

Sept. 15, 1942.

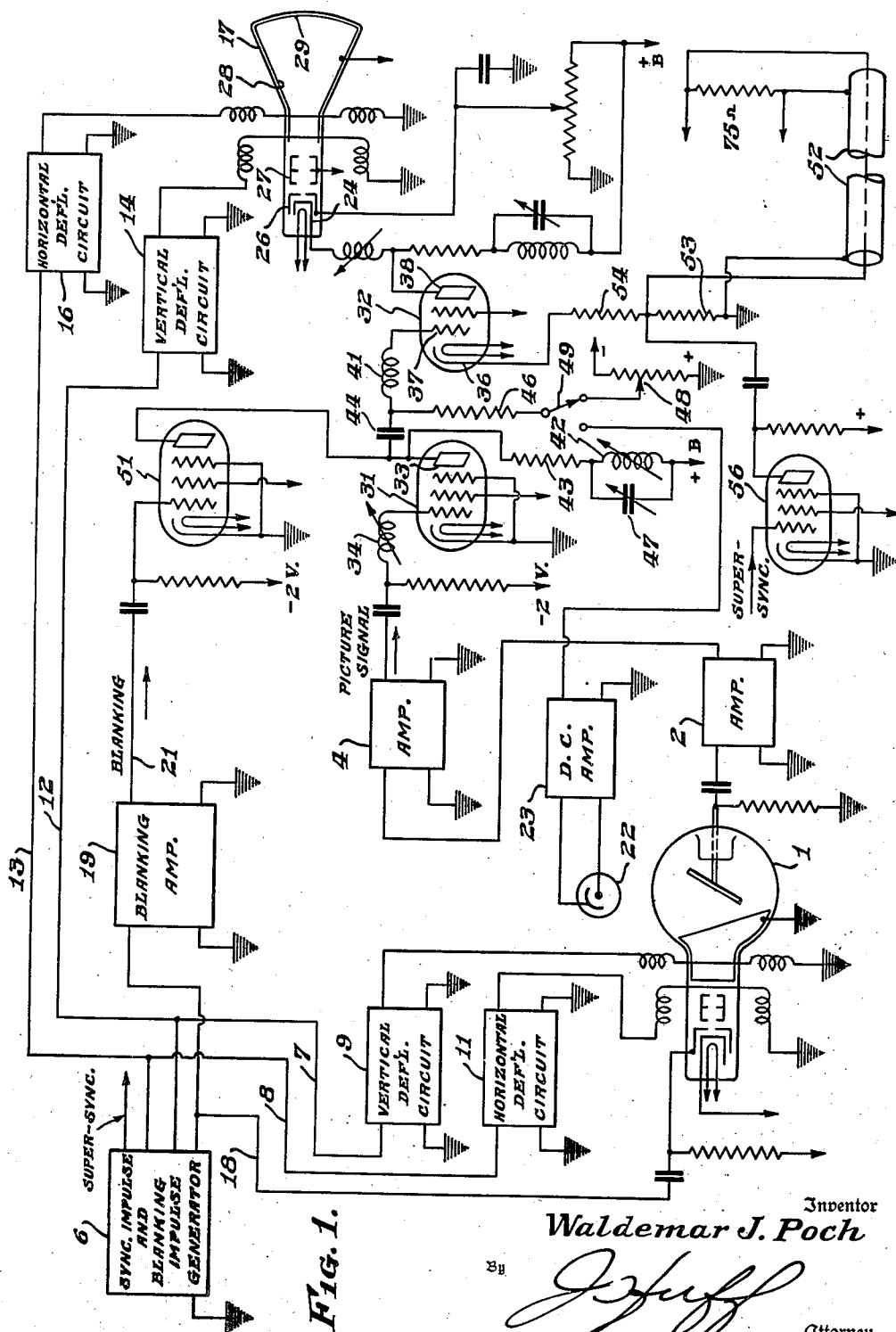
W. J. POCH

2,296,050

TELEVISION CIRCUIT

Filed Dec. 30, 1938

2 Sheets-Sheet 1



Waldemar J. Poch

Inventor

Attorney

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2 Sheets-Sheet 2

FIG. 2.

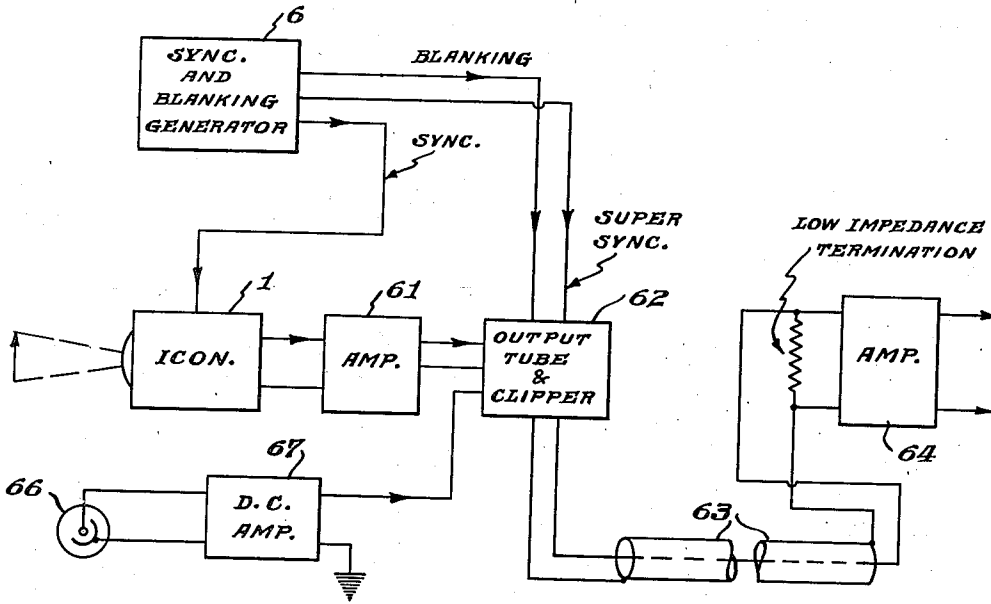


FIG. 3.

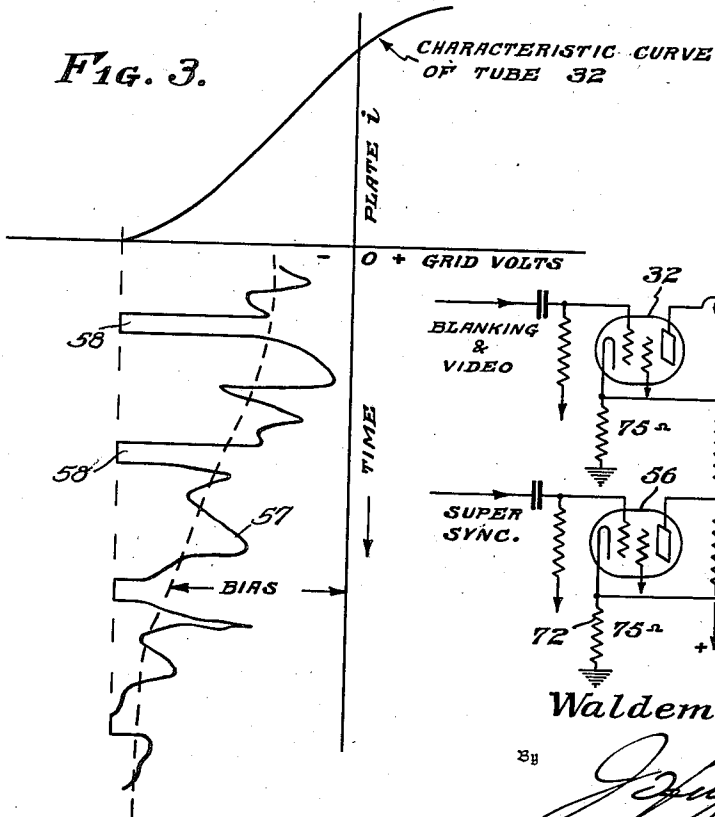
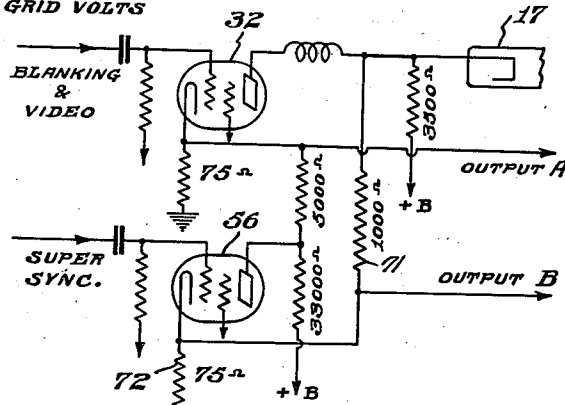


FIG. 4.



Inventor
Waldemar J. Poch

By

[Signature]

Attorney

UNITED STATES PATENT OFFICE

2,296,050

TELEVISION CIRCUIT

Waldemar J. Poch, Collingswood, N. J., assignor
to Radio Corporation of America, a corporation
of Delaware

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4 Claims. (Cl. 178—7.5)

My invention relates to television systems or circuits and particularly to television systems of the type wherein blanking impulses are combined with picture signals. Specifically, my invention relates to a system of the general type described in British Patent 448,065 and in the corresponding U. S. Patent 2,192,121 wherein blanking impulses are utilized to remove undesired transients or the like occurring during each return line period and wherein the height of the blanking impulses as received at the receiver is a measure of D. C. or background component of the picture.

An object of my invention is to provide in a system of the above-mentioned type an improved circuit for supplying picture signals and blanking impulses to a low impedance circuit such as a coaxial cable or the like.

A further object of my invention is to provide an improved circuit in which an output tube is utilized for supplying picture signal and blanking impulses to a cathode ray receiver tube and also to a low impedance line or cable.

In an embodiment of the invention as applied to demonstration equipment wherein there is a cable connection between the transmitting and receiving apparatus, I apply blanking signals to the last picture amplifier tube while maintaining the bias on this tube at the proper value to hold "black" in the picture close to the cut-off point of the tube. This bias may be maintained at the proper value either manually or by means of an automatic background control circuit. The resulting output of the tube is a mixture of blanking impulses and picture signal which is applied to the cathode ray receiver tube through direct current connections whereby the background of the received picture corresponds to that of the scene at the transmitter. This same output may be taken from a cathode resistor in the output tube circuit and fed to a low impedance line for supplying the signal to a plurality of receivers.

Other objects, features and advantages of the invention will appear from the following description taken in connection with the accompanying drawings in which

Figure 1 is a circuit diagram of one embodiment of my invention,

Figure 2 is a block diagram of another embodiment of my invention,

Figure 3 is a diagram which is referred to in explaining the invention, and

Figure 4 is a circuit diagram of another embodiment of my invention.

Referring to Fig. 1, I have shown, by way of

example, the invention applied to a television system wherein the various signals from the transmitter are transmitted to the receiver over a plurality of conductors which ordinarily are in a cable. The transmitter comprises a pick-up tube 1 such as the well-known iconoscope which supplies picture signals to an amplifier 2 and over a conductor 3 to a receiver amplifier 4.

A suitable impulse generator 6 supplies synchronizing or driving impulses over conductors 7 and 8 to the iconoscope, deflecting circuits 9 and 11 and over conductors 12 and 13 to the deflecting circuits 14 and 16 for a cathode ray receiver tube 17.

Blanking impulses from the generator 6 are supplied over a conductor 18 to the control electrode of the iconoscope 1 and through an amplifier 19 and a conductor 21 to the receiver.

For the purpose of obtaining a voltage representing the D. C. component in the picture signal which it is desired to transmit (i. e. to obtain a background control voltage), a photoelectric cell 22 is positioned to receive light reflected from the screen or mosaic of the iconoscope 1. The photoelectric cell output is amplified by a D. C. amplifier 23 whereby it may be utilized for automatic biasing at the receiver.

Referring more specifically to the receiving end of the system, it comprises the cathode ray tube 17 which is of the usual type having a cathode 24, a control electrode 26, a first anode 27, a second anode 28 and a fluorescent screen 29.

The picture signal from the amplifier 4 is further amplified by amplifier tubes 31 and 32 and then impressed across the input electrodes 24 and 26 of the cathode ray tube.

The tube 31 may be a conventional pentode having a plate electrode 33. Its input circuit may be provided with a peaking coil 34, if desired.

The tube 32 may be a screen grid tube having a cathode 36, a control grid 37 and a plate 38. Conventional resistance coupling may be provided between tubes 31 and 32. However, it is preferred to employ peaking coils 41 and 42 in addition to the usual plate resistor 43, coupling condenser 44 and grid resistor 46. A variable condenser 47 in shunt to coil 42 may be adjusted to vary the effectiveness of this coil for peaking.

The bias on the grid 37 of tube 32 may be varied manually by means of a variable tap 48 when a switch 49 is in the right-hand position shown. By throwing the switch 49 to the left-hand position, the bias on the grid 37 is changed automatically with change in the picture background

as described in the above-mentioned British patent.

The coupling between the video output tube 32 and the cathode ray tube 17 is direct current coupling whereby the background of the received picture corresponds to the background of the picture being transmitted. Peaking coils may be employed as in the coupling between tubes 31 and 32. It will be noted that the cathode 24 of the cathode ray tube is connected to the plate 38 of the output tube in order that the negative blanking impulses appearing on the grid 37 of the output tube will be negative at the grid 26 of the cathode ray tube to drive it beyond cut-off.

The blanking impulses for driving the output tube 32 beyond cut-off periodically are supplied through an amplifier tube 51 to the plate circuit of the tube 31 where blanking and picture signals are mixed in the plate resistor 43, this plate resistor being common to the tubes 51 and 31. The blanking impulses and the picture signals representative of "black" in the picture being transmitted appear on the grid 37 with a negative polarity.

The output tube 32 may be utilized for supplying picture signals and blanking signals efficiently over a cable 52 having the usual low impedance termination (such as 75 ohms) and, therefore, presenting a low impedance load to the output tube. The signal is supplied to the cable from a cathode resistor 53. A resistor 54 may be employed, if desired, to make the output tube characteristic more nearly linear.

The synchronizing impulses proper or "super-sync" impulses are set on top of the blanking impulses by feeding them through an amplifier tube 56 and across the resistor 53 whereby the complete signal for producing a picture in a television receiver appears across the cable termination.

The manner in which the output tube 32 is operated will be better understood by referring to Fig. 3. As shown, the signal impressed upon the grid of tube 32 comprises picture signals 57 and blanking impulses 58. The picture signal is represented as changing from a nearly all white picture to a nearly all black picture. It will be apparent that unless the bias is increased as this change takes place, there will be picture signals representing white which will drive the grid of tube 32 positive. Stated differently, with a fixed bias, the tube 32 would be operated on a non-linear part of its characteristic curve unless the grid swing were held within narrow limits. Since it is difficult to feed signal with sufficient amplitude into a low impedance load without employing large tubes, such operation with a fixed bias is undesirable.

The problem, from one aspect, is to operate efficiently a tube which is supplying to a low impedance load or line a signal in which the pedestals or blanking impulses vary in height with the picture background. The solution, in accordance with my invention, is to supply the blanking impulses to the output tube feeding into the low impedance line and, at the same time, vary the output tube bias in accordance with the picture background either manually or automatically.

Thus, as shown in Fig. 3, the signal supplied to the output tube may be allowed to swing the grid voltage over the entire linear region of the tube characteristic where the bias is varied to make the height of the blanking impulses a

measure of the picture background. Briefly put, by making the output tube 32 perform the function of clipping the blanking impulses, a function that must be performed by some tube in the system, it is made to operate with about twice the usual efficiency.

In Fig. 2, the feature of having the output tube clip the blanking impulses is illustrated as applied to a television transmitter which includes an impulse generator 6 and an iconoscope 1 corresponding to like units in Fig. 1. The picture signal is fed through an amplifier 61 to an output tube indicated by the block 62.

The blanking impulses, picture signals and super-sync impulses may be combined as described in connection with the output tube 32 in Fig. 1, and the combined signal then supplied to a coaxial cable 63 which carries the signal to an amplifier or modulator 64 at the radio transmitter. It will be understood that the cable 63 may be fed from either a plate resistor or a cathode resistor as desired. However, as in Fig. 1, it is the last tube or output tube feeding the cable 63 which clips the blanking impulses whereby the output tube may be operated efficiently. The bias on the output tube, of course, is varied in accordance with the picture background as illustrated in Fig. 3. This is done either manually or, if preferred, automatically by means of a photoelectric cell 66 and a D. C. amplifier 67 as previously described.

As illustrated in Fig. 4, my invention may be so applied to a circuit that an output of either polarity may be obtained. In Figs. 1 and 4, like parts are indicated by the same reference characters. The values of the resistors are indicated in ohms, these values merely being given by way of example.

It will be seen that the output A is obtained in the same way as shown in Fig. 1. To obtain the output B of the opposite polarity, resistors 71 and 72 are connected in series in the plate circuit of the output tube 32, the resistor 72 also being in the cathode circuit of the tube 56, and the output is taken off the resistor 72.

The super-sync impulses are mixed with blanking and video in the correct polarity since they appear across the cathode resistor 72.

I claim as my invention:

1. In a television receiver, a cathode ray tube having a control electrode and a cathode, an amplifier tube having an input circuit and having an output circuit which is direct current coupled to said control electrode and said cathode, said amplifier tube having a plurality of electrodes including a plate which is connected to said cathode and a control grid which is connected in said input circuit, means for applying a biasing potential to said control grid, means for applying picture signals from one signal channel to said input circuit, means for supplying negative blanking impulses from a different signal channel to one of said amplifier tube electrodes periodically with sufficient amplitude to block said amplifier tube periodically, and means for varying the biasing potential on said control grid.

2. In a television receiver, a cathode ray tube having a control electrode and a cathode, an amplifier tube having a control grid, a cathode and a plate and having an input circuit including said control grid and an output circuit including said plate, a direct current coupling between said output circuit and said control electrode and cathode, said plate being connected to said cathode, means for applying a negative biasing potential

to said control grid, means for applying periodically recurring picture signals from one signal channel to said input circuit which signals have periods therebetween during which undesired signals occur, means for supplying blanking pulses from a different signal channel and for driving said amplifier tube to cut-off by said pulses during said last-mentioned periods, and means for so varying said biasing potential that picture signal peaks representative of a certain picture shading such as "black" are held to a substantially fixed location on the characteristic curve of said amplifier tube.

3. In a television receiver, a cathode ray tube having a control electrode and a cathode, an amplifier tube having an input circuit and having an output circuit which is direct current connected to said control electrode and cathode, said amplifier tube having a plurality of electrodes including a plate which is connected to said cathode and including a control grid which is connected in said input circuit, said amplifier tube also including a cathode, a cathode resistor connected in series with said last cathode, means for applying a biasing potential to said control grid, means for applying picture signals from one signal channel to said input circuit, means for supplying negative blanking impulses from a different signal channel to one of said amplifier tube electrodes periodically with sufficient amplitude to block said amplifier tube periodically, means for varying the biasing potential on said control grid, and an output circuit connected across said cathode resistor.

4. In a television receiver, a cathode ray tube having input electrodes, an amplifier tube having a control grid, a cathode and a plate and having an input circuit including said control grid and an output circuit including said plate and having a cathode resistor common to said circuits, a direct current connection between said output circuit and said input electrodes, means for applying a negative biasing potential to said control grid, means for applying periodically recurring picture signals to said input circuit which signals have periods therebetween during which undesired signals occur, means for driving said amplifier tube to cut-off during said last-mentioned periods, means for so varying said biasing potential that picture signal peaks representative of a certain picture shading such as "black" are held to a substantially fixed location on the characteristic curve of said amplifier tube, a second amplifier tube having an input circuit, an output circuit and a cathode resistor common to said circuits, means for applying super-sync impulses to said second amplifier input circuit, means for coupling the output circuit of said second amplifier tube across the cathode resistor of the first amplifier tube, and a resistor connected from the plate of the first amplifier tube to the cathode of the second amplifier tube whereby signals of one polarity may be taken from one cathode resistor and signals of the opposite polarity taken from the other cathode resistor.

WALDEMAR J. POCH.