

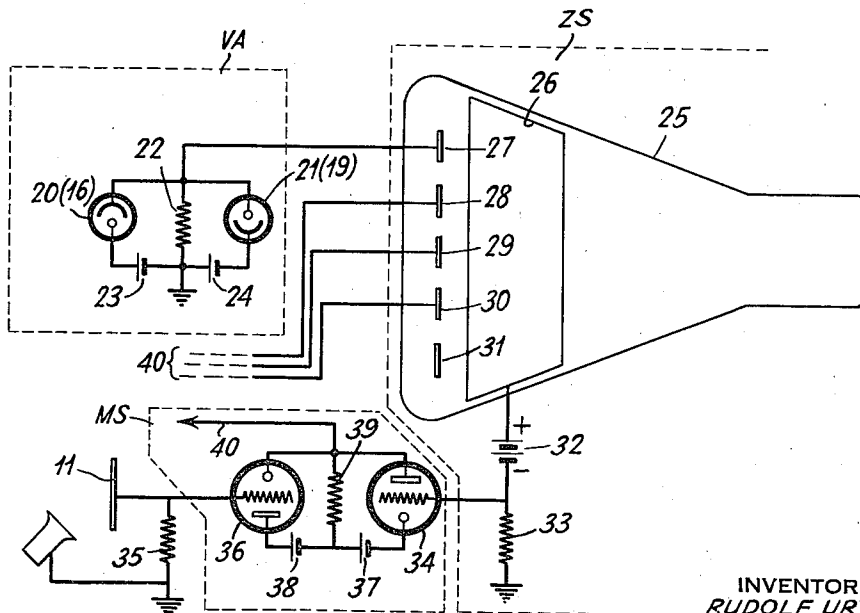
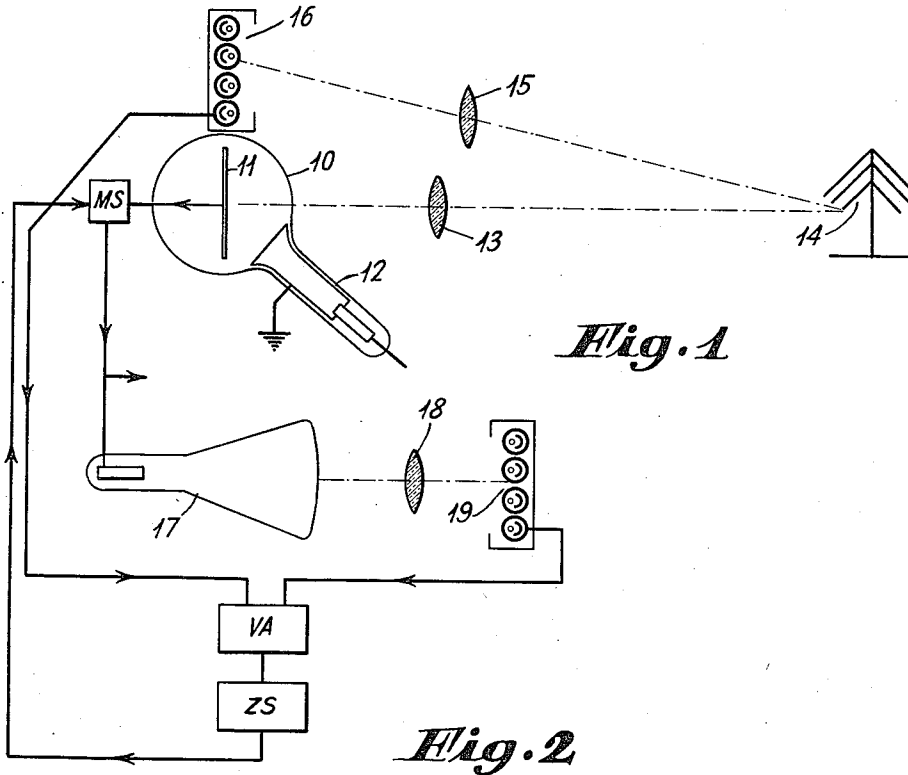
Aug. 15, 1939.

R. URTEL

2,169,714

BLACK SPOT CORRECTING MEANS

Original Filed May 13, 1937



INVENTOR
RUDOLF URTEL
BY *H. B. B. B.*
ATTORNEY

UNITED STATES PATENT OFFICE

2,169,714

BLACK SPOT CORRECTING MEANS

Rudolf Urtel, Berlin, Germany, assignor to Telefunken Gesellschaft für Drahtlose Telegraphie m. b. H., Berlin, Germany, a corporation of Germany

Application May 13, 1937, Serial No. 142,348. Renewed January 6, 1939. In Germany May 13, 1936

6 Claims. (Cl. 178—7.2)

When receiving the television image furnished by a cathode ray image scanner, a so-called disturbance signal can be observed, i. e., a brightness distribution that does not exist in the original image. This disturbance signal also appears at the receiver side when the original image consists of a uniformly white or gray surface. The physical cause of this distribution signal is unknown. It has simply been found that the same is added to the brightness signals corresponding with the original picture, and that it varies for instance in accordance with the hardness and the amperage of the scanning ray. It has been suggested to compensate for this disturbance signal by mixing at the transmitter side with the output signals of the cathode ray image scanner a signal for instead ahead of the modulation of a high-frequency transmitter, which signal consists for each coordinate of a saw tooth of the respective coordinate frequency, and of a sine of the latter and a sine of the doubled frequency. Each of these three components must be adjustable as to amplitude and phase, so that in order to produce the combination signal corresponding to definite operating conditions, twelve variables are to be adjusted. Furthermore, it has been proposed in order to compensate for the disturbance signal to scan an auxiliary image whose brightness distribution corresponds to the distribution of the disturbance signal, in synchronism and equal phase with the movement of the scanning cathode ray, and thereby to mix the potentials supplied by the photo-cell with the output potentials of the cathode ray scanner (T. 45 156 of April 3, 1935). Finally it has been suggested to produce a compensation signal in that a plurality of independently adjustable arrangements, for instance electrodes of a cathode ray tube and capable of secondary emission, are employed assigned to certain regions of the television picture to be scanned, producing a compensation signal which acts essentially in this region (T. 46 836 VIII/21a1).

In accordance with the invention a compensation arrangement is such that a change in the value of the disturbance signal appearing at a place of the image releases a compensating signal substantially limited to the respective place of the image, and which is admitted to the image signals.

A mode of construction in accordance with the invention will be elucidated on hand of Figure 1.

Fig. 2 shows the details of some of the members of Fig. 1.

In Figure 1, item 10 designates a cathode ray scanner whose screen 11 is photo-activated at the side facing the cathode ray scanning tube 12. Item 13 is an objective projecting the object on a photo-cell plate 16 composed of about 25 photo-electric cells. A Braun receiving tube is designated by 17, its fluorescent screen is reproduced on a second photo-cell plate 19 across an objective 18. The arrangement according to Figure 1 operates in such manner that the photo-cell of the table 16 and that the table 19 are arranged in pairs such that each photo-cell in the table 16 is combined with the photo-cell of the table 19 having the identical position. The plate currents of the two photo-cells thereby act in opposition, so that in the comparing apparatus VA in Figure 1 a current is produced corresponding to the value of the disturbance signal at the respective place of the image. This can be explained by the fact that solely the luminous current acts on a photo-cell of the table 16 which corresponds to the brightness value of the original picture at the respective place of the picture, while the luminous current furnished by the Braun receiving tube 17 acts on the coordinated photo-cell of the table 19. This receiving tube is however fed with the output potentials of the scanner 10, therefore also containing on its screen the disturbance signal. The brightness value of the respective place of the object 14 thus exists in both photo-cell currents and will be eliminated in the comparison apparatus VA. The apparatus VA hence, furnishes only a current or a voltage corresponding to the value of the disturbance signal of a respective place of the image.

Depending on this current or this voltage an additional signal is produced in the apparatus ZS whose time pattern corresponds with the distribution of the disturbance signal. This additional signal is mixed in a mixer stage MS with the voltages furnished by the scanner so that therefore each change in the distribution of the disturbance signal releases automatically a compensating additional signal limited essentially to the respective place of the image, and compensating again the change in the distribution of the disturbing signal.

Figure 2 shows by way of example the manner in which the apparatus VA, ZS, MS in Figure 1 can be constructed in principle. In Figure 2, item 20 designates a photo-cell of the table 16, while 21 is such a cell of the table 19. A common resistor 22 is passed in opposite directions by the currents of these two photo-cells, and items 23, 55

24 are two suction voltage sources for the two photo-cells. Item 25 is a cathode ray tube whose second anode is represented in 26, and which contains a number of electrodes capable of secondary emission which is equal to the number of the photo-cells in the tables 16 and 19. These electrodes are designated by 27 to 31. The anode 26 is grounded across a direct voltage source 32 and across a resistor 33. The voltage drop at the resistor 33 is applied to the grid of an amplifier tube 34 and the voltage drop through the resistor 35 passed by the output currents of the cathode ray scanner is applied to the grid of an amplifier tube 36. The plate currents of the tube 34 and 36 whose plate potential sources are designated by 37 and 38, pass through a resistor 39 in opposite directions. The circuit containing the tubes 34 and 36 can be grounded at a suitable place, eventually across a direct voltage source, and furthermore, grid bias voltage sources may be inserted in the grid circuits of one or of both tubes 34, 36.

The arrangement according to Figure 2 operates such that at the resistor 22 a voltage drop appears corresponding to a change in the disturbance signal which occurred eventually at the respective place of the image, and to which the resistor 22 is assigned. In accordance therewith the potential of the electrode 27 capable of secondary emission and hence also the secondary emission current passing from this electrode to the secondary emission anode 26 common to all electrodes, will be influenced. Thus also the voltage drop through the resistor 33 is a measure for the change of the value of the disturbance signal, and the plate current of the tube 34 therefore will also vary. At the resistor 39 therefore, a voltage drop appears again corresponding solely to the brightness of the image.

It should furthermore be pointed out that the arrangement VA in Figure 2 must be provided separately for each pair of photo-cells. The lines 40 pass to the arrangement VA for the electrodes 28 to 30.

What I claim is:

1. Apparatus for correcting for spurious signals occurring in cathode ray apparatus wherein an optical image is projected onto a mosaic comprising a plurality of independent photoelectric means adapted to respond to said optical image projected thereon, means for reconstructing the view formed on the mosaic, independent photoelectric means each responsive to portions of the reconstructed image, and means for developing a signal from the two sets of photoelectric means, said signal being representative of the spurious component appearing on the scanning mosaic, and means for correcting for said spurious signal from said developed signal.

2. Apparatus for correcting for spurious signals arising from the scanning of an optical image which is projected onto a mosaic element comprising a plurality of pairs of photoelectric elements, means for reconstructing the image formed on said mosaic element, means for developing a potential representative of the optical value of a portion of the object on one of said pairs of photoelectric means, and means for developing a potential representative of the optical value of the same portion of the optical image by the other of the pairs of elements, a mixing circuit comprising a plurality of resistive members each joined to a pair of said photoelectric elements in opposing relationship so that the current flow from said photoelectric element de-

velops a potential opposing in phase to that of the other of the photoelectric elements, a cathode ray device having a plurality of target members each joined to one of the plurality of resistors, and means for sequentially developing a potential representative of the spurious signal component of each section of the picture.

3. Apparatus in accordance with claim 2 wherein said latter means comprises anodic means and resistive means connected to said anodic means, said resistive means being adapted to have potentials developed thereacross by the current flow from said anodic means, said anodic means being located adjacent the target members.

4. The method of reducing distortion due to development of spurious signals in electronic television scanning which includes the steps of converting an optical image into an electrostatic image, scanning the electrostatic image to produce a train of signal energy representative of the optical image and spurious signals, producing an electro-optical monitor image of the original optical image under the control of the produced signal energy train, photoelectrically testing and comparing the actual light values of selected and spatially related areas of the optical and monitor images, and compensating the signal energy in the train of signals produced by scanning in accordance with variances in the actual light value of each of the compared images.

5. Apparatus for correcting for spurious signals arising from the scanning of an optical image which is projected on to a mosaic element comprising a plurality of pairs of individual photoelectric elements, means for reconstructing a monitor image of the image formed on the mosaic element, one of each of said pairs of photoelectric elements being positioned adjacent said reconstructed monitor image, means for projecting an area of the optical image onto one of each of said pairs of photoelectric elements, means for projecting substantially the same area of the reconstructed monitor image including the spurious signal formation onto the other of each of said pairs of photoelectric elements whereby a comparison of substantially the same area of the optical image and the reconstructed monitor image may be compared, means for developing a signal representative of the difference between the light values of an area of the optical image and the reconstructed monitor image, and means for combining sequentially the signals developed by said comparison with trains of picture signals developed from said mosaic element whereby the spurious signal is substantially compensated.

6. Apparatus for correcting for spurious signals arising from the scanning of an optical image which is projected on to a mosaic element comprising a plurality of pairs of individual photoelectric elements, means for reconstructing a monitor image of the image formed on the mosaic element, one of each of said pairs of photoelectric elements being positioned adjacent said reconstructed monitor image, means for projecting an area of the optical image on to one of each of said pairs of photoelectric elements, means for projecting separate areas of the reconstructed monitor image on to one of each of the pairs of photoelectric elements, means for projecting substantially the same area of the optical image on to each of the other of said pairs of photoelectric elements, resistive means common to both photoelectric elements

forming a pair of said elements, said photoelectric elements being connected across said resistor in opposition whereby a comparison of the light values impinging on each is obtained, means for impressing the comparison potential developed on to one of a plurality of anodic elements, means for sequentially scanning said elements whereby sequential signals are developed 5 representative of the comparison values of light on all of said pairs of photoelectric elements, and means for mixing said developed potentials with trains of a picture signal developed from said mosaic element whereby spurious signals 5 are substantially compensated.

RUDOLF URTEL.