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RADIO RECEIVER

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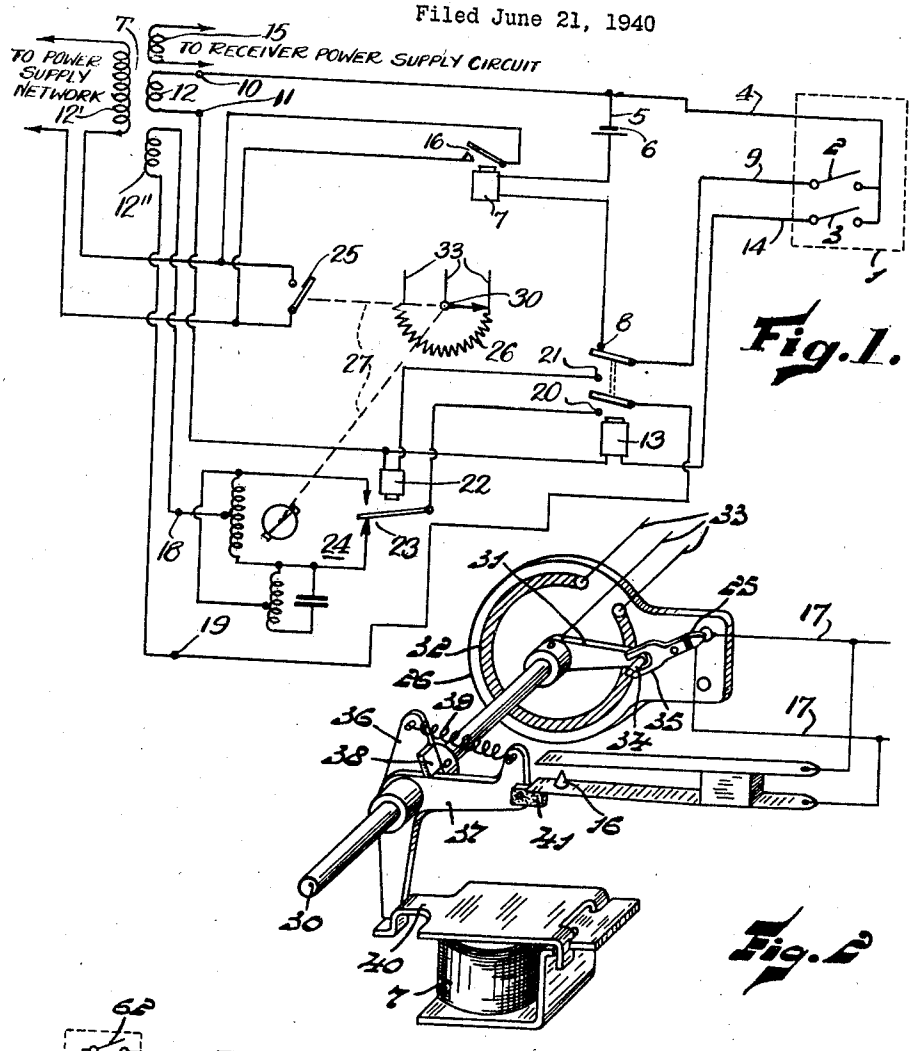


Fig. 1.

Fig. 2

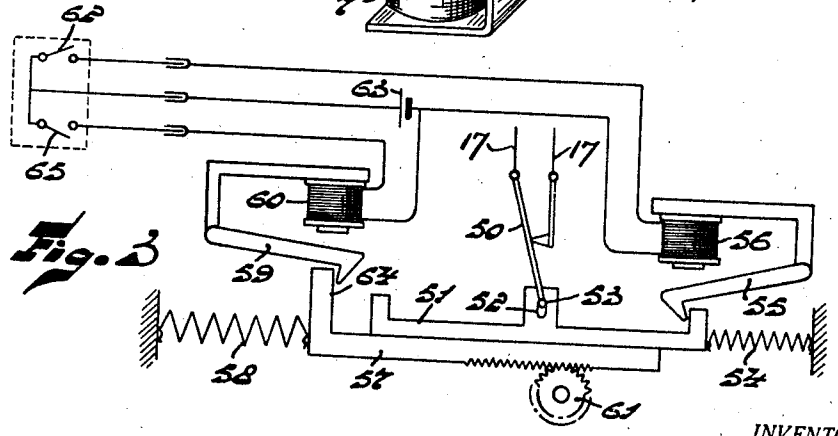


Fig. 3

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RADIO RECEIVER

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10 Claims. (Cl. 250—20)

This invention relates to a radio-receiver with remote switching on and off.

In radio-receivers with remote tuning and with remote control of sound intensity and in radio-receivers comprising a remote additional loudspeaker there is also want of remote switching on and off.

When this switching on and off is effected electrically by means of one or more conductors in the cable which already exists for the remote tuning or for the supply of energy to the remote loudspeaker, the mains switch in the receiver must be operated at a distance since, due to the inadmissibility of high mains voltage in such a cable, the so-called two-point control switch arrangement utilising two strong-current switches with relatively connected changing-over contacts is useless.

For remote operation of the supply switch energy is necessary which may be derived from the strong-current mains when the receiver is in operation.

However, when the receiver is still in the switched off condition the energy required for putting the mains switch into operation must be derived from a local source of supply, for example a dry-battery.

Since by reasons of economical nature only little energy can be extracted from such a source of supply it would only be possible to use a supply switch of light construction in the receiver.

Such a supply switch which is very satisfactory for switching on the receiver, involves difficulty, however, in switching off since the light contacts are burnt soon due to the spark occurring in switching off. The switching off requires a switch of very heavy construction which switches quickly. Consequently, more energy is required therefor than in the former case.

According to the invention the receiver comprises a supply switch which is so constructed that the energy of operation required for switching on is smaller than the energy required to bring the apparatus back in the switched off condition, after it has been switched on.

The supply switch is preferably constituted by two parallel-connected switches which are switched-on after each other and are switched off in the same order, less energy being required for operating the switch which is first switched on or off than for operating the other switch.

It is alternatively possible for the supply switch to be actuated in switching-on by means of the energy accumulated in the receiver during the previous working period.

The invention will be more clearly understood by reference to the accompanying drawing showing, by way of example, a few embodiments thereof.

Fig. 1 shows a diagram of one embodiment of the invention.

Figs. 2 and 3 show mechanical embodiments of the invention.

Fig. 1 shows a diagram of that part of a radio-receiver with remote switching on and off and with remote control of the sound intensity which serves to the said remote operation.

A box 1 for remote control comprises two push-buttons which are not shown in the drawing and two switches 2 and 3. One of the push-buttons operates switch 3 while the other push button operates both switch 3 and switch 2. Closure of switch 3 serves to decrease the volume and to switch off the receiver, while closure of switches 2 and 3 causes the receiver to be switched on and the sound intensity to be increased.

If switches 2 and 3 are closed by pressing the appropriate one of the push-buttons, two circuits are established, viz from the switch 2 through a conductor 4, a conductor 5, a battery 6, a relay 7, an alternating contact 8, back through a conductor 9 to the switch 2 and from the switch 3 through the conductor 4, a low-tension winding 12 of the receiver power supply transformer T, said winding 12 being connected between terminals 10 and 11, a relay 13 back through a conductor 14 to the contact 3.

The winding 12 however cannot supply current to the relay 13 as the receiver power transformer T is not as yet connected to the power supply network. The battery 6, however, supplies current to the relay 7 and thereby energizes relay 7 which in turn closes a spring switch 16 which is included in the mains supply conductor 17 to the receiver power transformer. As soon as the contact 16 is closed, a voltage is produced in the winding 12 as well as between the terminals 18 and 19 of the motor circuit and the secondary winding 15 of the receiver power supply.

The power supply transformer T has a primary winding 12' which is connected to the power supply network. There are three secondary windings 15, 12, and 12'' coupled to the primary 12'. The winding 15 is connected to the receiver power supply circuit, and winding 12'' is connected to the terminals 18—19. The

primary winding 12' includes in its circuit the switch 25. The relay 13 is thus energised, due to which the contact 20 in the motor circuit is closed, the changing-over contact 8 is interrupted and the changing-over contact 21 is closed.

This results in the battery current being interrupted. The spring contact 16 is, however, so constructed that it cannot go open yet in this stage. Further, a circuit is closed from the winding 12 through a relay 22, the changing-over contact 21, the conductor 9, the contact 2, back through the conductor 4 to the winding 12.

The relay 22 is thus energised and operates thereby the changing-over contact 23 by means of which a motor 24 serving for operating a switch 25 and a potentiometer 26 provided for volume control, can rotate to the left or to the right. The reversible motor 24 is switched on and operates in one direction causing closure of switch 25 which is connected in parallel with the contact 16. The potentiometer 26 serving for volume control, which, as is indicated by the dotted lines 27, is mechanically coupled to motor 24 and the switch 25, is then rotated in the direction of greater sound intensity. Contact 16 is arranged so that it is not opened until switch 25 is switched on by the motor. When the contacts 2 and 3 are interrupted as by releasing the depressed push button, the motor circuit is opened through opening of switch 21 and the motor is stopped.

If, then, only the contact 3 is closed, only the relay 13 is energised with the result that the motor 24 rotates in the opposite direction and the sound intensity decreases.

Finally, the motor switches off the switch 25, due to which the receiver is switched off since the spring contact 16 was already open.

The switching-on is consequently effected with the aid of the spring contact 16, for the operation of which only little energy is required, the switching off being effected by the switch 25. This switch can be so constructed that the contacts are not burnt by the spark occurring on switching off.

By reference to Fig. 2, the mechanical construction of the switch 25, the spring contact 16 and the relay 7 will be more clearly explained.

In Fig. 2, 30 denotes the shaft by means of which are driven the supply switch 25 and the potentiometer 26 and which can be rotated to the left or to the right by the motor which is not shown in Figure 2.

The shaft 30 has mounted on it an arm 31 which travels over a resistance track 32 when the shaft 30 is rotated.

The ends of this resistance track 32 and the arm 31 are connected through three conductors 33 to the low-frequency amplifier of the receiver.

The volume control of the receiver is effected by rotating the shaft 30. When the volume is decreased by rotating the shaft 30 in the counter-clockwise direction, near the end of the movement of arm 31, a pin 34 fixed on the arm 31 fits into a fork 35, and the continued movement of 31 operates the switch 25 which is shown simplified in the drawing and switches off the receiver. If further, the shaft 30 is rotated in the opposite direction, at first the switch 25 is operated to the "on" position as shown and then volume is increased.

A lever 36 is tightly fixed and a two-armed lever 37 is loosely fixed so as to be rotatable on the shaft 30. The lever 37 bears against a stop 38 provided on the lever 36 and is resiliently held against this stop by means of a retracting spring 39 provided between the levers 36 and 37.

In the position shown, in which the switch 25 is about to be switched off, the vertical arm of the lever 37 bears against the armature 40 of a relay 7, a piece of insulating material 41 fastened on the horizontal arm bearing against a spring contact 16 which is connected in parallel with the switch 25. In this position the spring contact 16 is still open.

When the shaft 30 is rotated from the position shown in the counter-clockwise direction, the switch 25 is switched off and stop 38 is drawn away from lever 37, however, armature 40 prevents lever 37 from following stop 38 despite the pull of spring 39 so that switch 16 remains open.

Assuming now that relay 7 is energized from a distance, if desired, the armature 40 is attracted thereby releasing the lever 37. The lever 37 rotates under the action of the spring 39 round the shaft 30 and thereby closes the spring contact 16, thus switching on the receiver.

As is explained by reference to Fig. 1, the motor then starts rotating and drives the shaft 30 in the clockwise direction.

In this case at first the switch 25 which is in parallel with the spring contact 16 is closed and then the potentiometer 26 is rotated in the direction of greater sound intensity. On rotating the shaft 30 clockwise the spring contact 16, after the switch 25 has been closed, is opened and the armature 40 is caused to lie again in the track of the arm 37. The receiver is now in the switched-on condition. To switch off the receiver again, the motor rotates the shaft 30 counter-clockwise until the switch 25 is opened, due to which the motor is stopped.

As has been described, the switching on is consequently effected by the spring contact 16 requiring little energy, the switch 25 providing the switching-off of the receiver. This switch consequently has to endure the spark occurring on switching off and consequently requires, due to its heavier construction, a greater energy of operation than the spring contact 16. Since the switch 25 is operated by the motor, this does not involve difficulty, however.

Fig. 3 represents diagrammatically another embodiment of the invention.

In this embodiment there exists, for switching the receiver on and off only one switch 50 comprising sufficiently heavy contacts to avoid burning on switching-off.

The switch 50 is mechanically coupled to a member 51 which can slide to and fro and opens or closes in this case the switch 50.

The mechanical coupling between the switch 50 and the member 51 is schematically indicated by a slot 52 provided in the member 51 in which can slide an insulated pin 53 fixed to the switch 50. Between the member 51 and the chassis of the receiver is provided a compression spring 54 which presses the element 51 to the left. The spring 54, is, however, maintained stressed by a pawl 55 which can be drawn away by a relay 56.

The member 51 is slidable along a body 57 which itself is also slidably arranged and is pressed to the right with the aid of a compression spring 58 which is provided between this body and the chassis of the receiver and which is stronger than the spring 54. The spring 58 is also maintained stressed by a pawl 59 which can be drawn away by a relay 60. The body 57 com-

prises a gearing into which fits a toothed wheel **61**. This toothed wheel can be driven by a motor which is not shown in the drawing, the body **57** in this case sliding to the left and the spring **58** being stressed.

In the position shown the switch **50** is closed and the receiver is switched on.

When in the box for remote control a push-button contact **62** is closed the relay **56** is energised by current originating from a battery **63**. The pawl **55** is drawn away and the spring **54** relaxes, thus opening the switch **50**. In this case the body **51** slides to the left till it engages the vertical part **64** of the body **57**.

If, further, in the box for remote control a push-button contact **65** is closed, the relay **60** is energised by a current originating from the battery **63**. The pawl **59** is drawn away and the spring **58** relaxes. The two bodies **51** and **57** together slide to the right and the spring **54** is stressed by the spring **58**. Sliding the body **51** to the right has the effect of the switch **50** being closed and the receiver being switched on. The spring **54** is maintained stressed by the pawl **55** and the spring **58** can be stressed again with the aid of energy derived from the strong-current mains. This can be effected in the described way by means of the gear wheel **61** driven by a motor. To this end, use may be made, for example, of the motor existing already for remote volume-control.

What we claim is:

1. In signalling apparatus, a source of operating current for said apparatus, a combined volume control and on and off switch of the type which, in the vicinity of its minimum volume position, acts to operate the switch to its on position when the volume control is operated in a direction to increase volume and to its off position when the volume control is operated in a direction to decrease volume, a reversible driving means for operating the volume control in either direction, an auxiliary source of current, a relay, operable means including the relay and said auxiliary source of current acting upon operation to connect the motor to said first named source of operating current in a sense to operate the volume control in a volume increasing direction to thereby operate the on and off switch to the on position, and means associated with the motor and effective after said on and off switch is operated to the on position for rendering said relay inoperative.

2. In electrical apparatus of the type which derives its operating current from a power supply network and is connected to the network through an operable on and off switch, an electric motor for operating said switch, an auxiliary source of current, a first relay, a first operable switch for connecting said relay across the auxiliary source to thereby energize the relay, a second relay, operable switching means acting upon energization of said first relay for connecting said second relay to the power supply network to thereby energize said second relay, and switching means acting upon energization of said second relay to connect the motor to the power supply network to energize the motor and cause it to operate said on and off switch.

3. In signalling apparatus of the type which derives its operating current from an electric light and power supply network and is connected thereto through an on and off switching device, electric driving means for operating said on and off switching device, means including a relay device acting when energized to connect said electric driving means to the power supply network to thereby energize said electric driving means and operate the same so as to cause connection of said signalling apparatus to the power supply network, an auxiliary source of current for operating said relay device, switching means for connecting said relay device across said auxiliary source of current to thereby energize said relay device, and additional switching means acting upon operation to cause said electric driving means to operate the on and off switching device so as to disconnect the signalling apparatus from the power supply network.

4. In the arrangement described in the next preceding claim, means acting independently of said second named means and effective after the connection of said signalling apparatus to the power supply network for disconnecting the relay device from said auxiliary source whereby the relay device is de-energized.

5. In signalling apparatus of the type which derives its operating current from an electric light and power supply network, an auxiliary on and off switch and a main on and off switch, said two switches being connected in parallel, a relay device acting when energized to close said auxiliary on and off switch to thereby connect the receiver to the power supply network, reversible electric driving means for said main on and off switch, an auxiliary source of current, operable switching means acting upon operation to connect said relay device across said auxiliary source whereby said relay device is energized, means acting upon closure of said auxiliary on and off switch for connecting both said receiver and said reversible driving means to said power supply network and to effect the operation of said electric driving means in a direction to cause closure of the main on and off switch, means rendered active by the operation of said motor means and after closure of the main on and off switch for disconnecting the relay device from said auxiliary source of current thereby de-energizing the relay device whereby the auxiliary on and off switch is opened, and additional switching means acting upon operation to effect the operation of said electric driving means in the opposite direction and thereby open said main on and off switch whereby both said electric driving means and receiver are disconnected from the power supply network.

6. In signalling apparatus of the type which derives its operating current from an electric light and power supply network, said apparatus including a combined volume control and an on and off switch of the type which, in the vicinity of its minimum volume position, acts to operate the on and off switch to its on position when the volume control is operated in a direction to increase volume and to its off position when the volume control is operated in a direction to decrease volume, a reversible electric motor for operating said volume control in either direction, an auxiliary on and off switch acting upon closure to connect the receiver to said network and to connect the motor to the network in a sense to cause operation of the volume control in a direction to increase volume, a relay device acting upon operation to effect the closure of said auxiliary on and off switch, an auxiliary source of current for energizing said relay, and operable means acting upon operation only when said first named on and off switch is in the off position for connecting said relay device across said source

whereby said relay device is energized thereby causing connection of both said apparatus and motor to said network, said operable means acting upon operation when said first named on and off switch is in the off position to connect only said motor to the network in such a way to cause operation of the volume control in a volume increasing direction.

7. In the arrangement described in the next preceding claim, a second operable means acting upon operation to connect the motor to said network in a sense to operate the volume control in a volume decreasing direction.

8. In electric power consuming apparatus of the type which derives its operating current from a power supply network and is connected to the network through an operable on and off switch, an electric motor for operating said switch, an auxiliary source of current, a first relay, a first operable switch for connecting said relay to said auxiliary source to thereby energize the relay, a second relay, operable switching means acting upon energization of said first relay for connecting said second relay to the power supply network to thereby energize said second relay, and switching means acting upon energization of said second relay to disconnect said first relay from said auxiliary source of current and connect said motor to the power supply network to energize the motor.

9. In electrical power consuming apparatus of the type which derives its operating current from a power supply network and is connected to said network through an operable on and off switch, a reversible electric motor for operating said switch, said motor being operable in one direction to operate said switch to the "on" position and in the other direction to operate said switch to the "off" position, a first normally open switch, an auxiliary source of current, a first relay, means acting upon closure of said first switch for connecting said relay across the source to thereby energize the relay, a second normally open switch and a second relay in series, a third normally open switch connected in parallel with the "on" and "off" switch and adapted to be closed by energization of said first relay, said second and third switches acting jointly upon operation thereof to their respective closed positions to connect the second relay across the power supply network to thereby energize the second relay, and switching means acting upon energization of the second relay and only when both said first and second switches are in their respective closed positions to connect the motor to the power supply network and cause the operation of the motor in the direction to operate the "on" and "off" switch to its "on" position, additional switching means acting upon energization of said second relay to disconnect the first relay from the auxiliary source of current irrespective of the position of the first switch, to thereby effect the de-energization of said first relay, means for preventing said second switch from assuming its open position despite de-energization of the first relay until after the "on" and "off" switch is operated to its "on" position, and means acting upon closure of said second switch while the first switch is in its open position and only when said "on" and "off" switch is in its "on" position to connect the motor to the power supply network and cause its operation in the direction to operate the "on" and "off" switch to its "off" position.

10. In signalling apparatus of the type which derives its operating current from a power supply network and is connected to said network through a combination volume control and "on" and "off" switch instrumentality, a reversible electric motor for operating said instrumentality, said motor being operable in one direction to turn the switch "on" and increase the volume, and in the other direction to turn the switch "off" and decrease the volume, a first manually operated, normally open switch, an auxiliary source of current, a first relay, means acting upon closure of said first relay for connecting said relay across the source to thereby energize the relay, a second manually operated normally open switch and a second relay in series, a third normally open switch connected in parallel with the "on" and "off" switch and adapted to be closed by energization of said first relay, said second and third switches acting jointly upon operation thereof to their respective closed positions to connect the second relay across the power supply network to thereby energize the second relay, and switching means acting upon energization of the second relay and only when both said first and second switches are in their respective closed positions to connect the motor to the power supply network and cause the operation of the motor in said first named direction, additional switching means acting upon energization of said second relay to disconnect the first relay from the auxiliary source of current irrespective of the position of said first switch to thereby effect the de-energization of said first relay, means for preventing said second switch from assuming its open position despite de-energization of the first relay until after the "on" and "off" switch is operated to its "on" position, and means acting upon closure of said second switch while the first switch is in its open position and only when said "on" and "off" switch is in its "on" position to connect the motor to the power supply network and cause its operation in the other direction.

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