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T. J. WEYERS

2,061,818

LOCAL OSCILLATOR CIRCUIT

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Fig. 1

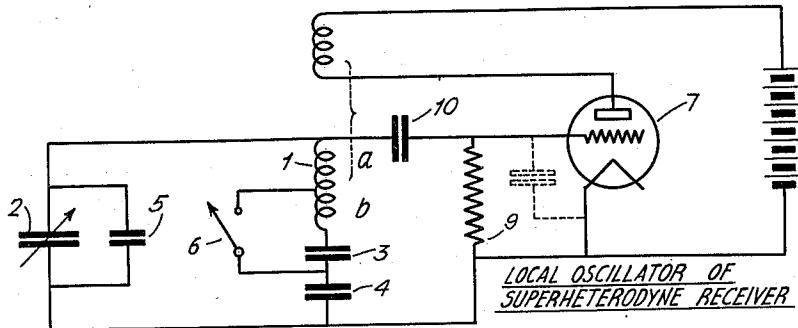


Fig. 2

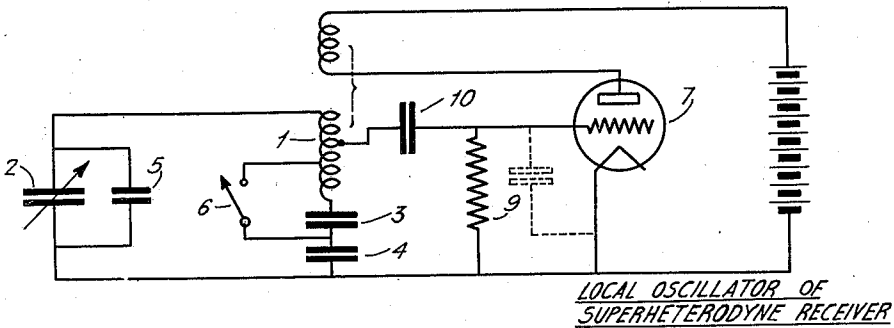
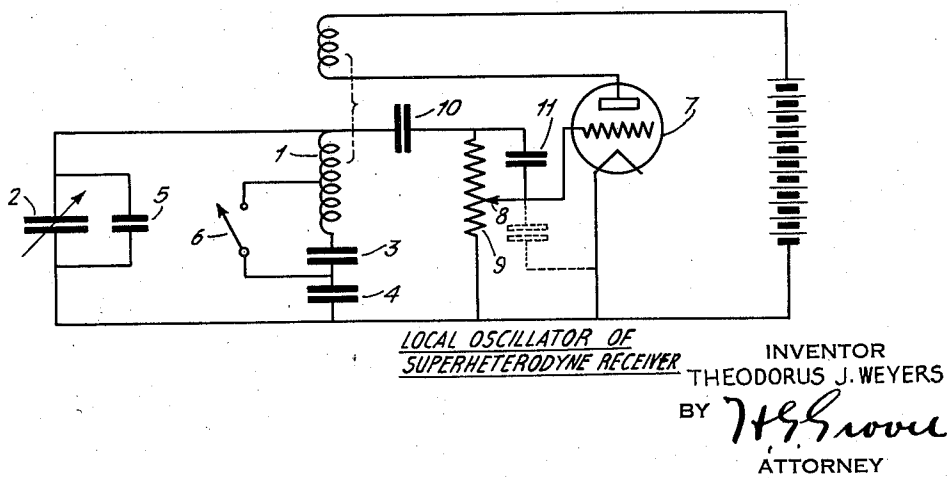


Fig. 3



UNITED STATES PATENT OFFICE

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LOCAL OSCILLATOR CIRCUIT

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4 Claims. (Cl. 250—36)

This invention relates to a superheterodyne receiving arrangement, and more particularly to those in which a comparatively high intermediate frequency is used.

As is well known with superheterodyne receiving arrangements the tuning circuit of the local oscillator comprises condensers which are connected in series and/or in parallel with the tuning condenser, and which allow a constant frequency difference between the locally produced oscillations and the incoming oscillations throughout the range of wave lengths to be received. In the drawing, Figs. 1 and 2 show respectively known local oscillators of superheterodyne receivers of the multi-range type; Fig. 3 shows a local oscillator network of such type which embodies the present invention. Fig. 1 shows an example of a known local oscillator, in which the tuning coil is denoted by 1, the tuning condenser by 2 and the usual padding condensers by 3, 4, and 5. Furthermore, a switch 6 is provided by which part of the coil 1 and of the condenser 3 is short-circuited when changing over from the long-wave range to the short-wave range.

This arrangement has the drawback that the natural capacity of the discharge tube 7, in other words the capacity between the grid and the cathode, lies in parallel with the tuning condenser. Due to this, variation of the tuning of the oscillator circuit will occur which variation, when replacing the tube 7 by another one, causes a variation of the difference frequency between the incoming oscillations and the locally produced oscillations, since the tuning condenser is mechanically coupled with the input circuit of the set. This frequency variation has such a value that it is still admissible for long-wave reception. In the short-wave range this frequency variation causes material distortion of the received oscillations and, moreover, the sensitiveness and the selectivity are materially decreased.

In order to limit the amount of variation of the natural frequency of the tuning circuit of the local oscillator the grid of the tube 7 may be connected to an intermediate point of the coil 1. Thus the influence exerted by the tube capacity on the frequency is reduced. If, for instance, the grid is connected to the midpoint of the coil part destined for short-wave reception, a frequency variation of the tuning circuit will occur when replacing the tube 7 by a tube having a different internal capacity, which variation amounts only to one quarter of the frequency variation occur-

ring under similar circumstances in the arrangement shown in Fig. 1.

An arrangement in which the grid is connected to the midpoint of the part of coil 1 destined for short-wave reception is represented in Fig. 2.

When the oscillator arrangement above referred to forms part of a superheterodyne receiver in which a high intermediate frequency is used, the condenser 4 will be of the same order of magnitude as the maximum value of the tuning condenser 2. Due to this, a small impedance to the desired oscillations lies between the grid and the cathode of the tube 7 when the condenser 2 has a large value, so that the tube does not oscillate. In fact, the oscillator frequency depends on the self-induction of the short wave section of coil 1 and on the series connection of the condensers 2 and 4; the natural frequency of both branches between the grid and the cathode of the tube 7, depends on half the self-induction of the said coil section and on the condenser 2 or the condenser 4. It will be appreciated that the natural frequency of each of the branches approximately corresponds to the oscillator frequency when the condenser 4 is of the same order of magnitude as the tuning condenser 2.

According to the present invention, an improvement of the described arrangement is achieved when the grid of the oscillator tube is connected to an intermediate point of the grid leakage resistance 9.

Fig. 3 shows a form of construction of an arrangement according to the invention, in which the grid of the tube 7 is connected to a point 8 of the leakage resistance 9. This arrangement comprises a condenser 11 connected in parallel with the part of the leakage resistance 9 that lies between the point 8 and the grid condenser 10. According to the invention this condenser 11 has such a value that the phase angle of the impedance between the point 8 and the grid condenser 10 corresponds to the phase angle of the impedance between the point 8 and the cathode. In this case the voltage set up at the grid will be in phase with the voltage set up across the total leakage resistance 9, thus allowing a phase displacement of 180° between the grid voltage and the anode voltage.

When it is desired that the voltage set up at the grid should amount to half the voltage set up across the resistance 9, the point 8 must be chosen in such a manner that the part of the resistance 9 between the point 8 and the grid condenser 10 corresponds to the parallel connection which includes a part of the resistance 9 between

the point 8 and the cathode and the resistance of the tube 7 occurring between the grid and the cathode. In this case the value of the condenser 11 will correspond to the capacity between the grid and the cathode of the oscillator tube 7.

What is claimed is:

1. In a local oscillator network of a superheterodyne receiver, a tube provided with a tunable oscillation circuit, the latter comprising a coil and a variable condenser, a padder condenser in shunt with the variable condenser, a pair of padder condensers in series with each other and the coil, the series combination of the coil and pair of condensers being connected in shunt with the variable condenser, a wave range change switch connected between an intermediate point on the coil and the junction of said pair of condensers, a grid leak-condenser network connected across said coil and pair of condensers, the cathode of said tube being connected to the low alternating potential side of the grid leak resistor, the control grid of the tube being con-

nected to an intermediate point on the said leak resistor, means for regeneratively coupling the anode and grid circuits of the tube, and a condenser connected between the high alternating potential side of the leak resistor and the intermediate point thereon.

2. In an oscillator network as defined in claim 1, the connection between the control grid and the leak resistor being adjustable.

3. In an oscillator network as defined in claim 1, the magnitude of the last named condenser being such that the phase angle of the impedance between the leak resistor intermediate point and the high potential side thereof corresponds to that of the impedance between said intermediate point and the cathode of the oscillator tube.

4. In an oscillator as defined in claim 1, wherein the value of the capacity between the grid and cathode of the oscillator tube corresponds to the value of the last mentioned condenser.

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