

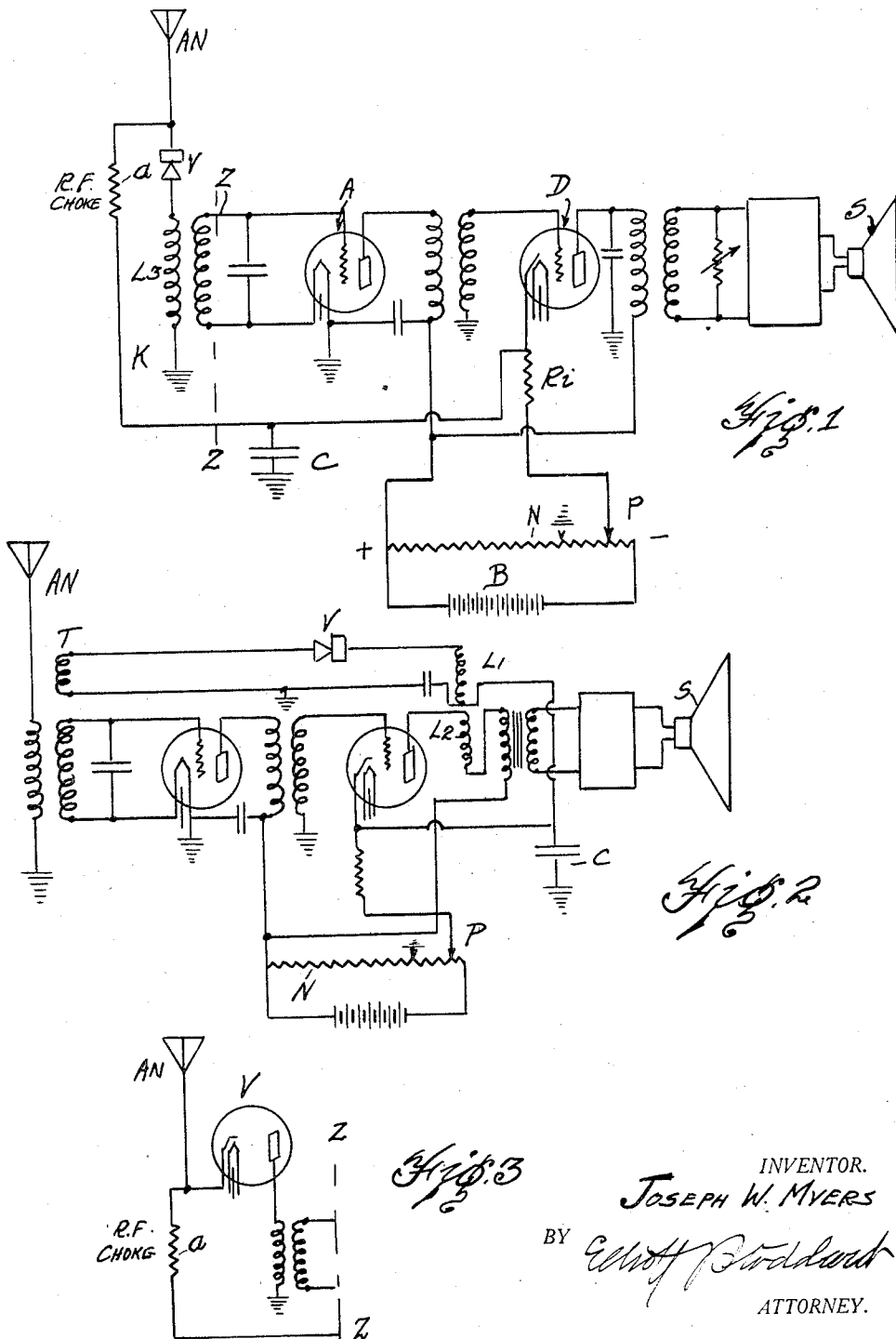
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APPARATUS FOR CONTROLLING THE INTENSITY OF ELECTRICAL OSCILLATIONS

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APPARATUS FOR CONTROLLING THE INTENSITY OF ELECTRICAL OSCILLATIONS

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2 Claims. (Cl. 250—20)

My invention relates to a method and apparatus for controlling the intensity of electrical oscillations in a circuit and an object of my invention is to maintain a substantially constant signal level output of a radio receiver with a varying signal strength in the antenna.

Obviously my method may be used whenever it is desired to maintain a practical constant high frequency voltage which would otherwise be subject to changes in intensity.

In my related copending application filed April 22, 1929, Serial Number 357,019, I show a method whereby an electron valve, which may be a tube or crystal, may be caused to damp a high frequency circuit across which it is shunted, when an unbalanced potential derived from an output portion of the circuit is applied to the electron valve.

In this application I particularly show how a similar electron valve may be used in series circuit, in a high frequency portion of a network and a substantially constant output obtained with a varying intensity of the input.

I also show how my method may control regeneration in a receiver to maintain a substantially constant output.

In the accompanying drawing:

Figure 1 is a diagrammatic view of the apparatus used when my method is applied to a simple receiver.

Figure 2 is a similar view of the apparatus used when my method is employed in an automatic regeneration control apparatus.

Figure 3 is a modification of the apparatus at the left of the line $z-z$, Figure 1, when a two element vacuum tube is substituted for the crystal.

V is an electron valve, which may be a carborundum crystal, in series with the antenna AN and the primary L^3 of the first R. F. transformer.

A is an R. F. amplifier and D is a detector tube. The output of the detector may be coupled to a conventional audio system and reproducer S.

The necessary plate supply voltages are supplied from the battery B.

As shown, R_i is a resistance in series with the cathode and battery B of the detector tube one of the purposes of which is for the purpose of getting relative grid-to-cathode bias necessary for detection by the C-bias method. The other purpose is to obtain a variable operating voltage.

The cathode of the detector is here connected through an R. F. choke a to the antenna AN to bias one of the electrodes of the electron valve, or crystal, to the same potential as the detector cathode.

The opposite side of the crystal V is at ground potential of the receiver which has been adjusted by the potentiometer N so that with no signal in the antenna there will be a small potential difference between the two electrodes of the crystal, which, of course, will cause a current through the crystal, if the crystal has been placed in the circuit in the proper manner. A crystal inserted in series with the antenna of a radio, will operate perfectly if the crystal is given a one or two volt bias from a battery, any rectifying effect would tend to turn the alternating current into a pulsating current of the same frequency and general characteristic as the alternating current.

This current through the crystal will cause it to have a comparatively low resistance for any high frequency oscillations that may now come in on the antenna. The resistance of a crystal varies inversely with the applied voltage at a very high rate. With a high plate current in D the applied voltage would be diminished and the resistance increased.

If now a strong signal should come in on the antenna, which is above the desired maximum intensity, the strong signal will cause an increased current flow through detector D plate circuit, which will increase the potential drop across R_i and this increase in potential will also apply to the antenna side of crystal V which brings it more nearly to the potential of the other side of the crystal, and thus increases the resistance of the crystal and attenuates the current since the conductor K maintains the detector cathode, or high side of R_i , and the antenna side of crystal V at the same potential.

This increase in potential tends to make the antenna terminal of the crystal more nearly the same potential as the ground side of the crystal and thus the potential difference that has been existent is reduced. This reduction in the potential on the crystal causes its effective resistance to the high frequency signal energy coming in from the antenna to increase. Thus, less energy gets through to the amplifying tube A and consequently the output is not permitted to be substantially increased.

It is understood, of course, that there is a slight increase, since a slight increase is necessary to balance the potential on the crystal V to an increasing degree as the signal intensity in the antenna increases.

Thus in my system here shown V acts as a variable resistance in the antenna circuit and its resistance automatically increases as the signal

intensity in the antenna increases, with a resulting substantially constant output.

In the form shown in Figure 2, T is a feed-back coil, V is a crystal and L¹ a coupling coil for coupling the feed-back circuit to the plate circuit of the detector through its inductive coupling with L². The method of operating is substantially the same as above described with reference to Figure 1, except the crystal V now controls feed-back energy to the input, instead of controlling energy coming in on the antenna.

It is obvious that as the detector output increases the resistance of the crystal will increase and the feed-back will diminish.

Figure 3 shows a form of the device, in which a two element vacuum tube is substituted for the crystal V. In either case whether a crystal is used or the two element vacuum tube, as shown in Figure 3, is substituted for the crystal a slight change in the bias of the interposed part will greatly affect the current carrying capacity.

What I claim is:

1. The combination of a circuit for an oscil-

lating current, having an amplifier and a rectifier in said circuit, a feed-back coupling between the delivery side of said amplifier and rectifier and the input side of the same, an electron valve whose resistance depends upon the potential differential of its electrodes, said valve being included in series with said feed-back circuit and means for supplying to said valve a controlling potential that is derived from and is a function of the output of said circuit so that it shall determine the resistance of said valve.

2. In a regenerative high frequency signalling system, having a feed-back circuit, an electron valve having an anode and a cathode in series in said circuit, means for biasing the anode and cathode of said valve to permit the passage of feed back currents, a high frequency rectifier in said system and connected to the electrodes of said valve so as to oppose the normal biasing of said valve and to cause an increase in its resistance upon an increase in the output of the said system.

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