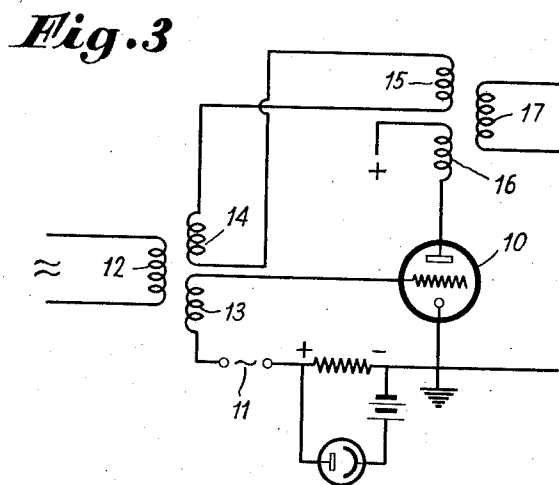
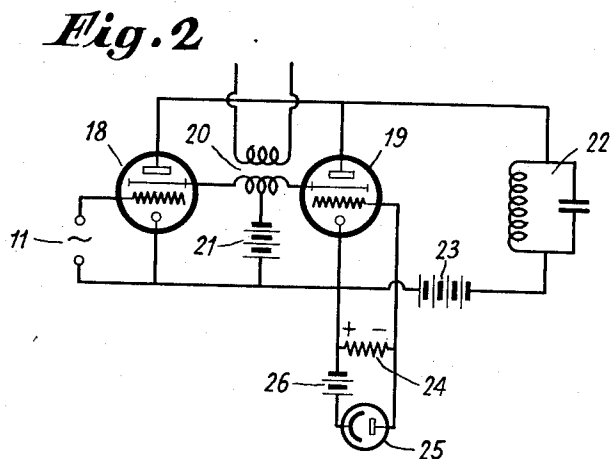
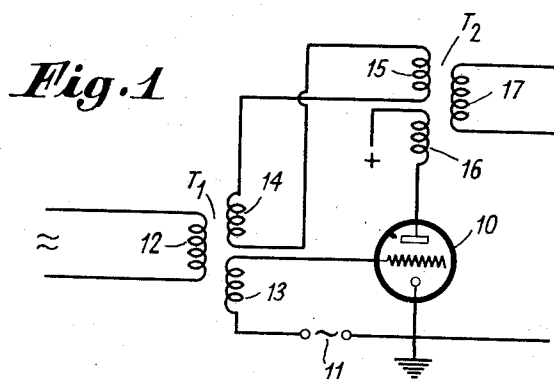


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SIGNALING SYSTEM
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SIGNALING SYSTEM

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This invention relates to signaling systems, and in particular to carrier wave transmission systems having amplitude modulated, variable carrier amplitude characteristics such as used in television systems, wherein it is desired to transmit both the average density of pictures together with the instantaneous density of each elemental area of the picture.

The transmission of the average density of television pictures by means of carrier oscillations according to the present invention presupposes a modulation arrangement wherein is produced the difference between two alternating currents of the carrier frequency and wherein one of the alternating currents is modulated according to the densities of the image points by influencing the amplification of a discharge vessel.

The drawing illustrates practical embodiments of my invention in which Fig. 1 shows schematically the principal features of a signaling system in accordance with my invention.

Fig. 2 shows a modification of the embodiment of Fig. 1 wherein a balanced modulator is used, and

Fig. 3 shows schematically another modification of Fig. 1.

An example of a modulation arrangement of this type is represented in Fig. 1 of the drawing. 10 denotes a triode in whose grid circuit is disposed a modulation potential source 11. Provided are further two transformers T_1 and T_2 , the primary 12 of transformer T_1 being fed with the carrier frequency. The secondary 13 of this transformer is connected in the grid circuit of tube 10 while secondary 14 is joined to primary 15 of transformer T_2 . A second primary 16 of this transformer is connected in the plate circuit of tube 10 while in secondary 17 is produced the modulated carrier oscillation.

The arrangement according to Fig. 1 operates in the manner that winding 15, traversed by the unmodulated carrier frequency current, acts in opposite sense with respect to winding 16 which is traversed by the modulated carrier frequency current with the result that in winding 17 is produced a carrier frequency oscillation modulated in a higher degree.

In accordance with the invention, the average density of the television picture is to be transmitted in the manner that one of the two alternating currents is varied prior to the differentiation in accordance with the average density.

An embodiment of the invention is shown in Fig. 2 of the drawing, whereby one of the alternating currents is varied in accordance with

the density of the average points, while the other is varied corresponding to the average density. As may be seen, both branches that carry the alternating currents to be subtracted from each other contain each a screen-grid tube marked 18 and 19 respectively. In the screen-grid circuit of tube 18 is impressed modulation potential 11 that corresponds to the image densities and both screen grids of both tubes are impressed through transformer 20 with a high-frequency alternating potential in phase opposition. The mid-point of the secondary of transformer 20 is connected with the cathodes of both tubes through a direct potential source 21 that furnishes the stationary or quiescent potential for the screen grids. In the joint plate current branch of both tubes 18 and 19 is provided a current resonance circuit 22 and a plate potential source 23 common to both tubes. The screen grid of tube 19 is connected to a resistance 24 wherethrough flows the current of a photocell 25 whose positive potential source is marked 26.

Arrangement according to Fig. 2 operates in the manner that the plate alternating currents of the carrier frequency equalize one another in the joint plate current branch as long as the control grids of both tubes are impressed with the same direct current potential. However, just as soon as there appears in the control grid circuit of tube 18 a direct potential, different from that of control grid circuit of tube 19, a potential of carrier frequency is developed in current resonance circuit 22 whose amplitude depends on the potential difference of the two control grids. If the control grid circuit of tube 18 is impressed with an alternating potential 11, the potential appearing in current resonance circuit 22 is modulated with the potential 11. Now, in order to control the average carrier value, around which the amplitudes vary and which corresponds to the average image density in the transmission of a television picture, the potential of control grid of tube 19 is to be varied according to invention corresponding to the average picture density. For this purpose, the cathode of photocell 25 is to be illuminated by the entire picture to be televised resulting in a potential drop at resistance 24 which will be the greater, the greater the average density of the picture to be televised. The average potential difference of the two control grids is increased by this potential so that the average value of the carrier amplitude at resonance circuit 22 is likewise increased in proportion to the increase in the average picture density.

An embodiment of invention whereby the same alternating current is varied by the modulation potential corresponding to the image point densities and by the potential corresponding to the average density is shown in Fig. 3. This circuit arrangement corresponds to that of Fig. 1 with respect to the circuits of transformers T₁ and T₂, as well as with respect to the location of modulation potential 11 in control grid circuit of tube 10. The arrangement according to Fig. 3 operates in the manner that no carrier frequency potential is produced at secondary 17 as long as no modulation potential exists in grid circuit of tube 10 and as long as the potential difference of the photocell current is equal to zero at resistance 24. When, however, a modulation potential 11 appears, the secondary 17 will furnish a modulated carrier frequency potential whose average value, corresponding to the average image density, will rise and fall with the potential drop at resistance 24. Hence, if photocell 25 is illuminated with the light produced by the entire picture to be televised, the average value of the carrier amplitude at secondary 17 will rise with an increase in above illumination, that is with an increase of the average image density, and vice versa.

In the description of Figs. 2 and 3 it was assumed that to the black image spots was to be coordinated the carrier amplitude value zero, while to the lightest image spots the maximum carrier value was to be coordinated. In contrast thereto, the carrier amplitude may be caused to decrease with increasing brightness. Moreover, the carrier wave may be caused to decrease to a definite final residual amount only, for instance to one third of the maximum possible value and this residual amount may be used for instance for transmission of synchronizing signals in the line and/or image pauses.

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

1. In a television system, the method of transmission of signals representative of an image of an object to be transmitted, which comprises the steps of developing carrier wave energy, transmitting the carrier wave energy over two different paths, obtaining the difference between the energies transmitted over the said two paths, regulating the difference of the energy in accordance with the average light value of the object whose image is to be transmitted, and varying the regulated energy in accordance with the instantaneously changing light values of the elemental areas of the object of which the image is to be transmitted.

2. A transmission system comprising a source of carrier wave energy, means to transmit energy from the source over two different paths, means to obtain the difference between the energies transmitted over the said two paths, means to regulate the difference of energy in accordance with the average light value of the object whose image is to be transmitted, and means to vary the regulated energy in accordance with the instantaneously changing light values of the elemental areas of said object of which the image is to be transmitted.

3. A television signaling system for transmitting energy representative of an object whose image is to be transmitted, comprising an electrical bridge arrangement having a plurality of

arms, means to supply carrier wave energy to said bridge whereby the difference in energy transmitted over two of the arms of the bridge is obtained, means to unbalance one of the arms of the bridge in accordance with the average light value of the object, and means to vary one of the other arms of said bridge in accordance with the instantaneously changing light value of the elemental areas of the object whose image is to be transmitted.

4. The method of transmitting electrical signals representative of an object of an image which is to be transmitted, which comprises the steps of supplying carrier wave energy, transmitting the supplied energy over two separate paths, varying the transmission characteristic of one of said paths in accordance with both the average light value of the object whose image is to be transmitted and the instantaneously changing light values of elemental areas of said object, deriving energy representative of the difference between the energy transmitted over the said one path and the energy transmitted over the other of said paths, and transmitting the derived energy.

5. A signaling system for transmitting signals representative of an object of which an image is to be transmitted, comprising means for supplying carrier wave energy, means for transmitting the supplied energy over two separate paths, means for varying the transmission characteristic of one of said paths in accordance with both the average light value of the object whose image is to be transmitted and the instantaneously changing light values of elemental areas of said object, means for deriving energy representative of the difference between the energy transmitted over the said one path and the energy transmitted over the other of said paths, and means for transmitting the derived energy.

6. In a television system, the method of transmission of signals representative of an object of which an image is to be transmitted, which comprises the steps of supplying carrier wave energy, transmitting the supplied carrier energy over two different transmission paths, producing output carrier energy representative of the difference between the energies transmitted over each of said paths, regulating the magnitude of the difference of the produced energy in accordance with the average light values of the said object, and varying the magnitude of the amplitude of the produced energy in accordance with the instantaneously changing light values of the elemental areas of the said object.

7. In a television system, the method of transmission of signals representative of an image of an object to be transmitted, which comprises the steps of supplying carrier wave energy to a transmission channel, regulating the average value of amplitude of energy supplied to the transmission channel in direct proportion to the average light intensity of an image of an object to be transmitted, and modulating the amplitude of the regulated energy supplied to the transmission channel by signal energy resulting from scanning the image to develop signal energy representative of the instantaneously changing light values of the elemental areas of the object of which the image is to be transmitted.

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