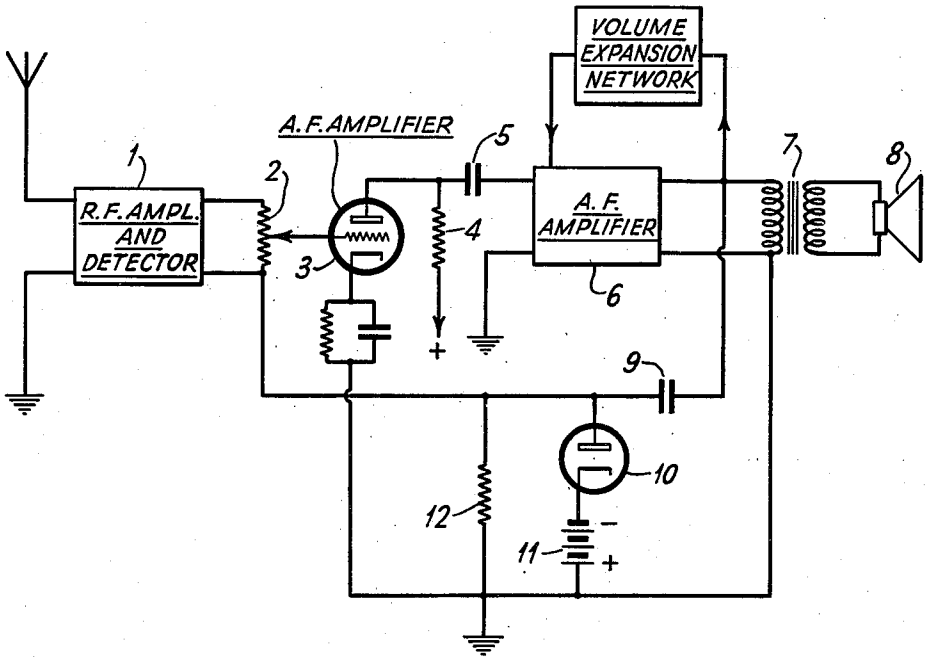
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VOLUME CONTROL CIRCUIT

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VOLUME CONTROL CIRCUIT

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1 Claim. (Cl. 179—171)

The present invention relates to a radio receiver with manual volume control, and preferably with contrast control, wherein the amplification by the low frequency amplifier is controlled, as is well known, in such manner that in the reproduction the ratio between soft and loud passages (the ratio between pianissimo and fortissimo) is increased.

When such an apparatus is adjusted by means of the manual volume control at a moment when a comparatively soft passage is reproduced with a sufficient sound intensity, the low frequency amplifier of the apparatus will, in general, be overloaded when loud passages occur. This overloading is still further increased when there is contrast control.

According to the present invention, in order to remove this drawback, there is provided a device having threshold sensitiveness which, if the amplitude of the low frequency oscillations exceeds a predetermined value, is actuated, and which reduces the amplification of the apparatus by means of an amplification control.

According to one embodiment, the said device controls the bias voltage of at least one electrode of at least one of the amplifying tubes of the apparatus. The control is in this case such that when there occurs a loud passage which causes distortion, the amplification is reduced almost immediately, and is restored comparatively slowly, for example not until after one minute, to the initial value.

The invention will be explained more fully with reference to the accompanying drawing which represents diagrammatically, by way of example, a radio receiver according to the invention. That portion of this apparatus which precedes the low frequency amplifier is denoted by 1. The rectified low frequency oscillations are supplied, through a manual volume control device 2, to the grid of a low frequency amplifying tube 3. The amplified low frequency oscillations set up across a resistance 4 in the anode circuit of the tube 3 are supplied through a condenser 5 to the network 6 of the low frequency amplifier. The output circuit of the latter includes a transformer 7 whose secondary winding is connected to a loudspeaker 8. The low frequency amplifier 6 may be provided with contrast control which is not shown in detail in the drawing. The "Volume expansion network" shown in the drawing is schematic, and is well known to those skilled in the art.

The low frequency oscillations occurring in the output circuit of the amplifier 6 are supplied through a condenser 9 to a rectifier 10. In the cathode lead of this rectifier is located a source 11 of bias voltage so that it is not until the amplitude of the low frequency oscillations in the output circuit of the low frequency amplifier 6 exceeds the highest value permissible which corresponds to the value of the source of voltage 11, that a rectified voltage is produced across a resistance 12. This voltage is applied to the grid of the amplifying tube 3 in such manner that the amplification is decreased to a value at which the amplifier is not overloaded.

The rectifier 10 is so chosen that when the threshold value is surpassed the current flowing through the rectifier charges the condenser 9 very rapidly so that an almost immediate control of the amplification of tube 3 is obtained. The condenser 9 and the resistance 12 are so chosen that the discharge of the condenser 9 takes place comparatively slowly through resistance 12, so that, for example, only after one minute the amplification by the tube 3 is restored to the initial value.

What is claimed is:

In combination with a source of audio voltage, an audio amplifier tube having at least a cathode, control grid and output electrode, means connecting said cathode to a point of relatively fixed potential, a resistive path connected across said source, a resistor in series with said path and connected to said point, a slider element connecting said grid to said path to provide a manually adjustable volume control device, an audio utilization network connected to said output electrode, an audio volume expansion network operatively associated with said utilization network, means to protect said amplifier against overloading due to audio voltages above a predetermined amplitude produced by action of said expansion network, said last means comprising a rectifier device in circuit with said resistor to develop across the latter unidirectional voltage for biasing said grid in an amplifier gain-reducing sense, means for maintaining the rectifier ineffective for audio voltages below said amplitude, a condenser coupling said utilization network to said rectifier, said rectifier being constructed to charge said condenser relatively quickly in response to said audio voltage exceeding said amplitude, and said resistor and condenser being so chosen as to prevent rapid discharge of said condenser.

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