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METHOD AND DEVICE FOR REMOTE TUNING OF RADIO RECEIVING APPARATUS

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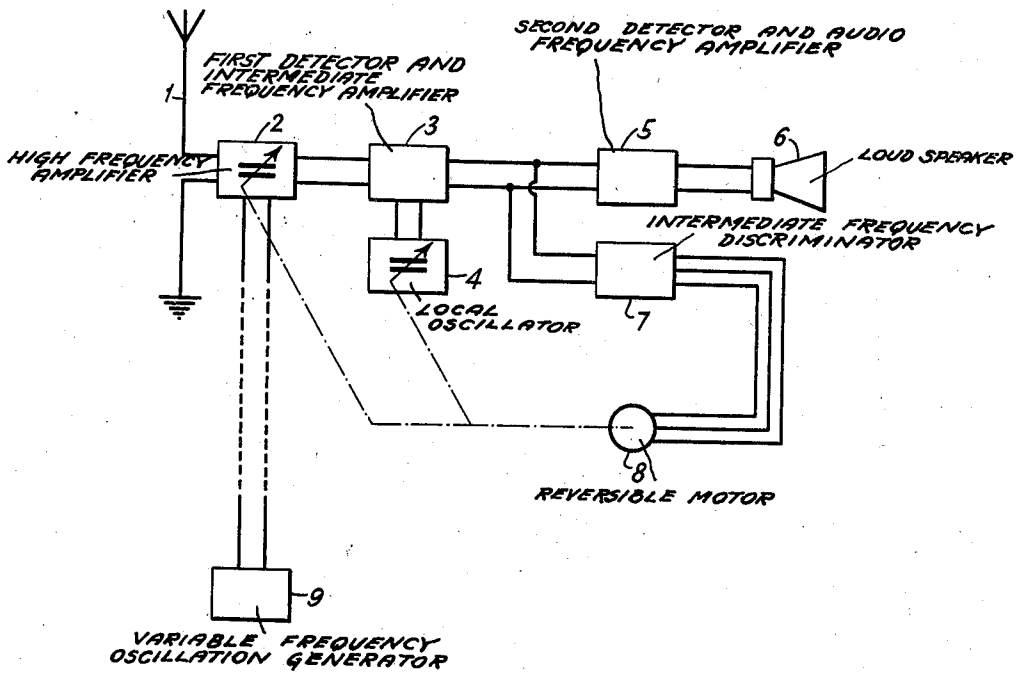

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METHOD AND DEVICE FOR REMOTE TUNING OF RADIO RECEIVING APPARATUS

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2 Claims. (Cl. 250—40)

There are known already radio-receiving apparatus with which tuning is automatically effected in the sense that in the case of a slight deviation from the correct tuning the tuning members are automatically adjusted in such manner that the correct tuning is recovered. With a determined form of construction of these apparatus the adjustment is limited to a region of a few kilocycles while with other apparatus automatic adjustment is possible over a band of frequencies of any desired width. The invention relates to apparatus of the last-mentioned type. With these apparatus, which generally operate on the super-heterodyne principle, the intermediate-frequency amplifier is coupled with a device sensitive to frequency which controls a motor which is coupled with the shaft of the tuning members so that the motor is actuated when the carrier-wave frequency which is operative in the intermediate-frequency amplifier differs from the frequency to which the intermediate-frequency amplifier is tuned, namely in such manner that correct tuning is obtained whereupon the motor is switched-off or uncoupled again. The invention relates to a method and a device for the remote tuning of such a receiving apparatus.

According to the invention, there is supplied to one of the high-frequency circuits of the apparatus an oscillation whose frequency, which is substantially equal to the frequency to which the apparatus is tuned and which is then continuously altered. With a proper choice of the amplitude the automatic tuning device is set into operation. It remains in operation as long as the oscillations are supplied with the result that the tuning of the apparatus follows the frequency of the oscillations supplied. The tuning members may thus be adjusted over a region of any desired extension. When the apparatus is approximately tuned to the wave-length of the station desired, the supply is interrupted whereupon further exact tuning is effected under the influence of the signals of the stations desired.

The invention will be explained more fully with reference to the accompanying drawing which represents diagrammatically a device for carrying out the method according to the invention.

In the drawing, 2 denotes a high-frequency amplifier to which are supplied the oscillations intercepted by an aerial 1. After amplification these oscillations are combined with oscillations generated by a local oscillator 4 and rectified in a device 3. The intermediate-frequency oscillation is amplified and supplied to a device 5 which comprises a second detector as well as a low-frequency amplifier which has connected to it a load 6, e. g., a loudspeaker. The high-frequency amplifier and the local oscillator comprise members (shown as variable condensers) by means of which the apparatus may be tuned.

Part of the intermediate frequency energy is taken from the conductors coming from the device 3 and is supplied to a device 7 (diagrammatically shown) which comprises a device known per se which responds when the frequency deviates from a given value, and thus causes a motor 8 (which may be like that shown in U. S. Patent 1,794,932) to rotate in such dependence on the direction of the deviations that the correct tuning is re-established. As is diagrammatically shown in the drawing, the motor is mechanically coupled for this purpose with the tuning members.

With the known devices the apparatus is tuned by hand by adjusting the members 2 and 4, the motor being switched-off or uncoupled. Once the tuning is effected, the device for automatic tuning ensures that the correct tuning is maintained independently of any frequency variations of the local oscillator and of the station received.

For the remote tuning of such a device there is supplied to one of the high-frequency circuits a locally generated oscillation whose frequency at first approximately corresponds to that of the station received and which is then slowly altered continuously. When this oscillation predominates over that of the station received, the tuning of the apparatus follows the frequency of the signal supplied owing to the actuation of the automatic tuning device. At the approximate tuning to the station desired the supply is interrupted whereupon further the tuning to this station is automatically maintained.

The generator intended for the remote tuning is denoted by 9. The oscillations are preferably supplied through the intermediary of a transmission line. It is essential that at the point where the oscillation is supplied the amplitude of this oscillation should be larger than that of the signal present at this point, which may be easily achieved. Alternatively, during the tuning the normal reception via the aerial may be interrupted, for example by means of a device by which the aerial is short-circuited or disconnected. The local oscillations instead of being supplied to the input circuit of the high-frequency amplifying tube, are preferably supplied, to a subsequent circuit in order to avoid radiation via the aerial. The local oscillator 9 may

have a scale which is calibrated as to wave-length or frequency and which may indicate, in addition, the stations.

I claim:

1. In radio receiving apparatus having an automatic tuning arrangement of the type wherein deviations from the correct tuning act upon a tuning instrumentality to cause the same to automatically adjust the tuning means of the receiver so as to tune substantially exactly to the frequency of the desired incoming signal energy and thereby compensate for frequency drift, the method of tuning the radio receiver from one point of a frequency band to another point thereof which consists in generating oscillations of a frequency approximately equal to the frequency to which the radio receiver is tuned but of substantially stronger amplitude than any normally received signal from a distant transmitter, and applying the generated oscillations to the receiver, continuously varying the frequency of the generated oscillations while the generated oscillations are applied to the receiver, the variations in the frequency of the generated oscillations being made at a rate such that the tuning instrumentality of the radio receiver can follow the changes in frequency of the generated oscillations and thereby operate the tuning means in accordance therewith, and discontinuing the application of the generated oscillations to the radio receiver when the frequency of the generated oscillations is approximately the same as the frequency to which it is desired to tune the radio receiving apparatus.

2. In a radio receiver provided with means for automatically compensating for frequency drift by varying the frequency to which the radio receiver is tuned in accordance with deviations between the frequency of the desired incoming signal and the frequency to which the receiver is tuned when receiving the signal, the method of tuning the radio receiver from one point of a frequency band to another which consists in generating local oscillations of a frequency which is approximately equal to the frequency to which the radio receiver is tuned and applying the locally generated oscillations to an intermediate input circuit of the receiver and continuously varying the frequency of the locally generated oscillations while applying them to the radio receiver to cause operation of the said means whereby the radio receiver is tuned as the frequency of the generated oscillations is varied and discontinuing the application of the generated oscillations to the radio receiver at a point where the frequency of the generated oscillations is approximately the same as the frequency of the signal energy emanating from a desired broadcasting station.

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