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E. L. C. WHITE ET AL

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TELEVISION TRANSMITTING OR RECEIVING SYSTEM

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Fig. 1

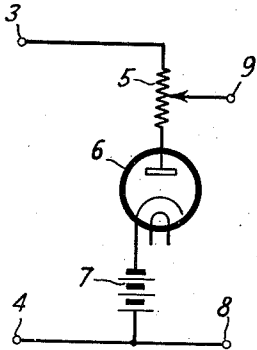


Fig. 2

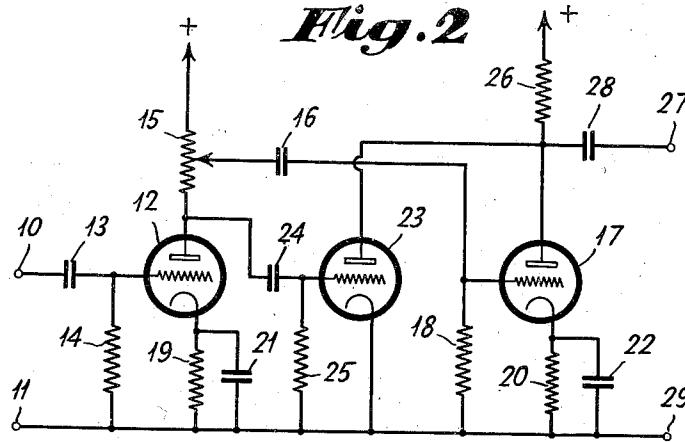


Fig. 3

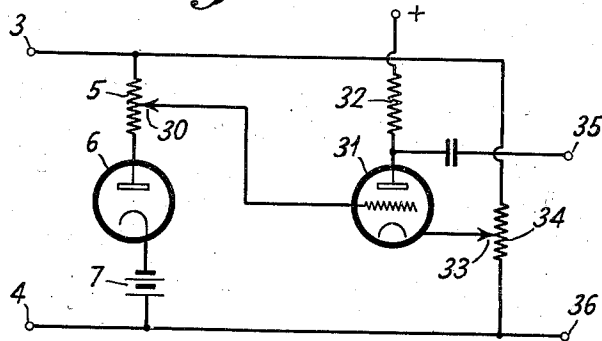
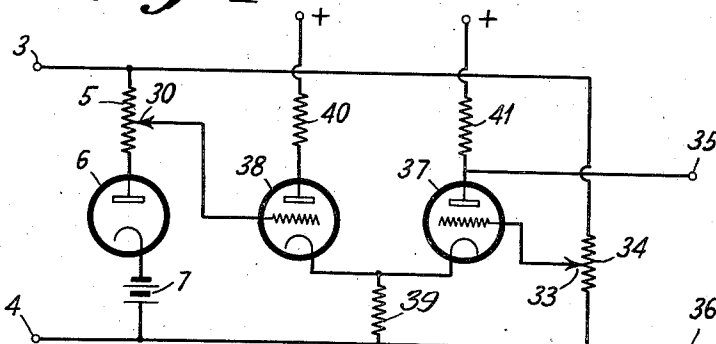


Fig. 4



INVENTORS
E. L. C. WHITE
O. L. RATSEY
BY *H. S. Snow*
ATTORNEY

UNITED STATES PATENT OFFICE

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TELEVISION TRANSMITTING OR RECEIVING SYSTEM

Eric Lawrence Casling White, Hillingdon, and Osbert Linn Ratsey, Havant, England, assignors to Electric & Musical Industries Limited, Hayes, Middlesex, England, a company of Great Britain

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4 Claims. (Cl. 178—7.1)

This invention relates mainly to television transmitting or receiving systems in which synchronizing signals are employed which have an amplitude outside the amplitude of the picture signals, but is also applicable to any system which employs signals comprising two portions, one portion having amplitudes greater than a certain datum value and the other portion having amplitudes less than said datum value.

In television transmitting systems the signals transmitted are composed of picture signals interspersed with synchronising signals, the synchronising signals being usually in the "black-than-black" direction. For various reasons it may be desirable to adjust the amplitude of the picture signals without altering the amplitude of the synchronising signals. If, for example, the picture signals and the synchronising signals are fed through a potentiometer, it will be found that on adjustment of the potentiometer to decrease the amplitude of the picture signals, the amplitude of the synchronising signals will likewise be reduced.

The necessity for adjusting the amplitude of the picture signals relatively to the synchronising signals may arise in the case where television signals are transmitted to a receiver from which the received signals after amplification are retransmitted. In this case it may be necessary to adjust the ratio of the picture signals to the synchronising signals before re-transmission, either to correct for misadjustment of the originally transmitted ratio or for attenuation of the synchronising signals due to non-linear amplification in the transmitter so that the ratio can be adjusted to that required for the main transmitter.

In addition, it is frequently necessary during television transmissions to change from one scanning device to another scanning device or from one transmitter to another transmitter. This changeover must be accomplished by fading out the signals from one scanner or transmitter and then fading in the signals from another scanner or transmitter. It is not feasible to mix two sets of signals in varying proportion, as in sound faders, since the two sets of synchronising signals may not be in phase. In the case where different synchronising signals are employed in the scanners or transmitters, the fading-out of one set of signals and the fading-in of another set of signals cannot, in the normal way, be effected, since with a reduction in the amplitude of the picture signals a reduction in amplitude of

the synchronising signals also occurs, and hence, at a certain instant during the changeover the receiver will not be fed with synchronising signals.

It is therefore the chief object of the present invention to provide an improved transmitting or receiving system whereby adjustment of the amplitude of picture signals or like signals can be effected without substantially reducing the amplitude of synchronising or like signals.

According to the main feature of the present invention there is provided a circuit arrangement for use with television signals comprising two portions, i. e. picture signals and synchronising signals, or for use with similar signals, one portion having amplitudes greater than a datum value and the other portion having amplitudes less than said datum value, comprising a unilaterally conducting device to which both picture and synchronising or the like signals are fed and which is arranged so as to discriminate between the picture and synchronising or the like signals, and to pass only one portion of the signal, and means for varying the amplitude of the picture or the like signals, and wherein in order to permit the amplitude of the picture or the like signals to be varied in amplitude without substantially varying the amplitude of the synchronising or the like signals, the unilaterally conducting device is arranged to permit the synchronising or the like signals to be substantially unaffected by said amplitude varying means.

In one embodiment of the present invention there is provided a circuit arrangement for use with television or the like signals comprising a potentiometer device in series with a unilaterally conducting device, to which both portions of the signals are fed, said unilaterally conducting device being so arranged as to pass only the picture or the like signals through said potentiometer device, the arrangement being such that when said potentiometer device is adjusted to vary the amplitude of the picture or the like signals, the amplitude of the synchronising or the like signals remains substantially unaffected.

In one modification of the above embodiment, in order to reduce the amplitude of the picture signals to zero, the residual signal which is due to the finite resistance of the unilaterally conducting device is neutralised by combining with it an equal signal in opposite phase.

The neutralising voltage may be derived from a potential dividing means shunting the source of picture synchronising or the like signals, and

in a further modification a valve which acts as a so-called cathode follower, is included in the circuit in such a manner as to allow the resistance of said potential dividing means to be increased.

According to another embodiment of the present invention there is provided a circuit arrangement for use with television or the like signals comprising two channels, one channel passing the picture or the like signals and including means for varying the amplitude of said picture or the like signals, and a second channel which includes a unilaterally conducting device which is so arranged as to pass only the synchronising or the like signals unaffected by said amplitude varying means, the outputs from the two channels being combined in a suitable manner.

According to a further embodiment of the present invention there is provided a circuit arrangement for fading from a first source of television or the like signals to a second source of television or the like signals, comprising two circuit arrangements according to any of the preceding claims, the two amplitude varying means are so coupled or ganged together and associated with switching means and having a common control that when the amplitude of the picture or the like signals of the first source is reduced substantially to zero, the switching means are operated to change from the first source to the second source and then the amplitude of the picture or the like signals of the second source is increased on continued movement of said common control.

In order that the said invention may be clearly understood and readily carried into effect it will now be more fully described with reference to the accompanying drawing in which:

Fig. 1 illustrates a circuit constructed in accordance with one form of the invention,

Fig. 2 is a circuit constructed in accordance with another form of the invention, and

Figs. 3 and 4 illustrate modification of the invention shown in Fig. 1.

With the circuit shown in Fig. 1, picture signals in the positive direction interspersed with synchronising signals in the negative direction are applied to input terminals 3 and 4, the signals with the D. C. component present being fed to the input terminals from a low impedance source, such as from a circuit which includes a so-called cathode-follower valve. The terminal 3 is connected through a potentiometer 5 to the anode of a diode 6, whilst the terminal 4 is connected to the cathode of the diode through a biasing battery 7 and to one output terminal 8, the other output terminal 9 being connected to the adjustable tapping point of the potentiometer 5. The cathode of the diode 6 is biased by the battery 7 to a potential equal to the potential of the black level of the signals applied to the terminals 3 and 4 so that the diode is only rendered conducting when picture signals are applied thereto, whilst the synchronising signals render the diode non-conducting. For example if the peaks of the synchronising pulses are at zero potential, the biasing potentials will require to be positive and equal in value to the amplitude of the synchronising pulses. With such an arrangement it will be appreciated that the synchronising signals are applied to the output terminals 8 and 9 with substantially their original amplitude despite the setting of the potentiometer whilst the amplitude of the picture signals derived from the output terminals depends on the setting of the potentiometer 5. It will thus be seen that by adjusting

the potentiometer 5, the amplitude of the picture signals can be reduced substantially to zero or increased from zero upwards, whilst the amplitude of the synchronising signals is substantially unimpaired. The diode 6 biased in the manner above described functions as discriminator means whereby the amplitude of one set of signals can be varied without substantially affecting the amplitude of another set of signals. Instead of employing a diode, any other suitable construction of unidirectional conducting device may be employed.

With the arrangement described in connection with Fig. 1, it will be appreciated that a picture may be faded out whilst holding the picture in synchronism during such fading process and, at an appropriate time, the scanning device or transmitter from which the signals are being faded out is switched off and another scanning device or transmitter switched in simultaneously, the picture from the second scanning device or transmitter being faded in by means of an arrangement similar to that shown in Fig. 1. The arrangement shown also permits of adjustment of the amplitude of the picture signals relatively to the synchronising signals whilst maintaining the latter signals of substantially constant amplitude.

The arrangement shown in Fig. 1 may, in some circumstances, not prove altogether satisfactory, since it may be difficult to reduce the picture signals to less than about 5% of the maximum amplitude without loss of the higher frequencies.

Fig. 2 of the drawing illustrates an arrangement in which the signals can be faded as above described, and in which the picture signals can be reduced to zero without substantial attenuation of the higher frequencies. In this figure separate channels are provided in parallel, one for the picture signals and the other for the synchronising signals, the picture signal channel having means for varying the amplitude of the picture signals. The picture signals interspersed with synchronising signals in the "blacker than black" direction are applied to input terminals 10 and 11 and to the grid of a triode valve 12 which acts as a linear amplifier through a condenser 13, a leak resistance 14 being provided between grid and cathode as shown. The anode of the valve 12 is connected through a potentiometer 15 to the positive terminal source of anode current, not shown, whilst the tapping point in the potentiometer is connected through a condenser 16 to the grid of a further triode valve 17 which acts as a linear amplifier and has a leak resistance 18, as shown. The cathodes of the valves 12 and 17 are associated with biasing resistances 19 and 20, each shunted by by-pass condensers 21 and 22. The path through valve 12, potentiometer 15, condenser 16 to the grid of the valve 17 constitutes the channel for the picture signals and a further valve 23 is provided which constitutes an element of the channel for the synchronising signals. The anode of valve 12 is connected through a condenser 24 to the grid of the valve 23 a leak resistance 25 being provided between grid and cathode as shown, valve 23, condenser 24 and resistance 25 are arranged to function in the manner described in the specification of British Patent No. 419,441, so that in this manner the valve 23 which operates in non-linear manner only conducts when synchronising signals are applied to its control grid. The anodes of the valves 23 and 17 are connected together and through a load resistance 26 to the positive ter-

minal of an associated source of anode current, not shown. The combined output of picture signals and synchronising signals are applied to an output terminal 27 through a condenser 28, the other output terminal 20 being constituted by the negative terminal of the associated source of anode current to which the cathodes of the valves are connected as shown. It will be seen from the arrangement described, that the amplitude of the picture signals can be varied on adjustment of the potentiometer 15, and since the synchronising signals are not only fed through the potentiometer 15, but are also fed directly from the anode of the valve 12 to the valve 23, the amplitude of the synchronising signals cannot be reduced below a predetermined amount by adjustment of the potentiometer 15. Since the synchronising signals are fed to the valve 23 and are, consequently, amplified and added to the signals appearing in the anode circuit of valve 17, the output from the terminals 27 and 29 will consist of picture signals and synchronising signals the latter being variable but always of greater amplitude than the synchronising signals fed to the input terminals 10 and 11. In order to reduce the amplitude of the synchronising signals to the required constant level, the signals are stabilised with reference to "black level" by the use of for example the means described in the specification of British Patent No. 449,242, and the signal passed through a limiting stage in order to restore the synchronising signal to the required amplitude.

In this example also it will be seen that the circuit functions to discriminate by the provision of separate channels between the picture signals and the synchronising signals so that the former signals may be varied in amplitude without substantial decrease in amplitude of the synchronising signals below their original value.

Where the arrangement shown in Fig. 2 is employed for fading out a picture from one source and fading in a picture from another source, two circuits similar to that shown may be associated with the two transmitters and the two potentiometers may be arranged to be operated from a common control knob so that on initial movement of the knob the picture from one transmitter is faded out and at the mid-position of the knob the first transmitter is switched off and the other transmitter switched on, the final movement of the knob fading in picture signals from the second transmitter.

Fig. 3 of the drawing illustrates a further circuit in which the amplitude of the picture signals can be reduced to zero. It will be appreciated that the reason for the inability of the circuit shown in Fig. 1 to reduce the picture signals to zero is due to the finite resistance of the diode 6 when conducting and also by reason of the fact that it may be necessary to insert resistance in the cathode of the diode in order to mask variations of this finite resistance. Fig. 3 shows a circuit embodying a diode operating in accordance with Fig. 1 and in which the residual signal is neutralised by combination in opposite phase with an equal and opposite signal. As shown, the tapping point 30 is connected to the grid of a triode valve 31, which if desired may be biased in any suitable manner, the anode of which is connected through a load resistance 32 to the positive terminal of a source of anode current, not shown, whilst the cathode is connected to an adjustable tapping point 33 on a potentiometer 34 connected across the input terminals 3 and 4, such that the

signal amplitude on the cathode of the triode is substantially the same as the signal amplitude at the anode of the diode, that is to say the lowest signal amplitude applied to the grid. As result the signal output obtained at the output terminals 35 and 36 is zero when the tapping point 30 is in its lowermost position.

With the arrangement shown in Fig. 3, the resistance of the potentiometer 34 cannot be made so high as to constitute a negligible load on the input, since the portions of the resistance above and below the tapping point 33 are in a given ratio depending upon the residual voltage to be neutralised, and since the lower portion cannot be large as it constitutes the biasing resistance for the valve 31.

Fig. 4 illustrates an arrangement having the properties of the circuit shown in Fig. 3, but in which the resistance of the potentiometer 34 can be considerably increased compared with the resistance of the potentiometer 34 of Fig. 3. In this case, the voltage at the tapping point 33 is applied to the grid of a triode valve 37, which, if desired, may be biased in any suitable manner, the cathode of which is connected to the cathode of a triode valve 38 to the grid of which the tapping point 30 is connected, the cathodes of the two valves 37 and 38 being connected together and through a cathode resistance 39 to the negative terminal of the associated source of anode current, not shown. The resistance 39 may be returned with advantage to a potential more negative than that of the negative terminal of the source, allowing the resistance 39 to be made larger than would otherwise be possible. The anodes of the two valves are connected through load resistances 40 and 41 to the positive terminal of the source of anode current. The magnitude of the resistance 39 is such that the valve 38 is correctly biased as an amplifier and so that the potential of the cathode follows substantially potential variations of the grid of that valve. The tapping point 33 on the potentiometer 34 is such that, with the tapping point 30 of the potentiometer 5 in its lowermost position, the voltage applied to the grid of the valve 37 is equal to that appearing at its cathode and hence there is substantially no change in the anode current in valve 37, that is to say, there is substantially no picture signal output. When synchronising pulses are applied to the input terminals 3 and 4, the voltage on the grid of the valve 38 falls by the full magnitude of the synchronising pulses, whereas the voltage of the grid of the valve 37 falls by only a fraction of this amplitude.

The effect of the common cathode resistance 39 is to provide synchronising pulses in push-pull relation at the anodes of the two valves. During decrease of the amplitude of the picture signals by adjustment of the tapping point 30 of the potentiometer 5, picture signal will also be obtained in push-pull at the anodes of the two valves 37 and 38. The output terminals 35 and 36, therefore, provide picture signals, the amplitude of which can vary down to zero, and synchronising pulses of substantially constant amplitude in the same sense as the synchronising pulses applied to the input terminals 3 and 4.

In the above description reference has been made to synchronising signals in the blacker-than-black direction, but it must be understood that the invention can also be applied in cases where synchronising signals are in the whiter-than-white direction. If, for example, the synchronising signals are in the positive direction

and the picture signal in the negative direction then the diodes of Figs. 1, 3 and 4 are reversed. Fig. 2 will, however, only work with the synchronizing signals in the negative direction.

5 We claim:

1. In a television system wherein picture and synchronizing signals are present and constitute a single series of signals, the picture signals being present between synchronizing signals and having an amplitude greater than a predetermined datum value and the synchronizing signals occurring at substantially regular intervals and having an amplitude less than the predetermined datum value, and wherein the picture signals may be altered in intensity to the exclusion of and by an amount different from the change in intensity of the synchronizing signals, comprising a unilateral conducting device and an impedance connected in series, means for impressing the picture and synchronizing signals across said device and impedance, means for biasing said device against conductivity for amplitudes of less than substantially the said predetermined datum value, and an output circuit including said device and a portion of said impedance, the portion of the impedance included in the output circuit being less than the entire impedance.

2. In a television system wherein a single series of signals including picture and synchronizing signals are present, the picture signals being present between synchronizing signals and having an amplitude greater than the predetermined datum value and the synchronizing signals occurring at substantially regular intervals and having an amplitude less than the predetermined datum value, and wherein the picture signals alone may be altered in intensity to the exclusion of the synchronizing signals, comprising a discharge tube having a cathode and an anode, a resistance, means for connecting one end of said resistance to the anode of said discharge tube, means for applying the picture and synchronizing signals to the cathode and the other end of said resistance, means for normally maintaining said cathode positive with respect to said anode by an amount substantially equivalent to the said predetermined datum value, and an output circuit connected to said cathode and an adjustable point along said resistance.

3. In a television system wherein a series of signals are present, a portion of the signals hav-

ing an amplitude in excess of a predetermined value, the remaining portion of the signals having an amplitude less than a predetermined value, and wherein the portion having an amplitude in excess of the predetermined value may be altered in intensity with respect to the amplitude of the remaining portion of the signals, comprising a discharge device having a cathode and an anode, a resistance, means for connecting one end of said resistance to said anode, means for applying said series of signals to said cathode and the other end of said resistance, means for maintaining said cathode positive with respect to said anode by an amount substantially equivalent to said predetermined value, and an output circuit connected to said cathode and an adjustable point along said resistance intermediate the ends thereof.

4. In a television system wherein a single series of signals including picture and synchronizing signals are present, the picture signals having an amplitude greater than the predetermined datum value and the synchronizing signals having an amplitude less than the predetermined datum value, and wherein the picture signals alone may be altered in intensity to the exclusion of the synchronizing signals, comprising a first discharge tube including a cathode and an anode, a first resistance, means for connecting one end of said resistance to said anode, a second resistance connected in parallel with said first discharge tube and said first resistance, a second discharge tube including a cathode, a control electrode and an anode, means for connecting the cathode of said second discharge tube to a point along said second resistor, means for connecting said control electrode to a point along said first resistor, means including a load impedance for maintaining the anode of said second discharge tube positive with respect to said cathode, means for maintaining the cathode of said first discharge tube normally positive with respect to said anode by an amount substantially equivalent to said predetermined datum value, means for applying said single series of signals across said second resistance and said series-connected first discharge tube and first resistor, and an output circuit coupled to the cathode and anode of said second discharge tube.

ERIC LAWRENCE CASLING WHITE.
OSBERT LINN RATSEY.