

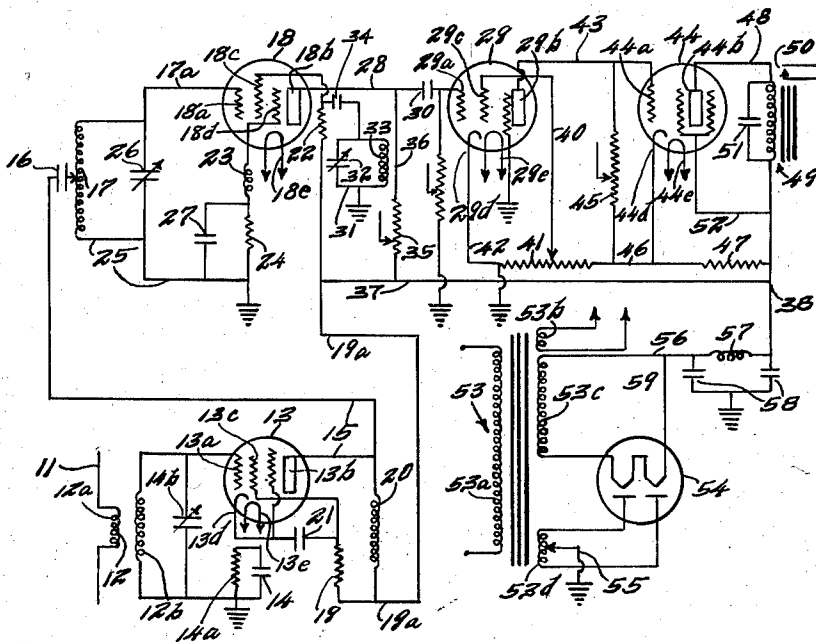
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RADIO RECEIVING SYSTEM

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RADIO RECEIVING SYSTEM

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This invention relates to a radio receiving system and the circuits thereof. While the invention might have various applications it is particularly designed to be used with alarm systems, secondary clock systems, signal systems and similar systems or devices which can be remotely controlled by ultra high frequency radio transmission more advantageously than by wires or direct transmission.

It is an object of this invention to provide a radio receiving system which can be used to receive and transmit a signal such as might be used with an alarm or clock device in a very efficient manner and which has great stability and dependability.

It is another object of the invention to provide a radio receiving system comprising a pair of vacuum tubes so connected that a controlled high current flows through the plate circuit of one of said tubes when there is no incoming signal and space current is blocked in the other tube.

It is a further object of the invention to provide a radio receiving system comprising a pair of vacuum tubes, the screen grid of one of said tubes being connected to an adjustable resistance, in turn connected to the cathodes of said tubes respectively, the plate of said tube being connected by a conductor to the grid of the other tube and a resistance connected between said conductor and said adjustable resistance so that a high negative potential is maintained across said last mentioned resistance which will block space current through said other tube and a current will flow through the plate circuit of said first mentioned tube when there is no incoming signal.

It is still another object of the invention to provide a radio receiving system comprising a pair of vacuum tubes, one of which is connected to a signal transmitting device, said tubes being so connected that a high controlled current flows through said other tube and space current is blocked in said first mentioned tube when there is no incoming signal and so that said current is decreased in said first mentioned tube and current flows in said second mentioned tube to operate said signal transmitting device when there is an incoming signal.

These and other objects and advantages of the invention will be fully set forth in the following description made in connection with the accompanying drawing, in which like reference characters refer to similar parts throughout the several views and in which the figure is a dia-

grammatic view of the apparatus and circuits used therewith.

Referring to the drawing, an antenna 11 is shown by which radio energy or radio waves are picked up from space. Said antenna is connected to a coil 12a of a transformer 12, the other coil of which is shown as 12b. The coil 12b is connected at one end to the grid 13a of an amplifying vacuum tube 13. The other end of coil 12b is connected through a condenser 14 to ground, a resistance 14a being connected between condenser 14 and the ground. Another variable condenser 14b is connected across the ends of coil 12b. The plate 13b of tube 13 is connected through conductor 15 and a transfer condenser 16 to the coil 17 connected by conductor 17a to the grid 18a of a vacuum tube 18. The screen grid 13c of tube 13 is connected through a resistance 19 to a conductor 19a and a coil 20 is interposed between conductor 19a and conductor 15. A condenser 21 is connected between one end of coil 19 and a cathode 13d of tube 13. The filament of tube 13 is shown as 13e. The tube 13 is an amplifying tube for the incoming signal or wave and there is no particular novelty in the connections thereof. The screen grid 18c of the tube 18 is connected through resistance 22 to conductor 19a. The other grid or cathode 18d of tube 18 is connected through a coil 23 and a resistance 24 to ground. The other end of the coil 17 is connected by a conductor 25 to ground. A variable condenser 26 is connected across the terminals of coil 17 and in the grid circuit of tube 18 and a condenser 27 is shown as connected between conductor 25 and a point between coil 23 and resistance 24. The filament of tube 18 is shown as 18e. The plate 18b of tube 18 is connected by a conductor 28 to the grid 29a of a vacuum tube 29, a condenser 30 being inserted in conductor 28. A tuned circuit 31 comprising the condenser 32 and choke coil 33 is connected through a condenser 34 to the screen grid 18c of tube 18, said circuit 31 also being shown as connected to ground. A variable resistance 35 is connected in a conductor 36 extending between conductor 28 and a conductor 37, the latter extending between conductor 19a and a conductor 38 to be later described. There is no particular novelty in the connections of tube 18, said tube acting as a detector tube for the amplified waves or signal from tube 13 and coil 17. The screen grid 29c of vacuum tube 29 is connected by conductor 40 to an adjustable resistance 41. Said resistance is connected at one end to a conductor 42 connected to the cathode 29d of tube 29 which

is also connected to ground. The plate 29b of tube 29 is connected by conductor 43 to the control grid 44a of another vacuum tube 44. An adjustable resistance 45 is connected between conductor 43 and a conductor 46, the latter conductor being connected to one end of the resistance 41 and extending to a resistance 47, which in turn is connected at its other end to conductor 38. The plate 44b of tube 44 is connected by conductor 48 to the winding or coil of a relay or signal transmitting device 49 controlling a pair of contacts 50 which are normally separated when no signal or radio energy is being received. The other end of coil or winding 49 is connected to conductor 38 already referred to and a condenser 51 is shown as connected between the terminals of coil or winding 49. The screen grids of tube 44 are connected to a conductor 52, which in turn is connected to conductor 38. The cathode 44d of tube 44 is connected to conductor 46 between the resistances 41 and 47. The filament for tube 29 is shown as 29e and the filament for tube 44 is shown as 44e. A transformer 53 is shown, the primary coil 53a of which will have its terminals connected to a source of alternating current supplying the power to the circuit. One secondary winding 53b of transformer 53 has its terminals connected in any suitable manner to the filaments 13e, 18e, 29e and 44e of the tubes 13, 18, 29 and 44 so that these filaments are heated. Another secondary winding 53c of transformer 53 is connected to a rectifying tube 54. A third secondary winding 53d of transformer 53 has its terminals connected to the contacts of rectifier tube 54, said winding being connected to ground through conductor 55. One end of winding 53c is connected by conductor 56 to the conductor 38 through a coil 57. Conductor 56 and conductor 38 are connected to ground through condensers 58. Conductor 56 is connected by conductor 59 to one of the electrodes of rectifier tube 54.

The resistance 14a and by-pass condenser 14 produces a negative control grid biasing action of tube 13. Resistances 19 and 35 prevent the radio frequency currents from flowing to ground and stabilize the supply currents to the tubes 13 and 18. Resistance 47 permits the establishment of stabilized voltage and current from conductor 38 to the tube 29. Resistance 47 acts to stabilize the potential between signal device 49 and the cathode of tube 44 and also acts to stabilize the potential across the potential dividing resistance 41. When current flows in tube 44 it is apt to be variable or unstable and this acts to unstabilize the currents in the rest of the system. Resistance 47 is quite large proportionately to the potential across plate 44b and cathode 44d of tube 49 so that the variation in the space current cannot in connection with resistance 47 exert any appreciable influence on the rest of the system. The resistance 24 and condenser 27 produce a negative control grid bias for tube 18.

In the vacuum tube 44 the space current flows through conductor 48 across the internal space between plate 44b and cathode 44d. This current divides and flows through the resistance 41 to the negative return ground and also through the resistance 45 through conductor 43 to plate 29b of the tube 29 and to cathode 29d. This space current, however, through tube 44 is blocked off by the grid biasing voltage developed across the resistance 45 due to the current flowing from conductor 38 through resistance 47, through resistance 45 and conductor 43 to plate 29b, to cathode 29d and to the negative ground return. A con-

trolled high current thus flows in tube 29 which is controlled by the adjustable resistance 41. When there is no incoming wave or signal, therefore, the maximum current is flowing through tube 29 and the space current is blocked in tube 44. When a signal or wave is received in the system and detected in tube 18, the current flowing in tube 29 decreases thereby decreasing the voltage drop across resistance 45 and thus produces a lessened negative biasing voltage across grid 44a and cathode 44d of vacuum tube 44 causing a space current flow in tube 44, which current flows through conductor 48 and flows from plate 44b to cathode 44d, through conductor 46 and resistance 41 to a negative return ground. The circuit of coil or winding 49 is tuned and when space current flows in tube 44 the relay or signal transmitting device is actuated and contacts 50 are caused to engage. An impulse can thus be transmitted to the desired apparatus, such as an alarm system or clock. The receiving set will be tuned to receive a certain signal which will be transmitted by the transmitters, which latter will form part of the alarm system. These transmitters can be actuated in any desired manner to give an alarm.

The receiving system while not limited to very high frequency is designed to be used with a very high frequency transmission preferably about 90,000 kilocycles. The system is very stable and dependable and is not affected by exterior electrical circuits or voltage such as occur in an electrical storm. The life of vacuum tube 44 is very long as there is normally no current passing therethrough. With the described system impulses for operating clocks and alarm systems can be sent with much less equipment and much less expensively than where wire circuits are used.

From the above description it is seen that applicant has provided a very simple, inexpensive and efficient system or apparatus for transmitting impulses designed to operate system devices such as clocks and alarm mechanisms. The apparatus has been amply demonstrated in actual practice and found to be very reliable, durable and efficient.

It will, of course, be understood that various changes may be made in the form, details, arrangement and proportions of the parts, without departing from the scope of applicant's invention, which generally stated, consists in a device capable of carrying out the objects above set forth in the parts and combinations of parts disclosed and defined in the appended claims.

What is claimed is:—

1. An amplifying system for a radio receiving set having in combination a vacuum tube for amplifying a detected signal, said tube having plate, cathode, grid and screen grid electrodes, a second vacuum tube, a conductor connecting the plate of said first mentioned vacuum tube to the grid of said second tube, an adjustable resistance, one end of which is connected to said conductor and the other end of which is connected to the cathode of said second tube, a potential dividing resistance device having one end connected to the cathode of said first mentioned tube and its other end connected to the last mentioned end of said adjustable resistance and thus to the cathode of said second tube, an adjustable arm for said device connected to the screen grid of said first mentioned tube, a third resistance, a source of plate supply potential to which one end of said third resistance is connected, means connecting said end of said third resistance to the screen grid

of said second tube, a signal transmitting device to which said last mentioned end is connected, a conductor connecting the other end of said signal transmitting device to the plate of said second tube and a conductor connecting the other end of said third resistance to the cathode of said second tube and to the last mentioned end of said adjustable resistance and also to said last mentioned end of said potential dividing resistance device, said adjustable resistance acting to block space current through said second tube when no signal is being received in said first mentioned tube but whereby a flow of current is permitted through said third resistance and through said adjustable resistance and between the plate and cathode of said first mentioned tube.

2. An amplifying device for a detected radio signal having in combination, a vacuum tube having plate, cathode, grid and screen grid electrodes, a second vacuum tube having plate, cathode, grid and screen grid electrodes, a conductor connecting the plate of said first mentioned tube to the grid of said second tube, an adjustable resistance having one end connected to said conductor and its other end connected to the cathode

of said second tube, a source of plate supply potential for the plate of said first mentioned tube also connected to the last mentioned end of said adjustable resistance, said adjustable resistance acting to block space current in said second tube when no signal impulse is being received in said first mentioned tube, said latter tube at such time having a maximum flow of space current, a signal transmitting device, a conductor connecting one end of said device to the plate of said second tube and a second resistance connected at one end to the screen grid of said second tube and to the other end of said device and connected at its other end to the cathode of said second tube and to the last mentioned end of said adjustable resistance.

3. The structure set forth in claim 2, a potential dividing resistance device, a conductor connecting one end of said last mentioned device to the cathode of said first mentioned tube and a conductor connecting the other end of said last mentioned device to the cathode of said second tube and to the last mentioned end of said adjustable resistance and said second resistance.

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