

July 11, 1933.

C. E. GERMANTON

1,917,881

REMOTE CONTROL DEVICE

Filed April 20, 1929

2 Sheets-Sheet 1

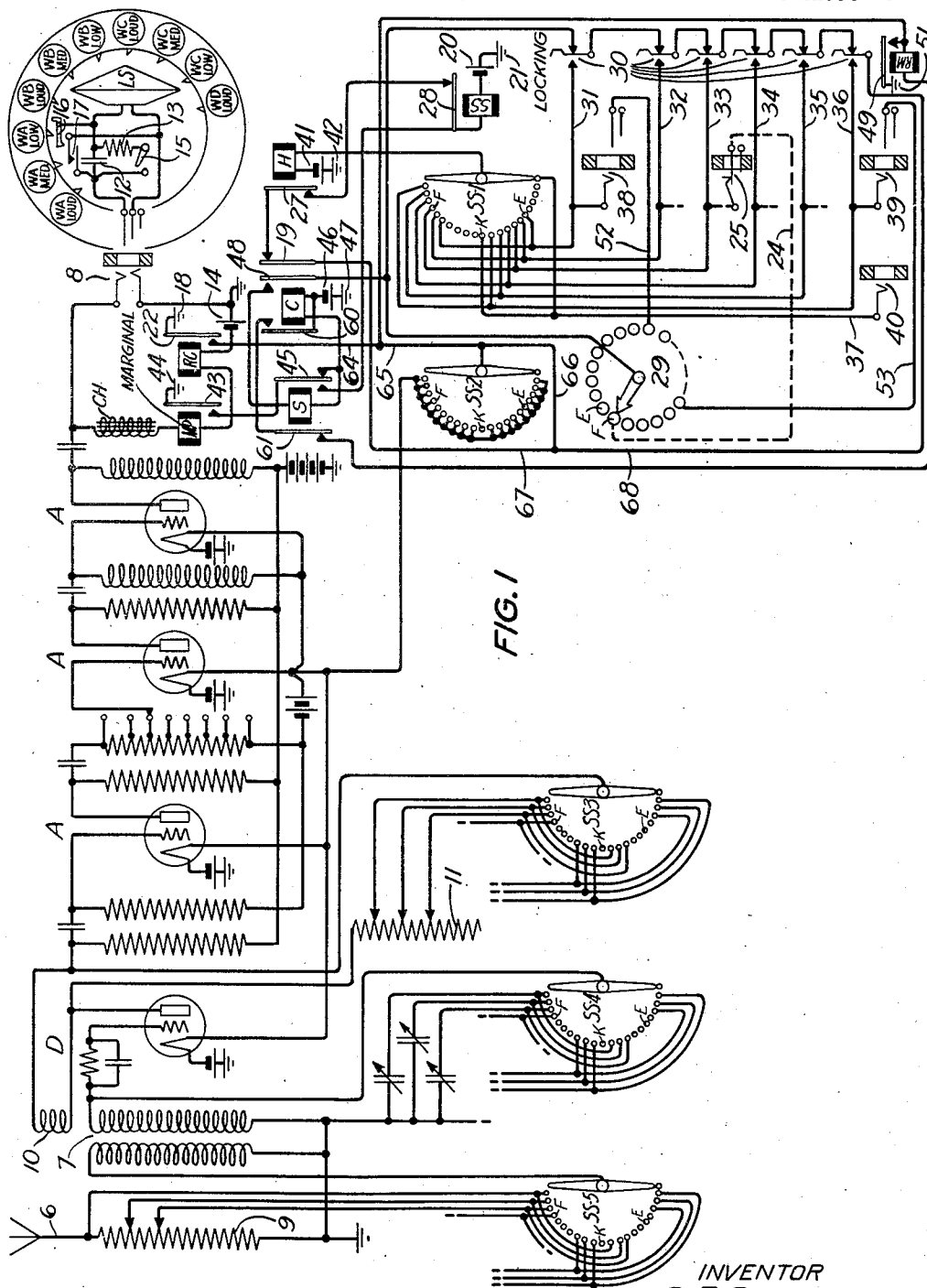


FIG. 1

INVENTOR
C. E. GERMANTON
BY *Guy T. Morris*
ATTORNEY

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C. E. GERMANTON

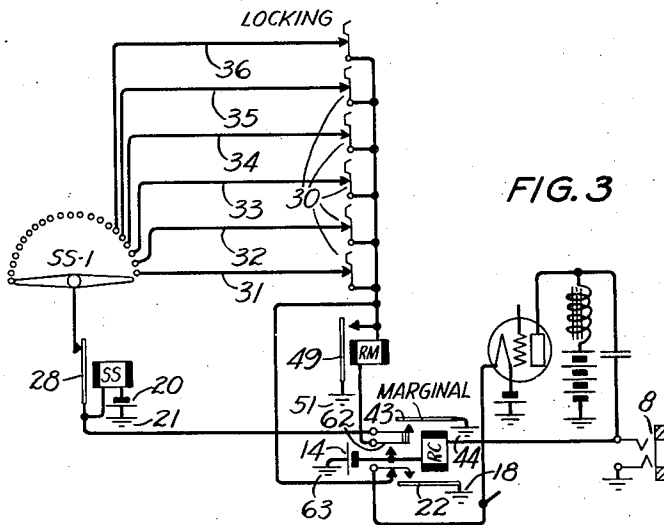
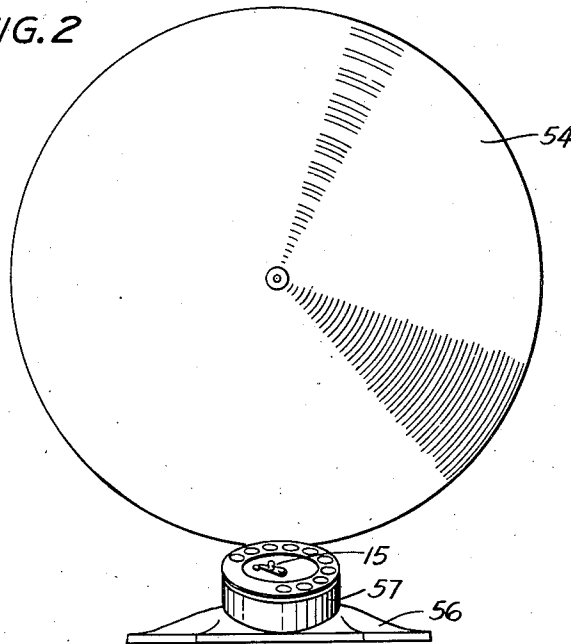
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2 Sheets-Sheet 2

FIG. 2



INVENTOR
C. E. GERMANTON
BY *Eugene T. Morris*
ATTORNEY

UNITED STATES PATENT OFFICE

CHARLES E. GERMANTON, OF BROOKLYN, NEW YORK, ASSIGNOR TO BELL TELEPHONE LABORATORIES, INCORPORATED, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK

REMOTE CONTROL DEVICE

Application filed April 20, 1929. Serial No. 356,718.

This invention relates to remote control means for a radio receiver.

An object of the invention is to effect the control of a radio receiver so that a prearranged schedule, consisting of programs from a plurality of broadcasting stations or channels, may be received without further manipulation of the controlling means.

Another object of the invention is to permit the tuning of a radio receiver to be adjusted by means of a switch at the loud speaker, which may be located at a point remote from the radio receiver, over the leads normally used to transmit current from the receiver to the loud speaker.

A further object of the invention is to control the operation of a stepping relay, connected with a rotating selector switch, by means of intensity variations in current transmitted over leads from a loud speaker to a radio receiver.

A still further object of this invention is to provide, in combination with a radio receiver, means for operating a series of time controlled switches to effect the tuning of the radio receiver to a succession of broadcasting stations after successive predetermined intervals, means comprising a switch associated with the loud speaker for cutting the time controlled switches out of the circuit and restoring them again at will, and for actuating the rotating selector switch to select a desired station while the time controlled switches are out of the circuit by means of tuning condensers connected to the switch contacts, a plurality of keys for instantaneously tuning the receiver to a desired station, automatically cutting out the previously mentioned control switches, and a release key for releasing the key control and restoring the other controls.

By means of this invention a program for an entire evening may be arranged at the beginning of an evening so that without further manipulation of any controlling or tuning means WJZ will be heard from 8:00 to 8:30, say, WEAF from 8:30 to 9:00, etc. At any time during the evening the prearranged program may be cut off by means of relays controlled by a switch at the loud speaker, and the rotating selector switch stepped along one step by each closure of the loud speaker switch, to select any desired station by means of tuning condensers connected to the various contacts of the rotating selec-

tor switch. The prearranged program may be restored at any time by means of relays controlled by turning the loud speaker switch to a third, or off, position and then back to its first position.

The prearranged program may also be cut off, and any desired station selected instantaneously, by depressing one of a plurality of keys associated with the selector switch which controls the tuning condensers, which keys may be located at the receiver. The station so selected may in turn be cut out and the prearranged program restored by the manipulation of means provided for releasing the depressed key, such as partial depression of a normal control key, or by turning the loud speaker switch to its off position and back to its first position.

Other objects, features, and advantages of, and results accomplished by, the invention will appear more fully from the following description in connection with the drawings in which:

Fig. 1 is a circuit diagram of the invention,

Fig. 2 is a front elevation of a remote control switch of the invention mounted on a loud speaker, and

Fig. 3 is a circuit diagram of a modification of the remote control system.

In Fig. 1 a radio receiving circuit is shown in which incoming signals received on antenna 6 are impressed on a regenerative detector D through a transformer 7. From the detector the signals are amplified in three stages by amplifiers A and are finally impressed on loud speaker LS, which is connected to the circuit through a plug and jack 8. Any type of radio receiving circuit may be adapted for use with this invention and the one chosen for illustration is typical of a great number of practical alternatives.

In the lead to the antenna 6 there is connected a variable resistance 9. A number of taps thereto are connected to the points of one arc 5 of a rotating selector switch comprising elements SS-1, SS-2, SS-3, SS-4, and SS-5 whose movable contacts are operated together by stepping magnet SS to be described later, for controlling the volume of the signals reproduced in the loud speaker. The rotating selector switch may be similar to that disclosed in U. S. Patent 1,472,465, granted October 30, 1923, to O. F. Forsberg and R. M. De Vignier. Across the input circuit of the detector tube there is pro-

vided a choice of a number of variable condensers all of which are permanently connected to one side of the circuit by one terminal and to the other side of the circuit through the points of arc 4 of the rotating selector switch element SS—4, one of which points, and therefore the corresponding condenser, may be selected at will by the switch arm for varying the wave length to which the receiver is tuned.

Connected in shunt to a feed-back coil 10 in the output of the detector tube there is provided a variable resistance 11, taps to which are connected to the points of arc 3 of the rotating selector switch element SS—3 to vary the feed-back to this tube.

On the loud speaker LS there is provided a switch 15 for permanently closing or opening a circuit, and a rotating dial switch having two contacts, 16 and 17, for effecting a circuit recurrently. Associated therewith is a condenser 12 and resistance 13.

When the switch 15 is open, the electrical circuits which control the operation of the set are open-circuited. When the switch is then closed a circuit is closed from battery 14 through relay RC, which operates, through relay MP, which is marginal and does not operate at this time, through choke coil CH, plug and jack 8, switch 15, resistance 13, loud speaker LS, plug and jack 8 and back to battery 14. The operation of the relay RC closes a circuit from ground 18 through the armature 22 of relay RC, leads 64, 65, 66 and 67, armature 19 of relay C, back contact 27 of relay H, armature 28 of stepping magnet SS, winding of stepping magnet SS, battery 20 to ground 21. This causes the stepping magnet SS to operate, which moves each of the movable contacts of the selector switch one step. This magnet will then continue to operate and release due to self-interruptions on contact 28 causing the rotating selector switch to step until the circuit to its armature 28 is broken. Ground 18 is also available to the movable arm of a time controlled switch 29 through armature 22, leads 64, 65, 66 and 68, and back contacts of push keys 30, provided the push keys are normal, as shown. Connected to the terminals of the switch 29 are a plurality of flexible leads as 52, 53, 24 which are adapted to be connected by means of plugs and jacks 38, 39, 40, 25, for example, or other suitable means, to a plurality of bus bars 31 to 37 inclusive, which are connected to the points of arc 1 of the rotating selector switch. The terminals shown on the time controlled switch 29 may correspond to 15-minute intervals, or any other suitable intervals, and successive terminals on the switch may be connected to successive bus bars 31 to 37. Of course, there may be as many points on the arcs of the rotating selector switch and as many bus bars connected to the points of

the first arc thereof, as desired, and each bus bar may be connected to a separate point instead of being multiplied as shown. Also a number of terminals on switch 29 may be connected to a single bus bar, depending on the schedule of programs desired.

Assuming now that the terminal F of the time control switch 29, which is closed, is connected to the bus bar 33, the circuit previously described from ground 18 through stepping magnet SS, and battery 20 to ground 21, will cause the stepping magnet SS to operate and rotate the selector switch until the brush on arc 1 makes contact with the terminal F which is connected to bus bar 33. This completes a circuit from ground 18 through contact 22, leads 64, 65, 66 and 68, back contacts of push keys 30, time controlled switch 29, flexible lead 24, plug and jack 25, bus bar 33, terminal F and brush of arc 1, winding of relay H, battery 41 to ground 42. Relay H operates and breaks the circuit from ground 18 through armature 27, and winding of stepping magnet SS to ground 21, and the rotating selector switch stops at the terminal F to which the bus bar 33 is connected. The brushes on the other arcs of the selector switch have, of course, been turning with the brush on arc 1. The condenser connected to the F terminal of arc 4 has been previously adjusted to tune the input circuit to the detector tube of the receiving set to a desired wave length to pick up signals from a desired radio broadcasting station. The lead connected to terminal F on arc 5 has been previously adjusted at a desired point on the variable resistance 9 so that signals will be received with the desired volume. The lead connected to terminal F on arc 3 has been previously adjusted to the desired point on variable resistance 11 to secure the desired amount of feed-back in the detector tube. Signals will then be received in the loud speaker LS from a predetermined station at a predetermined volume.

The filament current used to operate the receiver may be controlled as shown by connection to arc 2, if desired, so that the single operation of turning the switch at the loud speaker will turn on the filament current as well as tune the set to a desired wave length.

Assume now that the time controlled switch 29 moves to its next terminal E, which, let it be assumed, has been connected through a flexible lead, not shown, and plug and jack 38 to bus bar 31, which is in turn connected to point E on arc 1. The switch 29 bridges between terminals to prevent premature breaking the circuit through relay H and consequent undesired starting of the selector switch. However, when the switch is completely removed from terminal F on switch 29, the circuit previously described through relay H will be broken. The circuit from ground 18 through armatures 22, 19, 27 and

stepping magnet SS previously described is again completed and the stepping magnet SS will begin to operate to step the selector switch along until the circuit through the winding of relay H is again completed, this time through terminal E on arc 1, and the selector switch is stopped at this point, at which another predetermined station is tuned in at a predetermined volume. Thus, by connecting bus bars corresponding to certain stations to terminals on switch 29 corresponding to certain hours a program may be arranged at the beginning of an evening which will include as many different stations as desired at whatever time or times they may be desired during the entire evening, without further control.

If it is desired to cut the receiver off for a predetermined interval in the midst of the prearranged program the lead or leads from terminals on time controlled switch 29 corresponding to the interval may be connected to bus bar 37, which is connected to point K on arc 1. When switch 29 makes contact with this terminal the circuit from ground 18 through contact 22, and arc 2, to the filaments of the tubes is broken through arc 2 and the filament current in the set is turned off. The selector switch is kept at this point during the interval due to the operation of relay H which breaks the circuit through the stepping magnet SS as at other points in the rotation when a terminal on arc 1 is reached which is connected to ground through the time controlled switch 29. The circuit as before is from ground 42 through battery 41, winding of relay H, to terminal K of arc 1, bus bar 37, jack 40, plug and flexible lead, not shown, to terminal on switch 29, back contacts of push keys 30, leads 68, 66, 65, 64, armature 22 to ground 18. Relay RC holds its contact whenever the switch 15 is closed, through the circuit previously described. When the time arrives at which a station is again to be tuned in the switch 29 moves to a new terminal, the circuit through relay H is broken, ground is furnished to winding of stepping magnet SS from ground 18 through armature 22, leads 64, 65, 66 and 67, armature 19, armature 27, armature 28, winding of stepping magnet SS, battery 20 to ground 21, causing the stepping magnet SS to operate and move the selector switch one step. This moves the brush of arc 2 to the point beyond point K, lighting the filaments. The selector switch continues to step until the brush reaches the new point on arc 1 which is now grounded through time control switch 29, and completes a circuit through relay H as previously described, which stops the operation of stepping magnet SS and keeps the selector switch at this point, corresponding to a desired broadcasting station, until the switch 29 again moves to a new terminal.

As has been previously stated the circuits

just described will enable one to arrange a program at the beginning of an evening which will continue, as arranged, during the entire evening, without further manipulation of the controls. For example, the receiver may be arranged to start at 7:00 o'clock with a program from WEA. At 7:15 that station may be tuned out and WRC tuned in. From 7:30 to 8:15 the radio may be silent, and at 8:15 WEVD come in until 9:00 o'clock when the program will be switched to WOR, etc.

During the course of the evening it may be desired to switch from the program previously arranged to one from a different station for a while, but without disturbing the course of the prearranged program for the rest of the evening. To accomplish this the rotating switch at the loud speaker is turned in a counter-clockwise direction. This closes the contacts 16 and 17, which short-circuits the loud speaker and resistance 13, increasing the current flowing in the circuit through the windings of relays MP and RC. Relay MP, which is marginal and has not hitherto operated, now operates on this increased current, completing a circuit from ground 44 through armature 43, armature 45, winding of relay C, battery 46 to ground 47. This causes the operation of the relay C which opens its armature 19 and closes the circuits of its armatures 48 and 60. Relay S does not operate as there is a connection to ground on both sides of its winding, the ground at 44 being connected through armatures 43 and 45 to one side of winding of the relays, while a path from ground at 18 through armature 22, leads 64, 65, 66 and 68, back contacts of push keys 30 and armature 48 extends to the other side of the winding. Stepping magnet SS cannot operate because of the breaking of the circuit through armature 19. When the contact between armatures 16 and 17 is broken loud speaker LS and resistance 13 are reconnected to the circuit. Relay MP releases, removing ground from armature 45 and winding of relay S, which operates due to the circuit from ground 47 through battery 46, windings in series of relays C and S, armature 48, contacts of push keys 30, leads 68, 66, 65 and 64, armature 22 to ground 18. Relay C holds on this reduced current. The operation of relay S prepares a circuit for supplying ground through armature 45 for the operation of stepping magnet SS upon subsequent operation of relay MP. Relay S also opens a circuit through its armature 61 on operation, for purposes which will be hereinafter explained. With the closing and opening of contacts 16 and 17 then, contact armature 45 has been moved from its back contact to its front contact and circuits through armatures 48 and 19 have been closed and opened respectively.

Upon reoperation of the loud speaker

switch contacts 16 and 17 are again closed. Relay MP again operates closing a circuit from ground 44 through armature 43, armature 45, winding of stepping magnet SS, battery 20 to ground 21, which causes the stepping magnet SS to operate, stepping the selector switch one step to a new station on its release. Each successive closure of contacts 16 and 17 steps the selector switch one step, so that it can be stepped along to the desired station, and will remain tuned to that station until the controls are manipulated to move it from that station.

If it is now desired to cut out the station to which the receiver has been temporarily tuned by the stepping process just described, and resume the prearranged program, the switch 15 may be opened. This opens the direct current circuit through the loud speaker, causing relay RC to release, removing ground for holding relays C, S and H and from stepping magnet SS and the filaments.

Closing the switch 15 starts the scheduled program again as described above.

Resistance 13 is used only when required to provide sufficient current variation for the operation and release of relay MP. When resistance 13 is omitted the condenser 12 may be omitted, as it is for the purpose of providing a path for audio frequencies in shunt to resistance 13. Contact 17 is provided to permit the resistance of the loud speaker and the resistance 13 to be cut out of the circuit in two steps, to avoid sudden dissipation of energy due to increased current in the circuit.

Before proceeding further with the description of the circuit it will be helpful to pause at this point long enough to consider the function performed by each relay and magnet in the operations so far discussed.

The SS magnet is a stepping magnet. The circuit through its windings may be completed through its back contact and through the back contacts of relays H, C, and RC causing it to step. A circuit through its winding directly may also be completed through the front contacts of relay S and MP.

Relay RC operates to furnish ground for the stepping magnet SS.

Relay H operates to break the circuit to stepping magnet SS through its back contact to prevent further stepping of the selector switch after it has reached a point desired. It operates when the selector switch has found the terminal on arc 1 which is grounded through one of the bus bars, the time control switch, and the front contact of relay RC.

Relay C operates its back contact 19 to break the circuit through relay SS, which passes through the back contact of stepping magnet SS, and the armature of relay H, armature 19, leads 67, 66, 65 and 64 and arma-

ture 22 to ground at 18. Relay C operates its armature 48 to put ground on one side of the winding of relay S in order to prepare a circuit for its operation when relay MP releases. Relay C operates to close armature 60 to complete a circuit from ground 47, through battery 46, armatures 60 and 61, windings of relay RM, armature 49, to ground 51, when armature 49 is closed.

Relay S operates its armature 45 to complete a circuit through stepping magnet SS from the ground 44 furnished by the operation of relay MP.

When it is not operated, the armature of this relay completes a circuit through winding of relay C to ground furnished by the operation of relay MP, which causes the operation of relay C when relay MP operates. Relay S operates its armature 61 to break the circuit from ground 47 through armatures 60 and 61 and the winding of relay RM.

Relay MP operates first to operate relay C to break the circuit through the armature of relay SS, and furnish ground to one side of the winding of relay S to prevent its operation before the release of relay MP, and on further operation, after the operation of relay S, to furnish ground for the operation of stepping magnet SS.

Relay RM is provided to release the push keys 30 upon the closure of contacts 16, 17, as will be hereafter explained. The armature 49 of relay RM is normally open, but when any of the push keys are depressed, this moves the armature so that the circuit through it is closed. Then upon the operation of relay MP with the closure of contacts 16 and 17, relay C operates and a circuit is completed from ground 47, through battery 46, armatures 60 and 61, relay RM, to ground 51, causing the operation of relay RM and consequent release of any depressed push key by mechanical means not shown.

The push keys 30 and relay or release magnet RM may be a unitary piece of apparatus such as that described in U. S. Patent 1,387,950, granted May 24, 1921, to A. D. Hargan, for example. The functions of these push keys will be explained below.

One use of this invention is for reception of radio programs in a home, where the receiving set may be placed in a closet, a cellar or any out of the way place and a plurality of leads, to which loud speakers may be connected, multiplied to various points around the house. If the receiver is placed in the cellar and leads run to a bedroom, a speaker having associated therewith suitable switches may be connected by jack and plug, or other suitable connection, and a prearranged program be received without the necessity for further manual control. However, if it is desired to change the program from that prearranged, this may be done by manipulating the switches associated with the loud speaker

as previously described. It may also be desired at times to control the set locally, and for this purpose a set of push keys 30 are provided which may be located at or near the receiving set. The receiving set may be located in the living room and the push keys be located conveniently to a favorite chair therein, if desired.

Depressing one of the push keys, as by moving to the left in the drawings, breaks the circuit from ground at 18 (or 51 due to the mechanical making of armature 49) through the push keys to armature 48 or time controlled switch 29. This releases relays C and S, if operated, and also removes the ground from the arm of time controlled switch 29 thus releasing relay H. At the same time it supplies ground to the bus bar connected to the push key operated, and the stepping magnet SS, due to the circuit through its armature, now operates to move the selector switch along until the terminal on the arc 1 reaches the grounded terminal, when relay H operates, breaking the circuit supplying the ground for operating stepping magnet SS as previously described.

The push keys may be operated at any time to interrupt a program which has been prearranged for the whole evening by temporary connections from the bus bars to points on the time controlled switch, or to interrupt a program which has been switched in by manipulation of the switching arrangement associated with the loud speaker. The station switched in by manipulating a push key may be changed by depressing another key, which releases the first key pressed, by means not disclosed, in which case the selector switch steps along as before to find the new grounded bus bar. It may also be changed by operation of the short-circuiting switch at the loud speaker. The resulting increase in current causes the operation of relay MP as previously described, which furnishes ground for the operation of release magnet RM, releasing the push key. The circuit for the operation of relay RM is from ground 47 through battery 46, armatures 60 and 61, relay RM, to ground 51.

This closure of the circuits through armatures 16 and 17 will also operate relays C and S as before, and if it is desired to resume the prearranged program the switch 15 must now be opened and closed. This will renew the prearranged program in the manner previously described. The prearranged program may also be restored by manually releasing the operated push key. The usual method for accomplishing this with commercial keys of this type is to partially depress another key. The prearranged program will then continue as described before.

Thus it will be seen that the prearranged program may be changed by the push keys or the short-circuiting switches at the loud

speaker, or it may be stopped completely by opening switch 15 at the loud speaker, and later resumed by closing this switch. The program selected by manipulating one of the push keys may be interrupted by manipulation of the loud speaker switches, and the program selected by the loud speaker switches 16, 17 may be interrupted by the push keys. The predetermined program may be restored by manipulation of the loud speaker switches whether interrupted by the push keys or by one of the loud speaker switches.

In Fig. 2 a loud speaker 54 has mounted on its base 56 a rotating dial switch 57 such as that shown in Fig. 1, and mounted on the rotating dial switch is a two position switch 15, as shown in Fig. 1. The switches 16 and 17 may be closed by rotation of the switch 57, which will indicate the station thus tuned in. After operation of the selector switch by means other than the rotating dial switch, the dial switch may be reset by clockwise rotation.

Fig. 3 shows a modification of Fig. 1 in which the apparatus and circuits are designed to provide local control of a radio receiver by means of push keys, or remote control over the loud speaker leads by means of a short-circuiting loud speaker switch such as shown in Fig. 1 or 2. In this embodiment the automatic tuning to a prearranged program is omitted although, of course, it could be added if desired.

A radio receiver is connected as in Fig. 1 and the wiring of arcs 3, 4 and 5 of the rotating selector switch to the resistances and condensers shown in Fig. 1 is the same. Arc 1 corresponds to arc 1 of Fig. 1. Arc 2 is not used. A single relay RC is substituted for the two relays RC and MP of Fig. 1. This relay is provided with an armature 22 corresponding to armature 22 of relay RC in Fig. 1 and a second armature 43, corresponding to armature 43 of relay MP in Fig. 1. The loud speaker and switch are the same as in Fig. 2 although these are not shown in Fig. 3. The filament current in this circuit is controlled directly from ground 18 or 44 by armature 22 of relay RC, or from ground 51 by contact on the push keys when one of the push keys is depressed.

To operate the control mechanism from the push keys the key corresponding to the station desired is depressed. This supplies ground to the armatures of all of the push keys except the one which has been depressed. The selector switch rotates due to circuits completed through the armature of stepping magnet SS from successive terminals on the selector switch the circuits being from ground 21, through battery 20, winding SS, armature 28, arc 1, the bus bar connected to the point on which the arm of the rotating selector switch rests, armature 49 to ground 51. When the ungrounded terminal has been

reached the rotating switch stops, since there is no circuit then completed through the stepping magnet. To control the tuning of the circuit from the loud speaker the rotating switch is moved in a counter-clockwise direction, closing contacts 16 and 17, which causes marginal relay RC to be fully operated, closing the contact of armature 43, and furnishing ground 18 or 44 for a circuit through the winding of stepping magnet SS to step the selector switch one step for each step of the rotating dial switch.

If one of the push keys had been depressed, armature 49 would be closed, and the first closure of armature 43 would close armature 62, completing a circuit from ground 63, through battery 14, armature 62, relay RM, armature 49 to ground 50, operating relay RM, and releasing the push key depressed. If one of the push keys is depressed the filaments are lighted through the circuit from ground 51, through armature 49, and filaments to ground. If a push key is not depressed, and switch 15 is closed, thus closing armature 22, the filaments are lighted through a circuit from ground 18 or 44, through armature 22 to ground 63.

For the arrangement of the stations as shown on the dial it would, of course, be necessary to connect successive groups of three terminals on arc 4 to one side of a single condenser, while connecting corresponding terminals on arcs 3 and 5 to different points on the respective resistances, in order to effect reception of the desired signals at three levels of signal strength.

What is claimed is:

1. In combination, a radio receiver, a rotating selector switch, stepping mechanism for operating said switch, a remote control station comprising an acoustic device, a two-wire electrical circuit connecting said remote control station and said stepping mechanism and means responsive to increase in intensity of current in said electrical circuit for actuating said stepping mechanism, said two-wire circuit constituting the sole means for connecting the acoustic device to the radio receiver and the control station to the stepping mechanism.

2. A radio receiver, a plurality of tuning condensers therefor, a plurality of manual switches for controlling said tuning condensers, a plurality of time controlled switches connected with said tuning condensers, a rotating selector switch for controlling said tuning condensers, a loud speaker, a two-wire circuit connecting said loud speaker with said radio receiver, a switch located at said loud speaker, means controlled by said time controlled switches for rendering said tuning condensers successively effective at predeter-

mined intervals for tuning said receiver, means controlled by said manual switches for rendering said time controlled switches ineffective to control said tuning condensers, means controlled by said manual switches for restoring the effectiveness of the time controlled switches to control said tuning condensers, means controlled by said loud speaker switch for rendering said time controlled switches ineffective to control said tuning condensers, and for restoring the effectiveness of said time controlled switches, further means controlled by said loud speaker switch for actuating said rotating selector switch, and still further means controlled thereby for rendering all said switches ineffective to control any operation over said circuits and for breaking the filament circuits of said radio receiver.

3. A radio receiver, an acoustic device associated therewith, a plurality of manually operated switches for tuning said receiver, electromagnetically operated means for nullifying the control of said manually operated switches, and means associated with said acoustic device for actuating said electromagnetically operated means over the leads to said acoustic device.

4. A radio receiver, an acoustic device connected thereto, means comprising a time controlled switch for controlling the tuning of said radio receiver, means comprising manually operated switches located in proximity to said receiver for controlling the tuning thereof, means comprising a manually operated switch located in proximity to said acoustic device for controlling the tuning of said receiver, means controlled by said plurality of manually operated switches for nullifying the effectiveness of said time controlled switch in tuning said radio receiver and for restoring the effectiveness of said time controlled switch, and means controlled by said manually operated switch for nullifying the effectiveness of said time controlled switch in controlling the tuning of said radio receiver and for restoring the effectiveness thereof.

5. Means comprising a time controlled switch and a plurality of manually operated switches alternatively operable to control the tuning of a radio receiver, electromagnetically operated means for nullifying the effect of either of said means in controlling the tuning of said receiver, and means located at a remote point with respect to said receiver for actuating said electro-magnetically operated means.

In witness whereof, I hereunto subscribe my name this 16th day of April, 1929.

CHARLES E. GERMANTON.