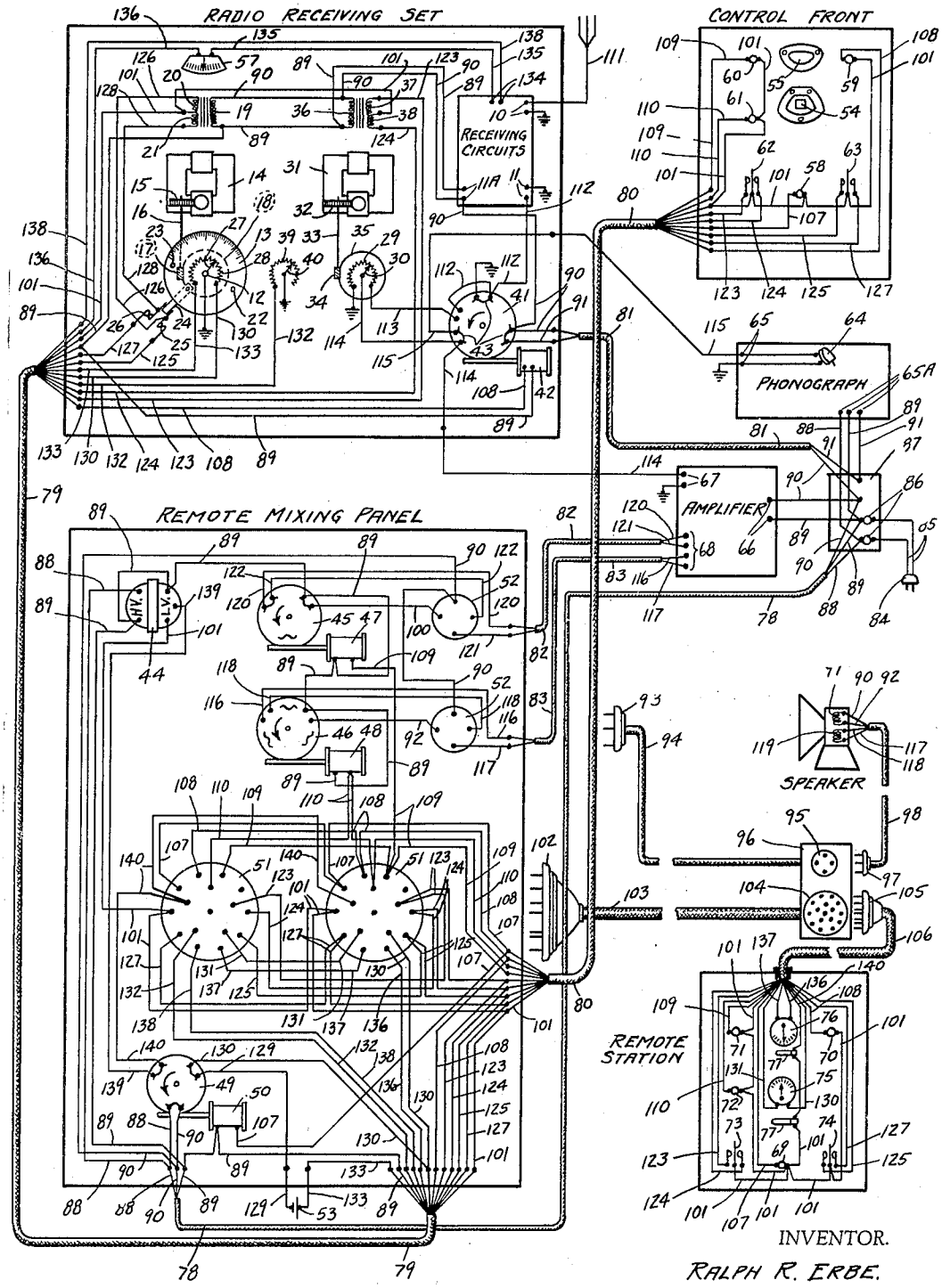
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REMOTE CONTROL FOR RADIOS AND THE LIKE

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REMOTE CONTROL FOR RADIOS AND THE LIKE

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This invention relates to a control for a combined radio and phonograph unit by means of which the tuning of the radio set throughout its receiving range, the output volume of either the radio or the phonograph, the initiation and stoppage of both radio and phonograph operation and the selective connection of two or more speakers to the unit may be controlled from one or more stations remote from the unit or by a station located at the unit. The features of the invention consist in the novel arrangement and operation of the component parts of the control apparatus hereinafter described.

The drawing is a wiring diagram of the apparatus as a whole.

In the drawing, there are shown a radio receiving set, control front therefor, a phonograph, an amplifier and a remote mixing panel, all indicated by appropriate legends. While these elements are shown herein as separate units, they are preferably built into a single cabinet, the separate showing being simply for clarity. There are also shown a remote station and a speaker indicated by appropriate legends which may be located at any desired point remote from the remainder of the apparatus.

The radio receiving set includes receiving circuits not shown in detail but indicated by an appropriate legend, and having input terminals 10, output terminals 11 and power terminals 11A. The receiving circuits include the usual tuning elements which are tuned in response to movement of a tuning shaft 12 carrying a dial 13. The shaft 12 may be rotated in either direction for tuning the receiving circuits to the desired wave length by means of a reversable motor 14 connected thereto through a gear 15, shaft 16, gear 17 and gear 18 mounted on shaft 12. The motor 14 is provided with a high voltage primary winding 19 and a pair of low voltage secondary windings 20 and 21. The motor is so constructed that it operates in one direction when the winding 20 is short-circuited upon itself and in the opposite direction when the winding 21 is so short-circuited. The dial 13 is provided with a pair of stop pins 22 and 23 which are in position to engage a pivotally mounted arm 24 in the rotation of said dial. When engaged by the stop pin 23, the arm 24 acts upon one of a pair 25 of normally closed contactors to open the same. When engaged by the stop pin 22, the arm 24 acts upon one of a second pair 26 of normally closed contactors to open the same. The tuning shaft 12 also carries the movable finger 27 of a rheostat 28, the said finger being grounded as indicated.

There is also included in the radio set a volume control rheostat 29, the movable finger 30 of which may be turned in either direction by a motor 31 by means of a gear 32, shaft 33, gear 34 and gear 35. The motor 31 is provided with a high voltage primary winding 36 and low voltage secondary windings 37 and 38 and is so constructed that it operates in one direction when winding 37 is short-circuited upon itself and in the opposite direction when winding 38 is similarly short-circuited.

The radio receiving set also includes a manually adjustable rheostat 39, the movable finger 40 of which is grounded as shown.

There is also mounted within the radio receiving set a magnetic switch 41 hereinafter referred to as the "phono-radio switch", operated by a solenoid 42. The switch 41 is of the rotary-ratchet type and is turned sixty degrees in the direction of the arrow each time the solenoid 42 is actuated. The moving element of the said switch is provided with three bridging elements 43 set 120 degrees apart. In the position of the switch shown in the drawing and known as the "phono" position, one element 43 connects a pair of conductors 90 and 91, the second connects a conductor 112 to ground and the third connects a pair of conductors 114 and 115. When the switch is moved 60 degrees by an operation of solenoid 42, the foregoing connections are broken and a connection is made by one of the bridging elements between conductors 112 and 113. This position of the switch is known as the "radio" position. Subsequent operations of the solenoid 42 place the switch alternately in the phono and radio positions.

The remote mixing panel has mounted thereon a transformer 44 having high voltage terminals HV and low voltage terminals LV. The remote mixing panel also carries a pair of switches 45 and 46, hereinafter referred to as the "speaker switches". These switches are of the same rotary-ratchet type as the phono-radio switch 41 and are operated respectively by solenoids 47 and 48. In the "on" position of switch 45, shown in the drawing, connection is made between a pair of conductors 89 and 100 and between a pair of conductors 120 and 122. Operation of the solenoid 47 in this position moves the switch to the "off" position in which these connections are broken. Subsequent operations of solenoid 47 move the switch alternately to the on and off positions. Similarly, when switch 46 is in its on position, connections are made between conductors 89 and 92 and between con-

ductors 116 and 118, these connections being broken when the switch is in the off position shown in the drawing.

A third rotary-ratchet switch 49, hereinafter referred to as the "main switch" is also positioned on the remote mixing panel and is operated by a solenoid 50. In the on position of this switch, connection is made between conductors 88 and 90, between conductors 129 and 130 and between conductors 139 and 140. In the off position of the switch, these connections are broken. Successive actuations of solenoid 50 move the switch alternately to on and off positions.

There are also mounted on the remote mixing panel a number of multi-conductor plug sockets 51, two of which are illustrated herein. However, as many of these sockets are provided as are required for the number of remote control stations desired. These plug sockets are hereinafter referred to as "remote control sockets". There are also provided a number of multi-conductor plug sockets 52, hereinafter referred to as "speaker sockets". As many of these sockets are provided as there are speakers to be operated. A battery 53, preferably two dry cells in parallel, is also connected to the remote mixing panel.

The control front of the radio set is provided with an escutcheoned opening 54 through which a portion of the dial 13 is visible and a second escutcheoned opening 55 through which the dial of a galvanometer 57 within the receiving set is visible. There are also mounted on the control front a "main switch" push button 58, a "phono-radio" push button 59, a "No. 1 speaker" push button 60, a "No. 2 speaker" push button 61, a two-circuit "volume control" switch 62 and a two-circuit "tuning control" switch 63.

The phonograph is of the record-changing type, the mechanism of which is not shown in detail since it is well known in the art. The phonograph is provided with a pick-up 64 connected to output terminals 65, and is also provided with power terminals 65A.

The amplifier is of the usual thermionic type having A. C. power terminals 66, input terminals 67, and a plurality of pairs of output terminals 68, there being provided as many such pairs as are necessary for the number of speakers to be operated.

Each remote station, only one of which is shown in the diagram, is provided with a main switch push button 69, a phono-radio push button 70, a No. 1 speaker push button 71, a No. 2 speaker push button 72, a two-circuit volume control switch 73, a two-circuit tuning control switch 74, a galvanometer 75 known as a "kilocycle meter", a galvanometer 76 known as a "tuning meter" and a pair of dial lights 77.

Multi-conductor cables 78, 79, 80, 81, 82 and 83 connect the various parts of the radio and phonograph unit.

Power circuits

The apparatus is preferably designed to operate on alternating current at the voltage usually supplied for household lighting and receives its supply from a plug 84 insertible in the usual household receptacle. It is evident, however, that any other suitable source of power supply may be used. Power mains 85 lead from the said plug to fuses 86 on a terminal block 87 which may be mounted at any convenient point in the unit. A line 88 is connected to one of said fuses and serves as a main power distributory, one branch leading to one of the phonograph power terminals 65A and another branch leading through cable 78 to one terminal of the main switch 49 and to one terminal of the transformer 44. A conductor 89 is connected to the second of the fuses 86 and serves as the power distributory of opposite polarity, branches thereof leading direct to each piece of apparatus supplied with A. C. It will be noticed particularly that branches of the conductor 89 are connected to both a high voltage and a low voltage terminel of the transformer 44 and it thus serves as a distributory of low voltage as well as high voltage A. C. Since the conductors 88 and 89 are always energized, the high voltage primary winding of the transformer 44 is always connected so that low voltage alternating current is always available from the low voltage terminals thereof.

When the main switch 49 is in the on position, a connection is made therein between a branch of the wire 88 and a wire 90. The wire 90 then becomes a distributory supplying A. C. to the receiving circuits of the radio receiving set, to the amplifier and to the primary windings 19 and 36 of motors 14 and 31, each of which elements is also connected to a branch of the opposite distributory 89. The movement of the main switch 49 to the on position, therefore, energizes the radio receiving circuits, the amplifier and the primary windings of the motors 14 and 31. When the main switch 49 is moved to its off position, the 88—90 connection is broken and the conductor 90 is, therefore, deenergized.

One branch of the conductor 90 leads to a terminal of the phono-radio switch 41. In the phono position of said switch a connection is made therein between the conductor 90 and a conductor 91 leading to the terminal block 87 and thence to one of the power terminals 65—A of the phonograph. When this connection is made, power is supplied to the phonograph through the following circuit: 84, 85, 86, 88, 49, 90, 41, 91, 65A, 89, 86, 85, 84. The phonograph is thus operated only when both the main switch 49 and the phono-radio switch 41 are in their on positions. A subsequent movement of either switch to the off position breaks the above power circuit for the phonograph. It will be noted that a branch of the line 88 also leads to one of the power terminals of the phonograph. The said line supplies power for completing the record-changing operation of the phonograph after the main power circuit is broken so that the phonograph will be immediately available for the commencement of playing a record when the switches 49 and 41 are again placed in position to supply power to the phonograph. The internal wiring of the phonograph for this action is disclosed in prior Patent No. 1,872,835, Aug. 23, 1932, to Small and forms no part of the present invention.

One branch of the conductor 90 leads to each of the speaker sockets 52 and a branch of the conductor 89 leads to each of the speaker switches 45 and 46. In the on position of switch 46, a connection is made between the line 89 and a line 92 leading to another terminal of one of the speaker sockets 52. A plug 93 is engageable with the said speaker socket and is connected by a cable 94 to a socket 95 in a wall receptacle 96, preferably located near a desired speaker location. A plug 97 is engageable with the socket 95 and is attached to a cable 98 leading to a speaker. When the plugs 93 and 97 are in position, two of the conductors in the cables 94 and 98 are connected to the conductors 90 and 92 and, for convenience, are given

the same reference numbers at the speaker. The said conductors are connected to the field coils 99 of the speaker. Thus, when the main switch 49 and the speaker switch 46 are in their on positions, the field coils of the speaker are energized by the following circuit: 84, 85, 86, 88, 49, 90, field coil 99, 92, 46, 89, 86, 85, 84. When the speaker switch 45 is in its on position, a similar connection is made between a branch of the line 89 and a line 100 leading to another of the speaker sockets 52. A second speaker may be connected to the said socket in a similar manner to that just described. Preferably, a speaker built into the unit is connected to one of the speaker sockets, and speaker switches, speaker sockets 52, plugs 93, cables 94, receptacles 96, sockets 95, plugs 97 and cables 98 are provided for as many remote speakers as desired.

Control circuit distributories

A conductor 101 is connected to one of the low voltage terminals of the transformer 44 and serves as a distributory for low voltage A. C., the conductor 89 previously described serving as the second low voltage distributory. Branches of the distributory 101 lead to each of the remote control sockets 51. A multi-conductor plug 102 is insertible in each of said sockets, only one being shown herein by way of illustration. Each plug 102 is connected by a cable 103 to a socket 104 in the corresponding wall receptacle 96. A plug 105 is engageable with each of said sockets and is connected by a cable 106 to the adjacent remote station. When the plugs 102 and 105 are in place, each of the conductors in the cables 103 and 106 is in contact with one of the conductors in the corresponding remote control socket 51 and, for convenience, corresponding conductors are given the same reference numbers in the remote station wiring as in the mixing panel wiring. The distributory 101 as shown in the diagram is thus connected to each of the push buttons and switches at each remote station and to one of the dial lights 77 at each station. A branch of the distributory 101 also leads through cable 80 to each of the push buttons and switches on the control front.

Control circuit for main switch

One terminal of the main switch solenoid 50 is connected to a branch of the distributory 89. The opposite terminal is connected to a conductor 107, branches of which lead to each remote control socket 51 and thence through cables 103 and 106 to the main switch push buttons 69 at the remote stations. The opposite terminals of said push buttons are connected to the distributory 101. Another branch of the conductor 107 leads through cable 80 to the main switch push button 58 on the control front, the opposite terminal of which is connected to the distributory 101. By means of this wiring, when push button 69 at any remote station or push button 58 on the control front is pressed, solenoid 50 is energized by the following circuit: 44, 101, 69 or 58, 107, 50, 89, 44. It will be remembered that low voltage A. C. is always available at the transformer 44 for energizing this circuit. Successive operations of any of said push buttons, therefore, move the main switch alternately into on and off positions.

Control circuits for phono-radio switch

One terminal of the phono-radio switch solenoid 42 is connected to a branch of the distributory 89. The opposite terminal is connected to a conductor 108 leading through cable 79 to the remote mixing panel and thence through each of the remote control sockets 51 and through cables 103 and 106 to the phono-radio push buttons 70 of each of the remote stations. The opposite terminals of said push buttons are connected to the distributory 101. Another branch of the conductor 108 leads through cable 80 to the control front and is there connected to one terminal of the phono-radio push button 59, the opposite terminal of which is connected to a branch of the distributory 101. By means of this wiring, when any of the push buttons 70, at any of the remote stations, or push button 59 at the control front, is pressed, solenoid 42 is energized by the following circuit: 44, 101, 70 or 59, 108, 42, 39, 44. Successive operations of any of said push buttons 70 or 59, therefore, move the phono-radio switch 41 alternately into the phono and radio positions.

Control circuits for speaker switches

The solenoid 47 of the speaker switch 45 has one terminal connected to a branch of the distributory 89 and the opposite terminal connected to a conductor 109. The conductor 109 leads to each of the plug sockets 51 and thence through the cables 103 and 106 to one terminal of the No. 1 speaker push button 71 at each of the remote stations. The opposite terminals of said push buttons are connected to the distributory 101. Another branch of the conductor 109 leads through cable 80 to one terminal of the No. 1 speaker push button 60 on the radio control front, the opposite terminal of which is connected to a branch of the distributory 101. By this wiring, when the push button 71, at any of the remote stations, or the push button 60, is pressed, the solenoid 47 is energized by the following circuit: 44, 101, 71 or 60, 109, 47, 89, 44. Successive operations of any of the push buttons 71 or 60, therefore, move the speaker switch 45 alternately into the on and off positions.

The speaker switch solenoid 48 has one terminal connected to a branch of the distributory 89 and the opposite terminal connected to a conductor 110 which leads through the plug sockets 51 and the cables 103 and 106 to a terminal of the No. 2 speaker push button 72 at each of the remote stations. The opposite terminals of said push buttons are connected to a branch of the distributory 101. A branch of the conductor 110 leads through cable 80 to one terminal of the No. 2 speaker push button 61 on the control front, the opposite terminal of which is connected to a branch of the distributory 101. By means of this wiring, when any of the push buttons 72 at the remote stations, or the push button 61, is pressed, the solenoid 48 is energized by the following circuit: 44, 101, 72 or 61, 110, 48, 89, 44. Successive operations of any of these push buttons alternately move the switch 46 to the on and off positions.

It is evident that as many speaker switch push buttons as are necessary for the number of speakers to be used may be provided at any or all of the remote stations and may be similarly connected to operate similar speaker switches.

Radio circuits

One of the input terminals 10 of the radio receiving circuits is grounded as shown and the other is connected to an antenna 111 in the usual manner. One of the output terminals 11 of the receiving circuits is also grounded and the opposite output terminal is connected by a con-

ductor 112 to the phono-radio switch. In the phono position of the switch shown in the diagram the conductor 112 is grounded. In this position, therefore, it is not possible for radio output to pass to the amplifier. In the radio position of the phono-radio switch 41, the conductor 112 is connected to a conductor 113 leading to one end of the resistance coil of rheostat 29, the opposite end of which is grounded. The movable finger 30 of said rheostat is connected by a conductor 114 to one of the input terminals 67 of the amplifier, the opposite input terminal thereof being grounded. The conductor 114 also leads to the phono-radio switch 41 but in the radio position of said switch, is not connected therein to any other conductor. In the radio position of the phono-radio switch, therefore, the output of the receiving circuits reaches the amplifier through the following circuit: ground, 11, 112, 113, 29, 30, 114, 67, ground. The rheostat 29 in this circuit acts as a volume control both by inserting resistance in the output circuit and by shunting a portion of the output to ground.

Phonograph output to amplifier

One output terminal 65 of the phonograph is grounded as shown and the opposite terminal is connected through conductor 115 to one terminal of the phono-radio switch 41. In the phono position of the said switch the conductor 115 is connected to the conductor 114. In the phono position of said switch, therefore, the output of the phonograph reaches the amplifier on the following circuit: ground, 65, pickup 64, 65, 115, 41, 114, 67, ground. A portion of the phonograph output is by-passed to ground through conductor 114, rheostat finger 30, coil 29, and its ground connection. The rheostat 29, therefore, serves as a volume control for the phonograph output as well as the radio output. However, no resistance is inserted in the circuit by the rheostat as in the radio operation since the 113 conductor is disconnected. By this means, the same volume control rheostat gives suitable control of both phono and radio volume, although the output characteristics of the two units may not be the same.

Amplifier output to speakers

One pair of the amplifier output terminals 68 is connected by conductors 116 and 117 to the speaker switch 46 and to one terminal of one of the speaker sockets 52 respectively. In the on position of the switch 46 the conductor 116 is connected to a conductor 118 which leads to another terminal of the same speaker socket 52. The conductors 117 and 118 lead through cables 94 and 98 to the voice coils 119 of the speaker. Thus, in the on position of the switch 46 the voice coil 119 is connected to a pair of amplifier output terminals and since the field coil 99 is supplied with high voltage A. C. in the on position of said switch, the speaker is fully connected for delivering the output of either the radio or phonograph, depending upon the position of the phone-radio switch. Similarly, a second pair of amplifier terminals 68 are connected by conductors 120 and 121 to the speaker switch 45 and to another of the speaker sockets 52 respectively. The conductor 120 is connected in the on position of switch 45 to a conductor 122 leading to another terminal of the same speaker socket. A speaker connected to the said socket is, therefore, similarly energized whenever switch 45 is in the on position and as many speakers as desired may be similarly connected by duplicating the apparatus and wiring herein described.

Remote volume control circuits

The secondary windings 37 and 38 of the volume control motor 31 are provided with a common terminal connected to a branch of the distributory 101 which is also connected to the central terminal of the volume control switch 73 at each of the remote stations and of the volume control switch 62 on the control front. The opposite terminal of the winding 37 is connected to a conductor 123 which leads through cable 79 to each of the remote control sockets 51 and thence through cables 103 and 106 to the lefthand terminal of the switch 73 at each remote station. A branch of the conductor 123 also leads through cable 80 to the lefthand terminal of switch 62. The opposite terminal of winding 38 is connected to a conductor 124 which leads through the cable 79 to each of the remote control sockets 51 and thence through cables 103 and 106 to the righthand terminal of switch 73 at each remote station. A branch of the conductor 124 also leads through cable 80 to the righthand terminal of switch 62. When any of the switches 73 or 62 is moved to the left to connect distributory 101 with conductor 123, the winding 37 is short circuited by the following circuit: 37, 101, 73 or 62, 123, 37. The motor 31, therefore, operates to move the rheostat 29 to increase or decrease the volume. When either switch 73 or 62 is moved to the right to connect lines 101 and 124, the winding 38 is short circuited by the following circuit: 38, 101, 73 or 62, 124, 38. The motor 31, therefore, operates the rheostat 29 in the opposite direction. The volume output of either the phonograph or the radio is, therefore, easily controlled from either the remote stations or control front by moving the switches 73 or 62 to the right or left until the desired volume is obtained. In these circuits, it will be noticed that the conductor 101 is used only for short-circuiting the secondary motor windings and not for supplying low voltage alternating current, although the said conductor is connected to the low voltage terminal of the transformer 44. Since no part of either circuit is connected to the opposite low voltage distributory 89, the connection of the conductor 101 to the transformer has no effect. The gear 35 or the finger 30, or both, is preferably frictionally mounted so that excessive movements of the motor 31 in either direction will cause no damage. A limit control, therefore, is not required.

Remote tuning control

The secondary windings 20 and 21 of the tuning motor 14 are connected to the line 101 which is also connected to the central terminal of the switch 74 at each remote station and the central terminal of the switch 67 at the control front. The opposite terminal of the winding 20 is connected by a conductor 126 to one of the contactors 25. The opposite contactor 25 is connected to a conductor 125 which leads through cable 79 to each of the remote control plug sockets 51 and thence through cables 103 and 106 to the left hand terminal of switch 74 at each remote station. A branch of the conductor 125 also leads through cable 80 to the left hand terminal of the switch 63. The opposite terminal of the winding 21 is connected by a conductor 128 to one of the contactors 26. The opposite contactor 26 is connected to a conductor 127 leading through

cable 79 to each of the plug sockets 51 and thence through cables 103 and 106 to the right hand terminal of switch 74 at each remote station. A branch of the conductor 127 leads through cable 80 to the right hand terminal of switch 63. When any of the switches 74 or 63 is moved to the left to connect conductors 101 and 125, the secondary winding 20 of the motor 14 is short-circuited by the following circuit: 20, 101, 74 or 63, 125, 25, 126, 20. The motor 14 then operates in the proper direction to turn the tuning shaft 12 and the dial 13 counterclockwise. When either switch 74 or 63 is moved to the right to connect conductors 101 and 127, the secondary winding 21 of motor 14 is short-circuited by the following circuit: 21, 101, 74 or 63, 127, 26, 128, 21. The motor 14 is then operated to turn the tuning shaft 12 and the dial 13 in the clockwise direction.

When the shaft 12 is turned in the counterclockwise direction by short-circuiting the winding 20 and has reached the safe limit of its travel, stop pin 23 engages the arm 24 which in turn separates the contactors 25 and opens the circuit through the winding 20, thus stopping the motor. Similarly, when shaft 12 is operated in the clockwise direction by short-circuiting winding 21 and the safe limit of movement is reached, stop pin 22 engages the arm 24 which acts to separate the contactors 26 and breaks the circuit through winding 21. The contactors 25 and 26 thus serve as limit switches to prevent over travel of the tuning shaft 12. By means of these circuits, the radio receiving circuits may be tuned to the desired frequency by moving any of the switches 74 or 63 to the right or left until the desired frequency tuning is reached.

Kilocycle meter circuits

A conductor 129 is connected to one terminal of the battery 53 and leads to a terminal of the main switch 49. In the on position of said main switch, the conductor 129 is connected to a conductor 130, a branch of which leads to one of the plug sockets 51 and thence through the corresponding cables 103 and 106 to a terminal of the kilocycle meter 75 in the corresponding remote station. The opposite terminal of the said meter is connected to a conductor 131 which leads through cables 106 and 103 to the corresponding plug socket 51 and thence to a second of the plug sockets 51. The kilocycle meter 75 in the remote control station connected to the last mentioned plug socket is connected to conductor 131 and to a conductor 132 leading back to said last mentioned plug socket. Similarly, as many kilocycle meters as there are remote stations and plug sockets therefor may be connected in series. In the diagram where only two plug sockets are shown, the conductor 132 leads through cable 79 to one terminal of the resistance coil of rheostat 39, the movable finger 40 of which is grounded as shown. A branch of the conductor 130 leads to one end of the resistance coil of rheostat 28, the movable finger 27 of which is grounded. The opposite terminal of said resistance coil is connected to a conductor 133 which leads through cable 79 to the remote mixing panel and is connected to the opposite terminal of the dry battery 53. When the main switch 49 is in the on position, the output of the battery 53 reaches the kilocycle meters over the following circuit: 53, 129, 49, 130, meter 75, 131, other meters not shown, 132, 39, 40, ground, 27, 28, 133, 53. A portion of the output of battery 53 is by-passed through the following circuit: 53, 129, 49, 130, 28, 133, 53. It will be seen that the proportion between the by-passed current and the current passing through the kilocycle meters is determined by the position of the movable pointer 27 of rheostat 28. Since this pointer is movable in response to the tuning of the receiving circuits, the meters 75 may be calibrated to show the tuned position of the receiving circuits in terms of kilocycles or wave lengths. The rheostat 39 in the circuit serves as a final adjustment upon this calibration and is useful in correcting the adjustment from time to time as the strength of battery 53 falls off. By means of these circuits, the tuned position of the radio set is indicated to the operator at any of the remote stations whenever the main switch is in the on position. Since the dial 13 is visible through the opening 54 on the radio control front, no kilocycle meter is necessary at the control front. If any of the plugs 102 or 105 is removed from its socket, it is necessary to insert a short-circuiting conductor in the said socket which will connect the conductors leading to and from the corresponding kilocycle meter in order to maintain the circuit to the remaining meters.

Tuning meters

In the radio receiving circuits, a pair of terminals 134 are connected in series between the plates of one or more of the thermionic tubes used for radio amplification and the B battery or rectifier which supplies the plate current for said tubes. One of the terminals 134 is connected by a conductor 135 to the galvanometer 57, the opposite terminal of which is connected to a conductor 136 which leads through the cable 79 to one of the plug sockets 51 and thence through the cables 103 and 106 to one terminal of the tuning meter galvanometer 76. The opposite terminal of the said meter is connected to a conductor 137 leading back to the corresponding plug socket 51 and connected to the next adjacent similar socket. The meter 76 in the remote station connected to the second of said sockets is connected in the same manner to conductor 137 and to a conductor 138 returning to the last mentioned plug socket. Similarly, as many galvanometers may be connected in series as there are plug sockets and remote stations provided. In the example illustrated where only two sockets are shown, the conductor 138 leads from the last mentioned socket through the cable 79 to the second of the terminals 134. The plate current through one or more of the amplification stages of the radio receiving circuits is thus conducted through the tuning meter 57 and the tuning meters 76 at the remote stations in series. In tuning the set to a given station, therefore, the tuning shaft 12 may be turned by the remote control until a maximum reading on either of the meters is obtained indicating that the circuits are tuned as accurately as possible to the desired station. The meter 57 being visible through opening 55 in the control front serves as the tuning meter at the radio set.

Remote station dial lighting

An intermediate tap on the LV winding of transformer 44 is connected to a conductor 139 leading to a terminal of the main switch 49. In the on position of said switch conductor 139 is connected to a conductor 140 leading to each of the remote control plug sockets 51 and thence through cables 103 and 106 to the remote stations. At each remote station, the dial lamps 77 are connected in series between conductors 140 and

101 and are thus supplied with A. C. at a suitably reduced voltage whenever the main switch 49 is in the on position.

The details illustrated in the drawing and described in the foregoing specification may be varied within wide limits without departing from the scope of the invention as defined by the appended claims.

The invention claimed is:

1. In a remote control for a radio-phonograph unit, the combination of radio receiving circuits, a phonograph output circuit, an amplifier, a variable resistance unit having a resistance coil and a finger movable relatively thereof, one output terminal of said receiving circuits, one terminal of said phonograph output circuit, one input terminal of said amplifier and one terminal of said resistance coil being electrically connected as by a ground connection and said finger being electrically connected to the second amplifier input terminal, a multicircuit magnetic switch and connection thereto adapted when said switch is in one position to connect the second output terminal of said radio receiving circuit to the opposite terminal of said resistance coil and when in another position to short circuit said radio output terminals as by a ground connection and to connect the second phonograph output terminal to said finger and to said second amplifier input terminal, the connections made in each of said positions being broken in the other, and a remote control circuit including parallel connected push buttons at a plurality of remote stations for operating said magnetic switch to place the same selectively in either of said positions.

2. In a remote control for a radio-phonograph unit, the combination of radio receiving circuits, a phonograph output circuit, an amplifier, a variable resistance unit having a resistance coil and a finger movable relatively thereof, one output terminal of said receiving circuits, one terminal of said phonograph output circuit, one input terminal of said amplifier and one terminal of said resistance coil being electrically connected as by a ground connection and said finger being electrically connected to the second amplifier input terminal, a multicircuit magnetic switch and connection thereto adapted when said switch is in one position to connect the second output terminal of said radio receiving circuit to the opposite terminal of said resistance coil and when in another position to short circuit said radio output terminals as by a ground connection and to connect the second phonograph output terminal to said finger and to said second amplifier input terminal, the connections made in each of said postions being broken in the other, a remote control circuit including parallel connected push buttons at a plurality of remote stations for operating said magnetic switch to place the same selectively in either of said positions, a reversible motor for moving said finger relatively of said resistance coil, and remote control circuits including parallel connected double throw switches at each of said remote stations for operating said motor in either direction.

3. In a control for a radio-phonograph unit, the combination of radio receiving circuits, a phonograph output circuit, an amplifier, a variable resistance unit having a resistance coil and a finger movable relatively thereof, one output terminal of said receiving circuits, one terminal of said phonograph output circuit, one input terminal of said amplifier and one terminal of said resistance coil being electrically connected as by a ground connection, and a multicircuit switch and connections thereto adapted when said switch is in one position to connect the second output terminal of said radio receiving circuit to the opposite terminal of said resistance coil and when in another position to short circuit said radio output terminals as by a ground connection and to connect the second phonograph output terminal to said finger and to said second amplifier input terminal, the connections made in each of said positions being broken in the other.

4. In a remote control for a radio receiving set, the combination of a plurality of remote control stations, a remote mixing panel, a socket, plug and cable connection between said mixing panel and each of said remote stations, a plurality of speakers, a socket, plug and cable connection between each of said speakers and said remote mixing panel, a magnetic speaker switch on said panel associated with each of said speakers, each of said switches being operable to connect its associated speaker for reproduction of signals received by said radio set, and remote control circuits including parallel connected push buttons at each of said remote stations for operating each of said switches to selectively connect and disconnect said speakers.

5. In a remote control for a radio receiving set, the combination of a plurality of remote control stations, a remote mixing panel, a socket, plug and cable connection between said mixing panel and each of said remote stations, a plurality of speakers, a socket, plug and cable connection between each of said speakers and said remote mixing panel, a rotary ratchet type magnetic switch on said panel associated with each of said speakers magnets for operating switches, each of said switches being operable to connect and disconnect its associated speaker on successive operations of its magnet, and remote control circuits including parallel connected push buttons at each of said remote stations for operating each of said magnets.

6. In a remote control apparatus for a radio unit, the combination of radio receiving circuits, tuning means therefor, a reversible motor for operating said tuning means, a remote mixing panel, a plurality of plug sockets on said pane., a plurality of remote control stations, plug and cable connections between each of said remote stations and one of said sockets, and control circuits for operating said motor connecting said motor through parallel connections at said sockets to each of said remote stations and including parallel connected double throw switches at each of said remote stations.

7. In a remote control apparatus for a radio unit, the combination of radio receiving circuits, tuning means therefor, a reversible motor for operating said tuning means, a remote mixing panel, a plurality of plug sockets on said panel, a plurality of remote control stations, plug and cable connections between each of said remote stations and one of said sockets, control circuits for operating said motor connecting said motor through parallel connections at said sockets to each of said remote stations and including parallel connected double throw switches at each of said remote stations, a rheostat adjustable by movement of said tuning means, a source of electric current, and a circuit connecting said rheostat and current source to each of said remote stations by means of series connections at said sockets, said circuit including a series connected

galvanometer at each of said stations for indicating the adjusted position of said rheostat.

8. In a remote control apparatus for a radio set, the combination of radio receiving circuits, a remote mixing panel, a plurality of plug sockets thereon, a plurality of remote stations, plug and cable connections between each of said stations and one of said sockets, and a circuit connecting said receiving circuits with said remote stations by means of series connections at said sockets, said circuit including a series connected galvanometer at each of said remote stations and one or more of the plate circuits of said radio receiving circuits.

9. A control for a combined radio and phonograph unit, including radio receiving circuits, a phonograph output circuit, an amplifier, a remote mixing panel, a plurality of wall receptacles remote from said panel, multiconductor cables connecting said wall receptacles and said remote control panel, a motor operated tuning device for said receiving circuits, a motor operated volume control for adjusting the output of both radio and phonograph, a magnetic switch operable to connect said radio receiving circuits and said phonograph alternatively to said volume control and said amplifier, a plurality of remote stations, plug and cable connections connecting each remote station with one of said wall receptacles, and control circuits for said motors and said switch including parallel connected switches at each of said remote stations.

10. A control for a combined radio and phonograph unit, including radio receiving circuits, a phonograph output circuit, an amplifier, a remote mixing panel, a plurality of wall receptacles remote from said panel, multiconductor cables connecting said wall receptacles and said remote control panel, a tuning motor operated tuning device for said receiving circuits, a motor operated volume control for adjusting the output of both radio and phonograph, a magnetic switch operable to connect said radio receiving circuits and said phonograph alternatively to said volume control and said amplifier, a plurality of remote stations, plug and cable connections connecting each remote station with one of said wall receptacles, control circuits for said motors and said switch including parallel connected switches at each of said remote stations, a plurality of speakers, plug and cable connections connecting each of said speakers to one of said wall receptacles, magnetic switches on said control panel each adapted to connect and disconnect one of said speakers to said amplifiers, and a control circuit for each of said switches including a parallel connected push button at each remote station.

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