

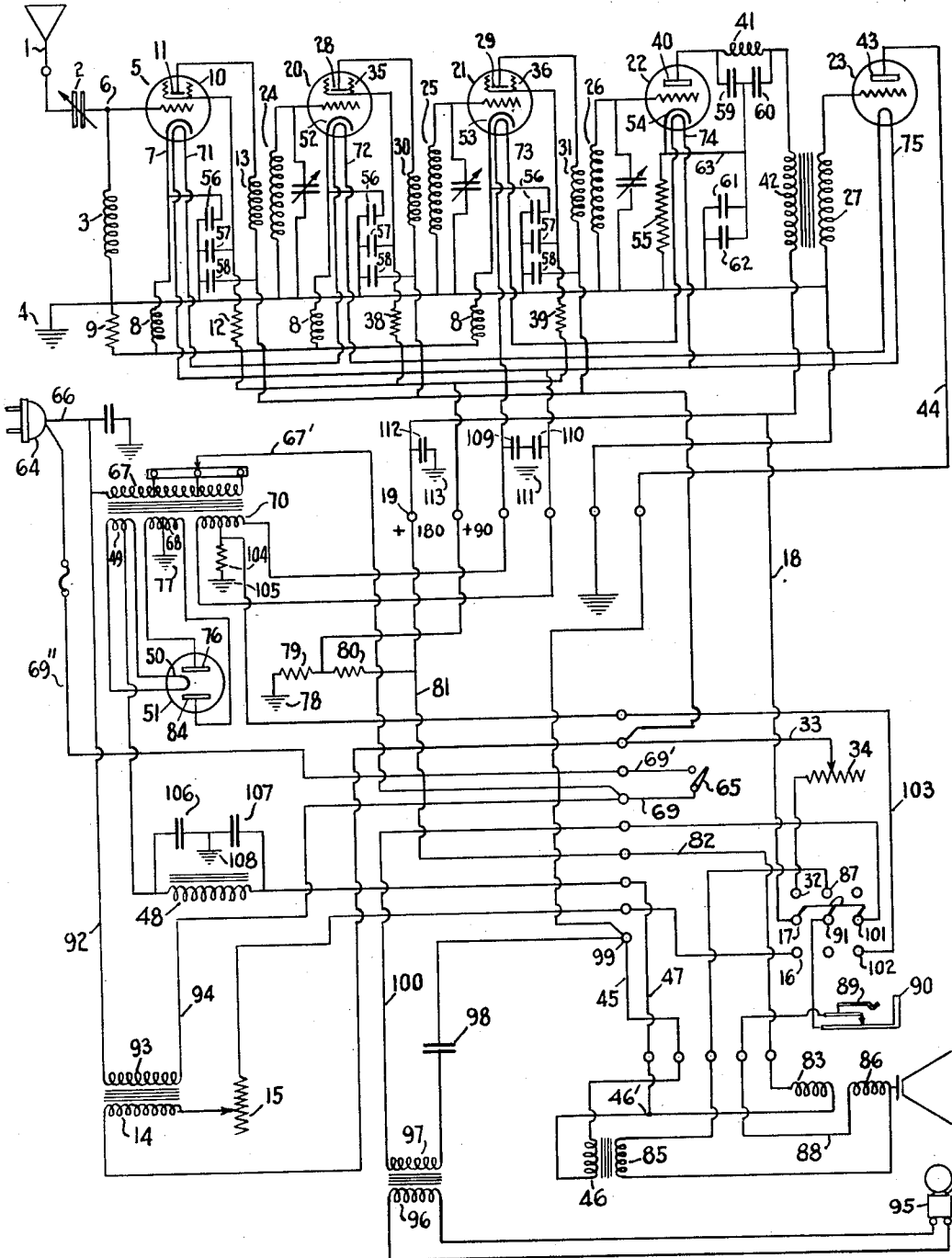
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RADIO RECEIVING SET

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RADIO RECEIVING SET

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This invention relates to radio receiving sets.

One of the objects of the invention is to construct radio receiving sets having means to call an attendant when the signal is being received.

Another object is to combine a radio receiving set with a signalling device and a standby connection for producing a warning signal when a radio message is about to be received.

A further object of the invention is to arrange the circuits so that the operation of a switch will disconnect the standby signal and connect the sound producing device for reception of the signal.

Other objects of the invention will appear in the following description, reference being had to the drawing in which the single figure is a diagrammatic illustration of the circuits of the apparatus in which the invention is embodied.

Referring to the drawing, 1, indicates the antenna connected through variable condenser 2 and an impedance coil 3 to the ground at 4. The grid of an amplifying tube, a four electrode or screen grid tube 5 being shown, is connected to the impedance coil at 6 and a cathode 7 which is preferably of the uni-potential type, is connected through inductance 8 and grid resistance 9 to the other end of impedance coil 3. This places the potential of the incoming signal between the grid and the cathode. The screen grid 10 of this tube is placed between the other grid and the plate 11 in a well known way and is connected through resistance 12 to an intermediate positive terminal of the power supply, for example, the 90 volt terminal. The plate 11 of tube 5 is connected through the primary 13 of the radio frequency transformer and thence to one coil 14 of the 60 cycle transformer, control resistance 15, contact 16 on the changeover switch, and when this is thrown into the lower or standby position, the circuit is completed through the switch to contact 17, conductor 18 to a plate supply, for example, 180 volt terminal 19. The grid of tubes 20, 21, 22 and 23 are all connected through their corresponding coils 24, 25, 26 and 27 to the ground 4, and the plates 28 and 29 are connected through coils 30 and 31 in parallel with the plate 11 to the coil 14 of the 60 cycle transformer previously referred to when the switch is thrown into the standby position. When the switch is thrown into the vertical position so that contact is made between points 32 and 17 all of the plates 11, 28 and 29 are connected through wire 33, volume control resistance 34, contacts 32 and 17 and wire 18 to the same 180 volt terminal. In this position of the switch the coil 14 is not energized. The screen grids 35 and 36 are connected through their corresponding resistances 38, 39 with the same potential terminal as screen grid 10.

The plate 40 of tube 22 is connected through

a radio frequency choke coil 41, transformer coil 42, to the plate terminal 19 above referred to.

The plate 43 of tube 23 is connected through wires 44, 45, with transformer 46, junction point 46', wire 47, inductance coil 48 to the mid point of transformer coil 49 that energizes the filament 50 of the rectifying tube 51. The unipotential cathodes 52, 53 of the tubes 20, 21 are connected respectively through individual inductances 8 and a common resistance 9 to the ground point 4. The unipotential cathode 54 of tube 22 is connected through individual grid bias resistance 55 to the ground point 4. All of the screen grid tubes have radio frequency bypass condensers 56, 57, 58 between ground 4 and the unipotential cathodes, screen grids and plates respectively. Radio frequency bypass condensers 59, 60 are bridged in series across the choke coil 41 and a connection is made from ground 4 through condensers 61, 62 to a point midway between said condensers 59, 60. The unipotential cathode 54 of the tube 22 is also connected by line 63 with this midpoint. Condensers 56, 61 and 62 bypass the radio frequency in the electron flow between plate and cathode to prevent a radio frequency potential in the grid bias resistance 9 and 55. This eliminates the feed back between the plate and grid of each tube that would otherwise occur to produce degeneration.

The condensers 57, 58 bypass the radio frequency around the voltage supply to the screen grids and plates respectively. The condensers 59 and 60 together with condensers 62 and 61 bypass the radio frequency around the transformer coil 42.

The power supply is obtained from the usual alternating current means by inserting plug 64 into a receptacle connected to such source of supply. When switch 65 is closed alternating current passes from lead 66 through transformer coil 67 and any one of the adjustment taps to wire 67', wire 69, switch 65, wires 69' and 69'' through the fuse back to the plug. This induces alternating current in coil 49 used to heat the filament of the rectifier, coil 68 to furnish the alternating current to be rectified and coil 70 to furnish current for the filaments 71, 72, 73, 74, and 75. Filaments 71 and 72 on the one hand and filaments 73 and 74 on the other, are placed in series across the transformer coil 70.

When power switch 65 is closed filament 50 will be heated by the current from coil 49 and the unipotential cathodes 7, 52 and 53 and 54 will be heated by filaments 71, 72, 73 and 74 respectively. Filament cathode 75 will be energized directly by connection to coil 70.

Current in one cycle of the alternations of the power supply will pass from filament 50 of the rectifier 51 to plate 76, transformer 68,

ground 77, ground 78, resistances 79 and 80, lines 81, 82, loud speaker field coil 83, wire 47, inductance coil 48, mid tap connection of transformer 49 back to the filament. This rectified
 5 current therefore passes in series through the resistances 79 and 80 and the field coil 83. During the other cycle of the alternating current the current will flow from filament 50 of the rectifier tube to plate 84 through the opposite
 10 terminal of transformer 68 to ground 77 and thence through the same circuit in the same direction thus furnishing double wave rectification.

The 90 volt terminal of screen grids 10, 35 and 36 are connected between the resistance 79 and 80 to give an intermediate potential say
 15 90 volts, while the plates 11, 28, 29, and 40 are connected to the high potential end of resistance 80 to obtain the highest potential, for example, 180 volts.

Coil 46 is coupled to coil 85 which is in circuit with movable coil 86 of the loud speaker. One terminal of coil 85 is connected to contact 87 of the standby-receiver switch, the other terminal being connected directly to coil 86. The
 20 other terminal of coil 86 is connected through wire 88 to plugtip contact 89. The ring contact 90 of this plug connection is connected to contact 91 on the switch above referred to. The alternating current line 66 connected to plug
 25 64 is joined by wire 92 with coil 93 coupled to coil 14. The other end of coil 93 is connected through wires 94 and 67 to the other terminal of the power supply transformer 67. The purpose of this last mentioned circuit will be explained in detail later.

Signal device 95 adapted to be operated by a 60 cycle current modulation is connected across transformer secondary 96 which is coupled to the primary 97. One terminal of this primary
 40 is connected through a large condenser 98 with the binding post 99. The other terminal of this coil is connected by wire 100 to terminal 101 on the standby-receive switch. Contact 102 on this switch is connected by wire 103 to the midpoint of transformer 70. This same midpoint is also connected through resistance 104 to ground at
 45 105.

The power supply inductance 48 is shunted by condensers 106, 107 and a point between these
 50 condensers is grounded at 108. The combination of these condensers and inductances make up the filter to filter out the ripples in the alternating current supply. The terminals of transformer 70 are also shunted by two condensers
 55 109 and 110 placed in series thereacross and the point between these two condensers is grounded at 111. These condensers act as a radio frequency bypass. Condenser 112 is connected to ground at 113 and likewise serves as a radio
 60 frequency bypass condenser.

The electron flow between cathodes 7, 52 and 53 of tubes 5, 20 and 21 must pass to the corresponding plates through the rectified power supply, ground 4 and grid bias resistor 9. This
 65 places the cathodes at a positive potential in respect to the grids of these tubes. In other words, these grids are negative in respect to cathode and get their negative bias in this way. The electron flow between cathode 54 and plate
 70 40 of tube 22 must pass from the plate supply in the way previously traced through resistance 55. Therefore the grid of tube 22 is negatively biased with respect to this cathode by this resistance. The electron flow from cathode 75
 75 to plate 43 of tube 23 must pass from ground

105 through grid bias resistance 104 to the center point of the source of supply for filament 75. This makes the filament 75 positive in respect to the grid of tube 23, or in other words, it makes
 80 the grid of that tube have a negative bias in respect to the cathode.

The operation of the receiving set will now be described:

Let it be assumed that this receiving set is installed in the station of a police or other peace
 85 force and that no attendant is hired to stay in the immediate vicinity of the receiving set. The standby-receive switch would be thrown into down position of the drawings and when no signal is coming in the 60 cycle current that
 90 is continually passing through coil 93 produces a 60 cycle alternating voltage ripple in the plate supply of tubes 5, 20 and 21 but this does not affect the current in the plate of tube 22 because of the loose coupling between coils 31 and
 95 26. Therefore there is no alternating current sent through the coil 46 of the alarm transformer. At least the amount of alternating current in this circuit is insufficient to ring the alarm. When the signal, that is, the telephone
 100 message, broadcast to all of the police stations reaches the antenna 1 radio frequency currents will pass through the tubes in well known ways that need not be specifically described and radio frequency currents to plates 11, 28 and 29 of
 105 tubes 5, 20 and 21 will be modulated by the ripple voltage in the plate supply and the modulated radio frequency current will be introduced into the grid circuit 26 of the tube 22 where it will be detected in the usual manner and the 60 cycle
 110 modulation passed into the tube circuit 27 of the final tube 23. The plate current of this latter tube will then pass through wire 44 to point 99, wire 45, coil 46, wire 47 to the filter inductance 48, coil 49, filament 50, plate 76 or
 115 84 to ground 77, ground 105, lead 75 and the filament of tube 23 back to the plate 43. This circuit includes the rectifier 51 and the filtering device 48 which furnishes the plate supply.

The coil 97 is connected to binding post 99
 120 through condenser 98 and wire 100, and by contacts 101, 102, grid bias resistance 104, ground 105 to ground 77 on the power supply. As has just been explained the plate current modulated by 60 cycle current of tube 23 passes in the
 125 circuit between the mid top of filament transformer 70 and binding post 99 across which coil 97 is connected. The potential drop across these points, which has 60 cycle modulations will therefore be impressed on coil 97 and be introduced
 130 into the secondary 96 which is connected directly to the alarm gong 95. The 60 cycle current will cause this gong to produce a loud noise that can be heard by anyone in neighboring rooms
 135 and they can immediately go to the room having the radio set if they are not already there and throw the standby-receive switch to the up position as shown in the drawing. This will disconnect the alarm gong and the 60 cycle current formerly introduced into the circuit through
 140 the transformer coil 93 and it will connect the plate circuit of tubes 5, 20 and 21 through wire 33, volume control resistance 34, contacts 32 and 17 to the 180 volt potential binding post 19. The
 145 plate circuit of tube 23 will pass through the same circuit as previously described which includes loud speaker coil 46. However, this loud speaker connection will now become effective because the circuit of the transformer 85 hereto-
 150

fore open will now be closed by connecting the contacts 91 and 87 of the switch.

The telephone message will therefore pass in regular order through all of the tubes and into the loud speaker and it will be received by all the police stations having the equipment. After the message has been received the switch can be thrown into the down position ready for the next alarm signal which will come in as soon as another message reaches the antenna.

The telephone jack 89, 90, is for the purpose of inserting a telephone head set or signal receiving device in place of the loud speaker.

While I have described the use of the invention particularly in connection with peace officers in crime prevention work, it of course will be readily apparent that the system can be employed in any other use where it is desirable to use an alarm or equivalent signalling device to call attention to the fact that a signal is being received.

Various modifications may be made in the radio circuit connections without departing from the spirit of the invention and the antenna is not to be limited to the particular arrangement disclosed which has been by way of example only.

I claim:

1. In sets for receiving radio signals, means for receiving communication signals, a coil connected to said means adapted to receive the said signals therefrom, a second coil coupled to said first coil, a potential source connected to apply alternating voltages to the first coil having a frequency incapable of inducing a substantial potential in the second coil through the coupling between the two coils, means containing call and communication signal devices connected to the second coil.

2. In sets for receiving radio signals, means for receiving communication signals, a coil connected to said means adapted to receive the said signals therefrom, a second coil coupled to said first mentioned coil, a potential source connected to apply alternating voltages to the first coil having a frequency incapable of inducing a substantial potential in the second coil through the coupling between the two coils, means for producing a call signal, means for producing a communication signal and means for connecting either of said two first mentioned means to the second coil.

3. In sets for receiving radio signals, a vacuum tube having a grid and a plate circuit, a coil connected in the grid circuit, a second coil loosely coupled to said first mentioned coil, a source of audio frequency potential in circuit with said second coil and means containing a call-signal device connected to receive potentials in said plate circuit.

4. In sets for receiving radio signals, a vacuum tube having input and output circuits, coupling means in said input circuit for introducing radio frequency energy thereinto, an audio frequency source of potential connected to said coupling means but incapable of inducing in the said input circuit substantial potential through said coupling means and a call signal device connected to said output circuit.

5. In sets for receiving radio signals, a vacuum tube having input and output circuits a coil in the input circuit, a second coil loosely coupled to the said coil, an audio frequency source of potential in circuit with said second coil but incapable of inducing a substantial potential in said circuit, means for introducing a radio frequency signal

into the second coil, a telephone receiver, a call signal device connected to said output circuit and means to disconnect the call signal device and to connect the telephone receiver thereto.

In sets for receiving radio signals, a vacuum tube having grid and plate circuits, a coil connected in the plate circuit, a coil loosely coupled to the first mentioned coil, an audio frequency source of potential connected to said first coil incapable of inducing a substantial potential in the second coil but capable of modulating a radio frequency signal in the first coil, a telephone receiver and a call signal device and means to alternatively connect the receiver and the signal device to the first mentioned coil.

7. In sets for receiving radio signals, a signal receiving circuit, a radio relay having a radio frequency coupling to said circuit, a source of audio frequency potential connected to said circuit, signal reproducing means connected to said relay and means to disconnect said source of audio frequency from said circuit to reproduce a message.

8. In sets for receiving radio signals, a vacuum tube having input and output circuits, a coil having a radio frequency coupling with the input circuit, an antenna connected to said coil, a supply source adapted to produce an audio potential in said coil, means adapted to reproduce call and message signals introduced into said plate circuit and means to disconnect said source from said coil to receive the signal.

9. In sets for receiving radio signals, a vacuum tube having grid and plate circuits, a coil connected in the grid circuit, a second coil loosely coupled to the first coil, a source of audio frequency potential connected in circuit with the second coil during the stand-by period, the flux produced by said audio frequency potential being incapable of passing alone across said coupling, means to introduce a radio frequency signal into the circuit of the second coil to interact with the audio potential frequency to produce a flux capable of passing across said coupling, a call signal device connected to said plate circuit and adapted to be energized by currents produced by the reaction of said audio and radio frequencies, a loud speaker, and means to disconnect said source of audio frequency potential from said second coil and to connect said loud speaker to said plate circuit to reproduce the signal.

10. In radio call systems, a circuit adapted to receive high frequency current, a source of audio frequency current adapted to modulate the high frequency current in said circuit, another circuit loosely coupled to the first circuit for receiving modulated current and not audio frequency current, a call signal device connected to the second circuit, means to disconnect the said source from the first circuit and a communication signal device connected to the second circuit.

11. In radio call systems, a circuit adapted to receive high frequency current, a source of audio frequency current adapted to modulate the high frequency current in said circuit, a rectifier loosely coupled to said circuit for passing modulated high frequency current but not audio frequency current, a call signal device connected to said rectifier responsive to the rectified modulated current, means to disconnect said source from said circuit and a communication signal device adapted to be connected to the said rectifier.

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