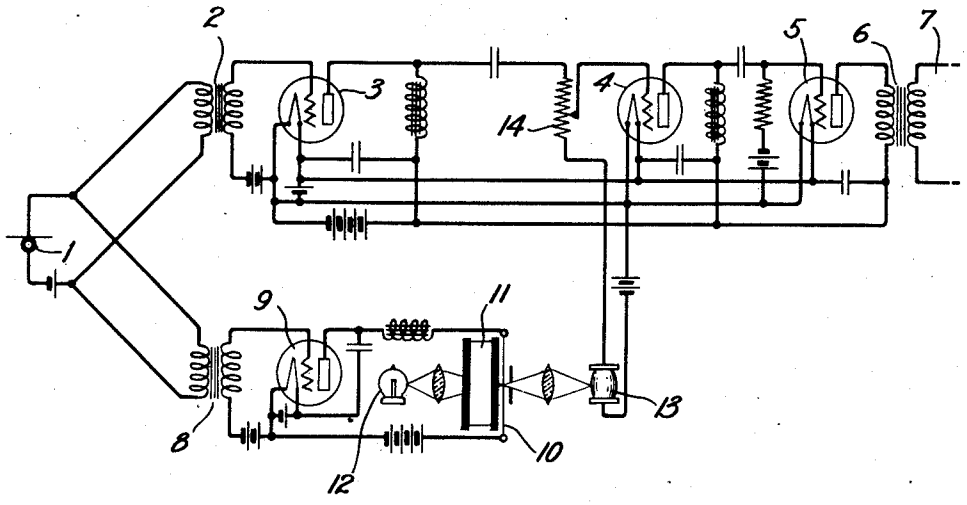
Nov. 6, 1928. 1,690,224

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WAVE TRANSMISSION SYSTEM

Filed June 1, 1926



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Patented Nov. 6, 1928. 1,690,224

UNITED STATES PATENT OFFICE.

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WAVE-TRANSMISSION SYSTEM.

Application filed June 1, 1926. Serial No. 112,851.

This invention relates to wave transmission systems, and particularly to means for controlling the energy level of transmission in such systems.

An object of the invention is to adjust the energy level in a wave transmission system in response to changes in the intensity of the transmitted waves. Other objects of the invention are to stabilize the operation and facilitate the maintenance of such systems.

In radio broadcasting and public address systems, where music and speech are transmitted to a distant point over telephone or other transmission circuits, it is desirable to maintain the transmitted waves at a constant energy level. This has usually been accomplished by connecting a volume indicator across the outgoing circuit to indicate changes in the energy level of the transmitted waves. An operator observes the deflection of the volume indicator and manually adjusts the gain of an amplifier in the outgoing circuit to maintain the desired energy level.

The present invention provides an automatic system of volume control which requires practically no maintenance and also eliminates the element of inaccuracy which usually exists in manually controlled systems. According to the invention an impedance element, such as a selenium cell, responsive to radiant energy, is included in the input circuit of the transmitting amplifier. The resistance of the selenium cell is controlled by means of a light valve which permits light of varying intensity to fall on the cell in response to changes in the energy level of the transmitted waves. Changes in the energy level of the transmitted waves thus produce a compensating change in the gain of the amplifier which tends to maintain the outgoing waves at a fixed energy level.

The invention will be described in connection with the accompanying drawing which is a diagrammatic illustration of a transmission system embodying the invention.

In the drawing, a microphone 1 is coupled to a multi-stage amplifier by means of a transformer 2. The amplifier comprises a plurality of three-electrode space discharge tubes 3, 4 and 5 connected in tandem, and provided with the usual sources of electrical energy to properly polarize the grid electrodes, to heat the cathodes, and to furnish anode-cathode current, respectively. The output circuit of the space discharge tube 5 is coupled by means of a transformer 6 to an outgoing circuit 7 whence the amplified waves are transmitted to a distant station.

The microphone 1 is also coupled by means of a transformer 8 to a branch circuit which is utilized for controlling the energy level of the transmitted waves. This circuit includes a rectifier 9 which may be of the type disclosed in Patent No. 1,523,827 to E. L. Nelson, issued January 20, 1925, having a substantially infinite input impedance so that it will absorb a negligible amount of energy from the signaling circuit. The grid of the rectifier is so polarized that the steady output current increases in response to increases in the input current.

The output circuit of the rectifier 9 is connected to the movable string 10 of a light valve 11 which may be of the type disclosed in a copending application of H. E. Ives, Serial No. 711,755, filed May 8, 1924. The displacement of the string 10 causes a variation in the quantity of light from a source 12 falling on a selenium cell 13, in accordance with variations in the current received from the signaling circuit. The light valve is so arranged that an increase in the current in the string 10 causes an increase in the quantity of light falling on the selenium cell. The resistance of the selenium cell decreases as the quantity of light falling on the cell increases.

The selenium cell 13 is connected in series with a potentiometer 14 in the grid circuit of the amplifier tube 4, and hence the proportion of the voltage across the potentiometer 14 decreases as the resistance of the selenium cell decreases. Variations in the voltage across the potentiometer produce corresponding variations in the gain of the amplifier, the gain of the amplifier decreasing, for example, when the resistance of the selenium cell decreases. It will thus be seen that an increase in the current in the input circuit of the rectifier 9 will produce a compensating decrease in the gain of the amplifier in the signaling circuit, while a decrease in the current in the input circuit of the rectifier will produce a compensating increase in the gain of the amplifier. As a result of this action the gain of the amplifier will vary gradually and continuously in accordance with variations in the amplitude of the current received from the signaling circuit.

The speed of operation of a selenium cell

is dependent to a certain extent upon the physical dimensions of the selenium material and by adjusting the gain of the amplifier in accordance with variations in the impedance of a selenium cell, the speed of operation of the system is slow enough to prevent sudden changes in the gain adjustment which might affect the quality of the transmitted speech or music, and serves to adjust the gain of the amplifier by an amount which will maintain a satisfactory output level.

The invention is also capable of other modifications and adaptations not specifically referred to but included within the scope of the appended claims.

What is claimed is:

1. A wave transmission system comprising a source of electrical waves of varying amplitude, a transmission medium, a space discharge amplifying device having an input circuit connected to said source and supplied with said electrical waves, and having an output circuit connected to said medium, an element in said input circuit the impedance of which to electrical currents varies in accordance with the quantity of radiant energy impressed thereon, and means for supplying to said element radiant energy varying directly in accordance with the amplitude of said electrical waves, whereby the energy level of the electrical waves impressed on said medium by said amplifying device is controlled.

2. A wave transmission system comprising a source of electrical waves of varying amplitude, a transmission medium, a space discharge amplifying device having an input circuit connected to said source and supplied with said electrical waves and an output circuit connected to said medium, a selenium cell in said input circuit, a source of light waves, and means automatically varying the quantity of light from said source falling on said cell and thus the impedance thereof in accordance with the varying amplitude of said electrical waves to adjust the gain of said amplifying device in such manner as to maintain the energy level of the electrical waves supplied to said medium substantially constant.

3. In a wave transmission system, a source of electrical waves of varying amplitude, a transmission medium over which said waves are to be transmitted, and means for maintaining the energy level of the waves supplied to said medium substantially constant comprising a space discharge device having a cathode an anode and a control electrode, and an input and an output circuit, said source of electrical waves being coupled to said input circuit, said transmission medium being coupled to said output circuit, an element in said input circuit in series with said cathode and said control electrode, said element having an impedance which is inversely proportional to the quantity of radiant energy impinging thereon, and means for supplying said element with radiant energy varying directly in accordance with the amplitude of the electrical waves from said source impressed on said space discharge device.

In witness whereof, I hereunto subscribe my name this 28 day of May A. D., 1926.

EDGAR W. GENT.