

May 22, 1934.

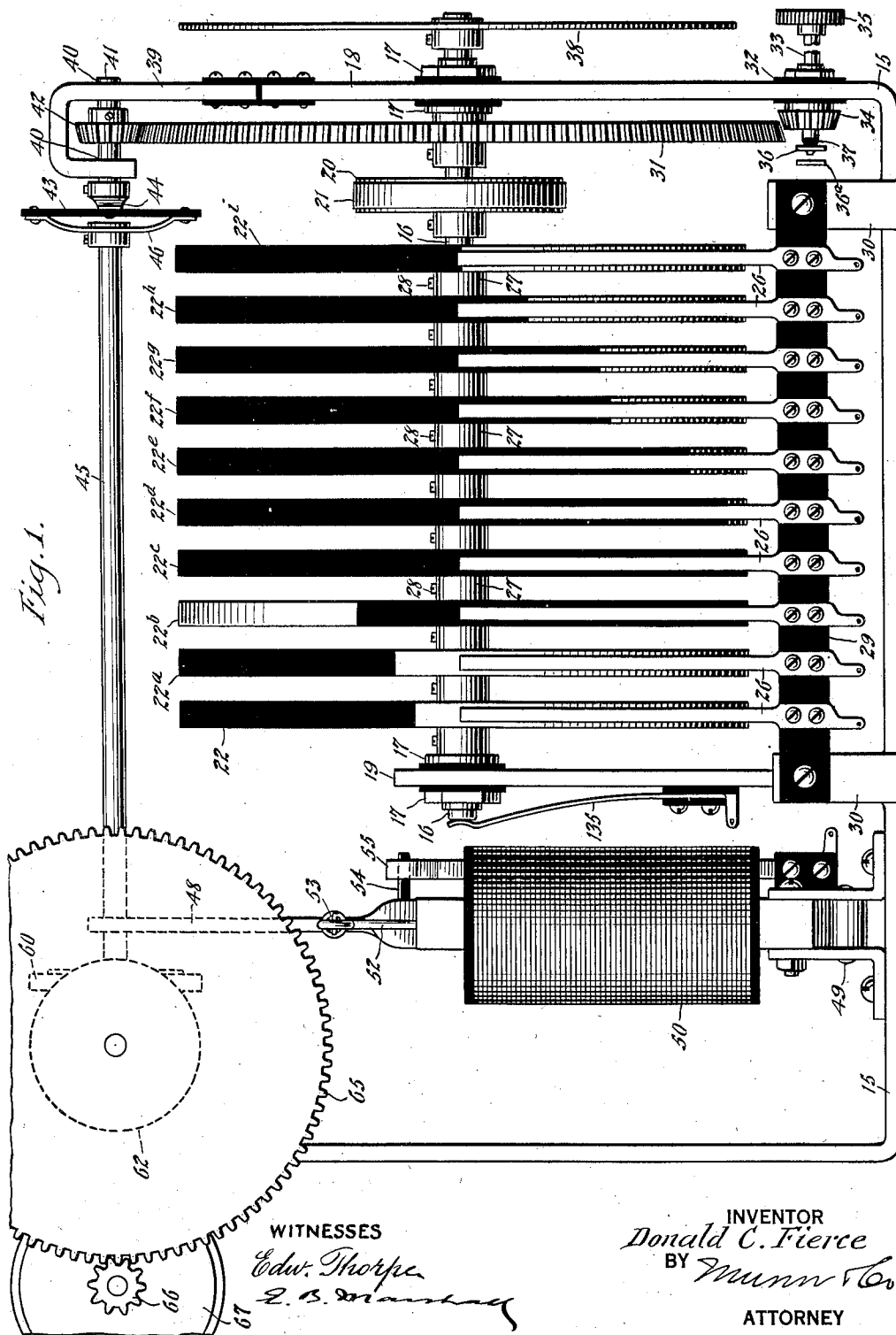
D. C. FIERCE

1,960,103

REMOTE RADIOCONTROL

Filed May 27, 1931

5 Sheets-Sheet 1



May 22, 1934.

D. C. FIERCE

1,960,103

REMOTE RADIOCONTROL

Filed May 27, 1931

5 Sheets-Sheet 2

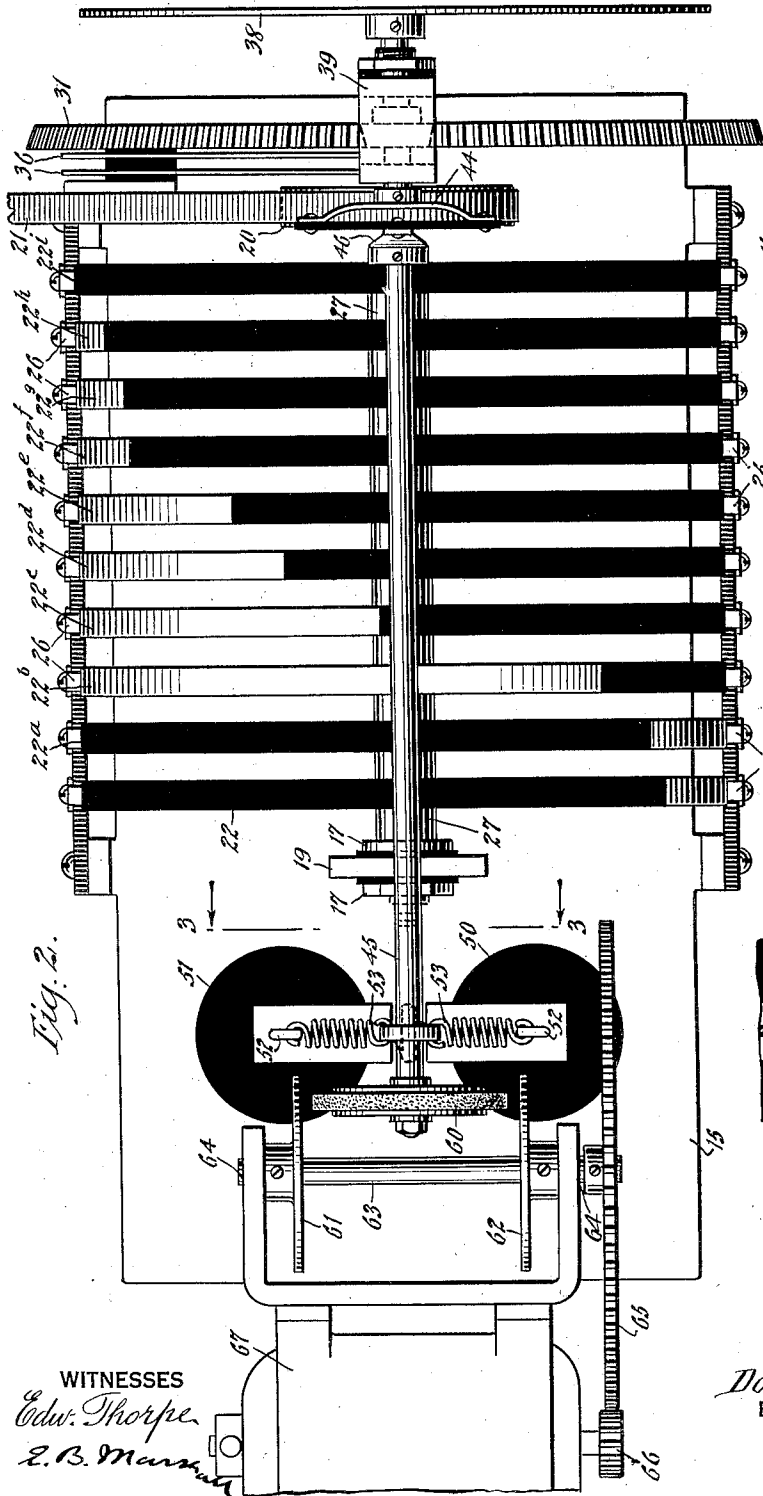


Fig. 2.

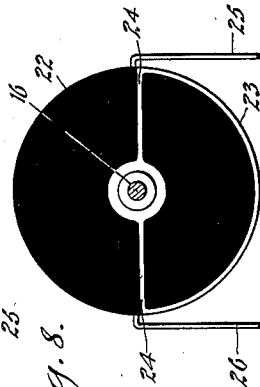


Fig. 8.

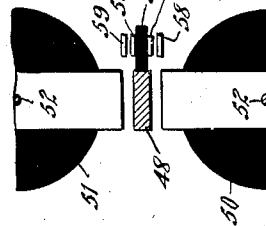


Fig. 7.

WITNESSES
Edw. Thorpe
E. B. Marshall

INVENTOR
Donald C. Fierce
BY Munn & Co.
ATTORNEY

May 22, 1934.

D. C. FIERCE

1,960,103

REMOTE RADIOCONTROL

Filed May 27, 1931

5 Sheets-Sheet 3

Fig. 4.

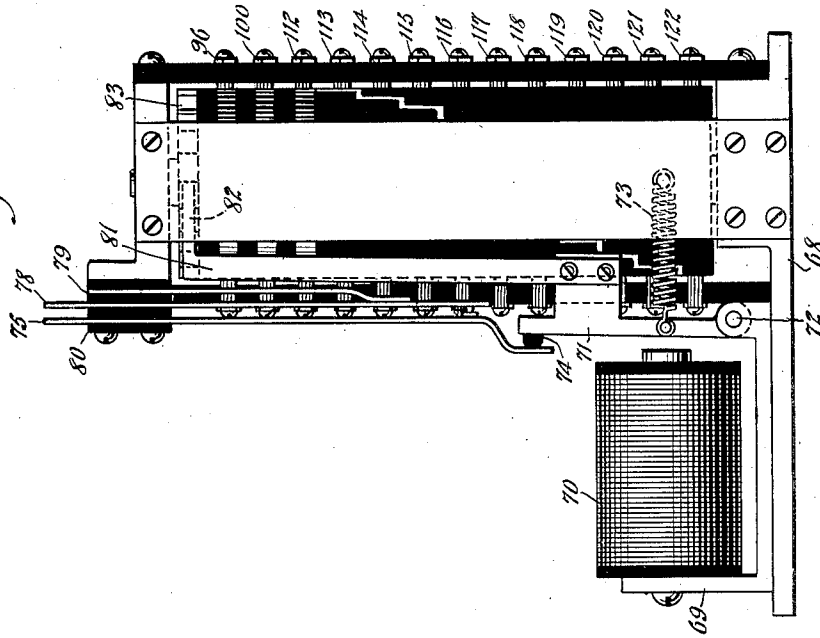
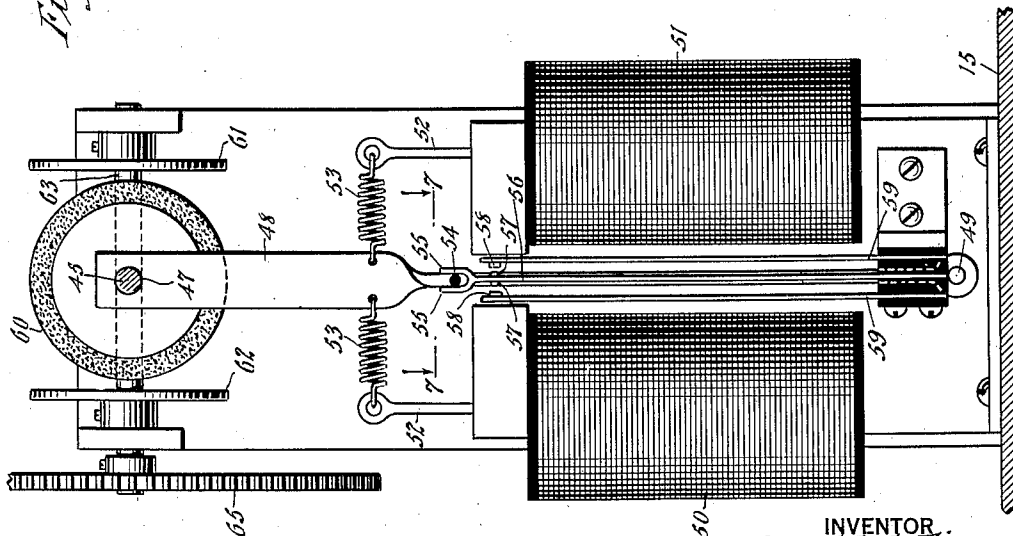


Fig. 3.



WITNESSES

Edw. Thorpe.

E. B. Mansfield

INVENTOR

Donald C. Fierce

BY

Munn & Co.

ATTORNEY

May 22, 1934.

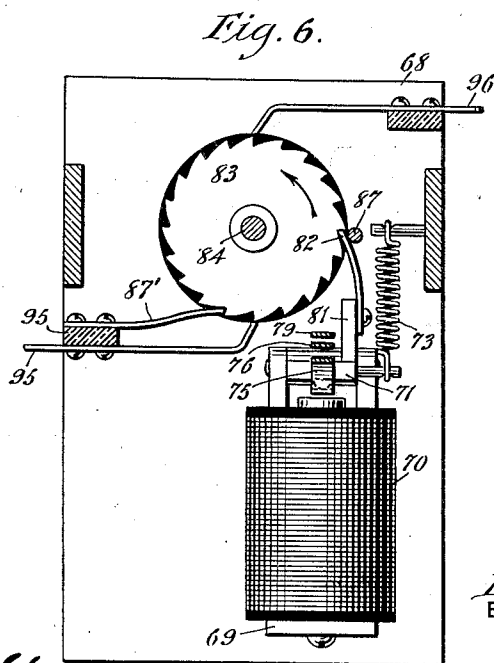
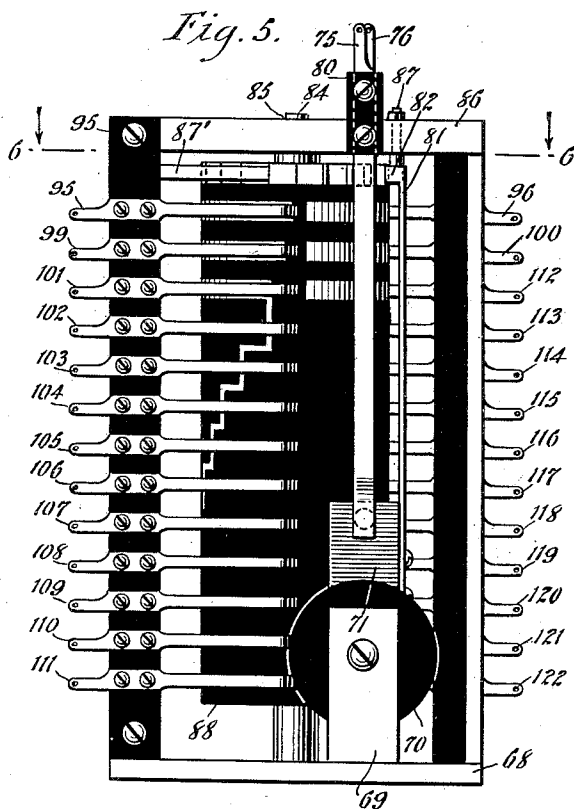
D. C. FIERCE

1,960,103

REMOTE RADIOCONTROL

Filed May 27, 1931

5 Sheets-Sheet 4



WITNESSES

Edw. Thorpe
Wm. Marshall

INVENTOR

Donald C. Fierce
BY *Munn & Co.*

ATTORNEY

May 22, 1934.

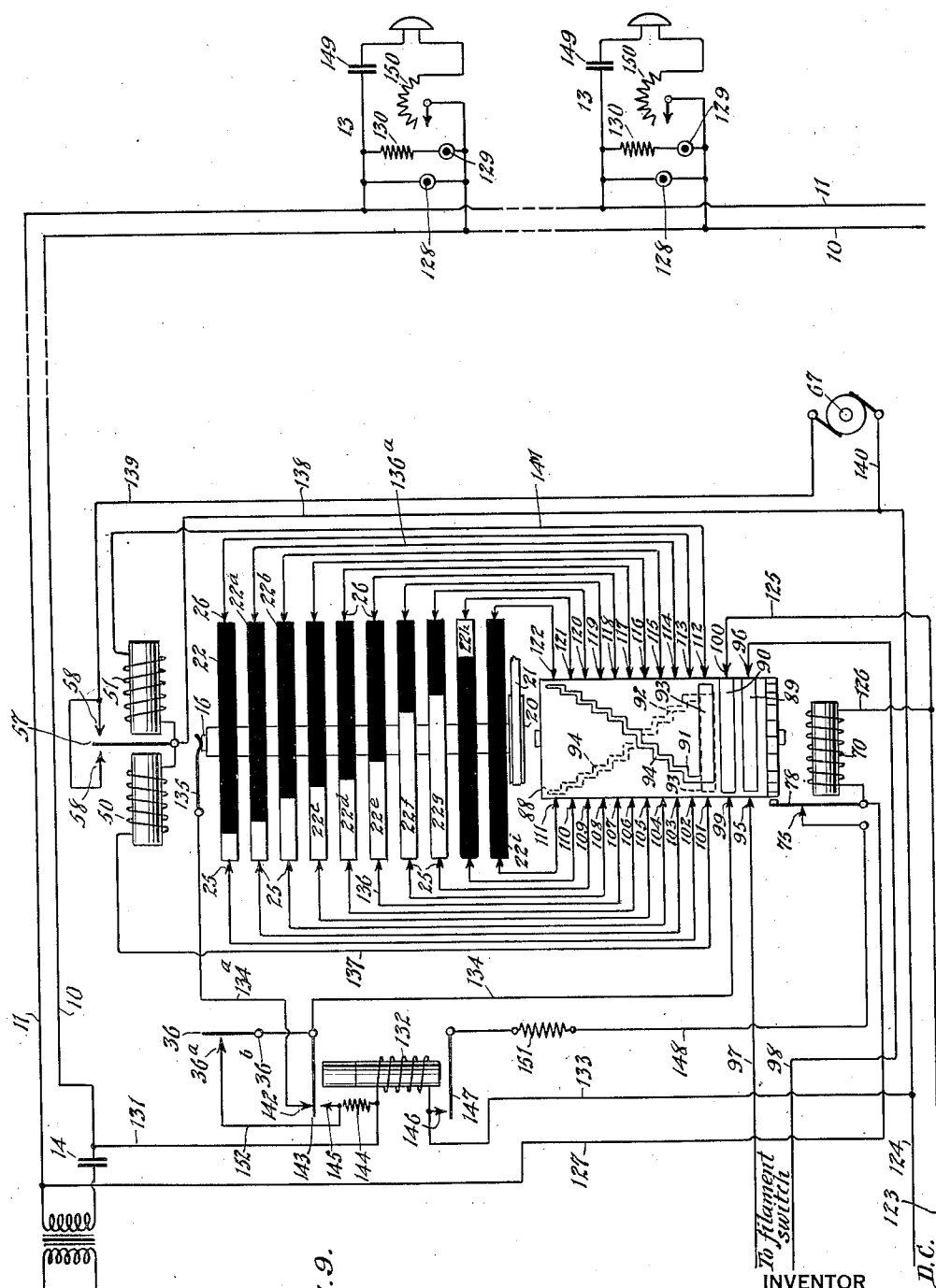
D. C. FIERCE

1,960,103

REMOTE RADIOCONTROL

Filed May 27, 1931

5 Sheets-Sheet 5



WITNESSES

Edw. Thorpe

Emmashall

INVENTOR
Donald C. Fierce
BY *Munn & Co.*
ATTORNEY

ATTORNEY

UNITED STATES PATENT OFFICE

1,960,103

REMOTE RADIOCONTROL

Donald C. Fierce, New York, N. Y.

Application May 27, 1931, Serial No. 540,447

5 Claims. (Cl. 250—40)

An object of the invention is to provide a remote radio control having means for tuning a radio set at any one of a plurality of headsets or speakers. The control uses the leads to the headset or speaker to connect the control with a condenser or other tuning means for adjusting the latter.

Another object of the invention is to provide means for adjusting a tuning means with means for returning the first mentioned means to its original position without moving the tuning means from its last adjusted position. Preferably the first mentioned means serves to close and open a filament circuit in the radio set.

Still another object of the invention is to provide a cylindrical member with a contact having a portion disposed around its periphery, the contact also extending longitudinally of the cylindrical member with the extending portion disposed alternately longitudinally of the cylindrical member and around the cylindrical member to form steps to be engaged by brushes for connecting the brushes respectively with an additional brush at the first mentioned portion of the contact. The longitudinally extending portion of the contact on the longitudinal member may, of course, be of spiral form to provide a step-by-step arrangement. Means are provided to rotate the cylindrical member by a step-by-step movement and means are also provided to connect the first mentioned brushes respectively in a circuit including the first mentioned brush, the circuit having electrical means for adjusting the tuning means.

A further object of the invention is to provide a shaft connected with the tuning means for operating the latter, a plurality of contact members being adjustably mounted on the shaft with which they have electrical connection, brushes being disposed for engaging the contacts on the shaft and being connected by circuits with the brushes engaging the steps in the contact on the cylindrical member. The said additional brush at the contact on the cylindrical member is connected with electrical means for rotating the shaft. Preferably the cylindrical member has two similar contacts, each provided with steps or being disposed spirally, and means are provided for controlling the direction of rotation of the electrical means.

Additional objects of the invention will appear in the following specification in which the preferred form of the invention is described.

In the drawings similar reference characters refer to similar parts in all the views, of which

Figure 1 is a side elevation illustrating the selector used in the remote radio control,

Figure 2 is a plan view of Figure 1,

Figure 3 is an enlarged sectional view on the line 3—3 of Figure 2,

Figure 4 is a side elevation of the step-by-step device for closing the circuit leading from a contact on a disc mounted on a shaft,

Figure 5 is an end view of Figure 4,

Figure 6 is a sectional view on the line 6—6 of Figure 5,

Figure 7 is a sectional view on the line 7—7 of Figure 3,

Figure 8 is a sectional view illustrating the shaft with a disc, with its contact and the brushes on a smaller scale than as shown in Figures 1 and 2, and

Figure 9 is a diagrammatic view illustrating the wiring.

The remote radio set control, which is the subject matter of this application, preferably utilizes the audio frequency output having the wires 10 and 11 leading to one or more speakers or headsets 13, there being a condenser 14 in the wire 10 and there being at each speaker or headset means for operating the remote radio set control in a manner which will be later described.

The selector, which is employed in connection with the present invention, is shown in Figures 1 and 2 of the drawings, and this selector is mounted on a base 15 and is provided with a shaft 16 journaled in bearings 17 which are insulated from the standards 18 and 19 which serve to support the shaft 16. There is a pulley 20 on the shaft 16 which is provided with a belt 21, which may be a brass belt and which connects the pulley 20 with a variable condenser, or other means, which may be disposed as desired relatively to the shaft 16. Mounted on the shaft 16 there is a plurality of discs 22, there being one disc for each station. In the drawings ten discs are shown, but it will be understood that any desired number of discs may be employed. Each of these discs 22, as will best be seen by referring to Figure 8 of the drawings, is constructed of insulating material and is provided with a contact member 23 extending around its periphery a predetermined distance.

Preferably the contact member 23 extends around the periphery of the disc somewhat less than 180°. The contact member 23 on each of the discs 22 has electrical connection at 24 with the shaft 16 and each disc 22 is engaged by two conductors 25 and 26 which, when the disc is in the position illustrated in Figure 8, will not contact

with the contact member 23, but when the shaft is rotated slightly, carrying with it the disc 22, one of the brushes 25 or 26 will contact with the contact member 23 and close communication between the brush and the shaft 16.

Each of the discs 22 is provided with a hub 27 which may be rotated for adjustment relatively to the shaft 16 and held in adjusted position by a set screw 28. It will be understood that the several discs will be adjusted on the shafts 16 so that each disc 22 is positioned to receive from a predetermined station. Each set of the brushes 25 and 26 is mounted on an insulator 29 secured to the supports 30 which extend upwardly from the base 15.

Secured to the shaft 16 there is a beveled gear 31 and mounted on the standard 18, and insulated therefrom by the insulating material 32, there is a plunger 33 having a beveled gear 34 adapted to mesh with the beveled gear 31, so that with the fingerpiece 35, the plunger 33 may be pushed inwardly to mesh the gear 34 with the gear 31, and by rotating the plunger 33, the shaft 16 may be rotated as desired. There is a contact member 36 disposed at a contact member 36^a, an insulating tip 37 on the plunger 33 serving to move the contact member 36 into engagement with the contact member 36^a.

A scale 38 is preferably secured to the shaft 16 so that when the selector is operated manually by the fingerpiece 35, the position of the shaft may be readily determined. A frame 39 is supported on the standard 18 and is insulated therefrom, this frame 39 having bearings 40 in which a shaft 41 is journaled, the shaft 41 having a beveled gear 42 meshing with the beveled gear 31. An insulating disc 43 is provided which is secured to the shaft 41 by suitable resilient means 44, a shaft 45 being secured to the insulating disc 43 by resilient means 46. It will, therefore, be understood that the shaft 45 will serve to rotate the shaft 16. This shaft 45 is journaled in a bearing 47 in an armature 48 which is pivoted at 49 relatively to the base 15, the lower portion of the armature extending between magnets 50 and 51 to be moved to the right or left by the magnets 50 and 51 when one of the magnets is energized. Mounted on the magnets 50 and 51 there are arms 52 which are connected to the armature 48 by springs 53, the said springs 53 serving to hold the armature in the position illustrated in Figure 3 of the drawings.

The armature 48 is provided with an insulating stud 54 which is disposed between the arms 55 of a contact member 56 having contacts 57 for contacting with the contacts 58 on the contact members 59. Secured for rotating with the shaft 45 there is a friction disc 60 which is preferably a cork disc and which is disposed between the metal discs 61 and 62 which are secured for rotating with a shaft 63 journaled in bearings 64 in the frame, the shaft 63 being connected by gearing 65 and 66 for rotating with the motor 67. It will be understood that when the armature 48 is moved in the direction of the magnet 51, the friction disc 60 will be rotated by the disc 61 and that when the armature 48 is moved in the direction of the magnet 50 the friction disc 60 will be rotated by the disc 62.

The stepper, illustrated in Figures 4, 5 and 6, is provided with a base 68 having a support 69 in which a coil 70 is mounted to command an armature 71 which is pivoted at 72. There is a spring 73 for holding the armature 71 yieldingly away from the coil 70. The armature 71 has an insu-

lating member 74 at a contact member 75 provided with a contact 76 for engaging a contact 77 on a contact member 78, the contact member 78 being held yieldingly outwardly by means of a spring 79, the said spring 79, together with the contact members 75 and 78, being mounted in an insulating member 80.

Mounted on the armature 71 there is a spring 81 having a pawl 82 for engaging with a ratchet wheel 83 secured to a shaft 84 journaled in bearings 85 in the frame 86 extending upwardly from the base 68. There is a stop 87 to limit the outward movement of the pawl 82 and there is also a resilient finger 87' to prevent a return movement of the ratchet wheel. It will be understood that when the armature 71 has been moved in the direction of the coil 70, when the coil 70 is energized, it will carry with it the spring arm 81 and with the return movement under the influence of the spring 73 the pawl 82 will be moved to rotate the ratchet wheel 83 one tooth.

Mounted on the shaft 84 there is a cylindrical member 88 which is constructed of insulated material such as bakelite. Mounted on the cylindrical member 88 there are two contact members 89 and 90, each of which extends around the cylindrical member 88 approximately 350°. There are two additional contact members on the cylindrical member 88, which are numbered 91 and 92, each of these contact members 91 and 92 having a portion 93 extending partially around the cylindrical member and each of these contact members 91 and 92 also having another portion 94 which extends longitudinally of the cylindrical member, then partially around the cylindrical member, and then again longitudinally of the cylindrical member, the direction alternating as stated and forming in a general way a spiral. These contact members 91 and 92, with their relation to each other, are best illustrated in the diametric view in Figure 9.

Brushes 95 and 96 engage the cylindrical member 88 at the contact member 89 to close a circuit formed by the wires 97 and 98, which leads to the filament of the radio set. Brushes 99 and 100 are disposed for engaging the cylindrical member at the contact member 90 and a brush 101 is disposed for contacting with the portion 93 of the contact member 91 and there are brushes 102, 103, 104, 105, 106, 107, 108, 109, 110 and 111 for contacting with the cylindrical member at the portion 94 of the contact member 91. There is also a brush 112 for contacting with the portion 93 of the contact member 92 and there are brushes 113, 114, 115, 116, 117, 118, 119, 120, 121 and 122 for contacting with the longitudinally extending portion of the said contacting member 92.

The discs 22, in order that they may be distinguished from each other, are referred to as the discs 22, 22^a, 22^b, 22^c, 22^d, 22^e, 22^f, 22^g, 22^h and 22ⁱ. There are a plurality of circuits connecting the brushes 102, 103, 104, 105, 106, 107, 108, 109, 110 and 111 with one set of brushes 25 at the discs 22 and there is also a plurality of circuits connecting the brushes 113, 114, 115, 116, 117, 118, 119, 120, 121 and 122 with the other set of brushes 26 at the discs 22 respectively.

The wires 123 and 124 are connected with a source of direct current and a wire 125 leads from the wire 123 to the brush 100, a wire 126 also leads from the wire 123 to the coil 70, and a wire 127 leads from the coil 70 to the wire 11. Each of the speakers or headsets 13 has two circuit closers 128 and 129, there being a resistance

130 in the circuit closer 129. A wire 131 leads from the wire 10 to a relay 132 and a wire 133 leads from the relay 132 to the wire 124. It will be understood that when the circuit closer 129 is operated it will close a circuit from the wire 123 to the wire 126, through the coil 70, through the wire 127, the wire 11 to the circuit closer 129, through the wire 10, the wire 131, the relay 132 and the wire 133 to the wire 124. However, the resistance 130 will prevent the operation of the coil 132 inasmuch as the relay 132 is marginal. Each time the circuit closer 129 is operated it will, by means of the coil 70, attract the armature 71, together with the spring arm 81 and the pawl 82 and serve to rotate the ratchet wheel 83 one tooth, when the armature is returned by the spring 73. With the movement of the ratchet wheel 83 one tooth, the cylindrical member 88 will be rotated to connect the brushes 95 and 96 through the contact member 89 and the brushes 99 and 100 through the contact member 90. The contact member 89 will close the circuit through the wires 97 and 98 to the filament and the contact member 90 will close a circuit from the wire 125, the brush 100, to the brush 99, the wire 134, the wire 134^a to the contact member 135 which engages the shaft 16.

If a station, controlled by the disc 22^e is desired, the circuit closer 129 is operated seven more times, which will bring the portion 94 of the contact member 91 at the brush 107 and will close a circuit from the contact member 23 on the disc 22^e through the wire 136 to the brush 107, where it will contact with the portion 94 of the contact member 91 and communicate with the brush 101 at its contact portion 93 and thence through the wire 137, where it will energize the magnet 50, the current passing through the wire 138 to the wire 124. The magnet 50 will move the armature 48 carrying with it the shaft 45 and the disc 60, which will bring the disc 60 into frictional engagement with the disc 62. This movement of the armature 48 will also close a circuit between the contact member 57 and one of the contact members 58, which leads through the wire 139 to the motor 67, and from the motor 67 through the wire 140 to the wire 124.

It will be understood that the shaft 16 carrying the disc 22 will be rotated counter-clockwise by this means until the circuit through the contact member 23 on the disc 22^e is broken by movement of the contact member on the said disc 22^e away from the brush 136. This will immediately deenergize the magnet 50, which will permit the armature 48 to assume the position indicated in Figure 3, which will serve to prevent any further rotation of the shaft 16 through the shaft 45 and the connecting gearing. This is so, although the motor 67 may rotate for a short interval thereafter. The position of the disc 22^e, when the circuit through the contact member 23 is broken, is illustrated in Figure 8.

It will also be understood that the circuit closer 129 may be depressed a number of times to close a circuit through one of the brushes 26 at a disc 22 through one of the wires 136^a, and through the contact member 92 and the wire 141 to the magnet 51, when the magnet will serve to move the arm to bring the disc 60 into engagement with the disc 61 and the shaft 45 will be rotated in a clockwise direction, as will be apparent. When the shaft 16 has been turned as desired the shaft 45 will be disconnected from the motor, as has been described, and the motor will slow down and stop in the customary manner.

To disconnect, the circuit closer 128 is depressed, or otherwise operated momentarily, which will energize the relay 132, since the resistance 130 is now removed from the circuit. This will break the circuit from the wire 134 to the wire 134^a at the contacts 142 and 143, which will prevent any further rotation of the shaft 16 while the cylindrical member 88 is returned to its original position. The relay 132 locks, through the resistance 144, the circuit including the wire 125, the brush 100, the contact member 90, the brush 99 and the wire 134, the contact 143 and the contact 145, the relay 132 and the wire 133. The relay has also opened communication from the wire 133 at its contact 146 to the contact 147 on the wire 148 which leads to the contact member 75. It will be understood that the magnet 70 with its armature 71 and the contact members 75, and 78 which is connected with the wire 127, will advance the cylindrical member 88 by step-and-step movement through the wire 126, the magnet 70, the contact members 78 and 75, the wire 148 to the contacts 147 and 146 and the wire 133, and it will further be understood that this step-by-step movement will continue until the circuit from the brush 100 through the contact member 90 to the brush 99 is broken, when the relay 132 permits the contact members 142, 143 and 145 to assume the position illustrated in Figure 9 and the contact members 146 and 147 to also assume the position indicated in the said figure. This prevents any further rotation of the cylindrical member 88. At the same time, the filament circuit from the brush 96 through the contact member 89 to the brush 95 is broken. Each of the speakers or headsets is provided with a condenser 149. Each speaker or headset is also provided with a volume control 150.

It will be understood that there is no direct current flow in the control leads while the audio frequency current is operating the speaker. The relay 132 and the magnet 70 also serve as chokes to confine the audio frequency to the speaker circuit. The resistance 144 compensates for the resistance in the magnet 70, the resistance 151 in the wire 148 serves to compensate for the resistance in the relay 132 plus the resistance 130 at the speaker. It will be understood that the circuit closers 128 and 129 may be replaced by a dial, or by any other similar device.

It will be seen by referring to Figure 9 of the drawings that, when the contact 36 engages the contact 36^a, a circuit will be opened from the wire 134 through the contacts 36 and 36^a to the wire 152 and through the resistance 144 to the relay 132, which will open the circuit from the wire 134 to the wire 134^a. The contacts 36 and 143 move together around a pivot 36^b. The contact 143 is moved out of engagement with the contact 142 by the relay 132 which moves at the same time the contact 36 into engagement with the contact 36^a while the cylindrical member is off normal. The circuit is then opened from the wire 134 to the wire 134^a and the shaft 16 cannot be operated by the motor 67.

What is claimed is:

1. In a radio set remote control, in combination, means to operate tuning means to tune in stations of various wave lengths by direct and reverse operation of said means, and mechanism to cause the direct and reverse operation of said means, said mechanism including a transmission shaft, means supporting the shaft for lateral movement in opposite directions, driving members rotatably mounted respectively on opposite

sides of said shaft and a driven member secured to said shaft which is selectively engageable with said driving members by reason of the lateral movement of said shaft to cause the direct or reverse rotation of said shaft and consequent direct or reverse operation of said first means.

2. In a radio set remote control, in combination, means to operate tuning means to tune in stations of various wave lengths by direct and reverse operation of said means, a transmission shaft, means including a bearing member having pivotal movement supporting said shaft for rotational and lateral movement in opposite directions; resilient means connected with said bearing member to yieldably retain said shaft in a neutral position, driving members rotatably mounted respectively on opposite sides of said shaft, a driven member secured to said shaft, means gearing said shaft with said first means to directly or reversely operate the latter by the direct or reverse rotation of the shaft, and means to cause the pivotal movement of said bearing member to cause the engagement of said driven member with one of said driving members to cause the direct rotation of said shaft, or to cause the engagement of the driven member with the other driving member to cause the reverse rotation of said shaft.

3. In a radio set remote control, in combination, means to operate tuning means to tune in stations of various wave lengths by direct and reverse operation of said means, and mechanism to cause the direct and reverse operation of said means, said mechanism including a transmission shaft, means supporting the shaft for lateral movement in opposite directions, driving members rotatably mounted respectively on opposite sides of said shaft, and a driven member secured to said shaft which is selectively engageable with said driving members by reason of the lateral movement of said shaft to cause the direct or reverse rotation of said shaft and consequent direct or reverse operation of said first means; and electromagnetic means which cooperates with said shaft-supporting means, to cause said lateral movement of the shaft.

4. In a radio set electrical remote control, in combination, a remote selector, an electromagnetic step-by-step device electrically connected with said selector, a rotary multiple switch operated by said device, said selector being manipulatable to close a circuit to operate said device

to cause the latter to operate said switch; a motor, electromagnetic clutch means, a second rotary multiple switch electrically connected with said first switch, means to operate tuning means to tune in stations of various wave lengths, said clutch means when energized serving to couple said motor and second means, and when de-energized serving to uncouple said motor and second means, means electrically connected with said second means, selector and second switch to operate the latter in conjunction with the operation of the first switch by said device upon the further manipulation of said selector, to complete a circuit, to start the motor, and to energize said clutch means, to cause the motor to operate said second means.

5. In a radio set electrical remote control, in combination, a remote selector, an electromagnetic step-by-step device electrically connected with said selector, a rotary multiple switch operated by said device, said selector being manipulatable to close a circuit to operate said device to cause the latter to operate said switch; a motor, electromagnetic clutch means, a second rotary multiple switch electrically connected with said first switch, means to operate tuning means to tune in stations of various wave lengths, said clutch means when energized serving to couple said motor and second means, and when de-energized serving to uncouple said motor and second means, means electrically connected with said second means, selector and second switch to operate the latter in conjunction with the operation of the first switch by said device upon the further manipulation of said selector, to complete a circuit, to start the motor, and to energize said clutch means, to cause the motor to operate the second means, an electrical resistance connected with said selector, a relay, and a circuit closer, said motor, resistance, relay and circuit closer being electrically connected, said resistance preventing said relay from being energized to render the selector temporarily inoperative, said circuit closer being manipulatable to close a circuit through said relay and step-by-step device, and to open the circuit through the motor, clutch means, and second switch; said selector then being manipulatable to operate said device to cause the latter to restore the first switch to original circuit opening condition.

DONALD C. FIERCE.

55 130

60 135

65 140

70 145

75 150