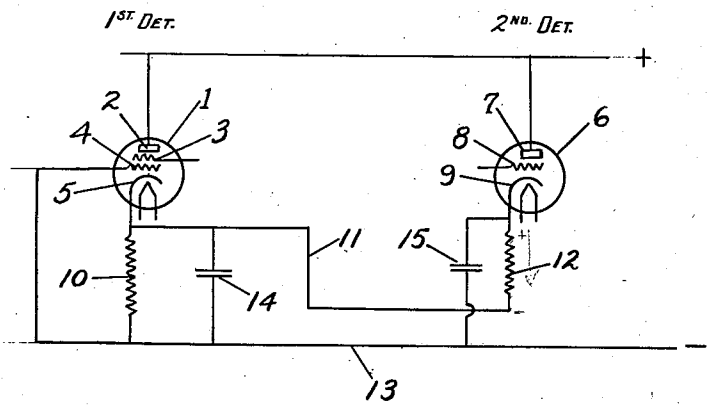
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AUTOMATIC OVERLOAD CONTROL IN RADIO SETS

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AUTOMATIC OVERLOAD CONTROL IN RADIO SETS

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1 Claim. (Cl. 250—20)

My invention is directed to the field of overload control in radio sets, of which volume control is a part. The general purposes of overload control are to prevent the rise of the value of the input to any tube or stage beyond the permissible maximum for full amplification without distortion. It is well known that the output curve of a tube plotted against the input shows a rise with the input until a maximum value is reached, beyond which further increases in the input current will not produce a corresponding increase in the output, but frequently produce gradually decreased output coupled with distortion. Overload control is designed to prevent the rise of the input voltage as respects any given tube beyond that value necessary to produce the maximum output without distortion. A number of ways of controlling volume are applicable and have been applied to different parts of radio sets; but control applied to a tube or stage, while effective in preventing the over-loading thereof, will not cause the set to operate at maximum efficiency so long as a preceding tube or stage is without such protection and is likely to be overloaded. Thus it is most effective to apply volume control to a radio set in such a way as to be effective upon that tube or stage which has relatively the lowest overload value.

My invention is particularly applicable to the prevention of overload in receivers of the superheterodyne or double detection type, and one of its primary objects is the prevention of the overloading of the second detector. This becomes particularly important in receivers where the gain is high between the first detector and second detector. Under these circumstances the second detector is much more easily overloaded than the first detector and the point of maximum power output is sharp with output falling off rapidly on either side. Another object of my invention is the increase of the overload point of the first detector due to the increase in grid bias.

These and other objects of my invention which will be set forth hereinafter or will be apparent to one skilled in the art upon reading these specifications, I accomplish by that certain construction and arrangement of parts of which I shall now describe an exemplary embodiment, reference being made to the drawing which forms a part hereof.

In this drawing I have illustrated diagrammatically the connections necessary to the practice of my invention without illustrating the circuits of a complete radio set, since these circuits will not otherwise differ from that which is known in sets of the superheterodyne or double detection type. I have shown a detector tube 1, which will be understood as being the first detector of a double detection system. It has a plate 2, a grid 3, and a control grid 4. A filament or other electron emitting device 5 is shown, and the tube may be classed as a tetrode. I have also shown a second tube 6 having a plate 7, a grid 8, and a filament or other electron emitter 9. This tube will be understood as the second detector of a double detection system. I will refer to the filaments or other electron emitting devices in both types as cathodes, and I have shown in series with the cathode of tube 1 a resistance 10. I have likewise shown a lead 11 connecting the cathodes of the first and second detectors. The bias for the first detector is obtained from the voltage drop across the cathode resistance 10, due to the flowing of the anode current of the first and second detectors through it. A resistance 12 may be inserted in the lead 11 if, as is usually the case, the bias for the second detector 6 is desired to be greater. The resistance 10 is connected to the grid return 13, which is usually the ground or chassis of the set, and it is bridged by a capacity 14. A second capacity 15 is connected between the cathode 9 of the second detector and the lead 13 as shown.

An increase in the signal of the second detector causes the anode or plate current thereof to increase. This current flowing through the resistance 10 tends to increase the bias of the first detector 1. This, in turn, decreases the amplification of the tube 1 until a point of balance is obtained, and it will be clear that by this means overload of the tube 2 will be prevented. My invention is applicable to radio sets employing double detection, and also to sets in which the anode current of the controlling tube is approximately of the same magnitude, or is larger than the anode current of the controlled tube. In the embodiment of my invention shown the tube 6 is the controlling tube and the tube 1 the controlled tube.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:—

In a radio receiver having a plurality of detector tubes, a detector tube having an anode circuit, and a grid circuit including a cathode resistance whereby a grid bias is obtained, a second detector having an anode circuit including a direct connection between the cathode of said second detector and the cathode of said first detector, whereby said cathode resistance of said detector tube is located in said anode circuit for said second detector tube, and a resistance in series in said connection for varying the bias of said second detector.

LOUIS F. WILLGING.