Jan. 1, 1952 R. SUEUR 2,580,973

PULSE SIGNALING MEANS

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Fig. 1.

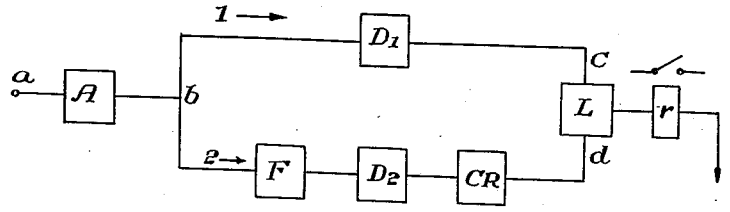


Fig. 2.

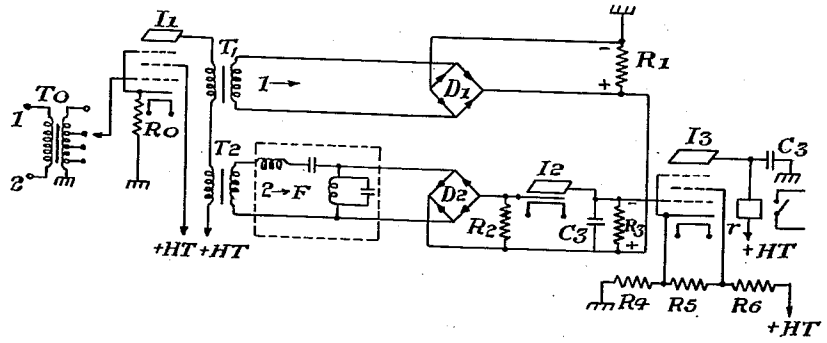
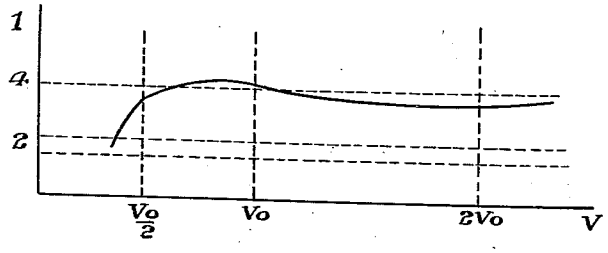


Fig. 3.



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PULSE SIGNALING MEANS

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5 Claims. (Cl. 179—1)

1

The present invention relates to signal transmitting systems, and more particularly to systems in which signals of a definite frequency to be retransmitted are likely to be superimposed by frequencies, particularly voice frequencies, which are not to be retransmitted.

It is an object of the present invention to provide a simple circuit for blocking the frequencies, particularly voice frequencies, which are not to be retransmitted.

It is another object of the present invention to provide a circuit of the kind described in which a device is connected in the circuit for the frequencies to be blocked which has different time constants for charging and discharging. In this way the signal transmitter is protected against operation caused by voice frequencies.

According to a preferred embodiment of the present invention the time constant device has a much smaller time constant for charging than for discharging. Therefore it blocks the disturbing frequencies practically immediately.

Other objects of the present invention will become apparent from the following detailed description thereof in connection with the accompanying drawings, in which

Fig. 1 is a circuit diagram showing the principle of the present invention;

Fig. 2 is a diagram showing by way of example an embodiment of the present invention; and

Fig. 3 is the current-voltage characteristic of the circuit shown in Fig. 2.

Referring now to the drawings and first to Fig. 1, it is seen that the circuit includes two branch circuits connected in parallel and presently to be described more in detail. The signals arrive at point *a* and are supplied to an amplifier A. The output of amplifier A branches at *b* in two branch circuits 1 and 2. Branch circuit 1 includes a first detector D_1 and leads at *c* to the output device including a vacuum tube system L and a relay *r* connected in series.

Branch circuit 2 includes a filter F, a second detector D_2, and a device CR charged by the detector D_2 in series and leads at *d* to the output device to which the first branch circuit is connected. The filter F is tuned to pass all frequencies which are different from a predetermined frequency, say 2,000 cycles per sec., particularly voice frequencies. The device CR has different time constants for charging and discharging, preferably a relatively small time constant for charging and a relatively large time constant for discharging.

The operation of this device is as follows:

Signals arrive at *a* and are amplified by the amplifier A. If the signals contain only the predetermined frequency which is not passed by the filter F, the signals proceed only along branch circuit 1 where they are rectified by detector D_1. The rectified signals are supplied to

2

the vacuum tube system L which energizes the relay *r* the armature of which moves in the rhythm of the signals and retransmits them.

If signals of any other frequency than the predetermined one, particularly of voice frequency, arrive at *a*, they are amplified by amplifier A and proceed partly along branch circuit 1 and partly along branch circuit 2, since the filter F allows such frequencies to pass. The part of the signals proceeding through branch circuit 1 tends to act on the vacuum tube system L in the same way as if a signal of the predetermined frequency had arrived, but it is prevented from acting on system L by the part of the signals proceeding through branch circuit 2 which after passing the filter F is rectified by detector D_2 and supplied to the device CR. This device, owing to its different time constants for charging and discharging, immediately blocks the system L against operation so that these signals are not retransmitted.

Referring now to Fig. 2 showing a diagram of an embodiment of the present invention, the point *a* of Fig. 1 is formed by the output of a transformer T_0 to the primary of which are applied the arriving signals. The amplifier A of Fig. 1 is designed in Fig. 2 as a vacuum tube l_1 the control grid of which is connected to the output of transformer T_0. In the anode circuit of tube l_1 the primaries of two transformers T_1 and T_2 are connected in series the secondaries of which feed the circuits 1 and 2, respectively. Circuit 1 leads to the detector D_1 shown as a two-way rectifier shunted by a resistance R_1 the positive terminal of which is connected to the control grid of a vacuum tube l_3 which corresponds to the tube system L of Fig. 1.

Branch circuit 2 leads first to a filter F consisting of a suitable combination of inductances and condensers, and then to a detector D_2 shown as a two-way rectifier. The filter F allows any frequency different from the predetermined frequency of, say, 2000 cycles per second to pass. The rectifier D_2 feeds the rectified signals to a resistance R_2 the negative terminal of which is connected to a cathode of a diode l_2 the anode of which is connected over a condenser C_3 to a resistance R_2. A relatively large resistance R_3 is connected in parallel to condenser C_3. The junction of the anode of diode l_2, condenser C_3 and resistance R_3 is connected to the control grid of tube l_3 to which the positive terminal of resistance R_1 is also connected. In the anode circuit of tube l_3 the relay *r* of Fig. 1 is connected.

Preferably the following numerical values are chosen for the resistances and the condenser:

R_3, 500,000 ohms
C_3, 30×10^{-9} farads
R_1, 2,500 ohms
R_2, 5,000 ohms

It will be readily understood that resistance R_2, the diode I_2, condenser C_3, and resistance R_3 form together the device CR of Fig. 1. The charging of the condenser is effected in a very short time dependent only on the values of resistance R_2 and condenser C_3. The discharging time constant of condenser C_3 is relatively large owing to the large value of resistance R_3. The control grid of tube I_3 which receives a positive bias from resistance R_1, is biased by resistance R_3 in a negative sense overcoming the bias by resistance R_1 whenever signals arrive which contain frequencies different from the predetermined frequency of, say, 2000 cycles per second. The negative biasing of the control grid of tube I, is effected almost instantaneously upon the arrival of signals having frequencies different from the predetermined frequency and the negative bias is maintained for some time owing to the large discharging time constant of condenser C_3.

With the numerical values given hereabove the tube I_3 receives a negative grid bias except for frequencies between 1,950 and 2,050 cycles per second.

Referring now to Fig. 3 showing the current i in the relay r as a function of the voltage v of the wave trains at the input of the transmitting device, it will be seen that the maximum distortion of the signals amounts to 10%.

An extensive testing of the circuit according to the invention has shown that voice frequencies, such as those of spoken words, do not cause an operation of the signalling system.

If desired, the filter F may be tuned to block any frequency differing from a plurality of predetermined frequencies.

What I claim is:

1. In a system for transmitting a predetermined desired signal frequency substantially to the exclusion of disturbing frequencies, a common input channel, a transmission channel, means for coupling said transmission channel to said input channel for transmitting both said signal frequency and said disturbing frequencies, a blocking channel, means coupling said blocking channel to said input channel, a signal transfer device adapted to be controlled by a potential applied thereto, means coupling said transfer device to said transmission channel and to said blocking channel, filter means in said blocking channel for rejecting said desired signal frequency and for passing said disturbing frequencies, and means including a time constant circuit in said blocking channel for producing a potential from said disturbing frequencies and for applying such potential to said transfer device to render it incapable of transferring said distributing frequencies from said transmission channel.

2. In a system for transmitting a predetermined desired signal frequency substantially to the exclusion of disturbing frequencies, a common input channel, a transmission channel, means for coupling said transmission channel to said input channel for transmitting both said signal frequency and said disturbing frequencies, a blocking channel, means coupling said blocking channel to said input channel, a controllable electron tube, means connecting said tube to said transmission channel and to said blocking channel, filter means in said blocking channel for rejecting said desired signal frequency and for passing said disturbing frequencies, and means including a time constant circuit in said blocking channel for producing a potential from said disturbing frequencies and for applying such potential to said tube to render said tube incapable of transferring such frequencies from said transmission channel, said time constant circuit having a relatively small time constant for charging and a relatively large time constant for discharging.

3. In a system for transmitting a predetermined desired signal frequency substantially to the exclusion of disturbing frequencies, a common input channel, a transmission channel, means for coupling said transmission channel to said input channel for transmitting both said signal frequency and said disturbing frequencies, a grid-controlled electron tube and means connecting its input circuit to the output of said transmission channel, a blocking channel, means coupling said blocking channel to said input channel, filter means in said blocking channel for rejecting said desired signal frequency and for passing said disturbing frequencies, and means in said blocking channel including a time constant circuit connected to the input circuit of said tube for producing from said disturbing frequencies a potential effective to render said tube incapable of transferring such frequencies from said transmission channel, said time constant circuit having a relatively small time constant for charging and a relatively large time constant for discharging.

4. In a system for transmitting a predetermined desired signal frequency substantially to the exclusion of disturbing frequencies, a common input channel, a transmission channel, means for coupling said transmission channel to said input channel for transmitting both said signal frequency and said disturbing frequencies, rectifier means and an output impedance in said transmission channel, a grid-controlled electron tube and means connecting its input circuit to said output impedance, a blocking channel, means coupling said blocking channel to said input channel, filter means in said blocking channel for rejecting said desired signal frequency and for passing said disturbing frequencies, rectifier means in said blocking channel connected to said filter means, a time constant circuit in said blocking channel connected to said rectifier means and operative to produce from said disturbing frequencies a potential capable of stopping signal transfer my said tube, and means connecting said time constant circuit to the input circuit of said tube so as to render the tube incapable of transferring disturbing frequencies from said transmission channel.

5. A system as defined in claim 4, wherein said time constant circuit includes a condenser and a large resistor in shunt therewith.

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