

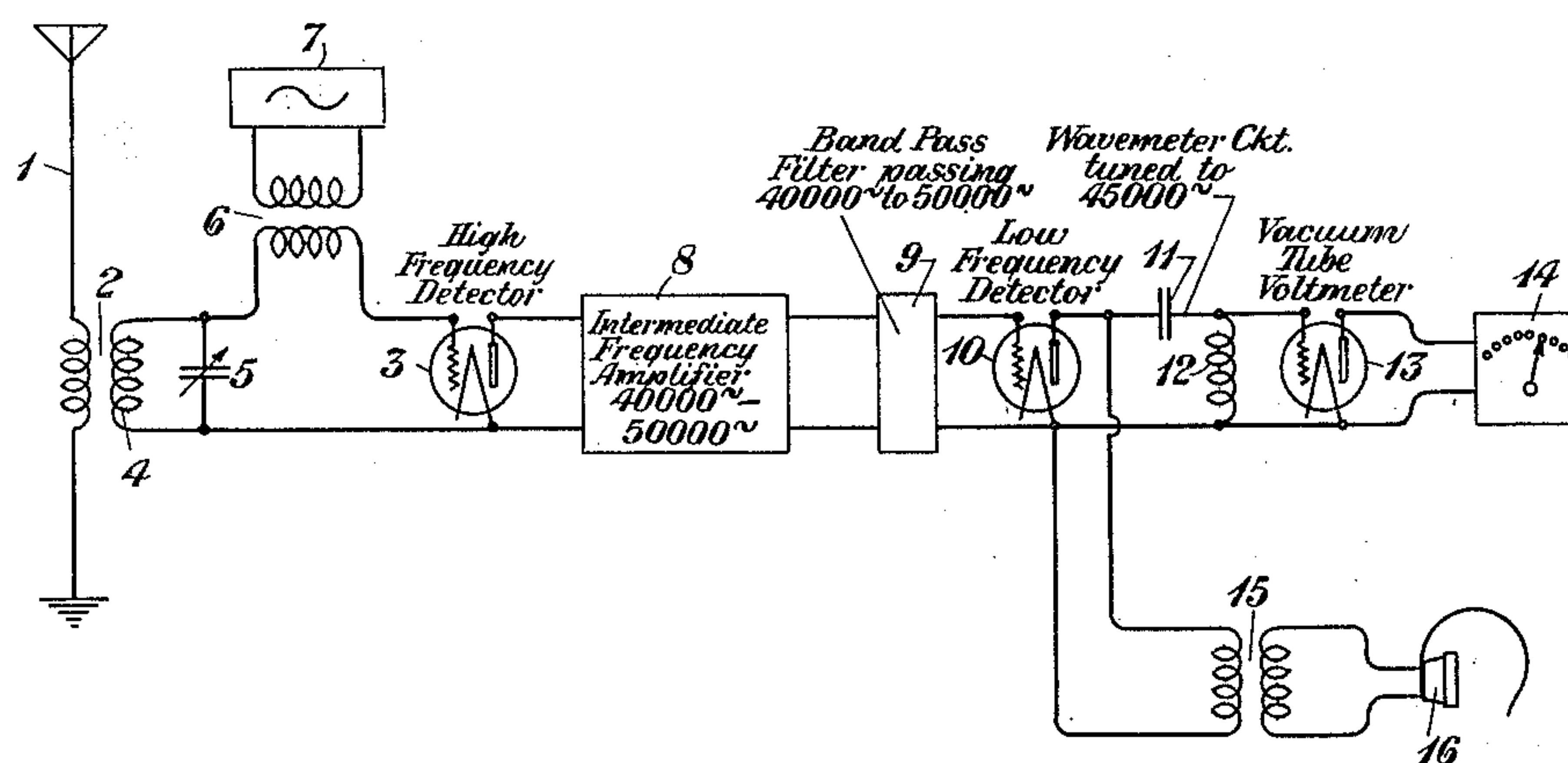
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RADIO RECEIVING SYSTEM

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RADIO RECEIVING SYSTEM.

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This invention relates to radio receiving systems, and particularly to visual indicating means to insure the proper adjustment of the tuning circuits in order to effect the best reception.

In highly selective radio receiving sets, it is difficult to tune such sets exactly without using an indicating instrument in the plate circuit of a detector tube to determine when the carrier frequency of the incoming signal coincides with the resonant frequency of the circuit. This method, however, is not applicable to receiving sets of the double detection type having intermediate frequency amplification and employing a band-pass filter for selectivity.

It is the object of this invention to provide means for insuring the proper tuning of receiving sets having a band filter or its equivalent connected therewith.

This invention will be clearly understood from the following description, when read in connection with the attached drawing, showing schematically a form of embodiment of the invention.

In the drawing, the antenna 1 is coupled by the transformer 2 with the input circuit of the detector 3. The input circuit is tuned by means of the winding 4 and condenser 5 for the band of frequencies desired to be received. Also connected with this input circuit by means of the transformer 6 is a source 7 of oscillations to beat down the incoming oscillations to provide an intermediate frequency. This intermediate frequency will be impressed upon the amplifier 8, the output side of which is connected with the band-pass filter 9. Oscillations passing this filter are impressed upon the low frequency detector 10, the plate circuit of which includes the condenser 11 and the inductance 12. Bridged across the said inductance is a vacuum tube 13 having in its plate circuit an indicating instrument 14, which together constitute a vacuum tube voltmeter. The constants of the condenser 11 and the inductance 12 are so chosen that the plate circuit will be resonant to the mid-frequency of the band passed by the filter 9 and the vacuum tube voltmeter will indicate the condition of resonance. Bridged across the plate circuit of the detector 10 in parallel with the said resonant circuit and the voltmeter is an audio-frequency circuit which is connected

with the receiver 16 by means of the transformer 15.

Having in mind the description of the apparatus which makes up the circuit, the invention will now be clear from the following description of the method of tuning the circuit in order to effect proper reception of signals. Let it be assumed that the incoming signal is made up of a carrier frequency of 750,000 cycles, with two side bands of 5,000 cycles each. That is to say, the incoming frequencies may be represented by a band extending from 745,000 to 755,000 cycles. Since the circuit 4—5 is tuned for this band, the potentials thereof will be impressed upon the grid circuit of the detector 3, together with oscillations from the source 7. As a result of the beating operation, an intermediate band of frequencies will be produced, which will be amplified by 8 and impressed upon the band-pass filter 9, which is designed to pass a band extending from 40,000 to 50,000 cycles. In order that the resultant band may pass through this filter, the source 7 of the beating oscillations must be operated at 705,000 or 795,000 cycles. The frequency representing the midpoint of the band passed by the filter 9 is that for which the circuit 11—12 is resonant. In other words, if the oscillator 7 is properly adjusted, such condition will be indicated by the visual indicating instrument 14, which shows the condition of resonance of the current flowing through the circuit 11—12. It will therefore be noted that the band of frequencies resulting from beating the incoming frequencies with the oscillations from the source 7, will be properly centered upon the band-pass filter 9, and therefore, the maximum result will be obtained in the receiving apparatus 16 connected with the audio-frequency circuit.

While a vacuum tube voltmeter has been shown as the device for indicating the resonant condition of the circuit 11—12, other forms of high frequency indicating devices might be used, such, for example, as a sensitive thermocouple of the type in which the heating is effected by means of the high frequency current and the direct current created thereby affects a sensitive direct current instrument such as a galvanometer. Furthermore, it is desired to point out that the wave meter circuit may be associated with the receiving set at any point in the intermediate

frequency level, as, for example, in front of the band filter, that is to say, between the band filter 9 and the amplifier 8. However, the arrangement shown in the drawing is the preferred one in that the energy level of the intermediate frequency signals at the output of the low frequency detector is higher than anywhere else in the receiving set, and consequently, the indicating device would not need to be particularly sensitive.

While this invention has been disclosed as embodied in a particular form and arrangement of parts, it is not so limited but is capable of embodiment in other forms without departing from the spirit and scope of the appended claims.

What is claimed is:

1. In a radio receiving system, the combination with a vacuum tube detector, the plate circuit of which is tuned to a known frequency, of a bandpass filter designed to pass a band of frequencies, the midpoint of which is the frequency at which the said plate circuit is resonant, a visual indicating device connected with the plate circuit to show the existence of resonance, and a source of received oscillations and a source of beating oscillations connected with the input side of said filter to produce the said band of frequencies transmitted thereby.

2. In a radio receiving system, the combination with an antenna of a detector having a source of beating oscillations connected

therewith, a band-pass filter designed to pass the difference frequency, between the incoming frequency and the beating frequency, a second detector having its plate circuit tuned to the mid-frequency of the band passed by the said filter, and means to indicate the potential across the said tuned plate circuit.

3. In an alternating current signaling system the combination with a vacuum tube detector of a source of oscillations to produce a band of frequencies, a filter connected between the said source and the said detector designed to pass the said frequency band, a selecting network connected with the output circuit of the said detector adjusted to pass an undetected component of the output of the said detector, and an indicating device connected with the said selecting network.

4. In an alternating current signaling system the combination with a vacuum tube detector of a source of oscillations to produce a band of frequencies, a filter connected between the said source and the said detector designed to pass the said frequency band, a selecting network connected with the output circuit of the said detector adjusted to pass the mid-frequency of the said band, and an indicating device connected with the selecting network.

In testimony whereof, I have signed my name to this specification this 18th day of August 1924.

RALPH BOWN.