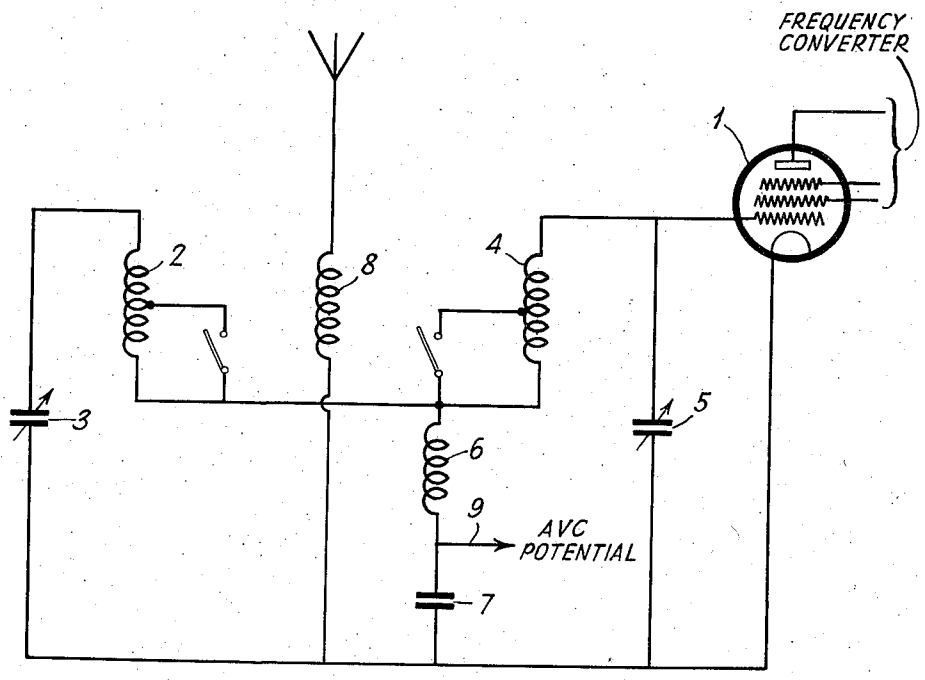
Dec. 27, 1938. E. S. V. TRUEFITT 2,141,774

WIRELESS RECEIVING APPARATUS

Filed June 4, 1937



INVENTOR
EDWARD S. V. TRUEFITT
BY H. S. Grover
ATTORNEY

Patented Dec. 27, 1938 2,141,774

UNITED STATES PATENT OFFICE

2,141,774

WIRELESS RECEIVING APPARATUS

Edward Samuel Villiers Truefitt, London, England, assignor to Electric & Musical Industries Ltd., Hayes, Middlesex, England

Application June 4, 1937, Serial No. 146,396
In Great Britain June 25, 1936

4 Claims. (Cl. 250—20)

This invention relates to radio receiving apparatus of the superheterodyne type, that is to say, of the type in which incoming signals are mixed with local oscillations whereby signals of an intermediate frequency are generated.

With receiving apparatus of this type interference occurs when signals are received corresponding to the intermediate frequency, such interference, as is well known, causing whistling when the apparatus is tuned for the reception of signals at a desired frequency. It is usually the practice to avoid interference at the intermediate frequency by employing rejectors or wave-traps in the aerial circuit where the selectivity of this circuit (or circuits) is not in itself sufficient, and whilst these rejectors or wave-traps may be satisfactory in avoiding the interference referred to above, they do, however, necessitate the introduction of additional components, thereby increasing cost of production of the apparatus.

It is the main object of the present invention to provide an improved radio receiving apparatus of the type hereinbefore referred to in which interference, due to the receipt of signals at the intermediate frequency, is substantially overcome, whilst, at the same time, the use of separate rejectors or wave-traps in the aerial circuit is avoided.

According to the present invention, a superheterodyne wireless receiving apparatus is provided having a band-pass or similar filter comprising two radio frequency circuits tunable within a predetermined range of frequencies for tuning the receiver to a desired frequency, the two radio frequency circuits being coupled together by a coupling circuit which is arranged to resonate at a frequency corresponding substantially to the intermediate frequency generated by the receiving apparatus. With such a construction, the coupling between the two circuits above-mentioned is at a minimum at the intermediate frequency thereby reducing the sensitivity of the receiver to signals of this frequency. Preferably, the coupling circuit aforesaid comprises a capacity and inductance in series, the values of which are so chosen that the circuit resonates at the desired frequency which, in a particular example, is about 465 kilocycles, corresponding substantially to the intermediate frequency generated by the receiving apparatus. At this frequency the residual coupling impedance is the effective resistance of the capacity and inductance which can be made of relatively small value.

Preferably, in accordance with a further feature of the invention, the aerial coupling coil which couples the aerial to the bandpass or similar filter is of such a value that with an average value of aerial capacity it also resonates at a frequency corresponding substantially to the intermediate frequency generated by the receiving apparatus whereby the sensitivity of the receiver over the range of frequencies capable of being received may be made substantially constant.

In the case of a receiver adapted to receive signals on the medium and long wave bands an aerial coupling coil resonating at the frequency which lies between these bands would be relatively inefficient at the ends of the wave bands covered remote from this resonant frequency. Since, however, the coupling circuit according to the present invention will be most efficient at those frequencies the combination of the aerial coil and coupling circuit both resonating at a frequency between the wave bands will provide substantially constant sensitivity over these bands and, as previously stated, will be very inefficient to transfer signals at their resonant frequency which corresponds substantially to the intermediate frequency of the receiver.

A further advantage accruing from the construction in accordance with the invention is that where the receiving apparatus is employed in conjunction with an automatic volume or gain control circuit, the automatic volume or gain control potentials can be applied across the capacity employed in the coupling circuit, so avoiding the use of a grid condenser and grid leak which might otherwise have to be employed.

In order that the said invention may be clearly understood and readily carried into effect one embodiment of the invention will now be described with reference to the accompanying drawing.

In the drawing the reference numeral 1 indicates, for example, a frequency changer tube with a band-pass filter connected to its signal input grid comprising two radio frequency circuits consisting of an inductance 2, and variable condenser 3, and inductance 4, and variable condenser 5, these two circuits being coupled by a circuit comprising an inductance 6 and a series condenser 7. The elements 2 to 5 of the filter circuit are tunable in known manner, as for example by means of a common control, whilst the values of the inductance 6 and the condenser 7 are so chosen that the combination resonates at a frequency corresponding to the interme-

diate frequency generated by frequency changer tube 1, which, in a particular example, corresponds to 465 kilocycles. The aerial coupling coil 8 is also arranged to resonate at a frequency corresponding to the intermediate frequency for the reasons above mentioned. Where the receiving apparatus is employed in conjunction with an automatic volume or gain control circuit, control potentials can be applied across the condenser 7 by connecting the automatic volume control circuit to the lead 9.

In some cases the required inductance to resonate with the condenser 7 may be provided by mutual inductance between the coils 2 and 4.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:

1. A superheterodyne radio receiving apparatus having an intermediate frequency network operating at a fixed intermediate frequency, a tunable band-pass filter network comprising two similar radio frequency circuits tunable within a predetermined range of frequencies for tuning the receiver to a desired frequency, the two radio frequency circuits having in common a coupling circuit which is arranged to resonate at a frequency corresponding substantially to the intermediate frequency generated by the receiving apparatus.

2. A superheterodyne receiver according to claim 1, in which the common coupling circuit comprises an inductance and capacity in series, the value of the two components being so chosen that the circuit resonates substantially at the intermediate frequency of the receiver.

3. A superheterodyne receiver according to claim 1, and provided with a coil for coupling the aerial to the band-pass filter network, the said coil being of such value that with an average value of aerial capacity it resonates at a frequency corresponding substantially to the intermediate frequency of the receiver.

4. A superheterodyne receiver according to claim 1, in which the tunable radio frequency circuits are adjustable over two frequency bands, one above and the other below the operating frequency of the intermediate frequency network, and in which the common coupling circuit comprises an inductance and capacity in series, the value of the two components being so chosen that the circuit resonates substantially at the intermediate frequency of the receiver, and provided with a coil for coupling the aerial to the band-pass filter network, the said coil being of such value that with an average value of aerial capacity it resonates at a frequency corresponding substantially to the intermediate frequency of the receiver.

EDWARD SAMUEL VILLIERS TRUEFITT.