

**July 31, 1934.**

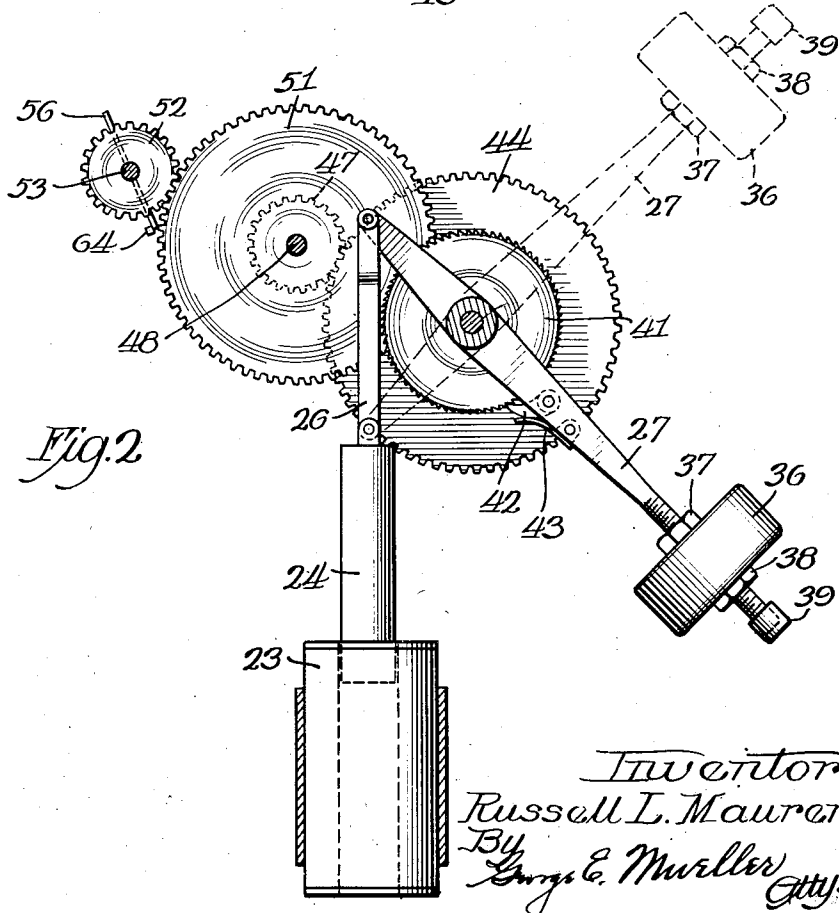
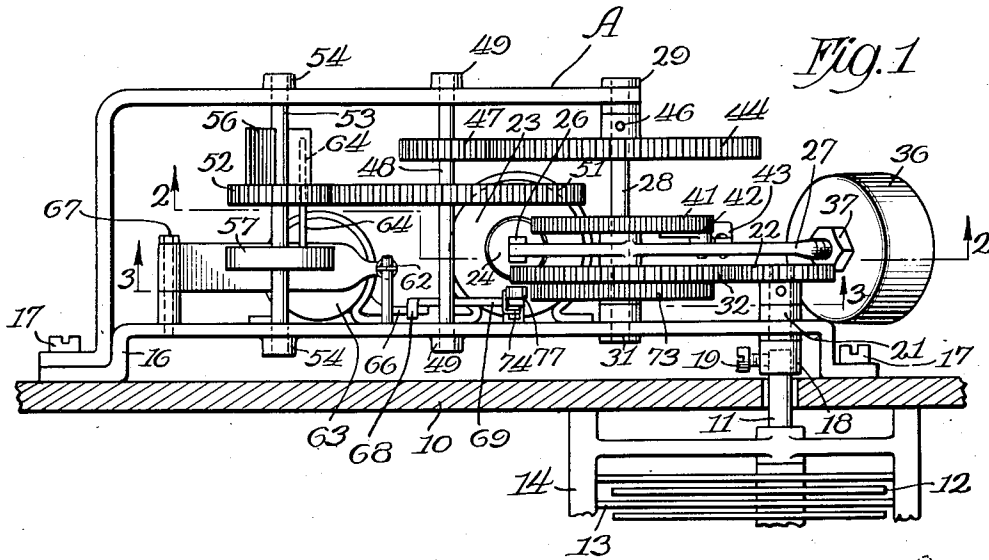
R. L. MAURER

**1,968,302.**

### CONTROL MECHANISM

Filed Sept. 14, 1928

3 Sheets-Sheet 1



Inventor  
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July 31, 1934.

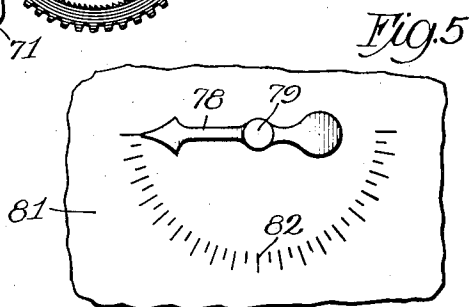
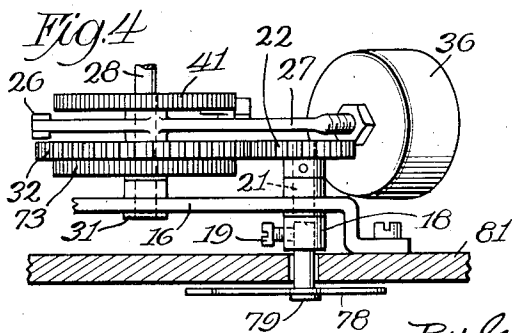
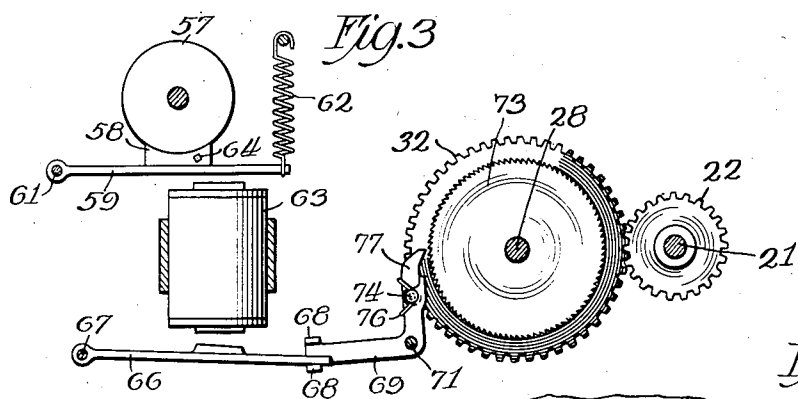
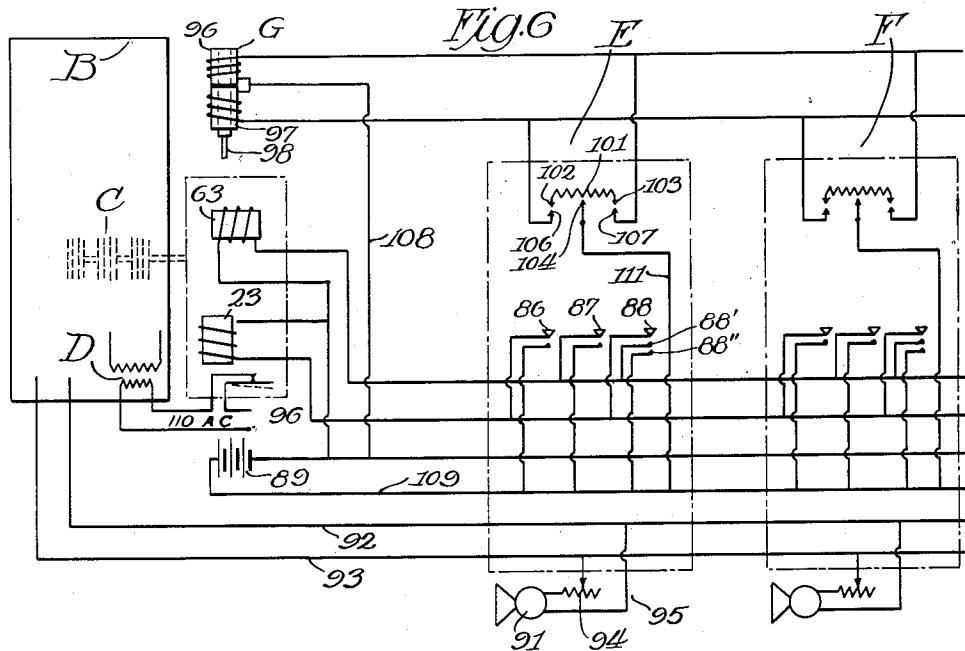
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CONTROL MECHANISM

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3 Sheets-Sheet 2



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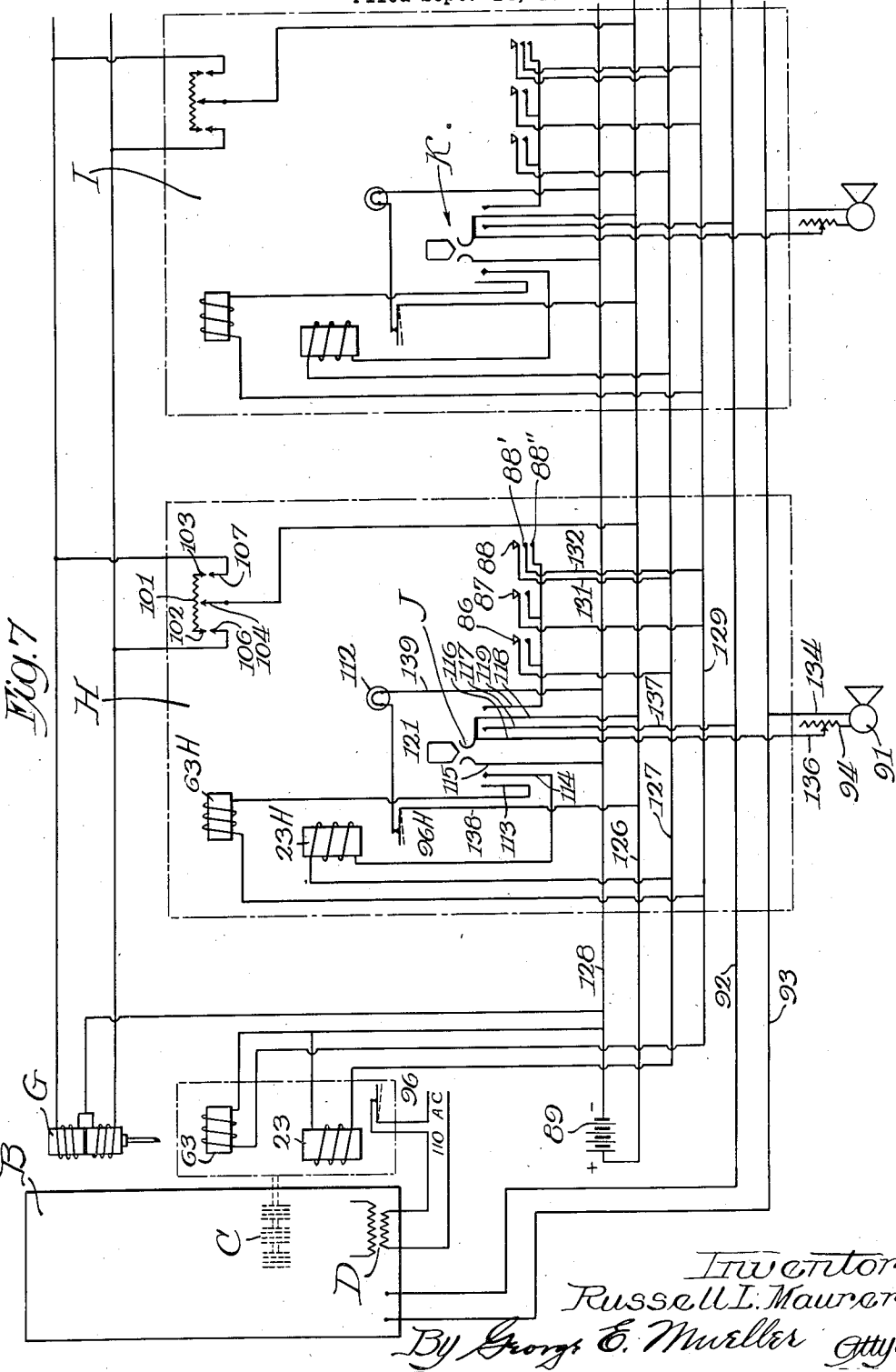
1,968,302

CONTROL MECHANISM

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3 Sheets-Sheet 3

Fig. 7



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## UNITED STATES PATENT OFFICE

1,968,302

## CONTROL MECHANISM

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Grigsby-Grunow Company, Chicago, Ill., a cor-  
poration of Illinois; Frank M. McKey, receiver  
in bankruptcy

Application September 14, 1928, Serial No. 306,083

11 Claims. (Cl. 250—20)

My invention relates in general to control mechanisms. It has to do more particularly with a method of and means for controlling the position and adjustment of apparatus which is located at some distance from the control point.

My invention as shown in the herein described embodiment is directed particularly to the control of a radio tuning apparatus. It presupposes the location of a speaking unit or speaking units at some distance from the receiver, and the tuning of the receiver from the location of the speaker.

In home installations, particularly where the residence is unusually large, it is often desirable to use a single receiver of a good quality, with a number of speakers located at different points, for example on a porch, a living room, and in a bed room. As now arranged it is necessary to go to the set not only for tuning the receiver itself, but also very often for connecting the speaker. Another example of the location of a radio receiver at some distance from the speaker is where the speaker must be placed in some location where there is considerable interference, and then in order to avoid this interference the receiver is placed in a quiet area and a relatively long cable carrying the voice frequency current is run to the speaker.

Accordingly the principal object of my present invention is the provision of an improved method of and means for controlling the movement of apparatus at a distance removed therefrom.

Another object is to tune a radio receiver from a distant point.

Another object is to provide a radio receiver with a speaker located at a distance therefrom and a tuning mechanism located at both the receiver and speaker.

Another object is the provision of an electrically controlled switch mechanism for turning a radio dial shaft.

Another object is the provision of such a mechanism mounted to control the dial shaft, and in combination therewith means for controlling a vernier or similar member.

Another object is the provision of a tuning mechanism located at a distance from the receiver and so designed as to show the frequency to which the receiver is tuned.

Another object is the provision of a distant controlling mechanism so designed that the same mechanism may be duplicated at a number of points and the radio receiver operated from any of such points.

Another object is the provision of a circuit for operation with such tuning mechanism which will permit the attaching of distant stations connected to a previously installed receiver without modifying the wiring.

Other objects and features of the invention will

be apparent from a consideration of the following detailed description taken with the accompanying drawings wherein

Fig. 1 is a plan view of the mechanism employed in one embodiment of my invention, and showing the manner in which it is attached to a radio receiver;

Fig. 2 is a view taken along the line 2—2 of Fig. 1—showing the way some of the mechanism operates;

Fig. 3 is a similar view taken along the line 3—3 of Fig. 1;

Fig. 4 is a fragmentary plan view of the mechanism as employed at the distant controlling station;

Fig. 5 is a face view thereof;

Fig. 6 is a diagram of a simplified form of circuit wherein the dial setting is now shown at the distant control point, and

Fig. 7 is a diagram of the preferred form of circuit.

I have illustrated my invention as applied to turning the usual dial shaft to which are connected a number of variable condensers and as now arranged I provide means for turning the dial shaft quickly in one direction so as to reset it for operation on low wave lengths. This is controlled at the distant station by means of any suitable switch, and I prefer a simple button contact for this purpose. By means of a second button the condensers are caused to move slowly in a direction to increase the capacity thereof until a full capacity for tuning higher wave lengths is reached, which takes in the full tuning scope of the receiver. In any position the movement may be stopped by simply releasing the tuning, or as I term it the brake release key. I also provide a third key which causes a slight backward movement of the dial shaft with a consequent slight decrease in capacity, which is of value if the condensers are permitted to turn slightly too far when employing the brake release key. There are other features associated with and forming part of my invention but these will appear as the detailed description progresses.

Referring now to the drawings I show a fragmentary portion of a radio receiver including a front panel 10 and a dial shaft 11 shown as the usual rotor shaft of a variable condenser with rotor plates 12 adapted to turn therewith and cooperate with stator plates 13 held by a frame 14 for the purpose of varying the capacity and modifying the tuning of the receiver. The tuning mechanism A I show as adapted to be secured to the standard radio tuning shaft, and this comprises a frame 16 secured to the front panel by screws 17. A coupling 18 sets around the end of the shaft 11 and is tightened thereto by a set-screw 19. This coupling forms a continuation of shaft 21 which is journaled in a part of the frame

and has connected thereto the hub of a gear 22. It is through this gear that all of the movement in either direction is imparted to the shaft 21 for transmission to the shaft 11.

As previously described the first movement of the mechanism is a so-called reset movement which takes place relatively quickly to turn the condensers to substantially zero capacity. In carrying out this movement I employ a solenoid 23 having a plunger type of armature 24 pivotally connected to a link 26 which is connected to the short end of an arm 27. This arm 27 is loosely mounted on a shaft 28, the ends of which are journaled at 29 and 31 in the frame 16. It is also secured to the hub of a gear 32 which is also journaled on the shaft, and this gear 32 meshes with the gear 22 so that movement of the arm 27 serves to turn the shaft 11. Consequently energizing the solenoid 23 will lower the plunger 24 and turn the arm 27 about its pivot in such a way as to reset the condensers to zero reading.

In tuning the variable condensers from the reset or zero capacity position the rotor plates are moved gradually to increase the capacity until a maximum possible capacity results. At any time in this gradual travel of the condensers the movement thereof may be stopped. I shall now describe the mechanism with which I accomplish this result.

In the first place the rotor plates are arranged on the rotor shaft so that they will naturally tend to move by gravity to a lower position. This is accomplished by connecting them off-center as is the usual practice, the off-center position being preferably the same which will result in a constant or even dial graduation. This has a tendency to cause the plates to move as they are reset and to further bring about this result I provide a weight 36 on the free end of the arm 27, this weight being threaded on to the arm so that it can be adjusted back and forth in a manner to be described, and a pair of locking nuts 37 and 38 are provided at both sides thereof. A cap 39 is threaded on to the extreme end of the arm 27 to protect the threads and also to perform a certain function which will be described. It is obvious therefore that with the weight of the rotor plates and the added weight of the weight mass 36 the rotor plates will be returned to a full capacity position. In order, however, to regulate the speed at which this takes place I provide a regulating movement which will now be described.

Secured on the shaft 28 is a ratchet gear 41, and a ratchet 42 pivoted to the arm and spring pressed against the ratchet gear teeth by a spring 43, causes a rotation of this ratchet gear as the arm 27 moves through the influence of the weight 36. A spur gear 44 is also secured to the shaft 28 by a pin 46 and meshes with a smaller gear 47 carried by a shaft 48 which is journaled in bosses 49—49 carried by a frame. This shaft 48 also has a larger gear 51 which meshes with a gear 52 carried on a shaft 53 also transverse of the frame and journaled in bosses 54—54. This shaft carries a fan type of regulator 56 which through the resistance offered by the air limits the speed at which the arm 27 is turned.

In order to permit turning of the arm 27 when occasion requires, I provide a braking mechanism which is shown in the form of a brake wheel 57 carried by the shaft 53 and adapted to be engaged by a brake shoe 58. This brake shoe is carried by an armature 59 which is pivoted at 61 and held in a position to engage the brake wheel with the brake 58 by a spring 62. Im-

mediately below the armature 59 is an electromagnet 63 which is adapted to be energized and attract the armature 59 so as to release the brake shoe 58. Secured to the brake shoe is a stop pin 64 which is adapted to engage the blade 56 and thus positively arrest the movement of the regulating movement when the armature 63 is deenergized.

It will be recalled that I also provided mechanism for causing a slight backward movement of the tuning mechanism and I accomplish this by operating the reset solenoid 23 so as to draw the entire mechanism in a reverse direction, but simultaneously with the operation of this mechanism I provide means for limiting the movement so as to obtain only a slight backward movement instead of a full reset movement. I accomplish this by means of the following mechanism.

Immediately below the electromagnet 63 is a second armature 66 which is pivoted at 67 and has its free end extending between a pair of bifurcations 68—68 on the end of a bell-crank lever 69. The bell-crank lever is pivoted to a stud shaft 71 which is adjacent to a ratchet wheel 73 formed integral with the reset gear 32. The upwardly extending arm of the bell-crank is formed in two sections with a pivot 74 between them and with a spring 76 tending to hold the upper point 77 in a straight position. This construction is to accomplish certain functions which will be described in connection with the operation of the mechanism.

In the type of installation which I prefer I arrange to show the dial setting, that is the frequency or wave length to which the receiver is tuned, at the speaker station. To accomplish this the control mechanism is repeated at the speaker station but, as shown in Fig. 4 a dial indicating hand 78 carried by a small shaft 79 is secured to the coupling 18 in place of the condenser shaft 11. In this connection the reset mechanism may be housed within any small type of cabinet with a panel 81, and the shaft 79 extends through the panel 81 in the manner shown so as to point to suitably provided graduations 82 carried by the panel (Fig. 5).

#### *Operation of the main control mechanism*

In the operation of the mechanism for tuning a receiver a button contact is closed supplying current to the solenoid 23. This draws down on the plunger 24 thus raising the weight 36 as well as raising the heavy ends of the rotor plates 12. As this is done the ratchet 42 is permitted by the spring 43 to ride the ratchet wheel 41 so that the speed control mechanism is not affected at all during resetting. The brake 58 and stop pin 64 are in engagement during this operation. The condensers are now arranged at zero capacity.

In the next step in tuning, a contact is closed energizing the solenoid 63. This draws the brake 58 away from the brake wheel 57 and also removes the stop pin 64 from engagement with the blade 56. This permits the downward movement of the weight 36 to operate the condenser shaft through the gears 32 and 22 and through the shaft 21, this downward movement being aided by the weight of the condensers themselves in my preferred form. This downward movement is allowed to continue until the proper dial setting is reached, and until the station desired is tuned in. During this time the armature 66 is also drawn upwardly so that the point 77 engages the teeth of the ratchet gear 73. The

spring 76, however, allows the point 77 to move about the pivot 74 and the ratchet wheel is permitted to move by the point 77. In this way the movement of the bell crank 69 is not effective to

5 hold the mechanism from turning.

Now when tuning it is always possible that the movement of the condenser plates is allowed to go too far and in this case another contact is closed which passes current to both the solenoid 23 and the electro-magnet 63. When these are energized the plunger 24 immediately starts to move and through the mechanism shown the rotor plates also immediately start to move. This immediate or initial movement is also imparted to the lever 66, but on account of the space between the bifurcations 68 this movement is not immediately effective as regards the point 77. Therefore the wheel 73 will have moved a portion of a gear tooth before the point 77 has gone in to engage against the ratchet gear, and accordingly movement equivalent to the width of one tooth only is permitted by this action. Obviously, however, the parts could be adjusted to permit a greater movement if desired.

#### 25 *The circuit*

Reference is first made to Fig. 6 in which a simple form of circuit is shown wherein no reset mechanism proper is employed at the speaker station. This illustrates any usual form of receiver B with a gang condenser C and adapted to be supplied with any suitable type of current as for example the usual alternating current which is supplied to a suitable power-pack D as shown. In this diagram I illustrate schematically the reset solenoid 23 and the brake electro-magnet 63. Two speaker stations E and F are shown which being in all respects duplicates of each other only one will be described as this suffices for an understanding of them both.

At the speaker station E key button switches 86, 87 and 88 are provided, controlling the reset, brake release, and reverse rotation movement of the mechanism. A battery 89 representing any suitable source of power is provided to control the operation of the mechanism at the speaker. The key 86 is adapted to be closed to energize the solenoid magnet 23, the circuit through this switch including simply the two contacts thereof, the solenoid windings 23 and the two terminals of the battery 89. The key switch 87 is closed to energize the solenoid 63 and the closing of this switch simply places the switch, solenoid windings, and battery 89 in series. As to the operation of the key 88 this has three contacts, namely, the upper or key contact, and two lower contacts 88' and 88''. The two upper contacts of the switch lead to one side of the solenoid windings 23 and 63 respectively, while the lower terminal 88' is common, extending to one terminal of the battery, while the second terminal of the battery is common to both of the solenoids. For this reason when contact is formed between the two upper terminals there is no current flowing, this occurring only when the lower terminal 88'' is cut into the circuit. This prevents any possibility of current flowing in one of the solenoids before the other which might be disadvantageous when operating the reverse rotation feature.

A speaker 91 of any suitable type is provided at the speaker station and is connected to the leads 92 and 93 carrying the voice frequency current. Between one of these connections, however, a rheostat 94 is positioned through the operation of which the loudness of the tones produced at

the speaker may be regulated. Switch 95 is provided for disconnecting the speaker at the location thereof without disconnecting the set itself.

It will be obvious that I provide a small switch 96 in the commercial A. C. line adjacent the solenoid 23. This is a spring contact type of switch which is adapted to be engaged by the end 39 of the arm 27 so that when this arm is in its lowermost position this switch will be open and accordingly cut off the flow of current to the receiver. In this way the set itself may be put out of operation at the location of the speaker by simply holding the brake release key until the arm 27 drops to its lowermost position and interrupts the commercial current input to the set.

While present day commercial radio receivers are all provided with so-called single dial control, practically all such receivers also have a vernier or fine tuning attachment of some type or other which is employed for bringing in stations which are not brought in with satisfactory clearness by the usual single dial. These stations are usually distant stations, since all of the better classes of sets now obtain practically perfect single dial tuning for all local stations in the vicinity of large cities. For the purpose of accomplishing this I provide a switch mechanism G wherein a plunger is provided within a solenoid and the attraction of the plunger is arranged to be proportional to the input of current, which input is controlled by a rheostat or potentiometer located at the speaker station. I may provide various specific arrangements to bring about this result but the arrangement which I show appears to me at the present time to be the most satisfactory. This consists of a pair of solenoids 96 and 97 arranged with their poles reversed and having a plunger 98 disposed within the two solenoids and having a plunger rod running to any suitable mechanical contrivance for effecting the vernier tuning. With this arrangement I obtain a push-pull or two way movement of the plunger which does not depend upon the use of springs, etc., to return it to position.

I also provide a novel type of switch for controlling the current supplied to the solenoids, this being arranged so that the power is cut off and the resistance taken out of series. This switch comprises a resistance winding 101 with terminals 102 and 103. The switch also includes a center terminal 104 adapted to contact with the winding 101, and a second pair of terminals 106 and 107 adapted to contact with the terminals 102 and 103 respectively. I arrange the movable portion of the switch so that it may be forced by the action of a suitable spring or the like away from engagement with the winding 101, so that when the plunger 98 is to be moved the switch is moved to connect the terminals described and so place the winding 101 in the circuit. The electrical connections in the operation of this switch include a lead 108 common to opposite sides of the two solenoids and leading to one side of the battery 89. The opposite side of the battery is connected through a common lead 109 and a terminal 111 to the switch terminal 104. The opposite ends of the solenoids 96 and 97 are connected to the terminals 107 and 108 respectively, so that with this arrangement operation of the switch arm and terminal arm 104 serves to increase the flow of current in one solenoid while decreasing it in the other, and this action can be carried on to such an extent as to practically cut off all flow of current in one solenoid, (this depending upon the resistance of the winding

101) or supply the full current to the other solenoid. This is responsible for the full movement which may be imparted to the plunger 98 in either direction.

5 In Fig. 7 a complete circuit, which I now consider as the best to employ with the preferred embodiment of my invention is illustrated. For the purpose of explanation I employ the same letters of reference as near as possible in this circuit as  
10 employed in the other figures. The two speaker control stations which are shown here I designate by the characters H and I to distinguish them from the stations E and F shown in Fig. 6. It is to be observed that the circuit of Fig. 7 is employed when a controlling mechanism is placed  
15 not only at the receiver, but at each speaker station, so that a dial 78 with graduations 82 is visible at each speaker station, so that the frequency to which the receiver is tuned is shown at the speaker station. At the speaker station the receiver  
20 B is shown as in Fig. 6 with the same arrangement in the gang condenser C, power-pack D, A. C. current supply, etc. The solenoids 63 and 23 are the same as is also the battery 89. The switches  
25 86, 87 and 88 are of the same character as is also the switch arrangement employing the resistance 101 for controlling the tuning member G.

Referring now more fully to the distant station H, in actual mechanical arrangement a unit exactly the same as that employed at the receiver may be used. This is hooked up when employed at the speaker station in the manner shown in Fig. 4. This employs a pair of solenoids which I designate 63H and 23H respectively which are  
35 the same as the solenoids 63 and 23 and operate the brake and reset mechanism respectively. A switch 96H is also employed but instead of cutting off a source of alternating current supply as happens in the receiver, this switch serves to extinguish the filament of a lamp 112 which is connected through the switch 96H to the battery 89  
40 and is therefore lit while the receiver is in operation. The use of this light therefore not only serves to make it possible to employ exactly the same construction in both places but it serves the additional purpose of furnishing a dial illumination and at the same time indicating positively when the radio receiver is disconnected from the source of commercial supply, that is whether or  
50 not it is in operation.

The station H is provided with a plural contact switch J which carries contact elements 113, 114, 115, 116, 117, 118, and 119. The terminals 115 and 116 are the main or operating terminals of the switch and have disposed between them a switch bar 121 which serves to force the terminals 115 and 116 outwardly and thereby close all of the terminals. This completes all of the circuits except as interrupted by the switches 86, 87 and  
60 88 through the operation of which, however, the circuits are completed and the adjusting mechanism operated.

The circuit is arranged so that by closing any one of the control switches the solenoids 23 and  
65 23H are each connected in series with the battery 89 so that both operate at the same time and to the same extent. Considering the operation of the control switches and the establishment of the circuits for energizing the solenoids,  
70 the closing of the button switch 86 serves to energize the solenoids 23 and 23H. The circuit thus established extends from the positive side of the battery 89 through conductor 126, to contact 118, contact 119, through switch 86 to the conductor  
75 127, through the solenoid 23 and back to the

negative side of the battery through conductor 128. Another circuit is established from the positive side of the battery through conductor 126, terminals 118 and 119, switch 86 to conductor 127, to the solenoid 23H to terminals 114 and 115 and back to the negative side of the battery through conductor 128.

Other circuits including the solenoids 63 and 63H are established through the operation of the switch 87. The first of the circuits so completed extends from the positive side of the battery through conductor 126 to terminal 118, thence to terminal 119, through the switch 86, to conductor 129, through the solenoid 63 and back to the common negative conductor 128 to the negative side of the battery. Another circuit is also established which is traceable from the positive side of the battery through the switch 87 in the same way to the conductor 129, and thence through the solenoid 63H to the terminal 113 and, contact having been established between terminals 113, 114 and 115 by the operation of the switch J, return is made through the terminal 115 to the negative conductor line 128.

In operating the switch 88 the same effect is obtained as if the switches 86 and 87 were operated simultaneously. To obtain this effect a conductor 131 is connected from the upper terminal of this switch to the conductor 127 and another conductor 132 interconnects the terminal 88' and the positive line 129 leading to the brake reset solenoids. The terminal 88'' is common to the two lower terminals in the switches 86 and 87 and leads to the terminal 119 so that actuation of the switch 88 obviously serves the same purpose as closing the switches 86 and 87. In this connection it is to be observed that since the common terminal 88'' is positioned at the bottom and is the last terminal to form contact there is no possibility of getting current in one of the solenoids before the other.

In the station H I provide a usual type of speaker with a volume control thereon all arranged substantially the same as in the simple circuit arrangement of Fig. 6, and in Fig. 7 I employ the same reference characters. This speaker is connected to the set by the operation of the switch J through the actuation of the switch arm 121. The speaker has one terminal 134 leading to one of the voice frequency conductors 93, while the other speaker terminal 136 is connected to the terminal 116. When the switch J is operated this terminal 116 makes contact with terminal 117 and a conductor 137 interconnects this terminal and the other voice frequency conductor 92. This throws the speaker into immediate operation when the switch is closed.

As previously described the lamp 112 is operated through the switch 96H and this switch is closed at all times when the dial has a number setting, that is to say the switch is closed at these times, but when the dial setting is zero the switch is opened. In order to supply current to the lamp 112 I provide a conductor 138 leading from the positive side of the battery through the conductor 126 to the switch 96H, and thence to the lamp 112 while a second conductor 139 extends from the other terminal of the lamp to the negative side of the battery through the conductor 128.

#### *Operation of preferred embodiment.*

In the preferred embodiment of my invention I employ controlling mechanism such as shown

in Fig. 1 connected to the dial shaft of the receiver, and an identical mechanism at each speaker station. These are connected for control by means of the circuit shown in Fig. 7. Assuming that the operator is at the station H and has no way of knowing whether or not the set is operating at another station, or in fact if the radio receiver is in operating condition. He starts in by looking at the lamp 112 and if this is lit he knows that the set B is in operation. He then moves the switch arm 121 and if the speaker 92 is heard it is fair to assume that another speaker is going in a different part of the house. Generally the operator is in a position to know the circumstances connected with the operation of this other speaker and if he does not desire to disturb the program he can simply listen in. If the set is closed off when he reaches the station he simply operates the keys 86, 87 and 88 in the manner described to tune in his program. If he is thoroughly familiar with the frequencies on which the various stations operate and knows the stations he wishes to tune in he can judge entirely by the dial setting which as explained will be the same as the dial setting in the receiver. When he is finished with his program and wishes to cut the set off entirely it is simply necessary to hold the brake release key 87 until the arm 27 drops down sufficiently to open the switch 96. He can tell when this takes place because simultaneously the light 112 will be extinguished.

The keeping of the various stations and the receiver in synchronism is a distinct problem and this is taken care of in the following way. To begin with the various adjusting mechanisms A are arranged so that they will operate in full sequence. This is done principally by adjusting the location of the weight 36. When these mechanisms are timed to operate in unison then from a single station the dials may be operated from any position and at any time and the station and receiver will be in synchronism. But the operation of station H, for example, will have no effect on the mechanism of station I; so that if the receiver has been controlled from station H and the operator then repairs to station I where he wishes to tune the receiver his dial setting at station I will probably not be the same as at the receiver. He can tune the receiver by depending entirely on the sound emitted by the speaker without regard to the dial setting. But it may be necessary and advantageous to have station I and the receiver in full synchronism to get the best tuning results. This is done by pressing the reset key and holding it long enough to be sure that the arm 27 at the receiver and the arm 27 at station I are both in their reset or extreme counter clockwise position. This establishes the stations in full synchronism again and tuning can be taken care of by viewing the location of the dial.

In tuning I also make frequent use of the switch G wherever necessary. A small potentiometer dial is placed on the speaker station cabinet so arranged that when it is pressed inwardly and turned the switch G can be moved in the manner described. This is of very great advantage when fine tuning is required.

It is recalled that I show a battery 89 for operating the control mechanism. This is simply illustrative, however, as any source of current may be supplied. It is not advantageous, however, to employ current from the power-pack D when the switch 96 is used, because then if this switch were opened it would be impossible to put the receiver in operation from a distant station point.

In constructing the stations I prefer to employ a plural contact switch such as shown at J because by this means I am able to put the whole station including the speaker in operation by means of a single switch. I am also able to control the circuits so that when a set is being operated from one station accidental interference with the button contacts 86, 87 or 88 at other speaker locations will have no effect upon the tuning of the receiver. In other words the switch J must be operated before the operation of the tuning buttons will have any effect whatsoever.

I have spoken of arranging the condensers so that with a zero setting and with the reset solenoid operating the rotor plates and separated from the stator plates their zero capacity results. The arrangement of the condenser plates and other things, however, may make it advisable to reverse this and reset the condensers to maximum capacity while gradually decreasing the capacity as the brake release key is pressed. This, however, is a matter of obvious arrangement and can be determined in accordance with the conditions found.

Among the advantages connected with the use of my invention in addition to those already pointed out I wish to state that the wiring is so arranged that additional speaker stations may be added on without making it necessary to change any of the previous installation or even the wiring in any way whatsoever. The conductors 128, 126, 127 and 129 are simply extended to the new station, together with the conductors 92 and 93 carrying the voice frequency current. The connections made to these conductors in connection with the operation of the newly installed station are obvious.

One of the principal advantages I see in the use of my invention is maintaining the receiver proper in such a position that it cannot be tampered with by inexperienced operators. For example in furnishing an apartment house I anticipate the possibility of providing a radio receiver with each apartment, the receiver itself being placed on the roof or any other suitable separate place, with a distant control station and speaker in the apartment. In this way the tenant would have full control of the operation of the set but would be unable to mutilate or mistreat the receiver itself in any way. With a number of receivers located at a single advantageous point all of them could be very economically serviced whenever necessary.

A similar idea can be carried out where it is not desirable to place the receiver in a particular location on account of interference, steel building construction which might interfere with receipt of carrier currents or the like. Another thing where it is desirable to employ an outside antenna and the lead-in would have to be very long, the receiver itself could be placed immediately adjacent the antenna and the conductor leading into the speaker location would carry voice current instead of the high frequency current. Obviously the losses, etc. would be a very great deal less with the relatively long voice frequency line instead of the long radio frequency lead-in.

While I have described a great many details of my invention to make the operation clear to those skilled in the art, it is obvious that I do not restrict myself to any of the details shown and the invention is limited only by the scope of the appended claims.

What I claim as new and desire to protect by Letters Patent of the United States is:

1. In a radio receiver provided with a tuning shaft for changing the adjustment of tuning apparatus between two extreme positions, means for turning said shaft relatively quickly to one extreme position, means including a governor for turning the shaft relatively slowly to the opposite extreme position, and means operable on said second means to stop the turning of the shaft at any selected position. 80
2. In a radio receiver provided with a tuning shaft for changing the adjustment of tuning apparatus between two extreme positions, means for turning said shaft to one extreme position, means for turning the shaft to the opposite extreme position, a governor for limiting the speed of turning in said opposite direction, operable on said second means to stop the turning of the shaft at any selected position, and means for turning the shaft a short distance in a direction opposite to the direction in which the shaft is turned by the slow turning means. 95
3. In a radio apparatus a tuning shaft for changing the adjustment of the tuning apparatus, shaft turning mechanism for turning said shaft comprising an operating shaft provided with means for connecting it to the shaft to be turned, a pivoted weighted arm, means for turning said arm relatively quickly to raise the weighted end, an operable connection between the arm and operating shaft so that said shaft is turned with the arm, releasable means for holding the arm with the weight in an elevated position, and regulating mechanism to lessen and control the rate of fall of said arm when the holding means is released. 95
4. In a radio apparatus having a tuning shaft for changing the adjustment of the tuning apparatus, shaft turning mechanism for turning said shaft comprising an operating shaft provided with means for connecting it to the shaft to be turned, a pivoted weighted arm, means for turning said arm relatively quickly to raise the weighted end, an operable connection between the arm and operating shaft so that said shaft is turned with the arm, releasable means for holding the arm with the weight in an elevated position, regulating mechanism to lessen and control the rate of fall of said arm when the holding means is released, both said arm raising means and releasing and regulating means including an electromagnet operable at a distance from the mechanism so that the operator may be at any distance from the shaft turning mechanism. 110
5. In a radio apparatus a shaft carrying a tuning element for said apparatus, shaft turning mechanism for turning said shaft comprising an operating shaft provided with means for connecting it to the shaft to be turned, a pivoted weighted arm, means for turning said arm relatively quickly to raise the weighted end, an operable connection between the arm and operating shaft so that said shaft is turned with the arm, releasable means for holding the arm with the weight in an elevated position, regulating mechanism to lessen and control the rate of fall of said arm when the holding means is released, and means for limiting the reset movement of the arm so that a slight backward movement of the operating shaft may be obtained. 115
6. In a radio apparatus a shaft carrying a tuning element, shaft turning mechanism for turning said shaft which comprises an operating shaft equipped with means for securing it to a shaft to be turned, means for turning the shaft against a load to a reset position representing one extreme of movement of the shaft, a brake mechanism for holding the shaft against the load in any selected position, means for releasing said brake to permit the shaft to turn, and regulator mechanism to maintain said shaft movement at a regular relatively slow speed. 120
7. In a radio apparatus a shaft carrying a tuning element, shaft turning mechanism for turning said shaft which comprises an operating shaft equipped with means for securing it to a shaft to be turned, means for turning the shaft against a load to a reset position representing one extreme of movement of the shaft, a brake mechanism for holding the shaft against the load in any selected position, means for releasing said brake to permit the shaft to turn, regulator mechanism to maintain said shaft movement at a regular relatively slow speed, and means for moving said operating shaft a short distance in a reset direction. 125
8. The combination with a mechanism as described in claim 6, and a switch operated when the mechanism is at a predetermined position to cut off the supply of electrical current to said receiver. 130
9. In a radio installation a receiver, a speaker located at a distance from the receiver, a turning mechanism located at the receiver and operable from the location of the speaker to tune the receiver, a similar mechanism located at the speaker, means for starting the two mechanisms from the same point to make them operable in unison, an indicator operable at the speaker mechanism to show the tuning position of the receiver, a pilot light at the speaker which is illuminated while the receiver is supplied with electrical energy, means for cutting off the current to the receiver when the turning mechanisms are in a predetermined position, and a separate vernier control operable from the speaker station for securing fine adjustment in tuning. 135
10. A radio receiver adapted for remote control, comprising a receiver proper and a remote control unit therefor, said receiver including local tuning means adjustable over a range for selecting a particular frequency, said tuning means being adapted to have forward and backward motions to go from one extreme position to the other extreme position, energy storing means mechanically connected to said tuning means, said energy storing means having a minimum of potential energy therein at one extreme position of said tuning means and a maximum at the other extreme position thereof, local means governed from said control unit for causing said energy storing means to tend to assume a condition of maximum potential energy with a corresponding extreme position of said tuning means, means for causing a gradual transformation of potential energy to kinetic energy and gradual movement of said tuning means away from said corresponding extreme position and means governed from said control unit for arresting said motion of said tuning means at any desired position thereof only during said energy transformation period. 140
11. The structure of claim 10, wherein additional means governed from said control unit is provided for causing a relatively small movement of said tuning means in a reverse direction to the gradual motion. 145

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