April 25, 1933. L. T. ROBERTON 1,905,503

SYSTEM OF REMOTE RADIOCONTROL

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FIG. 1

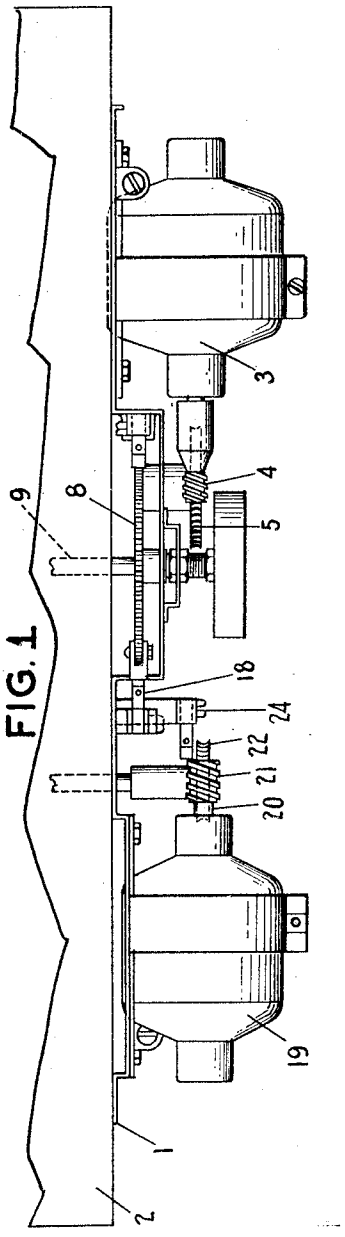
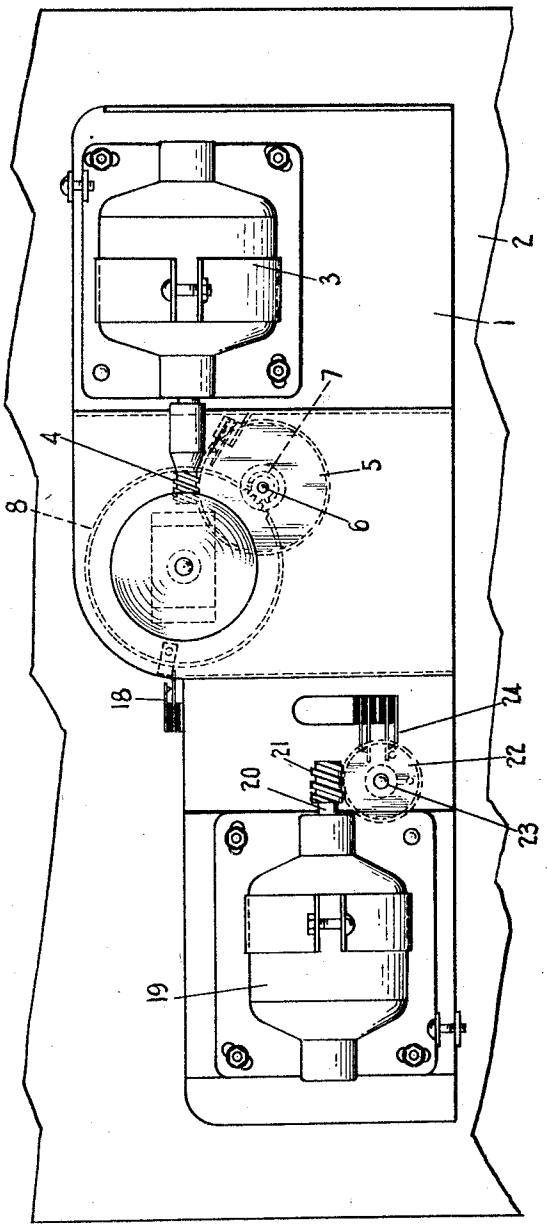


FIG. 2



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FIG. 3

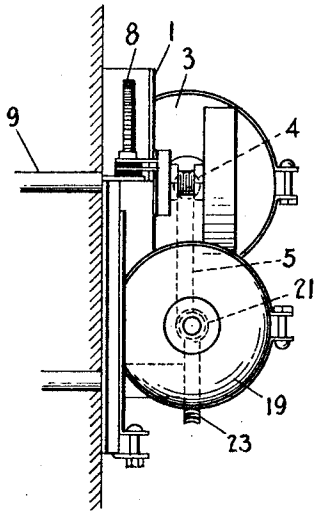


FIG. 4

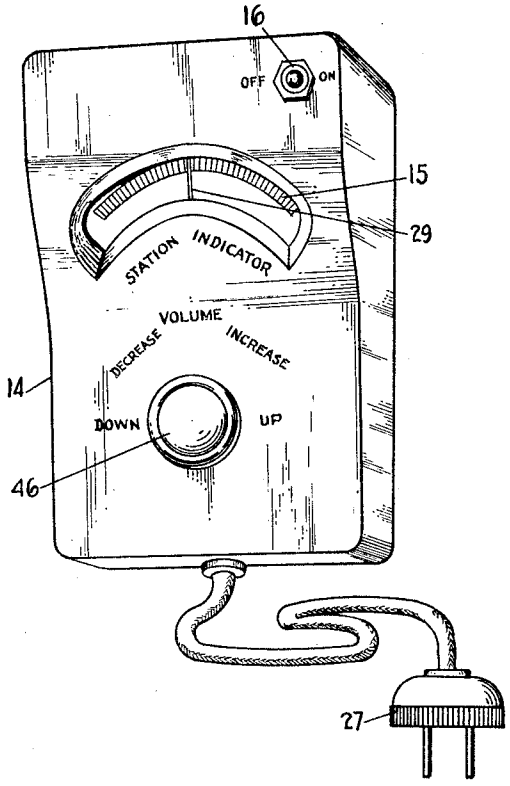


FIG. 5

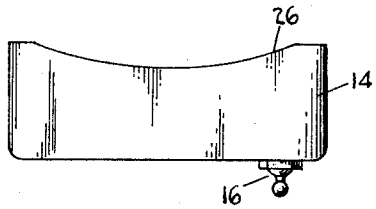


FIG. 6

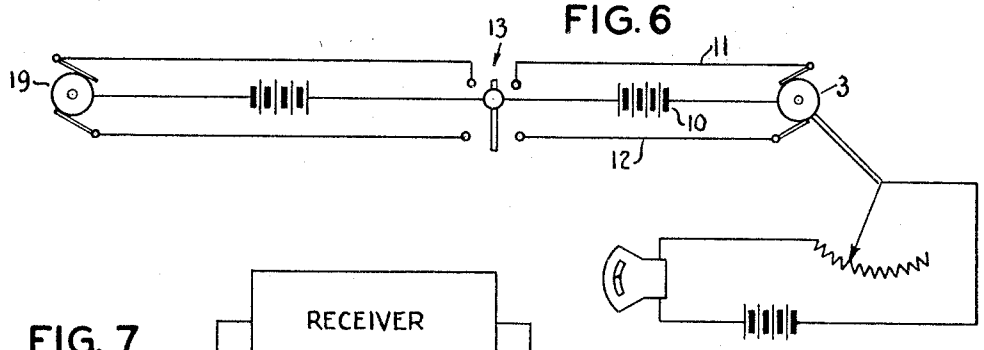
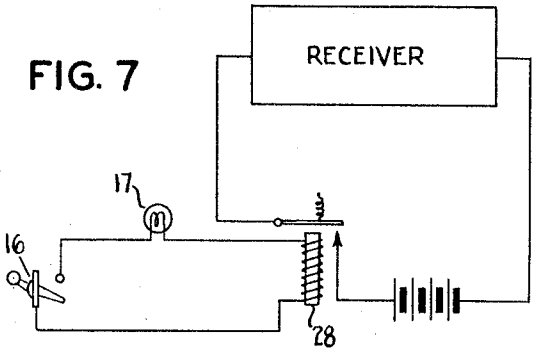


FIG. 7



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SYSTEM OF REMOTE RADIOCONTROL

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FIG. 8

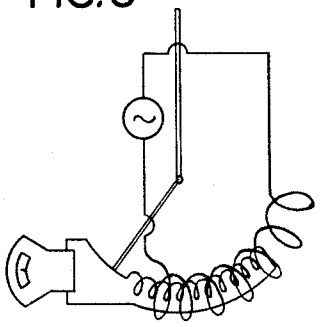


FIG. 9

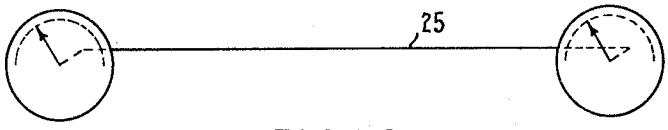


FIG. 12

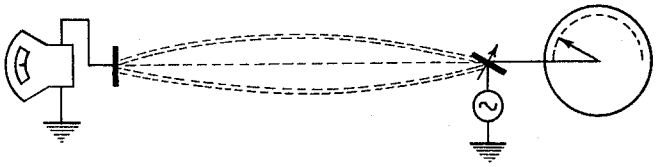


FIG. 10

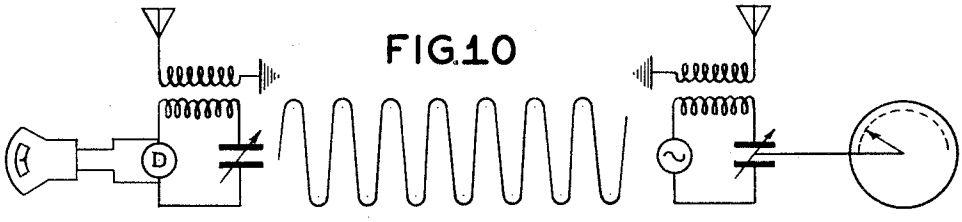


FIG. 11

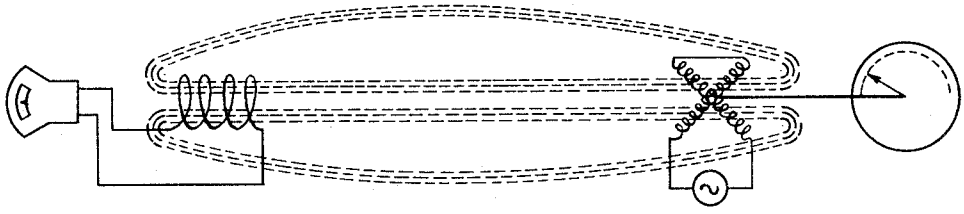


FIG. 13

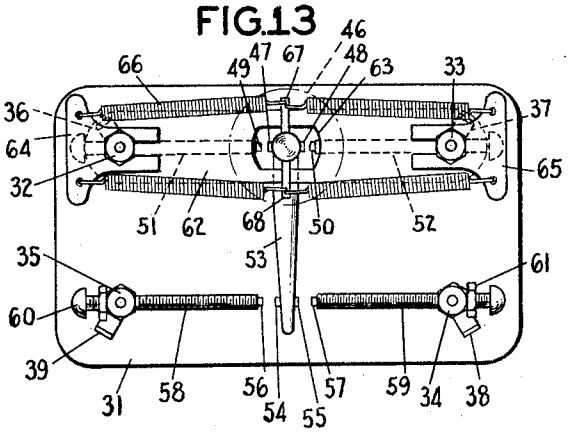
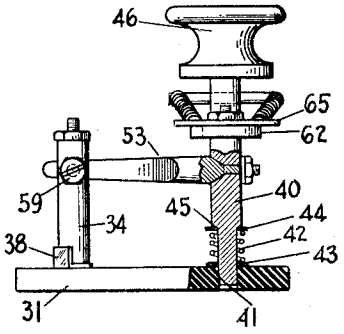


FIG. 14



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Patented Apr. 25, 1933 1,905,503

UNITED STATES PATENT OFFICE

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SYSTEM OF REMOTE RADIOCONTROL

Application filed October 25, 1929. Serial No. 402,389.

My invention relates to tuners of radio receiving sets whereby the device to be adjusted or tuned may be located in, say the attic of the building, while the control is in a wall plate or small casing located in the living room, although it will be obvious from the hereinafter contained description that it can be employed for any desired distance, and the set may even be in the room from which it is to be operated.

There are some devices, termed remote control devices, which will cut in the radio set, through a series of steps, to certain predetermined stations, but should a station get off its wave length, or the condensers become unbalanced, the operator or listener will either fail to get the station, or not get it clearly, or even get interference from an adjoining station.

My invention has for its principal object, to provide a system of control, by the use of which the operator may, from a remote position, tune in any station over the entire range of the broadcast band.

My invention has for its further object, visual indicators at the control, (which, as stated, may be either portable, or located in a wall plate), so that the exact kilocycle or wave length at which the instrument is operated (or the station which has been tuned in), may be seen immediately by the operator, without his having to wait for station announcement to learn if he has tuned in on the desired station.

In practice, it may in some cases be found desirable to substitute a directory of station call letters, rather than, or in addition to, a kilocycle or wave length scale.

My means for accomplishing the foregoing objects may be more readily understood by reference to the accompanying drawings, which are hereto annexed and are a part of this specification, in which—

Fig. 1 is a top or plan view of my controlling mechanism in position on the front of the cabinet of a radio receiving set, only a fragmentary portion of the cabinet being shown, as obviously it forms no part of my invention;

Fig. 2 is a front elevation of the mechanism;

Fig. 3 is an end elevation of the same;

Fig. 4 is a perspective view of the portable type of control;

Fig. 5 is a top view of the same;

Fig. 6 is a wiring diagram for the system;

Fig. 7 is a wiring diagram for turning on the set, with a pilot light to show that the set is on, and a relay switch in the line,— the latter being optional, but practice having shown that it is desirable;

Fig. 8 is a wiring diagram of an indicator circuit, operated by alternating current by means of inductive coupling, instead of resistance control as shown in Fig. 6;

Fig. 9 is a mechanical form of interconnecting receiver, with the indicator at the control and actuating the same;

Fig. 10 is a system of interconnecting the radio receiver with the indicator at the control, and actuating the same by means of radio waves;

Fig. 11 is a system of interconnecting the radio receiver with the indicator at the control, and actuating the same by means of electro-magnetic induction;

Fig. 12 is a system of interconnecting the radio receiver with the indicator at the control, and actuating the same by means of electro-static induction;

Fig. 13 is an enlarged plan view of my improved switch; and

Fig. 14 is an end elevation of the same.

Similar reference numerals refer to similar parts throughout the entire description.

As shown in the drawings, the operating mechanism is mounted upon a plate 1, which is secured in any suitable or convenient manner to the radio set (not shown). As illustrated, I have shown only a fragmentary portion 2 of the cabinet, as obviously the set forms no part of my invention, which is adaptable, as will appear from the hereinafter contained description, to any set, either with or without a cabinet.

Adjacent one end of the plate 1 is mounted an electric motor 3, upon the shaft of which is fixedly secured a worm 4, which meshes

with a worm wheel 5, mounted upon a shaft 6. On the shaft 6 I mount a pinion 7, which meshes with a spur gear wheel 8, which is secured to a shaft 9, the rotation of which actuates the tuning condenser (not shown).

As clearly seen in Fig. 6, the motor 3 is connected to a suitable source of electric current supply. As shown, it is a battery 10; but this is shown merely for illustrative purposes, as any convenient source of current supply—a battery or a generator—may be employed, using either alternating or direct current. Wires 11 and 12 lead to the contacts of a switch 13, which is preferably of the form shown in my copending application, Serial No. 393,879, a standard cut-out 18 being provided to prevent the indicating arrow or pointer 29 on the scale 15 from going too far in either direction, should the operator inadvertently hold the switch contacts closed for too long a time. This switch 13 is mounted in my control 14.

As shown, the control 14 is portable, and comprises a casing, having a portion of its front wall an inclined plane, for more convenient reading of the kilocycle or wave length scale 15, or a directory of the station call letters, as the case may be. In the control casing 14 is also mounted a switch 16, for turning the set on and off, the wiring diagram for this switch 16 being clearly seen in Fig. 7, in which I have shown a pilot light 17, which is so located as to serve the dual purpose of informing the operator that the current for operating the set has been turned on, and also of illuminating the scale 15.

Upon the other end of the plate 1 is mounted a second electric motor 19, the shaft 20 of which has fixedly secured thereto a worm 21, which meshes with a worm wheel 22, which is carried by a shaft 23 which actuates the volume control rheostat (not shown). An automatic stop 24, of standard construction, similar to the cut-out 18, is conveniently located to prevent the motor 19 from turning the rheostat beyond predetermined points, either up or down.

The left-hand portion of Fig. 6 shows the wiring diagram for the motor 19, and the right-hand portion thereof shows the wiring diagram for the motor 3.

In Fig. 9 I have shown, in diagrammatic form, a mechanical connector 25, which may be used when the control 14 is located in the same room with the set. This may consist of a Bowden wire, or any desired form of flexible mechanical transmission.

In Figs. 10 to 12, I have shown various types of interconnecting the control 14 and the operating mechanism on the plate 1, as I wish it clearly understood that any desired type may be utilized, as preferred.

Although I have shown a portable control 14, it will be apparent, to persons skilled in the art, that it may be mounted in the wall of the room as a wall plate. When used as a portable control, I find it convenient to form the rear wall 26 concave, to rest on the arm of a chair, or on the operator's knee, without danger of falling off. A standard plug 27 is provided, to enable the operator to plug into a suitably located base-board or other socket (not shown). This permits the portable control 14 to be carried from room to room in the house, as desired.

In Figs. 13 and 14 I show my improved switch, which comprises a base plate 31, formed of suitable insulating material. This base 31 has posts 32, 33, 34 and 35, which are rigidly mounted thereon. These posts are provided with clips 36, 37, 38 and 39, of standard construction, to which may be attached the wires of the various circuits.

The switch handle is mounted on the base plate 31, midway between posts 32 and 33, and consists of a post 40, which is tiltable and rotatable, as clearly seen in the drawings, being loosely mounted in an opening 41 in the base plate 31. A coil spring 42 is mounted on the post 40, and bears against a washer 43 which rests on the base plate 31, and a similar washer 44 which engages a shoulder 45 formed on the post 40. The result of this construction is that the spring 42 holds the post 40 normally in a vertical position, while it may be tilted from side to side when desired. A knob 46 is secured to the top of the post 40 for its convenient manipulation. Contact points 47 and 48, of suitable material, are mounted in the sides of the post 40, in position to register and contact with contact points 49 and 50 mounted in screws 51 and 52, which are adjustably mounted in posts 32 and 33, lock nuts being provided to secure the screws 51 and 52 in adjusted position. An arm 53 is mounted in the post 40, and extends outwardly therefrom. This arm 53 has contact points 54 and 55 mounted thereon, which are in register with contact points 56 and 57 mounted in screws 58 and 59, which are mounted in posts 34 and 35. These points are adapted to make contact when the arm 53 is swung to the right or left respectively. The screws 58 and 59 are adjustable in posts 34 and 35, lock nuts 60 and 61 being provided to secure the adjustment when made. The post 40 is connected by an electric conductor to a suitable source of electric current, such as the battery 10, this wire being the third or common wire, so called.

Mounted upon the posts 32 and 33 is a piece of insulator material 62, which is provided with a slot 63 which permits the post 40 to tilt. The ends of the insulation 62 have lateral extensions 64 and 65, to which are secured the ends of coil springs 66. The other ends of these springs 66 are secured to the ends 67 and 68 of a rod which is

mounted in the post 40. These springs 66 serve to hold the arm 53 normally out of contact with the contact points 56 and 57.

In operating the switch, assuming it is desired to close the circuit through post 33, the operator grasps the knob 46 and tilts the post 40 until the contact point 48 contacts point 50 in the screw 52 in post 33, thus closing this circuit. Now, if it is desirable to close the circuit through either post 34 or 35, all that is necessary for the operator to do is to rotate the knob 46 (while still holding the circuit closed through points 48 and 50) until the contact point on the arm 53 contacts either the contact point 56 or 57 as is desired, and the circuit through either post 34 or 35 will be closed, as the case may be.

It will be apparent from the foregoing, that upon releasing the knob 46 the coil springs 66 will automatically return and hold the post 40 in the open position, and all the circuits will be open. It is also plain that the knob 46 can be rotated to close the circuit through either post 34 or 35 without closing either circuit through posts 32 and 33, or that after the circuit through either post 34 or 35 is completed then the post 40 may be tilted either way and a circuit completed through either post 32 or 33.

The operation of my system of remote radio control is as follows:

The operator first closes the switch 16, which turns on the set through a relay 28, and at the same time lights the pilot light 17. As soon as the tubes (not shown) have warmed up, the operation turns the knob 46 of the switch 13 in the direction he wishes the tuning condenser to be moved, either up or down. The movement of the switch 13 in one direction completes the circuit, and the current will rotate the electric motor 3, which will, through the worm and gear drive, rotate the tuning condenser shaft 9, moving it upwardly. Should the operator wish the rotation of the condenser shaft 9 to be in the opposite direction, he moves the switch 13 to close the other contact, when the motor 3 will rotate in the downward direction. Having obtained the desired station, the operator then moves the switch 13 to close one of the contacts leading to the other motor 19. This completes the circuit, and the current will cause the motor 19 to rotate in the direction desired, either to decrease or increase the volume.

It will be obvious that the shaft of either the tuning condenser or the volume control rheostat may be turned for an exceedingly short part of a revolution, as the worm and gear train I employ permits an exceedingly fine regulation of these two important parts of the set, this regulation extending over the entire range of the broadcast band. The operator may, by watching the pointer 29 on the wave length or kilocycle scale 15 on the control 14, select any station and then tune it in perfectly, regardless of the condition of the condensers in the set, or whether the broadcasting station has lowered or raised its wave length.

This minute regulation also permits the operator to successfully tune out any interference from other stations, as a finer adjustment can be obtained than under manual operation.

Although I have shown and described a specific form of apparatus for an embodiment of my invention, I desire it understood that it is not intended to be in any manner a limitation thereupon, as numerous changes in construction may be made without departing from the scope of the invention. The only limitations I place thereon are such as appear in the hereinafter appended claims.

Having described my invention, what I regard as new, and desire to secure by Letters Patent of the United States, is:

1. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of electrically actuated means to operate the tuning condenser, electrically actuated means to operate the volume control rheostat, a control therefor, comprising a switch connected to convey current to the set, and means actuated by a single mechanism to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

2. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of electrically actuated means to operate the tuning condenser in either direction, electrically actuated means to operate the volume control rheostat in either direction, a control therefor, comprising manually operable means to motivate said set and means actuated by a single mechanism to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction, or both may be moved in the same direction.

3. The combination, with a radio receiving set, having a tuning condenser and a volume control rheostat, of electrically actuated means to operate the tuning condenser, electrically actuated means to operate the volume control rheostat, a control therefor, comprising a switch connected to convey current to the set, a single switch operable to any one of a plurality of positions to se-

lectively close the electric circuits to either or to both of said electrically actuated means, and means actuated by said single switch to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

4. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of electrically actuated means to operate the tuning condenser in either direction, electrically actuated means to operate the volume control rheostat in either direction, a control therefor, comprising a switch connected to convey current to the set, a single switch operable to any one of a plurality of positions to selectively close one or two of the electric circuits to said electrically actuated means, and means actuated by said single switch to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

5. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of an electric motor, means to connect said motor to operate the tuning condenser, a second electric motor, means to connect said second motor to operate the volume control rheostat, electric conductors connected to said set and motors and to a suitable source of electric current, a control therefor, comprising a switch connected to close a circuit which conveys current to said set, and means actuated by a single mechanism to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

6. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of an electric motor having a shaft, a worm on said motor shaft, a worm wheel in mesh with said worm, a shaft on which said worm wheel is mounted, a pinion on said shaft, a gear wheel on the tuning condenser shaft which meshes with said pinion, a second electric motor having a shaft, a worm on the shaft of said second motor, a worm wheel on the shaft of the volume control rheostat in mesh with said last named worm, electric conductors connected to said set and motors and to a suitable source of electric current, a control therefor, comprising a switch connected to close a circuit which conveys current to said set, and means actuated by a single mechanism to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

7. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of an electric motor having a shaft, a worm on said motor shaft, a worm wheel in mesh with said worm, a shaft on which said worm wheel is mounted, a pinion on said shaft, a gear wheel on the tuning condenser shaft which meshes with said pinion, a second electric motor having a shaft, a worm on the shaft of said second motor, a worm wheel on the shaft of the volume control rheostat, electric conductors connected to said set and motors and to a suitable source of electric current, a control therefor, comprising a switch connected to close a circuit which conveys current to said set, a single switch operable to any one of a plurality of positions to selectively close the electric circuits to either or to both of said motors, and means actuated by said single switch to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

8. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of an electric motor having a shaft, a worm on said motor shaft, a worm wheel in mesh with said worm, a shaft on which said worm wheel is mounted, a pinion on said shaft, a gear wheel on the tuning condenser shaft which meshes with said pinion, a second electric motor having a shaft, a worm on the shaft of said second motor, a worm wheel on the shaft of the volume control rheostat which meshes with said last named worm, electric conductors connected to said set and motors and to a suitable source of electric current, a control therefor, comprising a switch connected to close a circuit to convey current to said set, a single switch operable to any one of a plurality of positions to selectively close the electric circuits to either or to both of said motors, and means actuated by said single switch to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will

be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

9. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of an electric motor having a shaft, a worm on said motor shaft, a worm wheel in mesh with said worm, a shaft on which said worm wheel is mounted, a pinion on said shaft, a gear wheel on the tuning condenser shaft which meshes with said pinion, a second electric motor having a shaft, a worm on the shaft of said second motor, a worm wheel on the shaft of the volume control rheostat in mesh with said last named worm, electric conductors connected to said set and motors and to a suitable source of electric current, a control therefor, comprising a switch connected to close a circuit to convey current to said set, a signal light in said circuit, and means actuated by a single mechanism to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

10. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of an electric motor having a shaft, a worm on the motor shaft, a worm wheel in mesh with said worm, a shaft on which said worm wheel is mounted, a pinion on said shaft, a gear wheel on the tuning condenser shaft which meshes with said pinion, a second electric motor having a shaft, a worm on the shaft of said second motor, a worm wheel on the shaft of the volume control rheostat in mesh with said last mentioned worm, electric conductors connected to said set and motors and to a suitable source of electric current; a control therefor, comprising a casing having a portion of its top wall inclined, its bottom wall being concave, said casing containing a switch connected to close a circuit to convey current to said set, a single switch operable to any one of a plurality of positions to selectively close the electric circuits to either or to both of said motors, and means actuated by said single switch to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

11. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of electrically actuated means to operate the tuning condenser, electrically actuated means to operate the volume control rheostat, a control therefor, comprising a casing, having a portion of its top wall inclined, a scale in said inclined portion, said casing containing a switch connected to close a circuit to convey current to the set, a signal light in said circuit, arranged to illuminate said scale, and means actuated by a single mechanism to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

12. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of electrically actuated means to operate the tuning condenser, electrically actuated means to operate the volume control rheostat, a control therefor, comprising a switch connected to convey current to the set, a single switch operable to any one of a plurality of positions to selectively close the electric circuits to either or to both of said electrically actuated means, and means actuated by said single switch to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

13. The combination, with a radio receiving set having a tuning condenser and a volume control rheostat, of electrically actuated means to operate the tuning condenser in either direction, electrically actuated means to operate the volume control rheostat in either direction, a control therefor, comprising manually operable means to motivate said set and a single switch operable to any one of a plurality of positions to selectively close either or both circuits to said electrically actuated means, and means actuated by said single switch to close any one or more desired circuits individually or simultaneously, whereby either or both the rheostat control and tuning control will be moved in any desired direction or either one may be moved in any desired direction and the other in the opposite direction or both may be moved in the same direction.

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