudinal axis of said winding and connected with said tuned circuit, said rotatable metallic disc member being variable in spacial relation with respect to said fixed capacity areas for adjusting the tuning of said circuit.

3. A tuning control system comprising an inductance, a tuned circuit connected with said inductance, means disposed within said inductance and connected with said tuned circuit for varying the inductance and capacity values of said tuned circuit simultaneously, said means comprising a rotatable metallic disc member journaled diametrically within said inductance and a pair of fixed capacity areas extending in planes parallel to the longitudinal axis of said inductance, said metallic disc member being arranged to be moved to either of two limiting positions parallel to or perpendicular to said capacity areas for changing the inductance and capacity values of said circuit.

4. A tuning control system comprising in combination with a tuned circuit including an inductance and shunt connected capacity, an auxiliary condenser disposed within said inductance, said auxiliary condenser being constituted by a plurality of plate members, one of said plate members being movable within the field of said inductance for varying the effective value of said inductance and varying the effective capacity of said shunt connected condenser and the other plate members being rigidly mounted within said inductance in planes extending parallel to the longitudinal axis of said inductance.

5. A tuning control system including an inductance and shunt connected variable condenser, an auxiliary condenser disposed within the field of said inductance and con-

5 nected in shunt with said first mentioned condenser, said auxiliary condenser having a portion thereof disposed in the center of said inductance and variable within the field of said inductance for changing the effective inductance and capacity values in said tuned circuit and other portions thereof extending in planes on each side of a central axis through said inductance.

10 6. A tuning circuit including an inductance shunted by a variable capacity, an auxiliary condenser disposed within the field of said inductance and connected with said aforementioned variable condenser, said auxiliary
15 condenser having a pair of stationary plate members disposed in separate planes parallel with the longitudinal axis of said inductance, and a rotatable plate member disposed between said aforementioned plate member and
20 movable from a position parallel to the axis of said inductance to a plane parallel to the direction of turns of said inductance for varying the effective inductance and capacity values in said tuning circuit.

25 7. A tuning circuit including an inductance shunted by a variable capacity comprising an auxiliary condenser constituted by a pair of plate members disposed within said inductance spaced one from the other in planes
30 parallel to the longitudinal axis thereof, and an inductor rotatable between said plate members from a position parallel to the axis of said inductance to a position parallel to the direction of the turns of said inductance for
35 varying the inductance and capacity values in said tuning circuit from maximum to minimum over a selected range of frequencies.

In testimony whereof I affix my signature.

FREDERICK A. KOLSTER.

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