

Feb. 12, 1935.

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1,991,027

TRANSMITTING SYSTEM

Filed May 11, 1932

Fig. 1

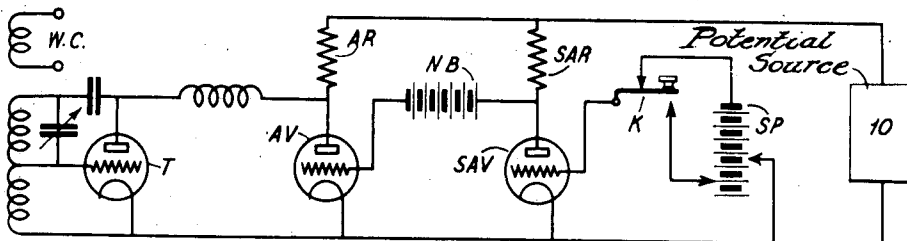


Fig. 2

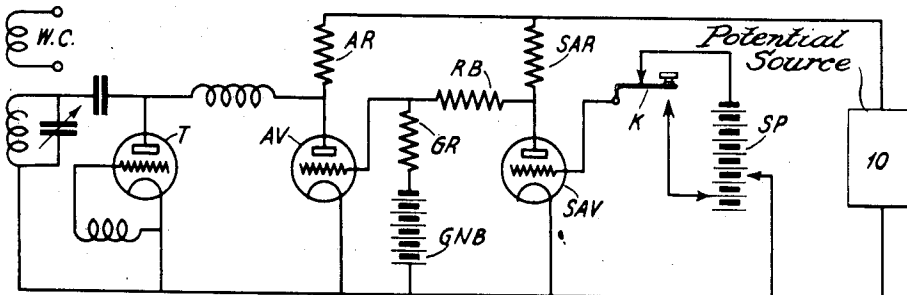
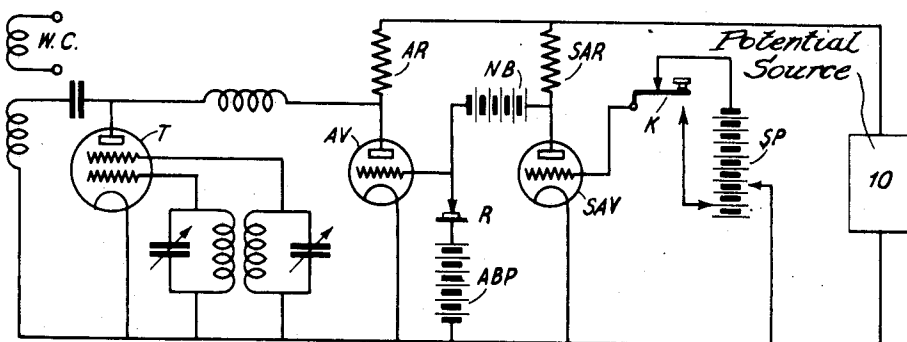


Fig. 3



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1,991,027

TRANSMITTING SYSTEM

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Application May 11, 1932, Serial No. 610,526
In Great Britain May 15, 1931

4 Claims. (Cl. 250—17)

This invention relates to radio and other high frequency transmitting systems and more particularly to keying systems of the kind employing so-called absorber and sub-absorber valves. The invention has for its object to remove certain disadvantages met with in known transmitters employing keying systems of the absorber and sub-absorber type.

Keying systems of the absorber and sub-absorber type are well known and consist broadly of arrangements wherein signaling is accomplished by controllably diverting anode feed from a stage of a transmitter by means of a valve termed an "absorber valve" whose grid is indirectly controlled so that the said valve becomes conductive and non-conductive in dependence upon the signals, the control of grid potential for the absorber valve being in turn effected by a sub-absorber valve whose grid is directly controlled, for example, by a key, so that the said sub-absorber valve becomes conductive and non-conductive, the consequent variations in plate potential of the sub-absorber valve forming part of the potential applied to the grid of the absorber valve. Thus when the key or equivalent device is operated, the transmitter is keyed by varying the voltage available at the terminals of the transmitter stage associated with the absorber valve. Such keying systems offer the advantages, inter alia, that the value of current or a portion of the value of current taken by the transmitter during signals is diverted through the absorber valve at other times, while, owing to the fact that the absorber valve is in turn controlled by the sub-absorber valve, the load or duty upon the keying means may be made quite small.

The present invention relates to keying circuits and systems of the absorber type, as briefly described above, and involves improvements over said systems as known heretofore in the art. The nature of said improvements will be better understood from the following detailed description thereof when read in connection with the drawing, throughout which like reference symbols indicate like parts, and in which:

Figure 1 shows a keying system including an oscillation generator, an absorber tube, and a sub-absorber tube; while,

Figures 2 and 3 show circuits of the type disclosed in Figure 1 which include novel features and improvements.

The circuit of Figure 1 comprises an absorber valve AV whose anode-cathode space is shunted across any one of the tubes T in any stage of the transmitter to be controlled. The tube T has

been shown connected in an oscillation generator circuit which is coupled to a work circuit W. C. This work circuit may be an aerial system. The anode of the said absorber valve being connected through an absorber resistance AR to the positive terminals of the anode supply 10 and the cathode being directly connected to the negative terminal of the supply 10. Also shunted between the positive and negative terminals of the anode supply is a sub-absorber resistance SAR in series with the anode-cathode space impedance of a sub-absorber valve SAV, the cathode of the said valve being connected to the negative terminal of the anode supply. The anode of the sub-absorber valve is connected through a suitable source of negative bias potential NB to the grid of the absorber valve and means, such as a key K associated with suitable sources of potential SP are provided for varying the potential between grid and cathode of the sub-absorber valve. It will be seen that with this arrangement, if the grid of the sub-absorber valve is given a suitable negative potential by moving the key into one position little or no anode current will pass through the sub-absorber valve, and in consequence the grid of the absorber valve will become positive. Owing to the grid current taken by the absorber valve a fall of potential will occur down the resistance SAR in the anode circuit of the sub-absorber valve, this fall of potential causing the grid of the absorber valve to assume a positive potential considerably less than the difference between the anode supply potential and the bias potential applied to the grid of the absorber valve. If now, the sub-absorber valve grid is given a suitable positive potential, by moving the key to its other position the sub-absorber valve will draw current through the sub-absorber resistance, the potential of the anode of the sub-absorber valve will fall and the potential of the absorber grid will become negative to a degree determined by the source of bias potential so that the said absorber valve (which, in the other position of the key, takes substantial current from the anode supply and thus reduces the voltage upon the transmitter stage being controlled) becomes non-conductive, so that the full or substantially the full anode supply voltage is available for the transmitter stage. Thus in the case of a telegraph transmitter operating in the usual way between "marking" and "spacing" the transmitter will be on "mark" when the sub-absorber grid is positive and on "space" when the sub-absorber grid is negative.

An inherent disadvantage of a circuit such as

that above described with reference to Figure 1 is that if when the key is at "space" the filament supply of the absorber valve should fail or the filament itself should fail, the sub-absorber resistance SAR, the bias battery NB, the absorber valve grid, and the sub-absorber valve anode, will all assume the potential of the positive terminal of the anode supply since no grid current will flow in the absorber valve. This, of course, involves the necessity of insulating the parts named for the full potential of the anode supply, and moreover, since the sub-absorber valve is generally designed for low voltages only, this valve is likely to be destroyed should the filament or filament supply of the absorber valve fail as supposed. In addition, owing to the high potential which the grid of the absorber valve would attain in these circumstances, the said absorber valve is likely to be damaged. A known method of overcoming this difficulty is shown in Figure 2 and consists in employing in effect a potentiometer resistance between the sub-absorber valve anode, and a suitable source of negative potential and in one arrangement of this kind the absorber and sub-absorber keying circuit shown in Figure 1 is modified by replacing the source of bias potential NB between the anode of the sub-absorber valve and the grid of the absorber valve by a resistance RB and connecting the grid of the absorber valve through a further resistance GR to a suitable source of negative potential GNB, the value of the resistances in the circuit being so chosen that in the event of failure of filament supply to the absorber valve, or in the event of filament failure in the absorber valve, the potentials obtained are not dangerous. This circuit though obviating the disadvantages above set forth, offers other disadvantages, the chief of which are that the resistive circuit consisting of the sub-absorber resistance SAR, the resistance RB between the anode of the sub-absorber valve and the grid of the absorber valve and the resistance GR between the grid of the absorber valve and the source of negative potential, causes current to be taken from the high tension supply in excess of that required merely to provide grid current for the absorber valve, while, since the sub-absorber valve has to deal with a larger anode current than in the case in which the potentiometer arrangement is not employed, this valve has either to be a larger valve or must consist of a number of valves in parallel. This potentiometer arrangement, therefore, offers the disadvantage of being practically uneconomical.

The present invention has for its object to provide an absorber and sub-absorber keying system in which the dangers above referred to are avoided without lack of economy as compared to the first described absorber and sub-absorber circuit.

According to this invention, in an absorber and sub-absorber keying system there is provided across the terminals of the source of anode potential 10 a shunt path having connection to the grid of the absorber valve, said shunt path including a device offering an approximately infinite resistance or a very high resistance during normal operations of the absorber and sub-absorber valves, but being adapted to offer a reduced resistance should the absorber valve grid attain a higher potential than necessary for normal operation, the whole arrangement being such that the said device in the shunt circuit prevents the absorber grid and associated parts from reaching a dangerously high potential but passing little or no current during normal operation.

Figure 3 of the accompanying drawing illustrates diagrammatically one way of carrying out the invention. Referring to Figure 3 it will be seen that the absorber and sub-absorber valve circuit of Figure 1 is modified by connecting a rectifier R (e. g. of the well known cuprous oxide type) between the grid of the absorber valve and a suitable source of biasing potential ABP arranged to be slightly more positive than the potential attained by the absorber grid in normal service. It will be seen that under normal conditions, therefore, the rectifier will pass substantially no current, but should, for any reason, the absorber grid attain an unduly high potential, the rectifier will become conductive and provide a path between the grid of AV and ground and thus prevent a dangerous rise of potential on the elements connected with the positive terminal of direct current source 10. It will be seen that in this circuit arrangement the shunt path comprises the sub-absorber valve resistance SAR the source of bias potential NB the rectifier R and the source of positive potential ABP to which one end of the rectifier is connected.

In a modification (not illustrated) the rectifier R is replaced by one or more glow discharge tubes, such for instance as neon lamps. In this case the potential of the bias source ABP to which the side of the lamp or lamp combination remote from the absorber valve grid is connected, should be of such value that under normal service conditions the potential drop across the lamp or lamps is below the ignition potential. If, however, the absorber valve grid rises in potential by a predetermined amount, the lamp or lamps will light and provide a comparatively low resistance path.

In a modification of the last described arrangement the discharge lamp or lamps is or are replaced by one or more spark gaps.

In arrangements in accordance with this invention the bias potential with which the rectifier or other safety resistance device is associated may conveniently be obtained from the grid negative and positive supply from which the keying potentials for the sub-absorber grid are obtained, although for the sake of simplicity in the drawing the various sources of potential are represented as constituted by separate batteries.

What we claim is:

1. In a signalling system, a thermionic tube having electrodes including anode, cathode, and control grid, and coupled circuits connected between said electrodes to produce oscillations in said tube and circuits, means for interrupting the oscillations produced in said tube and circuits comprising, a second thermionic tube having anode, cathode and control electrode, a circuit for connecting the anode and cathode of said second named tube in parallel with the anode and cathode of said first named tube, a circuit for connecting a source of potential in parallel with the anode and cathode of both of said tubes, a keying device connected in parallel with the control grid and cathode of said second named tube, and a source of potential and a rectifier connected between the control grid and cathode of said second named tube, said source of potential being of a value greater than the normal operating potential applied during keying between the grid and cathode of said last named tube, said rectifier being conductive when excess potentials are applied between the grid and cathode of said last named tube during keying.

2. In a signalling system, a thermionic tube

having an anode, a control grid and a cathode, oscillation producing circuits connected between the electrodes of said tube, means for keying the oscillations produced in said tube and circuit comprising, a thermionic tube having anode, cathode and control grids, a circuit connecting the anode and cathode of said last named tube in parallel with the anode and cathode of said first named tube, a third thermionic tube having anode, cathode and control grid, a source of potential connecting the anode of said third named tube to the control grid of said second named tube, a connection between the cathodes of all of said tubes, a rectifier connected between the control grid and the cathode of said second named tube, said rectifier being non-conductive at the normal potential applied to said control grid during operation, a key connected with the control grid of said third named tube, and a source of potential having its negative terminal connected to the cathodes of all of said tubes and its positive terminal connected by way of resistances to the anodes of all of said tubes.

3. In a signalling system, an oscillation generator including a thermionic tube having a control grid an anode and a cathode, and oscillation circuits connected between said electrodes of said tube, keying means connected with said tube comprising, a second thermionic tube having its anode to cathode impedance connected between the anode and cathode of said first named tube, key-

ing means connected between the control grid and cathode of said last named tube, and a source of potential and a rectifier connected in parallel with said keying means, said source of potential being of a value in excess of the normal operating potential applied during keying between the grid and cathode of said last named tube, said rectifier being conductive when excess potentials are applied between the grid and cathode of said last named tube during operation.

4. A device for producing potentials, the amplitude of which may be varied at signal frequency comprising, a thermionic tube having anode, cathode and control grid, a source of direct current potential, resistive means connecting the anode of said tube to the positive terminal of said source of direct current potential, a connection between the cathode of said tube and the other terminal of said source, a resistance and a source of potential connected between the control grid of said tube and the positive terminal of said source, a circuit for applying signalling potentials between said resistance and the cathode of said tube, and means for limiting the value of the potentials which may be applied to said control grid during operation comprising a device conductive in one direction only connected between the control grid and cathode of said tube.

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