Jan. 19, 1932. C. L. WEICHELT 1,841,864

VARIABLE RESISTANCE DEVICE

Filed Aug. 7, 1929 2 Sheets-Sheet 1

Fig. 1.

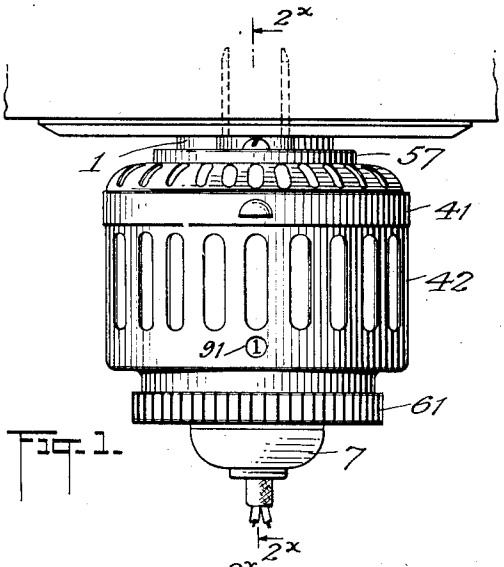


Fig. 4.

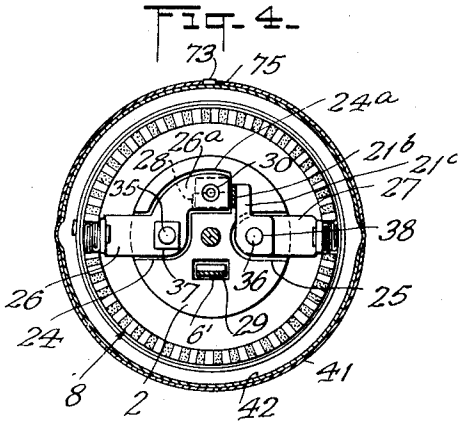


Fig. 2.

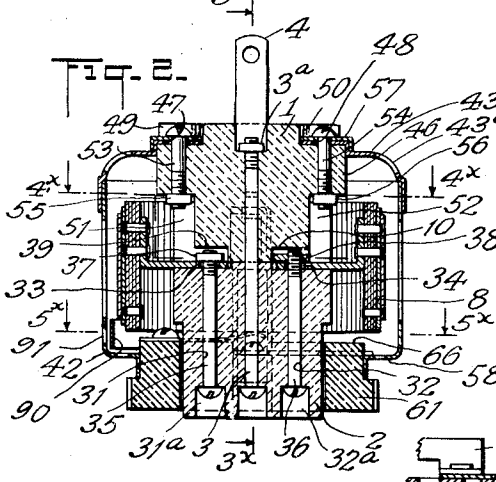


Fig. 5.

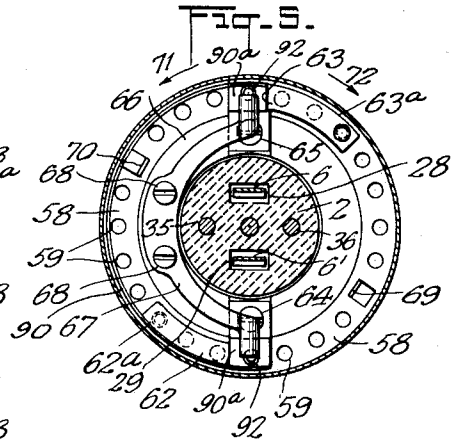


Fig. 18.

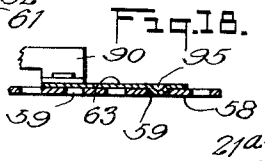


Fig. 3.

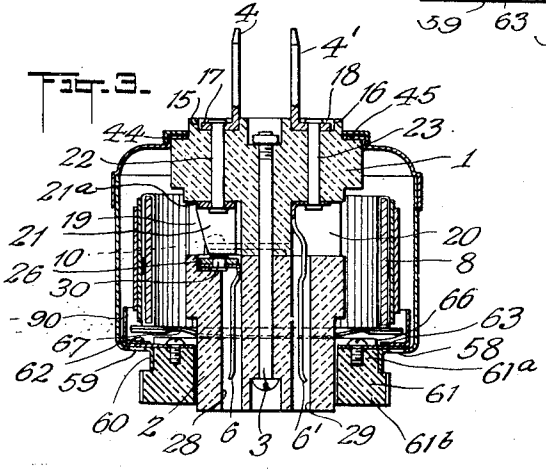
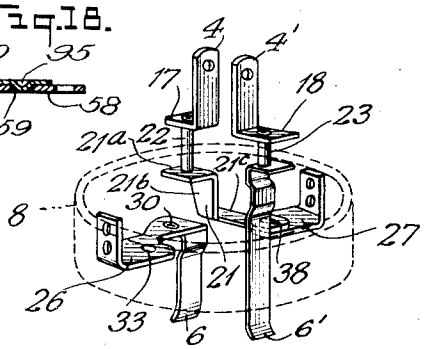


Fig. 6.



INVENTOR
Carl L. Weichelt
BY
William Rich & Sons
ATTORNEYS

Jan. 19, 1932. C. L. WEICHELT 1,841,864

VARIABLE RESISTANCE DEVICE

Filed Aug. 7, 1929 2 Sheets-Sheet 2

Fig. 7.



Fig. 8.

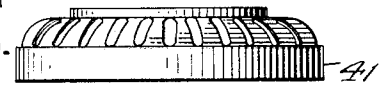


Fig. 9.

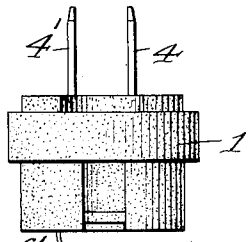


Fig. 10.

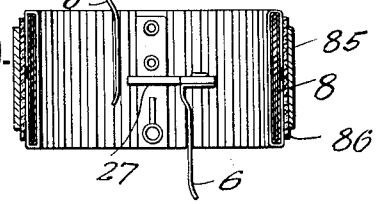


Fig. 11.

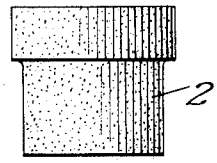


Fig. 12.

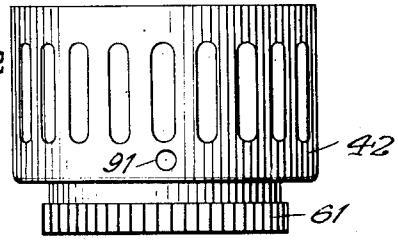


Fig. 16.

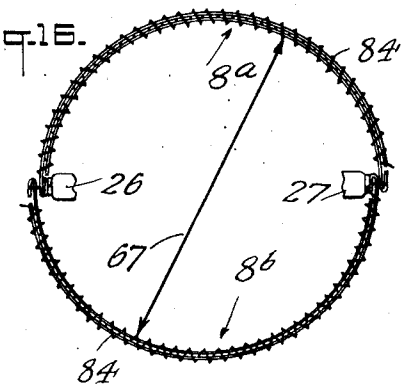


Fig. 13.

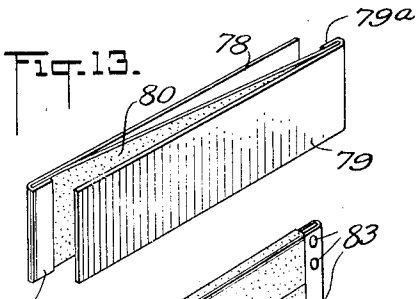


Fig. 14.

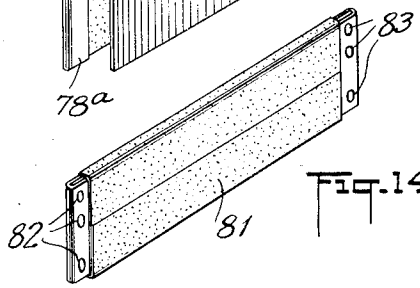


Fig. 15.

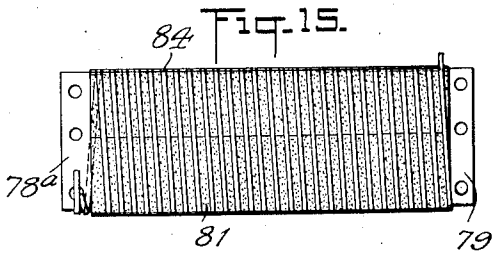
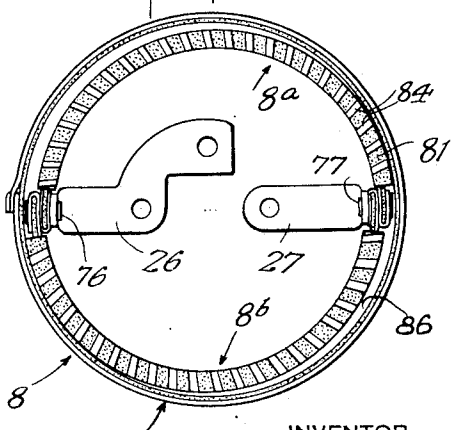


Fig. 17.



INVENTOR
Carl L. Weichelt
BY
Williams Rich & Lyons
ATTORNEYS

Patented Jan. 19, 1932 1,841,864

UNITED STATES PATENT OFFICE

CARL L. WEICHELT, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO WIRT COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF MAINE

VARIABLE RESISTANCE DEVICE

Application filed August 7, 1929. Serial No. 384,105.

The present invention relates to variable resistance devices, and more especially to such a device which may be used in conjunction with a radio receiving set or similar device for lowering the voltage from an ordinary house lighting circuit and regulating the resulting lowered voltage so that a proper current may be supplied to the radio receiving set.

The general object of the invention is to provide a device of the character referred to, which is simple in construction, economical to manufacture, easy to assemble and to operate, and reliable and durable in operation.

The device comprises a single compact piece of apparatus requiring no external wiring, being adapted for direct attachment to a house current outlet and for direct reception of a plug to a radio receiving set. The controlling means for the regulation of the lowered voltage are capable of being manipulated in a convenient manner, and an inspection of the interior parts may be made by simply detaching the two casing parts of the device one from the other.

A feature of the invention comprises novel means for effecting the variation of the resistance disposed within the device, said means rendering the device, as a whole, simple in character and construction.

Another feature of the invention comprises a novel construction of the resistance coil per se.

Other novel features of the invention will be apparent from the description and the claims.

In the drawings, Figure 1 is a side view of an assembled device embodying the present invention and illustrates its adaptation for attachment to a house outlet and for connection of an ordinary plug thereto; Fig. 2 is a cross sectional view on the plane indicated by the line 2^x—2^x in Fig. 1, with the house outlet and plug removed; Fig. 3 is a cross sectional view on the plane indicated by the line 3^x—3^x in Fig. 2; Fig. 4 is a horizontal cross-sectional view looking down on the plane indicated by the line 4^x—4^x of Fig. 2, with the upper casing part and upper insulating body removed and showing in particular the resistance coil supported by the lower insulating body; Fig. 5 is a horizontal cross sectional view looking down on the plane indicated by the line 5^x—5^x of Fig. 2, showing in particular the disposition of the switching arm on the rotatable handle and the means for effecting definite positions of said arm for corresponding definite values of resistance; Fig. 6 is a perspective view showing the resistance coil and the conducting parts of the device rendering said coil operative, the switching arm being omitted for purpose of clarity; Figs. 7, 8, 9, 10, 11 and 12 are side views of various portions of the device, these portions being shown one above the other for the purpose of illustrating the novel means associated with said portions for effecting an easy assembly of the device, the resistance coil in Fig. 10 being shown in section for purpose of clarity; Figs. 13 and 14 are perspective views showing the novel means of forming a support for a resistance wire to be wound thereon; Fig. 15 illustrates one of the units adapted to form the resistance coil and comprising the support shown in Fig. 14 with a resistance wire wound thereon and connected thereto, before said unit has been coiled into semi-circular shape; Fig. 16 is a schematic illustration of the circuit established by the two resistance wires forming part of the resistance coil, and by the rotatable switching arm; Fig. 17 is a plan view in detail of the resistance coil, showing in particular the two metallic brackets holding together adjacent ends of the two resistance units respectively and affording means for electrical conduction to the coil and for support of the latter; Fig. 18 is a detail of the spring which cooperates with the flange of the casing to control the movement of the annular member which regulates the resistance.

For convenience in describing the embodiment of the invention shown in the drawings, the end of the device shown adapted for attachment to the house outlet will be described as the upper end of the device.

A variable resistance device constructed in accordance with my invention, briefly described, comprises plug and socket insulat-

ing bodies 1 and 2 respectively, adapted to be joined end to end by the center screw 3 and adapted to carry a set of pins 4 and 4′ projecting from the upper free end of the plug body 1 for insertion into an ordinary house outlet, and a set of contact springs 6 and 6′ disposed within the socket body 2 for electrical connection to the pins of a plug 7 inserted into the free end of said member 2. It also embodies a tubular rheostat coil 8 so disposed around the members 1 and 2 as to be substantially completely surrounded by air, said coil being held in place by two inwardly projecting brackets 26 and 27 secured to the rheostat and in turn supported between the inner ends of the bodies 1 and 2. Said brackets establish electrical connection from the rheostat coil to the spring 6 and to the pin 4 respectively, the other pin 4′ and the other spring 6′ being directly connected to each other. A protective casing consisting of two detachable parts 41 and 42 having a telescoping connection is provided for the inner parts of the device, one of said casing parts, 42, having operable thereon a resistance adjusting annular member 61 mounted for manual rotation around the socket member 2, said resistance adjusting member carrying a switching arm 67 in sliding engagement with both portions of the rheostat 8 between the supporting brackets 26 and 27 when the member 61 is rotated.

Referring particularly to Figs. 3 and 6, the plug body 1 is formed at its upper free end with diametrically disposed depressions 15 and 16 for admission thereinto of the flat flanging portions 17 and 18 of the pins 4 and 4′ respectively. The body 1 is also formed at its inner end with diametrically disposed recesses 19 and 20 which extend to the outer circumference of the member 1, for admission thereinto respectively of portions of the conducting member 21 (the purpose of which will be understood in the later description), and of the inner end portion of the contact spring 6′, the member 21 comprising a flat portion 21—*a* engaging the flat bottom of the recess 19 and the spring 6′ comprising a flat outwardly bent portion engaging the flat bottom of the recess 20. The depressions 15 and 16 and the recesses 19 and 20 are formed in the same axial plane so that the rivets 22 and 23 passing through longitudinal apertures formed in the body 1 secure respectively the flanging portion 17 of the pin 4 to portion 21—*a* of the conducting member 21, and the flanging portion 18 of the pin 4′ to the outwardly flanging portion of the spring 6′. Thus the body 1 has permanently attached thereto both pins 4 and 4′, the member 21 and the spring 6′, the pin 4′ being thus directly electrically connected to the contact spring 6′ through the medium of the rivet 23, and the other pin 4 being electrically connected to the member 21 through the medium of the rivet 22.

The socket body 2 is formed at its inner end with a set of depressions 24 and 25 (Fig. 4) to conform to and afford a seat for the horizontal inwardly extending end portions of the brackets 26 and 27 respectively, which brackets are secured to and support the tubular rheostat coil 8 in axial alinement with the body 2. As will be more thoroughly understood in the later description, the brackets 26 and 27 afford electrical connecting means to the resistance coil 8. The body 2 is also formed with longitudinal perforations 28 and 29 extending all the way through said body, for admission and setting thereinto of the springs 6 and 6′, the spring 6 being directly attached to and thus in electrical connection with the bracket 26, said spring 6 having an outwardly flanging portion clamped by the rivet 30 to the lower surface of the bracket 26 adjacent the body 2. In the embodiment of the invention illustrated in the drawings, these perforations 28 and 29 are arranged in the axial plane of the pins 4 and 4′ and at right angles to the diametrical disposition of the brackets 26 and 27. Thus, in order to properly position the spring 6 in the perforation 28, the bracket 26 is formed with an arcuate end portion 26—*a* extending a full quadrant of a circle, said arcuate portion 26—*a* carrying the spring 6 as above described and being seated in a conforming depression 24—*a* communicating with the perforation 28.

The depth of the depressions 24, 24—*a* and 25 is such as to have the upper surface of the brackets 26 and 27 flush with the surface of the member 2. Thus with the coil 8 properly supported by the brackets 26 and 27 on the body 2, the contact spring 6 being then positioned in the opening 28, the spring 6′ may then be inserted into the opening 29 by bringing the plug and socket bodies 1 and 2 together, and when the latter are thus assembled their inner ends will adjoin, the rigid conducting member 21 attached to the member 1 being adapted to then establish an electrical connection to the supporting bracket 27. The disposition of the openings 28 and 29 and the operative disposition of the springs 6 and 6′ therein is such that the pins of an ordinary plug 7 may be inserted from the free lower end of the body 2 and into electrical connection with said springs.

Said conducting member 21 is made in three portions (see Fig. 6) the horizontal flat end portions 21—*a* and 21—*c* extending at right angles to one another and being spaced from one another by the middle vertical portion 21—*b*. Portions 21—*a* and 21—*b* are thus enclosed within the recessed space 19, the total height of the member 21 being made substantially exactly equal to the height of said space 19, and a depression

10 formed on the inner end of the body 1 and communicating with the space 19 permits a proper positioning of the lower portion 21—*c*, so that the latter permanently lies flush with the inner end of the body 1 and establishes electrical connection with the bracket 27 when the members 1 and 2 are brought together as described hereinbefore.

Fig. 6 shows the electrical connections of the conducting parts of the device. Pin 4′ is permanently connected to the spring 6′ through the rivet 23, while the other pin 4 is permanently connected through the rivet 22 to the member 21, the latter being in contact with the bracket 27, the bracket 26 being connected to the other spring 6. Thus the coil 8 is interposed on one side of the line between the pin 4 and the spring 6, the voltage taken from the springs 6 and 6′ being accordingly lowered.

As securing means for the parts described, the socket body 2 is formed with a set of diametrically disposed longitudinal perforations 31 and 32 (Fig. 2) extending all the way through said body and diametrically disposed in the axial plane of the brackets 26 and 27. Other perforations 33 and 34 are so formed in the bracket 26, and 27 respectively that they are caused to register respectively with said perforations 31 and 32 when the coil 8 is in its position of assembly on the body 2. A screw 35 inserted from the free end of the body 2 and passing through the perforations 31 and 33 cooperates with a nut 37 to secure the bracket 26 on the body 2, this assembly being made before the bodies 1 and 2 are brought together. A tapped opening 38 formed in the lower portion 21—*c* of the conducting member 21, registers with the apertures 32 and 34 when the body 1 is in its position of assembly on the body 2 carrying the coil 8; and another screw 36, likewise inserted from the free end of the body 2 and passing through the perforations 32 and 34, cooperates with said tapped opening 38 as means for clamping the bracket 27 to the body 2 and as means for initially securing during the process of assembly the two bodies 1 and 2 together, this being performed after the body 1 with conducting member 21 attached thereto has been placed in its position of assembly on the body 2. A recess 39 formed on the inner end of the body 1 provides a space for the nut 37 and the screw 35 cooperating therewith and the recess 10 formed on said inner end of the body 2 provides a space for proper operation of the screw 36 in said opening 38. Preferably larger openings 31—*a* and 32—*a* are provided at the entrance of the perforations 31 and 32 as a means for positioning the heads of the screws 35 and 36. A center screw 3 and nut 3*a* fixedly secure the bodies 1 and 2 together, center recesses being formed on the free ends of the bodies 1 and 2 for positioning of the nut 3*a* and of the head of the screw 3.

The outer casing of the device consists of two members 41 and 42 having a telescoping connection and joined at their free ends by locking devices which may be readily detachable. The lower member 42 has two outwardly struck shoulders in its side wall, while the upper member 41 has two apertures which interlock with said shoulders. The upper end of the upper member 41 is formed with an inturned flange 43 which is provided with a plurality of ventilation openings 43—*a*, the inner end of said flange meeting an upward extension 44 likewise formed with an inward flange 45 at its upper end. Said extension 44 and flange 45 afford means for seating the upper casing member 41 on the upper corner ledge provided by the extension 46 formed on the insulating plug body 1. The flange 45 is formed with diametrically opposite inward extensions 47 and 48 which rest on the bases of corresponding recesses 49 and 50 formed on the upper end of the body 1, said extensions 47 and 48 preventing a rotation of the casing member 41 and of the body 1 relative to one another. In the same axial plane of said recesses 49 and 50, corresponding recesses 51 and 52 are formed on the lower end of the body 1 so that the screws 53 and 54 passing through longitudinal apertures formed through the extension 46 of the body 1 in said axial plane and through registering apertures formed in the extensions 47 and 48 of the casing member 41, in cooperation with the nuts 55 and 56 positioned within said recesses 51 and 52, serve to secure the casing member 41 on the body 1. Preferably a metal cap 57 following the shape of the upward extension 44 and inward flange 45 and inward extensions 47 and 48 is placed over the latter, the screws 53 and 54 clamping both the casing member 41 and the cap 57 to the body 1, this insuring a more rigid attachment of the casing to the supporting body 1.

The lower casing member 42 has an inward flange 58 at its lower end formed with ventilation openings 59, said flange having a downward extension 60 depending therefrom.

A means for effecting a variation of the resistance provided by the coil 8 comprises a rotatable spring switching arm 67 the diametrically disposed ends of which are adapted to cooperate respectively with two resistance wires 84, 84, forming part of the coil 8 (Fig. 16). Each wire is electrically connected at one end respectively to the brackets 26 and 27. Thus, portions of the resistance wires are placed in series through the medium of the arm 67 and the latter's rotation enables a variation of the resistance measured between the conducting brackets 26 and 27.

The arrangement of parts described including that of the resistance wires 84, 84, makes possible novel controlling means for adjust-

ing the position of the arm 67 to obtain various regulations of voltage. The arm 67 is carried by a tubular member 61 adapted for rotation around the lower end portion of the body 2, said arm extending arcuately and vertically upwardly in both directions from its securing means 68, 68, so as to adapt its diametrically disposed end portions for a sliding engagement with the lower end of the coil 8. Said member 61 is made in two portions, an inner end portion 61—*a* adapted for rotation within the aforesaid casing extension 60, and an outer end portion 61—*b* of larger diameter than said portion 61—*a*. The height of the inner end portion 61—*a* is made equal to that of the extension 60, so that the member 61 is held in operative position by the lower end of the casing extension 60 cooperating with the ledge formed by the outer handle portion 61—*a* and by a set of springs, 62 and 63, secured to the inner end surface of the member 61 by the screws 64 and 65 and arcuately projecting on portions of the inner surface of the casing flange 58. In the embodiment shown in the drawings, these springs 62 and 63 and their arcuate flanging portions 62—*a* and 63—*a* are disposed diametrically opposite to one another. The member 61 is formed on its inner end with a projection 66 which carries the spring switching arm 67. Preferably as a means to establish definite positions of the member 61, the arcuate portions 62—*a* and 63—*a* are formed with outward protuberances 95 (Fig. 18) which cooperate with some of the ventilation openings 59, these protuberances temporarily checking the rotation of the member 61 when they come into engagement with said openings. An arcuately shaped band 90 is vertically disposed on the annular member 61 and is provided with vindicating numerals on its outer surface, said numerals successively registering with an aperture 91 (Fig. 1) formed in the lower casing member 42 when the member 61 is rotated to its individual positions and thus making possible an immediate obtainment of any of the various values of reduced voltage corresponding to said positions of the member 61. The band 90 may be conveniently held in place by means of the inwardly directed flanges 90—*a*, 90—*a*, formed at the ends of the band, the rivets 92, 92 securing said flanges to the springs 62, 63. Diametrically disposed inwardly struck shoulders 69 and 70 formed in the casing flange 58 alternately cooperate with the ends of the arcuate spring portions 62—*a* and 63—*a* in preventing further rotation of the arm 67 in either direction. These rotation limiting means are essential if the device is to be used in conjunction with a radio receiving set or similar article for lowering the voltage thereto from an ordinary house lighting outlet, since a rotation of the arm 67 in either direction to a position in electrical contact with the electrically connected ends of the wires 84, 84, i. e., in electrical contact with the conducting brackets 26 and 27, would entirely short circuit the resistance. In the embodiment shown in the drawings, however, the device is shown as adapted to a large range of resistance values, eight positions of the member 61 being possible, a maximum resistance being established when the outer ends of said spring flanging portions 62—*a* and 63—*a* abut the shoulders 69 and 70 and the minimum resistance being established when the inner ends of said spring flanging portions abut said shoulders.

Since the resistance adjusting member 61 is held in operative relation with the rheostat coil 8 by the lower casing member 42 and since the rheostat coil 8 is fixed with relation to the insulating bodies 1 and 2, means are provided to bring the two casing members together so that they may be joined at all times in the same positions relative to one another. Said means may comprise a small pin 73 fixed to the lower casing which engages a longitudinal slot 75 formed from the lower edge of the upper casing.

It is noted that the rheostat coil 8 is amply spaced from the insulating bodies 1 and 2 and from the outer casing, so as to provide proper ventilation of the rheostat coil, the casing being provided with ventilation openings in the side wall of the lower member 42 as shown in Fig. 1, as well as the openings 43*a* and 59 hereinbefore described. The novel means for supporting the rheostat coil 8 comprising the inwardly directed brackets 26 and 27, permit an ideal disposition of said coil, the latter being entirely surrounded by air and substantially insulated from heat conducting parts, said brackets 26 and 27 also serving to supply electrical conduction to the coil thus lessening the number of parts connected to the coil. Thus the arrangement affords a circulation of air in contact with the complete extent of the coil which very efficiently serves to keep the latter from overheating and to maintain the casing cool at all times.

A description of the assembly of the various parts will now be given, this description further assisting the demonstration of the simplicity of the parts and their ease of assembly. The coil 8 with the brackets 26 and 27 attached thereto is caused to be supported in place by properly placing said brackets on the inner end of the socket body 2, the spring 6 being then properly positioned in the opening 28. The bracket 26 is then secured to the body 2 by the screw 35 and nut 37, this serving as an initial securing means of the coil 8 to the body 2. The upper casing member 41 and the cap 57 are then secured to the plug body 1 by the screws 53 and 54 and respective nuts 55 and 56, the

plug 1 having initially secured thereto the pins 4 and 4′, the spring 6′ and the conducting member 21. The plug body 1, carrying all of the aforesaid parts, is then placed on the socket body 2 in such a way that the spring 6′ is properly positioned in the opening 29. The screw 36 cooperating with the tapped opening 38 then serves to secure the bracket 28 to the body 2, to establish good electrical contact between the conducting member 21 and said bracket 28 and to initially secure the bodies 1 and 2 together. Thus there is established electrical connection between all of the conducting parts of the device, with the exception of the switching arm 67. The center screw 3 may then be used to rigidly secure the bodies 1 and 2, with parts attached thereto, together. The bottom casing member 42 having thereon the rotatable member 61 carrying the switching arm 67, may then be joined to the upper casing 41, the arm 67 being then rendered operative on the bottom of the coil 8. Thus an inspection of the interior parts of the device, including the parts attached to the upper casing 41 and the parts attached to the lower casing 42, may be made by simply detaching the casing parts one from the other, the annular member 61 sliding outwardly out of operative position when said casing members are detached.

A construction of the resistance coil 8 per se which has been found especially satisfactory comprises forming said coil in two separate semi-circular units 8—*a* and 8—*b*. Novel means of constructing the resistance units comprises the provision of two metallic strips 78 and 79 (Fig. 13) affording the support for a resistance wire to be wound thereon. Each strip is bent over at one end and a sheet of insulation such as a sheet of asbestos 80 is positioned between the two strips so as to permanently insulate the two strips one from the other, the insulating sheet 80 being of such a length that the folded ends 78*a* and 79*a* of the strips are separated from the unbent edges thereof, thereby insuring insulation between the strips and a substantially uniform thickness of the structure when the two metallic strips are brought together. The assembled strips 78 and 79 with the sheet 80 therebetween are covered with a suitable protective insulation, such as by a wrapping thereon of several layers of an asbestos sheet, 81, the folded end portions of the support thus formed being left uncovered. Said uncovered portions are each provided with a set of three suitably positioned openings 82 and 83, and a resistance wire 84 is wound on the insulation 81 and has one of its ends secured to the support and in electrical connection with one metallic strip 78 by looping said end into the lower opening 82. Each of the two resistance units 8—*a* and 8—*b* formed in this way is bent into a semi-circular shape and these are supported, so as to form a tubular resistance unit, by the brackets 26 and 27 to which the unit is attached by the rivets 76 and 77, passing through the upper openings 82 and 83, the ends of the wires 84, 84 looped into the lower openings 82 being then disposed diametrically opposite to one another and in electrical connection with the brackets 26 and 27 respectively. Other rivets are preferably provided for the lower openings 82 and 83, said rivets serving to firmly clamp the looped ends of the wires 84, 84 between the uncovered conducting portions of the supporting metallic strips. The resistance units 8—*a* and 8—*b* are so assembled that the unconnected ends of the wires 84, 84 are clamped between the insulation 81 and an outer insulation such as an asbestos sheet 86 held in place by the outer protective shell 85. It is noted that the arrangement of the resistance units makes possible an equal distribution of heat on both sides of the coil 8.

The invention has been described and illustrated by the portrayal of a structure which in practice has proved to be a satisfactory commercial embodiment thereof, but it is understood that the structure shown is merely illustrative and the invention may be carried out in other ways.

What is claimed is:

1. In a resistance device, two insulating bodies adapted to abut end to end, contact pins and springs associated with said bodies for establishing electrical connections to a supply circuit and for establishing electrical connections to a circuit to be supplied, an outer rheostat coil, two inwardly projecting brackets secured between the two bodies for supporting the coil and spacing the latter from said bodies, said brackets being electrically connected to the rheostat coil at two separate points, said contact pins and springs, coil and brackets cooperating for lowering the voltage from the supply circuit to the circuit to be supplied.

2. In a variable resistance device, two insulating bodies adapted to be joined end to end, a pair of terminals associated with one body for electrical connection to a supply circuit, another pair of terminals associated with the other body for electrical connection to a circuit to be supplied, an outer rheostat coil, a pair of inwardly projecting brackets secured between the two bodies for supporting the coil, said brackets establishing electrical connection from two points of the coil respectively to one of said first terminals and to one of said second terminals, the other of said first terminals and the other of said second terminals being electrically connected, and a short circuiting switch adapted for rotation on both portions of the rheostat coil between the aforesaid points.

3. In a resistance device, an insulating

body having a pair of longitudinal perforations formed therethrough, an outer rheostat coil, two supporting inwardly projecting brackets electrically connected to two separate points of the coil, a spring contact carried by one of said brackets and positioned in one of said perforations, another insulating body, a pair of terminals carried by said other body on its outer end, a second spring contact and a conducting member also carried by said other body at its inner end, said terminals being in electrical connection respectively with said second spring contact and with said conducting member, the inner ends of the two bodies being joined together with the brackets therebetween, said conducting member establishing electrical connection with the other of said brackets and said second spring contact being positioned in the other of said perforations, said brackets spacing said coil from the insulating bodies.

4. In a variable resistance device, two insulating bodies adapted to be joined at their inner ends, one of said bodies having formed therethrough a pair of longitudinal perforations, a pair of terminals carried by the other body at its outer end in the same axial plane of the perforations, a spring contact and a conducting member depending from recesses formed on the inner end of said other body, securing devices extending through said last mentioned body and electrically connecting said terminals respectively to said spring contact and said conducting member, an outer tubular rheostat coil, two diametrically disposed inwardly extending brackets acting as supporting means for and electrical conduction means to the rheostat and secured between the inner ends of the two bodies, another spring contact carried by one of said brackets and positioned in one of said perforations, said first spring contact being positioned in the other of said perforations and the conducting member establishing connection to the other bracket when the two bodies are joined together, and a conducting arm adapted for rotation on the rheostat coil on both portions between the conducting brackets.

5. In a resistance device, an insulating body having a pair of longitudinal perforations formed therethrough, an outer rheostat coil, two inwardly projecting brackets secured to said coil and supported on the inner end of said body, a spring contact carried by one of said brackets and positioned in one of said perforations, another insulating body, a pair of terminals carried by said other body at its outer end, a second spring contact and a conducting member also carried by said other body at its inner end, said terminals being in electrical connection respectively with said second spring contact and with said conducting member, the inner end of the two bodies being adapted to be joined together with the brackets therebetween, said second spring contact being positioned in the other of said perforations, a screw insertable from the free end of said first mentioned body securing the spring carrying bracket to the latter, another screw likewise insertable from said free end cooperating with a tapped opening in the conducting member for securing said member and the other bracket together and to said first mentioned body, and a center screw joining the two bodies together.

6. In a variable resistance device, two cylindrical insulating bodies adapted to be joined end to end, two pairs of terminals associated respectively with the free ends of said bodies, one pair adapting the device for connection to a supply circuit and the other pair for connection to a circuit to be supplied, a rheostat coil adapted to be supported around said bodies, electrical conducting means rendering said rheostat and terminals operative, an outer protective casing comprising two detachable parts one of which is supported by one of said bodies, an annular resistance controlling member carried by the other casing part and adapted for rotation around the other body, and a switching arm carried by the member adapted for rotation on said coil.

7. In a variable resistance device, two cylindrical insulating bodies adapted to abut end to end, two pairs of terminals associated respectively with the free ends of said bodies, one pair adapting the device for connection to a supply circuit and the other pair for connection to a circuit to be supplied, a rheostat coil adapted to be supported around and by said bodies, electrical conducting means rendering said coil and terminals operative, an outer protective casing comprising two interlocking parts, one part of comparatively small length being supported at its outer end on one of said bodies, the other casing part being of comparatively large length, an annular resistance adjusting member carried by the outer end of said other casing part and adapted for manual rotation around the other body, a switching arm carried by said member adapted for rotation on said coil, said member and switch being in operative relationship with said rheostat coil when the two casing parts are in locked position.

8. In a variable resistance device, a plug member and a socket member adapted to abut end to end, a pair of terminals carried by the plug member at its free end, a pair of spring contacts within the socket member adapted for electrical connection thereto from the free end of said socket member, an outer rheostat coil disposed around the bodies and having two terminals, electrical conducting means rendering said coil, plug terminals and spring contacts operative, an outer protective casing comprising two detachable parts, one part being supported by the plug mem-

ber, an annular member carried by the other casing part and adapted for manual rotation around the socket member, and a switching arm secured to said member and adapted for sliding engagement with both portions of the coil between its terminals.

9. In a variable resistance device, two cylindrical bodies adapted to abut end to end and adapted to afford connections at their free ends to a supply circuit and to a circuit to be supplied, a rheostat coil disposed around said bodies and having two resistance elements and a terminal for each, electrical conducting means rendering said coil and bodies operative, an outer casing for the aforesaid parts, an annular member carried by said casing and adapted for manual rotation around one of said bodies, said member carrying a switching arm adapted for rotation on both of the resistance elements of the coil between its terminals.

10. In a variable resistance device, an element adapted to afford connections at its ends respectively to a supply circuit and to a circuit to be supplied, a rheostat coil disposed around and supported by said element, electrical conducting means rendering said coil and elements operative, an outer casing having an aperture in its side wall, an annular member loosely carried by said casing and adapted for manual rotation around said element, a switching arm carried by said member for engagement with said coil and an internal arcuate member in liaison with the member and having indicating numerals adapted to successively register with and be visible through said aperture when said annular member is rotated.

11. In a variable resistance device, of the character described, having internal insulation, resistance, and electrically conducting members, and an outer protective casing, an inwardly extending flange at one end of said casing having openings therein, an annular rotating member fitted in said flange, springs internally secured to said annular member and bearing against said flange, protuberances on said springs, coinciding with said openings to determine definite positions of said annular member.

12. In a variable resistance device, of the character described, having internal insulation, resistance, and electrically conducting members, and an outer protective casing, an inwardly extending flange at one end of said casing having openings therein, an annular rotating member fitted in said flange, springs internally secured to said annular member and bearing against said flange, protuberances on said springs, coinciding with said openings to determine definite positions of said annular member, and inwardly struck shoulders in said flange in the path of rotation of said springs to limit their travel in opposite directions.

13. In a variable resistance device, a structure adapted to afford connections at its ends to a supply circuit and to a circuit to be supplied and comprising insulation means, resistance means and electrically conducting means, an outer protective casing for said structure, and means for varying the resistance of said resistance means including an annular member adapted for rotation around one end of said structure and extending from one end of said casing to expose it for manual control.

14. In a variable resistance device, a structure having a pair of plug terminals at one end to afford connection to a supply circuit and a pair of socket terminals at the other end to afford connection to a circuit to be supplied and also including insulation means, resistance means and electrically conducting means, an outer protective casing secured at one end to one end of said structure, and means for varying the resistance of said resistance means including an annular member extending from the other end of said casing to expose it for manual control and being loosely carried by said casing to adapt it for rotation around the other end of said structure.

In testimony whereof, I have affixed my signature to this specification.

CARL L. WEICHELT.