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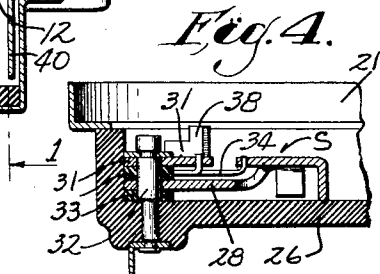
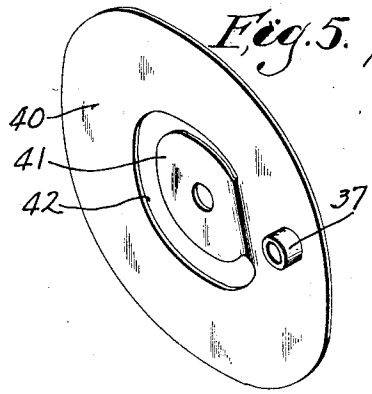
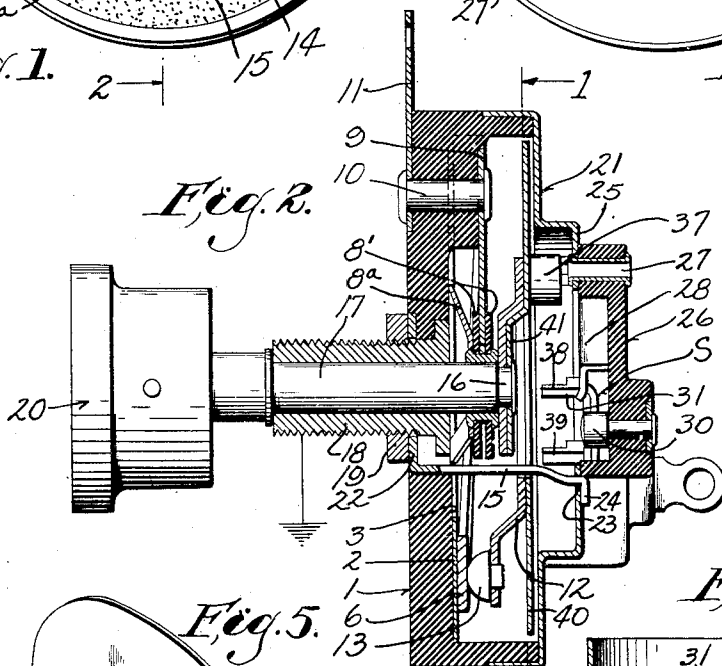
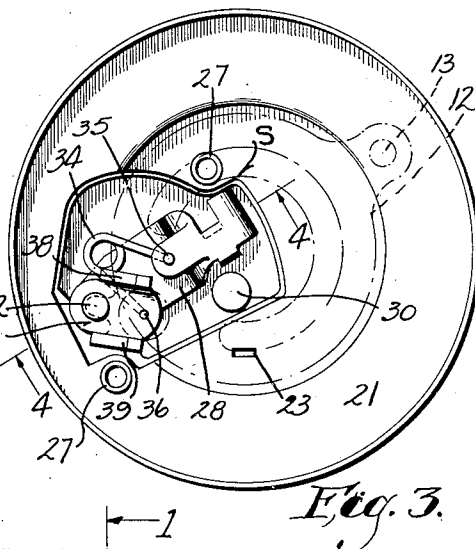
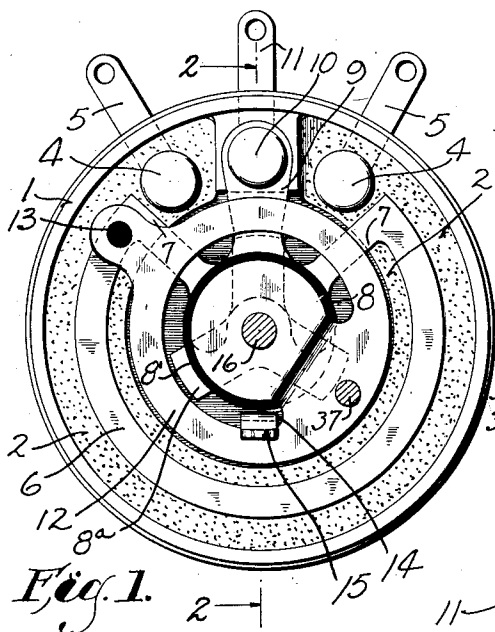
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2,255,132

COMBINED VARIABLE RESISTANCE AND SWITCH

Filed Dec. 6, 1935

3 Sheets-Sheet 1



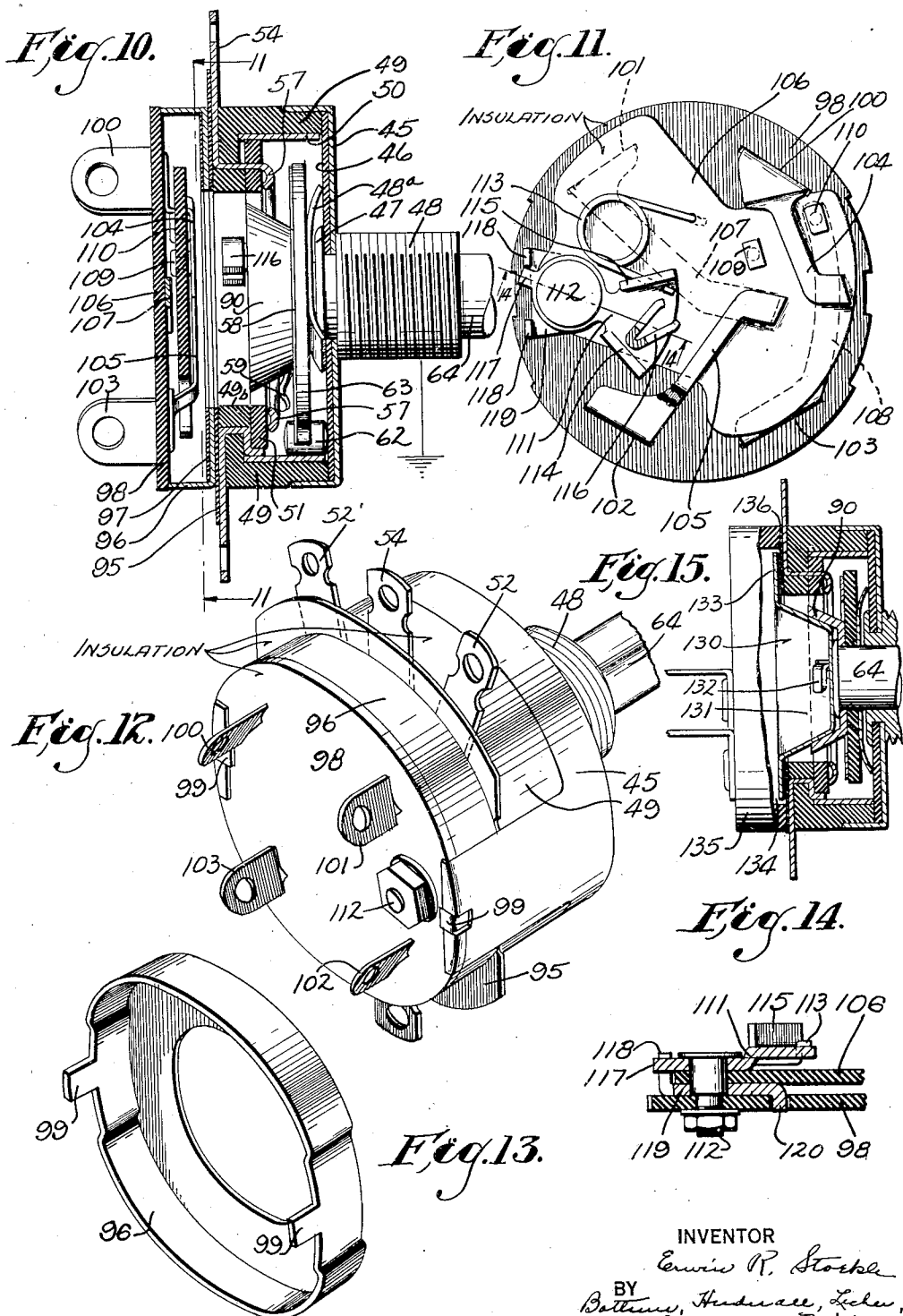
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COMBINED VARIABLE RESISTANCE AND SWITCH

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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,255,132

COMBINED VARIABLE RESISTANCE AND SWITCH

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 meane assignments, to Globe-Union Inc., Mil-
 waukee, Wis., a corporation of Delaware

Application December 6, 1935, Serial No. 53,139

10 Claims. (Cl. 261—48)

This invention relates to a control device, such as a combined variable resistance and power supply switch, which may, for example, be employed in connection with radio receivers or similar electrical sound reproduction apparatus.

The present application is a continuation in part of my application for "Combined variable resistance and switch for use with radio receivers," filed April 2, 1932, Serial No. 602,855, which last named application is in turn a continuation in part of my application for "Combined variable resistance and switch for radio receivers," filed April 23, 1931, Serial No. 532,133.

Since the adoption of alternating current energy supply and the development of increasing sensitivity in radio receivers in recent years, the necessity has arisen for carefully shielding, from the varying currents or potentials which supply the energy to the receiver, all parts of the receiver which carry the signal current to be amplified into the final output of the loud speaker.

The present invention is concerned, among other things, with the provision of a simple, practical and effective shield between the supply switch and the variable resistance employed to control volume and often associated with the input grid of the amplifier tubes. Such a switch and resistance are commonly disposed in closely adjacent relation and are frequently interlocked so that when the volume control is turned up the switch will be automatically closed whereas when the volume control is turned all the way down the switch is thrown to open position. These conditions, coupled with the fact that the new types of vacuum tubes have a much greater amplification than those previously used and consequently render the receivers much more highly sensitive, makes it desirable to provide some simple and effective means for electrostatically and electromagnetically shielding the variable resistance of a volume control from the power supply switch.

One of the principal objects of the present invention is to provide for such a shield and to so constitute and combine the structure that the shielding is had while furthering compactness and simplicity of construction and general operating efficiency.

Another object is to provide for complete shielding, both electrostatic and electromagnetic, irrespective of the number of terminals employed in and associated with the resistance and switch and even though a relatively large num-

ber of live parts may be juxtaposed to the variable resistance or vice versa.

Another object is to provide for the shielding in all positions of the parts.

A further object is to provide an improved type of adjustable resistance and one which is so compactly organized that it may be conveniently used in crowded quarters.

A still further object is to provide an improved and simplified means for holding the resistor and terminals of the variable resistance in place; and to improve the adjustable contact thereof and the manner of mounting, biasing and adjusting the same as well as the means employed for conveying current thereto.

Other objects and advantages reside in certain novel features of the construction, arrangement and combination of parts which will be hereinafter more fully described and particularly pointed out in the appended claims, reference being had to the accompanying drawings, forming a part of this specification, and in which:

Figure 1 is a view in section taken on line 1—1 of Figure 2, illustrating one embodiment of the invention, and parts being shown in elevation for the sake of illustration;

Figure 2 is a view in transverse vertical section taken on line 2—2 of Figure 1;

Figure 3 is a view in elevation showing a cover and switch, the cover being removed from the housing of the adjustable resistance;

Figure 4 is a fragmentary sectional view taken on line 4—4 of Figure 3;

Figure 5 is a perspective view of the large shielding disc;

Figure 6 is a view in longitudinal cross section taken on line 6—6 of Figure 7 and showing another embodiment of the invention;

Figure 6* is a detail view taken on line a—a of Figure 8;

Figure 7 is a view in transverse section taken on line 7—7 of Figure 6;

Figure 8 is a view in elevation looking toward the left in Figure 6, but showing the device as it appears with the metal housing cup and parts of the variable resistance carried thereby removed;

Figure 9 is a group view in perspective illustrating the resistor, its split clamping ring and the tapered terminal and ring employed for maintaining the parts assembled;

Figure 10 is a view similar to Figure 6 but showing still another embodiment of the invention;

Figure 11 is a view taken on line 11—11 of Figure 10;

Figure 12 is a perspective view of the switch shown in Figures 10 and 11;

Figure 13 is a detail perspective view illustrating the additional shield employed in this form of the invention;

Figure 14 is a detail sectional view taken on line 14-14 of Figure 11; and

Figure 15 is a fragmentary view similar to Figure 10 but showing another modified form of the invention.

Referring to the drawings, and more particularly to Figures 1 to 5, it will be seen that the invention, in one embodiment, comprises a housing 1 which may be molded of suitable material such as Bakelite or hard rubber. A resistor 2 is provided and consists of a flexible backing strip usually of insulating material to one face of which a resistive coating of graphite or the like is applied. The resistor 2 is held flatly against the end wall 3 of the housing by means of rivets 4 which also electrically connect the ends of the resistor 2 with terminals 5. An arcuate contact strip 6 overlies the resistor 2 and has an angular extent of approximately three-quarters of a circle. The spaced ends of the arcuate strip 6 have integral therewith inwardly extending radial arms 7 which merge into a central yoke-like hub 8. A third outwardly extending intermediate arm 9 is also integral with the hub 8 and at its outer end is secured to the housing and electrically connected to a third terminal 11 by means of a rivet 10. The yoked hub 8 straddles an operating shaft 17 but is electrically insulated therefrom by means of insulating washers 8'. A metallic spring washer 8^a coacts with insulating washer 8' to maintain the yoked hub 8 properly positioned axially of shaft 17. The contact strip 6 is thus so mounted that the inherent resiliency of the metal of which it is composed tends to maintain it out of contact with the resistor. However, any portion of the strip may be pressed into contact with the resistor by rotating a metallic disc-like structure 12 which carries a pressure pad or button 13, the latter bearing against the strip 6, and serving to displace the portion of the strip 6 against which it bears into engagement with the resistor 2. The disc 12 may be slotted as at 14 to accommodate a stop 15 which limits the movement of the disc in either direction. The center of the disc 12 is apertured and suitably fastened as well as electrically connected to the reduced end 16 of the rotatable operating shaft 17. The shaft 17 is supported for rotation in a bushing 18 which has a flanged end fastened to the wall 3 of the housing by means of a nut 19. This bushing may be employed to support the unit on the mounting panel or chassis of the receiver in the ordinary way. A suitable operating knob 20 may be pinned or otherwise secured to the other end of the shaft 17.

In the construction as thus far described rotation of the knob 20 and consequent rotation of its shaft 17 and the disc 12 will vary the point at which the arcuate strip 6 engages the resistor and hence vary the value of the resistance in the circuit. It will be understood that current will flow from either terminal 5 through the portion of the resistor included in the circuit and from the resistor through strip 6, arms 7 and 9 and rivet 10 to the terminal 11.

A metallic cap or cover 21 is provided for the open end of the housing and may be appropriately secured in place. As shown in the drawings, 75

the stop 15 may be utilized for this purpose. At one end the stop 15 may be provided with an apertured angular extension 22 which may be clamped against the housing 1 by the nut 19. The other end of the stop 15 may be extended through a slot 23 provided in the cap 21 and then bent over as at 24 to hold the cap assembled with the housing.

The cap 21 may have an offset portion 25 apertured to accommodate an insulating casing or panel 26 for a switch designated generally at S, the switch casing 26 being suitably riveted as at 27 to the cap or cover. The switch is shown as a snap action toggle type switch, and comprises a movable contact 28 constituting an arm of a toggle and selectively engageable with and disengageable from a fixed contact 30. The movable contact 28 and fixed contact 30 are electrically connected with suitable terminals provided on the exterior of the insulating casing 26. The other member of the toggle is designated at 31 and may be of molded insulating material. Both toggle members 28 and 31 are mounted on a common pivot 32 although axially spaced along the pivot by insulating washers 33. A spring 34 is provided and has one end pivotally connected with the arms 28 as indicated at 35 and its other end pivotally connected with the arm 31 as indicated at 36. The spring is so tensioned and so interconnected with the arms of the toggle that its biasing action automatically changes or reverses as the toggle member 31 is swung to one side or the other, or, in other words, as the pivotal connection 36 is swung to one side or the other of a line extending through pivot axis 32 and the other pivotal spring connection 35. As illustrated, the toggle member 31 is of U-shaped cross section and is positioned so that a roller-like projection 37 constrained to rotate with the shaft 17 will, in certain adjustments of the resistance, wipe between the side flanges 38 and 39 of the toggle member 31, thereby swinging the toggle member to one side or the other depending upon the direction in which the projection 37 is moved and consequently effecting opening or closing of the switch. The parts are so arranged that when the volume control is turned up a little the switch is turned to closed position, whereas when it is turned down as far as it may be the switch will be moved to open position.

The present invention proposes to provide an effective shield between the switch S and the adjustable resistance in all positions of these parts. To some extent, shielding is had by virtue of the presence of the metallic disc-like structure 12, which, being connected to the shaft 17, is thereby grounded. It has been common practice for many years to mount bushings such as 18 on the chassis of the receiver which is connected to ground. As a consequence, in an arrangement such as described, the rotatable metallic disc or broad spring shoe 12 is at ground potential and being interposed to a large extent between the live parts of the switch and the variable resistance operates as an electrostatic and electromagnetic shield. However, there are some of the live parts of the switch not thoroughly shielded from the resistance by the part 12, as will be understood by a consideration of the outline of the disc 12 shown in dotted lines in Figure 3. In order to provide for complete shielding a larger shielding disc 40 of metal is provided and has its apertured central portion 41 fitted over the reduced inner end 16 of the shaft 17 and secured thereto by the head upset or formed at the shaft end and which

also secures disc 12 to the shaft. The disc 40 is provided with a circumferentially extending slot 42 to accommodate the stop 15 and may also be used to carry the projection 37. The shield 40 turns with the shaft and is effective in all positions to electrostatically and electromagnetically shield the resistance from the switch. It performs this function without increasing to any appreciable extent the overall dimensions of the device and without requiring special ground connections.

In the embodiment of the invention shown in Figures 6 to 9, inclusive, the variable resistance is contained in the housing, designated generally at H, made up in part of a shallow metal cup 45, to the inner face of the body of which a flat disc 46 of insulating material is secured. The insulating disc 46 may be secured in place by the upset inner end 47 of a mounting bushing 48 which is in this way also connected to the apertured central portion of the body of the cup 45. The housing for the resistance also includes an annular body member 49 of insulating material, a portion of which telescopes into the metal cup 45. A resistor 50 is provided and may comprise a flexible strip having a resistive coating applied to its inner surface. The strip 50 is positioned against the inner wall of the annular housing member 49 and is secured in position by means of a split expansible clamping ring 51 which may be made of fiber or other insulating material of appropriate elasticity or resiliency and which has one of its side faces positioned against the inner side of an interned annular flange 49^b integral with one end of the body member 49.

A fiber key 50' is tightly driven into a key-way provided therefor in the housing member 49 and engages between the ends of the resistor 50 and also between the ends of the split clamping ring 51 to locate these parts properly in the housing 49.

Terminals 52 and 52' are electrically connected with the ends of the resistor 50 and project exteriorly of the resistance housing H. The terminals 52 and 52' are of identical construction and, as shown in Figure 6^a, each has an angular portion 52^a accommodated in an opening 49^a provided in flange 49^b and also in a groove 49^c formed in the inner side face of said flange 49^b, the annular portion 52^a of each of the terminals having an appropriately shaped extremity 52^b snugly engaging the adjacent portion of the resistor 50.

The outer periphery of the ring 51 adjacent the split is notched as at 51^a to accommodate the inner extremities 52^a of the terminals 52 and 52' so that the ring 51, when expanded, not only holds the resistor 50 but also the terminals 52 and 52' in place. Suitable means is provided for expanding the ring 51 so that its periphery clamps the resistor 50 against the inner wall of the annular housing member 49 and the terminals 52 and 52' against the resistor. In the present instances, it is proposed to utilize a third terminal 54 for this purpose and, to adapt the terminal to perform this function, it is tapered, as clearly shown in Figure 9. In the assembly, the tapered portion of the terminal 54 engages in notches 55' and 55 formed in the end 55 of the ring and a shoulder 56 presented by a wall of the notch on the inner periphery of the other end of the ring. Thus, the tapered terminal 54, by forcing the ends of the split ring away from each other at the split, brings about the desired expansion and clamping of the resistor and the other two terminals. The

terminal 54 may be formed integral with a conducting ring 57 which is disposed against the inner side face of the split ring 51.

The movable contact of the variable resistance is designated at 62 and is in the form of a roller or short cylinder having rounded ends, the periphery of the roller contact bearing directly against the resistive coating of the resistor 50. The contact 62 is urged into engagement with the resistor 50 by means of a spring ring 58 which also serves a current collecting and conveying ring.

The ring 58 is of special construction in that it is stamped or cut out of a flat sheet of metal to the outline shown and hence the resilient or spring action of all such rings 58 on their movable contacts 62 is uniform. Uniformity of action in this particular is of special importance in variable resistances of this character. As shown in the drawings, the ring 58 is in the form of a split circular strip and has one end deflected laterally from the plane of the strip to provide a collecting shoe 59 which wipes against the conducting ring 57 and insures passage of electric current from the conducting ring 57 to the movable contact 62 in all adjustments of the resistance. The opposite end of the ring 58 is enlarged as at 60 and notched as at 61, the notch 61 receiving or straddling a portion of the contact 62 so that the tension or spring of the ring 58 is properly applied to the contact 62 whereby the contact 62 is urged with proper pressure against the resistor 50.

The ring 58, except for its collecting shoe portion 59, is disposed flatly against one face of a carrier disc 63 of insulating material and is connected to the disc to rotate therewith by means of a tongue 65 integral with an intermediate portion of the ring and extended through a slot 66 in the disc and then clenched or bent into firm engagement with the back of the disc. The disc 63 generally is of circular form except that one portion of its periphery is slightly enlarged and provided with a notch 67 which also receives a portion of the roller contact 62, the arrangement being such that the walls of the notch 67 of the carrier disc 63 perform the function of transmitting angular movement or adjustment to the movable contact 62 and ordinarily leaves to the spring strip or ring 58 merely the duty of applying the requisite outward pressure to the contact 62 and of conveying current thereto from the terminal 54 and conducting ring 57.

The disc 63 has a non-circular opening in its center which is snugly fitted on a correspondingly formed inner end portion 64' of an operating shaft 64 supported for rotative movement in the bushing 48 and constrained against any axial movement by the provision of a shoulder 64^a on the shaft engaging one end of the bushing 48 and by the assembly held on the inner end of the shaft by its upset end 64^b. This assembly includes the carrier disc 63, just described, an appropriate spring washer 48^a and a conical cup-shaped shield 90, which will be hereinafter more fully described.

With the construction as thus far described, current flows through terminal 54 and conducting ring 57 to the shoe 59 at one end of the ring 57 and thence through the ring 57 to the roller contact 62. From the roller contact 62 the current flows through the resistor 50 to the terminals 52 and 52'. The amount of resistance incorporated in the circuit depends upon the angular position of the contact 62 with respect to

the resistor 50 and this, of course, may be conveniently adjusted by turning the shaft 64.

Associated with the adjustable resistance is a power supply switch designated generally at 70 and made up of a shallow cup-like housing 71 of insulating material, the open end of which abuts the outer end of the annular insulating housing 49. Metallic legs 72 which may be integral with the annular portion of the metallic cup-like housing 45 may be extended through slots 72' provided therefor and extending along the switch housing 71 and bent therearound as at 73 to secure the parts assembled. The switch 70 has terminals 74 and 75 fastened to the housing 71 by rivets 76 and 77. The inner head of the rivet 77 is rounded off as at 78 to provide one contact of the switch. The rivet 76 secures in position the other contact 79 of the switch which is in the form of a spring and has a portion 80 offset or spaced from as well as opposed to the contact 78. These contacts 78 and 79 may be electrically connected by a bridging contact 81 in the form of a double headed rivet which is carried by a piece of insulating material 82 constituting one arm of a toggle. The toggle arm 82 is pivotally mounted on a pivot pin 83 supported by the switch housing 71 and serving also as the pivotal axis of a second toggle arm 84 which is shorter than the arm 82 and overlies the same. A spring 85 is provided and has its intermediate portions coiled and its ends interconnected with the arms 82 and 84, the spring being so related to the arms that it is effective to bias the arm 82 and consequently its bridging contact 81 either to switch opening or switch closing position depending upon the adjustment of arm 84. The arm 84 is provided with spaced flanges 86 and 87 which project toward the adjustable resistance and which are adapted to be engaged by an operating projection 88 rotatable with a movable portion of the resistance so that as the resistance is turned up the switch will be thrown to "on" position and yet when the resistance is turned down as far as it may be the switch is turned to its "off" position, all in a manner very similar to that described more at length in connection with the previous embodiment of the invention.

In the present construction the projection 88 is shown as being integral with the metallic cup-like shield 90 which is securely fastened to the operating shaft 64 and which effectively interposes an electrostatic and electromagnetic shield between the switch and the adjustable resistance.

The shielding cap is at ground potential, this being effected in the construction shown by virtue of its direct connection to the metal shaft 64 which is in turn grounded through the bushing 48 on the chassis of the receiver. By so combining the shield 90 with the shaft 64 and so interposing it between the resistance and switch, it is effective at all times and in all adjustments and yet the device is very compact and the resistance and switch operatively interlocked.

In the form of the invention shown in Figures 10 to 13, inclusive, the adjustable resistance of the device is substantially the same as that shown in Figures 6 to 9, inclusive, and the parts thereof are correspondingly numbered, and the foregoing description applies thereto. In Figures 10 to 13 a different type of switch is shown and is such as to necessitate additional shielding over that afforded by the shielding cup 90. In general, the switch arrangement provided in Figures 10 to 13 is such that there is available a

double pole single throw, a single pole double throw, or a so-called four-point switch. Other switch combinations may be had with suitable variations in the switch structure. The present invention, however, is concerned primarily with shielding the resistance in a combination of this sort where the switch arrangement is such as to involve quite a multiplicity of terminals and consequently a more or less aggravated shielding problem.

In the construction shown in Figures 10 and 13, a washer 95 of insulating material is interposed between the outer open end of the housing 49 and the terminals of the adjustable resistance carried thereby and a shallow metallic cup-like member 96. The switch associated with the resistance is carried by but electrically insulated from this cup-like member 96 which serves both as a carrier and as a shield. To the inner surface of the body of the member 96 an insulating washer 97 is applied. A circular switch panel 98 of insulating material is held against the outer end of the member 96 by means of bent-over extensions 99 of the metallic cup-like member 45. The switch is provided with terminals 100, 101, 102 and 103, all mounted on the insulating panel 98. The terminals 100 and 102 are connected to spring contacts 104 and 105 which are offset inwardly from the inner face of the panel 98 and overlying a toggle plate 106 of insulating material. The terminals 101 and 103 are integral with the contact strips 107 and 108 which underlie the insulating toggle plate 106. In one position of the toggle plate, strip 107 is electrically connected to strip 105 and strip 108 is electrically connected to strip 104 by means of bridging contacts 109 and 110, carried by and extending through the toggle plate 106. In Figure 11 these contacts 109 and 110 are shown in the open position of the switch but when the toggle plate is swung in a clockwise direction as viewed in Figure 11 to the closed position of the switch, the contact 110 has its underside still riding on the strip 103 and has its upper surface engaged with the contact 104. Similarly, at such time the contact 109 is engaged with the strips 107 and 105 and electrically connects them.

The toggle includes a second arm 111 supported for pivotal movement on the same pivot pin 112 that serves as the axis of rotation of the toggle plate 106. A toggle spring 113 interconnects the toggle arm 111 and biases the switch to open or closed position depending upon the position to which the arm 111 is swung. This arm 111 has flanges 114 and 115 cooperable with a projection 116 integrally formed with the shielding cup 90 and functioning to interlock the resistance and the switch as in the other embodiments of the invention.

A stop finger 117 may be formed on the toggle arm 111 and is cooperable with fixed stop lugs 118 provided on a stop plate 119 to limit the movement of the toggle arm 111 in either direction. The stop plate 119 is also mounted on the pivot pin 112 but has a key 120 interlocked with an opening in the switch panel 98 to maintain it in position in the assembly.

With this arrangement, even though we have a multiplicity of contacts and terminals on the switch and a large number of terminals on the resistance, effective shielding is had without detracting from the compactness of the structure nor its operative efficiency.

It will be noted that the terminals of the re-

sistance in the forms of the invention shown in Figures 6 to 14, inclusive, are thoroughly anchored in place when bent to their final position and furthermore are clamped between the sections of the housing. Furthermore, these constructions readily lend themselves to the use of so-called tap terminals similar to the terminals 52 and 52' and which may be clamped up against the resistor by the split ring 51 at desired points intermediate the ends of the resistor.

The form of the invention shown in Figure 15 is identical with that shown in Figure 10 except that the metallic cup-like shield 96 is omitted and in lieu thereof an auxiliary metal shield 130 is provided. The shield 130 is in the form of a flanged cup which has its body portion 131 suitably secured to the shield 90 as for example by metal tongues 132 struck from the shield 90 and extended through openings in the shield 130 and clamped thereagainst. The flange 133 of the shield 130 extends outwardly in a spaced or annular groove 134 provided therefor in the molded housing 135 which replaces the switch housing shown in Figure 10. Thus, the shield 130 and its flange provides a complete shield or barrier between the terminals of the switch and the terminals of the rheostat or resistance. The shield 130 is grounded through the shaft 64 as before. The terminals of the adjustable resistance may be covered by an annular insulating disc 136 which is clamped in position by the sections of the housing.

While I have shown and described typical constructions in which the invention may be advantageously embodied, it is to be understood that these several constructions have been selected merely for the purposes of illustration or example and that various changes in the size, shape and arrangement of the parts may be made without departing from the spirit of the invention or the scope of the subjoined claims.

The invention claimed is:

1. An electrical control device comprising a housing, a variable resistance therein, a switch carried by said housing in close proximity to the resistance, a common operating shaft for said variable resistance and said switch, said operating shaft being grounded, and an electric shield comprising an electrically conductive metal disc fixed to and electrically connected with the shaft and interposed between the live parts of the switch and the variable resistance to completely shield the resistance.

2. An electrical control device comprising a sectional housing, a variable resistance in one section of the housing, a switch in another section of the housing, a common operating shaft for the resistance and switch, said operating shaft being grounded and a conductive disc fixed to and electrically connected with the shaft and disposed within the housing in between the switch and resistance whereby to provide an electric shield for the resistance.

3. A control device comprising a housing including a plurality of sections, a variable resistance device disposed in one of said sections, a switch disposed in another of said sections, a grounded conductive electric shield interposed between said variable resistance and said switch, means for securing said housing sections together, and an actuator positioned in one of said sections for operating said variable resistance device and switch and also serving to support said shield.

4. An electrical control device comprising a

housing, a variable resistance therein, a switch carried by said housing in close proximity to said resistance, a common operating element for said variable resistance and said switch, and a conductive electrical shield between said switch and said variable resistance and mounted on and electrically connected with said operating element, said operating element being at ground potential.

5. An electrical control device comprising a sectional housing, a variable resistance in one section of the housing, a switch in another section of the housing, the terminals of the resistance extending outwardly between the housing sections, means for securing the housing sections assembled, a common operating shaft for the resistance and switch, said operating shaft being at ground potential, and a conductive disc fixed to and electrically connected with the shaft and disposed within the housing in between the switch and the resistance whereby to provide an electric shield for the resistance.

6. An electrical control device comprising a sectional housing, a variable resistance in one section of the housing, a switch in another section of the housing, a common operating shaft for the resistance and switch, said operating shaft being at ground potential, and a conductive disc in the form of a shallow conical cup fixed to and electrically connected with the shaft and disposed within the housing in between the switch and the resistance whereby to provide an electric shield for the resistance.

7. An electrical control device comprising a sectional housing of insulating material, a variable resistance in one section of said housing and having its terminals extending outwardly between the housing sections, means for securing the housing sections assembled, a switch in another section of the housing, a metallic shield interposed between the section housing the switch and the section housing the resistance and insulated from the terminals of the resistance, said shield being at ground potential, a common operating shaft for the resistance and switch, said operating shaft being grounded, and a conductive shield fixed to and electrically connected with the shaft and disposed within the housing between the switch and the resistance.

8. An electrical control device comprising a sectional housing, a variable resistance in one section of the housing and having its terminals extending outwardly between and insulated from the housing sections, means for securing the housing sections assembled, a switch in another section of the housing, a cup-like metallic shield embracing one of the housing sections and having a portion interposed therebetween and insulated from the terminals of the resistance, said switch also having a plurality of terminals and said shield serving to electrostatically and electromagnetically shield the terminals of the resistance from the terminals of the switch, a common operating shaft for the switch and resistance, said operating shaft being grounded, and a metallic disc fixed to and electrically connected with the shaft and disposed within the housing between the switch and the resistance, said cup-like shield being electrically connected with said shaft.

9. A variable resistance and power switch unit of the character described comprising a housing having walls closing the ends thereof, a resistance element supported within the said housing adjacent one of said end walls, switch mecha

nism mounted within said housing adjacent the other end wall, a metallic bushing interconnected with one of said end walls and having a portion disposed exteriorly of the housing, a metallic shaft rotatably mounted within and in contact with said bushing and extending into said housing, a metallic disk directly fixed to said shaft within the housing and interposed between and in spaced and electrically insulated relation to said switch mechanism and said resistance element, means actuated by the shaft to vary the effective resistance of said element and means on said disk to actuate said switch mechanism.

10. A variable resistance and power switch of

the character described comprising a housing, a resistance element disposed within the housing, switch mechanism disposed within the housing in close proximity to the resistance, a grounded shaft supported for rotation and extending into the housing, a metallic disk directly fixed to said shaft within said housing and interposed between and electrically insulated from the resistance element and the switch mechanism, means actuated by the shaft to vary the effective resistance of said element and means on said disk to actuate said switch mechanism.

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