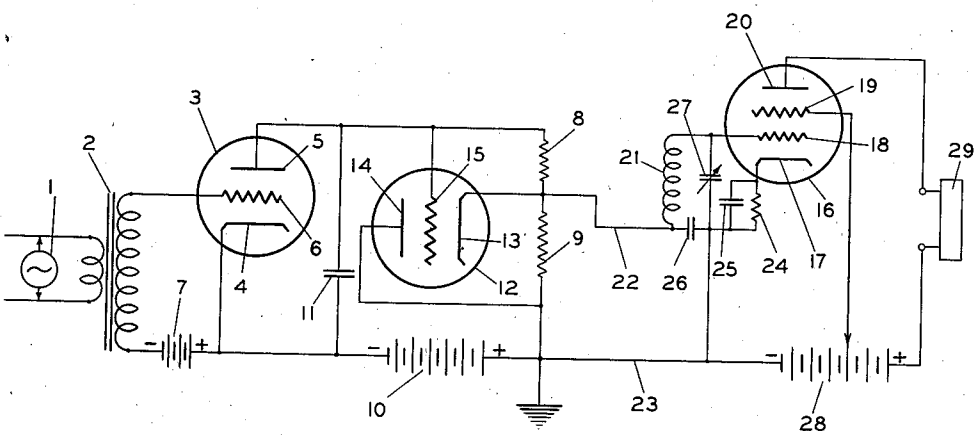
June 8, 1937. W. C. LANE, JR 2,083,501

AUTOMATIC GAIN CONTROL SYSTEM

Filed May 28, 1935



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Patented June 8, 1937

2,083,501

UNITED STATES PATENT OFFICE

2,083,501

AUTOMATIC GAIN-CONTROL SYSTEM

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Application May 28, 1935, Serial No. 23,823

2 Claims. (Cl. 250—20)

This invention relates to gain-control systems and with particularity to an improved method and means for automatic volume control in a sound reproducing or similar signalling system.

A principal object of the invention is to provide an automatic volume control arrangement for wave transmission or reproducing systems, which arrangement possesses a rapid response to transmission level or signal level variations.

Another object is to provide an automatic volume control arrangement employing a gain-control bias resistor for an amplifier tube in conjunction with a discharge tube to expedite the "recovery" of the gain-control.

A feature of the invention relates to the use of a condenser-resistor combination for controlling the gain of an amplifier tube, in conjunction with an electric discharge tube for expediting the discharge of the condenser to restore the system to normal gain level.

A further feature relates to the novel organization, arrangement and relative proportion of parts which go to make up a simple, efficient and rapidly acting gain-control arrangement.

Other features and advantages of the invention not specifically enumerated will be apparent after a consideration of the following detailed description and the appended claims.

While the invention will be described herein as embodied in one particular type of signalling system and employing specific kinds of apparatus, it will be understood that the invention is not necessarily limited thereto, but that this is done merely for purposes of explanation. The drawing shows in schematic diagrammatic form a typical wave repeating system embodying the invention.

Referring to the drawing, the numeral 1 represents schematically any well-known source of signalling current such for example as a source of telephone currents, telegraph currents or the like. These currents are impressed through the intermediary of transformer 2 upon the rectifying device 3 preferably, although not necessarily, of the three electrode electron-emitting type. Thus as shown, device 3 comprises an evacuated envelope containing an electron-emitting cathode 4, an anode 5, and a control-grid 6. The incoming signal waves are impressed across the cathode 4 and grid 5 preferably through the grid biasing source 7, polarized as shown. The output circuit for tube 3 may be traced from the anode or plate 5, resistor 8, resistor 9, thence through the anode potential source to the cathode 4. Preferably a by-pass condenser 11 is shunted around the resistors 8, 9, and source 10, to divert all but the signalling variations from the said resistors and from the said source. Preferably also, sources 7 and 10 are chosen so that the tube 3 acts on that portion of its characteristic curve where it functions as a "plate circuit rectifier."

Associated with resistors 8 and 9 is another tube 12 having an electron-emitter 13, an anode or plate 14, and a discharge controlling grid 15. The tube 12 may be of the gas or vapor filled type such as a "Thyratron", although preferably it is of the high vacuum type similar to tube 3. The anode-cathode discharge space of tube 12 is shunted across resistor 9, while the control-grid 15 is connected to one end of resistor 8 the opposite end of said resistor being connected to cathode 13. Preferably the resistors 8 and 9 are so proportioned that the ratio of resistance 9 to resistance 8 is approximately equal to the amplification factor of tube 12.

Also associated with resistor 9 is the amplifier tube 16. While the drawing shows tube 16 of the so-called shield-grid type comprising an electron-emitter 17, a control-grid 18, a shield-grid 19, and an anode 20, any other well-known form of amplifier tube may be employed. The signal input circuit for tube 16 may be traced from the control-grid 18 through the coupling coil 21, conductor 22, resistor 9, conductor 23, thence in parallel through the biasing resistor 24 and by-pass condenser 25 to the cathode 17. Shunted across the resistor 9 is a condenser 26. If desired the inductance 21 may be provided with a variable tuning condenser 27 to tune the input circuit of the tube 16 to a particular frequency or group of frequencies. The shield-grid 19 may be connected to a suitable potential tap on the direct current source 28, and likewise anode 20 may be connected through a suitable load device 29 to the source 28.

When signals of the desired level are applied to the input circuit of tube 3, there flows a predetermined magnitude of rectified current through the resistors 8 and 9. The resistors 8 and 9 and the condenser 26 are so proportioned that this normal rectified current flowing through the tube 3, charges condenser 26 to a predetermined potential which acts to control the static bias of grid 18 and consequently the level of the output from tube 16. During this normal condition of the amplifier the potential drop through resistor 8 biases the grid 15 to cut-off, that is to say, so that substantially negligible space current flows between cathode 13 and anode 14. Thus under these conditions the drop through

resistance 9 is a function substantially entirely of the rectified plate current of tube 3. Should the signal level on grid 6 decrease or be removed the current flow through resistor 8 likewise decreases and consequently the negative bias on grid 15 is reduced and the plate resistance of tube 12 is likewise reduced. Because of this reduction of plate resistance of tube 15 and because the anode-cathode space of tube 12 is in shunt to resistor 9 and also in shunt to condenser 26, the latter condenser discharges through the parallel combination of the resistor 9 and the anode-cathode space of tube 12. Ordinarily the resistor 9 is of a relatively high value and in the absence of tube 12 the discharge of condenser 26 is materially slowed down. However, by providing the tube 12 in parallel to the resistor 9 the discharge time of condenser 26 may be made very much lower thus insuring rapid response in the gain-control bias of the amplifier tube 16.

Various changes and modifications may be made herein without departing from the spirit and scope of the invention.

What is claimed is:

1. In a wave signalling system, a first thermionic tube upon which incoming waves are impressed, a pair of resistors in the anode circuit of said tube, a second thermionic tube having its control-grid biased by the potential drop through one of said resistors the other of said resistors being in the anode-cathode circuit of said second tube, a third thermionic tube, a condenser for applying a predetermined static bias to the grid of said third tube, a charging circuit for said condenser including the second resistor, and a discharge circuit for said condenser including the anode-cathode space of said second tube.

2. In a wave signalling system a rectifier tube upon which incoming waves are impressed, a grid-controlled discharge tube, an amplifier tube, a pair of resistors connected in series between the anode and cathode of the rectifier tube, one of said resistors being connected between the cathode and grid of said second tube, the other of said resistors being connected between the cathode and anode of said second tube, a condenser for controlling the static grid bias of the third tube, and means connecting said other resistor in parallel with said condenser.

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