Nov. 22, 1938. J. SCHUNACK 2,137,545

DETECTOR OUTPUT CIRCUIT

Filed April 13, 1936

Fig. 1.

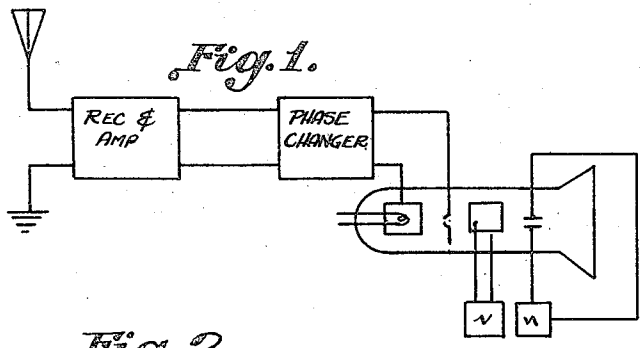
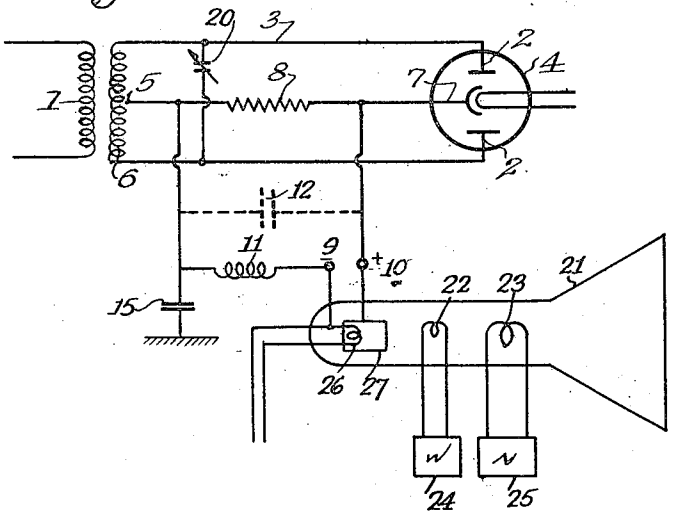


Fig. 2.



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DETECTOR OUTPUT CIRCUIT

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7 Claims. (Cl. 250—27)

The present invention relates to output circuits for amplifiers and deals particularly with the proportioning of the output circuit to the succeeding apparatus.

If the apparatus to be annexed is, for example, a Braun tube, such as is employed for reproduction purposes in television work, then, when the greatest luminosity is present, that is, when the incoming high frequency energy is greatest, a voltage maximum is required at the Wehnelt cylinder of the tube and to such a degree that the Wehnelt cylinder should thereby become more positive with respect to the filament.

In order to utilize the luminosity of the Braun tube to the fullest extent it is known to rectify the carrier wave and to change phase in another tube in order to apply the voltage at correct polarity to the Braun tube as illustrated schematically in Fig. 1 of the drawing. If the absolute luminosity of the image is to be conjointly transmitted, a separation has to be arranged between the carrier frequency amplifier and rectifier. The circuit therefore, owing to the use of multiple tubes and the necessary voltage sources, becomes undesirably dependent upon the frequency. A further drawback is that when the anode of the Braun tube is grounded, the full anode voltage, e. g., about 3000 volts is applied to the rectifier device. The insulation and screening necessary in such cases involves great weight and requires a large amount of space in the apparatus and hence high cost, while at the same time the operating reliability leaves much to be desired.

In order to obviate these drawbacks, in accordance with the present invention, an indirectly heated double diode tube is used, which is connected in push-pull relation and which has as small a capacity as possible with respect to the emitting cathode on the one hand and the anode as well as heating cathode on the other hand. The diode is directly controlled by the high frequency carrier oscillation.

An embodiment of the invention is shown in the drawing, wherein Fig. 1 shows a prior art circuit, and Fig. 2 illustrates schematically the present invention.

A conventional cathode ray tube 21, having saw tooth deflecting coils 22 and 23, fed by conventional saw tooth generators 24 and 25, has an emissive cathode 26, energized by suitable current means, and a Wehnelt cylinder 27 positioned to control the emission thereof. External circuit connections to cathode 26 and cylinder 27 are made from terminals 9 and 10, connected in a manner to be described hereafter.

To the output circuit 1 of a carrier frequency amplifier there is coupled a resonant circuit 3 which is tuned to the carrier frequency, and to the two voltage terminals of which the anodes 2 of the rectifier tube 4 are connected. The transformer is so proportioned that the circuit is damped to the proper degree by the thereon coupled rectifier. The rectified voltage is taken off from resistance 8 between the center 5 of the oscillation coil 6 and the cathode 7 of the rectifier. No high frequency voltage is present at the ends of this resistance 8 since there is a radio frequency ground from the cathode 7 for the carrier wave through capacitance 15 owing to the bridged circuit used. The rectified voltage at the cathode therefore has positive polarity, that is, at its high voltage terminal, and consequently is in correct phase for controlling the emission from the Wehnelt cylinder. Consequently image reversal is no longer necessary. Direct connection of the receiver between 9 and 10 has the advantage that no distortions will occur.

A prerequisite for unobjectionable operation is that the capacity of the effective cathode must be small with respect to the other electrodes. The entire harmful loading capacity is formed by the capacities within the tube and these capacities, in accordance with the invention, are kept small. It is not necessary to use a small capacity transformer for heating the rectifier tube, so that an appreciably cheaper apparatus of small size suffices.

It may also be preferable to tune the tuning circuit, for example, by inserting a variable condenser 20 so as to be able to operate with reduced inductance and so that the high frequencies will be deleteriously affected as little as possible.

The output resistance of the diode, in accordance with the above recited fundamentals, that is, maintaining the reactance losses due to interelectrode capacity at a minimum at the highest modulation frequency, will in general be of the order of between 1000 and 5000 ohms. With this resistance, there will always be associated a certain amount of carrier frequency voltage loss which will cause screen patterning of the image. In order to prevent this patterning, a high frequency choke 11 is interposed for example behind the rectifier resistance in the line leading to the control electrode. This high frequency choke 11 is so proportioned that together with the attached conductor cable the capacitative

effect of which is illustrated by capacitance 12, it forms a filter device which allows the modulation frequencies but not the carrier to reach the control electrode.

The natural resonance of this inductance-capacity system may lie between the highest modulation frequency and the carrier frequency and it is so chosen that voltage drop at the choke at the highest modulation frequency is of negligible value.

The circuit, when the arrangement is suitably proportioned permits a frequency curve to be obtained which is linear for the carrier frequency plus side bands or the slope of which approaches a straight line in the required manner. The arrangement may however also be so proportioned that definite frequency ranges, e. g. carrier or highest side bands, are given the preference.

The circuit described may be used in all cases where the negative terminal of the output circuit is to be grounded.

I claim:

1. In combination with television apparatus utilizing a cathode ray oscillograph tube, a resistance so connected and arranged that potential difference thereacross may control the intensity of the cathode ray in said tube, an input coil having a mid-point, a diode having a single cathode and two anodes, a connection from each of said anodes to opposite ends of said input coil, a connection from said cathode to one end of said resistance, and a connection from the opposite end of said resistance to the mid-point of said input coil.

2. In combination with television apparatus utilizing a cathode ray oscillograph tube, a resistance so connected and arranged that potential difference thereacross may control the intensity of the cathode ray in said tube, an input coil having a mid-point, a diode having a single cathode and two anodes, a connection from each of said anodes to opposite ends of said input coil, a connection from said cathode to one end of said resistance, and a connection from the opposite end of said resistance to the mid-point of said input coil, said input coil and connections therefrom to said anodes comprising a resonant circuit.

3. In combination with television apparatus utilizing a cathode ray oscillograph tube, a resistance so connected and arranged that potential difference thereacross may control the intensity of the cathode ray in said tube, an input coil having a mid-point, a diode having a single cathode and two anodes, a connection from each of said anodes to opposite ends of said input coil, a connection from said cathode to one end of said resistance, a connection from the opposite end of said resistance to the mid-point of said input coil, said input coil and connections therefrom to said anodes comprising a resonant circuit and means for tuning said resonant circuit.

4. In combination with television apparatus utilizing a cathode ray oscillograph tube having therein a Wehnelt cylinder and a control electrode, a resistance so connected and arranged that potential difference thereacross may control the intensity of the cathode ray in said tube, an input coil having a mid-point, a diode having a single cathode and two anodes, a connection from each of said anodes to opposite ends of said input coil, a connection from said cathode to one end of said resistance, a connection from the opposite end of said resistance to the mid-point of said input coil, said input coil and connections therefrom to said anodes comprising a resonant circuit, and a radio frequency choke connected between said input coil mid-point and said control electrode.

5. In combination with television apparatus utilizing a cathode ray oscillograph tube having therein a Wehnelt cylinder and a control electrode, a resistance so connected and arranged that potential difference thereacross may control the intensity of the cathode ray in said tube, an input coil having a mid-point, a diode having a single cathode and two anodes, a connection from each of said anodes to opposite ends of said input coil, a connection from said cathode to one end of said resistance, a connection from the opposite end of said resistance to the mid-point of said input coil, said input coil and connections therefrom to said anodes comprising a resonant circuit, a radio frequency choke connected between said input coil mid-point and said control electrode, and a connection between said Wehnelt cylinder and said diode cathode.

6. Apparatus as in claim 5, wherein a high capacitance exists between the leads to said Wehnelt cylinder and control electrode.

7. Apparatus as in claim 5, wherein the said capacitance between said Wehnelt cylinder and control electrode leads is so related to said radio frequency choke that only currents of signal modulation frequency may be passed therethrough.

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