

Oct. 22, 1935.

F. C. LUNNON

2,018,370

HIGH FREQUENCY CIRCUIT ARRANGEMENT

Filed Jan. 26, 1931

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Fig. 1

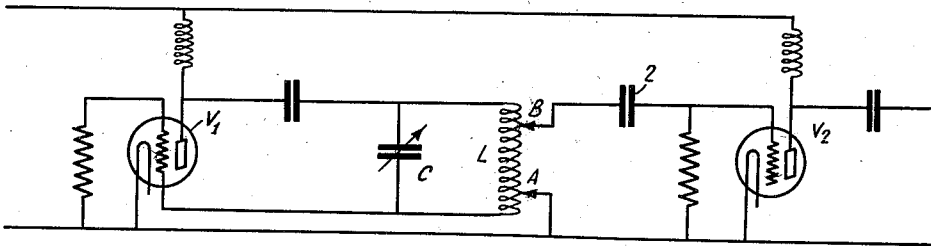


Fig. 2

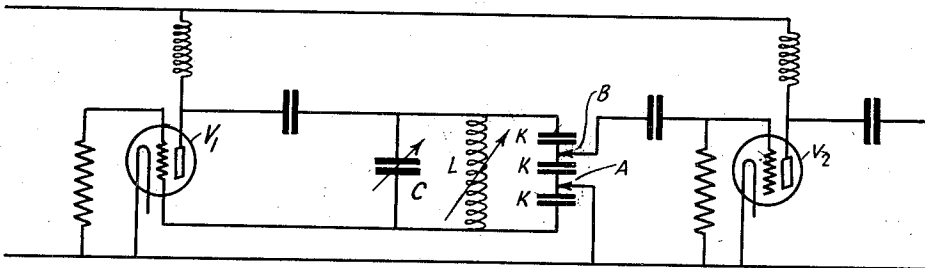
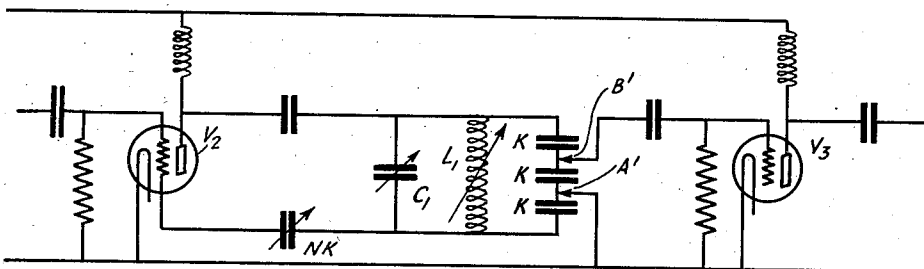


Fig. 3



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Fig. 5

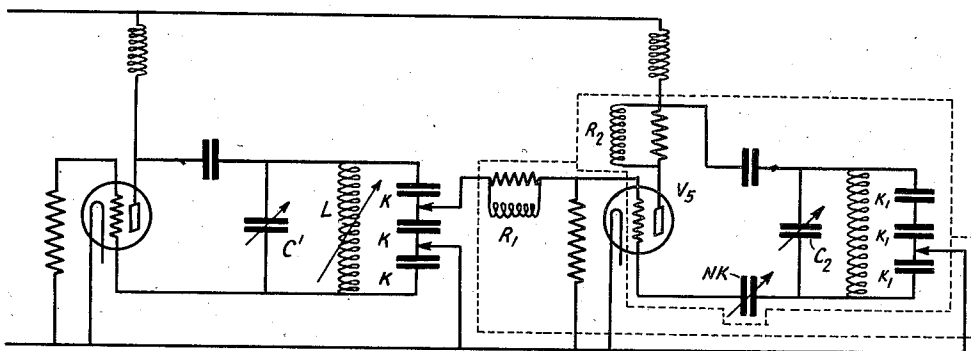
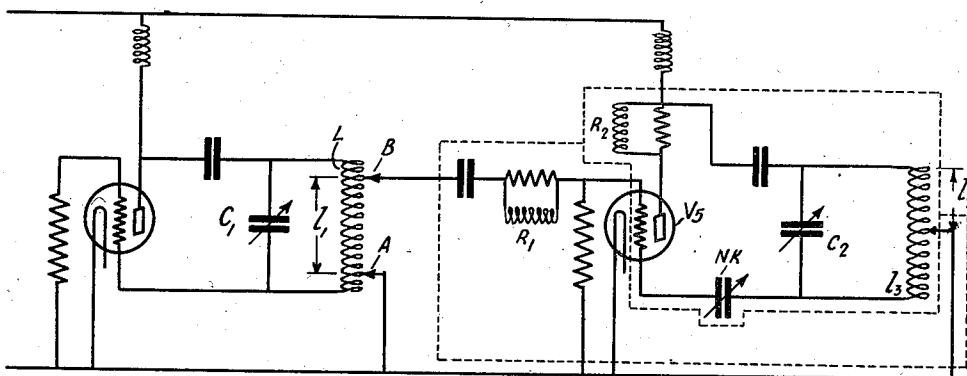


Fig. 4



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Fig. 6

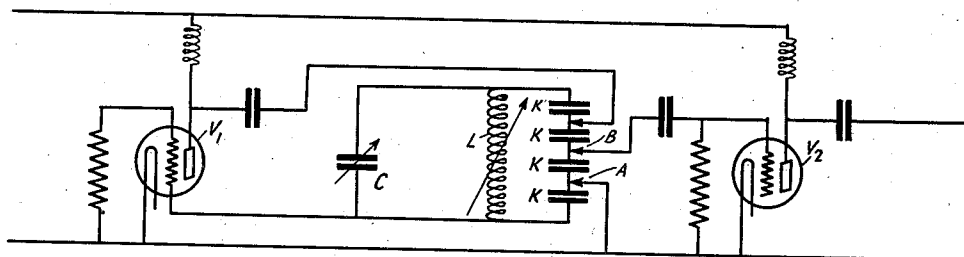


Fig. 7

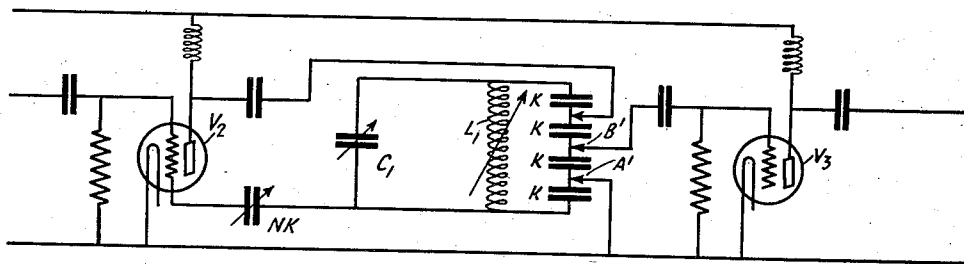
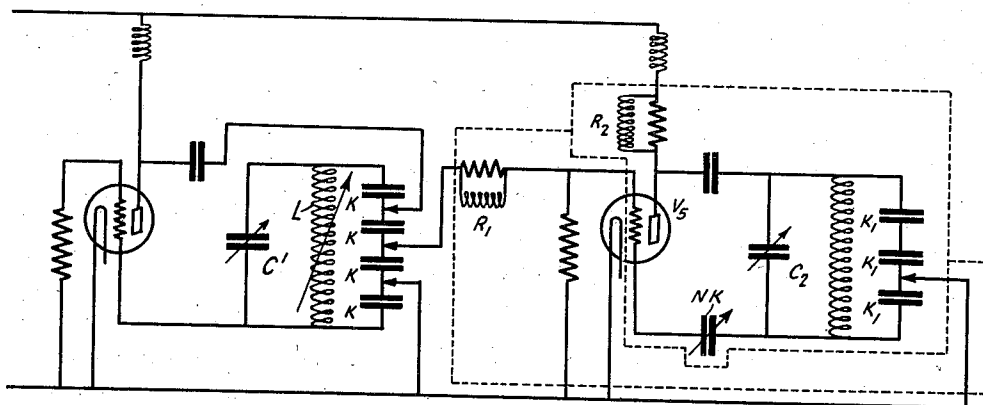


Fig. 8



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HIGH FREQUENCY CIRCUIT ARRANGEMENT

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2 Claims. (Cl. 250—17)

This invention relates to high frequency circuit arrangements.

In many cases, for example in transmitters comprising a master oscillator and one or more stages of power amplification it is desired to be able to adjust a portion of the circuit to give a predetermined amount of energy feed back, and also to pass on a predetermined proportion of voltage to a following circuit while at the same time said portion of the circuit must be able to be tuned over a relatively large wave length range.

Figure 1 of the drawings accompanying the specification shows a well known circuit in which a master oscillator comprising a valve V_1 is coupled to a power amplifier comprising a valve V_2 . The output circuit of the valve V_1 comprises a tuned circuit LC the inductance L of which is tapped at two points indicated at B and A, the tapping B being led to the grid of the power amplifier valve V_2 through the usual blocking condenser 2 while the tapping A leads back to the common cathode connection.

As will be obvious, the tapping B determines the driving voltage impressed on the grid of the amplifying stage V_2 while the tapping A determines the reaction adjustment of the oscillator. The inductance L thus constitutes an inductance potentiometer and, until the ratio C/L of the master oscillator tuned circuit becomes too great for efficient oscillation, the wave length of this circuit may be adjusted by means of the variable condenser C without disturbing either the reaction adjustment or the intensity of the driving voltage impressed on the magnifier valve. The working range, however, imposed by this limit is somewhat narrow and if it be attempted to extend this range by altering the value of the inductance L obviously re-adjustment of the tapping points A and B becomes necessary.

According to the present invention, transfer of voltage from a tuned circuit is effected by tapping said voltage from a tapped condenser or from points between a plurality of series condensers, said tapped condenser, or series condensers being connected across said tuned circuit so as to constitute a condenser potentiometer the arrangement being such that both the inductance and the capacity in said tuned circuit may be varied as desired substantially without affecting the adjustment or adjustments which determine the voltage transferred.

In the accompanying drawings, which are given mainly in order to illustrate the present invention,

Figure 1 illustrates a known arrangement of a master oscillator followed by an amplifier,

Figure 2 illustrates the present invention applied to the arrangement shown in Figure 1,

Figure 3 illustrates the present invention applied to a capacity neutralized circuit,

Figure 4 illustrates a known circuit utilizing antiparasitic devices for the prevention of oscillations,

Figure 5 illustrates the present invention applied to a circuit such as shown in Figure 4, and,

Figures 6, 7 and 8 illustrate embodiments of the invention utilizing different capacity potentiometers, similar to those shown in Figures 2, 3 and 5.

Figure 2 of the accompanying drawings illustrates the present invention as applied to an arrangement of the kind shown in Figure 1. As will be seen, Figure 2 differs from Figure 1 in that the tuned circuit LC is shunted by three fixed condensers K in series with one another (obviously an equivalent tapped condenser may be substituted for the three series condensers), and the points B and A are connected not to the inductance L in the tuned circuit but to the tapped condenser or condensers. To put the matter in another way, the accompanying Figure 2 differs from Figure 1 of the specification in that voltage is transferred from the tuned circuit LC by means of a condenser potentiometer connected across said circuit.

Figure 3 of the accompanying drawings shows the invention as applied to a capacity neutralized or so-called "neutrodyne" circuit. This circuit comprises a valve V_2 whose output circuit contains a tuned circuit L'C', capacity neutralization being obtained by means of the usual neutrodyne condenser NK. In applying the present invention to this circuit, connection to a subsequent amplifier stage V_3 and connection from the output circuit of the valve V_2 back to the cathode thereof, are established from tapping points B' and A' upon the condenser potentiometer KKK which is shunted across the tuned circuit C'L'. As will be seen in this arrangement, the neutrodyne balance of the amplifier stage V_2 and the intensity of the driving voltage impressed on the grid of the following stage V_3 may be adjusted once for all and need not be disturbed, while both the condenser C' and the inductance L' may be varied for purposes of tuning.

An incidental advantage of the present invention lies in the fact that it facilitates the provision of effective means for preventing parasitic oscillations.

Figure 4 of the drawings shows a well known

circuit arrangement in which anti-parasitic devices R_1 and R_2 are inserted in the grid and plate leads of a valve V_5 . The path for parasitic oscillations in this circuit is indicated by chain lines and, as will be seen, this path includes (apart from the inductances of the various leads) three inductive portions which are marked in the figure as l_1 , l_2 and l_3 . The wave length of the oscillation in this parasitic path will be determined mainly by the grid anode capacity of the valve V_5 and the inductances l_1 , l_2 and l_3 . It will be appreciated that when the tuning condensers C_1 , C_2 , are brought to a very low valuation, the parasitic oscillation frequency may approach so closely to the fundamental frequency of the master oscillator and the magnifier tuning circuit that the damping devices R_1 and R_2 induce considerable losses as respects the working frequency.

When the present invention is applied to this circuit so as to transform it into the circuit arrangement shown in the accompanying Figure 5, the path for possible parasitic oscillation passes (as is indicated by the closed chain line) through the potentiometers consisting of the condenser elements KKK and $K_1K_1K_1$ so that, while the grid-anode capacity of the amplifier valve remains as a factor in controlling the parasitic frequency, the inductances l_1 , l_2 , l_3 are no longer in the path of the parasitic oscillations but are replaced in that path by condensers, and the only inductance in the circuit is "stray" inductance due to leads and so forth. The parasitic frequency will therefore be so high that, in general, continuous oscillation at this frequency will not occur. In exceptional cases where damping devices R_1 and R_2 are still necessary, they may be effectively employed without any substantial loss occurring on the fundamental wave length.

The accompanying Figures 6, 7 and 8 differ

from Figures 2, 3 and 5 respectively, only in that the capacity potentiometer comprises four condensers instead of three, while the anode of the valve preceding the said potentiometer is shown in each of Figures 6, 7 and 8 as effectively tapped upon the said potentiometer instead of being effectively connected to the top of the tuned circuit as in Figures 2, 3 and 5.

Capacity potentiometers employed in carrying out the present invention are preferably constituted by mica dielectric condensers consisting of a large number of elements in series, said elements being brought out by suitable connections to provide tapping points.

Having thus described my invention what I claim is:

1. The combination with an electron discharge device having an output circuit, and another electron discharge device having an input circuit, of a condenser potentiometer comprising four serially connected condensers for coupling said input and output circuits together, and individual connections from said output circuit to tap points on said potentiometer between the first and second condensers and third and fourth condensers, respectively, and a connection from said input circuit to a tap point on said potentiometer between the second and third condensers.

2. The combination with an electron discharge device having a tunable output circuit comprising a variable inductance and a condenser in parallel, and another electron discharge device having an input circuit, of a condenser potentiometer connected across the terminals of said inductance, said potentiometer comprising four serially connected unvariable condensers for coupling said input and output circuits together, and individual connections from said output and input circuits to different points on said condensers.

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