Jan. 30, 1934. B. D. H. TELLEGEN 1,945,096

CONVERTIBLE BAND PASS RECEIVER

Filed Feb. 18, 1931

Fig. 1

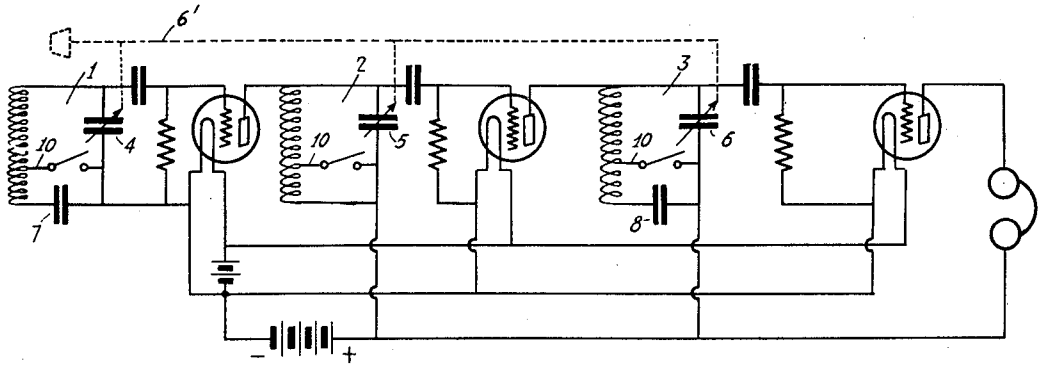
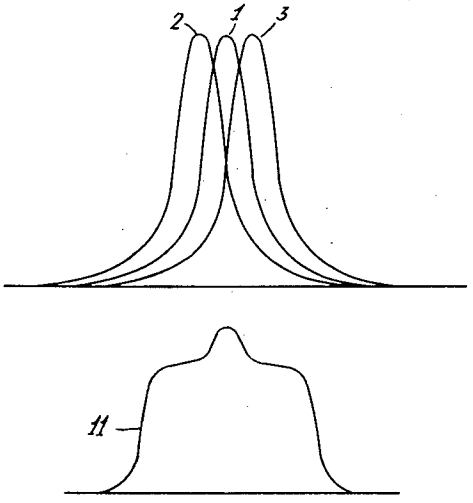


Fig. 2



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CONVERTIBLE BAND PASS RECEIVER

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Application February 18, 1931, Serial No. 516,549, and in the Netherlands April 15, 1930

10 Claims. (Cl. 178—44)

My present invention relates to a radio receiving set comprising a plurality of tuned circuits, the condensers of which are mounted on one shaft.

When using circuits of comparatively low damping, and particularly when the circuits are equalized as far as possible, the selectivity of the system may increase too much so that on receipt of telephony the high tones coming through are too weak in relation to the low tones.

According to the present invention, in order that the advantage of circuits of low damping may be conserved, each of the various circuits, or all the circuits but one, include, in series with the variable condenser, a preferably fixed condenser so that the various circuits become somewhat mistuned with relation to each other. This results in the resonance curve being more enlarged at the end of the long wave than at the end of the short wave.

According to the invention, the tuning of the first tuned circuit is preferably chosen between those of the other circuits so that there are circuits with a tuning higher than that of the said circuit, equally well as circuits with a tuning lower than that of the said circuit. That is, the resonance curves of the circuits are staggered. This choice is desirable, as obviously it is important that the middle point of the resonance curve should coincide with the carrier wave of the signals to be received, with the usual symmetrical modulation of the carrier wave.

If the first circuit were to be tuned slightly beside the carrier wave a powerful signal having a wave length little different from that of the signals to be received would easily modulate the carrier wave to be received so that disturbing oscillations would be introduced which could no longer be suppressed by the means of selection following the first circuit as they have partly the same frequency as those composing the signal to be received.

It has been found that generally the measures hereinbefore described are unnecessary for receiving short waves since in this zone of wavelengths the damping of the various circuits is inherently sufficiently great. For this reason switches may be used by means of which the fixed condensers for the short wave-zone are short-circuited. This may be effected, for example, by the switch by means of which the change in connections to the various zones of wave lengths is performed.

The novel features which I believe to be characteristic of my invention are set forth in particularity in the appended claims, the invention itself, however, as to both its organization and method of operation will best be understood by reference to the following description taken in connection with the drawing in which I have indicated diagrammatically one circuit organization whereby my invention may be carried into effect.

In order that the invention may be clearly understood and readily carried into effect, one form of construction of the circuit arrangement according to the invention will be described more fully with reference to the accompanying drawing in which this circuit arrangement is diagrammatically illustrated.

Referring to Fig. 1, 1, 2 and 3 designate three tuned circuits the tuning condensers 4, 5 and 6 of which are mounted on one shaft 6'. 7 and 8 are fixed condensers. The fixed condensers have a capacity which is several times greater than the maximum capacity of the tuning condensers. In one practical embodiment the capacity of condenser 7 was 15,000 cm., and that of condenser 8 was 10,000 cm. Preferably, the circuit 1, which includes the largest condenser, is chosen as the first circuit.

The resonance curves of the different circuits are shown as staggered in Fig. 2, and referred to by the same numerals as the tuned circuits. The combined resonance curve is designated by 11. As the damping of the circuits 1 and 2 is but slight, the combined resonance curve is rather steep on either side.

In Fig. 1, 10 designates a switch by means of which part of the self-induction of the circuits can be short-circuited so as to effect the passing to another zone of waves. In the circuits 1 and 3 the fixed condenser is also short-circuited by the switch.

Frequently, the damping of the grid circuit of the detector tube is slightly greater than that of the other circuits. In this case the resonance curve of the circuit 3 is slightly more enlarged, and slightly lower than that of the other circuits which may give rise to a slight asymmetry in the resulting resonance curve. This asymmetry is, however, of little importance. If desired, it may be compensated for by initially imparting to the tuned circuit to be coupled to the detector, a slightly lower damping than the other circuits.

By a suitably chosen measure of artificial damping reduction (retroaction) provision may be made for the resonance keenness of this circuit being equalized with that of the other circuits. Further, while I have indicated and described

one arrangement for carrying my invention into effect, it will be apparent to one skilled in the art that my invention is by no means limited to the particular organization shown and described, but that many modifications may be made without departing from the scope of my invention as set forth in the appended claims.

What I claim is:

1. In combination, a series of tunable circuits, a space discharge device coupling each pair of adjacent circuits, reactive means in at least two of said circuits to effect such staggering of the resonance curves of all the circuits that the over-all resonance curve of the circuits is wider when receiving long waves than when receiving short waves, and means for selectively rendering said last means inoperative for receiving short waves.

2. In a radio receiver, at least three cascaded oscillation circuits, an electron discharge tube coupling each pair of successive circuits, each circuit including an inductance coil and a variable tuning condenser, a fixed condenser in series with the coil and tuning condenser of the first and last of said circuits, means for simultaneously adjusting said tuning condensers, the magnitudes of said fixed condensers being different and so chosen that the circuits are sufficiently staggered in tuning to produce an over-all resonance curve of the circuits which is wider at the long wave end of the receiver tuning range than at the short wave end.

3. In a radio receiver, at least three cascaded oscillation circuits of relatively low damping, each circuit including an inductance coil and a variable tuning condenser, a fixed condenser in series with the coil and tuning condenser of the first and last of said circuits, means for simultaneously adjusting said tuning condensers, the magnitudes of said fixed condensers being so chosen that the tuning of the circuits at any setting of the said means is staggered and the over-all resonance curve of the circuits is wider at the long wave end of the receiver tuning range than at the short wave end, the fixed condenser in the first circuit being larger.

4. In a radio receiver, at least three cascaded oscillation circuits, an electron discharge tube coupling each pair of successive circuits, each circuit including an inductance coil and a variable tuning condenser, a fixed condenser in series with the coil and tuning condenser of the first and last of said circuits, means for simultaneously adjusting said tuning condensers, the magnitudes of said fixed condensers being so chosen that the circuits are resonant to different frequencies at any setting of the adjusting means and the first of said circuits is resonant to a frequency intermediate the frequencies of the other two circuits.

5. In a radio receiver, at least three cascaded oscillation circuits, each circuit including an inductance coil and a variable tuning condenser, a fixed condenser in series with the coil and tuning condenser of the first and last of said circuits, means for simultaneously adjusting said tuning condensers, the magnitudes of said fixed condensers being so chosen that the said circuits are resonant to different frequencies and the over-all resonance curve of the circuits is wider at the long wave end of the receiver tuning range than at the short wave end, and means for short-circuiting said fixed condensers at the said short wave end.

6. In a radio receiver, at least three cascaded oscillation circuits, an electron discharge tube coupling each pair of successive circuits, each circuit including an inductance coil and a variable tuning condenser, a fixed condenser in series with the coil and tuning condenser of the first and last of said circuits, means for simultaneously adjusting said tuning condensers, the magnitudes of said fixed condensers being so chosen that the over-all resonance curve of the circuits is wider at the long wave end of the receiver tuning range than at the short wave end, said fixed condensers having a capacity relatively greater than the maximum capacity of the tuning condensers.

7. In a radio receiver, at least three cascaded oscillation circuits, an electron discharge tube coupling each pair of successive circuits, each circuit including an inductance coil and a variable tuning condenser, a fixed condenser in series with the coil and tuning condenser of the first and last of said circuits, means for simultaneously adjusting said tuning condensers, the magnitudes of said fixed condensers being so chosen that the over-all resonance curve of the circuits is wider at the long wave end of the receiver tuning range than at the short wave end and the fixed condenser in the first circuit being larger than the fixed condenser in the third circuit.

8. In a radio receiver, at least three cascaded oscillation circuits, each circuit including an inductance coil and a variable tuning condenser, a fixed condenser in series with the coil and tuning condenser of the first and last of said circuits, means for simultaneously adjusting said tuning condensers, the magnitudes of said fixed condensers being so chosen that the over-all resonance curve of the circuits is wider at the long wave end of the receiver tuning range than at the short wave end, a load coupled to the last circuit which excessively damps the latter, the damping of the third circuit being slightly lower than the damping of the preceding circuits to compensate for said excessive damping.

9. In a radio receiver, at least three cascaded oscillation circuits, each circuit including an inductance coil and a variable tuning condenser, a fixed condenser connected with the coil and tuning condenser of at least the first and last of said circuits, means for simultaneously adjusting said tuning condensers, the magnitudes of said fixed condensers being different and so chosen that the first circuit is resonant, at any setting of said adjusting means, to a desired carrier while the other two circuits are resonant to frequencies above and below said carrier.

10. In a radio receiver, at least three cascaded oscillation circuits, each circuit including an inductance coil and a variable tuning condenser, a fixed condenser connected with the coil and tuning condenser of at least the first and last of said circuits, means for simultaneously adjusting said tuning condensers, the magnitudes of said fixed condensers being different and so chosen that the first circuit is resonant, at any setting of said adjusting means, to a desired carrier while the other two circuits are resonant to frequencies above and below said carrier, the over-all resonance curve of said circuits being wider at the long wave end of the receiver tuning range than at the short wave end.

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