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SHIELDED VOLUME CONTROL AND SWITCH

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Fig. 1.

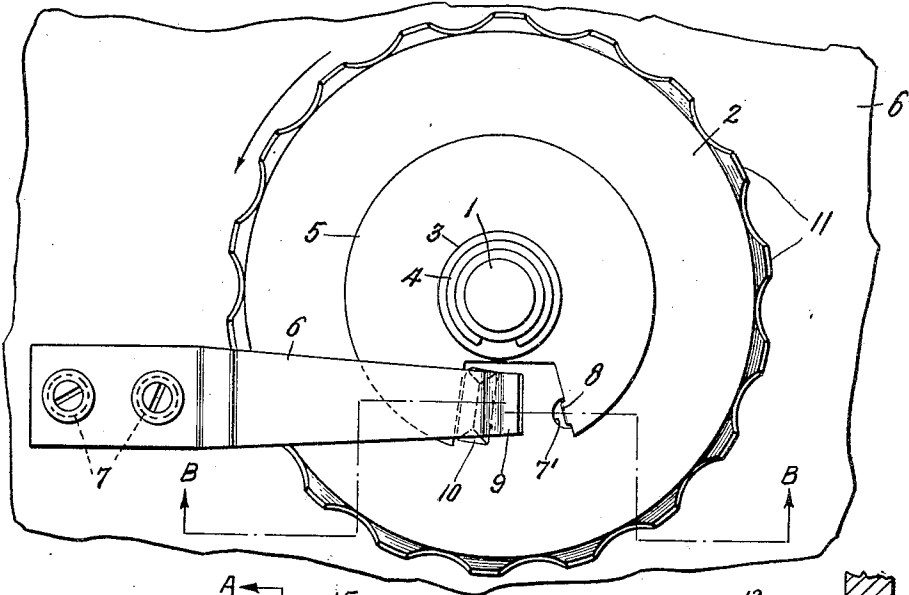


Fig. 2.

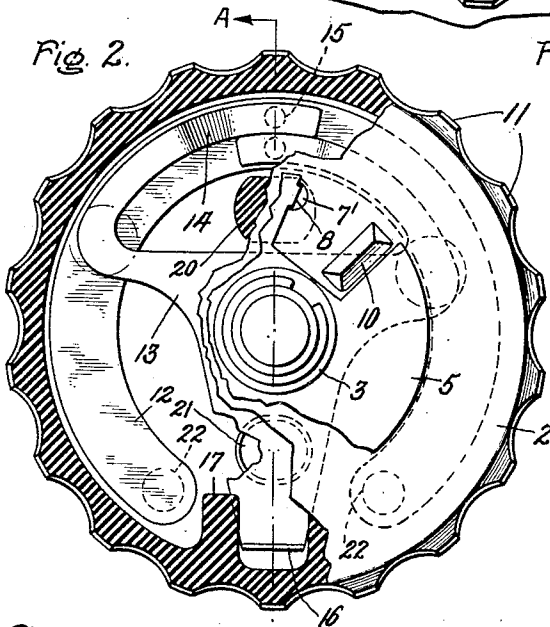


Fig. 3.

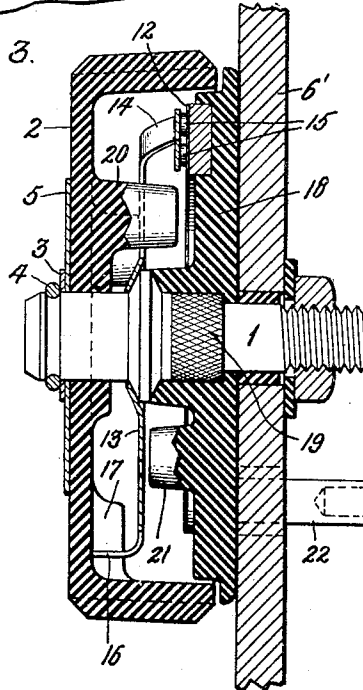
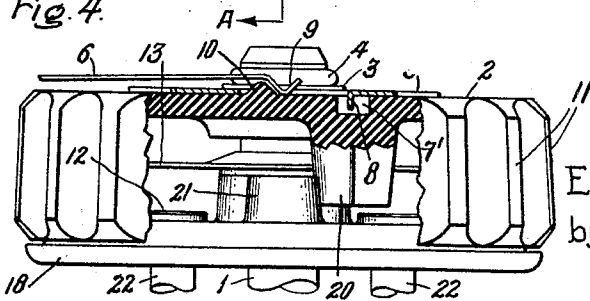


Fig. 4.



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SHIELDED VOLUME CONTROL AND SWITCH

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6 Claims. (Cl. 201—48)

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My invention relates to a combined volume control and switch, and more generally to a variable resistance device with a switch incorporated therewith. The invention also relates to an electrostatic shield for a volume control wherein the shield also comprises a movable switch contact element.

The object of my invention is to provide an improved variable resistance and switch assembly.

A more specific object of my invention is to provide a variable resistance, of the type commonly known as a volume control potentiometer, incorporating a switch in which elements of the variable resistance are electrostatically shielded by a portion of the switch.

A further object of my invention is to provide a switch for incorporation in a volume control assembly which will be inexpensive, positive in operation, and which will combine the function of electrostatic shielding with the switching function.

The novel features which I believe to be characteristic of my invention are set forth with particularity in the appended claims. My invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof may best be understood by reference to the following description taken in connection with the accompanying drawing wherein Fig. 1 is a front view of the variable resistance assembly showing the switch mechanism according to the invention; Fig. 2 is a partially cutaway front view showing the variable resistance elements and a portion of the switch assembly; Fig. 3 is a sectional side view of the assembly taken along line A—A of Fig. 2, and Fig. 4 is a side view partially in section taken along the line B—B of Fig. 1 and showing portions of the switch mechanism and the variable resistance.

The assembly as shown in Fig. 1 comprises a central mounting shaft 1 rotatably supporting a circular wall member 2, of insulating material, which is retained on shaft 1 by a conductive washer 3 and split retaining ring 4 cooperating with a peripheral shaft groove, best understood from Fig. 3. Held firmly against the exterior face of member 2 by the ring and washer is a flat disc-shaped conductive member 5, which serves the dual functions of an electrostatic shield for the resistance element and slider on the other side of member 2, and the function of a switch contact member for cooperation with a resilient switch arm 6. The switch arm 6 is bolted to a

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chassis or other mounting member 8' through suitable insulating washers and bushings 7. As best seen in Fig. 4, a small opening 7' is provided in the wall member 2 to receive a tongue 8 formed on conducting member 5 to prevent relative rotation between these members. Conducting member 5 has an opening or cutaway portion generally trapezoidal in shape exposing a limited area of the insulating surface of member 2 on which rests the crimped contact portion 9 near the end of switch arm 6 when the wall member 2 and conducting member 5 are rotated into the position shown in Fig. 1. A protrusion 10, preferably formed on the face of wall member 2 during molding, is arranged to extend outwardly through the opening in member 5 to cooperate with the crimped end portion 9 of switch arm 6 to provide increased resistance to rotation of member 2, as well as rapid separation of contact 9 from member 5, as the resistance is adjusted to a value corresponding, for instance, to minimum volume if the resistance is used as a volume control. Serrations 11 are conveniently provided at the periphery of rotatable wall member 2 to provide a surface for manual rotation. Upon rotation into or away from the position shown in Fig. 1, protrusion 10 provides a sensible indication, similar to the effect of snap action, as the switch is opened or closed.

As shown in Figs. 2 and 3 a slider is provided for contacting different peripheral portions of the annular resistance element 12. The slider, which is rotatable with member 2 about shaft 1, comprises a substantially flat central portion 13 with two resilient arcuate portions 14 carrying resistance element contacting studs or protrusions 15 at the ends. Opposite the contact protrusions an upstanding ear 16 is arranged for cooperation with protrusions 17 provided on the inner face of wall member 2. Ear 16 and protrusions 17 cooperate to rotate the slider and adjust the resistance value in response to rotation of the wall member 2. A stationary wall member 18 of insulating material is formed about shaft 1, such as by molding, and is held firmly by the scored portion 19 of the shaft. The resistance element 12 is attached to wall member 18, such as by riveting or molding. Rotatable wall member 2 carries an additional protrusion 20 from the internal face which comprises a stop member for cooperation with protrusion 21 formed on the internal wall of member 18, preventing further rotation of member 2 after contact studs 15 of the slider have reached either end of the resistance element.

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Fig. 3 shows retaining ring 3 and washer 4 in position on shaft 1 to hold contact member 5 against the outer face of rotatable member 2, the retaining ring and washer also serving to hold the rotatable member on the shaft against the spring pressure produced by resilient portions 14 of the contact slider. The end of shaft 1 which extends through stationary member 18 is screw-threaded to permit mounting of the variable resistance assembly to the chassis member 6'. An insulating bushing and washer may be provided as shown to insulate the shaft from the chassis if desired. The shaft serves as a terminal for making connections to the electrostatic shield 5 and to the rotatable slider since electrical connection is established between the central portion of the slider and a peripheral flange adjacent the scored portion 19 of the shaft, as well as through retaining ring 4 and washer 3 to the conductive disc 5 at the end of the shaft. Terminals connected to the ends of the resistance element extend through the stationary wall member terminating in hollowed rods 22 to which external connections may conveniently be soldered.

Fig. 4 discloses the relative positions of switch arm 6, switch member 5, protrusion 10 and member 2 in the switch-open position, wherein end 9 of the switch arm is in contact only with the insulating area of the surface of member 2. It will be noted that protrusions 20 and 21 are, in this position, abutting, preventing further rotation of member 2. From the position shown in this figure, member 2 can be rotated in the direction which would cause protrusion 10 to pass under end 9 of the switch arm. During further rotation in this direction end 9 is in contact with switch member 5 to complete a circuit from the mounting shaft 1 to switch arm 6. The shaft is also electrically connected to the slider and, through the studs 15, to the selected position of the resistance element.

Fig. 4 shows the serrations 11 provided on the outer periphery of rotatable member 2, and indicated the relative positions of stationary member 18, mounting shaft 1 and terminals 22.

While shield member 5 as herein described comprises a metallic disc held against the face of member 2, it will be understood that a conductive coating on the outer face of the member can be used instead to serve the same functions, provided that a portion of the conducting coating is removed to permit end 9 of the switch blade 6 to be separated from the coating. It will be also understood that disc 5, or such conductive coating as may be desired, may be proportioned to substantially completely cover the outer face of member 2, and may be extended downwardly over serrations 11 to shield the device more completely, instead of covering only the central portion of the outer face of member 2 as shown in the drawings. The degree of shielding desired will determine, at least in part, the most suitable diameter for disc 5 in each application. In addition the thickness and the material of disc 5 will affect the magnetic shielding provided thereby.

While I have shown only certain preferred embodiments of my invention by way of illustration, many modifications will occur to those skilled in the art and I therefore wish to have it understood that I intend, in the appended claims, to cover all such modifications as fall within the true spirit and scope of my invention.

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

1. A variable resistance comprising a rotatable

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member and a substantially parallel stationary member, an annular resistance element attached to one of said members and a cooperating contact slider attached to the other of said members for contacting different portions of said resistance element in accordance with the relative rotational positions of said members, a conductive shield member attached to said rotatable member for rotation therewith, a stationary resilient switch member for normally making electrical contact with said shield member, a limited area of insulation interposed in the path of contact of said switch member and arranged to be contacted thereby to break said circuit at a predetermined rotational position of said rotatable member.

2. A variable resistance comprising a stationary wall member and a rotatable wall member, an annular resistance element mounted to said stationary member, a slider arranged for rotation with said rotatable member for slidably engaging said resistance element, said rotatable member having an insulated face, a conductive electrostatic shield applied to said face at least partially defining a limited insulated area, and stationary resilient switch means for selectively contacting said conductive shield or said insulated area in accordance with the angular position of said rotatable member.

3. A variable resistance comprising two oppositely disposed relatively rotatable members carried by a mounting shaft, an annular resistance element, a cooperating contact arm in sliding engagement with said element, said element and said arm being relatively rotatable through operative association respectively with different ones of said members, one of said members having conductive and non-conductive surface portions, said conductive portion comprising an electrostatic shield, a switch element attached to the other of said members and arranged for selective engagement with said conductive or said non-conductive surface portions in accordance with the relative rotational positions of said members.

4. A variable resistance comprising a stationary wall member and a substantially parallel rotatable wall member, an annular resistance element and a cooperating contact element, one of said elements being held against rotation of said stationary member and the other of said elements being arranged for rotation with said rotatable member, a conductive electrostatic shield applied to an insulating face of said rotatable element, an insulating area of said face at least partially defined by said shield, and a contact member supported in a predetermined position with respect to said stationary member for selective cooperation with said shield or said insulating area in accordance with the angular position of said rotatable member.

5. A variable resistance device comprising a rotatable circular wall member and a cooperating stationary supporting wall member, said members having parallel exterior wall surfaces and having oppositely disposed interior faces defining an interior space, an annular resistance element mounted in said space to one of said interior faces, a contact slider member operatively associated with the other of said interior faces for cooperation with said element, a conductive shield comprising a portion of the exterior surface of said rotatable wall member, a resilient switch member arranged, in response to a predetermined rotational position of said rotatable wall member, for selective engagement with said shield or with a limited non-conductive portion of the exterior

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wall surface of said rotatable wall member to complete or interrupt, respectively, an electrical connection to said shield.

6. In combination, a switch and variable resistance for mounting on a chassis comprising a shaft attached to said chassis, an annular resistance element and cooperating contact slider, a supporting member and rotatable member for relatively rotating said slider and said element to interpose varying resistance between said slider and a predetermined connection point of said resistance, said members being mounted on said shaft, a conductive shield on the surface of said rotatable member arranged to shield said slider and

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said element, a limited area of insulating material exposed to said surface, and a switch member mounted to said chassis arranged for contacting selectively said area or said shield.

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The following references are of record in the file of this patent:

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