United States Patent

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[54] **METHOD AND ARRANGEMENT FOR ELIMINATING PERSISTENCY EFFECTS AT LOW LIGHT LEVELS IN PLUMBICON TUBES**
30 Claims, 9 Drawing Figs.

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[51] **Int. Cl.** **H04n 1/02**
[50] **Field of Search** .... 178/7.2, 5.4 RCF, 5.4 STC, 5.44 TCC, 3.2; 315/11, 10

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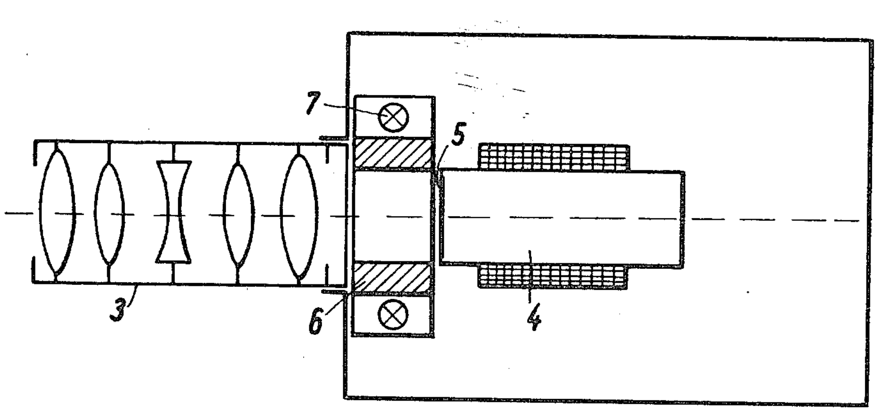
ABSTRACT: An arrangement for eliminating visible persistencies in plumbicon tubes when used in conjunction with low light levels. An auxiliary current is produced in the photolayer of the tube for shifting the operating point for black from the origin of the diode characteristic of the tube. The shift is made to the linear portion of the tube characteristic. The signal portions arising from the auxiliary current are clipped from the output signal.



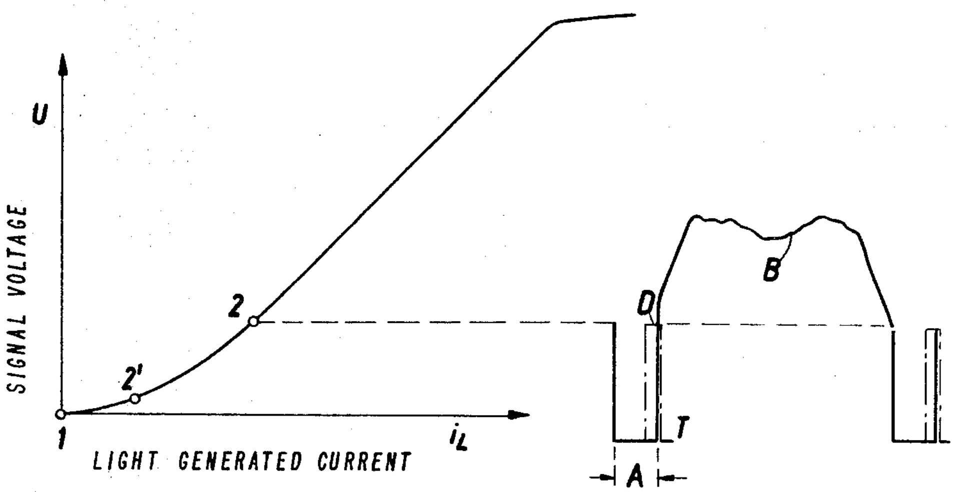


Fig.1

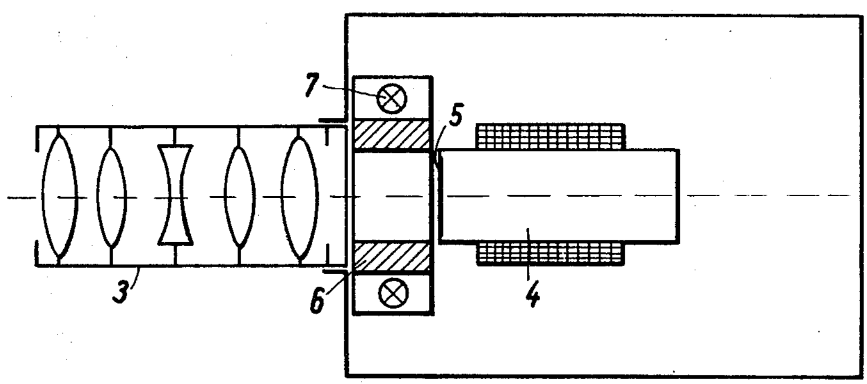


Fig.2

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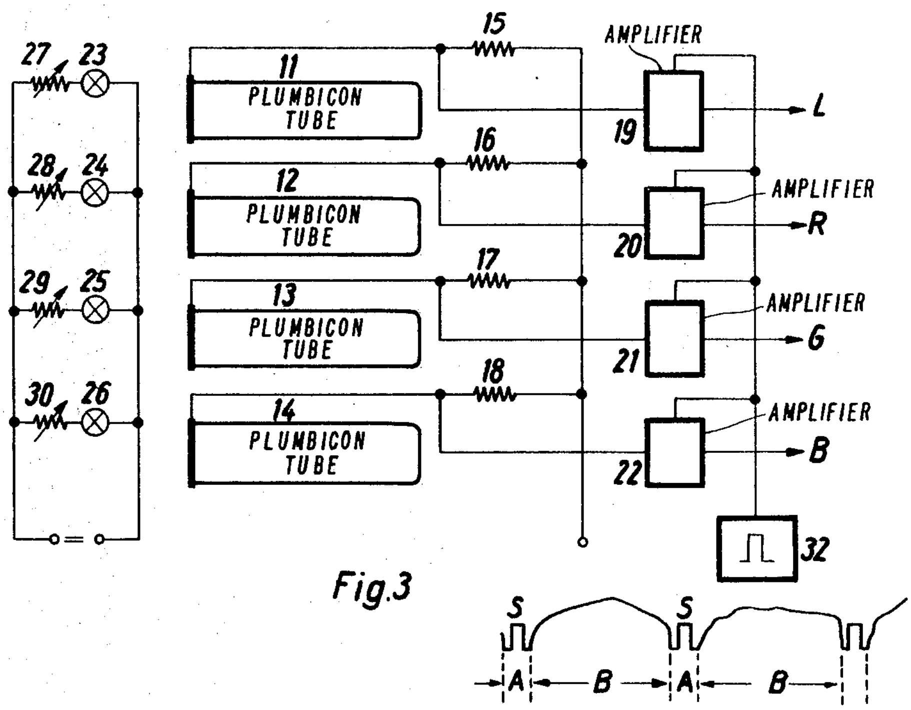

Fig.3

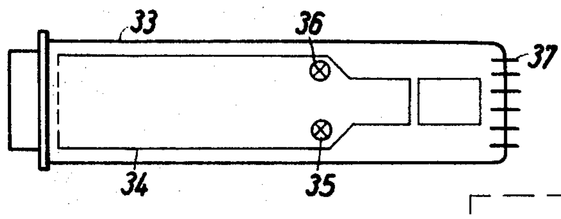

Fig.4

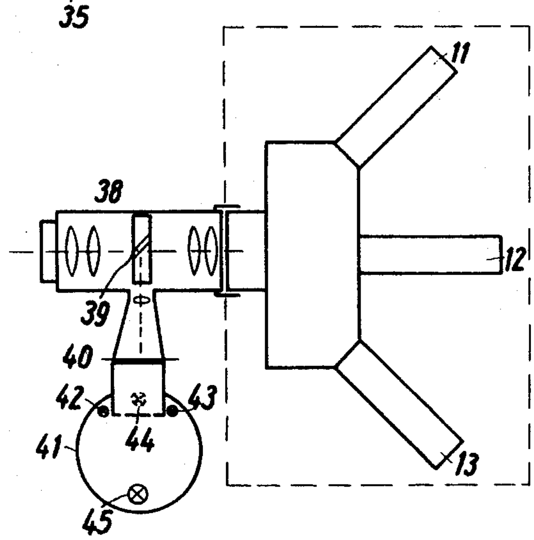

Fig.5

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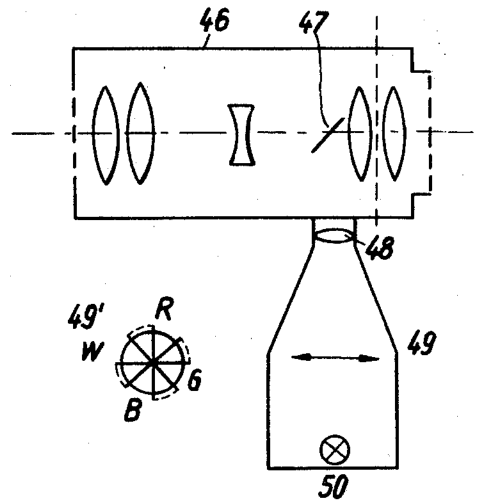

Fig.6

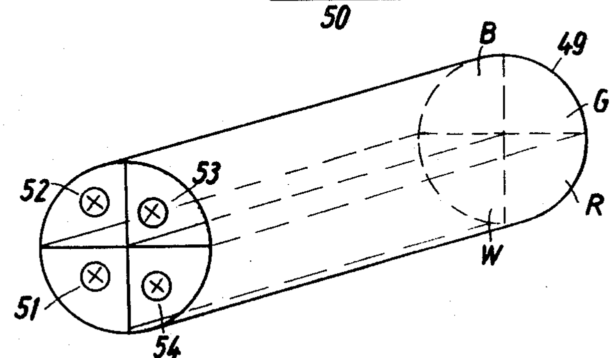

Fig.7

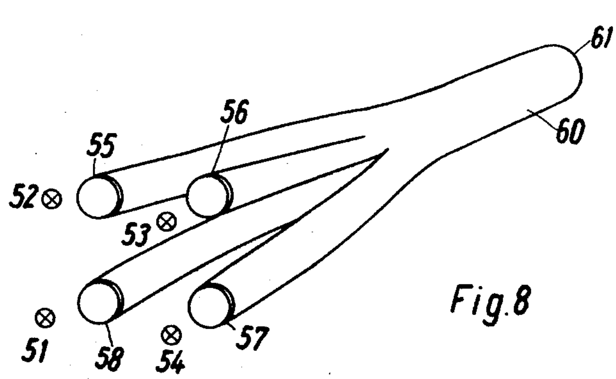

Fig.8

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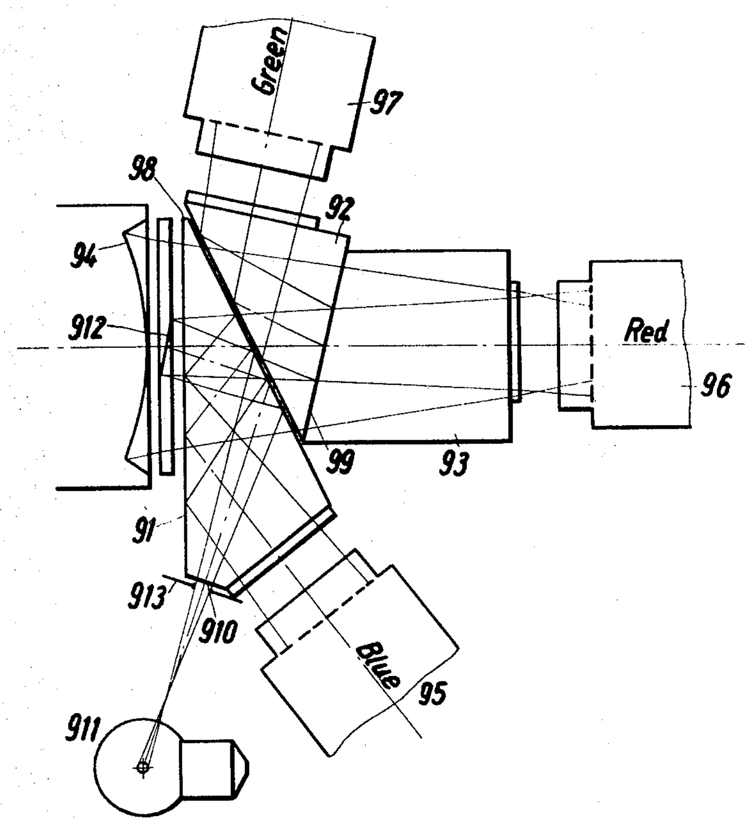

Fig.9

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METHOD AND ARRANGEMENT FOR ELIMINATING PERSISTENCY EFFECTS AT LOW LIGHT LEVELS IN PLUMBICON TUBES

BACKGROUND OF THE INVENTION

The present invention resides in a process for eliminating persistencies in the region of small light levels in tubes of the plumbicon type. The distinguishing features of plumbicon tubes are in that they include a photocathode and a photo semiconducting layer, preferably of lead oxide. The layer combination is designated through a *p–i–n* reference designation. The *n* layer has an excess of negatively charged carriers, as conventionally known, whereas the *i* layer has equal amounts of positively negative charged carriers, and the *p* layer has an excess of positively charged carriers which may also be considered as a deficiency in negatively charged carriers. A photocathode constructed in this manner behaves circuitwise similar to a diode. Thus, the diode exhibits rectifying characteristics, whereby both types of charged carriers can flow off in an electrical field, but are inhibited from such flow in a field of opposite polarity. A diode characteristics, however, has a curved shape for small currents or voltages, as a result of temperature effects and the diffusion of charged carriers.

This curvature of the characteristics is particularly noticeable in plumbicon cameras because if produces disturbing effects or undesirable effects. This results in the condition that for small light currents, the storage capacitance discharges relatively slower, than larger light currents. As a result, the television picture may be observed to have video persistencies and movable obstructions referred to as "flags." In color cameras, the persistencies are particularly outstanding through the undesired color flags. This is due to the condition that the pickup tubes in the chrominance channels, particularly the tube for the red channel receive low light currents, and thereby exhibit this effect in a prominent manner.

Accordingly it is an object of the present invention to eliminate these interfering or disturbing persistency effects, or to at least suppress these effects to an unnoticeable value.

The object of the present invention is achieved by applying to the photocathode an auxiliary constant current. The magnitude of this auxiliary constant current is such that the operating point for black on the diode characteristics, is shifted from the curved portion to the straight-lined portion. The signal portions arising from such an auxiliary current, are clipped in the conventional manner.

By taking these measures which may be realized through simple means, the persistency effects within the region of small light values may be widely suppressed. At the same time, the sensitivity may be increased within this region. The resulting decrease in the control modulation region is almost of no importance, since the persistency effects become noticeable or disturbing only usually under such operating conditions, in which the prevailing light quantity is insufficient or complete control modulation. The aforementioned auxiliary current is produced preferably through auxiliary illumination of the photocathode through means of a light source in close proximity to the photocathode.

In another process, radioactive material is contained in the photocathode layer. This radioactive material produces through its radiation an auxiliary current in the *i* layer. It may also be of advantage to produce the auxiliary current through a special electron source. Finally, it is also possible to arrange semiconducting layers within the photocathode, which may result in the liberation of hot electrons through the aid of very large fields.

In accordance with the present invention, the novelty in the process using a plurality of pickup tubes for different colors, resides in the particular selection and scaling of the auxiliary or additional illumination of the individual pickup tubes. This selection or scaling is such that the derived or arising auxiliary currents are of equal magnitude with regard to at least the color information pickup tubes. By taking these measures, the advantage is realized that the persistency becomes considerably suppressed. As a result, no persistency effects or in the worst case a small effect prevails in the different channels of the color camera. In the event that a small effect does prevail, the persistency is uniform. A uniform persistency in all of the channels of the color camera produces less disturbing effects, since it produces only an amplification with respect to the human eye without any accompanying effects. It has been found that the basic signal current produced from the auxiliary illumination should be between 5 and 20 nA/cm. of the surface of the photocathode.

The present invention is applicable to three-tube cameras as well as to four-tube cameras with three chrominance or one luminance channel. In the latter case, it has been found that it is necessary to provide an auxiliary light current in the luminance channel next to that of the chrominance channels. This is the case even though the luminance channel receives the largest portion of the light current available. Further objects and structure of the present invention reside in the construction and arrangement of the mediums by which the auxiliary illumination is produced. A color camera is a very complex apparatus in which every available space is used for containing optical systems and color arrangements, as well as circuit systems. As a result, a further improvement to the present invention resides in introducing the structure for producing the auxiliary illumination without affecting disadvantageously the remaining elements and construction of the color camera.

In accordance with one embodiment of the present invention, each individual picture pickup tube is provided with an independent light source, insofar as this is constructionally possible. In such a case it is very simple to regulate the light currents of the individual light sources, so that a basic signal of equal magnitude results in each pickup tube. Under such conditions, the persistency is of equal magnitude in all channels.

In another embodiment of the present invention, an auxiliary light current of unique spectral distribution is blended into the picture or video light current before the color-dividing arrangement of the camera. In this case the blended-in light becomes an underlying component as a result of the color-dividing medium. Uniformity in the base signals or persistency can then be attained only if the spectral distribution of the auxiliary light is set so that the individual photocathodes are uniformly excited.

One possible application for the auxiliary light resides in the condition that the light is introduced into the same optical path of the beam. This is the beam in which the picture of a test projector is admitted. This case has the advantage that the test projector or the auxiliary light source may be switched in, depending upon which one is required, and no auxiliary blending medium is necessary.

In accordance with one embodiment of the present invention, incandescent lamps may, for example, be arranged on the side of the photocathode facing the beam system. This arrangement may be applied when it is not possible to carry out this structure with respect to the other side of the photocathode due to the lack of space. In an advantageous arrangement, the light source may be introduced into the interior of the picture pickup tube so that the light of this source falls upon a photocathode. In such an embodiment it is necessary to provide for a particular connecting arrangement for the purpose of regulating the brightness or intensity of the light source.

In the case of blending the auxiliary light into the main beam, the process may be such that the source or the auxiliary light consists of a uniform illuminated surface of different color light sources. This uniformly illuminated surface may be imaged either directly upon the photocathodes of the picture pickup tubes, or in conjugate planes. Another method resides in imaging the source of the auxiliary light in the plane of the diaphragm or the main objective lens. At the same time, this image of the source of the auxiliary light may be produced in an optical plane conjugate to these preceding planes. In the last configuration, it is not required that the surface to be imaged or projected, be of homogeneous illumination. Accordingly, the surface may consist of different illuminated color filters. To simplify the arrangement of the desired spectral distribution of the light to be blended in, a neutral filter may be provided aside from the color filters. In a special construction, the color filters are, for example, arranged in the form of sectors of a circular disc. Between these sectors, opaque sectors are situated, and sector diaphragms are arranged over these opaque sectors. The sector diaphragms may be set or adjusted independent of each other. A further advantageous embodiment resides in transferring or conducting through semiconductors, the auxiliary light from the lamps to the blending surface of the individual pickup tubes or also individual filters. In given cases, it is also advantageous to use optical fibers of a number of parts in bundles or pencils. With the aid of such optical fibers or optical parts, the desired spectral distribution of a mosaic type of surface may be realized. For this purpose, a number of individual bundles or pencils are used to which differently colored and regulatable light is applied to one end. At the other end, intermixing of the fibers of the individual bundles occurs at an uniformly or statistically so that the resulting end surface consists of differently colored light points closely situated next to each other. When using a uniformly illuminated surface for blending into the main beam, it may be advantageous to derive the desired spectral distribution through mixing of variously differently colored light currents, in the conventional manner, on a neutral surface. The Ulbricht sphere is advantageously adapted for this purpose. Finally, it is also possible to provide an auxiliary beam path when using a beam-splitting prism. The aid of this auxiliary beam path, the photocathodes of the picture pickup tubes may be additionally illuminated in an auxiliary manner.

The color television camera under consideration, provides for unique improvements particularly through the pickup of scenes with low light intensity or brightness. As a result of such a color television camera, it is possible to produce substantially good color pictures with illumination intensities which have previously resulted in the appearance or unbearable persistencies. In such persistencies, heretofore, the reproduction of the color picture left much to be desired.

In color cameras with beam-splitting or dividing mirrors and optical relays, the illumination of the photocathode may be carried out in a simple manner from the structural point of view. This results from the condition that sufficient space is available in front of the photocathodes for arranging a light source and the associated beam path. Alternately, these conditions are confronted in the using of beam-splitting prisms, by the little amount of available space between the end surfaces of the prisms of the main objective lens system, on the one hand, and the pickup tubes on the other hand.

These difficulties are overcome in the arrangement of the present invention in which the color camera is provided with a color-splitting prism system, through the condition that the light of an auxiliary light source is introduced into the first prism of the beam-splitting system. The light source has a regulatable spectral distribution. The light of the auxiliary light source is applied so that the border surfaces between the first and the following prism produce total reflection. At the same time, the reflection is in the direction of the main objective, and a mirrored surface for dividing or splitting purposes is situated between the first prism and the main objective lens. A part of the auxiliary light is reflected from this mirror surface and deflected into the same beam originating from the main objective lens in the color-dividing or -splitting system. The auxiliary light becomes distributed on the pickup tubes. In an advantageous embodiment, the light source with regulatable spectral distribution consists of a secondary beam which becomes illuminated through differently colored lamps of regulatable intensity. Thus, this secondary beam emitter may be in the form of frosted glass, ground glass, or similar such substance.

A convenient and simple regulation is thus realized for the illumination of the photocathode with the required illumination intensity. The arrangement may be made so that signal currents of the pickup tubes are all of the same magnitude and within the range, for example, of 5 to 20 nA.

SUMMARY OF THE INVENTION

A method and arrangement for eliminating persistency effects in colored television cameras. An auxiliary current is produced in the photolayer of the picture pickup tube of the camera. This auxiliary current is adjusted and set so that it shifts the origin of the diode characteristic of the tube to the linear or straight-line portion of the characteristic. The resulting signal emitted by the tube becomes processed through a clipping step in which the signal portions attributable to the auxiliary current are clipped from the main signal. A method and arrangement is particularly adapted to tubes of the plumbicon type, and in which low light levels prevail.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a graphical representation of the characteristic of a plumbicon tube and a television signal;

FIG. 2 is a functional schematic diagram, in simplified form, of a television camera in which the objects of the present invention are achieved through an auxiliary arrangement;

FIG. 3 is a block diagram of a four-tube color camera;

FIG. 4 is a functional schematic of a plumbicon tube with auxiliary illuminations;

FIG. 5 is a functional schematic diagram of a camera arrangement using beam-splitting prisms and varioptics;

FIG. 6 is another embodiment of the arrangement of FIG. 5 using further varioptics in conjunction with an arrangement for producing an auxiliary light current;

FIG. 7 shows schematically a further embodiment for producing an auxiliary light current;

FIG. 8 is still another embodiment shown schematically for producing an auxiliary light current; and

FIG. 9 shows schematically a precise color-splitting prism arrangement for blending in the auxiliary light current.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing, FIG. 1 illustrates the characteristics of a plumbicon tube upon a coordinate system in which the abscissa is the light generated current i_L and the ordinate is the signal voltage U. Under usual operating conditions, the operating point of the plumbicon tube for black, is substantially at the zero point of the characteristics. For small light currents and corresponding small signal currents, the electrical resistance du/di is very large. Accordingly, the discharge of the storage capacitance results with essentially a larger time constant than for larger light currents. As a result, those portions of the target which are only little illuminated, do not become fully discharged during a scanning, and therefore produce picture signals still at the next scanning. In accordance with the present invention, the operating point for black becomes shifted in position from the origin or zero point on the coordinate axis, through an auxiliary current in the photolayer. Thus, the operating point becomes shifted from the origin one to a position at which the diode characteristics is substantially linear. When a plumbicon layer becomes scanned by an electron beam, with such a set operating point, an incomplete discharge also appears. This is because the scanning beam discharges the target to the point 2′ . The signal portion between 2 and 2′ does not, however, produce a disturbance of the picture, since it becomes cut off through circuitry.

In the right portion of FIG. 1, a television signal is shown consisting of a portion A in which the sync pulse and the black shoulder lie. The portion B reproduces the actual picture or video signal. In accordance with the operation of the present invention, the impulse T of the plumbicon tube may be adjusted so that the top of the pulse D coincides with the signal level at the point 2 in the left portion of FIG. 1. Through a subsequent clamping of the top level of the pulse D, remaining charges on the target of the television picture are not at all noticeable.

FIG. 2 shows a plumbicon camera is simplified form. The camera is provided with an objective lens system 3 through which a picture is transmitted to the photocathode 5 of the plumbicon tube 4. For the purpose of achieving the operating point shift, in accordance with the present invention, an auxiliary arrangement is provided in the camera. This auxiliary arrangement consists of a ring 6 provided with fluorescent material which is illuminated from the outside through lamps 7. The result is such that a uniform diffused light current impinges upon the photocathode. The ring 6 may be made of lucite or other transparent material.

With such an arrangement, the copies or characteristics of the camera were essentially improved and the persistence widely suppressed. In particular, it has been found that with color cameras the color persistency is almost fully eliminated for cameras with luminance and three chrominance channels. This is the case when the red channel and the blue channel is provided with the auxiliary arrangement of the present invention.

In FIG. 3 picture pickup tubes 11, 12, 13 and 14 are of the plumbicon type. The signal currents from these tubes are tapped from resistors 15, 16, 17 and 18, respectively, and transmitted to corresponding amplifiers 19 to 22. Incandescent lamps 23, 24, 25 and 26 are spaced at a predetermined distance from the photolayers of the picture pickup tubes 11, 12, 13 and 14, respectively. The light intensity of these incandescent lamps becomes regulated through the use of the variable or regulating resistors 27, 28, 29 and 30. The output of the camera tubes, is a pulse generator 32. Clamping pulses are applied to the amplifiers 19 to 22 by the pulse generator 32. Through the amplitude of the clamping pulses, the black level signal appearing at the output of the amplifiers 19 to 22, may be adjusted so that the level of the basic signal realized from the auxiliary illumination becomes the black level.

In accordance with the present invention, it has been found to be advantageous to adjust the lamps 23 to 26 so that a signal current between 10 and 20 milliamperes appear at the outputs of the pickup tubes 11 to 14. For purposes of clarification, FIG. 3 includes the function of a picture or video signal. The B portion of this function represents the picture or video signal portion, whereas the A portion represents that portion which prevails during the blanking. An impulse S from the pulse source or pulse generator 32 is applied during the blanking signal A, and is superimposed upon the resulting base or ground signal. The attained level is such that black appears in the picture even though the photolayers of the tubes 11 to 14 are illuminated by the lamps 23 to 26, respectively. The gradation of the picture remains substantially unaltered, as a result of this procedure, when the characteristics of the tube is substantially linear, as is the case in the plumbicon tube.

It is possible that in some picture pickup tubes a noise signal or interference signal appears in the dark picture portions. Such disturbances or interferences can be compensated in the conventional manner through the superposition of auxiliary signals or compensating signals.

FIG. 4 shows an arrangement in which it is possible to illuminate the photo layer from the back or rear side. Thus, the illumination is a light through the side carrying the beam-radiating system. Within the tube envelope 33, is an anode 34 which is narrowed down 35. At the location of this narrowed down section, one or two incandescent lamps 36 may be introduced. A socket pin 37 may be provided for applying current to the lamps from the exterior of the tube. In this manner, it is possible to illuminate the photolayer from the outside.

FIG. 5 shows an embodiment in which the camera is provided with an auxiliary testing projector. In this embodiment, a Vari-Optical System 38 is provided. This optical system may be similar to the optical system produced by the Schneider Company under the name Variogon. A small mirror 39 is transversely located for the purpose of blending in the slide of a test projector. The position of the slide image is designated with the reference numeral 40. To use this test projector for introducing the auxiliary light, the supplementary equipment 41 may be employed. This additional equipment 41 may be in the form of an Ulbricht sphere-type photometer in which colored lamps 42, 43 and 44, and a white lamp 45 are situated. These lamps are positioned such that direct transmission of light to the exterior is inhibited. If this arrangement is to be used as a slide projector, then a slide is inserted in the plane 40, and the interior of the sphere is illuminated with white light. Thus only the white incandescent lamp 45 is switched on. For the purpose of producing the auxiliary light, the test slide is removed and the interior of the sphere is illuminated with the aid of the lamps 42, 43, 44 and 45 so that the desired spectral distribution is realized.

The Figure shows another embodiment for blending an auxiliary light into the main light beam. In this embodiment, an objective lens system 46, preferably of the Vari-Optic type, is provided. A blending mirror 47 is also again present. An auxiliary optical system 48 is provided, which images the field 49 of a color filter arrangement in the interior of the objective lens system 46. In order that the structure of this field of color filters 49 does not appear in the picture, the plane 49 is imaged in the diaphragm aperture plane of the objective lens 46, or a plane conjugate to this one.

The creation of the filter field 49 becomes clarified through the diagram of FIG. 6. In this Figure different color filters in sector form are designated by R, G, B and W. These are three color filters in this sector form or a neutral white filter. Sectors which transmit light are situated between these different color filter sectors. Adjustable sectors are mounted over the preceding sectors and provide for restricting more or less the color filter, similar to a diaphragm procedure. Finally a lamp 50 serves for illuminating the filter arrangement and for the purpose of producing the light falling into the main beam through the mirror 47. The desired spectral characteristics of this light are realized through the setting of the adjustable sectors in FIG. 6.

A further embodiment for producing the field of a color filter with filter parts R, G, B and W, is shown in FIG. 7. Four lamps 51, 52, 53 and 54 are provided at the inputs of the four light tubes. The filters R, G, B and W are at the outputs of these tubes.

As mentioned above, it is desired to blend the auxiliary light into the main beam. A homogeneous surface with adjustable spectral distribution for color is desired. This surface can then be directly imaged upon the photolayers of the color pickup tubes.

The structure of an arrangement for producing a mosaic type of surface is shown in FIG. 8. In this configuration, lamps 51 to 54 again illuminate the filters 55, 56, 57 and 58. One of the filters can be a neutral filter. Behind these filters are fibers or rodlike optical material which these optical fiber rods are bundled together at one end 60. The optical rods in the individual bundles are combined within the entire bundle so that a regular or a statistical distribution of the individual light sources associated with the rods, is realized.

Accordingly, a light intensity field prevails in the plane 61, which has a color value or spectral characteristics corresponding to the brightness or light intensity of the lamps 51 to 54, and may be set as desired. This field must be imaged in the diaphragm aperture.

Although only three-tube or four-tube color cameras were considered in the preceding embodiments, it will be understood by those skilled in the art, that the present invention is also applicable to color cameras with only two tubes. The invention is furthermore applicable in an advantageous manner, to color cameras with one tube in which different color regions are used on the photocathode. In each one of these cases, the undesired properties with regard to persistance are altered in the photosemiconducting picture pickup tubes, so that the persistance no longer acts in a disturbing or interfering manner. It will be understood that the process in accordance with the present invention is equally applicable to monochromatic cameras.

FIG. 9 shows a conventional prism distribution system with prisms 91, 92 and 93. These prisms divide the light originating from the main objective lens 94, among the three color pickup tubes of the plumbicon type 95, 96 and 97. The prisms are covered at the sides 98 and 99 with dichroic layers. A thin air gap, furthermore, prevails between the prisms 91 and 92. As a result, total reflection occurs at the bordering surfaces for predetermined angles. The light reflected at the dichroic surface 99 reaches the tube 97. Total reflection also occurs for the light reflected from the dichroic surface 98, with respect to the surface of the prism 91 facing the main objective lens. In this manner a part of the light current can reach the tube 95. Thus, the tube 95 receives the blue color portion, the tube 96 receives the red portion, and the tube 97 receives the green color portion of the sunlight. To achieve the object of the present invention, the prism 91 is provided with a cut at the location 910. Light originating from the lamp 911 passes through this cut and enters the interior of the prism at such an angle that total reflection occurs at the surface line across from the prism 92. A semimirrored surface 912 prevails between the main objective 94 and the prism 91. This surface 912 is inclined at a small angle to the prism surface and has a small diameter compared to the opening of the objective. The mirror characteristics of the surface may be so minute that only 5 to 10 percent of the impinging light is reflected. The inclination of the mirror is such that the light current travels concentric in the pickup light current and through entrance diaphragm 913. With these conditions, the auxiliary light reaches the different intermediate surfaces of the prism system in almost homogeneous distribution as a result of total reflection for division. The auxiliary light reaches the photocathodes of the pickup tubes through essentially the same beam path as the light of the scene to be picked up. Dosing of the quantity of light for each pickup tube can be carried out by regulating the spectral distribution of the auxiliary light as well as the total intensity of the same. For example, it is possible to achieve that out-weighing red auxiliary light, the pickup tube 96 of the red channel receives a substantially larger portion than the other pickup tubes. The lower sensitivity of the plumbicons in the red spectral region can thereby be compensated. The regulating arrangement for the dosing of the quantity of light can be arranged between the cut 910 and the lamp 911. In place of a single individual lamp, a plurality of differently colored lamps may be provided which illuminate the secondary emitter.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in plumbicon tube arrangements, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

We claim:

1. A method for eliminating visible persistencies in plumbicon tubes for low light levels comprising the steps of producing an auxiliary current in the photolayer of said tube; shifting the operating point for black from the origin of the diode characteristic of the tube to the linear portion of said characteristic; transmitting the resulting signal from said tube; and clipping from said signal the portions arising from said auxiliary current.

2. The method as defined in claim 1 including the step of illuminating the photocathode with constant uniform light for producing said auxiliary current.

3. The method as defined in claim 1 including the step of bombarding the photolayer with high velocity electrons for producing said auxiliary current.

4. The method as defined in claim 1 including the step of embedding raidoactive material in said photocathode.

5. The method as defined in claim 1 including the step of introducing intermediate layers in said photocathode for providing positively and negatively charged carriers.

6. The method as defined in claim 1 wherein said auxiliary current has a magnitude of between 5 and 20 nA.

7. An arrangement for eliminating visible persistencies in plumbicon tubes for low light levels, comprising, in combination, a plumbicon tube with photocathode; means for generating an auxiliary current in the photolayer of said cathode; means for shifting the operating point for black from the origin of the diode characteristic of the tube to the linear portion of said characteristics; means for transmitting the resulting signal from said tube; and clipping means for clipping from said signal the portion arising from said auxiliary current.

8. The arrangement as defined in claim 7 including a camera objective lens functioning in conjunction with said plumbicon tube; a light dispersion member in close proximity to said photocathode and outside of the beam path of said camera objective lens; and a light source for illuminating with constant light said light dispersion member.

9. The arrangement as defined in claim 7 including a ring of fluorescent material in close proximity to the photocathode.

10. The arrangement as defined in claim 7 including picture tubes arranged for operating as a color camera, said picture tubes being associated with chrominance channels; and means connected to said picture tubes for generating an auxiliary current whereby said visible persistencies are eliminated.

11. The arrangement as defined in claim 10 wherein said means for producing an auxiliary current is connected to the red and blue color channels only, said color camera being a four-tube camera.

12. The arrangement as defined in claim 10 wherein said auxiliary current has a magnitude between 5 and 20 nA.

13. The arrangement as defined in claim 7 including a plurality of pickup tubes for different colors; an auxiliary light source for illuminating the photocathode with constant and uniform light for producing said auxiliary current, the illumination from said auxiliary light source being of the intensity whereby the auxiliary currents of the individual pickup tubes are all of identical magnitude.

14. The arrangement as defined in claim 13 wherein said auxiliary light source is arranged on the side of said photocathode facing the beam system.

15. The arrangement as defined in claim 13 wherein said auxiliary light source comprises a plurality of light sources with one light source associated with one picture pickup tube and independent from the other light sources.

16. The arrangement as defined in claim 12 including color-splitting means in said camera; and means for blending said auxiliary light from said auxiliary light source with corresponding spectral distribution into the picture light current before reaching the color-splitting means.

17. The arrangement as defined in claim 15 including test projector means, the mixing through said blending being over the same optical path as the path in which the picture of said test projector is introduced.

18. The arrangement as defined in claim 15 including means for regulating the spectral distribution of the auxiliary light.

19. The arrangement as defined in claim 15 wherein said auxiliary light source is a surface uniformly illuminated from different color light sources and imaged upon the photocathode of the picture pickup tube.

20. The arrangement as defined in claim 15 wherein said auxiliary light source is imaged in the diaphragm claim of the main objective lens of a camera.

21. The arrangement as defined in claim 15 wherein said auxiliary light source comprises a surface illuminated from different and independent lamps associated with color filters.

22. The arrangement as defined in claim 20 wherein said color filters comprises three color filters and a neutral filter.

23. The arrangement as defined in claim 21 wherein said color filters comprise first sectors of a circular disc; second sectors of opaque material between said first sectors; and diaphragm sectors over said opaque sectors and independently adjustable.

24. The arrangement as defined in claim 21 including light tubes for conducting light from said light source to said filters.

25. The arrangement as defined in claim 19 including optical fiber bundle means with a plurality of parts, one end of said bundle means illuminating said surface and the other end of said bundle means being in the path of light from differently colored and regulatable light sources so that the fibers of the individual bundle parts are statistically intermixed at one end.

26. The arrangement as defined in claim 19 wherein said surface is illuminated through a neutrally white surface with regulatable lamps of different color.

27. The arrangement as defined in claim 7 including a auxiliary light source for uniformly illuminating the photocathode with auxiliary illumination to generate said auxiliary current; a prism system of a color television camera for splitting the light beam into a plurality of channels; a first prism in said prism system to which the light from said auxiliary light source is applied, said auxiliary light source having means for regulating a spectral distribution; a second prism in the path of light from said first prism and arranged so that total light reflection prevails at the border surfaces between said prisms; entrance objective means against which the light from said prisms is deflected; and a partially-mirrored surface between said first prism and said entrance objective means, a portion of said auxiliary light from said auxiliary light source being returned from said partially-mirrored surface and distributed onto the pickup tubes.

28. The arrangement as defined in claim 27 wherein said first prism has a cut for admitting the auxiliary light from said auxiliary light source perpendicularly.

29. The arrangement as defined in claim 27 including a glass plate between said objective means and said first prism and containing said partially-mirrored surface.

30. The arrangement as defined in claim 29 wherein said partially-mirrored surface has a reflection coefficient between 5 and 10 percent.