Sept. 22, 1936. W. T. POWELL 2,055,363

REMOTELY CONTROLLED RADIO RECEIVING SYSTEM

Filed Nov. 30, 1929 3 Sheets-Sheet 1

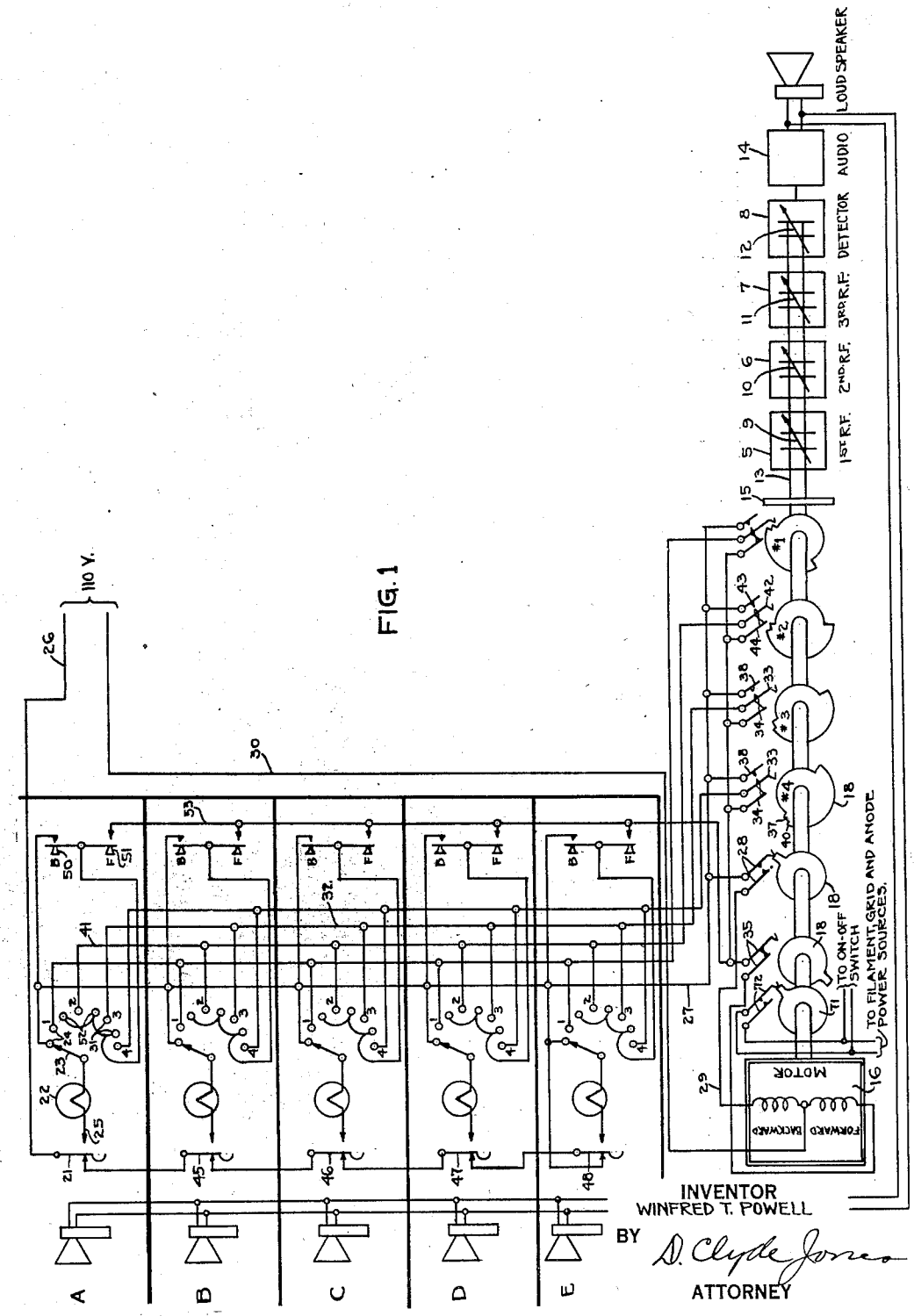


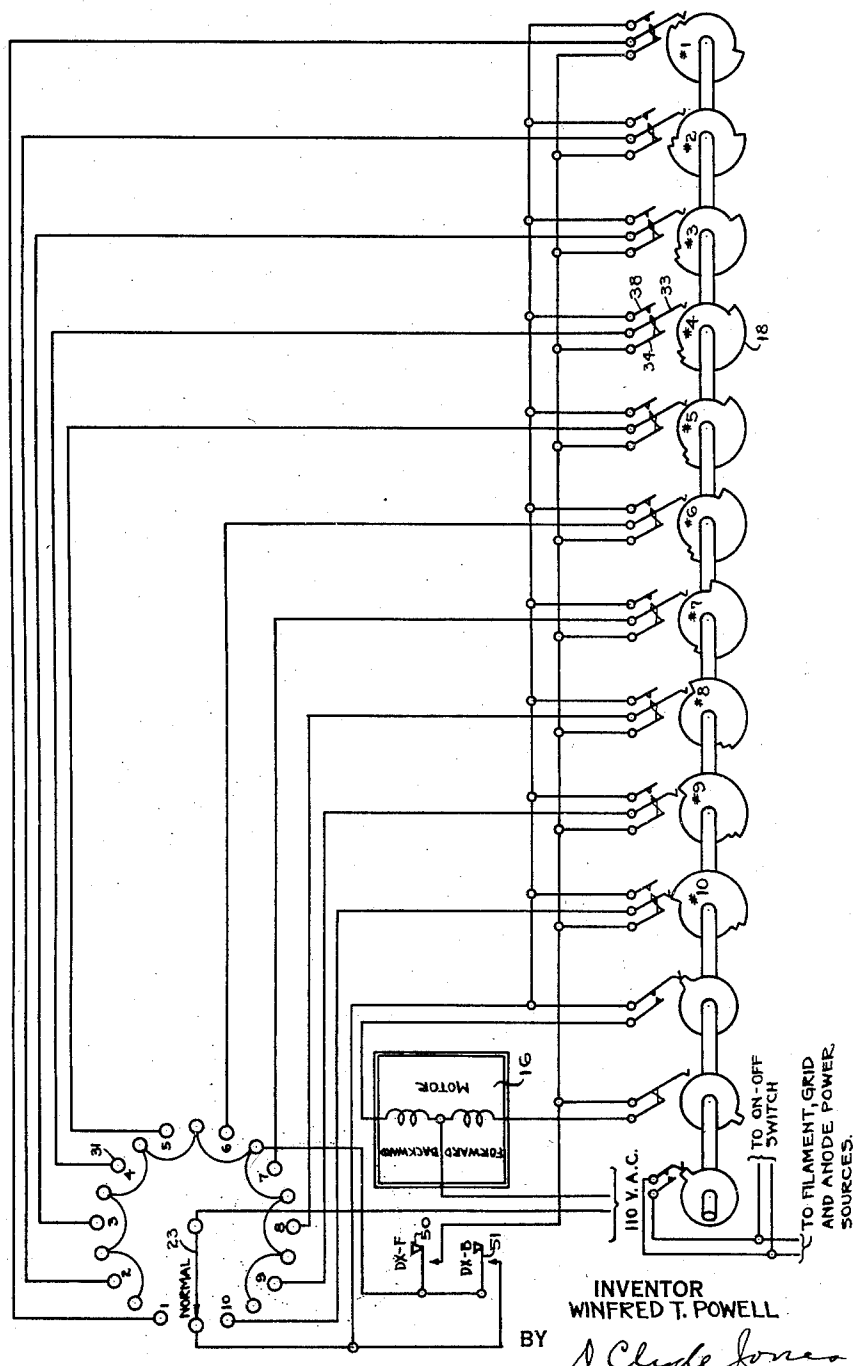
FIG. 1

Sept. 22, 1936. W. T. POWELL 2,055,363

REMOTELY CONTROLLED RADIO RECEIVING SYSTEM

Filed Nov. 30, 1929 3 Sheets-Sheet 2

FIG.2



INVENTOR
WINFRED T. POWELL

BY S. Clyde Jones

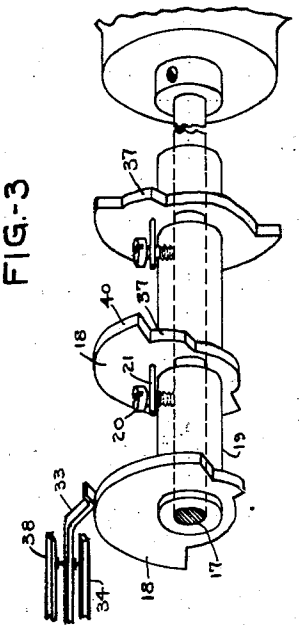
ATTORNEY

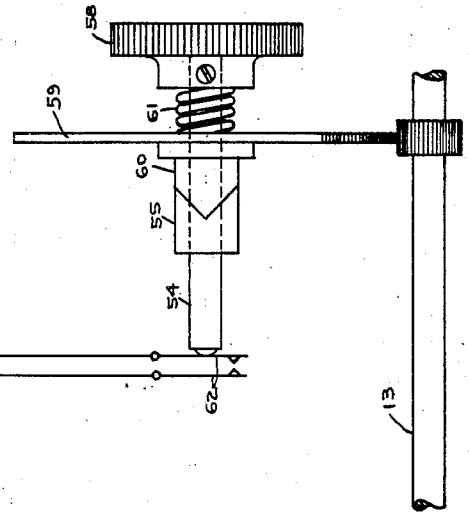
Sept. 22, 1936. W. T. POWELL 2,055,363

REMOTELY CONTROLLED RADIO RECEIVING SYSTEM

Filed Nov. 30, 1929 3 Sheets-Sheet 3

FIG.-3





15

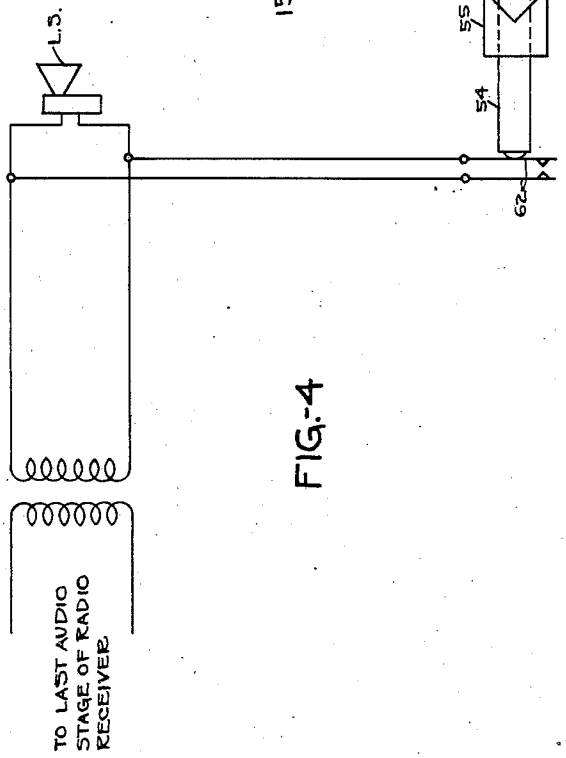


FIG.-4

INVENTOR
WINFRED T. POWELL

BY D. Clyde Jones

ATTORNEY

Patented Sept. 22, 1936 2,055,363

UNITED STATES PATENT OFFICE

2,055,363

REMOTELY CONTROLLED RADIO RECEIVING SYSTEM

Winfred T. Powell, Rochester, N. Y., assignor to Stromberg-Carlson Telephone Manufacturing Company, Rochester, N. Y., a corporation of New York

Application November 30, 1929, Serial No. 410,823

8 Claims. (Cl. 250—20)

This invention relates to signalling systems and more particularly to remotely controlled radio receiving systems.

The present arrangement has for its purpose a remotely controlled radio receiving system in which a large number of desired broadcasting stations may be selected by the use of a minimum amount of controlling equipment. A further feature of the invention relates to a radio receiving system having a plurality of remote control stations from any one of which a radio receiver may be directively tuned without the use of controlling relays. An additional feature of the invention is the arrangement whereby certain of the remote control stations of a radio receiving system are given preference over the others in controlling the radio receiver. Another feature of the invention includes a control device located at the radio receiver whereby said receiver may be tuned independently of the remote control station or stations from a manual dial by the mere adjustment of which the receiver is silenced during the tuning operation.

In the drawings, Fig. 1 is a diagrammatic showing of one form of the remote control radio receiving system in which the portion thereof at the bottom of the drawings represents a multistage tuned radio frequency receiver with a tuning motor and certain of the control equipment associated with the radio receiver for directively effecting the tuning thereof, the portions of the drawings defined by the heavy lines and the margins represent diagrammatically the control equipment located at a plurality of remote control stations; Fig. 2 is a circuit diagram representing a radio receiver and its associated control equipment arranged to be actuated from a single remote control station; Fig. 3 is an enlarged perspective view of certain of the cams mounted on the control shaft for use in the systems of Figs. 1 and 2; and Fig. 4 is a diagrammatic representation of a portion of the output of the radio receiver showing means actuated by a manual tuning control at the radio receiver for short circuiting the loud speaker during the tuning operation.

Referring especially to Fig. 1 there is indicated a radio receiver having three radio frequency stages 5, 6 and 7 and a detector stage 8, arranged in cascade and including the condenser tuning units 9, 10, 11 and 12 of a multi-unit condenser adjusted by a common shaft 13. The detector 8 is linked to an audio frequency amplifier 14 including one or more audio frequency stages also connected in cascade, of which the last stage is linked to a loud speaker LS. The shaft 13 of the tuning condensers is arranged to be actuated at the receiver from a manual control 15 shown in detail in Fig. 4 which will be hereinafter described. In addition to this manual control the radio receiver may be adjusted from any one of several remote control stations by a reversible motor 16, the shaft 17 thereof having a plurality of adjustable cams such as 18 mounted thereon, as more clearly shown in the enlarged detail view of Fig. 3. Each cam 18 includes off-set portions 37 and 40 and a sleeve 19 adjustable on the shaft 17 but normally locked in position by a set screw 20 which projects above the sleeve. Each cam is also provided with an arm 21 in position to engage the set screw 20 of the preceding cam of the series so that each of the cams has a definite setting with respect to the preceding cams in the series, for a purpose to be described. The motor shaft 17 may be coupled directly to the shaft 13 of the tuning elements of the radio receiver as shown or it may actuate the shaft 13 through a series of reduction gears if it is desired to operate this shaft at a slower speed than the motor 16.

In the system of Fig. 1 there are shown the remote control stations A, B, C, D and E although the system is capable of functioning with many more such remote control stations. Each remote control station includes an off-and-on switch such as 21, a lamp 22 for indicating that the motor of this remote control equipment is in operation, and a dial or other adjusting equipment including a movable wiper 23 engaging fixed contacts such as 24, certain of which designated by small numerals #1, #2, #3, #4, etc., correspond to predetermined desired broadcasting stations, the selection of which is determined by the cams such as 18 correspondingly designated by small numerals #1, #2, #3, #4, etc. Other contacts intermediate of those mentioned are provided at each of the remote control stations by which the radio receiver may be actuated to hunt for other broadcasting stations than the predetermined stations.

It is believed that the invention will best be understood by describing the operation of tuning the radio receiver to a predetermined broadcasting station from a remote station such as A. To accomplish this result, the off-and-on switch is first actuated to make engagement between the spring 21 and the contact 25, and the wiper 23 is adjusted to its setting for the desired station which is assumed to be selectable through the #3 contact 31. These mentioned adjustments close a circuit over conductor 26, spring 21, contact

25, lamp 22, wiper 23 now in engagement with contact 31, conductor 32, the normally closed contacts 33 and 34 of #3 cam 18, through the normally closed contacts 35, forward winding of the motor 16, conductor 30 to the alternating current source. This circuit drives the motor 16 forward until the first off-set 37 of the #3 cam 18 opens the back contact 34 but does not close the front contact 38 of this spring assembly. In this position of this cam the motor circuit is opened and the tuning device is stopped. It will be noted that, during the period that the circuit just described is completed for operating the motor, the lamp 22 is lighted which gives an indication to the operator that the motor is making the selection of the desired broadcasting station.

If the dial controlling the wiper 23 is moved to another position such as #4, a circuit is extended through the back contacts of the #4 cam to drive the motor forward again until it reaches the desired station #4 similar to that for effecting the selection of station #3, until the selected cam opens its back contact but does not close its corresponding front contact. When a cam such as 18 is advanced past the position corresponding to its selecting position, the middle contact such as 33 is switched to close its forward contact such as 38 and this is also true of cams #1, and #2 preceding it in the series. As soon as the motor 16 is rotated past position #3 the portion 40 of the cam 36 moves the spring 33 to make engagement with the contact spring 38.

If the dial at the remote station is turned backward causing the wiper 23 to engage a contact such as that associated with program #2, the operating circuit for the motor is now extended from the alternating current source over conductor 26, spring 21, contact 25, lamp 22, wiper 23, the #2 contact, conductor 41, cam springs 42 and 43, corresponding to the #2 station, off-normal contacts 28 (now closed), backward winding of the motor 16, conductor 30 to the other side of the alternating current source. This circuit operates the motor 16 in a reverse direction until the cam corresponding to the #2 station breaks contact between springs 42 and 43 but does not cause spring 42 to engage spring 44. In this position the motor stops thereby selecting the #2 program.

In the event that the operator at one of the remote control stations A desires to select a broadcasting station other than those selectable through the control circuits terminating in contacts #1, #2, #3, #4, etc. the "backward" button 50 and a "forward" button 51 are provided whereby the motor 16 may be turned forward or backward to adjust the tuning condensers of the radio receiver until the desired station is found. To accomplish this result, after closing the off-and-on switch 21 to make contact with spring 25, and after moving wiper 23 into engagement with some one of the contacts 52, the operator presses the forward key 51 thereby closing an operating circuit for the motor 16 through its forward winding as follows; from the alternating current source, over conductor 26, switch 21, contact 25, lamp 22, wiper 23 in engagement with some one of the contacts such as 52, key contacts 51, conductor 53, contacts 35 now closed, forward winding of the motor 16, conductor 30 to the other side of the alternating current source. Under the control of this circuit the motor 16 advances the shaft of the tuning condensers until the radio receiver is tuned to the desired station at which time the operator opens the "forward" key contacts 51. If the shaft of the tuning condenser is advanced beyond the point at which the desired station can be received, the operator may depress the "backward" key 50 whereupon a circuit is closed through the backward winding of the motor 16 to rotate the shaft counterclockwise. This circuit is completed from the alternating current source, over conductor 26, switch 21, contact 25, lamp 22, wiper 23 and one of the contacts 52, key 50, conductor 27 and through contacts 28, the shaft 17 being in its off-normal position, backward winding of the motor 16, conductor 30 to the other side of the alternating current source. The system of the present invention therefore provides means whereby the radio receiver may be tuned to predetermined stations or whereby the operator may hunt for a desired station. It will be noted that two sets of contacts 28 and 35 actuated by cams 18 are provided in the circuits of the forward and backward windings respectively of the motor to stop the motor shaft at the limit of its rotation in each direction. This arrangement is provided since the tuning condenser shaft rotates only through a portion of a complete revolution.

In the present remote control arrangement provision has been made to turn off and on the radio receiver from any remote station. This has been accomplished by providing a cam 71 on the shaft 17 which cam in the off-normal position of the shaft closes the contacts 72 to connect the commercial power source to the power supply device which supplies the A, B and C voltages to the radio receiver. It will be understood that when any of the off-and-on switches such as 21 is moved to its "on" position and the motor operated, the contacts 72 are closed. However, when the on-and-off switches are all restored to their off-position the motor rotates the shaft 17 backward until the cam 17 opens the contacts 72 to disconnect the power source.

It will be noted in this preferred modification that remote control station A has preference over the remote control stations B, C, D and E and that each of these remaining stations has preference over the other stations succeeding it in the series, that is, if remote station B is being operated to control the radio receiver, an operator at remote station A may take the control from station B and effect the station selection which he wishes. This is desirable since the first preference station A may be located in the living room of a home where it is desirable to effect selection of desired programs from this room even if any of the other stations are being used. This preference control is accomplished by reason of the fact that the conductor 26 from one side of the alternating current source is included in a series circuit extending through the back contacts of the off-and-on switches 21, 45, 46, 47 and 48 so that when the off-and-on switch 21 is operated to close the contact 25, the remaining off-and-on contacts 45, 46, 47 and 48 are disabled. When all of the off-and-on switches preceding the off-and-on switch of any station, are closed, that station may use the remote control system to the exclusion of the remaining remote control stations in this series.

It has previously been mentioned that there is provided at the radio receiver a manual tuning device generally designated 15. In one of its forms this device may include a stub shaft 54 provided with a V-shaped-notched sleeve 55 and

terminating in a knurled knob 58, which shaft is mounted for longitudinal movement through but adapted to rotate a dial 59 fixedly mounted for rotation only, on a support (not shown). This dial is provided with a clutch member 60 terminating in a beveled or V-shaped end normally in engagement with the V-shaped notch in the sleeve 55 (as shown). When it is desired to tune the radio receiver by means of the manual device 15, the knob 58 is turned in either direction. The turning of the knob 58 rotates the shaft 54 and the notched sleeve 55 fixed thereto, so that as the surfaces of the V-shaped notch in the sleeve 55 are rotated out of registry with the V-shaped end of the clutch member 60, which is fixed against endwise movement, the end of this member rides up the inclined surfaces of the notch, thereby forcing the sleeve and its shaft toward the left to close the pair of contacts 62. Preferably the left hand contact of the pair is sufficiently rigid to limit the left hand movement of stub shaft 54. The dial 59 and the shaft 54 now rotate together as a unit in response to the further rotation of the knob 58. The rotation of the dial adjusts or rotates the shaft 13 of the tuning element in the well-known manner. It will be understood that the loud speaker LS is linked to the audio portion 14 of the radio receiver diagrammatically shown in Fig. 1 so that when the contacts 62 are closed during the tuning operation the loud speaker is short-circuited so that the operator does not hear undesired stations or atmospheric noises. As soon as the operator releases the knob 58 the spring 61 moves the stub-shaft to the right thereby opening the contacts 62 to break the short-circuit that has been temporarily established across the loud speaker LS.

In the modification of Fig. 2 there is diagrammatically represented only the remote control portion of a radio receiving system having but a single remote station. As shown the off and on switch has been omitted and the system is disabled merely by moving the wiper 23 to the normal point at which time the motor 16 rotates its shaft until the cam-controlled spring assemblies are in the condition shown in the drawings. In this arrangement also the operator may select a predetermined station such as #4 by advancing the wiper 23 to the contacts 31 associated with this station whereupon the related cam 18 at the motor operates as previously described to control the contacts 33, 34 and 38 of its spring assembly. Similarly in this modification a forward key 50 and a backward key 51 are provided so that the operator may hunt for desired stations. In this modification there is also provided means similar to that shown in Fig. 1 for turning the radio receiver on and off.

By reference to Fig. 3 it will be noted that the cams 18 for use in the systems of Figs. 1 and 2 may each be set to preselect a predetermined program anywhere along the 180° arc of rotation of the multi-unit condenser. It should be pointed out that these cams may be formed from any rigid material and that the set-screw 20 for attaching the sleeve 19 of a cam 18 to the motor shaft 17 projects in a position to engage an arm 21 of the preceding cam of the series. In this way it is impossible to advance the off-set 37 of any cam beyond the position occupied by the off-set of a cam individual to a program having a lower setting of the tuning condensers. Since it is the angular position of the off-set positions 37 and 46 of any cam 18 which controls the related contact springs and not the distance between adjacent cams, this construction allows the selection of any two different positions of the multi-unit tuning condenser which are just sufficient to tune out adjacent broadcasting channels.

What I claim is:

1. In a remote control radio receiving system, a radio receiver having a tuning element, a motor for adjusting said tuning element, a plurality of remote control stations, means including the mechanism of any remote control station for selectively operating said motor, and means at any one of several remote control stations for disabling a plurality of the remaining remote control stations.

2. In a remote control radio receiving system, a radio receiver having a tuning element, a motor for adjusting said element, a plurality of remote control stations, means including the mechanism of any remote control station for selectively operating said motor, and means for giving preferential control to any one of several remote control stations to the exclusion of a plurality of the remaining remote control stations.

3. In a remote control radio receiving system, a radio receiver having a tuning element, a motor for adjusting said tuning element, a plurality of remote control stations, means including the mechanism of any remote control station to effect a predetermined operation of said motor, means at any one of several remote control stations for disabling a plurality of the remaining remote control stations and other means at each remote control station for effecting a station-hunting operation of said motor.

4. In a remote control radio receiving system, a radio receiver having a tuning element, a motor for adjusting said tuning element, a plurality of remote control stations, means including the mechanism of any remote control station for selectively operating said motor, means at any one of several remote control stations for giving preferential control to any one of several remote control stations to the exclusion of a plurality of the remaining remote control stations, and other means at said remote control station for effecting a station-hunting operation of said motor.

5. In a remote control radio receiving system, a radio receiver having a tuning element, a motor for adjusting said tuning element, a plurality of contact sets controlled by said motor, a plurality of remote control stations, a control device at each remote control station having a plurality of contacts through each of which a different tuning adjustment may be effected, a plurality of conductors multiply connected to the contacts of said control device and terminating in said motor-controlled contact sets, means for closing a circuit including one of said conductors, said circuit extending through a predetermined contact of a remote control station and one of the motor-controlled contact sets for closing an operating circuit for said motor whereby it may be selectively controlled, and means for giving preferential control to one of said remote control stations to the exclusion of other remote control stations.

6. In a remote control radio receiving system, a radio receiver having a tuning element, a motor for adjusting said tuning element, a plurality of remote control stations, a control device at each remote control station having a plurality of contacts through each of which a different tun-

ing may be effected, a plurality of conductors multiply connected to the contacts of said control device, a series of contact sets at which said conductors terminate, said contact sets being actuated by the operation of said motor, means for closing a circuit through one of said conductors extending through certain contacts of a remote control station and one of the contact sets controlled by said motor for completing an operating circuit for said motor whereby it may be selectively controlled, a series control conductor extending through each of a plurality of remote control stations, at least a portion of said last mentioned conductor being arranged to be included in said circuit, and means at each station for disconnecting said circuit from the succeeding remote control stations of the series.

7. In a remote control radio receiving system, a radio receiver having a tuning element, a motor for adjusting said element, a plurality of remote control stations, a tuning control device at each station for indicating a desired stopping point for said motor, means for causing the motor to advance to said stopping point, and means to give preferential control to any one of several remote control stations to the exclusion of other remote control stations.

8. In combination with a radio receiver having a tuning element, a shaft for actuating said element, a plurality of sets of contact springs, adjustable cams mounted on said shaft for actuating said sets of contact springs, means on adjacent cams cooperating with each other to insure a definite, relative angular positioning of said cams with respect to each other whereby said contact springs are actuated according to predetermined sequence, and a motor for driving said shaft.

WINFRED T. POWELL.