conductive layer positioned on one said member of each said pairs; a first source of potential connected to said conductive layers; a second transparent conductive layer positioned on the other said member of each said pairs; a second source of potential connected to said second conductive layers; a photoconductive coating positioned on the conductive layers of one of said members; means producing a uniform electrical charge on said photoconductive coatings, said means comprising the electrical field established between said conductive layers by said sources; means for converting said uniform charge on successive said coating to a charge pattern corresponding to said successive pictures; means for converting said charge patterns to light and dark areas; and means for projecting light through said transparent support members—whereby said light and dark areas produce a display on a viewing screen.

7. A cathode ray tube having means for producing sequential pictures on its faceplate; a plurality of pairs of fixedly positioned transparent support members; a transparent conductive layer positioned on one said member of each said pairs; first sources of potential connected to respective said conductive layers; a second transparent conductive layer positioned on the other said member of each said pairs; second sources of potential connected to respective said second conductive layers; a photoconductive coating positioned on each said second conductive layer; means for producing a uniform electrical charge on each said photoconductive coatings, said means comprising an electrical field established between said members of said pairs by said first and said second sources of potential; means for sequentially converting said uniform charge on sequential said coating to charge patterns corresponding to sequential pictures on said faceplate of said cathode ray tube; means for converting said charge patterns to light and dark areas, said means comprising means for causing dark particles to adhere selectively to said charge patterns; and means for projecting light through said light and dark areas onto a viewing screen.

8. The combination comprising means including a photoconductive sheet for converting light patterns impinging thereon to corresponding electrostatic patterns on said photoconductive sheet, means for developing said charge patterns on said photoconductive sheet to provide visual patterns and means for projecting said developed patterns on said photoconductive sheet onto a viewing screen.

References Cited in the file of this patent

UNITED STATES PATENTS

1,808,137	Hartley	June 2, 1931
2,185,379	Myers	Jan. 2, 1940
2,212,249	Schroter	Aug. 20, 1940
2,297,691	Carlson	Oct. 6, 1942
2,566,713	Zworykin	Sept. 4, 1951
2,605,352	Fischer	July 29, 1952
2,848,533	Burr	Aug. 19, 1958
2,890,633	Huebner	June 16, 1959

Aug. 27, 1963 E. SENNHENN 3,102,163

CIRCUIT ARRANGEMENT FOR PRODUCING A CONTROL VOLTAGE FOR AUTOMATIC CONTROL OF ELECTRIC SIGNALS

Filed Jan. 28, 1960 3 Sheets-Sheet 1

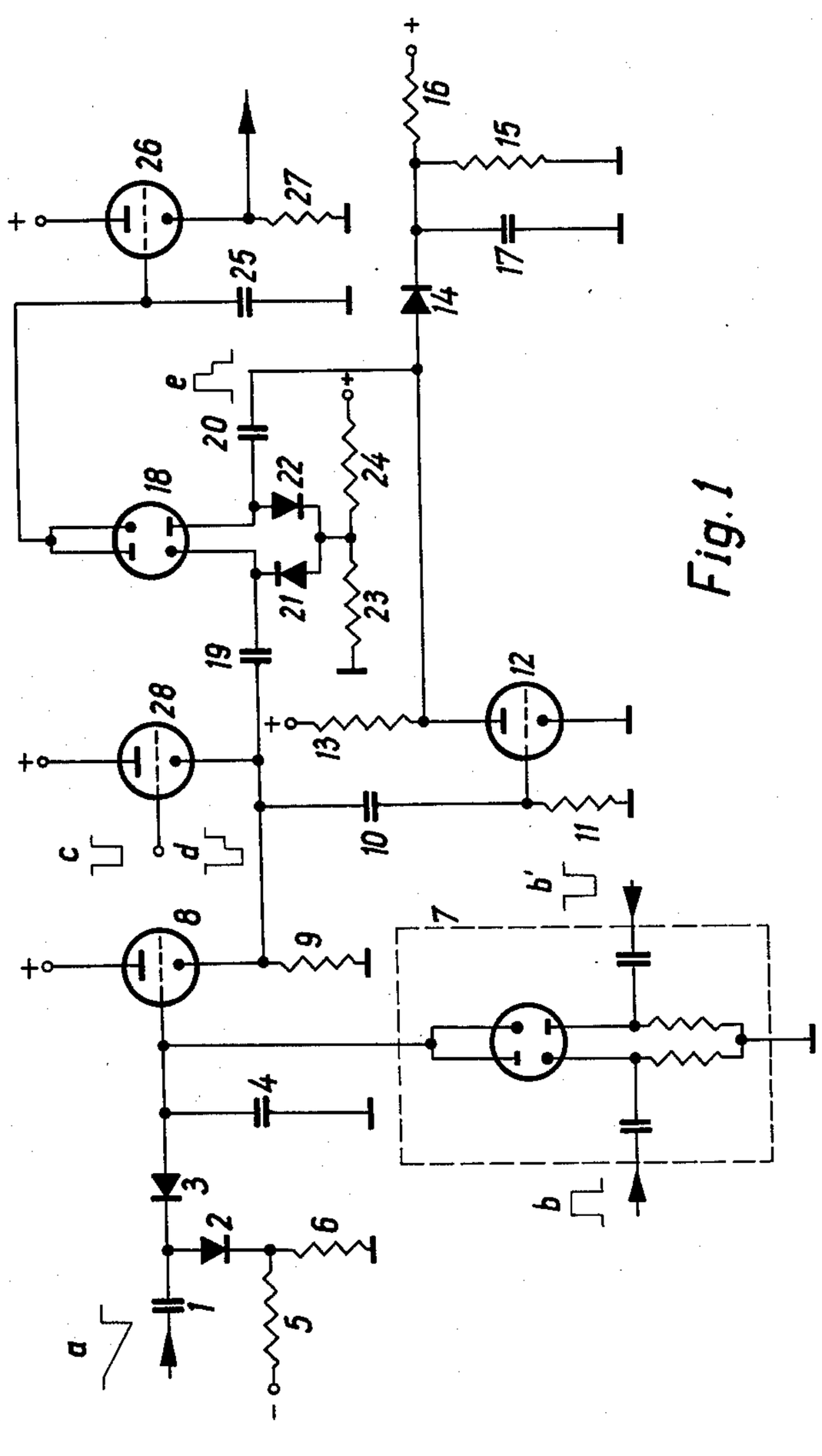


Fig. 1

Inventor:
Emil Sennhenn
By Michael S. Striker
Attorney

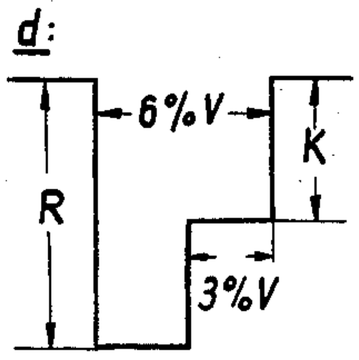


Fig. 2

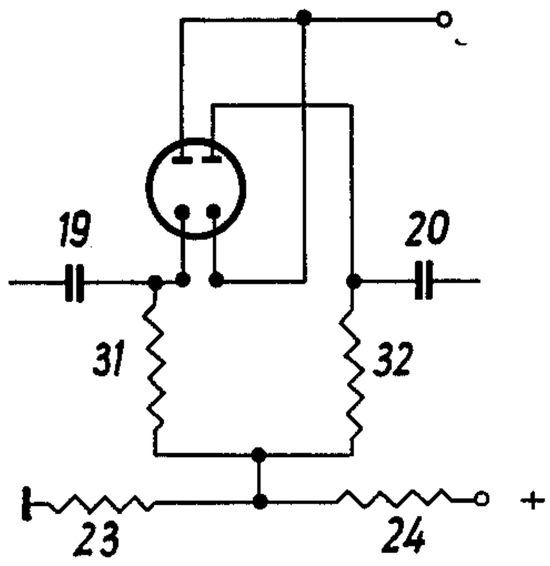


Fig. 3

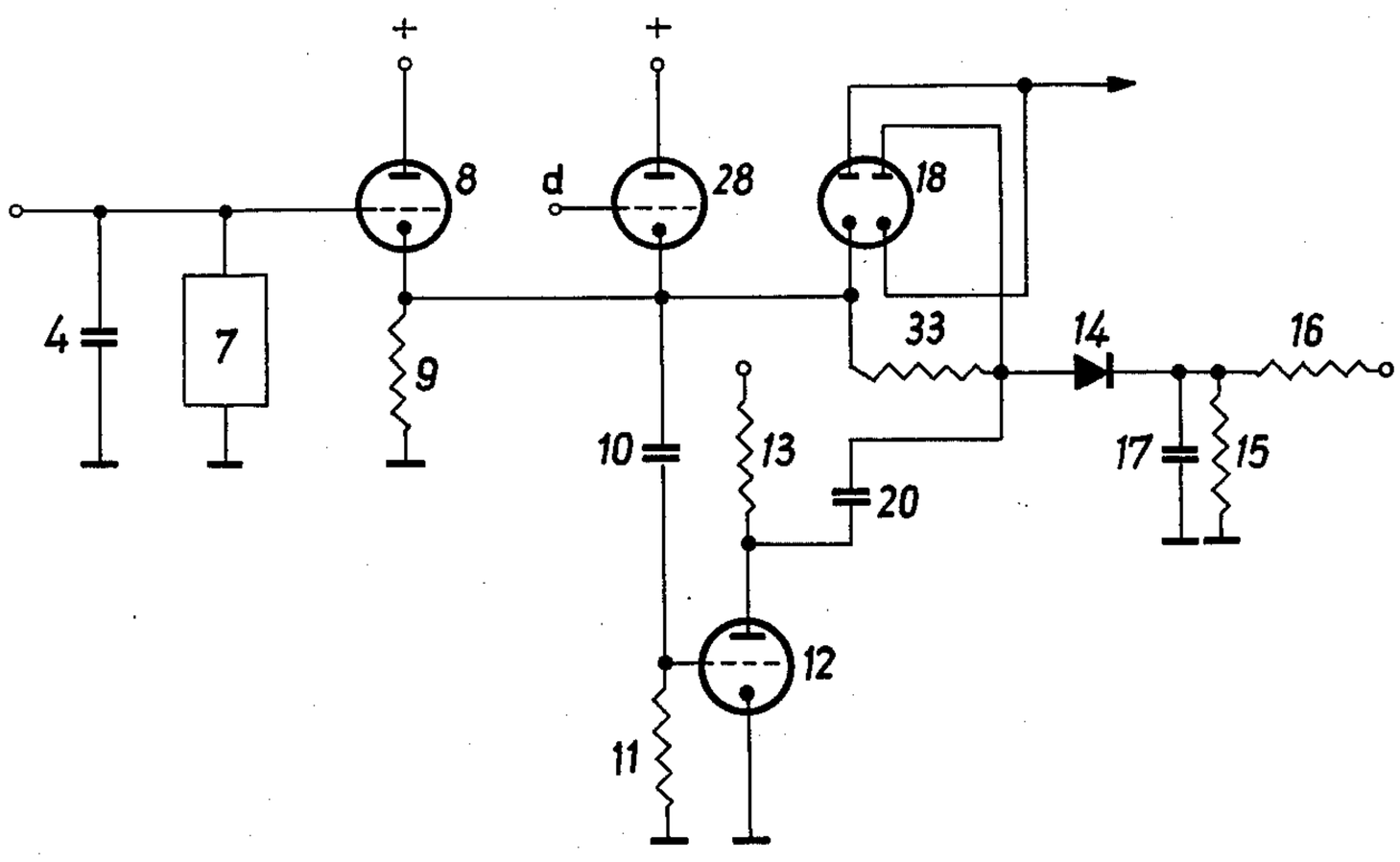


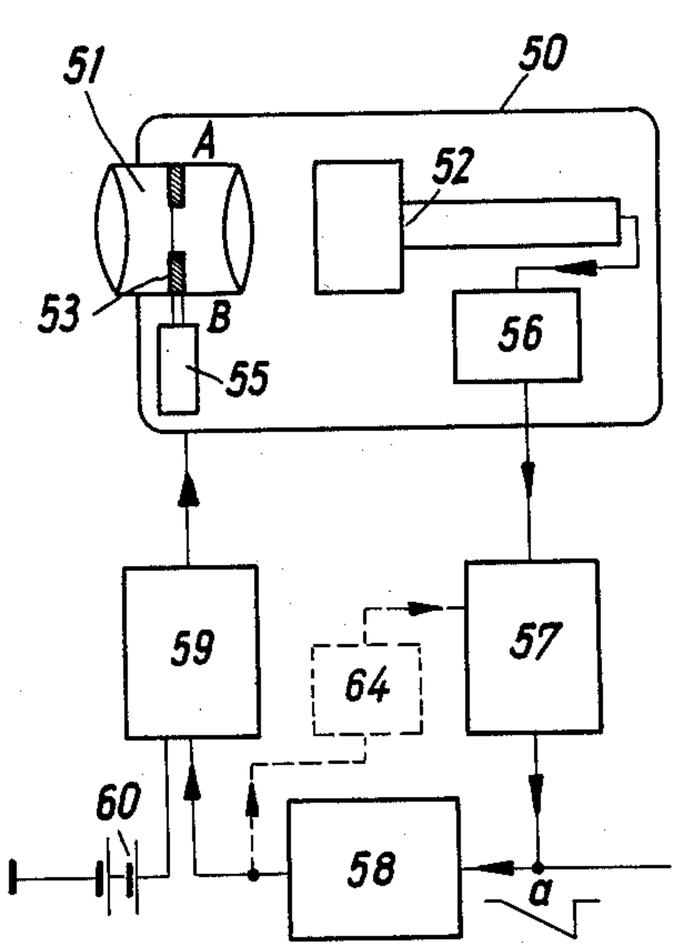
Fig. 4

Inventor:
Emil Sennhenn
By Michael S. Striker
Attorney

Aug. 27, 1963 E. SENNHENN 3,102,163

CIRCUIT ARRANGEMENT FOR PRODUCING A CONTROL VOLTAGE FOR AUTOMATIC CONTROL OF ELECTRIC SIGNALS

Filed Jan. 28, 1960 3 Sheets-Sheet 3



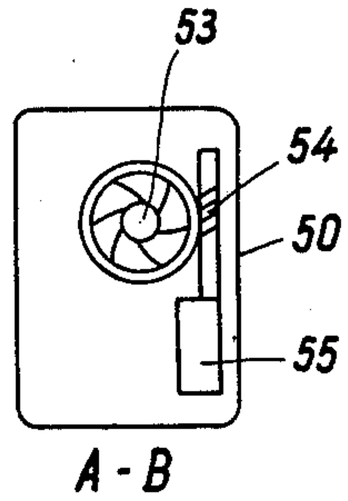


Fig. 5

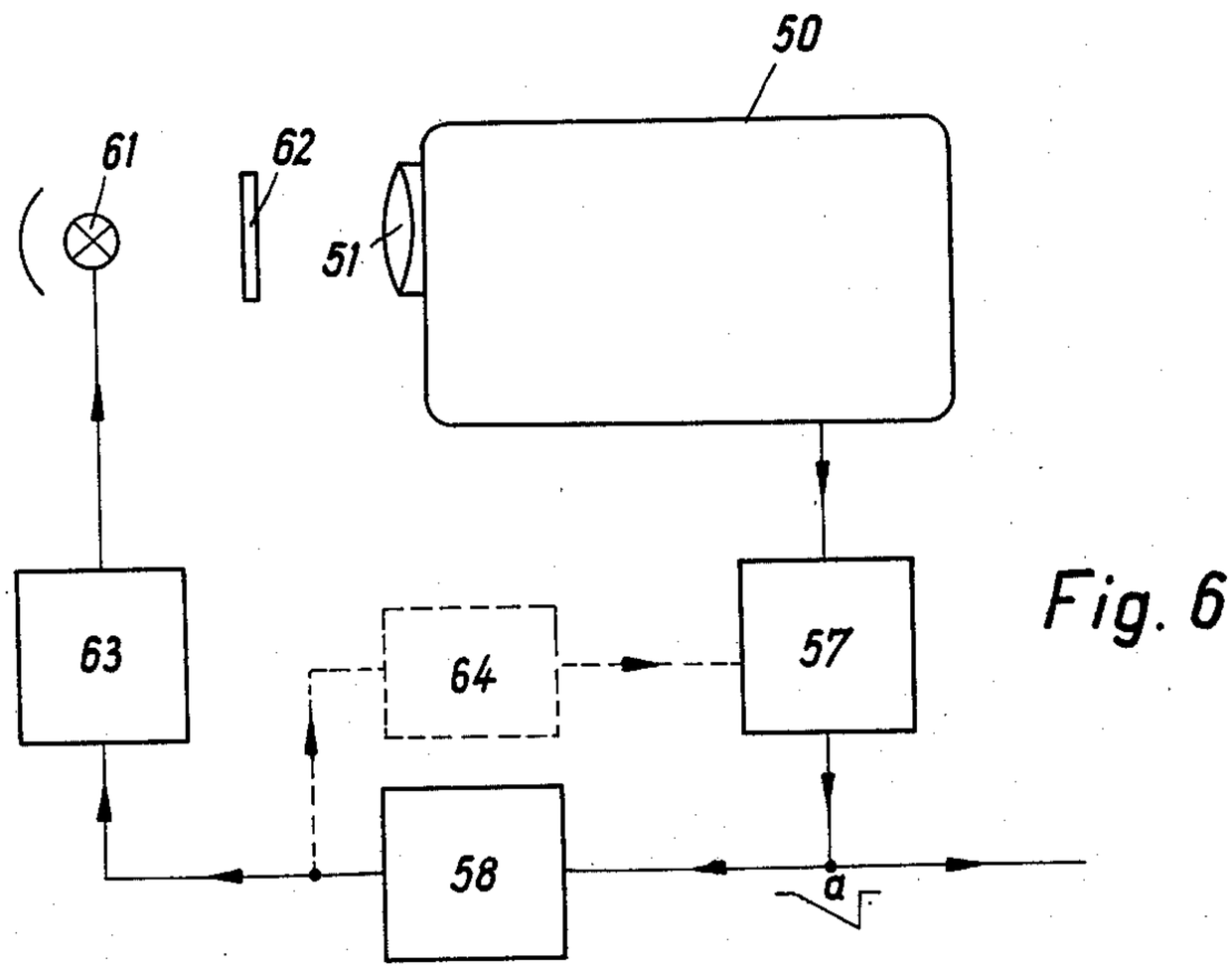


Fig. 6

Inventor:
Emil Sennhenn
BY Michael S. Striker
Attorney

United States Patent Office

3,102,163

Patented Aug. 27, 1963

3,102,163

CIRCUIT ARRANGEMENT FOR PRODUCING A CONTROL VOLTAGE FOR AUTOMATIC CONTROL OF ELECTRIC SIGNALS

Emil Sennhenn, Darmstadt-Arheilgen, Germany, assignor to Fernseh G.m.b.H., Darmstadt, Germany

Filed Jan. 28, 1960, Ser. No. 5,278
Claims priority, application Germany Jan. 28, 1959
14 Claims. (Cl. 178—7.2)

The invention relates to a circuit arrangement for producing a control voltage for automatic control purposes, especially in television amplifiers for controlling the gain in accordance with the peak level of a television signal.

To obtain a control voltage dependent upon the peak level, e.g. upon the white level of a television signal, the signal voltage is rectified by a peak rectifier and the voltage thus obtained is applied, if necessary with the interposition of time-constant elements, as control voltage to the amplifier to be controlled. The condenser of the peak rectifier is bypassed by a resistor so that in the time interval between the peak values of successive television pictures the condenser may discharge to a certain degree. The discharge time-constant is dependent upon the value of the resistance and upon the capacity of the condenser.

In order to avoid an impermissible change (for instance more than 2%) of the amplitude of the television signal during one frame the time-constant should be long. But in consequence, when the amplitude of the peak value of the television signal is suddenly becoming smaller—e.g. when a scene with bright high-lights is followed by a scene with less bright high-lights—then the control voltage produced by the circuit with a long time-constant cannot change quickly enough. If the value of the control voltage should quickly respond to changes of the peak value of the television signals, a short time-constant would be necessary. But when using an automatic gain control circuit with small time-constant in control amplifiers for television signals, the sensitivity to small white areas thus becomes smaller. Therefore, when the area of the high-lights is only small, the control voltage will not properly follow the changes of the peak value of said high-lights. Furthermore large areas of constant brightness will show an impermissible shadow.

It is an object of the invention to improve the quality of the transmitted television picture by providing another hitherto not used circuit for producing the control voltage for automatic control of electric signals.

It is a further object of the invention to provide an improved curcuit for producing a control voltage of automatic gain control which does not show the aforesaid disadvantages.

The invention shows a novel way to combine the hitherto contradictory appeals for large time-constant in regard to avoiding impermissible changes of amplitude during one frame and for a small time-constant in regard to proper response to small white areas.

It is therefore a still further object of the invention to provide a circuit for producing a control voltage which has a large time-constant during the transmission of each frame but a small time-constant between the end of one frame and the beginning of the next frame.

With the above objects in view the present invention mainly consists in a method of producing control voltage for automatic control of electrical signals comprising the steps of deriving an auxiliary voltage according to the peak values of the electrical signal, periodically sampling at the end of each frame for short periods said auxiliary voltage deriving a control voltage according to the sampled value of said auxiliary voltage and keeping the control voltage constant until the next sampling occurs, the auxiliary voltage being keyed to a constant potential shortly after each sampling. The constant potential to which the auxiliary voltage is keyed after each sampling should be smaller than the value corresponding to the smallest occurring peak value of the transferred signal.

In a preferred embodiment of the invention the control voltage will be obtained by means of a clamping device comprising at least two diodes of reversed polarity, one diode being controlled respectively opened by sampled pulses of the auxiliary voltage, the other diode being opened at the same time and for the same time by pulses of constant amplitude.

In an embodiment according to the invention the condenser of the peak rectifier is not bypassed by a resistor. Thus the condenser will be charged to a value which will be nearly equal to the peak value of the transferred signals, also if the areas of the high-lights in the picture are only small. After charging the condenser its potential will be practically constant. At the end of each frame the potential of said condenser will be sampled and afterwards the condenser will be quickly discharged so that at the end of the blanking interval the condenser is practically discharged. During the following frame the condenser will be charged again according to the peak value of the signal. As the condenser is periodically discharged before the beginning of a new frame, the new charging process is independent from the potential of the condenser during the previous frame. It is a great advantage of the new method that the control voltage will quickly respond to charges of the peak values of the transferred signal, not only the amplitudes are changing the higher values but also if they are changing the smaller values.

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 embodiments 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 drawings, in which:

FIG. 1 is a wiring diagram of an arrangement for producing a control voltage for automatic gain control of a television system,

FIG. 2 is a diagram showing the form of an impulse appearing in the method according to the invention,

FIG. 3 is a modification of a portion of the amplifier circuit of FIG. 1,

FIG. 4 is another modification of a portion of the amplifier circuit of FIG. 1,

FIG. 5 illustrates diagrammatically one form of a light control system for television according to the present invention, and

FIG. 6 illustrates diagrammatically another light control system for television.

FIG. 1 is illustrating a circuit for producing a control voltage dependent upon the white level of a television signal. The signal *a* is applied by way of a condenser **1** (e.g. 10,000 pF) to the semiconductor diodes **2** (e.g. of type S 33) and **3** (e.g. of type RL 31 *i*). Owing to the rectifying effect of the diodes the condenser **4** charges to the peak level of the signal *a*. The semiconductor diode **2** receives a small negative bias voltage (e.g. —1 v.) by way of the voltage divider consisting of the resistances **5** (e.g. 100 kΩ) and **6** (e.g. 1 kΩ) from a voltage source of e.g. —100 v. applied to **5**. No discharge resistance is provided for the rectified voltage on condenser **4**, so that its dependence upon the size of the white areas is very small.

If it is desired to improve still further the sensitiviness for small white area, a clamping device driven by im-

pulses of line frequency can be used instead of diode **2**. Further the source for signal *a* should have a small inner resistance so that also peak values of the television signal which are corresponding to small white areas will charge the condenser **4** up to that peak potential.

By means of a clamp circuit **7** the condenser **4** is discharged at the end of each frame to a constant voltage, which corresponds for example to zero potential. For this purpose the clamp circuit is fed with frame frequency repetition frequency clamp impulses *b, b'* of e.g. 3% of the duration of one frame. In this manner it is arranged that condenser **4** becomes charged to the greatest value of signal voltage appearing during each frame and retains this charge until the end of each frame.

The voltage appearing on the condenser **4** is applied to the control grid of a valve **8** (e.g. one section of an E88CC double triode) connected as a cathode follower, of which the anode is connected to the operating voltage for the valves of the circuit arrangement (e.g. +150 v.) and in the cathode circuit of which is connected a resistance **9** (e.g. 600 Ω).

The valve **8** is normally cut off and is opened only for a short time at the end of each frame. This is effected by an impulse *c*, which is applied to the grid of a valve **28**, of which the cathode is connected to the cathode of the valve **8**. The impulse *c* has a longer duration that the clamp pulses *b, b'*. Its duration may amount to e.g. 6% of the duration of a frame. The trailing edges of the impulses *c* and *b, b'* approximately coincide in time. The leading edges of the impulses *c* therefore occur at about e.g. some 3% of the frame duration before the leading edges of the clamp impulses *b, b'*. In the time the beginning of the impulses *c* to the incidence of the clamp impulses *b, b'* valve **8** thus transmits the control voltage appearing on the condenser **4** and subsequently, during the time of the clamp impulses *b, b'*, the constant voltage level to which the condenser **4** is discharged by the clamp circuit.

The voltage waveform *d* appearing at the cathode of valve **8** is illustrated in FIG. 2. During the first part of the impulse *c* the pulse amplitude corresponds to the control voltage R, for the duration of the clamp impulses *b, b'* the constant voltage K appears.

By way of a coupling circuit consisting of the condenser **10** (e.g. 0.2 μf) and the resistance **11** (e.g. 1 MΩ) the voltage *d* of FIG. 2 is transmitted to the grid of a further valve **12**. On the anode resistance **13** (e.g. 3 kΩ) of this valve **12** (e.g. one section of an E88CC double triode) the pulse form voltage appears with opposite polarity (*e*).

It is here arranged through the diode **14** that the amplitude of this signal *e* is limited to a constant amount. The limiter diode **14** receives a suitable bias voltage by way of a voltage divider with the resistances **15** and **16** from the operating voltage (+150 v.). The bias voltage is bypassed by a condenser **17** (e.g. 8 μf).

The impulse *e* held constant in amplitude by the limiter and the impulse *d* appearing at the cathode of the valve **8**, of which the amplitude R corresponds to the magnitude of the peak level contained in the signal are employed for keying a double diode **18**. For this purpose the voltages of impulse form are applied to the cathode of the one and the anode of the other diode section of the double diode **18** by way of the condensers **19** and **20** respectively (each e.g. 0.2 μf). In series with the two diode sections are connected semiconductor diodes **21, 22** which, by connection to a voltage divider with the resistance **23** (e.g. 3 kΩ) and **24** (e.g. 100 kΩ) receive a small positive bias voltage (e.g. +4 v.) from the positive operating voltage.

According to the diagram illustrated in FIG. 3 it is also possible to use resistances **31** and **32** (e.g. 1 MΩ) instead of the diodes **21** and **22**. If it is desirable that the circuit should respond also to very slow changes of the peak value, condenser **19** should be rather large or the wires leading to condenser **19** should be joined.

FIG. 4 illustrates how in such case the diodes **21, 22** of FIG. 1 respectively the resistances **31** and **32** of FIG. 3 are replaced by the high resistance **33**. The voltage divider **23, 24** of FIG. 3 and FIG. 1 may be dispensed with.

By way of the keying circuit with the double diode **18** the condenser **25** (e.g. 1000 pF) is charged during the appearance at the keying circuit of the voltages of impulse form to the control voltage R, which the condenser **25** retains during the period of one frame. From this control voltage is controlled a valve **26** which is connected as a cathode follower and from the cathode resistance **27** of which may be taken the control voltage for the controlled amplifier.

Valve **26** of the circuit shown in FIG. 1 may also serve for amplification of television signals; it can be a variable μ-valve of a multistage amplifier. In that case condenser **25** serves for coupling valve **26** with the preceding amplifying valve, its one end not being earthed but connected to the anode of said preceding valve. The automatic gain controlled television signal can be taken either from the cathode or from the anode of valve **26**.

The input signal *a* for the circuit producing the control voltage can be taken from the amplifier either before the gain controlled stage or after it.

The control voltage taken e.g. from the cathode of valve **26** can also serve to control the amount of light which is reaching the photocathode of the pickup tube generating the television signals, according to the peak values of the television signal.

This automatic light control can be done e.g. by varying the opening in an iris-diaphragm or another light control device according to the value of the derived control voltage.

FIG. 5 illustrates diagrammatically and partially cross-sectionally such a light control system for a television camera. The television camera **50** is fitted with a lens system **51**. The amount of light reaching the photosensitive surface of the television pick-up tube **52** can be controlled by means of an iris-diaphragm **52** which is inserted in the optical path between lens system **51** and television pick-up tube **52**. The size of the opening in the diaphragm **53** can be varied by means of a worm gear **54** driven by an electromotor **55**. The television signal derived from the output of preamplifier **56** is again amplified in the main amplifier **57**. From the final or an intermediate stage of said main amplifier **57** a video signal *a* is derived which is fed to a special amplifier **58**, its wiring diagram already shown in FIG. 1 and its function already described in connection with FIG. 1. The control voltage taken from special amplifier **58** is fed to a device **59** and compared therein with a constant potential delivered from a source **60**. If the control voltage is higher than the reference potential of source **60**, the motor **55** will be switched on and close the iris-diaphragm **53** until the control voltage is equal to the reference potential of source **60**. If the control voltage is lower than the reference potential, motor **55** will drive the worm gear **54** in the opposite direction and thus increase the opening of iris-diaphragm **53** until control voltage **58** reaches the pre-set reference potential.

When pictures are televised from films or slides it is also possible to vary the light of the projection lamp by controlling the voltage of said lamp. This method is illustrated diagrammatically in FIG. 6. Parts corresponding to FIG. 5 have the same reference numbers. The light of projection lamp **61** is passing through a slide **62** and a lens system **51** onto the photosensitive surface of a television pick-up tube (not shown) within the camera **50**. The television signal *a* delivered from camera **50** after being amplified in the main amplifier **57** will be fed to special amplifier **58** which has also been described. The control voltage delivered by said special

amplifier 58 will be fed to a magnetic amplifier 63. This magnetic amplifier is controlling the voltage of the electric current energizing the projection lamp 61. If the amplitude of the white peak values of television signals *a* is high, the voltage of the electric current for projection lamp 61 will decrease until the peak values correspond to the preset level.

It may be well understood that the system is also applicable on television film scanners the slide 62 being replaced by the film which is going to be televised.

In the embodiment diagrammatically illustrated in FIGS. 5 and 6 the variation of the light stream reaching the photosensitive surface cannot respond to quick variations of the control voltage. If a quick response is necessary, the control voltage can also be fed (see dotted lines in FIGS. 5 and 6) to a variable μ-value of main amplifier 57, a time-constant device 64 (e.g. a condenser shunted by a resistance) being inserted in said line.

When the peak values of succeeding frames (e.g. the transparency of succeeding slides or film pictures) are suddenly varying the output of the television signal is kept practically constant at first by variation of the gain of amplifier 57. Owing to the influence of the time-constant device 64 the additional control voltage impressed on amplifier 57 will slowly fade away and in the same time the light control device (iris-diaphragm in FIG. 5 or magnetic amplifier in FIG. 6) will accordingly vary the amount of light which is reaching the photosensitive surface of the television pick-up tube or photocell.

It lies within the scope of the invention to vary the gain of a multiplier, e.g. the multiplier section of the television pick-up tube or photocell instead of varying the gain of a variable μ-value in an amplifier.

What is claimed as new and desired to be secured by Letters Patent is:

1. An arrangement for producing a control voltage suitable for regulating the automatic control of the amplification of periodically recurrent electrical signals of varying amplitudes, comprising, in combination, peak rectifier means adapted to receive the periodically recurrent electrical signals of varying amplitudes and furnishing intermediate voltage pulses at the frequency of the recurrent periods during which said electrical signals occur and corresponding in amplitude to the peak amplitude values of said electrical signals during said periods; sampler circuit means for periodically sampling the amplitudes of said intermediate voltage pulses during predetermined brief sampling periods close to the ends of consecutive ones of said recurrent periods, respectively; keying means for keying the amplitudes of said intermediate voltage pulses to a predetermined value immediately after each sampling period; and circuit means for deriving from the sampled amplitude values of said intermediate voltage pulses a control voltage and including voltage level control means for keeping the amplitude of the control voltage thus obtained during one of said recurrent time periods substantially constant through the next following one of said recurrent time periods, respectively.

2. An arrangement for producing a control voltage suitable for regulating the automatic control of the amplification of electrical video signals of varying amplitudes, comprising, in combination, peak rectifier means adapted to receive the electrical video signals of varying amplitudes occurring during consecutive frame periods and furnishing intermediate voltage pulses at the frequency of the frame periods during which said electrical video signals occur and corresponding in amplitude to the peak amplitude values of said electrical video signals appearing during individual frame periods, respectively; sampler circuit means for periodically sampling the amplitudes of said intermediate voltage pulses during predetermined brief sampling periods close to the ends of consecutive ones of said frame periods, respectively; keying means for reducing the amplitudes of said intermediate voltage pulses to a predetermined value immediately after each sampling period, said predetermined value being smaller than the smallest occurring peak amplitude value of said electrical video signals; and circuit means for deriving from the sampled amplitude values of said intermediate voltage pulses a control voltage and including voltage level control means for keeping the amplitude of the control voltage thus obtained during one of said frame periods substantially constant through the next following one of said frame periods, respectively.

3. An arrangement for producing a control voltage suitable for regulating the automatic control of the amplification of electrical video signals of varying amplitudes, comprising, in combination, peak rectifier means adapted to receive the electrical video signals of varying amplitudes occurring during consecutive frame periods and furnishing intermediate voltage pulses at the frequency of the frame periods during which said electrical video signals occur and corresponding in amplitude to the peak amplitude values of said electrical video signals appearing during individual frame periods, respectively; sampler circuit means for periodically sampling the amplitudes of said intermediate voltage pulses during predetermined brief sampling periods close to the ends of consecutive ones of said frame periods, respectively; keying means for reducing the amplitudes of said intermediate voltage pulses to a predetermined value immediately after each sampling period, said predetermined value being smaller than the smallest occurring peak amplitude value of said electrical video signals, said keying means including means for furnishing constant amplitude control pulses during the intervals between the ends of said sampling periods and the ends of the corresponding frame periods, respectively, and clamping circuit means periodically energized by said control pulses and causing said intermediate voltage to be reduced to said predetermined value during each of said intervals; and circuit means for deriving from the sampled amplitude value of said intermediate voltage pulses a control voltage and including voltage level control means for keeping the amplitude of the control voltage thus obtained during one of said frame periods substantially constant through the next following one of said frame periods, respectively.

4. An arrangement for producing a control voltage suitable for regulating the automatic control of the amplification of electrical video signals of varying amplitudes, comprising, in combination, peak rectifier means adapted to receive the electrical video signals of varying amplitudes occurring during consecutive frame periods and furnishing intermediate voltage pulses at the frequency of the frame periods during which said electrical video signals occur and corresponding in amplitude to the peak amplitude values corresponding to white of said electrical video signals appearing during individual frame periods, respectively; sampler circuit means for periodically sampling the amplitudes of said intermediate voltage pulses during predetermined brief sampling periods during the blanking periods between consecutive ones of said frame periods, respectively; keying means for reducing the amplitudes of said intermediate voltage pulses to a predetermined value immediately after each sampling period, said predetermined value being smaller than the smallest occurring peak amplitude value of said electrical video signals; and circuit means for deriving from the sampled amplitude values of said intermediate voltage pulses a control voltage and including voltage level control means for keeping the amplitude of the control voltage thus obtained during one of said blanking periods substantially constant through the next following one of said frame periods, respectively.

5. An arrangement for producing a control voltage electrical video signals of varying amplitudes, comprising in combination, peak rectifier means adpted to receive the electrical video signals of varying amplitudes occurring during consecutive frame periods and furnishing inter-

mediate voltage pulses at the frequency of the frame periods during which said electrical video signals occur and corresponding in amplitude to the peak amplitude values corresponding to white of said electrical video signals appearing during individual frame periods, respectively; sampler circuit means for periodically sampling the amplitudes of said intermediate voltage pulses during predetermined brief sampling periods during the blanking periods between consecutive ones of said frame periods, respectively; keying means for reducing the amplitudes of said intermediate voltage pulses to a predetermined value immediately after each sampling period, said predetermined value being smaller than the smallest occurring peak amplitude value of said electrical video signals, said keying means including means for furnishing constant amplitude control pulses during the intervals between the ends of said sampling periods and the ends of the corresponding blanking periods, respectively, and clamping circuit means periodically energized by said control pulses and causing said intermediate voltage to be reduced to said predetermined value during each of said intervals; and circuit means for deriving from the sampled amplitude values of said intermediate voltage pulses a control voltage and including voltage level control means for keeping the amplitude of the control voltage thus obtained during one of said blanking periods substantially constant through the next following one of said frame periods, respectively.

6. An arrangement for producing a control voltage suitable for regulating the automatic control of the amplification of electrical video signals of varying amplitudes, comprising, in combination, peak rectifier means adapted to receive the electrical video signals of varying amplitudes occurring during consecutive frame periods and furnishing intermediate voltage pulses at the frequency of the frame periods during which said electrical video signals occur and corresponding in amplitude to the peak amplitude values of said electrical video signals appearing during individual frame periods, respectively; sampler circuit means for periodically sampling the amplitudes of said intermediate voltage pulses during predetermined brief sampling periods close to the ends of consecutive ones of said frame periods, respectively; keying means for reducing the amplitudes of said intermediate voltage pulses to a predetermined value immediately after each sampling period, said predetermined value being smaller than the smallest occurring peak amplitude value of said electrical video signals; and circuit means for deriving from the sampled amplitude values of said intermediate voltage pulses a control voltage and including voltage level control means for keeping the amplitude of the control voltage thus obtained during one of said frame periods substantially constant through the next following one of said frame periods, respectively, said voltage level control means including clamping circuit means comprising at least two diodes of mutually opposed polarities, both said diodes being connected to be controlled by said sampled intermediate voltage pulses, and one of said diodes being additionally connected to a source of constant voltage, the output of said clamping circuit means determining the desired control voltage.

7. An arrangement for producing a control voltage suitable for regulating the automatic control of the amplification of electrical video signals of varying amplitudes, comprising, in combination, peak rectifier means adapted to receive the electrical video signals of varying amplitudes occurring during consecutive frame periods and furnishing intermediate voltage pulses at the frequency of the frame periods during which said electrical video signals occur and corresponding in amplitude to the peak amplitude values corresponding to white of said electrical video signals appearing during individual frame periods, respectively; sampler circuit means for periodically sampling the amplitudes of said intermediate volt-

age pulses during predetermined brief sampling periods during the blanking periods between consecutive ones of said frame periods, respectively; keying means for reducing the amplitudes of said intermediate voltage pulses to a predetermined value immediately after each sampling period, said predetermined value being smaller than the smallest occurring peak amplitude value of said electrical video signals; and circuit means for deriving from the sampled amplitude values of said intermediate voltage pulses a control voltage and including voltage level control means for keeping the amplitude of the control voltage thus obtained during one of said blanking periods substantially constant through the next following one of said frame periods, respectively, said voltage level control means including clamping circuit means comprising at least two diodes of mutually opposed polarities, both said diodes being connected to be controlled by said sampled intermediate voltage pulses, and one of said diodes being additionally connected to a source of constant voltage, the output of said clamping circuit means determining the desired control voltage.

8. An arrangement for producing a control voltage suitable for regulating the automatic control of the amplification of periodically recurrent electrical video signals of varying amplitudes, comprising, in combination, peak rectifier means adapted to receive the electrical video signals of varying amplitudes occurring during consecutive frame periods and furnishing intermediate voltage pulses at the frequency of the frame periods during which said electrical video signals occur and corresponding in amplitude to the peak amplitude values of said electrical video signals appearing during individual frame periods, respectively; sampler circuit means for periodically sampling the amplitudes of said intermediate voltage pulses during predetermined brief sampling periods close to the ends of consecutive ones of said frame periods, respectively; keying means for reducing the amplitudes of said intermediate voltage pulses to a predetermined value immediately after each sampling period, said predetermined value being smaller than the smallest occurring peak amplitude value of said electrical video signals, said keying means including means for furnishing constant amplitude control pulses during the intervals between the ends of said sampling periods and the ends of the corresponding frame periods, respectively, and clamping circuit means periodically energized by said control pulses and causing said intermediate voltage to be reduced to said predetermined value during each of said intervals; and circuit means for deriving from the sampled amplitude values of said intermediate voltage pulses a control voltage and including voltage level control means for keeping the amplitude of the control voltage thus obtained during one of said frame periods substantially constant through the next following one of said frame periods, respectively, said voltage level control means including second clamping circuit means comprising at least two diodes of mutually opposed polarities, both said diodes being connected to be controlled by said sampled intermediate voltage pulses, and one of said diodes being additionally connected to a source of constant voltage, the output of said second clamping circuit means determining the desired control voltage.

9. An arrangement for producing a control voltage suitable for regulating the automatic control of the amplification of electrical video signals of varying amplitudes, comprising, in combination, peak rectifier means adapted to receive the electrical video signals of varying amplitudes occurring during consecutive frame periods and furnishing intermediate voltage pulses at the frequency of the frame periods during which said electrical video signals occur and corresponding in amplitude to the peak amplitude values corresponding to white of said electrical video signals appearing during individual frame periods, respectively; sampler circuit means for periodically sampling the amplitudes of said intermediate