

Oct. 29, 1940.

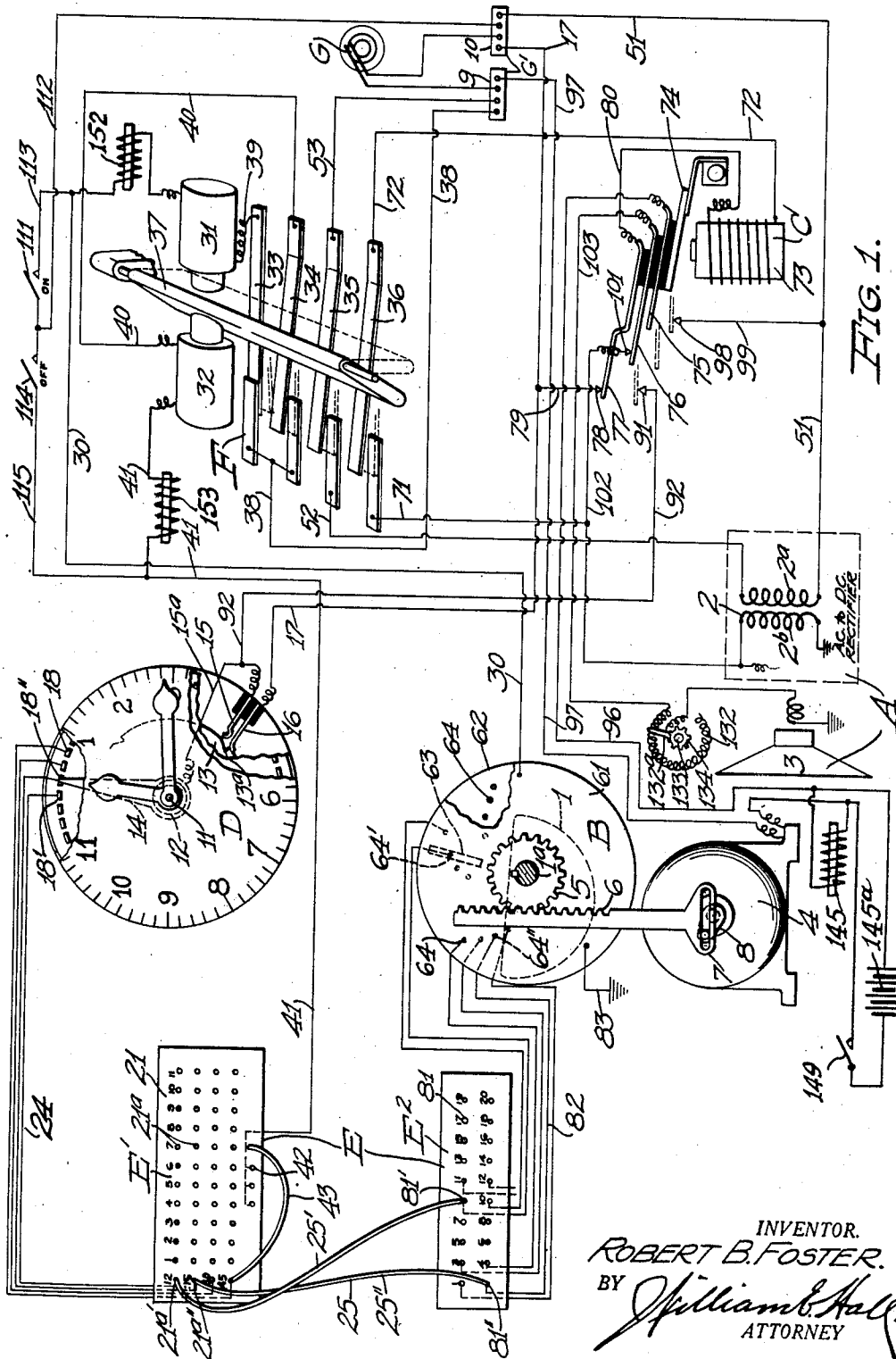
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2,219,302

VOLUME CONTROL APPARATUS FOR RADIO RECEIVERS

Original Filed Dec. 6, 1937

2 Sheets-Sheet 1



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VOLUME CONTROL APPARATUS FOR RADIO RECEIVERS

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2 Sheets-Sheet 2

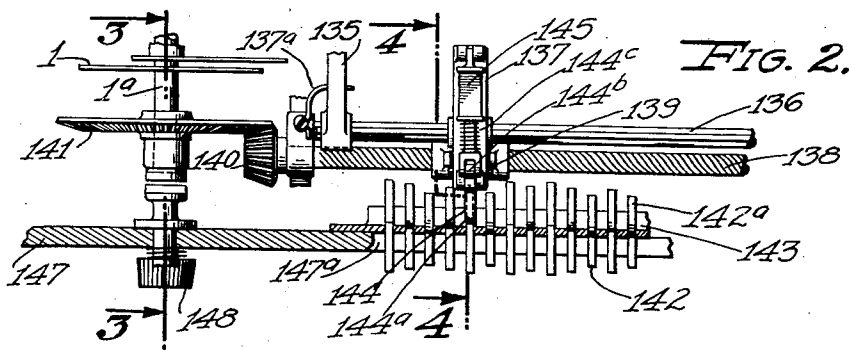


FIG. 2.

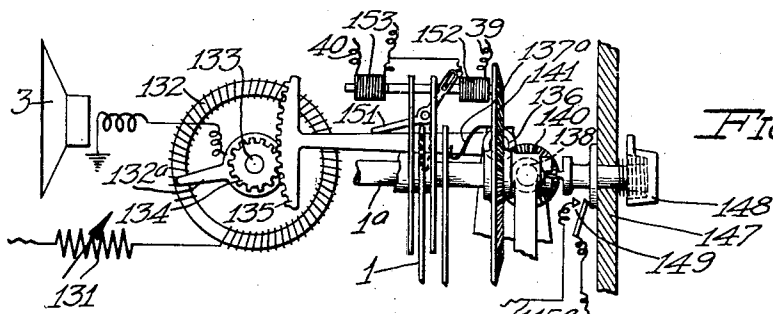


FIG. 3.

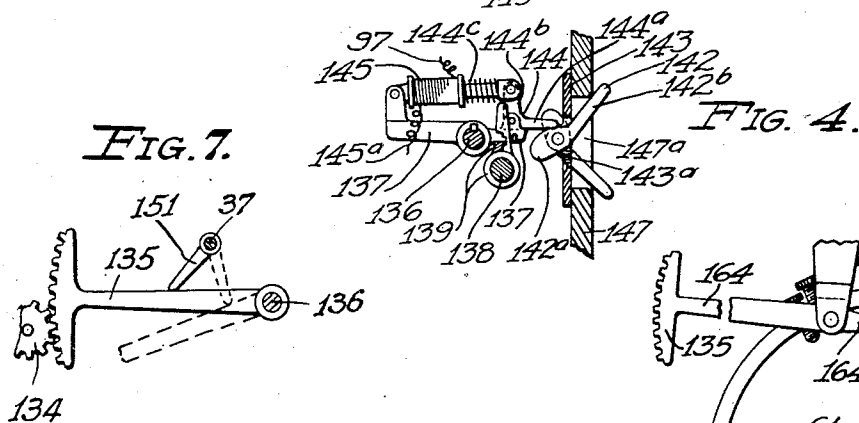


FIG. 4.

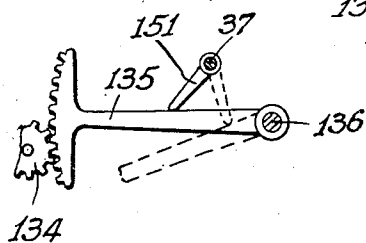


FIG. 5.

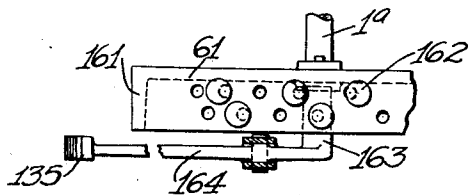


FIG. 6.

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2,219,302

VOLUME CONTROL APPARATUS FOR RADIO RECEIVERS

Robert B. Foster, Los Angeles, Calif., assignor to
John B. Smiley, New York, N. Y.Original application December 6, 1937, Serial No.
178,220. Divided and this application May 28,
1938, Serial No. 210,664

11 Claims. (Cl. 250—20)

My present invention relates to volume control apparatus for radio receivers, and is a division of United States application Serial No. 178,220, filed by me December 6, 1937, for Automatic and

5 manual radio control apparatus.

The principal object of this invention is to provide a simple means for automatically adjusting the volume of a radio receiver, whether the latter is manually or automatically tuned in.

10 Another object of this invention is to provide such means whereby the volume of all stations of the receiver may be automatically adjusted or controlled.

15 An important object also is to provide simple and readily available means for manually adjusting or changing such automatic volume control.

20 A further object of this invention is to provide a volume control means of this class in which the volume of each broadcast station may be easily adjusted or changed from the front of the cabinet of the radio receiver.

25 With these and other objects in view, as will appear hereinafter, I have devised an apparatus of this class having certain novel features of construction, and arrangement of parts and portions, as will be hereinafter described in detail, and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon, which form a part of this application, in which:

30 Fig. 1 is a schematic view of an automatic control apparatus for radio receiving sets in which my volume control apparatus is incorporated;

Fig. 2 is a fragmentary plan view of my volume control mechanism in one form of construction;

40 Fig. 3 is a fragmentary elevational view taken at 3—3 of Fig. 2, showing the same operatively connected to a variable resistance in the receiver circuit;

Fig. 4 is a fragmentary sectional view thereof, taken through 4—4 of Fig. 2;

Fig. 5 is a fragmentary elevation of my volume control mechanism in a modified form of construction;

Fig. 6 is a fragmentary plan view thereof;

50 and, Fig. 7 is a fragmentary view, similar to Fig. 3, showing a slightly modified form of construction.

My volume control apparatus for radio receivers is applied in this instance to a conven-

tional radio receiving set A, showing, for the purpose of illustration, only a rotary variable condenser 1, a power transformer 2, and a dynamic or loud speaker 3. The shaft 1^a of the condenser, as diagrammatically illustrated, is axially aligned with and directly connected to a selective tuning means or station finder switch B. The shaft 1^a is rotated by a controlled motor 4. The operative connection consists of a gear 5 on the shaft, a rack 6 for rotating the gear, a slotted crosshead 7 at one end of the rack, and a crank 8 on the motor shaft, the free end of the crank having a pin operating in the slot of the crosshead, to reciprocate the rack as the motor rotates, as shown and described in United States Patent No. 2,075,809.

The motor, in the preferred construction, is controlled primarily by an electro-magnetic switch C at predetermined periods in accordance with a time switch element or control clock D, as indicated, designated, or directed by a switch or jack board E. The starting and control of the set or receiver, although initiated by the time switch element or control clock D, is effected primarily by a multiple switch mechanism F.

The radio receiving set, shown and described, may be connected to and operated by either alternating or direct current, but I have described the same as operated by ordinary alternating electric current, such as the conventional 110 volt domestic alternating electric current. I have shown the two leads from an alternating current generator G connected to a multiple block G', these leads being referred to, for convenience, as leads 9 and 10.

The time switch or control clock D may be an electrically operated or mechanical clock having a minute shaft 11 and an hour shaft 12. On the minute shaft is mounted a fibre disc 13 which has, at its periphery, four equal-arcuately spaced notches 13^a. On the hour shaft is mounted, but insulated therefrom, a contact arm 14. The clock frame carries a finger 15 which is connected by wire 15^a to the contact arm 14. The frame also carries an insulated resilient brush 16 which is connected, by wire 17, to the lead 10, and which normally engages the periphery of the insulating disc 13. The free end of this brush drops in succession into the notches 13^a during the rotation of the disc, and, when thus dropped into one of the notches, it engages at its free end the finger 15, until the disc 13 rotates and disengages the brush 16 from the finger 15. The clock carries a series

of circularly arranged contacts 18 which are engaged by the contact arm 14. These contacts are circumferentially spaced at fifteen minute intervals from each other.

- 5 The jack board E is divided into two parts, namely the time jack board E¹ and the broadcast station board E².

The board or panel 21, which comprises the board E¹, has spaced jacks 21^a, each of which is connected by a separate wire 24, to a contact 18 on the control clock. Thus, there is one jack for each contact 18. The jacks 21^a are capable of receiving one end or plug of cords 25, these cords being interchangeable, as desired and as hereinafter more particularly set forth.

The multiple switch mechanism F, illustrated, consists of spring switches 33, 34, 35, and 36, in which, when the radio receiver is off, the switch 33 is normally closed while the other switches are normally open. The condition of these switches is simultaneously reversed, that is, switch 33 is opened while the others are closed, by an operating device or rocking bar 37 which is pivoted at the opposite ends of its upper edge and is adapted to engage with its lower edge the free end portions of the movable members of the above switches. The bar is rocked to opposite positions by the magnet 31, known as the on-magnet, and by an off-magnet 32. The former, when the radio receiver is turned on, reverses the switches from their normal positions, that is, it opens the switch 33 and closes switches 34, 35, and 36. The latter magnet 32 is the off-magnet and returns the switches, or, as shown, allows the switches to return, to their normal open positions.

One end of both switches 33 and 34 is connected by wire 38 to lead 9. The other ends of both switches are connected by wires 39 and 40, respectively, to one end of magnets 31 and 32.

The other end of the off-magnet 32 is connected, by wire 41 to a plurality or series of connected jacks 42. A flexible cord or cable 43 may be plugged into and connect one of the jacks 42 and 21^a.

Thus, at a particular and designated time the radio receiving set will be turned on by energizing the on-magnet 31, and it may also be turned off at a designated or predetermined time by energizing the off-magnet 32.

When the on-magnet is energized, switches 34, 35 and 36 are closed. Closing of the switch 35 energizes the primary 2^a of the transformer 2, through the wires 51, 52 and 53, exciting the secondary 2^b, which energizes the receiving set A, thereby beginning reception over the broadcast station designated on the jack board E² at the time the receiving set A is turned on.

The selective tuning means or station finder switch B illustrated, consists essentially of a rotary disc 61 and a concentric stationary disc 62, the rotary disc 61 carrying an insulating strip 63 and the latter a plurality of electric contacts 64 insulated from each other. These contacts 64 are arcuately spaced to correspond to the broadcast station spaces on the dial of the tuning condenser 1. The contacts 64 normally and resiliently contact the disc 61, but are sequentially insulated therefrom by the insulating strip 63 as the disc 61 is rotated. The portion of the strip 63 adapted to engage the contacts 64 is narrow, presenting in substance, an edge or hairline, but it is slightly wider than the engaging ends of the contacts 64. Thus a break in the electric circuit between a particular contact 64 and the

plate 61 is made. Unless the particular contact 64, corresponding to the desired condenser position or broadcast station, engages the insulating strip 63, when the radio is turned on through the on-magnet 31, the disc 61 is always connected, through one of the contacts 64, through the clock D and the switch arm 77, to the secondary 2^b of the transformer, and thereby the magnet 73 of the electro-magnetic switch C is energized, as will be described hereafter.

The electro-magnetic switch C comprises the magnet or coil 73 and an armature 74 which carries a plurality of three flexible switch members 75, 76, and 77, insulated from each other and from the armature. The latter switch member is permanently electrically connected, that is, when the switch 36 is closed, through the coil 73 with a source of energy, which consists, in this instance, of the secondary 2^b of the transformer 2. When the coil 73 is deenergized, the leaf or member 77 normally engages a contact 78 which is connected by wire 79 to the wire 17 which is connected to the brush 16.

The last mentioned circuit, which energizes the magnet or coil 73, consists of the following: One terminal of the secondary is grounded; the circuit passes through the other terminal, through wire 71, switch 36, wire 72, coil 73, wire 80, contact leaf 77, contact 78, wires 79 and 17, brush 16, finger 15, switch arm 14, a particular contact 18, the corresponding wire 24 and jack 21^a, through the detachable cord or cable 25, connecting the particular jack 21^a to the particular jack 31 on the station selecting jack board E², and thence through the wire 82 connecting the latter jack to the contact 64 which engages the disc 61, which is grounded, as indicated at 83. The cables or cords 25 are the same as ordinary switch board cables. The jack or switch board E² contains jacks which correspond with and are connected to the respective contacts 64 which correspond with the markings or station positions on the condenser dial.

As the magnet or coil 73 is energized through the circuit described, the armature 74 is attracted and the contact leaf 77 forced to engage a contact 91 which is directly connected, through wire 92, to the finger 15. Thus, when the brush 16 is disengaged from the finger 15 by the fibre disc 13, a holding circuit continues to pass through the coil 73 until broken by the rotation of the disc 61 and insulating strip 63, as will be described hereafter.

The flexible contact leaf or switch member 75 is connected by wire 96 to the motor 4, which is connected, by wire 97, to the lead 9. When the armature is attracted by the magnet or coil 73, the free end of the leaf 75 engages a contact 98 which is connected to the other lead 10 by wire 99. Thus, when the magnet 73 is energized, an alternating circuit to the motor 4 is closed, and the disc 61 thereby rotated until the insulating strip 63 breaks the circuit through the contact 64 which has caused the magnet 73, to be energized. Thus, when the magnet 73 is deenergized the armature 74 is allowed to return to its normal position, breaking the motor connections. Shortly after the armature 73 is attracted, the contact between the brush 16 and finger 15 is broken, preventing reestablishment of a circuit through the magnet 73 when the armature is released.

The free end of the contact leaf 76, when released by the magnet 73, engages a contact 101 which is connected by wire 102 to the wire 71 or

one terminal of the secondary 2^b, the other end of the contact leaf 76 being connected by wire 103 to the loud speaker through a variable resistance 132, to be described hereafter. Thus, when the motor is operated the loud speaker is disconnected.

The operation of the automatic portion of my radio receiver is briefly as follows:

In the drawings, I have shown the variable tuning condenser 1 adjusted to correspond to the position in which the insulating strip 63 engages the contact 64'. Such adjustment is shown as having taken place at 12 o'clock, with the cable 25' connecting the 12 o'clock jack 21^a' with the station jack 81'. Assuming the radio set to have been turned off, at 12:15 a circuit will be established, through the wire 17, parts 16, 15, and 14 of time switch or clock D, contact 18'', a wire 24, jack 21^a'', cable 25'', jack 81'', a wire 82 which is connected through the contact 64'' to the disc 61, wire 30, magnet 31, switch 33, and wire 38, thereby energizing magnet 31, rocking bar 37, closing switches 34, 35, and 36. The closing of the switches 35 and 36 will cause a direct current to pass through the magnet 73, break the loud speaker circuit, and direct an alternating current through the motor, which will rotate the condenser 1 and the disc 61 of the station finder switch B until the insulating strip 63 engages the contact 64'', which is connected, through the switch boards, to the contact 13'' designating 12:15 on the clock D. If the radio receiver has not been turned off at 12:15, switch 33 remains open, and the switches 35 and 36 remain closed, permitting only the coil 73 to be energized, the armature 74 to be attracted, the dynamic speaker 3 to be disconnected, and the motor 4 to be operated a predetermined amount. The breaking of the circuit by the insulating strip 63 breaks the circuit through the wire 92 and allows the armature 74 to assume its original off-position. Because the switch 35 is closed, the receiving set is energized and continues to receive a program over the designated broadcast station. When the reception is continued to the predetermined time designated by a cable 43, which connects one of the jacks 42 with the designated jack 21^a connected to the clock, the off-magnet 32 is energized, reversing the condition of the multiple or cooperating switches and returning them to their normal off-positions, which breaks the switch 35 and deenergizes the receiving set.

The volume control mechanism, shown in Figs. 2 and 3, is embodied with the main unit, the shaft 1^a in Fig. 3 being the condenser shaft.

The loud speaker 3 is controlled by the usual manually controlled variable resistance or rheostat 131 provided on the conventional set. In series with this resistance or rheostat is another but automatically controlled variable resistance or rheostat 132, which is intended to equalize the volume or signal strength of all stations. The manually controlled resistance provides means for controlling all stations alike. The resistance 132 is circularly constructed and provided with an arm 132^a which is mounted on and rotated by a shaft 133 on which is mounted a gear 134 rotated by a quadrant 135 fixedly secured to one end of a shaft 136 by which it is oscillated. On this shaft is axially slidably but non-rotatably mounted a rocker arm 137. The mechanism for variously rocking this arm will be hereinafter described.

The rocker arm 137 is caused to slide on the shaft by means of a screw 138, mounted near and

parallel to the shaft 136. This screw carries a shoe 139 interlocked in such a manner with the sliding rocker arm 137 that the free end of said arm normally rests on the shoe but is permitted freely to be raised within a vertical slot extending upwardly from the screw. The screw is rotated by suitable mechanism such that the screw 138 is rotated a number of times during the oscillation of the condenser shaft through its arc. Such mechanism is illustrated as a bevel pinion 140 driven by a bevel gear 141 mounted on the condenser shaft 1^a, which, in this instance, is rocked back and forth by the motor. The screw 138 is rotated sufficiently that the shoe travels the length of the screw during the necessary arcuate travel of the condenser, or the rotatable disc 61 of the station finder or selection switch B. This longitudinal travel of the shoe is coextensive with the lateral extent of laterally spaced volume control keys 142.

The front wall 147 of the cabinet of the radio set is provided with a horizontal slot 147^a in which is placed a panel 143 having a multiplicity of vertical slots 143^a in which are located the station volume control keys 142, which are pivoted intermediate their ends in the vertical slots. The inner ends have cam portions 142^a and the other ends 142^b extend outwardly, and are arranged to be pushed down for greater volume and up for less. The keys either frictionally engage the side walls of the vertical slots, or by suitable notch means, shown in Fig. 4, for temporarily holding the keys in their adjusted positions.

On the free end of the rocker arm is pivoted a bell crank lever 144 having an arm 144^a held, by means of a spring 144^c, in an extended portion with its end extending beyond the arm 137. The free end of the arm 144^a is adapted to rest on the cam portion 142^a of one of the keys 142, which thereby determines the position of the rocker arm 137, the quadrant 135, and the contact arm 132^a of the variable resistance unit 132, and thus determines the volume of the loud speaker. The keys 142 are manually, and preferably previously, adjusted to determine the volume of the broadcast station to which the condenser 1 is tuned.

Although the rocker arm 137 rests on the shoe 139 at the low position of the cam portions 142^a, and is resiliently held in this position by a suitable spring 137^a these cam portions prevent the free movement of the rocker arm by the screw 138 when the radio set is being tuned either manually or by the motor 4. To avoid such interference, I have provided a magnet 145 on the rocker arm 137, which is adapted to rock the bell crank by attracting the normally upright arm 144^b of the bell crank and thus raising the other arm 144^a out of the path of the cam portions. This magnet 145 may be in series with the motor circuit so that the arm 144^a is raised when the motor operates, as shown in Fig. 1. The arm 144^a is resiliently held in its extended position, and against the upper side of the rocker arm 137, by a spring 144^c, positioned between the arm 144^b and the magnet 145.

The condenser shaft may be adjusted manually by a knob 148. It is preferably normally disconnected from the shaft, and is operatively connected therewith by pressing the knob inwardly. When so depressed, a switch 149 is closed, which manually connects the magnet 145, by wire 145^a, to a suitable source of electrical energy, as shown in Figs. 1 and 3, the energizing of magnet 145 causing the arm 144^a to be

raised out of the path of the cams 142^a, and permitting the rocker arm 137 freely to be shifted.

In order to prevent obstruction to the manual operation of the knob during the time when the radio set is turned off, the rocker arm 137 is normally preferably raised free of all of the cam portions. This may be done by any suitable means when the knob is depressed inwardly. Such means shown may consist of a rocker 151 which, when the radio set is on, is in the solid line position, and when off, is in the dotted line position. When the multiple switch mechanism is in the cabinet 147, the rocker 151 may be a part of the rocker 37, shown in Fig. 7, but when arranged in separate units, the rocker 151 may be shifted to the respectively mentioned positions by magnets 152 and 153 which may be in series with the magnets 31 and 32, respectively, or circuits controlling the same, as indicated in Fig. 1. Or, if desired, a similar rocker 151 may be provided and mechanically connected to the knob 148, for throwing the arm 137 and the arm of the bellcrank lever 145 free of the cam levers 142 when the knob is depressed.

The modified volume control means, shown in Figs. 5 and 6, is considerably simplified. Synchronized with the variable condenser 1 and with the rotary disc 61 of the station selecting switch is a rotary cam which directly controls the volume of the broadcast station indicated by the condenser 1 or the insulating strip 63 on the rotary disc 61. This rotary cam may consist of a cylindrical flange 161 on the back side and near the periphery of the rotary disc 61. From the outer side of the cylindrical flange are screwed thumb screws 162, preferably one for each of the stations indicated on the disc 61, or for which a contact is provided on the disc 62. These screws 162 may be staggered, as shown, so that a screw may be provided for each broadcast station, and so that all screws may be easily adjusted. The inner ends of the screws, projecting through the flange, serve as cams, upon or over which is adapted to ride the suitably shaped portion or roller 163 at the free end of a lever 164 which is pivoted intermediate its ends and carries at its other end the above mentioned quadrant 135. To vary the volume of the loud speaker, the screws 162 are adjusted as desired. In this instance, the free end of the lever 164 may remain in engagement with the cams or the inner side of the flange, as the condenser is adjusted.

Though I have shown and described a particular construction, combination, and arrangement of parts and portions, and a certain modification thereof, I do not wish to be limited to the same, but desire to include in the scope of my invention the construction, combination, and arrangement substantially as set forth in the appended claims.

I claim:

1. A device for controlling the volume of sound from a radio receiving set which is adapted to receive signals of varying strength, comprising tuning means, a signal receiver, a volume control for controlling the signal receiver, a pivoted arm for controlling the volume control, a cam follower slidable along the pivotal axis of the arm, means synchronized with the tuning means for shifting said follower axially with respect to said arm, and a plurality of cam elements variously manually shiftable and spaced with respect to the shifted positions of the follower

and adapted variously to locate the latter and the arm about their pivotal axes when the follower is in alignment with a particular cam element.

2. A device for controlling the volume of sound from a radio receiving set which is adapted to receive signals of varying strength, comprising tuning means, a signal receiver, a volume control for controlling the signal receiver, a pivoted arm for controlling the volume control, a cam follower slidable along the pivotal axis of the arm, means synchronized with the tuning means for shifting said follower axially with respect to said arm, a plurality of cam elements variously manually shiftable and spaced with respect to the shifted positions of the follower and adapted variously to locate the latter and the arm about their pivotal axes when the follower is in alignment with a particular cam element, and means for shifting the arm and thereby shifting the follower beyond the path of the cam elements.

3. A device for controlling the volume of sound from a radio receiving set which is adapted to receive signals of varying strength, comprising tuning means, a signal receiver, a volume control for controlling the signal receiver, a pivoted arm for controlling the volume control, a cam follower slidable along the pivotal axis of the arm, means synchronized with the tuning means for shifting said follower axially with respect to said arm, a plurality of cam elements variously manually shiftable and spaced with respect to the shifted positions of the follower and adapted variously to locate the latter and the arm about their pivotal axes when the follower is in alignment with a particular cam element, means on the cam follower normally urging the latter in engagement with the cam elements, and other means in connection with the cam follower for shifting the latter out of the path of the cam elements when the tuning means is operated.

4. A device for controlling the volume of sound from a radio receiving set which is adapted to receive signals of varying strength, comprising tuning means, manual means for shifting the tuning means, a signal receiver, a volume control for controlling the signal receiver, a pivoted arm for controlling the volume control, a cam follower slidable along the pivotal axis of the arm, means synchronized with the tuning means for shifting said follower axially with respect to said arm, a plurality of cam elements variously manually shiftable and spaced with respect to the shifted positions of the follower and adapted variously to locate the latter and the arm about their pivotal axes when the follower is in alignment with a particular cam element, means on the cam follower normally urging the latter in engagement with the cam elements, and means in connection with the last mentioned means for shifting the cam follower out of the path of the cam elements when the manual means is operated.

5. A device for controlling the volume of sound from a radio receiving set which is adapted to receive signals of varying strength, comprising tuning means, a signal receiver, a volume control for controlling the signal receiver, a movable arm for controlling the volume control, a cam follower synchronized with the tuning means for shifting said follower in proportion to the operation of the tuning means, said cam follower being operatively connected to the arm for moving the latter, and a plurality of cam elements variously manually shiftable and spaced from each

other corresponding to the station positions of the tuning means, said cam elements being constructed variously to locate the cam follower and the arm when the follower is in alignment with a particular cam element.

6. A device for controlling the volume of sound from a radio receiving set which is adapted to receive signals of varying strength, comprising tuning means, a signal receiver, a volume control for controlling the signal receiver, a movable arm for controlling the volume control, a cam follower synchronized with the tuning means for shifting said follower in proportion to the operation of the tuning means, said cam follower being operatively connected to the arm for moving the latter, and a plurality of cam elements variously manually shiftable and spaced from each other corresponding to the station positions of the tuning means, said cam elements being constructed variously to locate the cam follower and the arm when the follower is in alignment with a particular cam element, and means for shifting the arm and thereby shifting the follower beyond the path of the cam elements.

7. A device for controlling the volume of sound from a radio receiving set which is adapted to receive signals of varying strength, comprising tuning means, a signal receiver, a volume control for controlling the signal receiver, a movable arm for controlling the volume control, a cam follower synchronized with the tuning means for shifting said follower in proportion to the operation of the tuning means, said cam follower being operatively connected to the arm for moving the latter, and a plurality of cam elements variously manually shiftable and spaced from each other corresponding to the station positions of the tuning means, said cam elements being constructed variously to locate the cam follower and the arm when the follower is in alignment with a particular cam element, means on the cam follower normally urging the latter in engagement with the cam elements, and other means in connection with the cam follower for shifting the latter out of the path of the cam elements when the tuning means is operated.

8. A device for controlling the volume of sound from a radio receiving set which is adapted to receive signals of varying strength, comprising tuning means, manual means for shifting the tuning means, a signal receiver, a volume control for controlling the signal receiver, a movable arm for controlling the volume control, a cam follower synchronized with the tuning means for shifting said follower in proportion to the operation of the tuning means, said cam follower being operatively connected to the arm for moving the latter, and a plurality of cam elements variously manually shiftable and spaced from each other corresponding to the station positions of the tuning means, said cam elements being constructed variously to locate the cam follower and the arm when the follower is in alignment with a par-

ticular cam element, means on the cam follower normally urging the latter in engagement with the cam elements, and means in connection with the last mentioned means for shifting the cam follower out of the path of the cam elements when the manual means is operated.

9. In a radio control apparatus, the combination with a cabinet, a radio receiver therein, the receiver having a variable tuning means, and means for shifting the tuning means, of a volume control for controlling the volume of the receiver, a movable arm for controlling the volume control, a cam follower synchronized with the tuning means for shifting said follower in proportion to the operation of the tuning means, said cam follower being operatively connected to the arm for moving the latter, and a plurality of cam elements, each having manual means for shifting the same, said manual means extending beyond the outer side of the cabinet and arranged in positions to designate the station positions of the tuning means, said cam elements being constructed variously to locate the cam follower and the arm when the follower is in alignment with a particular cam element.

10. In a radio control apparatus, the combination with a cabinet, a radio receiver therein, the receiver having a variable tuning means, and means for shifting the tuning means, of a volume control for controlling the volume of the receiver, a pivoted arm for controlling the volume control, a cam follower slidable along the pivotal axis of the arm, means synchronized with the tuning means for shifting said follower axially with respect to said arm, said cam follower being operatively connected to the arm for moving the latter, and a plurality of cam elements, each having manual operating means extending beyond the outer side of the cabinet and arranged in positions to designate the station positions of the tuning means, said cam elements being constructed variously to locate the latter and the arm about their pivotal axes when the follower is in alignment with a particular cam element.

11. In a radio control apparatus, the combination with a cabinet, a radio receiver therein, the receiver having a variable tuning means adjustable to different broadcast station positions, means for shifting the same, and a loud-speaker, of means of varying the volume of the loud-speaker, an adjustable cam for each broadcast station of the variable tuning means, means for operatively connecting the volume varying means with all of the cams of the variable tuning means, but with one particular cam at a time, the latter cam corresponding to and depending upon the specifically shifted station-tuning position of the tuning means, and separate means at the outside of the cabinet for each of the cams for separately adjusting each of the cams, said adjusting means being spaced and located in positions corresponding to the station positions of the tuning means.

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