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TELEVISION RECEIVER

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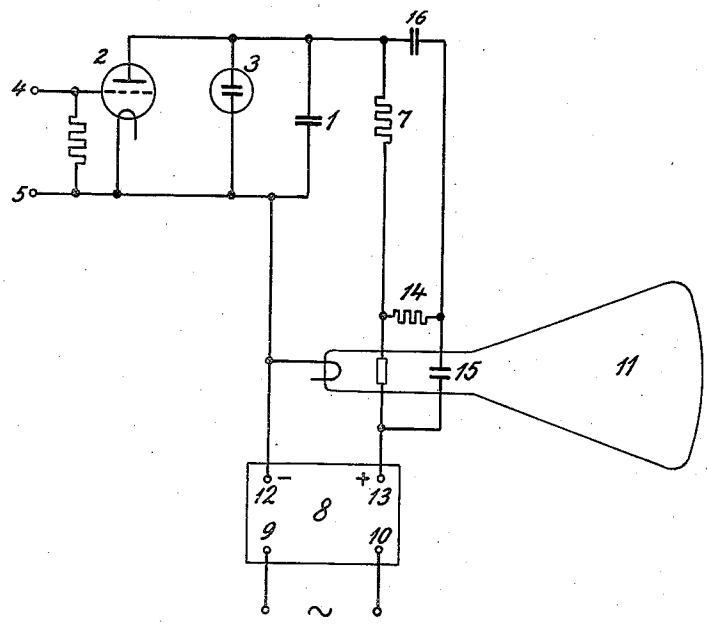


Fig.1

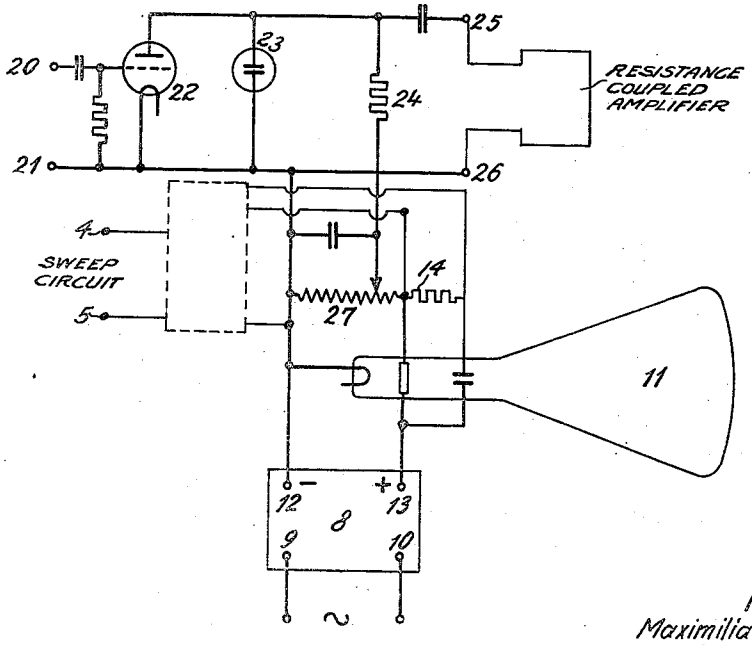


Fig.2

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TELEVISION RECEIVER

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4 Claims. (Cl. 178—5.8)

The present invention relates to television receivers, and more specifically to arrangements in such receivers for utilizing the Braun tube anode potential source also for other circuits forming part of the image and sound reproducing equipments thereof.

Preferably, a television receiver consists of three essential parts, that is, an image reproducing equipment, a sound reproducing equipment and a Braun tube which converts the received electric image current impulses into visible rays. The fundamental difference between the television receiver and a broadcasting receiver of the general type is that the former in addition to the normal potential source for the filament and anode potential supply also comprises a particular potential source for the anode potential supply to the Braun tube. This potential is in the order of several thousands of volts.

The present invention has for its object to provide means which permit the utilization of the Braun tube anode potential source likewise for feeding other circuits pertaining to the image and sound reproducing equipments. In fact, the use of the Braun tube anode voltage source, e. g. for certain of the tube circuits, considerably increases the efficiency of the television receiver. According to another object of the invention the above mentioned improvement is obtained by the use of conventional tubes, that is, tubes operative at the heretofore normally used anode potential.

According to the main feature of the invention, a glow discharge tube is employed and adapted to protect against eventually occurring excessive voltages the conventional tube and other circuit elements which by any reason are shunted across these tubes.

The invention consists in certain features of novelty which will be readily understood from the following description and be pointed out in the appended claims, reference being made to the accompanying drawing, in which:

Fig. 1 is a schematic wiring diagram illustrating a charging circuit according to the invention in connection with the image reproducing equipment of a television receiver; while Fig. 2 is a schematic diagram showing in detail the connection of the common high voltage D. C. supply to the sound equipment of the television receiver. The dotted rectangles shown in Figs. 1 and 2 represent the same equipment.

It is a well known expedient in order to secure correctly time deflection of the cathode ray of a Braun tube to employ a time base circuit in which a condenser is periodically charged through a resistance. When this condenser has been charged to a given value it is caused to discharge through a discharge tube shunted across said condenser. Either gas-filled tubes having a glowing cathode and a control grid, or high vacuum tubes may be employed as discharge tubes. It is a known fact that the charge characteristic of a condenser is ane-function. Indeed, there is a restricted range within these functions involve sufficient linearity for use in the television field. The usual value at which distortions will not yet impair the operation amounts approximately to 10 per cent of the charging potential, in other words, only a low percentage of the charging potential can be utilized for the actual cathode ray deflection.

According to one feature of the invention the potential source which supplies its direct current to the anode of the Braun tube, is likewise utilized for supplying the charge potential to the time base condenser. Assuming a constant ratio of the charging potential to the deflection potential, this expedient introduces a multiple increase with respect to the deflection potential. In other words, amplification is saved and the efficiency of the time base circuit is enhanced. For instance, it has been common practice in the past in standard television receivers fed from the mains supply to charge the time base condenser at approximately 300 volts which voltage represents the average direct current potential available in such receivers, so that the amplitude of the deflection potential amounts somewhat to 30 volts. However, the use of a charging potential of approximately 5,000 volts according to the invention provides a deflection potential peak value of 500 volts and this voltage is well adapted for deflecting purposes without any amplification.

It may happen that the charging condenser or the discharge tube across this condenser receives a potential which exceeds the normal peak value of the deflection voltage. This condition prevails on the one hand e. g. in cases that a hard valve, i. e. a high-vacuum valve, is employed as discharge tube and that by any reasons the synchronization impulses to the grid of this tube fail, for instance, when the synchronization gaps of the transmitted wave are covered by extraneous waves. Moreover, even in connection with soft valves, that is, gas-filled tubes, this potential may considerably exceed the peak value of the time base operating voltage, e. g. before the glow cathode assumes its operating temperature since this condition is delayed on account of the fact that soft tubes generally operate with an indi-

rectly heated cathode in contradiction to the directly heated cathodes of the rectifying tubes which deliver the charging potential.

In accordance with one of the features of the invention, a glow discharge tube is shunted across such circuit elements which might be exposed to the aforementioned deleterious excessive voltages. Not only the discharge tube but also the charging and coupling condensers become protected by this expedient. It is thus sufficient when the circuit elements are so dimensioned as to withstand the ignition voltage of the glow discharge tube. This voltage is adjusted to a value which is slightly in excess to the peak value of the normal deflection potential.

Referring first to Fig. 1 of the drawing, reference numeral 1 denotes the charging condenser which is shunted across a discharge tube 2 and a glow discharge tube 3, the use of which represents one feature of the invention. The synchronization impulses are impressed upon the discharge tube 2 over the terminals 4 and 5. The condenser 1 is charged from a device 8 through a charging resistance 7. This device 8 serving as the anode potential source may be a glowing cathode rectifier connected to the mains supply at the terminals 9 and 10. The anode potential for the Braun tube 11 is derived from the terminals 12 and 13 of the rectifying device 8 which according to the invention simultaneously feeds the charging circuit. The alternating relaxation voltage is derived from the charging resistor 7 and applied to the deflecting plates 15 of the Braun tube through a coupling condenser 16. A leak resistance 14 has for its object to leak off the electron flux for the cathode ray to the deflecting plates 15. The following data may serve as a guide for dimensioning the various elements of the circuit. The device which is fed from the mains supply delivers a direct voltage of 5,000 volts; the resistance of a charging resistor is 3 megohms, that of the leak resistor 10 megohms, and the charging condenser approximately 100 $\mu\mu$ F. to 10,000 $\mu\mu$ F. whether this condenser is used in connection with a deflecting voltage in the horizontal or the vertical scanning direction.

Moreover, the invention may advantageously be realized in connection with detector and resistance-capacity coupled amplifiers as used in the image and sound reproducing equipments of television receivers in which a high anode resistance is desirable. This resistance shall involve a possibly high useful alternating potential drop which is applied to the succeeding tube. However, this measure suffers under the drawback that also a direct potential drop occurs in the anode resistance so that the supply voltage of the tube is considerably decreased. On the other hand, this voltage shall not exceed a given minimum value, from which follows that said resistance cannot be so chosen as to offer that high resistance which seems desirable merely from the viewpoint of securing a high alternating potential drop.

The anode potentials for the detector and the resistance-capacity coupled amplifying stages are according to the invention delivered from the anode potential source of the Braun tube, and this expedient involves the possibility of using a considerably higher operating resistance than would otherwise be permissible because a sufficiently high supply voltage still persists of the tube. In fact, the increase across the tube beyond the permissible value, which heretofore has been described in conjunction with the first embodiment according to the invention, may also exist in the last mentioned case with the result that the function of the tube and of the further circuit elements connected across this tube is jeopardized. This risk is reliably eliminated according to the present invention by connecting a glow discharge tube parallel to the aforementioned discharge tube.

The last mentioned application of the inventive idea is illustrated in conjunction with the detector circuit shown in Fig. 2 in which the tube 22 serves as detecting valve. A high frequency alternating potential, for example, is impressed upon this valve over the terminals 20 and 21. A glow discharge tube 23 is shunted across this valve 2. A resistance 24 which serves as operative resistance conveys the rectified alternating potential to the succeeding tube stage through a coupling condenser and over the terminals 25 and 26. The anode potential for the detector voltage 2 is derived from a potentiometer 27 fed from the potential source 8 which according to the invention at the same time delivers the anode potential for the Braun tube. This potential source 8 may be a glowing cathode rectifier similar to that mentioned in connection with Fig. 1 and is connected to the mains supply over the terminals 9 and 10.

The improvement thus involved by the invention will be readily appreciated by considering the following data. The anode potential of the thermionic valve detector in the sound equipment of a conventional television receiver generally amounts to approximately 300 volts and its operating resistance is .2 megohm, while according to the invention a thermionic valve detector anode potential of 1,500 volts and an operating resistance of 1.5 megohms are employed. Approximately a sevenfold perfection is attained by this arrangement and, moreover, the amplifier stage required in the heretofore known devices can be omitted.

The provision of the glow discharge path parallel to the discharge valve in the circuit arrangement shown in conjunction with the first embodiment of the invention involves a further advantage. In fact, if the synchronization impulses fail the condenser would not be discharged if this glow discharge path would not be provided from which follows that the cathode ray would persist on the same point in such events. Since the cathode ray is controlled to "white" due to the large amplitude of the extraneous wave, the fluorescent screen becomes highly stressed so that a brown spot appears which considerably affects the quality of the image. This interference is rather troublesome. This drawback is avoided according to the invention since in the absence of synchronization impulses the function of the discharge tube is transferred to the glow discharge tube which sustains the motion of the cathode ray. The aforesaid cathode ray persistence on one point is thus eliminated.

Both embodiments heretofore described and illustrated clearly disclose that the present invention provides means which enable amplifier stages and thus amplifying tubes to be saved. The efforts to reduce the costs of television receivers to an appropriate level have heretofore been obstructed specifically on account of the large number of tubes required in such devices. The present invention, therefore, provides a substantial step toward the possibility of manufacturing television devices which are cheap enough for being accepted by the general public.

What is claimed is:

1. In a television receiver, an image reproducing equipment including a Braun tube, at least one discharge tube serving as a normal deflection control for said Braun tube and other circuit elements forming part of said equipment, a D. C. potential source supplying the anode of said Braun tube with direct current and likewise delivering the direct current required for operating said discharge tube and energizing said circuit elements, and means shunted across said discharge tube and circuit elements and connected to the deflecting system of said Braun tube to protect said discharge tube and circuit elements against breakdown by excess voltage and to provide an automatically effective emergency deflection control source for preventing discoloration of the Braun tube screen when said normal deflection control is ineffective.

2. In a television receiver, an image reproducing equipment including a Braun tube, a potential source supplying the anode of said Braun tube with a direct current, a timing circuit for controlling the deflecting system of said Braun tube comprising a resistance, a condenser and a discharge tube, said condenser being periodically charged from said source through said resistance and discharged through said discharge tube under control of received timing signals, a glow discharge device shunted across said condenser, the ignition voltage of said glow discharge device being higher than the normal peak value of said charging condenser whereby said glow discharge device acts as an emergency deflection control.

3. In a television receiver, a sound reproducing equipment, an image reproducing equipment, discharge tubes and other circuit elements forming part of said sound equipment, discharge tubes and other circuit elements forming part of said image reproducing equipment, said image reproducing equipment also including a Braun tube; a D. C. potential source supplying a high D. C. voltage to the anode of said Braun tube and for simultaneously supplying a D. C. operating voltage for the discharge tubes of the sound reproducing equipment, said D. C. source being connected in a D. C. sense to both the sound reproducing equipment and the image reproducing equipment; a glow discharge tube shunted across the circuit elements of the sound reproducing equipment, and a glow discharge tube shunted across the circuit elements of the image reproducing equipment both said glow discharge tubes arranged to protect the associated circuit elements from breakdown by excess voltage derived from said source, one of said glow discharge devices also serving as an emergency deflection control for the beam of the Braun tube.

4. A television receiver according to claim 3, in which the sound reproducing equipment has at least one resistance-capacity coupled discharge tube, said D. C. potential source supply is connected to the anode of said resistance-coupled discharge tube in a D. C. sense through the coupling resistor thereof, and said glow discharge tube shunted across the circuit elements of the sound reproducing equipment being connected between the anode and the cathode of said resistance-capacity coupled discharge tube.

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