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RECEIVER GAIN CONTROL CIRCUITS

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Fig. 1

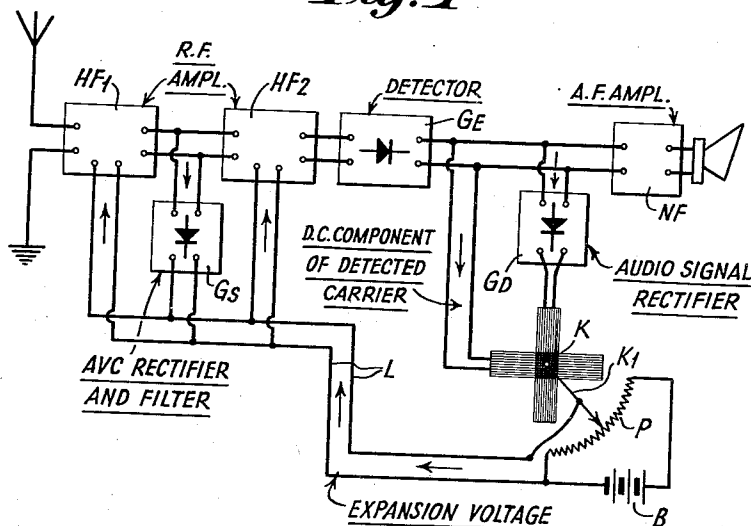
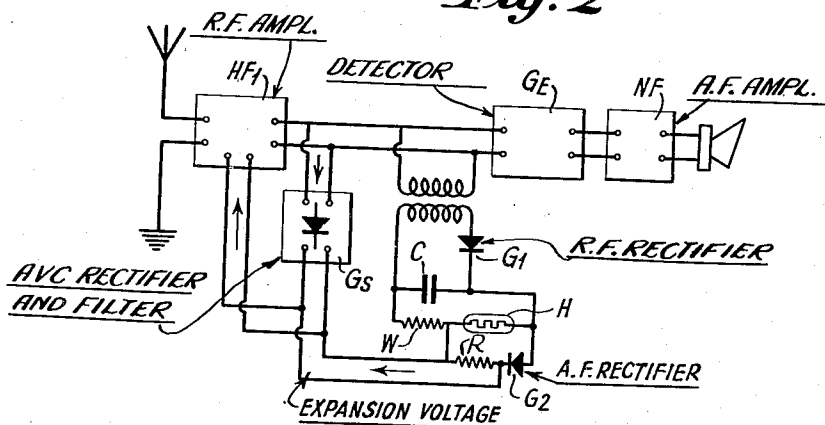


Fig. 2



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3 Claims. (Cl. 250—20)

My present invention relates to a radio frequency receiver with acoustic intensity range regulation means.

The intensity of reproduction is compressed, for instance, in broadcast apparatus in order that the transmitter may not be overloaded during loud passages. It is known that the intensity may be expanded again in the receiver in order that sound reproduction fidelity may be insured which will come more closely to the original production.

Now, if such intensity regulation is to be accomplished in the receiver by action upon the radio frequency amplifier only, the so-called retrogressive regulation may be taken into consideration. If, then, the regulator potential obtained by rectification of the audio energy is fed to the radio amplifier to be governed, there arises the risk of an undesirable over-regulation. It will be noted that with increase of the audio, the amplification or gain of the radio amplifier is raised, and this results in a further increase of the audio in the sense of the desired acoustic regulation. The consequence is that also the control, or regulator, potential experiences a rise, and this results in the radio amplifier gain being raised still further. In other words, there is a real danger and risk for the amplifier being over-shot, or overloaded.

Now, according to this invention the said drawback is avoided in that regulation is effected with a voltage in the radio amplifier corresponding to the modulation percentage. Excessive or over-regulation, above referred to, will then no longer be able to happen, seeing that by an increase in the radio amplification the ratio between the audio amplitude and the radio amplitude (modulation percentage) is not influenced.

The practical application of the basic idea of this invention shall be described in more detail in what follows by reference to the two annexed figures wherein Figs. 1 and 2 show different embodiments of the invention.

Referring to Fig. 1, it will be seen that following the radio amplifier stage HF_1 the regulating rectifier G_s is connected for fading adjustment or compensation. The regulator potentials, after removal of the audio energy by filters, are brought to act upon the radio stages HF_1 and HF_2 . Following the receiving rectifier or detector G_E , the direct current component corresponding to the signal carrier amplitude is fed to one coil of a crossed-coil type of instrument K , while the direct current component corresponding to the audio amplitude, which is

obtained in the rectifier G_D , is impressed upon the other coil of the same instrument. The movable slide K_1 of the instrument slides over a potentiometer P , which is connected across a source of direct current B . Thus, by way of the line L a regulation voltage, which corresponds to the modulation percentage, will be impressed upon the radio amplifiers. The audio amplifier is indicated at NF .

Fig. 2 shows an arrangement which operates without any mechanical means. In this instance, fading compensator potential is impressed upon the radio amplifier HF_1 by way of the rectifier G_s . The radio energy further, is rectified in rectifier G_1 so that across the terminals of the condenser C , which shorts only radio energy, there will prevail a direct current and audio voltage. Resistance W is a normal resistance, whereas H denotes a hot conductor (i. e., a resistance with a negative temperature coefficient), say, a uranium dioxide resistance, across which is acting a constant potential in spite of fluctuating currents. Inasmuch as the said hot conductor, as a result of its thermal inertia, has an adjusting period amounting to several seconds or over, it follows that the audio energy will not be smoothed, but will persist or be preserved. In this arrangement there is thus obtained across the hot conductor H an audio potential which will correspond to the percentage modulation.

The audio voltage arising across H is rectified in the rectifier G_2 , and the direct current voltage obtained across resistance R is used for the regulation of the acoustic intensity range, or volume ratio.

The present invention, as will be obvious, is not confined to the two instances hereinbefore cited; in fact, recourse could be had to any arrangement which will furnish a regulator voltage corresponding to the modulation percentage. It would, also, be feasible to effect regulation of the volume ratio in a radio stage which is not subject to fading compensation.

What is claimed is:

1. A method of expanding the volume range of a receiver of the type including at least one radio frequency amplifier tube, which includes detecting amplified modulated carrier energy to provide a direct current whose amplitude is proportional to carrier amplitude variation, rectifying the modulation voltage component of the detected carrier energy, controlling the gain of the amplifier tube in an increasing sense in response to both said rectified component and said direct current whereby the gain of said amplifier

is dependent on the degree of modulation of the said carrier, and additionally automatically regulating the amplifier gain in accordance with carrier amplitude variation.

2. A radio receiver including at least a high
5 frequency amplifier, a demodulator and an audio
utilization network, automatic volume control
means for controlling the gain of the amplifier in
response to received carrier amplitude varia-
10 tions, automatic volume expansion means for
said receiver comprising means for rectifying the
audio component of demodulated carrier energy,
and additional means, responsive to the joint
action of the rectified audio component and the
15 direct current component of said demodulated
carrier energy, for varying the signal transmis-

sion efficiency through at least one of said re-
ceiver networks.

3. In combination, in a radio receiver of the
type including a high frequency amplifier, an
automatic volume control circuit responsive to
carrier amplitude increase for varying the am- 5
plifier gain in a decreasing sense, an automatic
volume expansion circuit, responsive to the de-
gree of modulation of received carrier energy, for
varying the amplifier gain in an increasing sense, 10
said expansion circuit including a rectifier of the
carrier energy, a second rectifier of the modu-
lation component of the rectified carrier energy,
and means responsive to the unidirectional cur-
rent outputs of both rectifiers. 15

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