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TUNING CONTROL

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Fig. 1

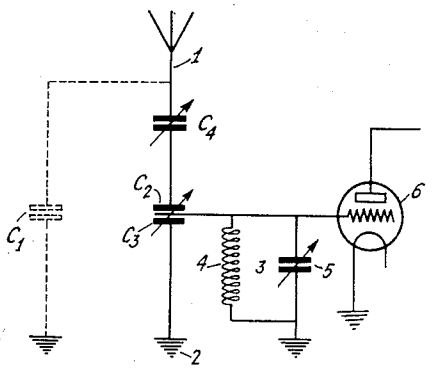
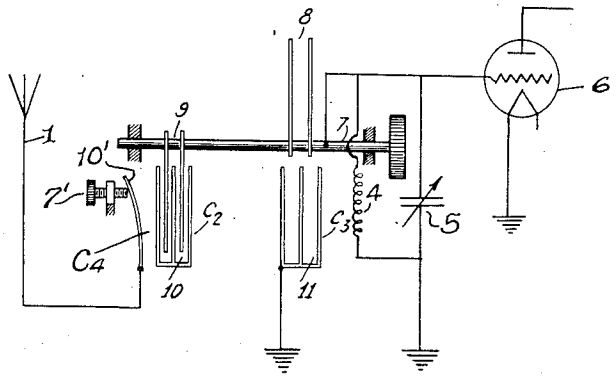


Fig. 2



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TUNING CONTROL

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6 Claims. (Cl. 250—20)

The present invention relates to tuning control systems, and more particularly to a method and arrangement for the tuning of a receiving apparatus for electromagnetic oscillations.

Receiving circuit arrangements wherein the antenna is capacitatively coupled with the first radio stage involve the disadvantage that with a variation of the coupling condenser, the natural wave length of the first stage varies likewise. This disadvantage becomes especially noticeable in case there exists a second tuned radio circuit, for the reason that, in this case, it is desirable that the elements changing the tuning, for instance condensers, result in the same tuning value for the same tuning indicator scale value. If now, however, the natural wave length of the first stage has changed, the coincidence of the scale value is no longer possible, since to accomplish this object, the tuning values of the condensers of both radio stages must coincide absolutely.

In accordance with the present invention, this fault is remedied by effecting with a variation of the antenna coupling capacity a corresponding opposite variation of a compensating capacity determining the natural oscillation of the tuning circuit. The compensating capacity is independent of the tuning condenser of the tuning circuit. As a particularly suitable embodiment of this method, a mechanical coupling of the antenna coupling condenser with the compensating condenser disposed in the first radio stage oscillation circuit may be used in such manner that with a decrease in the magnitude of the coupling condenser there takes place automatically a corresponding increase in the magnitude of the compensating condenser.

Figs. 1 and 2 illustrate with more detail the objects of the present invention.

1 in Fig. 1 is an antenna, grounded at 2, which is coupled to a tuning circuit 3, consisting of an inductance 4 and condenser 5. Succeeding the tuning circuit is disposed an amplifier tube 6 whose grid is connected with the tuning circuit. By means of condenser C_2 the antenna 1 is variably coupled to the tuning circuit. The condenser C_2 is, as may be seen, of special construction which is shown in more detail in Fig. 2, and which will be described later on.

Considering that the coupling condenser C_2 produces a resulting capacity in combination with the antenna capacity C_1 there follows, further, that with a variation of the condenser C_2 this total capacity, likewise varying, is added to the tuning capacity 5 of circuit 3, and, also, modifies the natural wave length of the oscillating circuit 3. To offset this fault there is varied simultaneously with the variation of the coupling capacity C_2 a further capacity C_3, influencing the tuning circuit in such a way that the influence of capacity C_2 is offset.

As shown in Fig. 2, the capacities C_2 and C_3 are so mechanically coupled that the natural wave length variation caused by the capacity C_2 is automatically balanced or compensated by the corresponding opposite variation of the capacity C_3. On shaft 7 are disposed, offset by 180 degrees, two sets of rotary plates 8 and 9.

The two sets of stator plates 10, 11 are arranged to one side of the shaft so that with a maximum of capacity between the plates 9 and 10 of condenser C_2 there exists a minimum of capacity between plates 8 and 11 of condenser C_3. Accordingly, by means of this arrangement there is accomplished, with for instance a decrease of the coupling capacity C_2 in Fig. 1, an increase of the capacity C_3 which is connected in parallel to the tuning capacity 5. Thereby the natural wave length of the oscillating circuit is maintained substantially constant with a change in the magnitude of the capacitative coupling between the antenna and the circuit 3.

In the construction of the device it is necessary to assume an average antenna capacity value which serves as basis for the calculation of the oscillation circuit. Since there exist, in particular in broadcasting sets, greatly different antenna proportions, it is suitable to provide also for a special condenser which furnishes the means to adapt the local antenna capacity to the conditions on which the apparatus is based. This condenser C_4 in Fig. 1 is constructed, in accordance with Fig. 2, in such manner that, as its fixed plates, are used the ones of capacity C_2.

As shown in Fig. 2, the antenna lead 1 is connected to the adjustable plate 10' of the auxiliary condenser C_4. By appropriate adjustment of the screw 7' the desired capacity of C_4 can be selected. The shaft 7 is conductively connected to the grid of tube 6, while the stator plates 11 are grounded. Hence, it will be seen that the capacity C_3 (comprising rotors 8 and stators 11) is connected in parallel with the tuning condenser 5 in the oscillation circuit 3.

What is claimed is:

1. In combination, an antenna, a tuned radio frequency stage, a variable condenser for coupling the stage and antenna, capacitative means in said tuned stage, simultaneously variable with the condenser, for maintaining the natural wave length of the stage constant regardless of varia-

tion of the coupling condenser and a ground connection for said capacitative means, said coupling condenser, said capacitative means and said ground connection forming a series path to ground for currents passing through said antenna.

2. In combination, an antenna, a stage of radio frequency amplification including a tuned input circuit, means for capacitatively coupling the antenna and input circuit, said means comprising a variable coupling condenser, a variable compensating condenser uni-controlled with the coupling condenser in such a manner that the natural wave length of the input circuit is maintained constant regardless of the variation of the coupling condenser and a condenser connected to said antenna arranged to adjust its capacity to a predetermined value, said condenser, said variable condenser and said compensating condenser forming a series connected circuit with said antenna.

3. In combination with an antenna and the input circuit of a radio frequency amplifier stage, said input circuit being tunable to a desired frequency, a variable coupling condenser connected between the antenna and the input circuit, a compensating variable condenser connected in the said input circuit, a lead conductively connecting one side of said compensating condenser to ground, said coupling condenser and said compensating condenser being connected in series between said antenna and said ground lead, means for simultaneously varying said condensers, said condensers being so relatively designed that for a decrease in coupling capacity there occurs such a corresponding increase in magnitude of the compensating capacity that the natural frequency of the input circuit is maintained substantially constant regardless of the variation of the coupling condenser.

4. In combination with an antenna and the input circuit of a radio frequency amplifier stage, said input circuit being tunable to a desired frequency, a variable coupling condenser connected between the antenna and the input circuit, a compensating variable condenser connected in the said input circuit, means for simultaneously varying said condensers, said condensers being so relatively designed that for a decrease in coupling capacity there occurs such a corresponding increase in magnitude of the compensating capacity that the natural frequency of the input circuit is maintained substantially constant regardless of the variation of the coupling condenser, and an auxiliary adjustable condenser, including as a plate thereof the end plate of said coupling condenser, in series with the coupling condenser in said antenna circuit for adjusting the antenna capacity to a desired value.

5. In a device of the class described, the combination of a source of radio frequency signal currents, a circuit tunable to said signal currents, a vacuum tube amplifier having a control grid, a variable coupling condenser connected between the said source and said tunable circuit, a compensating variable condenser connected in said tunable circuit, said compensating condenser being so relatively designed that for a decrease in coupling capacity there occurs such a corresponding increase in magnitude of the compensating capacity that the natural frequency of said tunable circuit is maintained substantially constant as said coupling condenser is adjusted, a control shaft, said coupling condenser and said compensating condenser having plates connected to said shaft and a lead conductively connecting the said control grid to said shaft.

6. The combination defined in the preceding claim in which a ground connection to said shaft is provided, whereby it is maintained at ground potential.

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