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TUNED CIRCUITS FOR WIRELESS RECEIVERS

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Fig. 1.

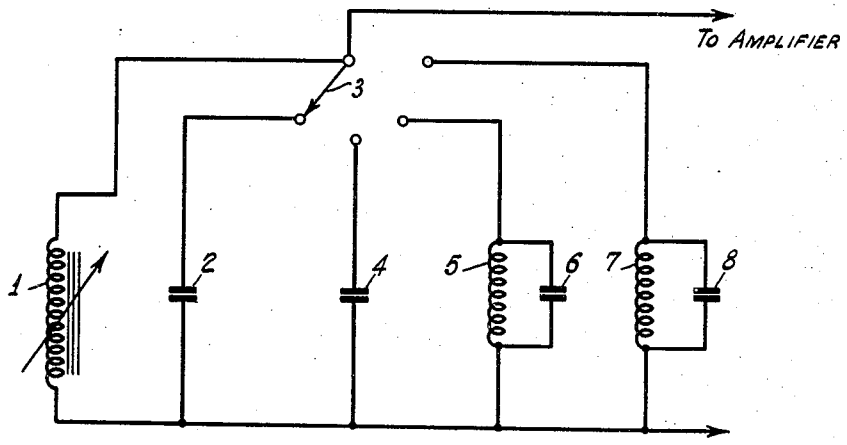
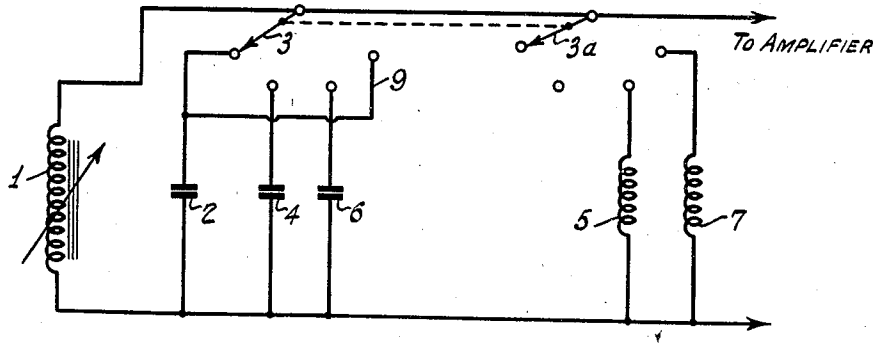


Fig. 2.



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TUNED CIRCUITS FOR WIRELESS RECEIVERS

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5 Claims. (Cl. 250—40)

This invention relates to tuned circuits of the kind employed in wireless apparatus and particularly in broadcast wireless receivers.

Tuning by variation of inductance instead of by variable capacity has certain advantages. The layout of the receiver chassis is simplified and the cost of the tuning elements can be reduced, particularly by using a variable inductance of the variable permeability type in which a suitable core of magnetic material is employed inside a solenoid. This type of tuning inductance is most convenient for receivers covering only one waveband; the addition of a further band leads either to unsuitable ratios of inductance to capacitance or else to the need for additional components. In receivers with bandspread tuning in some wavebands, the complications are likely to be serious.

The object of the present invention is to provide inexpensive waveband spreading tuning means in a circuit employing permeability tuning and involving the use of a vary few components.

According to the present invention a tuning circuit includes a single permeability tuned inductance which serves as the main tuning adjustment means over frequencies in one tuning range and as a fine tuning adjustment means at frequencies higher than those in said tuning range.

A particular form of tuning circuit according to the invention includes a single permeability-tuned inductance shunted by a condenser which may be variable, the frequency bandwidth covered by said inductance and condenser being extensible by the addition of an alternative shunt condenser, tuning to higher frequencies being effected by the addition of an inductance in shunt with the first inductance together with a suitable condenser or condensers in shunt, the arrangement being such that the permeability-tuned inductance operates as a fine tuning control at the higher frequencies.

The tuning inductance can take care of the medium waveband, for example, and can easily be arranged to cover the long waveband by the connection of a suitable fixed condenser in shunt. On the short waves, the tuning inductance can be used to provide fine tuning in the spread bands by connecting suitable values of fixed inductance and capacity in shunt so as to center the tuning range in the frequency ranges required, the ratio of the fixed inductance to the fixed capacity being so chosen that the desired tuning range is provided by the tuning inductance.

In order that the invention may be more clearly understood and readily carried into effect, alternative circuits embodying the invention will now be described in greater detail by way of example with reference to Figures 1 and 2 of the accompanying drawing.

Referring to Figure 1, the permeability tuning inductance 1 is normally operative over the medium broadcast waveband and is the only variable inductance required. The shunt condenser 2 may be fixed or variable. An extension of the waveband over longer wavelengths is obtained without the addition of variable inductance merely by arranging the wave change switch 3 to increase the capacity across the variable inductance 1 by the substitution of a shunt condenser 4 for the condenser 2. Further, an extension of the waveband over shorter wavelengths, again without the use of additional variable inductances, is obtained by arranging the wave change switch 3 to remove the shunt condensers 2 or 4 and to connect in their place in parallel with the variable inductance 1 appropriate tuning elements such as inductance 5 and condenser 6, or inductance 7 and condenser 8. It will be clear that the provision of pairs of shunt components provide sufficient degrees of freedom to allow both the mid-frequency and the spread of each band to be given any reasonable values.

In a receiver with several bands, various components may with economy be shared between wavebands. As an example, Figure 2 shows a method of sharing condensers such as could be performed if the values of condenser 2 and condenser 8 in Figure 1 were found to be substantially the same, by splitting up the wave change switch 3 into two ganged sections 3 and 3*a*, one selecting condensers and the other inductances.

It will be seen in Figure 2 that by providing a lead 9 from the end contact of the switch contact arm 3 to the condenser 2 and by providing two dead contacts for the first two positions of the switch contact arm 3*a*, the equivalent arrangement of Figure 1 is provided except that in the extreme right hand position of the switch contact arms, the condenser 2 will be connected across inductance 7, thus eliminating the condenser 8 of Figure 1.

Variation of the position of the adjustable iron core cooperating with the variable inductance 1 in Figure 1 or 2 will tune the combination of shunt inductance over a range adequate to cover one of the allocated broadcast bands, although the tuning is not linear.

The invention will be found to be of particular application to the design of low priced radio re-

ceivers in which it is desired to obtain maximum band spread with a single variable inductance.

What I claim is:

1. A circuit capable of being tuned over a plurality of wave bands comprising a permeability-tuned inductance, a condenser and a circuit comprising inductance and shunt capacity, and means for selectively shunting the condenser or the latter circuit across the permeability-tuned inductance, the arrangement being such that with the condenser shunting the permeability-tuned inductance the latter serves as the main tuning means in one of the wave bands, and with the circuit of the inductance and shunt capacity shunting the permeability-tuned inductance, the latter serves as the fine tuning means in another, higher frequency band.

2. A tunable circuit comprising a single permeability-tuned inductance and a shunt condenser of such values to tune the circuit over one wave band, said inductance serving as the main tuning means in said band, a circuit comprising a fixed inductance and a shunt capacity tuned to the mid-frequency of a band of higher frequencies than the first band, and means for substituting the latter circuit for the first mentioned shunt condenser across the permeability-tuned inductance, the latter now serving as the fine tuning means in the band of higher frequencies.

3. In a receiver, at least one tunable circuit comprising a single permeability-tuned inductance and a shunt condenser for tuning the receiver through a band of medium or broadcast frequencies, and means for replacing the shunt condenser with a shunt circuit comprising an inductance and a shunt capacity which are tuned to the mid-frequency of a higher frequency band, the permeability-tuned inductance effecting band spread tuning in said higher frequency band.

4. In a multi-band receiver, a single permeability-tuned inductance, a plurality of condensers and a plurality of fixed tuned circuits, means for selectively connecting one of the condensers or one of the fixed tuned circuits in shunt across the permeability-tuned inductance, the values of said elements being such the receiver will be tuned to different frequency bands depending upon the position of the selective means, the permeability-tuned inductance serving as the main tuning means when one of the condensers is shunted thereacross, and said inductance serving as the fine tuning means for effecting band spread tuning when one of the fixed tuned circuits is shunted thereacross.

5. The invention as defined in claim 4 wherein at least one of the condensers serves also as an element of the fixed tuned circuit.

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