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TUNING INDICATOR CIRCUIT

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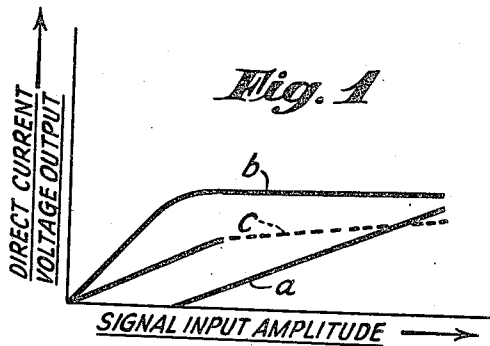
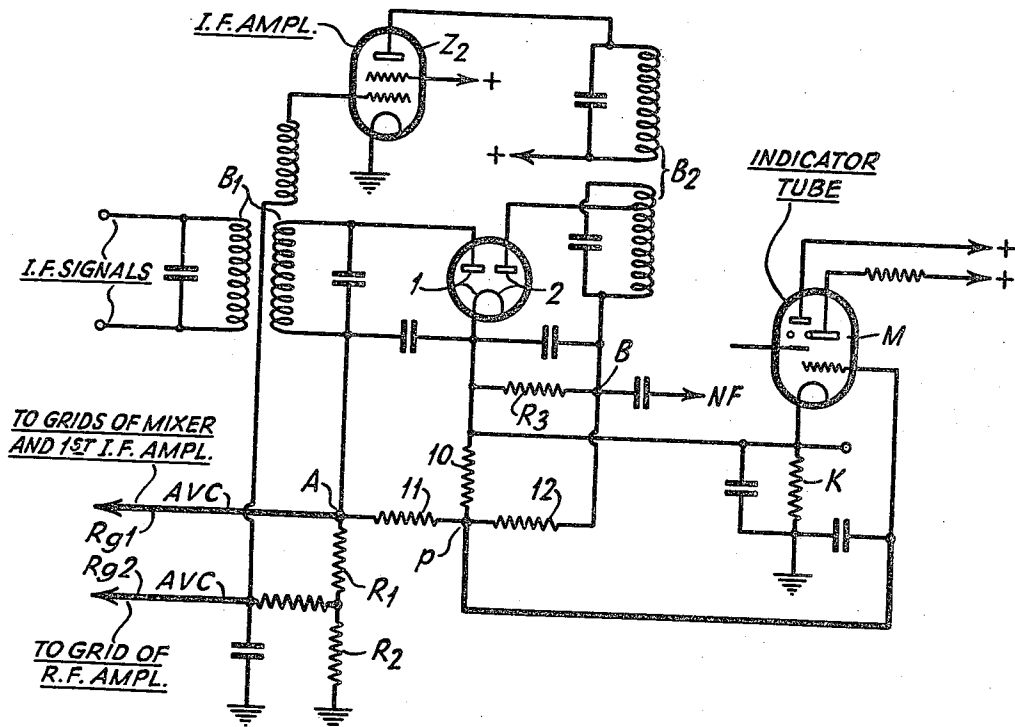


Fig. 2



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TUNING INDICATOR CIRCUIT

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6 Claims. (Cl. 250—20)

In receivers with delayed automatic volume control, in other words with automatic volume control which will operate only upon a certain threshold value being attained, the drawback arises that the tuning indicator up to the threshold value of the signal input voltage will not react if the tuning indicator is operated by the volume control potential directly, or through a controlled tube. If this drawback is to be avoided, and if response of the tuning indicator is desired also for feeble stations, then the tuning indicator may be actuated by the receiving rectifier which is not subject to a bias voltage, or else by a tube which is not subject to delayed volume control. However, these circuits are inapplicable whenever the receiver contains in its radio frequency section forward and backward regulator means which is subject to delayed action, for the regulator action is so perfect that at the receiver rectifier there prevails a roughly constant radio voltage, and thus, also, an approximately constant D. C. voltage obtained from the radio potential. In such a case it would be necessary to provide in addition to the negatively biased control rectifier, at the same place, a non-biased rectifier. By using the ways and means here disclosed this distinct and additional rectifier is dispensable.

As stated, the invention is concerned with a receiver set comprising automatic volume control means in the R. F. part with forward and backward action, and acting only upon arising of a certain threshold value by virtue of a negative biasing voltage for the regulator, or control, rectifier. The invention consists in the feature that the tuning indicator device is actuated by the sum total of the regulator voltage operative only upon the arising of a threshold value, and of the D. C. voltage resulting from the radio frequency energy (stabilized by the forward and backward regulation) in the receiver rectifier, or the sum of portions of these D. C. voltages, in either case by the use of resistances designed to decouple the two regulator potentials.

In the drawing:

Fig. 1 illustrates graphically the operation of the invention,

Fig. 2 is a circuit diagram of an embodiment of the invention.

The effect thus obtained is illustrated in Fig. 1. Graph *a* shows the delayed volume control potential which, as noted, arises only upon the production of a threshold value in the signal input potential. Graph *b* shows the D. C. voltage arising upon rectification of the signals in the

receiver rectifier. Initially this voltage rises and thereafter proceeds along a fairly straight horizontal line as soon as the control action has grown sufficiently high. Curve *c* shows that by summation, or integration, of parts of the two potentials a voltage arises which will be present also up to the said threshold value, and which thereupon rises still further so that this voltage is suitable for a tuning indicator. If a voltage as shown by graph *b* were to be used, this means that indication would be obtainable only for weak broadcast stations, whereas with the use only of the potential illustrated by graph *a*, solely powerful stations would give action. By a suitable choice of the relation of these two component voltages, the sum total of which is utilized for indication, conditions can be made so that until the arising of the threshold value, that is for feeble stations, the deflections of the tuning indicator turn out relatively stronger.

Fig. 2 shows an embodiment of the invention. The I. F. signal energy by way of the band-pass filter B₁ reaches the diode 1, the anode of which is negatively biased because of the fact that the cathode of the diode is connected with the positive end of the cathode resistance K of the indicator tube. From the divided load resistance R₁—R₂ of this regulator-voltage diode are derived the regulator potentials R_{g1} and R_{g2}. The regulator voltage R_{g1}, for instance, is fed to the signal grids of the mixer stage and the first I. F. stage, whereas the regulator potential R_{g2} acts upon the grids of the R. F. amplifier tube and the second I. F. tube Z₂ following the control voltage rectifier, the said I. F. amplifier being fed, as shown, with I. F. signals by inductive coupling. The I. F. energy, amplified in this stage, is fed through band-pass filter B₂ to the receiver diode rectifier 2 whose load resistance is designated by R₃ and from which the audio potential NF is taken off.

The voltage prevailing at point A, as will thus be seen, varies as indicated by graph *a*, Fig. 1, while the potential prevailing at point B follows curve *b*, Fig. 1. Now, at terminal *p* at the junction of the 1 and 5 megohms resistors 10 and 11, about one-sixth of the control voltage *a* is tapped off and at the same point one-fourth of the voltage *b* is tapped off by the aid of the voltage divider consisting of the 1 and 3 megohm resistors 10 and 12. The sum total of these potentials is thereupon impressed upon the tuning indicator M which, in the present instance, consists of an electronic indicator tube known under the trade-mark "Magic Eye", and also

known as a 6E5 type tube. Those skilled in the art are fully aware of the operation of this type of indicator tube.

What is claimed is:

1. In a signal receiving system of the type including a network tuned to a desired signal carrier frequency, the method of indicating resonance of said tuned network with incoming carrier waves which includes deriving a direct current voltage from rectification of waves of an amplitude below a predetermined intensity value, deriving a second direct current voltage from rectification of said waves upon said amplitude exceeding said value, producing an indication responsive to the resultant of said voltages, and controlling the signal transmission through said network with said second voltage.

2. In a superheterodyne receiver including an intermediate frequency transmission network and a detector coupled thereto, a delayed rectifier coupled to said network and deriving a direct current voltage from rectified intermediate frequency currents which exceed a predetermined amplitude, an automatic gain control connection between a point in said receiver preceding said detector and said rectifier to employ said voltage as a gain control voltage, means to derive a second direct current voltage from the detected output of said detector, and means responsive to said direct current voltages for indicating the resonance condition of the receiver.

3. In a superheterodyne receiver including an intermediate frequency transmission network and a detector coupled thereto, a delayed rectifier coupled to said network and deriving a direct current voltage from rectified intermediate frequency currents which exceed a predetermined amplitude, an automatic gain control connection between a point in said receiver preceding said detector and said rectifier to employ said voltage as a gain control voltage, means to derive a second direct current voltage from the detected output of said detector, means responsive to said direct current voltages for indicating the resonance condition of the receiver, an intermediate frequency amplifier coupling the detector to said

network, and means for applying said control voltage to said amplifier.

4. In a superheterodyne receiver including an intermediate frequency transmission network and a detector coupled thereto, a delayed rectifier coupled to said network and deriving a direct current voltage from rectified intermediate frequency currents which exceed a predetermined amplitude, an automatic gain control connection between a point in said receiver preceding said detector and said rectifier to employ said voltage as a gain control voltage, means to derive a second direct current voltage from the detected output of said detector, means responsive to said direct current voltages for indicating the resonance condition of the receiver, said detector and rectifier being provided by a cathode and two anodes disposed in a single tube envelope, and said resonance indicating means comprising a tube of the fluorescent target type.

5. In combination with a signal network, a delayed automatic volume control circuit operatively associated with the network, an undelayed rectifier operatively associated with the network and having a direct current voltage output which varies directly with signal strength, and means, responsive to control voltage of said delayed circuit and said direct current voltage, for indicating the resonance condition of said signal network.

6. In combination with at least two cascaded signal transmission networks feeding into a detector of the undelayed diode rectifier type, a biased diode rectifier coupled to a point intermediate the two networks and deriving a direct current voltage from rectified signals exceeding a predetermined amplitude, means applying the voltage to said networks as gain control voltage, means deriving a second direct current voltage from the detector which varies with signal intensities below said amplitude, and means responsive to said two direct current voltages for indicating the signal amplitude over a wide range of intensities.

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