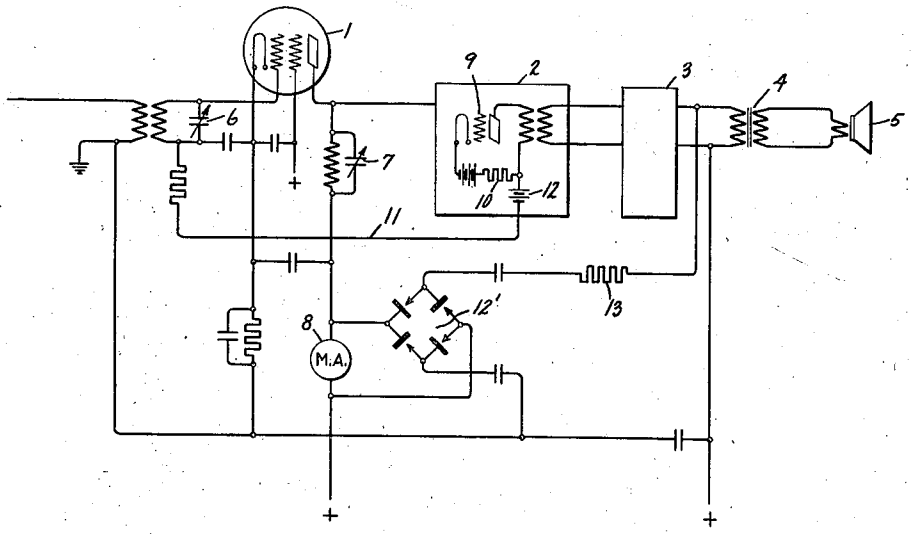
April 13, 1937. S. BECKER 2,077,205

RADIO RECEIVER

Filed May 25, 1934




Inventor:
Stewart Becker,
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Patented Apr. 13, 1937

2,077,205

# UNITED STATES PATENT OFFICE

2,077,205

## RADIO RECEIVER

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Application May 25, 1934, Serial No. 727,439

4 Claims. (Cl. 250—20)

My invention relates to radio receivers, and more particularly to indicating means for use therein.

In radio systems, such for example as those used in connection with municipal police operations, the radio transmitter of the system may be controlled by a police officer located at a police station which may be at a distance from the transmitter. Such an officer is provided with certain controls whereby he starts the transmitter and whereby he subsequently transmits a desired calling signal, as for example, a suitable audible tone which is modulated onto the transmitted carrier wave to call the attention of remote police officers to whom the message is to be transmitted. After these operations have been effected the operator proceeds to transmit the desired message, as by speaking into a microphone.

It is highly desirable that such a police officer be provided with means indicating to him whether or not the transmitter is operating, the intensity of the carrier transmitted, and the type of modulation being produced. One of the objects of my invention is to provide satisfactory means whereby these indications are produced.

A further object of my invention is to provide means whereby all of these indications may be produced by a single visual indicating device which may if desired be located on the operator's desk, or otherwise, in easy range of his vision.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation together with further objects and advantages thereof may best be understood by reference to the following description taken in connection with the accompanying drawing in which the single figure represents an embodiment of my invention.

Referring to the drawing, I have shown therein a portion of a radio receiver including an electron discharge radio frequency amplifier 1, any subsequent radio amplifiers and detector 2 plus an audio amplifier 3 from which the output currents are supplied through a transformer 4 to a loudspeaker 5. The radio frequency amplifier is provided with input and output circuits which are tuned respectively by condensers 6 and 7. The anode of this amplifier is supplied with a positive potential through the inductance of the tuned circuit and a suitable indicating meter 8.

The meter 8 may comprise the tuning meter which is frequently employed in automatic volume control receivers, this meter being connected in the anode circuit of an amplifier the grid bias voltage of which is varied in accordance with the intensity of the received carrier wave. To illustrate one means whereby such bias voltage may be supplied to the amplifier I have indicated in the rectangle 2 an electron discharge device 9 which may be of any suitable type and which operates to rectify the received carrier wave and to produce a direct current in the resistance 10 connected in its anode circuit. This voltage is supplied through a conductor 11 to the grid of the amplifier 1, a battery 12 being included in series with this conductor for the purpose of adjusting the bias voltage during no signal condition to a proper value. When a signal is received it is amplified by the discharge device 1 and supplied, through any intermediate stages which may be employed, to the grid of the discharge device 9 thereby causing an increase in current through the resistance 10. This causes an increase in potential on the resistance 10 with the result that the potential at the right-hand terminal of this resistance approaches the cathode potential which may be at any desired fixed value. In this way the voltage upon the grid of discharge device 1 becomes increasingly negative thereby reducing the amplification of the discharge device 1.

During normal operation of the receiver the variation in gain of the amplifier through the action described may be such as substantially to remove variations in the output signal produced by fading. The variation in intensity of the received signal, however, is indicated by the meter 8 since the stronger the intensity of the received signal the greater the bias supplied to the grid of amplifier 1 and the greater the reduction in anode current in the meter 8. Thus, in the absence of the signal the meter 8 indicates a maximum of current whereas when a carrier wave is received the meter deflects in such a way as to indicate a reduced anode current.

Since this meter responds to the intensity of the carrier wave it also responds to the position of the tuning controls 6 and 7 and thus may be used to indicate the tuning of the receiver.

In the police application of the invention, previously described, the loudspeaker 5 commonly is in a separate room from that in which the operator is located whereby acoustic feed back from the loudspeaker to the microphone is avoided. When he starts the transmitter, however, thereby causing a carrier wave to be received in the re-

ceiver, the meter 8 deflects from its maximum position indicating to the operator that a carrier wave is being received and informing him as to the intensity of the carrier wave. In order that he may also be informed as to whether the carrier wave transmitted by the transmitter is being modulated with the calling tone employed, a portion of the output from the audio amplifier 3 is rectified by means of a rectifier 12' which may be of any suitable type, such for example as rectifiers of the well known copper oxide contact type. The unidirectional output from this rectifier is also supplied to the meter 8 with such polarity that when the received carrier wave is modulated with an audible signal a further reduction in current is produced in the meter. That is, the rectified current produced by rectifier 12' opposes the current flowing in the meter from amplifier 1. Resistance 13 is included in circuit with the rectifier 12 to adjust the value of current supplied to meter 8 thereby to produce additional deflection of the meter upon modulation of the carrier, of desired amount. This resistance also serves to increase the resistance across the output of amplifier 3 thereby to avoid excessive loading of this amplifier.

Thus, the operator when he starts the transmitter notes a deflection of the instrument 8. When he transmits the calling tone he notes a further deflection of the instrument and subsequently when he speaks into the microphone he will note vibrations of the meter 8 in accordance with the words and syllables spoken and the loudness of his voice. In this way these indications are all provided by means of a single meter which may be of a small milliammeter type and which may, if desired, be mounted upon the operator's microphone and in easy range of his vision.

While I have shown a particular embodiment of my invention it will of course be understood that I do not wish to be limited thereto since various modifications may be made therein. I contemplate by the appended claims to cover all such modifications as fall within the true spirit and scope of my invention.

What I claim as new and desire to secure by Letters Patent of the United States, is:—

1. The combination, in a radio receiver, of means to rectify the received carrier wave to produce a low frequency demodulation current, a visual indicating device having a direct current winding, means to supply unidirectional current to ing, means to supply unidirectional current to said winding having a magnitude dependent upon the intensity of the received carrier, means to supply an additional current to said winding having an intensity dependent upon said low frequency demodulation current, current supplied by both of said means flowing in the same turns of said winding, whereby a visual indication is produced by said visual indicating device during reception of unmodulated carrier distinct from that produced during reception of modulated carrier.

2. The combination, in a radio receiver, of means to demodulate the received carrier wave to produce both a direct current dependent in magnitude upon the intensity of the received carrier and a low frequency demodulation current, means to rectify the demodulation current, an indicating device and means to pass said direct current and the rectified current produced by said last means through said indicating device.

3. The combination, in a radio receiver, of a visual indicating device comprising a meter having a deflecting index member, means to cause said index member to deflect from its normal position in a certain direction in accordance with the intensity of the received carrier waves, means to demodulate said carrier, means for rectifying said demodulated carrier and means for passing said rectified current through said indicating device thereby to cause said member to produce a further deflection in said direction in accordance with the intensity of the demodulation currents.

4. The combination in a radio receiver of means to rectify the received carrier wave to produce a low frequency demodulation current, a visual indicating device having a deflecting index member, means for supplying current to said indicating device having a magnitude dependent upon the intensity of the received carrier thereby to produce a deflection of said index member in one direction, means to rectify the demodulation current, and means for passing said rectified demodulation current through said indicating device thereby to produce a further deflection of said index member in the same direction.

STEWART BECKER.

CERTIFICATE OF CORRECTION.

Patent No. 2,077,205. April 13, 1937.

STEWART BECKER.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 3, claim 1, strike out the syllable and words "ing, means to supply unidirectional current to"; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 1st day of June, A. D. 1937.

(Seal)

Henry Van Arsdale
Acting Commissioner of Patents.