Aug. 8, 1939. A. N. GOLDSMITH 2,168,566

TELEVISION SYSTEM

Filed July 30, 1937

Fig. 1

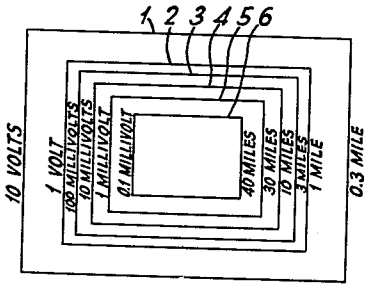


Fig. 2

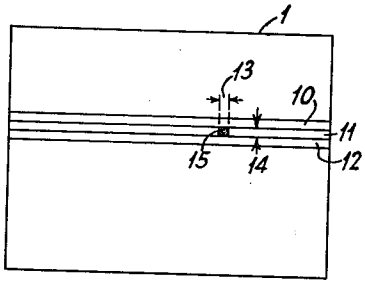
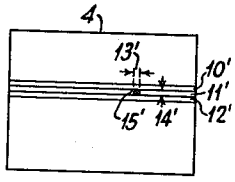


Fig. 3



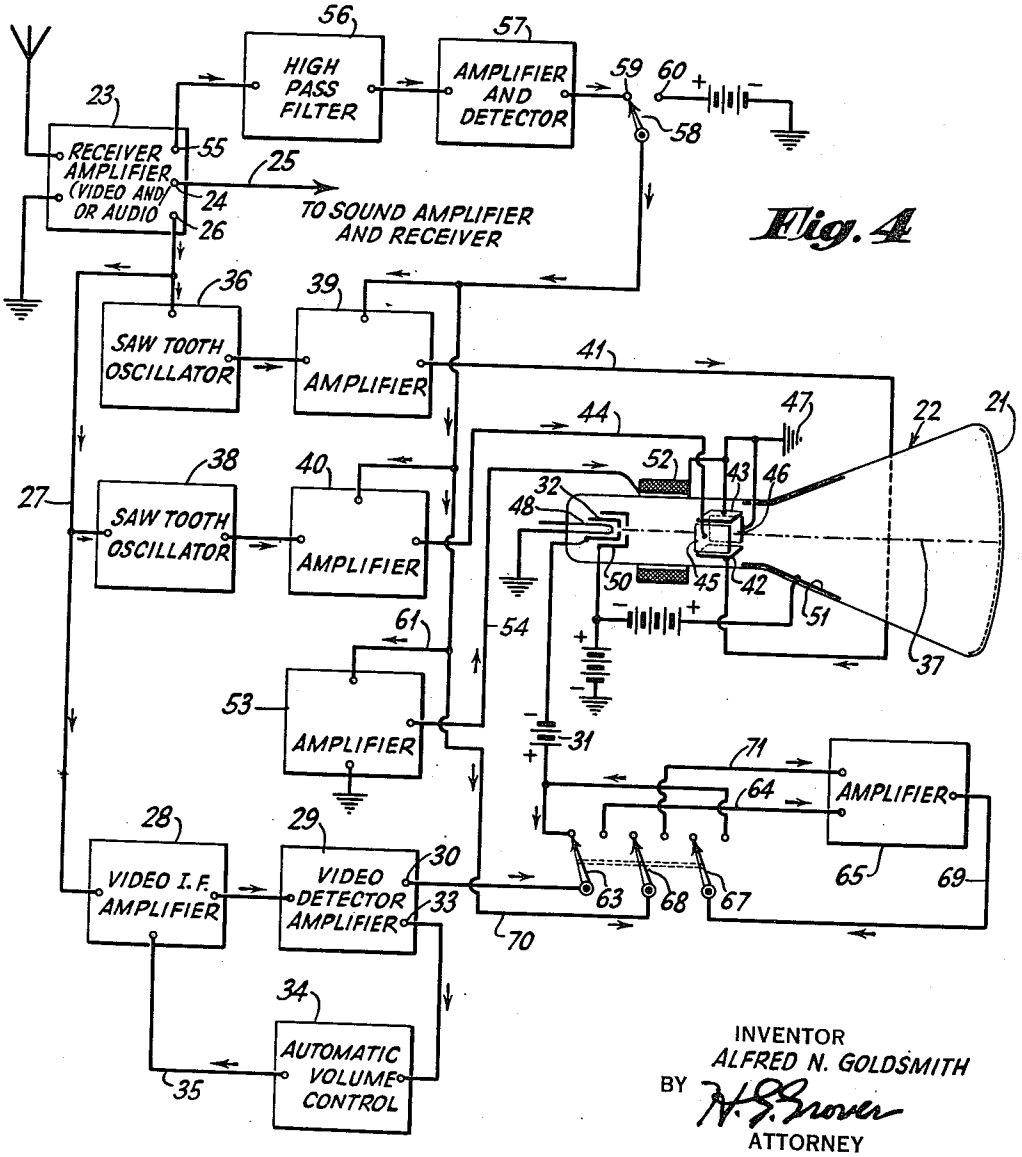


Fig. 4

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TELEVISION SYSTEM

Alfred N. Goldsmith, New York, N. Y.

Application July 30, 1937, Serial No. 156,504

17 Claims. (Cl. 178—7.5)

The present invention relates to television systems and is particularly adapted to television systems wherein the size of the received television image is proportional or related to or representative of the distance separating the point of instantaneous reception and the point from which the television or video signals are transmitted.

The invention in its preferred form is so constituted that the size of the received television image is related preferably to incoming signal strength in order that the received image size may indicate the distance separating the transmitting station from the receiving station. Further, the invention in its preferred form provides a television receiver in which, in accordance with the selected operating conditions, the image size may be either related to the incoming signal strength and/or the distance between the transmitter and the receiver so as to simulate in size an optical view or wherein a constant size of resultant image may be obtained regardless of the incoming signal strength and/or the distance separating the transmitter and the receiver so as to simulate in size a telescopic view.

Further, the invention to be herein described provides a suitable control of the size of the scanning element or unit area in the received image which is controlled in such a manner as to maintain it at approximately the most suitable size for reproducing an image of minimum "line structure" in a reproduced picture of any particular dimension so that there will be equal detail and suppression of line structure in the produced picture or electro-optical image of both large and small size.

In one of the preferred forms of the invention, as it is to be herein described, the system is particularly applicable to guiding aircraft and ships into airports or harbors where, due, for example, to bad weather conditions or to darkness, a direct and accurate view of the ultimate point of destination cannot be obtained. In this type of televisible viewing it is desirable to be able to obtain a reasonably exact calculation, not only of the conditions instantaneously obtainable at the point of ultimate destination of the airplane or ship, or other type craft, for example, but it is also desirable that the instantaneously obtained signal at the point of reception shall give some indication of the relative distance between the point of reception and the point of transmission.

Accordingly, it is one of the objects of the present invention to provide ways and means by which television images may be obtained and produced upon a screen or viewing surface in such a manner that the size of the resultant image may, if desired, be a measure of the distance separating the receiver point from the transmitter point and wherein a suitable control of the size of the the reproduced television image is accomplished under the direct control or under influence of the received signals or a derivative thereof.

Other objects of the invention are to provide a system for receiving television images wherein received images of variable size are obtainable and wherein, irrespective of the actual size of the finally reproduced picture or electro-optical image, the detail obtainable in each separate picture or image shall be maintained substantially constant and the line structure shall at all times be minimized.

Other objects of the invention are to provide a system for receiving television images which shall indicate relative distances between the reception point and the transmission point and which systems shall be relatively simple in their construction and arrangement, which shall utilize a minimum number of auxiliary parts, and shall be both efficient and certain in control and operation.

Still other advantages and objects of the invention will become apparent and at once suggest themselves from reading the following specification in connection with the accompanying drawing, wherein

Figure 1 schematically illustrates variance in sizes of images which may be produced, for example, upon the viewing screen of a cathode ray image reproducing tube of a television receiver;

Figure 2 illustrates schematically several assumed lines of a produced television image and indicates the relative magnitude of the elemental area size and the line width;

Figure 3 is a schematic showing similar to Fig. 2 except that each dimension and size has been reduced from that shown by Fig. 2 to indicate, for example, that the receiver is more remote from the transmitter than in Fig. 2; and

Figure 4 schematically and diagrammatically illustrates a receiver constructed in accordance with the present invention.

Referring now to the drawing for a further understanding of this invention and first to Fig. 1 thereof, there is shown on what may be assumed to be the viewing screen of a cathode ray tube, a series of homologous rectangles all formed on the same diagonals and each having, for example, similar proportions, that is, similar aspect

ratios; which are herein assumed to be a relationship of 4 to 3 for width to height. These rectangles are conventionally illustrated as included within the areas 1, 2, 3, 4, 5 and 6 and indicate the resultant and/or desired optimum picture sizes for the signal strengths indicated at the lefthand margin of each. The assumed signal strengths for the different size picture areas are shown, for example, as values ranging from 10 volts for the picture area embodied by the rectangle 1 to 0.1 millivolt for the picture area of rectangle 6. These voltages are, as usual, the product of the signal field strength at the point of reception, in volts per meter, and the effective height or intercepting length of the receiving antenna, in meters. Also, at the righthand margin of each of the rectangles 1 through 6 there has been illustrated conventionally assumed distances from the point of transmission which are assumed to coincide with the suggested signal strength. The distances are indicated as being variable distances from an assumed 0.3 mile for rectangle 1 to a distance of 40 miles for the rectangle 6. Of course, it is to be understood that these designations of signal strength and distances are merely intended to be illustrative but actual size picture areas may be obtained by a suitable calibration of the receiver and by maintenance of regulated radiation from a standardized transmitter so that distances corresponding to certain predetermined signal strength and thus certain picture sizes are to be obtained. In other words, like conditions existing in the case of direct vision it is appreciated that the further the distance from the transmitter to the receiver, the smaller will be the size of the picture area which should be produced.

In accordance with these varying sizes of pictures, it is apparent that the endwall of the cathode ray image reproducing tube upon which the television or electro-optical images are produced are received from the point of transmission may be scribed or marked suitably or covered with a transparent scribed attached screen and thus supplied with suitable indicia to indicate the relative distances which would provide signal strengths at the point of reception to produce any given size picture. Thus, if the receiver producing a picture of any size varying, for instance, between the size indicated by the rectangle 1 to that of the rectangle 6, the observer by noting the calibrations on the viewing screen can approximate very closely the actual distance separating the transmitter from the receiver and hence judge accurately the actual spacial separation between the two points.

In any case where the actual picture or television image received is of a size indicated by the rectangle 1 or of a reduced size such as indicated, for example, by the rectangle 6, it is desirable that each of the picture areas produced within these rectangles shall have the same detail in order that the observer may be able to picture exactly, although in reduced size, the same conditions. Thus, the invention, in its preferred form, contemplates not only a control of the size of the resultant viewed area, but also a control of the size of the scanning cathode ray spot, assuming a cathode ray image reproducing tube, so that there will be traced within the rectangle 6, for example, the same number of scanning lines as are traced within the rectangle 1, although the size of the scanning spot for a picture area coinciding with the size of the rectangle 6, will, naturally, be smaller than that required for an image reproduction size corresponding to rectangle 1.

Figs. 2 and 3 conventionally indicate the relative widths of the scanning lines for the areas 1 and 4 of Fig. 1 respectively. In Fig. 2, for example, the several scanning lines herein pictorially represented are the lines 10, 11 and 12 where the width of the scanning spot 15 is indicated by the dimension 13 and wherein the height of the scanning spot 15, coinciding with the line width of any single scanning line, is indicated by the dimension 14. Similarly, in Fig. 3, these same scanning lines 10', 11' and 12' are formed by tracing a second scanning spot 15' (in each dimension proportional to the spot 15 of Fig. 2) having a width 13' and a height 14' coinciding with the width of any one of the scanning lines 10', 11' or 12' across the area included within the rectangular area 4. Such a pattern as that embodied by rectangles 1 or 4 would be produced upon the end viewing wall 21 or luminescent screen surface of a cathode ray image reproducing tube 22 of the general character shown by Fig. 4 and already described by Zworykin in the Proceedings of the Institute of Radio Engineers for December, 1933 (vol. 21, No. 12, page 1655 et seq.).

Referring now to Fig. 4 of the drawing for a further understanding of the complete system and its nature of functioning, reference may be made for simplicity of understanding to the general form of transmitter equipment, such as disclosed by Zworykin in the Journal of the Institution of Electrical Engineers (British) vol. 73, No. 442 of October, 1933, and also by the article entitled "An experimental television system" by Kell, Bedford and Trainer published in the Proceedings of the Institute of Radio Engineers and reprinted in a book entitled "Television" vol. 1, 1936, published by RCA Institutes Technical Press, New York, commencing on page 259, for a suitable form of transmitter for sending out video signals accompanied by suitable synchronizing and, where desired, sound transmissions. Such a transmitter system has not been illustrated herein, since it is not per se a part of this invention and is of well known type. The transmitter which is to send out signals to be received by the herein disclosed receiver embodies a suitable form of device for translating an optical image into a train of electrical signal energy and also further embodies a system for developing synchronizing impulses which accompany the transmitted video signals.

Signals of the general character transmitted from a transmitting device of the above mentioned type are received with the general form of apparatus disclosed herein by Fig. 4. In the present form of the receiving device, the receiver selected signals in a manner similar to that described in the patent of W. L. Carlson No. 1,975,056 of September 25, 1934 (since reissued as reissue 20,700 on April 19, 1938) and reference is made to this patent for further details of the receiver amplifier 23 for receiving the video synchronizing and/or audio signals which accompany the transmitted television image signals. The audio signals which are separated out from the video signals in the receiver amplifier 23 are passed from a terminal point 24 of the receiver along the conductor 25 to a suitable sound amplifier and sound receiver or reproducer (not shown), while the video signals, which are to be utilized to produce on the luminescent screen 21 of the cathode ray image reproducing tube 22 an indication of the optical image at the point of

transmission, are directed from the terminal point 26 of the receiver amplifier 23 by way of the conductor 27 to an intermediate frequency video amplifier 28 and thence to a detector 29. The output from the detector 29 which appears at terminal point 30 thereof, is applied by way of the switch 63 (in the left position, as shown) and suitable biasing source 31 or by way of a further amplifier 65 suitably controlled and operated (as will hereinafter be described) and connected in operation by the switch in the right-hand position so that the output energy from either the detector or amplifier 29 or amplifier 65 is connected to the control electrode 32 (forming a part of the electron gun) of the cathode ray image reproducing tube 22. Another portion of the output of the video detector 29 is taken from the terminal point 33 and supplied to an automatic volume control unit 34 (for example, of the general type described by the aforesaid Carlson patent) which is connected by way of conductor 35 to control the output of the video intermediate frequency amplifier 28.

The foregoing arrangement of parts is substantially analogous to that disclosed in the above mentioned Carlson patent, and likewise similar to the arrangement disclosed by Carlson. A suitable oscillator unit 36 from which suitable output energy for deflecting the cathode ray beam 37 developed within the tube 22, in a vertical direction, (that is in the instance shown parallel to the plane of the paper of the drawing) is provided. Similarly, a second oscillator 38 for developing output energy which shall deflect the cathode ray beam 37, developed within the tube 22, in a vertical direction is also provided. Each of the saw-tooth oscillators, or energy developing sources for deflecting the developed cathode ray beam may be of the form disclosed by the Carlson patent but it is also equally desirable to utilize a form of blocking oscillator such as that disclosed, for example, by Tolson, No. 1,999,378, granted April 30, 1935. In any event the oscillators 36 and 38 may be controlled as to the rate or frequency of operation in accordance with the received synchronizing impulses or signals which accompany the video signals and/or the audio signals supplied or received upon the receiver amplifier 23. The output energy from each of the saw-tooth oscillators 36 and 38 is directed to amplifier units 39 and 40 respectively from which amplifiers the resultant amplified energy is supplied by way of conductor 41 for the amplifier 39 to be impressed upon the deflecting electrode 42 of the deflecting electrode pair 42, 43 for producing vertical deflection of the cathode ray beam and the output from saw-tooth oscillator 38 and its associated amplifier 40 is supplied by way of the conductor 44 would to the deflecting electrode 45 of the deflecting electrode pair 45, 46 so that the voltages applied between the deflecting plates 45, 46 deflecting the cathode ray beam 37 across the viewing endwall 21 of the tube 22 in a direction perpendicular to the plane of the paper of the drawing. For convenience, one electrode or deflecting plate of each pair of the beam deflecting plates has been shown as grounded at 47 and the deflecting voltage has been applied above or below ground potential, as desired, to the opposite deflecting plate of each pair of deflecting electrodes 42, 43 or 45, 46.

In the development of the cathode ray beam 37, the electrons which are to form the beam are released in the usual manner from the cathode element conventionally shown at 48. Such an emitter may be either a directly heated emitter or an indirectly heated cathode. By the application of a suitable positive potential upon an anode member 50 relative to the cathode 48 the electrons emitted from the cathode are drawn longitudinally through the tube in the form of an electron beam or cathode ray. In order to focus the produced electron beam, there is provided within the cathode ray tube envelope 22 a second anode member 51 which is maintained also positive, relative to both the cathode and the anode 50, and at a voltage varying between 3 to 1 and 10 to 1 with respect to the voltage applied between the first anode 50 and the cathode 48.

In accordance with the present invention, however, since it is desired to change the spot size which the cathode ray beam impinging upon the luminescent screen surface of the viewing wall 21 shall produce, an additional focussing coil 52 is arranged to surround the neck of the tube 22. Any increase or decrease in the current flowing through this focussing coil 52 produces a greater or lesser strength electromagnetic field and controls accordingly the concentration of the electron stream passing between the electron gun assembly (comprising the cathode, control electrode and anode) and the viewing screen 21. The current which is supplied to the focussing coil 52 is developed in an amplifier unit 53 whose output is connected to the focussing coil 52 by way of a conductor 54 and in accordance with the current flowing in the output circuit of the amplifier 53 (a standard type current amplifier) a greater or lesser intensity magnetic field will be developed and thus a more concentrated or diffused cathode ray beam 37 strikes or impinges upon the viewing surface 21.

The foregoing portions of the description provide for the reproduction of electro-optical image effects on the viewing surface 21 of the cathode ray tube 22 but have not taken into account any changes in the area or dimensions of the resultant electro-optical image, such as have been provided and diagrammatically illustrated by Figs. 1, 2 and 3 herein above discussed. In order to provide image reception wherein the area embodied by the resultant picture or electro-optical image shall be proportional to the distance of the receiver device from the point of transmission and thus, for example, proportional to the strength of the signal energy received in the receiver amplifier 23, a portion of the output from the receiver amplifier 23 is taken from the terminal point 55 of the receiver amplifier 23 and supplied to a highpass filter or resonant circuit 56, which is preferably tuned to the carrier frequency upon which the video transmission takes place and thus has an output proportional to the received carrier wave or the signal strength. Thus, the carrier frequency energy is selected to the exclusion of the video modulation in the filter 56. In accordance with the variance in distance of the receiver from the point of transmission the strength of the carrier signal energy will vary, being less, of course, the greater the distance between the receiver and the transmitter.

The output energy from the highpass filter 56 is supplied to an amplifier and rectifier or detector unit 57 whose output is connected by way of the switching unit 58 contacting the terminal point 59 to each of the amplifiers 39 and 40 for supplying the output from the saw-tooth oscillators

36 and 38 to the deflecting means. The output energy from amplifier 57 is also applied to the amplifier 53 which supplies its output current to the focussing coil 52 to vary the spot size of the cathode ray beam as it impinges upon the viewing screen 21 of the tube 22. It can be appreciated that for a reduced output signal from the amplifier-detector unit 57 that the amplifiers 39 and 40 should be biased negatively so that the amplitude of the resultant output energy therefrom becomes less and consequently the amplifier unit 57, when connected as shown by the drawing, is arranged so that the bias applied to amplifiers 39 and 40 is applied in a positive sense. In other words, the greater the output energy from the amplifier 57, the more positive bias will be applied to the amplifiers 39 and 40 and hence the greater the output energy from these amplifiers, and the greater will be the deflection of the cathode ray beam 37 and, therefore, the corresponding dimensions of the picture. Similarly, under normal conditions, the greater the output energy from the amplifier-detector 57, the greater will be the energy supplied by way of the conductors shown by way of the amplifier unit 53 to bias positively the amplifier unit which supplies current to the focusing coil 52, but with increased area of the beam deflection trace across the viewing screen 21 of the tube 22 the less should be the concentration of the cathode ray beam 37 if the picture or electro-optical image results is to be of equal definition and freedom from visible line structure with that of a picture or electro-optical image resulting from a limited amount of deflection. Hence, the amplifier 53 is so arranged that the greater the output signal from the amplifier 57, which is supplied to bias, by way of conductor 61, the less will be the output energy from the amplifier 53. In other words, the output energy signal from the amplifier 57 while serving to bias positively the amplifier units 39 and 40 for greater output signals, must in effect bias negatively the amplifier 53 for greater output energy signals in order that the strength of the magnetic field, developed from the focussing coil 52, shall become less when the signal strength received in the receiver amplifier 23 is greater. Such a control of the amplifier 53 so that it operates in the opposite sense to the amplifiers 39 and 40, that is, for example, decreased output current from the amplifier 53 at times of increased output current from amplifiers 39 and 40 or vice versa, may readily be accomplished, as is well known, through the use of a suitable reversing tube connected between amplifiers 57 and 53 (not shown herein because of a desire to simplify the drawing).

Thus, it can be seen that, with the arrangement disclosed, provision is made for controlling, in accordance with the strength of the signals received in the receiver amplifier 23, not only the modulation which is supplied to the control electrode 32 of the electron gun of the tube 22 to produce variations in intensity of the picture producing electron beam, but also the size of the resultant picture or electro-optical image and the area of illumination developed on the end wall 21 of the tube 22; and provision is also made for varying in accordance with the strength of this signal the amplitude of deflection of the cathode ray beam 37 across the viewing surface 21 and, at the same time, varying the concentration or focussing of the electron beam as it impinges upon the viewing end wall 21 of the tube 22. Thus, with the switch 58 operated in the position shown by Fig. 4 of the drawing the area viewing surface 21, over which an electro-optical image reproduction can take place, is made proportional or related to the strength of the signal received in the receiver amplifier 23 and, accordingly, the area is representative of the distance separating the receiver from the transmitter. As shown by Fig. 1 with suitable calibrations made on the end wall viewing surface of the tube 22, the observer can calculate or approximate the actual distance separating the receiver and the transmitter in accordance with the size or area of the resultant electro-optical image effect.

In the event that it is desired that the rate at which the picture dimensions decrease as the distance from the transmitting station increases shall be reduced (in order to avoid too small a picture within a certain reception range), this can readily be accomplished by a selection of tubes and circuits in amplifier-detector 57 and/or amplifiers 39 and 40, any of these being so arranged according to well-known means as to give a desired relationship between input and output.

However, for some conditions of operation, it is frequently desirable to provide for viewing larger size pictures or, in other words, for viewing electro-optical images which shall always be of maximum dimensions corresponding, for example, to that area included within the rectangle 1 of Fig. 1. For this purpose provision is mode for rendering the automatic control operation provided by the highpass or equivalent filter 56 and associated amplifier-detector 57 inoperative to vary the deflection pattern or the beam concentration and, under such conditions, the switch arm 58 is closed over upon the righthand contact 60 instead of upon the lefthand contact 59 in order that a positive biasing voltage may be applied at all times to the amplifiers 39 and 40 and in order that this positive voltage applied to the amplifier 53, which is above noted, acts in a reverse sense to the polarity of the bias, shall produce a weaker magnetic field from the coil 52. With this arrangement provided, it readily can be seen that the observer can, by changing the switch arm 58 between the contact points 59 and 60, obtain on the one hand a variable size-electro-optical image which shall be indicative of the distance separating the transmission point from the reception point and with increase or decrease in the size of the reproduced elemental areas and, on the other hand, a constant size picture in which better to observe and more easily to select particular sections of the resultant electro-optical image which it is desired to note. By switching from time to time between the contact points 59 and 60 the observer can on the one hand note first in accordance with the size of the image resulting approximately the distance between the receiver and the transmitter and then later, knowing these distances, enlarge immediately the picture, noting at all times that it is a picture which is equivalent to a reduced size picture, for example. This latter form of switching arrangement provides a system wherein the size of the picture resulting, for example, when the switch arm 58 is upon the contact 59 is equivalent to direct vision of the subject located at the point of transmission and when the switch arm 58 rests upon the contact point 60, wherein the size of the resultant picture is equivalent to a telescopic vision of the subject located at the point of transmission.

It was above stated that with the switch 63 on the left-hand contact, as shown, the signal out-

put of the video detector amplifier 33 is supplied directly to the control electrode 32 of the image reproducing tube 22. However, under some conditions, where it is desired that an overall control in the intensity (determined, for example, by the distance of the receiver from the transmitter) of the cathode ray beam 37 as it impinges upon the screen 21 of the reproducing tube 22 provision is made for supplying the output energy from the video detector amplifier 29 to a further amplifier 65. This is done by changing the position of the switch arm 63 over to the righthand contact point so that the energy output from the video detector amplifier 29 is supplied by way of the conductor 64 to a further amplifier 65. Under these conditions the switch arms 67 and 68 which are always actuated simultaneously with the switch arm 63 also move over to their righthand contacts and away from the blank lefthand contacts, as shown by the drawing. When the switch arms 67 and 68 are against the righthand contacts, it will be seen that the output energy from the amplifier 65 is supplied by way of the conductor 69 and the switch arm 67 over against the righthand contact to the control electrode 32 of the image reproducing tube 22. Simultaneously, the output energy from the amplifier detector 57 is supplied by way of the switch 58 and the conductor 54, together with the associated conductor 70, to the switch arm 68 which when it rests over against the righthand contact point is fed through conductor 71 to the amplifier unit 65.

Under these conditions, the output energy from the amplifier detector 57 not only controls the amplifier 39, 40 and 53, but also serves to bias the amplifier unit 65 so that any desired relationship between picture brightness on the screen 21 of the tube 22 and the signal strength received in the receiver amplifier 23 may be obtained. In other words, even though the automatic volume control unit 34 may serve to maintain substantially constant for varying distances the signal level of the video signals controlling the image reproducing tube 22 by moving the uni-controlled switch arms 63, 67 and 68 from the lefthand contacts (as shown) over to the righthand contacts, the overall brilliance of the electro-optical image produced on the viewing screen 21 may be made variable in accordance with the distance between the transmitter and the receiver. The biasing control exercised by the output signals from the amplifier detector 57 upon the amplifier unit 65 also may be arranged in a manner similar to that described for operating the amplifier units 39 and 40, for example, and therefore further description has not been inserted in view of the known means of applying bias voltage to any type of an amplifier in accordance with any desired signal strength.

Although the invention has herein been described in one of the many forms which it may assume, it is to be understood that the general arrangement herein disclosed is capable of being modified or varied considerably and within wide limits.

One of these modifications, obviously, may be that the developed cathode ray is deflected by electromagnetic means or a combination of electro-magnetic and electrostatic means in place of the pure electrostatic deflecting system shown by the drawing. A still further change which may be made is that instead of controlling the amplitude of the oscillators 36 and 38, which is effective through a variation in the amplification of their associated amplifiers 39 and 40 respectively, the biasing may be made effec ve directly upon the local oscillators 36 and 38 and as a still further alternative, it is possible, instead of utilizing the highpass filter 56 and associated amplifier 57, to utilize the output signal from the video detector amplifier 29 to control the saw-tooth oscillators 36 and 38 or the several amplifiers 39, 40 and 53.

Therefore, it is thought that such changes and modifications in the general arrangement disclosed may be made within the spirit and scope of the invention provided, of course, such changes fall fairly within the terms of the hereinafter appended claims.

Having now described the invention, what is claimed and desired to be secured by Letters Patent is the following.

What I claim is:

1. A television receiver comprising means for receiving video signals, electronic means energized by the received signals for producing electro-optical images, means for controlling the size of the produced electro-optical image in accordance with the strength of the received signals so as to represent the geographical separation of the receiver from the point of transmission as a function of the size of the electro-optical image resulting and means to maintain the aspect ratio substantially constant.

2. A television receiver comprising means for receiving signals and reproducing electro-optical images therefrom, means for controlling in accordance with the strength of the signals reaching from the point of transmission of the received signals to vary the size of the electro-optical images resulting, and means for maintaining substantially constant the detail and the aspect ratio in the reproduced images irrespective of variations in the size of the resultant electro-optical image.

3. A television receiver comprising means for receiving transmitted video signal energy, means responsive to the received video signal energy for producing electro-optical images, means for controlling in accordance with the strength of signals reaching the receiver from the point of transmission the size of the electro-optical image resulting while maintaining the substantially constant aspect ratio thereof, and means for rendering the control means inoperative at will, and means for producing during inoperative periods of the signal responsive control substantially constant size electro-optical images irrespective of the geographical separation of the receiver and transmitter.

4. In a television receiver, means for receiving video and accompanying synchronizing signals, means for producing in accordance with the received video signals electro-optical images representative of a subject at the point of transmission, means for controlling in accordance with the received synchronizing signals the rate and spacial position at which the video signals are translated into electro-optical effects, and means for controlling in accordance with the strength of the received signals the size of the electro-optical image reproduced while maintaining substantially constant aspect ratio thereof.

5. In a television receiver, means for receiving video and accompanying synchronizing signals, electronic means for translating the received video signals into electro-optical images representative of a subject at the point of transmission, means for controlling in accordance with the received synchronizing signals the rate and position in space at which the video signals

are translated into electro-optical images, and means for controlling in accordance with the strength of the received signals the size of the electro-optical image reproduced while maintaining substantially constant aspect ratio thereof.

6. In a television receiver, means for receiving video and accompanying synchronizing signals from a point of transmission, electronic means for translating the received video signals into electro-optical images representative of a subject at the point of transmission, means for controlling in accordance with the received synchronizing signals the spacial position and the repetition rate at which the video signals are translated into electro-optical images, means for controlling in accordance with the strength of the received signals the size of the electro-optical image reproduced, and means for maintaining substantially constant the aspect ratio of the reproduced electro-optical image reproductions irrespective of the actual variation in size thereof.

7. The television receiver claimed in claim 6 comprising, in addition, means for rendering inoperative the picture size control at will and means for producing during inoperative periods of the picture size control substantially constant size electro-optical images irrespective of signal strength variations due to varying geographical separation of the transmitter and receiver.

8. In a television receiver, means for receiving video and accompanying synchronizing signals, a cathode ray tube having means for developing and controlling the intensity of a cathode ray, means for applying the received video signals to the control means of the cathode ray tube to vary thereby the intensity of the cathode ray developed within the tube, a luminescent target forming a part of the cathode ray tube, said target being located in the path of the cathode ray intensity variations to convert the ray into electro-optical images representative of a subject at the point of transmission, means for deflecting and controlling the cathode ray traverse across the target under the control of the received synchronizing signals to regulate the repetition rate and position in space upon the target at which the video signals are translated into electro-optical images, and means for controlling in accordance with the strength of the received signals the amplitude of the deflection path across the screen to vary the size of the electro-optical image produced upon the target.

9. In a television receiver, means for receiving video and accompanying synchronizing signals from a point of transmission, a cathode ray tube connected with the receiver means, means for developing a cathode ray beam within the cathode ray tube, means for controlling the intensity of the developed ray by the received signals, a plurality of oscillators for developing energy to deflect the cathode ray beam in two mutually perpendicular directions to produce a two dimensional electro-optical image, and means for controlling in accordance with the received signals the amplitude of the electrical energy developed by the oscillators.

10. The television receiver claimed in claim 9 comprising, in addition, means for rendering inoperative the oscillator amplitude control at will whereby substantially constant size electro-optical images result irrespective of geographical separation of the transmitter and receiver.

11. A method of television reception comprising the steps of receiving video signals, electronically converting the received signals into electro-optical image representations, and controlling the size of the produced electro-optical image representations in accordance with signal strength changes for changing geographical separation of the reception point from the point of transmission and maintaining during control periods substantially constant aspect ratios in all produced images.

12. A method of producing television images comprising the steps of receiving video signals, producing two dimensional electro-optical images under the control of the received video signals, controlling in accordance with signal strength changes for changing geographical separation of the receiving point from the point of transmission the size of the electro-optical images resulting, and maintaining constant detail in the produced electro-optical images during all variations in size of the resultant electro-optical image.

13. A method of producing television images comprising the steps of receiving video signals, producing two dimensional electro-optical images under the control of the video signals, controlling in accordance with signal strength changes for changing geographical separation of the receiving point from the point of transmission of the received signals the size of the electro-optical images resulting, maintaining constant detail in the produced electro-optical images during all variations in size of the resultant electro-optical image, and controlling the brightness of the resultant image in accordance with the signal modulation of the received video signals.

14. In a television receiver, means for receiving video and accompanying synchronizing signals from a point of transmission, a cathode ray tube wherein is provided a means for developing an electron beam and a target upon which the electron beam is adapted to impinge to produce luminous effects, means to control the intensity of the electro-optical effects in accordance with the strength of the received signals, means to control the target area over which the electro-optical effects are produced also in accordance with received signal energy, and means for simultaneously varying in accordance with departures from a predetermined average signal strength the concentration of the electron beam to maintain equal detail in the produced electro-optical effects irrespective of signal strength variations due to geographical separation between transmitter and receiver aparatus.

15. A method of producing television images comprising receiving video signals, converting the video signals into electro-optical image signals, tracing the produced electro-optical image signals in bi-directional paths across a viewing screen, controlling in accordance with the strength of the received signals for changing geographical separation of the receiving point from the point of origin of the video signals the dimensions of the bi-directional produced electro-optical image, simultaneously varying the size of each produced electro-optical image point in accordance with the variations in the bi-dimensional pattern so as to maintain substantially constant detail and aspect ratio of the produced electro-optical images for all variations and size.

16. In a system for reproducing electro-optical images, means for receiving transmitted video signals, an electro-optical image producing means having a viewing target therein, means for converting the received video signals into electro-optical representations on the viewing

target, means for shifting the instantaneous position of each produced electro-optical representation according to bi-directional paths to provide a bi-dimensional electro-optical replica of an optical image, means for controlling in accordance with the changes in signal strength of the received video signals for varying geographical separations between the receiving point from the point of the signal transmission the dimensions of the bi-dimensional pattern, means for simultaneously controlling the elemental size of each produced electro-optical effect to maintain constant detail in the produced electro-optical images irrespective of the size variations representing varying distances between the receiving point and the point of signal transmission, and a switching means for rendering inoperative the signal controlled pattern size and expanding at predetermined time intervals the bi-dimensional pattern to a predetermined size irrespective of the geographical separation between the receiving point and the point of signal transmission.

17. A system for producing television images comprising means for receiving converting video signals into electro-optical image representations, means for tracing the produced electro-optical image representations in bi-directional paths across a viewing screen, means for varying in accordance with the strength of the received signals for changing geographical separation of the receiving point from the point of origin of the video signals the boundary dimensions of the bi-directional produced electro-optical image and means for simultaneously varying the size of each produced electro-optical image point in accordance with variations in the bi-dimensional pattern so as to maintain substantially constant detail and aspect ratio of the produced electro-optical images for all variations and size.

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