July 11, 1933. C. L. WEICHELT 1,917,675

ADJUSTABLE RESISTANCE DEVICE

Filed Nov. 12, 1930

Fig. 1.

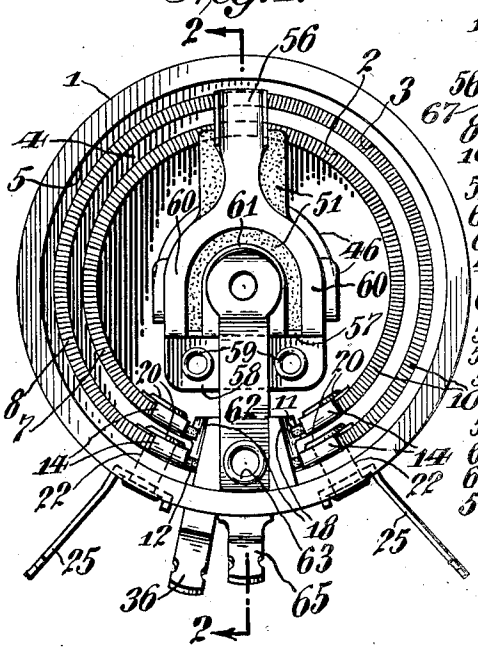


Fig. 2.

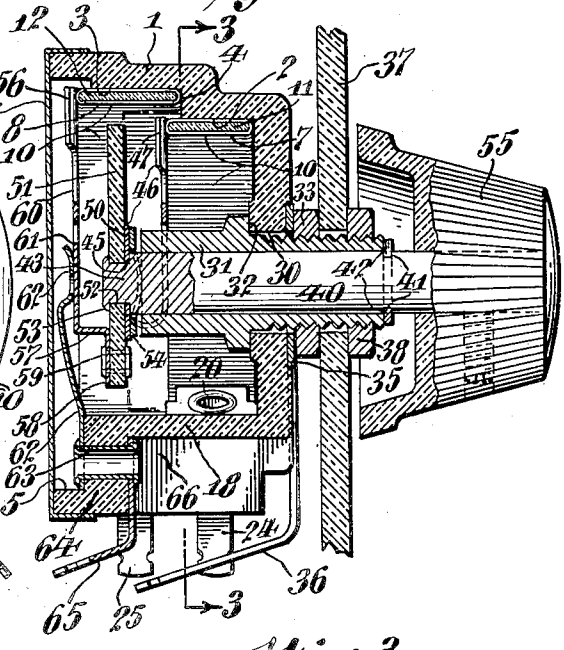


Fig. 4.

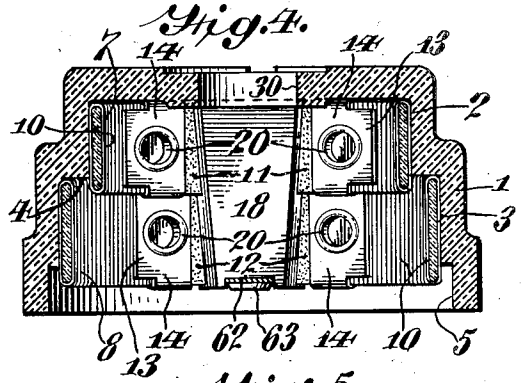


Fig. 3.

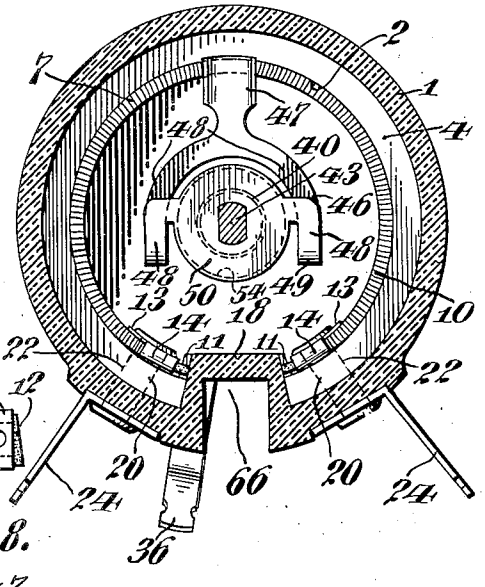


Fig. 5.

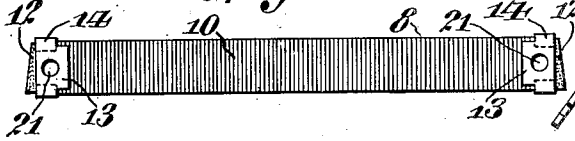


Fig. 6.

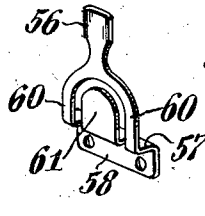


Fig. 7.

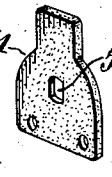
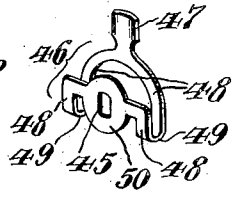


Fig. 8.



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1,917,675

UNITED STATES PATENT OFFICE

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ADJUSTABLE RESISTANCE DEVICE

Application filed November 12, 1930. Serial No. 495,017.

My invention relates to adjustable resistance devices which may be utilized as potentiometers for varying simultaneously by adjustment the differences in potential, through two separate resistance elements or members, between two points associated respectively with the said members. The device is of especial utility as a volume control means for radio reception apparatus.

The general object of the invention is to provide a resistance device of the character indicated having at least two resistance elements located in cooperative relation to movable contacts which contacts are mounted upon a single support and are movable simultaneously into different positions relatively to the said resistance elements or members.

To the foregoing and other ends the invention comprehends the construction and arrangement as hereinafter described in detail, particularly pointed out in the appended claims, and as shown in the accompanying drawing wherein I have illustrated one embodiment of the invention in a form at present preferred by me; but it will be understood that the invention may be embodied in other forms of construction than that illustrated and that changes in the details of construction may be made within the scope of the claims without departing from the said invention or the principle thereof.

In the drawing:

Fig. 1 is a view in elevation of one end of a device embodying the invention, the top or cover of the casing thereof being removed;

Fig. 2 is a view in longitudinal central section taken on the line 2—2 of Fig. 1, the top or cover being shown in place upon the open end of the casing of the device;

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 2;

Fig. 4 is a longitudinal sectional view of the casing and in cross section of the resistance elements mounted therein;

Fig. 5 is a view in side elevation of a resistance element removed from the casing and in extended or straightened condition; and

Figs. 6, 7 and 8 are perspective views of certain elements embodied in the construction.

In the drawing I have shown at 1 a casing of cup shape consisting of suitable insulating material as, for example, a phenolic condensation product. The side of the casing is of stepped formation; that is to say, the diameter in adjoining relation to the bottom thereof, as at 2, is less than the diameter of an upper intermediate portion as shown at 3. These differences in diameter provide a shoulder or ledge 4. The extreme outer end portion of the casing is of greater diameter than the intermediate portion, as is indicated at 5.

Two resistance elements or members 7 and 8 are employed in the construction, each of which comprises resistance wires 10 of required gauge and of suitable material wound around thin elongated strips 11 and 12 of suitable insulating material as, for example, condensite or a fabric saturated with a phenolic condensation product. The strip 11 is of somewhat shorter length than the strip 12 for a reason which will become apparent as this description proceeds.

The coils of wire 10 at the opposite ends of the strips 11 and 12 are held in place by overlying holding metal portions 13 which project inwardly from metal clips 14 the opposite ends of which are bent around the edges of the strips 11 and 12 and operate to hold the clips in place. The opposite ends of the strips 11 and 12 are cut on the bias as shown in the drawing; that is, along lines inclined with respect to the length of the said strips. These strips are bent into circular form and are inserted into the casing 1, the resistance element 7 including the shorter strip 11 being placed in the bottom portion 2 of the casing, while the element 8 including the longer strip 12 being placed in the upper intermediate portion 3 of the casing.

For the purpose of forcing the strips outwardly and closely against the inner sides of the portions 2 and 3 of the casing within which they are located the said casing is provided upon its inner side with a wedge-shaped projection 18 which is tapered and widens from the top toward the bottom, as is clearly shown in Fig. 4 of the drawing. The inclination of the opposite ends of the

strips 11 and 12 is the same as the angle of taper of the wedge 18, so that as the strips with the resistance coils thereon are pushed downwardly into place they are pushed outwardly so that their outer sides are caused to seat closely against the inner sides of the adjoining portions of the casing. The members 7 and 8 having been positioned within the casing 1 they are then fastened to the casing by suitable fastening means such, for example, as tubular rivets 20 which extend through openings 21 provided in the opposite ends of the strips 11 and 12 and through registering openings 22 provided in the adjoining portions of the wall of the casing 1. The outer ends of the rivets, which fasten the opposite ends of the member 7 to the casing, also engage and hold the terminal strips or bars 24, to the outer ends of which wires (not shown) are connected which form parts of an external electric circuit. The rivets by which the opposite ends of the member 8 are secured in place to the casing 1 engage and hold terminal strips or bars 25 to which wires, not shown, are connected which also form parts of an external circuit.

For the purpose of supporting adjustable or movable contacts which respectively cooperate with the resistance elements or members 7 and 8 I have provided an opening 30 in the bottom of the casing 1 within which is located a tubular bearing member 31 the inner end of which projects into the interior of the casing 1 to a point above or beyond the outer edge of the element or member 7 and slightly beyond the inner edge of the element or member 8. The tubular bearing member 31 is provided intermediate its ends with a shoulder 32 which is seated against the portion of the inner side of the bottom of the casing 1 which constitutes the inner edge of the opening 30. The outer end portion of the tubular bearing 31 is screw threaded for the reception of a nut 33 which cooperates with the shoulder 32 to hold the said bearing member in place in said opening. The nut 33 also is clamped against the base 35 of a metal terminal strip or bar 36 to which a wire, not shown, is connected which forms a part of an electric circuit, as for example, the circuit including the filament and battery of a radio reception apparatus. The base 35 is provided with an opening therethrough through which the screw threaded portion of the tubular sleeve 31 extends. The screw threaded portion of the tubular sleeve 31 also extends through an opening provided in the panel 37 of a radio receiving or other apparatus and is held therein by a clamping nut 38 in known manner and as indicated in Fig. 2 of the drawing. A rotatable member or shaft 40 is mounted within the tubular bearing 31. The shaft 40 is provided near its outer end with a groove 41 within which is removably mounted a ring 42 for limiting the movement of the shaft 40 inwardly of the tubular bearing 31. Portions of the shaft 40 upon opposite sides of the inner end thereof are cut away as indicated to provide a flattened portion 43 of general or approximately rectangular shape in cross section. The inner ends of these cut-away portions terminate in shoulders 44. The portion 43 extends through a correspondingly shaped opening 45 provided in the inner end of a spring metal contact 46 the outer end 47 of which is in contact with the upper or outer edge of the resistance member 7. The contact 46 comprises spaced leg-like portions 48 which are provided with bends 49 intermediate their ends so that the upper and lower portions of the contact are arranged in general parallel relation to each other as shown. The separated ends of these legs are connected by a crosswise extending portion 50 within which the opening 45, previously referred to, is located. The presence of the bends imparts increased yielding and resilient qualities to the contact 46. The terminal 36 has electrical connection with the contact 46 through the tubular bearing 31 and the shaft 40.

A flat member 51 of suitable insulating material also is mounted upon the portion 43 of the shaft 40 in overlying relation to the portion 50 of the contact 46. The member 51 is provided with an opening 52 of general rectangular shape which fits the correspondingly shaped portion 43. The said contact and the member 51 are held in position by upsetting the outer end of the portion 43 as indicated at 53.

For the purpose of yieldingly holding the shaft 40 inwardly with the removable ring 42 in contact with the outer end of the tubular bearing 31 I have provided a spring washer 54 which is located between the inner end of the tubular bearing 31 and the portion 50 of the contact. The shaft 40 is frictionally held in any position to which it may be adjusted by rotation. Rotation of the said shaft may be effected by means of the knob 55 secured to the outer end thereof.

A contact 56 which engages the upper or outer edge of the resistance element or member 8 is supported upon the member 51 of insulating material. The contact 56 is spaced outwardly from the insulating member 51 and is provided at its inner end with an offset portion 57 terminating in an outwardly extending portion 58 which is secured by means of rivets 59 to the said insulating member 51. Both the contacts 46 and 56 rotate with the shaft 40 when the latter is rotated and in their rotation change the positions of their points of contact with the resistance elements or members 7 and 8. The contact 56 comprises spaced portions 60. An integral portion 61 extends from the portion

58 into the space between the portions 60, the said portion 61 being located in alinement with the shaft 40. The inner end of a stationary contact 62 engages the outer side of the portion 61. The contact 62 is connected by a suitable fastening means 63, such as a tubular rivet, with an overhanging portion 64 of the casing 1. The said rivet also engages and fastens a terminal stop or bar 65 to the under side of the said overhanging portion 64. The said overhanging portion is provided by the presence of a notch at 66, the formation of which is permitted by reason of the presence of the tapered wedge-like portion 18 previously referred to. The terminal bar 65 is adapted to be connected to a wire, not shown, having connection with some element such as the grid of a vacuum tube so that the potential thereof may be varied.

As heretofore described, the resistance elements and the co-operating contact members are enclosed within a cup-shaped casing 1 having an open end for which a closure member 67 is provided. This closure member may be made of metal and is preferably so constructed as to be readily positioned upon the casing and removed therefrom. A marginal flange may be provided for the closure member, as shown in Fig. 2, for locating the same on the casing and for removably retaining it thereon. Such a closure permits ready access to the interior of the casing whenever this is desirable.

It will be noted that by my invention I have provided a construction of adjustable resistance means, utilizable as a potentiometer and specifically as a volume control means for radio reception apparatus, wherein two separate and independent resistance members are mounted in concentric relation to the same axis, the said members, however, being located in different planes which extend transversely of the said axis. In other words, the said resistance members are located in different positions in the direction of the axis so that they are suitably positioned for cooperation with two separate and independent movable or adjustable contacts which are mounted upon and are rotatably adjustable by the rotary movement of a single shaft.

It also will be seen that by my invention I have provided means whereby the resistance members, as they are inserted into the casing of the device, automatically are wedged or pushed outwardly against the inner side of the wall of the said casing.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In an adjustable resistance device, the combination of a casing having portions the interiors of which are of different diameters and also having upon its inner side a wedge-shaped projection which is tapered from the bottom toward the top, relatively flat resistance members located in the said casing, one of the said members being positioned in the portion of smaller diameter and the other in the portion of larger diameter of said casing, and the opposite ends of said resistance members being in engagement with the opposite sides of the wedge-shaped projection, contact members for engaging the said resistance members, and an adjustable support for the said contact members.

2. In an adjustable resistance device, the combination of a substantially cylindrical casing having a closed end and an open end, a projection extending inwardly from the outer wall of the casing and tapering outwardly from the open end of the casing toward the closed end thereof, a resistance element arranged within the casing with the opposite ends thereof in engagement with said projection, means for securing the resistance element to the casing, a contact member cooperating with the resistance element, and an adjustable support for the contact member.

In testimony that I claim the foregoing as my invention I have hereunto signed my name this 10th day of November, 1930.

CARL L. WEICHELT.