

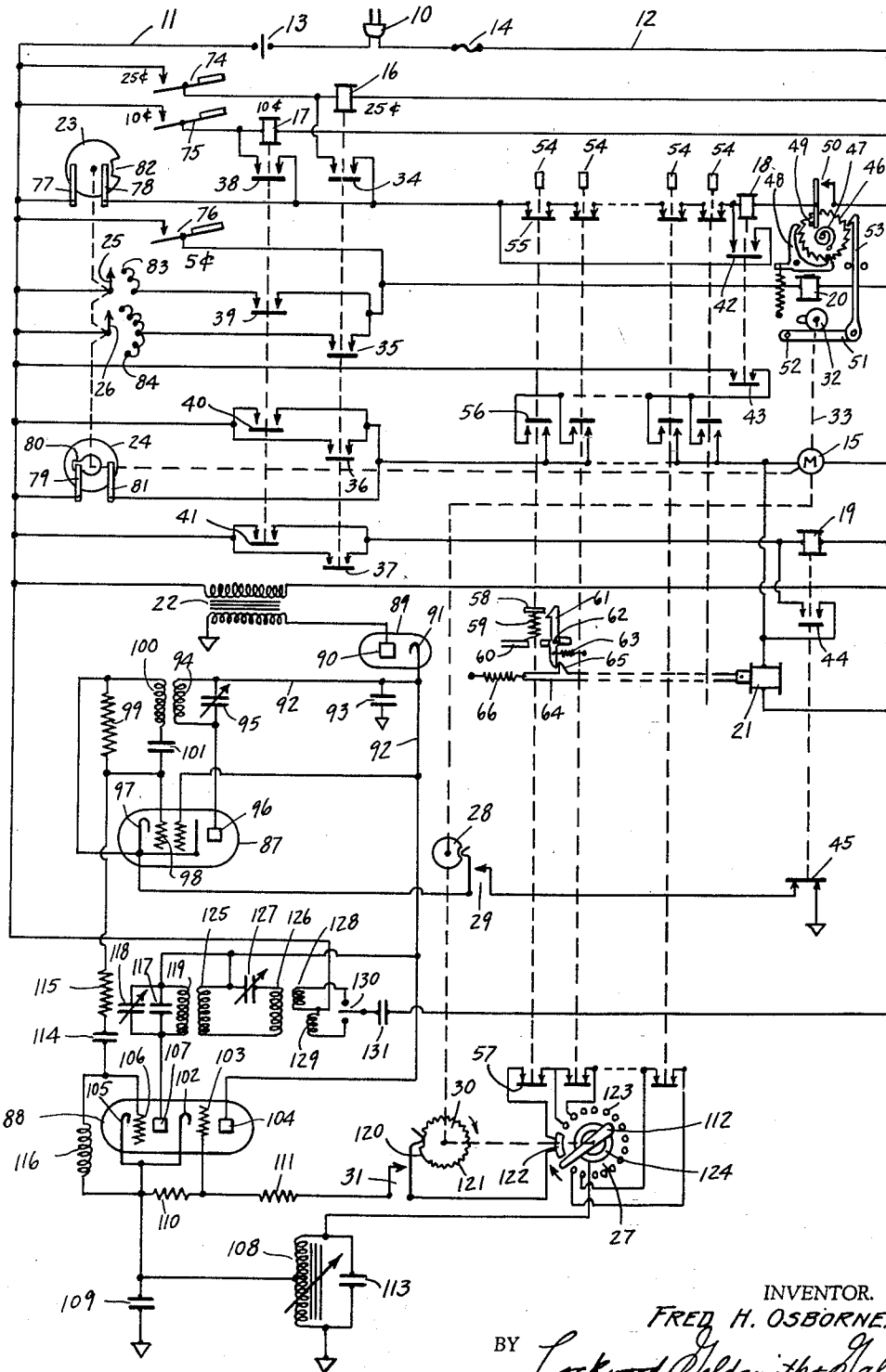
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SIGNAL TRANSMITTER

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SIGNAL TRANSMITTER

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This invention relates to a signal transmitter which is particularly adapted for remote control of automatic record changing phonographs but which is useful for other purposes as well. Certain features of the invention are applicable to local coin control as well as remote control.

The invention is particularly adapted to a cyclic type of signal transmitter operable through successive operating cycles in each of which a controlling signal may be generated. Preferably each signal consists of a series of electrical impulses, and selectivity is obtained by controlling the number of impulses in each series. The impulses may be of a direct current type transmitted over metallic circuits, may be transmitted by radio or metallic circuits in the form of power impulses impressed upon a suitable carrier wave or may be transmitted in other suitable forms. In the preferred form of the invention a power modulated carrier wave transmitted over commercial power lines is used and certain features of the invention are particularly applicable to this type of transmission, while other features are of more general application.

One object of the present invention is to provide a remote control transmitter particularly adapted for coin control of a machine such as a record changing phonograph and which is adapted to operate in response to coins of several different denominations. In co-pending application of La Mar H. Hayslett and Fred H. Osborne, Serial No. 405,522, filed August 5, 1941, there is described and claimed a remote control system operable in response to coins of a single denomination. In the control apparatus of said co-pending application a single series of signal impulses may be transmitted upon receipt of a single coin of a definite value.

Another object of the present invention is to provide a transmitter which may operate with the signal receiving apparatus described in said co-pending application and in which one or more series of selective signals may be transmitted upon receipt of coins of different denominations, the number of said series depending upon the denomination of the coin received.

Another object of the invention is generally to improve signal impulse transmitters of the type described and to provide accurate, complete and certain operation thereof.

Other objects and features of the invention will be understood from the accompanying drawing and the following description and claims:

The drawing is a diagram of electrical connections of a transmitter constructed in accordance

with the preferred form of the invention with mechanical parts illustrated diagrammatically.

The apparatus disclosed in the drawing may be divided for convenience of description into two divisions, the cycle control apparatus and the signal generating apparatus. The cycle control apparatus will first be described.

Cycle control apparatus

Referring now to the drawing, there is shown therein a socket plug 10 which may be inserted in an outlet socket of a local wiring system providing preferably the usual 60 cycle alternating current. A pair of power lines 11 and 12 are connected to the prongs of the plug 10 and one of said power lines may include the usual cutout switch 13 and the other may include an overload fuse 14 or other suitable overload protection. The power lines 11 and 12 provide the necessary power for operation of an electric motor 15, a number of electromagnetic relays 16, 17, 18 and 19, a register magnet 20, a latch magnet 21 and a transformer 22. The transformer 22 has its primary winding connected to the power lines 11 and 12 and its secondary winding supply current at a suitable potential for operation of the signal generating apparatus to be hereinafter described.

The motor 15 is mechanically connected to drive a pair of contact discs 23 and 24, a pair of multi-point rotary switches 25 and 26 and a multi-point switch 27, a cam 28 operating a switch 29, a cam 30 operating a switch 31 and a cam 32 operating certain mechanical parts. The switches 27, 29 and 31 may be considered as part of the signal generating apparatus. The mechanical connection of the motor to the various driven elements just mentioned is indicated in the drawing by broken lines 33 and it is to be understood that these connections are such that each of the driven elements makes one complete revolution in a given period of time. In the drawing each of these driven elements is shown in an initial idle position and in each cycle of signal operation each of said driven elements makes one complete revolution and returns to said idle position.

The relay 16 may be named for convenience the "twenty-five-cent relay" and is adapted when energized to close a series of normally open switches 34, 35, 36 and 37. The relay 17 may be called the "ten-cent relay" and is adapted when energized to close a series of normally open switches 38, 39, 40 and 41. The relay 18 may be called the "push button relay" and when ener-

gized closes a pair of normally open switches 42 and 43. The relay 19 is known as the "isolation relay" and when energized closes a normally open switch 44 and opens a normally closed switch 45.

The register magnet 20 forms part of a coin register device of a well known type consisting of a ratchet wheel 46 urged in a counterclockwise direction by a torsion spring 47 and normally held in an initial idle position by an escapement 48 operated by the magnet 20. In the normal idle position a pin 49 on said ratchet engages one member of a switch 50 and holds said switch in the open position. The motor operated cam 32 engages a lever arm 51 which is mounted at 52 on a stationary pivot and which has secured to the outer end thereof a link 53 having a hooked upper end adapted to engage the teeth of the ratchet 46 and to move said ratchet in opposition to the action of the spring 47. In the operation of the coin register device just described, each actuation of the register magnet 20 operates the escapement 48 to permit the ratchet wheel 46 to move counterclockwise a distance corresponding to one tooth. In the first such movement the switch 50 is closed and it is not again opened until the cam 32 has operated the link 53 to return the ratchet 46 to initial position. In order to return to initial position the number of operations of link 53 must equal the number of previous actuations of magnet 20.

For selective control of signal transmission there are provided a number of push buttons 54, four of which are shown in the drawing. It is to be understood that as many such push buttons may be provided as desired. Each of said buttons when pressed opens a normally closed switch 55, closes a normally open switch 56 and opens a normally closed switch 57, the last named switch being associated with the signal generator. The switches 55 for the several push buttons are connected in series. The switches 57 are similarly connected and the switches 56 are connected in parallel. The last of the push buttons 54 is not provided with a switch 57.

Each of the push buttons 54 is provided with a latch mechanism, one of which is shown in the drawing by way of illustration. It is understood that the others are similar and that other suitable forms of latch devices may be employed. Said latch mechanism includes a collar 58 secured to the stem of the push button 54. A compression spring 59 abutting against the collar 58 and against a stationary member 60 urges the push button 54 toward the normal idle position. A latch member 61 mounted on a stationary pivot 62 is urged toward engagement with the collar 58 by a tension spring 63. A latch bar 64 having a projection 65 engaging the latch member 61 is normally drawn to the left by a tension spring 66 but is drawn to the right against the action of said spring when the latch magnet 21 is energized. In the idle condition of the apparatus the latch bar 64 normally holds the latch member 61 in such position that it cannot engage the collar 58. If one of the push buttons 54 is pressed under this condition, it immediately returns to normal position as soon as the operator's finger is removed. When the latch magnet 21 is energized, the latch bar 64 is drawn to the right and releases the latch member 61. If one of the push buttons 54 is pressed under this condition, the latch member 61 engages the collar 58 and holds the push button in its lowermost position until the latch magnet 21 is deenergized.

The transmitter may be provided with a suit-

able coin receiver of any well known type adapted to receive coins of different denominations. The coins may be received in separate slots for each denomination or may be received in a single slot and sorted. In either case, each denomination of coin is caused to operate an electric switch, separate switches being provided for each denomination. In the drawing the switches just mentioned are illustrated in the form of the usual "butterfly" switches 74, 75 and 76, each of which is momentarily closed upon receipt of a coin of a given denomination. It may be assumed that the switch 74 is closed by a twenty-five-cent piece, the switch 75 by a ten-cent piece and the switch 76 by a five-cent piece.

The wiring circuits for the cycle control apparatus may best be described in connection with a description of the operation of the apparatus.

Wiring and operation—Cycle control apparatus

In operation the several elements of the apparatus initially stand in the condition shown in the drawing. None of the relays or magnets are energized and the push button latches 61 are held out of engaging position by the latch bar 64. The push buttons therefore cannot be latched in the selected position. In the normal operation the coin is deposited first and a selected push button is then operated.

Assuming that a five-cent piece is deposited, the switch 76 is momentarily closed and completes a circuit for the register magnet 20 direct from power line 11. The actuation of said magnet operates the ratchet wheel 46 to close switch 50 as previously described. All of the push buttons 54 being in normal position and all of the switches 55 being closed, the operation of switch 50 completes a circuit for the push button relay 18, said circuit leading from the power line 11 through a contact finger 77, contact disc 23, a contact finger 78, all of the switches 55, the relay 18 and switch 50 to the power line 12. The operation of the push button relay 18 closes switch 42, short circuits the switches 55 and maintains the circuit just described after one of the push buttons 54 has later been pressed. The operation of relay 18 also closes switch 43. Thereafter one of the push buttons 54 may be pressed, and the corresponding switch 56 is closed. The operation of any one of the switches 56 completes a circuit for the motor 15 from the power line 11 through switch 43, the selected switch 56 and the motor windings to power line 12. It is to be noted that said circuit could not be completed prior to the operation of the relay 18 since switch 43 then stood open. At the same time, a circuit is completed for the latch magnet 21 since said magnet is connected in parallel with the windings of the motor 15. The operation of said magnet releases the latch members 61 and the selected push button 54 is therefore retained in the selected position.

The first operation of the motor 15 rotates the contact disc 24 and engages said disc with a contact finger 79 theretofore registering with a recess 80 in said disc. A retaining circuit is thus completed for the motor from the power line 11, through finger 79, disc 24 and a contact finger 81 to said motor. This retaining circuit is not broken until the motor and the elements driven thereby have completed a cycle of operation to return the recess 80 to the finger 79. Thus a complete cycle of motor operation is assured independent of the later opening of the circuit by means of which the motor was started.

At a convenient time in the cycle of operation, a recess 82 in the contact disc 23 engages the finger 77 and breaks the circuit for the push button relay 18. The switch 42 is thus opened and since one of the switches 55 is open, the relay 18 is not again energized when the recess 82 passes the contact finger 77 and said finger re-engages the contact disc 23. Thereafter, the check-off cam 32 is operated to return the ratchet 46 to normal position and open the switch 50. When a complete cycle of motor operation has been accomplished, the recess 80 engages the finger 79 and breaks both the motor circuit and the circuit of the latch magnet 21 to stop the motor and return the selected push button to normal position.

When a ten-cent piece is deposited, the switch 75 is momentarily closed. Said switch completes a circuit for the ten-cent relay 17. Actuation of said relay closes the switch 38 and completes a retaining or "stick" circuit for the relay from the power line 11 through finger 77, disc 23, finger 78 and switch 38. Thus the relay 17 is energized by momentary actuation of switch 75 and remains energized until the retaining circuit is broken. The operation of the ten-cent relay 17 closes switch 40 to complete a circuit for the motor 15 direct from the power line 11 and thus starts motor operation independently of the push button switches 56 and the switch 50 of the coin register device. At the same time the latch magnet 21 is actuated as before to place the latch members 61 in condition for operation. The relay 17 also closes switch 41 to complete a circuit for the isolation relay 19 direct from the power line 11. The actuation of said relay closes switch 44 and opens switch 45. Switch 44 is a "stick contact" which connects the relay 19 in parallel with the motor 15 and said relay therefore remains energized as long as the motor continues to operate even though switch 41 is later opened. Relay 17 also closes switch 39 to condition a circuit for operation by the multi-point switch 25.

The operation of motor 15 in response to the actuation of the ten-cent relay 17 first turns the contact disc 24 to close the motor retaining circuit as before. Thereafter and before the recess 82 in disc 23 reaches finger 77, the multi-point switch 25 is rotated and makes momentary contact at each of three contact points 83. Each of said three contacts energizes the register magnet 20 through a circuit leading from the power line 11 through switches 25 and 39 to said magnet. The ratchet wheel 46 of the coin register device is thus operated through a distance corresponding to three teeth and the switch 50 is closed. Assuming that none of the push buttons 54 have been pressed, the closing of switch 50 operates the push button relay 18 as before. However, immediately after operation of the switch 25 the recess 82 in contact disc 23 reaches the finger 77 and breaks the circuit for relay 18 and the retaining circuit for relay 17. Thereafter the check-off cam 32 operates the ratchet wheel 46 to return the same in the clockwise direction a distance corresponding to one tooth, thus leaving two unit coin values registered on the coin register device. At the completion of the cycle of motor operation, the motor is stopped when recess 80 in the contact disc 74 reaches finger 79. At the same time the latch magnet 21 is deenergized to release any push button which may have been pressed and the isolation relay 19 is deenergized. The parts have thus returned

to their normal idle position except that the switch 50 is closed and two unit coin values have been registered on the coin registry device.

Thereafter the operation of any one of the push buttons 54 results in a second cycle of operation exactly similar to that produced by an operation of one of the push buttons after the receipt of a five-cent piece. During this cycle of operation, the check-off cam 32 checks off one of the coin values on the register device, leaving switch 50 still closed and one coin value still registered. By operation of another of the push buttons 54, another similar cycle of motor operation is produced.

The deposit of the ten-cent piece thus results first in a preliminary cycle of motor operation independent of the push buttons 54 and during this operation the isolation relay 19 is energized and switch 45 is opened. Switch 45 is included in one of the controlling circuits of the signal generating apparatus which will be described in more detail hereinafter and when opened it renders said generating apparatus ineffective. The preliminary cycle of motor operation is thus ineffective to transmit a signal and the positions of the push buttons 54 during the cycle is immaterial. The preliminary cycle results in three actuations of register magnet 20 and the subsequent check-off of one of the coin values so registered. The apparatus is thus left in condition for two subsequent signal cycles which may be initiated by successive actuations of two of the push buttons 54 and during each of which controlling signals may be generated and transmitted.

The deposit of a twenty-five-cent piece results in an initial cycle of operation similar to that described for the ten-cent piece, the twenty-five-cent relay 16 and its associated switches 34, 35, 36 and 37 performing the same functions as the ten-cent relay 17 and its associated switches 38, 39, 40 and 41. The switch 35 however connects the register magnet 20 to the multi-point switch 26 which is provided with 6 contact points 84 instead of the three contact points carried by switch 25. Thus the coin register device receives six actuations, one of which is checked off by the operation of cam 32 during the preliminary cycle. During this cycle the isolation relay 19 is energized as before to prevent generation or transmission of signals and at the end of said cycle the apparatus is left in condition for five successive actuations by push button control.

Signal generating apparatus

The signal generating apparatus is disclosed herein as similar in principle to that shown in the co-pending application of Hayslett and Osborne, previously mentioned. Other suitable types of cyclic signal generators may be used as well. Said generator includes electron discharge tubes 87, 88 and 89. Tube 87 is shown as a standard pentode tube and is used as a generator of radio frequency energy. Tube 88 is a twin triode tube. One of the triode elements is used as a radio frequency amplifier and modulator and the other as an audio frequency oscillator. Obviously, two standard triode tubes could be used in place of the single tube 88. Tube 89 is shown as a diode tube connected as a half-wave rectifier to supply the necessary D. C. plate voltages for tubes 87 and 88. In practice it is advantageous to combine the elements of tubes 87 and 89 in a single tube but separate tubes are illustrated in the drawing for the sake of simplicity.

One terminal of the secondary winding of transformer 22 is grounded and the opposite terminal is connected to the anode 90 of the rectifier tube 89. The cathode 91 of said tube is connected to a distributory conductor 92 which is maintained thereby at a suitable potential above ground and supplies the necessary D. C. potential for the plate circuits of tubes 87 and 88. A condenser 93 connected between conductor 92 and ground serves to smooth out the D. C. voltages. The cathodes of the several tubes may be heated by heating elements connected to suitable taps on the primary or secondary windings of transformer 22 in a conventional manner.

Wiring and operation signal generating apparatus

At the beginning of each cycle of motor operation, the motor moves cam 28 to close switch 29 and said switch remains closed throughout the cycle of operation. Switch 29 is connected in series with switch 45 and except when switch 45 is opened, the switch 29 starts the operation of the radio frequency oscillator tube 87. Said tube is provided with a conventional anode-cathode circuit leading from the D. C. distributory conductor 92 through inductance 94 and tuning condenser 95 in parallel to the anode 96 and thence through the cathode 97, switch 29 and switch 45 to ground. The grid-cathode circuit leads from cathode 97 to control grid 98 through a resistor 99 and the parallel path formed by inductance 100 and condenser 101. Inductances 94 and 100 are coupled to give the necessary feed back for oscillation and the frequency of oscillation is controlled by the tuning of condenser 95. Preferably oscillations of the order of 250 kc. are used. Since switches 29 and 45 are included in the anode-cathode circuit, radio frequency energy is generated in the circuits of said tube only when both switches are closed. The tube thus operates during operation of the motor 15 except on the preliminary operating cycles for the coins of multiple unit value.

The radio frequency energy generated in the tube 87 is amplified and power modulated by the tube 88 and associated circuits. In tube 88 the audio oscillator section consists of cathode 102, control grid 103 and anode 104. The radio frequency section of the tube consists of cathode 105, grid 106 and anode 107. The two cathodes 102 and 105 are connected together and are connected to ground through the lower half of a variable inductance 108 which is thus common to the cathode circuits of both sections of the tube. A condenser 109 serves as a radio frequency bypass for the cathodes. The control grid 103 is connected to the cathodes through a resistor 110 and to the inductance 108 through a resistor 111, the switch 31, switch 27 and certain of the switches 57, depending upon the position of the finger 112 of switch 27. A condenser 113 is shunted across the inductance 108 to complete the audio frequency tuned circuit. The anode 104 is directly connected to the D. C. distributory conductor 92. The grid 106 is coupled to the grid of tube 87 through a condenser 114 and a resistor 115. An inductance 116 serves as a radio frequency choke between grid 106 and the cathode circuits. Anode 107 is connected to the D. C. distributory conductor 92 through condenser 117, variable condenser 118 and inductance 119, all connected in parallel and together forming a radio frequency "tank."

In the electrical connections just described, the

inductance 108 and condenser 113 form the tuned circuit of the audio frequency section of the tube 88. The grid 103 receives the necessary energy for oscillation from the tuned circuit only when switch 31 is closed and a circuit is complete from said switch through switch 27 and one or more of the push button switches 57 to the inductance 108. The inductance 108 also forms a part of the cathode circuit of the radio frequency section of the tube 88 so that the potential of the cathode 105 is affected by the oscillating current in the inductance 108. Thus the inductance 108 serves the dual purpose of producing oscillation and controlling the potential of the cathode 105 to modulate the radio frequency energy.

During each cycle of motor operation, the cam 30 and switch 27 are rotated through a complete revolution. The cam 30 is provided with a projecting portion 120 adapted to engage and close the switch 31 for an appreciable period of time at the start of motor operation. Thereafter said switch is engaged by a series of teeth 121 to produce a succession of much briefer momentary actuations of said switch. The operation of switch 31, so long as the circuit is complete through switch 27 and the push button switches 57, results in modulation of the radio frequency energy in the form of a single relatively long power impulse followed by a succession of much shorter impulses.

The switch 27 is provided with a contact segment 122 connected to the switch 31 and to the first of the switches 57. The switch 27 also has a series of contact points 123 connected with the switches 57 as indicated in the drawing. In the operation of the motor 15 the switch 27 is moved in timed relation with the operation of the impulse switch 31 and this relation is such that the finger 112 engages the contact segment 122 during the long impulse and the first of the shorter impulses produced by switch 31. The second of the shorter impulses occurs when the finger 112 is in contact with the first of the contact points 123. Similarly, successive impulses occur while the finger 112 is in engagement with successive contact points 123. The contact finger 112 is constantly in engagement with a contact ring 124 connected to the inductance 108 and condenser 113. Thus the modulating circuit is always complete during the long impulse and the first of the shorter impulses. Thereafter the movement of the finger 112 introduces the switches 57 successively into the modulating circuit. When a switch 57 which has previously been opened by operation of its associated push button 54 is introduced into the circuit, said circuit is broken and no further power impulses can be produced even though switch 31 continues to operate. For example, if the first of the switches 57 has been selected, the circuit is broken when the finger 112 moves to the first of the contact points 123. The generated signal then consists only of the long impulses and a single shorter one. If the first of the switches 57 is in normal position and the second of said switches has been opened, a second short impulse is added to the signal. Thus the number of short impulses in a given series is determined by the operation of the proper push button 54.

Radio frequency energy from the tube 87 is fed to the grid 106 through the condenser 114 and resistor 115 and is amplified, modulated and impressed upon the tank circuit 117—118—119 by the radio section of the tube 88. The inductance 119 is coupled with an inductance 125 connected

in series with an inductance 126 and a condenser 127. The inductances 125 and 126 and the condenser 127 form a link circuit in which currents induced by the coupling with inductance 119 may be tuned by the condenser 127 to eliminate harmonics. The inductance 126 is closely coupled with an inductance 128 and loosely coupled with inductance 129 and said coupling induces corresponding high frequency energy therein. One terminal of each of the inductances 128 and 129 is connected to the power line 11 and the opposite terminals of said inductances may be selectively connected to the power line 12 by a switch 130 connected to the last mentioned power line through a condenser 131.

By means of the connections just described, the amplified and modulated radio frequency output of tube 88 is impressed upon the power lines 11 and 12 by either one of the inductances 128 and 129, the particular one of said inductances to be used being chosen by manual operation of the switch 130 and the choice depending upon the strength of signal required to be impressed upon said power lines. The signal so impressed upon the power lines may be transmitted thereby to a receiver such as that described in the before-mentioned co-pending application of Hayslett and Osborne and may be used to operate said receiver in the same manner as described in said co-pending application.

The invention has been described in one of its preferred forms, the details of which may be varied by those skilled in the art without departing from the scope of the invention as defined by the appended claims.

The invention claimed is:

1. In a signal transmitter having a cyclic signal generator, the sub-combination of a motor operating said generator, an impulse operated register device and associated circuits controlling operation of said motor and normally limiting the number of cycles of motor operation to the number of impulses registered thereby, check-off means operated by said motor during each operating cycle to check off a registration from said register device, a manually controlled electric switch and associated circuits adapted to initiate a cycle of operation of said motor, and an electric circuit adapted to operate said register device, said circuit including impulse switching means operated by said motor to register a predetermined number of impulses on said register device during the cycle of operation so initiated.

2. In a signal transmitter having a cyclic signal generator, the sub-combination of a motor operating said generator, an impulse operated register device and associated circuits controlling operation of said motor and normally limiting the number of cycles of motor operation to the number of impulses registered thereby, check-off means operated by said motor during each operating cycle to check off a registration from said register device, a pair of coin controlled electric switches each operable by a coin of a different denomination, circuits associated with said switches and adapted to initiate a cycle of operation of said motor in response to the receipt of a coin, and parallel circuits adapted to operate said register device, each of said circuits being controlled by operation of one of said coin controlled switches, and each including impulse switching means operated by said motor to register a predetermined number of impulses on said register device commensurate with the denomination of the corresponding coin.

3. In a signal transmitter having a cyclic signal generator, the sub-combination of a motor operating said generator, an impulse operated register device and associated circuits controlling operation of said motor and normally limiting the number of cycles of motor operation to the number of impulses registered thereby, check-off means operated by said motor during each operating cycle to check off a registration from said register device, a pair of coin controlled electric switches each operable by a coin of a different denomination, a circuit associated with the switch of the smaller denomination coin and adapted to operate said register device in response to receipt of a coin, a parallel circuit for said register device controlled by the switch of the larger denomination coin and including impulse switching means operated by said motor to register a plurality of impulses thereon during a cycle of operation, and circuits controlled by operation of the switch of the larger denomination of coin and adapted to initiate a cycle of motor operation for registering said plurality of impulses.

4. In a remote control signal transmitter having a cyclic signal generator adapted to generate a control signal during each operating cycle, the sub-combination of a motor operating said generator, an impulse operated register device adapted to register electrical impulses received thereby, check-off mechanism operated by said motor and adapted to check off one impulse registration from said register device at each cycle of operation, a coin controlled electrical circuit responsive to receipt of a coin of a given denomination to operate said register device to register one impulse thereon, a parallel circuit for said register device including impulse switching means operated by said motor to register a plurality of impulses during a cycle of operation, said circuit being normally inactive, and coin controlled means responsive to a coin of a larger denomination and adapted to condition said parallel circuit for operation and to initiate a cycle of operation of said motor.

5. In a remote control signal transmitter having a cyclic signal generator adapted to generate a control signal during each operating cycle, the sub-combination of a motor operating said generator, an impulse operated register device adapted to register electrical impulses received thereby, check-off mechanism operated by said motor and adapted to check off one impulse registration from said register device at each cycle of operation, a coin controlled electrical circuit responsive to receipt of a coin of a given denomination to operate said register device to register one impulse thereon, a parallel circuit for said register device including impulse switching means operated by said motor to register a plurality of impulses during a cycle of operation, said circuit being normally inactive, and coin controlled means responsive to a coin of larger denomination and adapted to condition said parallel circuit for operation, to initiate a preliminary cycle of motor operation during which said plurality of impulses are registered and to render said signal generator inactive during said preliminary cycle.

6. In a remote control signal transmitter having a cyclic signal generator adapted to generate a control signal during each operating cycle, the sub-combination of a motor operating said generator, an impulse operated register device adapted to register electrical impulses received thereby, check-off mechanism operated by said motor and

adapted to check off one impulse registration from said register device at each cycle of operation, a coin controlled electrical circuit responsive to receipt of a coin of a given denomination to operate said register device to register one impulse thereon, a parallel circuit for said register device including impulse switching means operated by said motor to register a plurality of impulses during a cycle of operation, said circuit being normally inactive, a coin actuated stick relay responsive to a coin of a larger denomination, circuits controlled by said stick relay and adapted to condition said parallel circuit for operation, to initiate a preliminary cycle of operation of said motor during which said plurality of impulses are registered and to render said signal generator inactive, and switching means operated by said motor after said impulses are registered and serving to release said stick relay.

7. In a signal transmitter the combination of a cyclic signal generator, a plurality of manually operable selector means adapted to control the characteristics of the signals transmitted, a motor operating said generator, electric circuits associated with said selector means and adapted to initiate a cycle of motor operation when any one of said selector means has been placed in a se-

lected position, latching means adapted to hold said selector means in selected position, and electromagnetically operated latch restraining means operated in timed relation with the operation of said motor to render said latching means effective during periods of motor operation and ineffective at other times.

8. In a signal transmitter the combination of a cyclic signal generator, a plurality of manually operable selector means adapted to control the characteristics of the signals transmitted, a motor operating said generator, a stick relay control switch, an operating circuit for said relay controlled by said control switch said selector means and operating said relay when said control switch is closed and all of said selector means are in normal position, a motor operating circuit associated with said relay and said selector means and adapted to initiate a cycle of motor operation when said relay has been operated and one of said selector means has been placed in selected position, latching means adapted to retain said selector means in selected position, and means operated in timed relation to the operation of said motor first to release said stick relay and then to release said latching means.

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